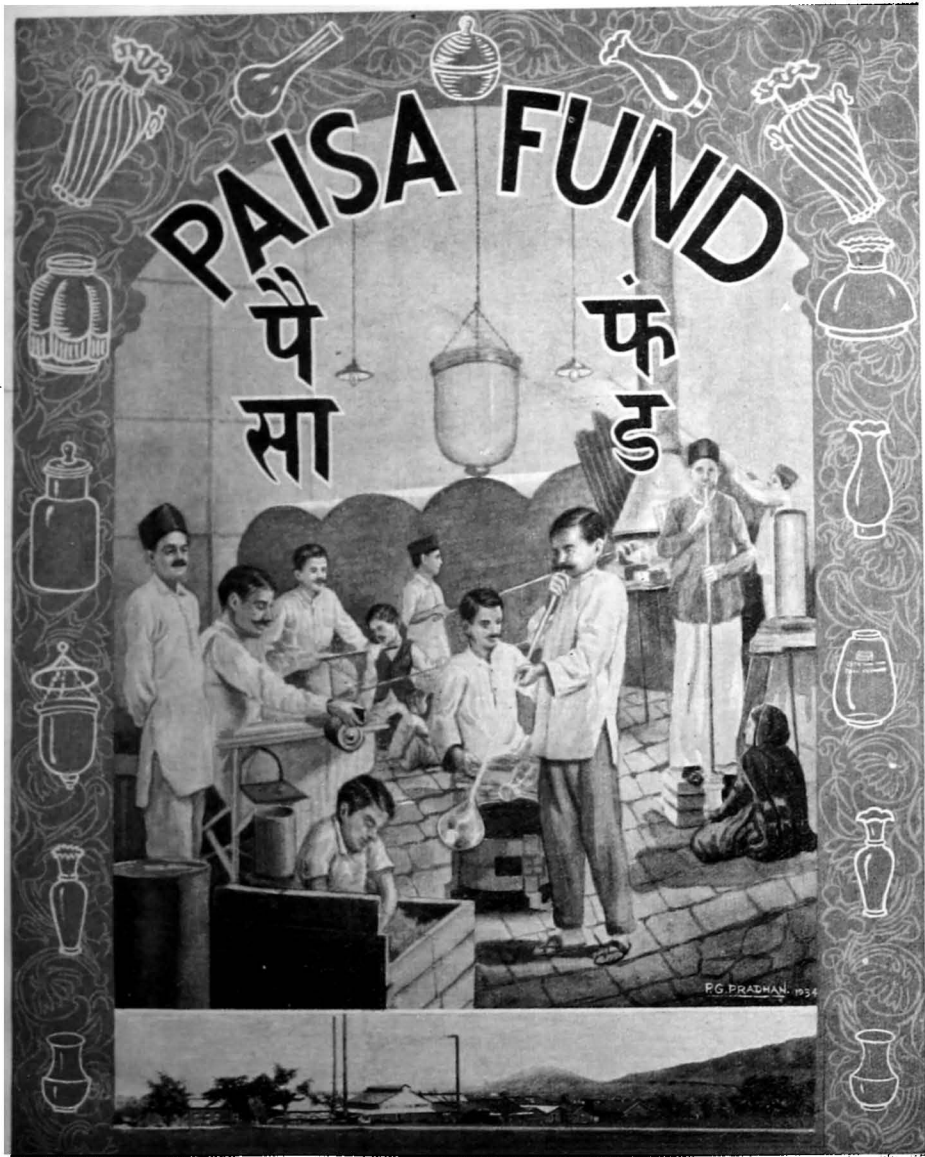


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***THE PAISA FUND  
SILVER JUBILEE NUMBER***

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# Foreword



[by *Late Dr. V. N. Bhajekar*]

Maharashtra is proverbially a poor country. It has poor agricultural land, its mineral wealth is poor if not insignificant and it is watered by rivers which are few and often dry. It has forests which are far from rich. Naturally, industry and commerce cannot flourish or develop in a country where such disabilities exist. For such a country to prosper people must make enormous sacrifices, their co-operation must be extensive and their exertions intensive.

Maharashtra has never been an industrial country. Its only asset is a healthy climate; its people are hardy and self-sacrificing and its food though coarse is sufficiently nutritious. No wonder, in absence of any natural help or other resources of wealth, they had to take to arms for defence and offence. For centuries they wielded their poor plough, then for the last three or four centuries they had recourse to the sword, and during the last century had to use the pen.

Times have changed and the Maharashtrians are now deprived of all these avocations. They have now no other source of wealth to look to but the Balance—the Hall Mark of Commerce—the Hall Mark that was used by the late East India Company on their coins. In other words, Maharashtra has now to look to Trade and Industry; particularly industry should be the watchword of every Maharashtrian. But trade and industry both require capital—so the economists tell us. Some differ and say “No, our only capital is the brain,” and point out that with this capital the non—mercantile Maharashtra has made certain progress in this line.

The cult of Swadeshi is the first off spring of this progress, and it is expected to be the greatest savior of India. It is the salvation of a country and a key to all national enterprise. Even to-day it is preached in Britain, in Germany, in the U. S. A. Swadeshi was preached in Poona as early as sixty years back by the late Kaka Joshi, and it is only now that we are realising its hidden meaning. To-day it is preached everywhere. Patriots like the late Lok. Tilak and C. R. Das shouted themselves hoarse in preaching the gospel of Swadeshi. Even now Dr. P. C. Ray is exhausting himself to death in the cause of Swadeshi. Sir M. Viswesaraya has preached the doctrine for years.

But what is Swadeshi? After all it is the cult of self-help and mutual help—a cult rigorously practised by Czekoslovakia and welcomed by Mussolini. It requires organisation and immense sacrifice. Its fruits are sweet but they grow on tall and thorny trees, Maharashtra thought that this was the best

weapon to wield in the struggle for economic supremacy and an organised effort in this direction was an urgent necessity. The Paisa Fund is probably the first expression of the industrial and commercial ideas of the middle and poor classes of Maharashtra and for the matter of that of India, and its constitution is founded on the principle of Swadeshi. The record of the Paisa Fund and its activities during the last twenty-five years speak for itself.

Many other industrial and commercial organisations have been started during the last twenty-five years in Maharashtra, but, the backbone of them all has been Swadeshi. Many of these ventures are on the anvil of trial and experiment. If they fail, the consolation will lie in the fact that we are no worse off than many other bigger industries, that are still in a precarious condition though supported by the props of protective tariffs, unlimited funds, and the highest available intelligence. The Tata Iron Works, the Scindia Steam Navigation Co., The Mill Industry of Bombay, The British India Corporation, The Back Bay Scheme and many others are examples of the shaky state of affairs in big and well equipped enterprises. Considering this, the Paisa Fund and its industrial activity in the shape of its Glass Works is indeed a source of satisfaction. The mere existence of the Fund and its Glass Works during the last twenty-five years against all odds is no mean achievement—indeed one might wonder it is not crushed outright in the very beginning of the struggle. The continuous existence itself of this Fund and its Glass Works for the last twenty-five years ought to inspire the public to help the Fund and its activities in an increasing degree.

“ What has the Paisa Fund done to Maharashtra and to India ” ? is a blunt and matter of fact question that might be asked by every contributor to the Paisa Fund. I shall answer this in the most straight forward way. The Paisa Fund has brought and fostered a new industry in the Deccan. It has trained hundreds of workmen in the Craft of Glass-making. It has given bread to thousands of workmen and their families. It has trained educated university men in the Ceramic Science and Art. It has stopped to a certain extent the drain of money to foreign lands. It has trained the general public to a much greater extent to work in an organised way. It has taught the public what can be achieved by united effort and has inspired confidence in their mind that industrial concerns can be started and run successfully without the assistance of foreign experts. This is all accomplished so far without the props of protective tariffs or the purses of millionaires, the help of Government or the advice of any foreign hired expert.

The Paisa Fund is an insignificant item in the vast capitalistic ocean. It has not collected more than five lakhs in twenty-five years. It has given means of subsistence to only an insignificant iota of the Deccan population; its turn-over is negligible. On the hand the capitalistic world has contributed at a stroke crores of rupees when necessary; it has employed lakhs of men, its turn-over has also been stupefying. It is equally true that in the same grand way, crores have been quickly lost and lakhs of men thrown out on the streets

to face hunger and privation. The contributaries to these crores are sleeping restlessly on the thorns of mere rosy hopes. They have seldom received adequate return on their crores, nay, they are in the perpetual fear of losing even these initial crores.

The meaning of the collection of these crores has ever been a mystery to the contributor. He has never understood why he does not get anything when he has contributed to make up these crores. The crores have not educated the public, neither elevated their patriotism nor trained their commercial instinct; much less have they stemmed the huge tide of Japanese imports. Their investments have generally been a gamble for the benefit of the Agents, and the Contributors have secured only crumbs for themselves. The real spirit of Swadeshi has never touched the fringe of imagination either of the agent or the contributor and the nation has gained little by such enterprises.

The spirit of Swadeshi awakened in the people by the teachings of the late Messrs. Tilak, Joshi, Ranade, Das and Motilal Nehru and by the living Achyarya P. C. Ray, Sir Viswesaraya and other noble workers have really kept up those crores alive to a certain extent. Let this grand rock of Swadeshi shake and all those crores or whatever is left of them will come tumbling down. Thus from the safety point of view, the Paisa Fund stands supreme.

At one of the public meetings, held for the collection of the Fund, the late Lok. Tilak said "Come all, join and subscribe; I do not want one man to contribute thousand rupees to the Paisa Fund, but I want a thousand contributors each giving one rupee and making up a thousand. Such a spirit of contribution will shew me that there are more men who take real interest in the welfare of their country. It will demonstrate an organised effort. A man who contributes a thousand at a stroke has nothing further in his head, nothing higher in his mind than a looming fat dividend. The thousand poor contributors have a nobler aim. So rally round all men and subscribe your humble Paisa." Such was the ideal of the late Lokmanya.

Paisa Fund is a nursery of organised effort staning on the foundation of Swadeshi, it is the nucleus of patriotism, it is the panacea of our economic ailments. The following pages will reveal the history of the Paisa Fund and its Glass Works. As I have said, it is an insignificant cipher, yet the most powerful weapon for the uplift of India. The story of the Paisa Fund and its activities as narrated hereafter, is naturally of immense interest to the contributor, but it is believed to be equally interesting and instructive to others in their own industrial pursuits. It is my earnest prayer not only to the great self-sacrificing public of Maharashtra, but to the whole public of India to come forward and contribute their mite to this Fund or to start such funds all over India; so that we may be able to widen our commercial and



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industrial enterprises without fear of collapse, making India a self contained unit. So in course of time we shall be able to celebrate not only a Silver or Golden or Diamond Jubilee but even our Centenary of Public Service.

I now pray for a long life and sound health to the first organiser and founder of this Fund Mr. Antaji Damodar Kale, all credit is due to him. The two Herculean pillars of this Fund though embraced in the bosom of Time, still stand to-day as noble and as firm in our memory as ever, and their memory will serve as a beacon light for generations to come : Who will forget them—the late Lok. Bal Gangadhar Tilak and Dr. Nanasaheb Deshmukh, the first two sponsors of this Fund ? Their memory is sacred to us. Of course, among their many and varied activities for the emancipation of the country, the Paisa Fund was child's play to them; all the same the Fund of to-day would not have been what it is without the help, the fostering care and the vigilant interest of these two giant patriots. All glory to them. I have next to offer thanks on behalf of the Fund to the veteran and indefatigable aged worker Mr. Vasukaka Joshi, the Proprietor of the Chitra Shala Press, Poona, the redoubtable lieutenant of the late Lok. Tilak and Dr. Deshmukh. The Paisa Fund has lost its strongest and ever vigilant treasurer in the person of the late Mr. Annasaheb Nene. Thanks are due to all the Office bearers of the Paisa Fund and the Workers in the Glass Factory who have worked there during the last twenty-five years. Mr. Chandorkar is the Chief of the Glass Works and his self sacrifice, hard work and skilful management are worthy of praise any time. The Managing Committee during the last twenty-five years have worked in most difficult time and their guidance, advice and sober judgment were always unerring and convincing.

The heavy mantle of Chairmanship of the Fund has now fallen on Mr. N. C. Kelkar and I wish the compilation of this work had been looked after by him; but as he had to attend to other matters of urgency, I was pressed into this difficult job. I have tried my best. Though trade and industry are not in my line, there was no other way but to obey the call of duty and do my bit. Under the regime of our worthy new Chairman Mr. N. C. Kelkar, we pray, the power of the Paisa Fund will grow, open up new fields of activity, and elevate our people in the industrial world.

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## PREFACE

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A somewhat melancholy interest is attached to this Jubilee Souvenir. Its preparation was specially entrusted by the Paisa Fund Committee to my friend Dr. V. N. Bhajekar. He spent a lot of time in giving instructions for obtaining information contained in this booklet, and afterwards in reading the manuscript. Such merit, therefore, as can be claimed by this work, must go mainly to Dr. Bhajekar himself. The Paisa Fund Committee feels grieved that Dr. Bhajekar did not live to see the production of this booklet in print.

Though devoted to Medicine and Surgery as a profession, Dr. Bhajekar had a pronounced natural bent for studies in Industrial Subjects. And not a small part of his leisure was given by him to the promotion of ideas and undertakings calculated to advance the development of Swadeshi industries. The Committee were looking forward to the execution of his plan of building a small house near the Paisa Fund Glass Works at Talegaon, where he might spend his leisure in pursuing his enlightened hobbies, and giving the benefit of his supervision of the Glass Works to the Paisa Fund. But that hope, alas! has now been frustrated.

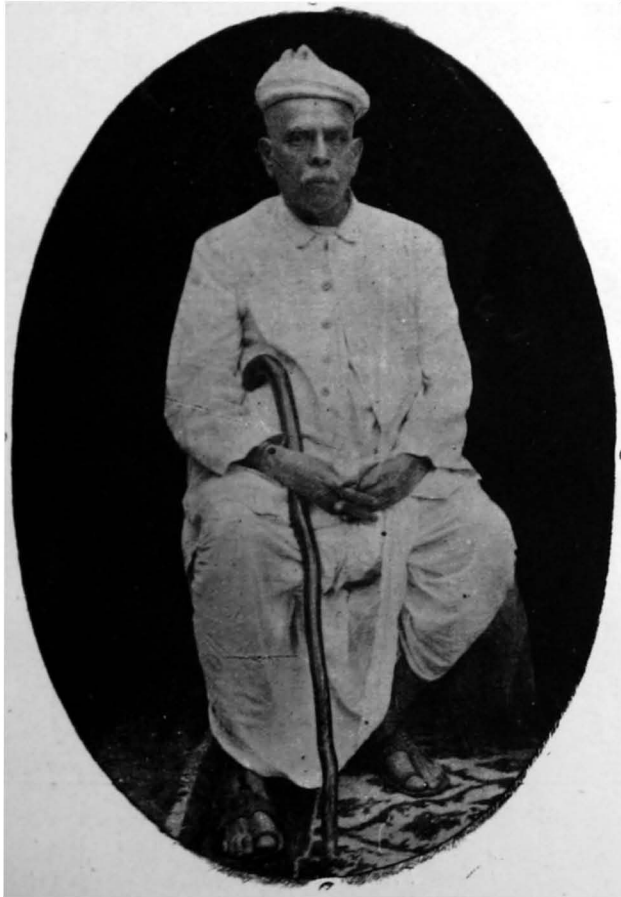
The Committee takes this opportunity also to pay a tribute to the late Mr. Y. V. Noney, who rendered very valuable services to the Paisa Fund Institution all along as Treasurer or Secretary to the Fund. The Committee regrets that he is not alive to associate with it in person and to take part in the present Jubilee Ceremony.

The Committee's thanks are due to Mr. S. N. Oka B. Com. and Mr. Chandorkar and his colleagues for preparing this booklet, and to Messrs. Gosavi and Sane for supervising its production in the Press.

*N. C. Kelkar,*  
*President, Paisa Fund Committee*

# PAISA FUND

Governing Body



**Late Dr. Nanasahab Deshmukh**

*President, 1905-1929*

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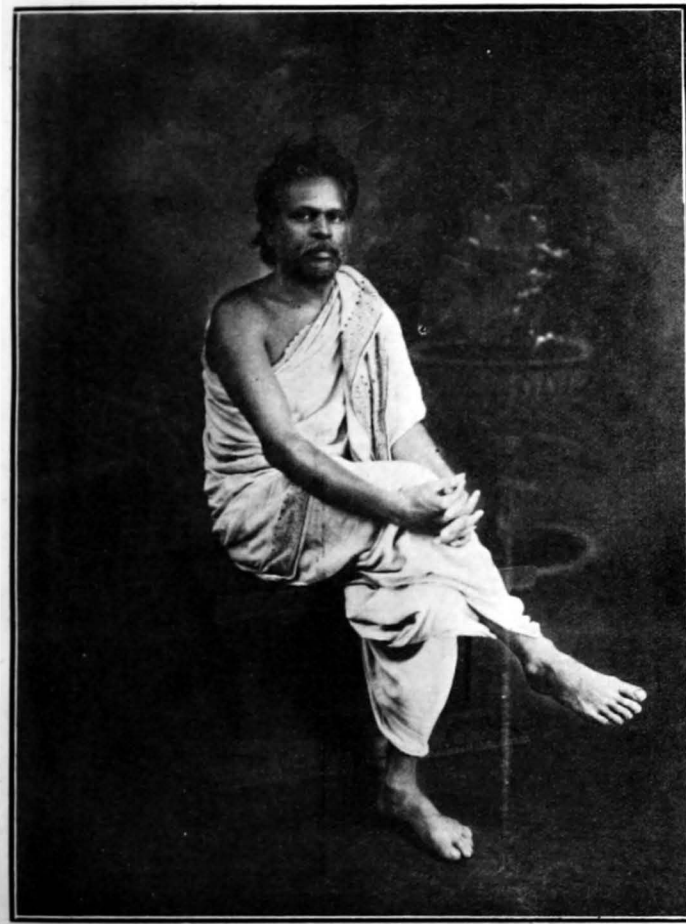
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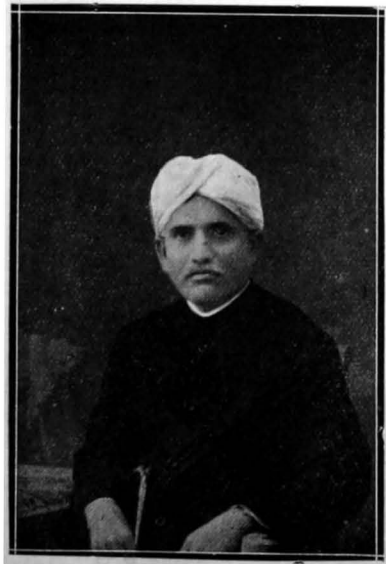
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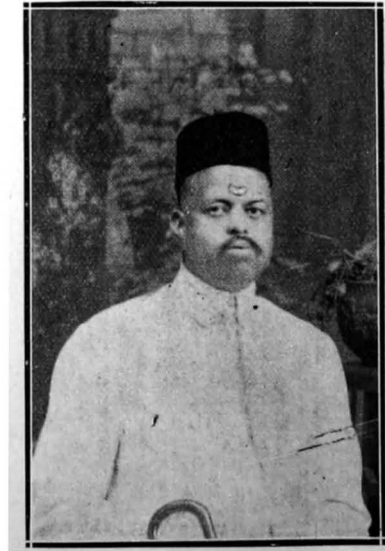


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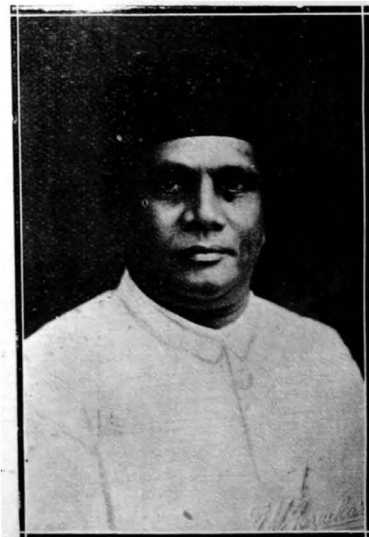
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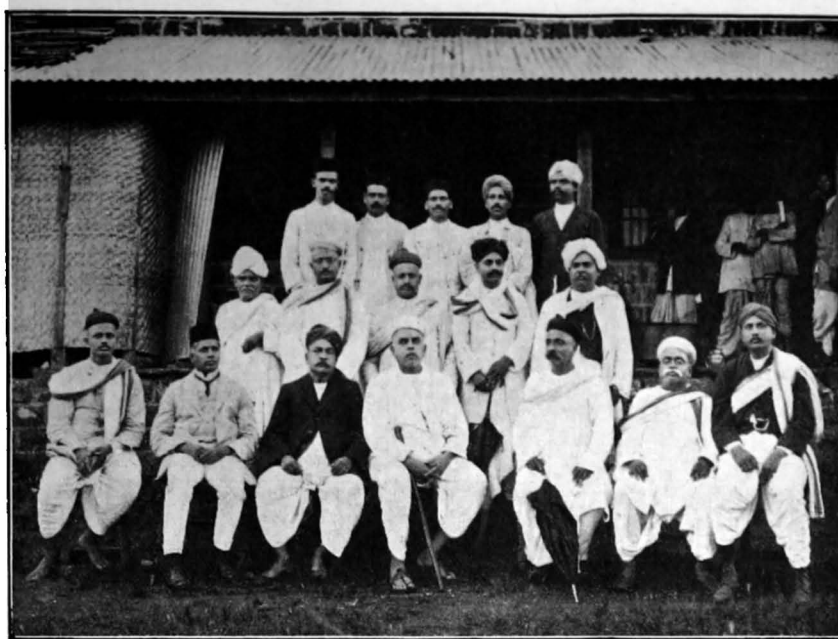
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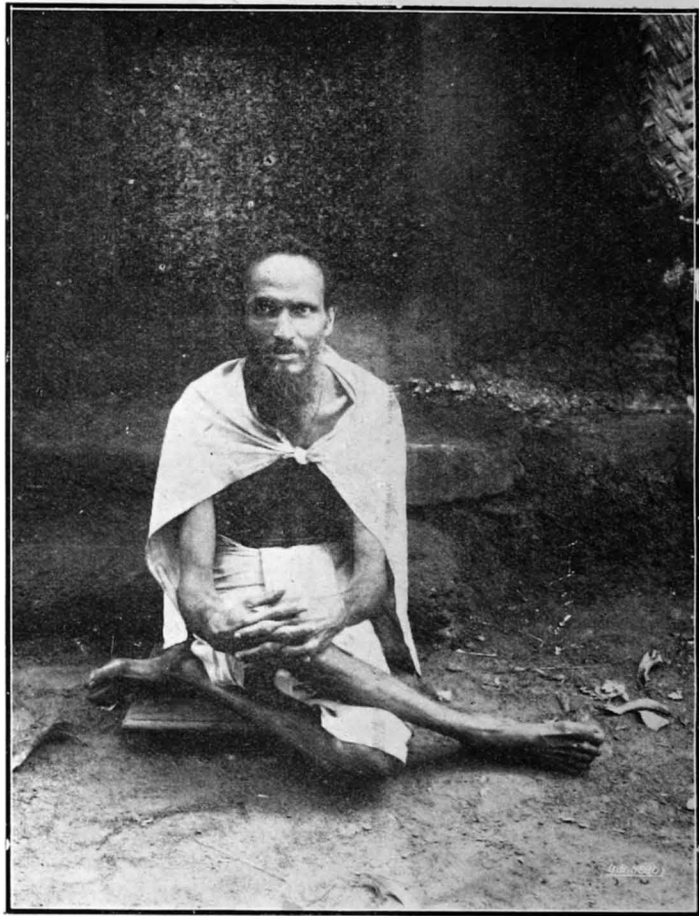
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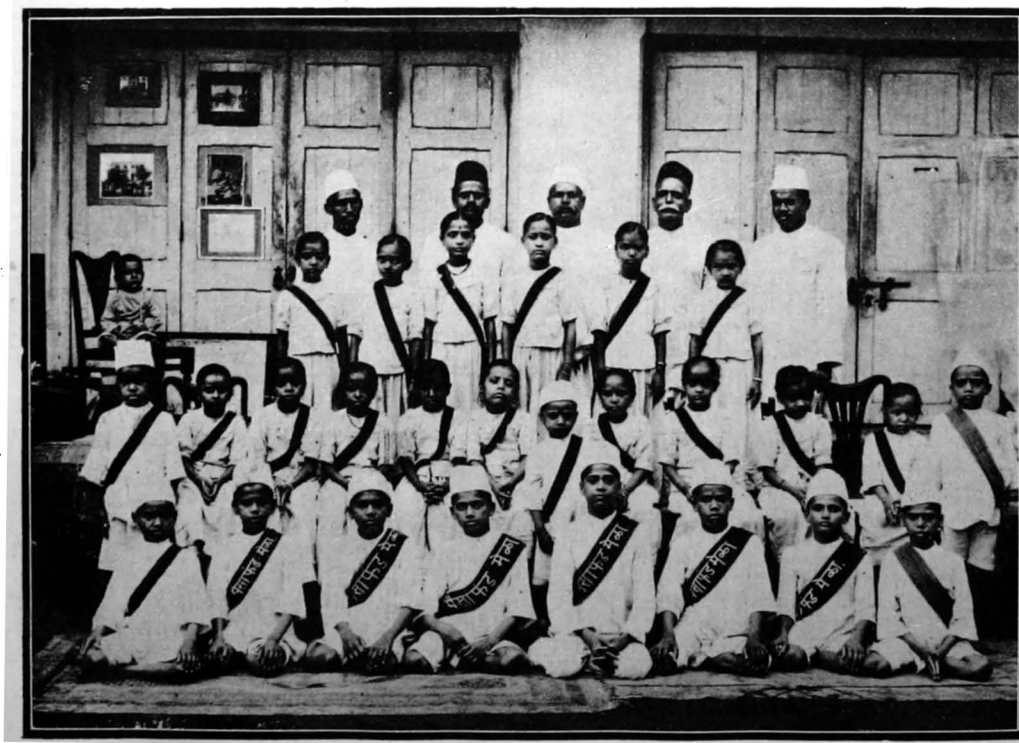


**V. G. Pandit**  
*Patron, Belgaum*



**Late V. R. Lande**  
*Patron*  
**East Africa.**

PAISA FUND SILVER JUBILEE NUMBER



**Paisa Fund Mela.**  
( Concert Party )



# THE PAISA FUND

## SILVER JUBILEE NUMBER

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### Chapter I

#### Some Economic Considerations.

The path of material progress is beset with obstacles placed by nature against which mankind has ceaselessly to contend in order to preserve its existence and enrich its earthly life. In successive periods of its progress, every time it has shifted up to a higher level of material well-being. It has done so by some discovery or other of nature's laws. Thus for instance, the use of fire, of wheel traction and the knowledge of plant life and the seasons—each of these, though so commonplace in modern economic life, are yet milestones on the road which humanity has traversed.

The Knowledge of agriculture (the successful application of which took ages) made possible the beginning of settled communities, in the economy of which, nature still played an important part. It was nature's bounties supplemented by a little human effort that provided these communities, the elementary needs of food, clothing and shelter in peace and plenty. Elemental disturbances like famines, floods and earth-quakes disorganised them temporarily, but otherwise their happy routine continued and would have continued indefinitely without any appreciable change but for two factors, the first of which was foreign invasion. Other communities less favoured by nature and schooled into hardihood by their struggle for existence, found an easy prey in these peaceful people, whose power of resistance was enfeebled by their life of effortless ease. Thus we see the early inhabitants of fertile river-valleys in India, China and Egypt go down before rapacious hordes of invaders from barren lands.

A pastoral community living solely on the soil, is bound to be static; its healthy growth of a living organism which is only fostered by a struggle with nature, is checked. The energies of the people run to waste for want of direction into new efforts and initiative dies down. Things take a turn for the worse when population multiplies at a faster rate than means of subsistence; land yields diminishing returns and even if there is food, there are too many people to compete for earning it, since all the work they can offer

to do is on the land. The ultimate result of all this is the adherence of the community to a life of elementary needs.

Without belittling the importance of spiritual advancement, we will proceed with the assumption that material progress is indispensable to a nation. Economists measure material progress of human beings in terms of their number of needs—the more numerous and complex the needs of men, the better lived is their life. To rise above elementary agricultural existence, therefore, a country must enrich its life by a fuller utilisation of all its natural resources. The static inertia of the people must be converted into dynamic force by directing their corporate energies into every conceivable line of productive activity, for the profitable utilisation of which, there are various ways; communications have to be developed; firstly to bring together scattered communities which can exchange ideas of living a richer life; and secondly to distribute among them the commodities needed for the purpose; organisations of production have to be set up to supply such commodities, labour and capital mobilised to help the production. The nation must thus be occupied with a diversity of industries connected with transport and trade instead of eking out a miserable existence on the over-burdened agriculture.

The importance of industries in the material well-being of a nation cannot be over emphasised. "The Industries of a country reflect the productive capacity and executive ability of its inhabitants, and form one of the chief tests of a nation's efficiency." (Sir M. Visweshwarayya 'Reconstructing India'). The establishment of industries increases the production of wealth and enriches the country generally. Industries relieve the excessive dependence upon land so common in agricultural countries, offer scope for the development of capital resources and employ more profitably the labour, which otherwise crowds on agriculture. Industrial employment is also an alternative to fall back upon, in case disasters like famines overtake agriculture. A minor advantage of industries is that by increasing the wealth per capita in the country, they also increase the taxable capacity of the people and bring more revenues to the State. The most important benefit expected of industries, however, is their effect on national character, which as the Fiscal Commission said, "Cannot be measured in terms of money. A Country industrially undeveloped, tends to suffer from a certain intellectual deadness. The outlets for diversity of talent are few. Those who might have shone in a wider sphere, have their energies and ambitions cramped in the mould of uniformity. It is hardly too much to say that a certain measure of industrial life and opportunity is an essential condition for building up a vigorous national character."

With such undoubted advantages of industrial development the question would naturally arise as to what is India's position in this respect; has she an adequate number of flourishing industries and if not, what are the reasons for her backwardness ?

The Indian Industrial Commission attempted, fifteen years ago, to tackle these questions and arrived at the conclusion that **Modern Industrial Revolution** "the Industrial system ( of India ) is unevenly and is in most cases inadequately developed." These remarks with some modifications, may still apply to the present condition of industries. Nearly three-fourths of the population still show their occupation as agriculture, which is described as the greatest industry of India. This description is likely to lead to misunderstanding, since at best, agriculture is a feeder industry. It produces raw materials and food stuffs, which are in no sense ' manufactured ' ; its dependence upon Nature and the comparative simplicity of its processes place it outside the modern definition of industry, as far as Indian agriculture is concerned. It can be called an industry only when it is as highly developed as in the United States or Modern Russia, where methods of large scale production, an elaborate organisation and a free use of the Sciences ( all of which indicate a highly developed industrial technique ) characterise agriculture. In India it is yet carried on on primitive lines and its rapid development on modern lines side by side with other industries, is a problem equally urgent. In talking of industries, it is not sought to detract from the undoubted importance of agriculture, but, it is merely indicated that due to its being the sole means of livelihood of a very large majority of people, India is yet far from the front rank of industrial countries. That agriculture is not India's sole occupation by choice, can be seen later from a bird's eye-view of its economic history, since the middle of the eighteenth century. That industries have dwindled down during the same period, can be verified in the Indian Industrial Commission's Report, which records that " When merchant adventurers from the West made their first appearance in India, the industrial development of this country was, at any rate, not inferior to that of the more advanced European Nations." We will now enquire into the reasons why during the last hundred and fifty years or so, ' the more advanced European Nations ' have made all the industrial progress while India is still no where.

At about the middle of the eighteenth century the methods of production in the West were much the same as in India. But in 1770, came in England what is known as the Industrial Revolution, which changed all ideas of production. There were inventions of steam-power and machinery, which gave man the weapons for greater mastery over nature. Commodities were manufactured in unprecedented quantities at a miraculous rate; land and ocean transport speeded up to annihilate distance and join up the scattered patches of the world. A direct result of the Industrial Revolution was a great increase in the wealth and producing capacity of England and her supremacy over all other nations. Now the appearance of the Industrial Revolution in England before any other nation was due to a combination of several favourable circumstances such as a victorious emergence from a long war and the consequent insular immunity, a strong central government, a large supply of

labour relieved from the land and enough wealth (probably coming from India) available as capital. The lead of this early start, the wealth and the power of England, soon alarmed the other European nations. Germany was the first to be busy, creating her own industrial revolution. The writings of Frederick List on National Finance had awakened the country into a national out-look and measures like heavy protective tariffs were resorted to for an undisturbed development of national industries. Many other European countries followed suit in the course of the nineteenth century, and finally Japan had its industrial revolution the first in Asia, at the beginning of the twentieth century. After the Great War, Turkey, Czecho-Slovakia and Italy adopted the 'national outlook' and to-day Russia is causing anxiety to the world with its "Fifteen years' plans," a formidable development of industries on a national basis.

By this time one may well enquire what had India been doing all these years? Did she not feel the need of the national out-look? What attempts were made in India to revolutionise industry? The reply to all such queries is in one statement; in each of the cases cited above,

**The case of India** the country and the government were identical; in the case of India, during the period under consideration the governing people were not of the country; their interests far from being identical with those of the people they ruled, were practically hostile during most years of their regime. They did not want an Industrial Revolution in India; in fact they accomplished in India a Revolution *from* Industries *back* to Agriculture. Even among the Indians themselves, the national out-look appeared after about a hundred years of British Rule, which had done little during the period to remedy the ignorance of the ruled.

It was not as if India has not the favourable factors needed for industrial development on modern lines. It is a 'world in itself' being fifteen times as big as Great Britain and equal to the whole of Europe except Russia. It has a land frontier of 6000 miles and a coast of 5000 miles with many fine ports and harbours. Its position is at the very centre of the Eastern hemisphere. As to natural resources, according to the Industrial Commission, 'the mineral deposits of India are sufficient to maintain most of the key industries, and there is an unlimited potential supply of hydro-electric power. Capital is no more shy than in other countries and is available to any demonstrably sound industry as seen in the case of Cotton Manufacture. The supply of labour is cheap and plentiful, though skilled labour is naturally scarce owing to the want of an industrial tradition, a defect which could be easily remedied. Finally, the three hundred and fifty millions of Indians alone, should prove a sufficient market for the products of any organised industry. Why, in spite of all these advantages, we have no industrial system worth the name, will be clear from a brief survey of the recent economic history.

The superiority of India in all kinds of manufactures before the advent of the modern industrial system was never in much doubt. Since the earliest times, India was celebrated for its fabrics and other works of art, and had

**Recent Economic History**

traded in these commodities from 8000 B. C. with ancient Babylon, Egypt, Rome, Greece and other countries and with Venice and Genoa among others, in the middle ages. Though the waves of conquest which began from the eleventh century, hampered Indian industries, they were fully restored under the stable rule of Akbar and the later Moghuls. It was by this time that, lured by the treasures of India, the foreign merchant adventurers made their appearance, first captured trade and then territory. The industrial decline of India then began with the East India Company's rule, which was simultaneous with the rise of English industries.

The East India Company which started its work with trade in finished Indian articles, soon transferred its attention at the instance of their Directors in England, to the export of Indian raw materials only, for feeding the growing demands of English industries. In England, prohibitive duties were levied on imported Indian finished articles; and further, double and quadruple heavy duties on exports from India of such goods and even direct prohibition of manufactures, effectively crushed all Indian industries of which textiles was the chief.

All the time, imports of English manufactured goods were given every facility and gradually not only foreign markets, but their own home markets were lost to the Indian industries which could not survive these duties and unfair competition. Indian shipping was similarly stamped out at the instance of English shipbuilders. So, towards the close of the eighteenth century as historians like Dutt, Digby, Wilson and Taylor testify the East India Company had systematically starved the Indian industries to death, made India at once the greatest supplier of raw materials to England, and finally her largest single market. By this time, India which had once produced the finest fabrics for the world, itself imported from England cotton goods alone worth close on twenty million sterling! (Pandit M. Malaviya's Note in the Industrial Commission's Report).

Thus the East India Company, by firstly supplying the capital, with the spoil of Indian wars, secondly the raw materials and finally a market, virtually brought about the industrial Revolution in England. "India was sacrificed to the great English manufactures" as Toynbee admits. Later on, with the Crown's direct rule, all duties were abolished, but not before their work was thoroughly accomplished. Before that, however, the policy of encouraging exports of raw materials aided by the rapid development of railways, assumed unprecedented proportions during the eight years of Dalhousie's rule. Export of raw cotton more than doubled itself and that of grain trebled, while imports during the same period rose by 150 per cent.

Thus India was forced to be an agricultural country. The suppression of industries and the encouragement of agriculture resulted in driving almost the whole of the population into agriculture, and exposed the country to the aggravated evils of frequent famines. In successive quarters of the nineteenth century, the occurrences of famines were respectively 5, 2, 6 and 18. In the last quarter, they were four times as numerous and four times more wide spread than in the earlier 100 years. One after another, the Famine Commissions emphasised the necessity of a diversity of industries, so that the entire population should not suffer by the failure of one occupation.

By this time, intelligent minds in India were beginning to sit up and take notice. Dadabhai Nowroji drew attention of the people to the poverty of India and Justice Ranade exposed the whole rotten structure of Indian economics. The **Economic consciousness** of the Government after the avowedly destructive policy of the East India Company, was almost as pernicious. Though Government had loosened the fetters of heavy duties, they had loosened them from the skeleton of Indian Industry, and their subsequent adherence to the principle of "Free Trade" was no more than a disingenuous excuse for withholding aid to a dying body to please a dearer object—the English Industry. The special facilities to Lancashire goods gave the direct lie to the Free Trade pretensions. The callousness of Government was all the more bitterly felt by contrast with the feverish activity of the Japanese Government in the matter of fostering national industries. It was no wonder, therefore, that industrial problems took a political complexion. "The Indian Industrial Conference of 1905 convened in association with the National Congress marks the linking of economic and political discontent." (Jathar and Beri—Indian Economics ).

The first Swadeshi movement was launched; the clamour for industrialisation was the purpose of which 'the Swadeshi Movement was the positive and Boycott the negative expression' as the Montague Chelmsford Report described it. Failing to move an indifferent Government, the people bravely attempted to start new industries, most of which quickly perished owing to lack of training and of commercial experience, differential railway rates and absence of protective tariffs, and Government's determination to do nothing to help them. Besides, any possible Government sympathy was completely alienated owing to the Boycott agitation, which was in those days, a bold challenge to the ruling race.

In spite of adverse circumstances, however, there had been a slight revival since 1870, the lowest point of decline. The cotton, jute and coal industries had attained reasonable status; though in the latter two, foreign capital played too predominant a part. Only a beginning of the Iron and Steel Industry was made in 1907 at Jamshedpur, and unimportant semi-manufacturing industries like Cotton-ginning and pressing, Jute-pressing,

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paper, rice, oil, mills, sugar and leatherworks and small engineering shops had sprung up in small Units.

This was the state of industries at the out-break of the Great War, which marked the beginning of a greater interest in Indian Industries on the part of the Government.

**The Great War** We have seen how the East India Company had almost completely wiped them out; also how even after 1858, the British Government refused to help their growth under the pretence of 'Laissez Faire'. Later on, however, there were a few casual steps taken by Government to look into the matter; in 1905 Lord Curzon separated the department of Commerce and Industries, and the Governments of U. P. and Madras started on some sort of an industrial programme. But such officiousness was promptly snubbed by Lord Morley who in a dispatch in 1910, sternly reprimanded the delinquents for such grave transgression of the sacred doctrine of 'Laissez Faire'.

Later, the Indian Government returned the compliment by defeating Lord Crew's efforts for Indian industries, putting forth the lame excuse of lack of equipment—a defect which could have been easily remedied had there been an intention of doing so. The Swadeshi Movement also, could have been utilised to advantage by Government to some purpose, but it was not; and only a great war was to awaken Government with a rude shock into the realisation of lost opportunities, and of the results of deliberate negligence. The European War of 1914 found India ready enough with men and money, but absolutely helpless in the matter of munitions. There was no shipping to relieve Empire transport, no organised basic industries like iron and steel, anti-friction metals, ferro-manganese, asbestos, glass, pottery, refractory materials or chemicals; and no skilled workmen to run new factories. And all this was in spite of vast natural resources, easily available capital, cheap labour and a ready market.

An administration first positively hostile and then supremely indifferent to the interests of the country, had brought on its own head the results of its own policy. An industrially developed India would have been its greatest asset in the emergency and they had ruined the asset by their own doing. As it was, the full advantage of the emergency was taken by countries like Japan and the U. S. A., whose manufacturing capacity was unhampered owing to their safe distance from the Theatre of War.

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## Chapter II

### The State and Industry.

It was rather late in the day, therefore, that the Indian Government showed the first signs of concern and that **Industrial Commission :** too, from no altruistic motives for the industries of India by appointing in 1916, the **Post-War Conditions** Industrial Commission "to examine the questions of industrial development in India, new openings for capital and the extent of State aid to industry". The Commission's Report, not the least important part of which was Pandit Malaviya's Note, was presented in 1918 and will live as a most important document in India's Economic History. It stressed the duty of Government to give a "powerful and well-directed stimulus to start the economic development of India along the path of progress by supplying an organised system of technical, financial and administrative assistance." It was later found, after the reports of the Technical and Chemical Services Committees, that technical (and financial) assistance was impossible owing to the habitual financial stringency. As to administrative assistance which mainly consisted of a protective tariff, the question was finally taken up in 1921, whereupon Britain's acceptance of the principle of India's fiscal autonomy, the Fiscal Commission was appointed and made its Report.

It advocated a policy of discriminating protection to be based upon the recommendations of a permanent Tariff Board, which was duly constituted. But in the meantime, Indian Industries, which had received a temporary stimulus at the hands of the Munitions Board appointed in 1917 "to control and develop Indian resources with special reference to the needs of war", again languished shortly after the close of the War. And the subsequent depression aggravated by the difficulties of importing machinery, of procuring chemical and technical experts, shortage of coal and railway wagons, and scarcity of skilled labour, left them in no better position than before the War. If Government now had any intention to foster the industries, it had also the excuse of financial stringency, and the provincial departments of industries have since done little for Industrial development except perhaps in Bengal.

Education, now being a transferred subject, relieved Government of any feeling of responsibility for technical education. Regarding the remaining question of administrative assistance typified by a protective tariff, we are yet to see an instance of any important industry, progressing vigorously by such assistance, except perhaps the match and sugar industries since very recent times,



To-day, therefore, we find India still backward industrially. Progress, if any, is deplorably slow and uneven, and though world factors are partly responsible for this condition, the state has by no means done even its minimum to remedy it. Private enterprise is yet struggling single-handed and the following pages contain an account of such a struggle in one of the most important of key industries—Glass. Before beginning it, however, it is necessary to see in detail, what part the state must play in industrial development, so that we can appreciate what its neglect means to an industry fighting for life.

As pointed out earlier, the degree of economic development of a country depends upon how far the State interests itself in it. We have seen how national Governments in various countries before and after the War, took it upon themselves to revolutionise national industries. Backwardness in this respect was treated as an emergency as great as war and dictatorial powers exercised as in Italy and Russia, in commandeering resources, capital and labour. The State took the lead in industrial development not stopping at mere administrative assistance. Even England which had long stuck to the dogmatic principles of Free Trade and of non-interference by the State, resorted to protection with the Mackenna Duties in 1915, and with the Safeguarding of Industries Act in 1925. India alone has looked to the state in vain for leading the nation into new paths of industrialisation.

The primary measure expected of the State in this connection, is a protective tariff. As the question of protection will be dealt with more fully when considering the glass industry's demand for protection, we proceed to other ways by which Government can help industrial advancement. Financial aid can be given in the form of loans at low interest to start new industries or subsidies to promising ones. Inducement to start new enterprises can be offered by providing facilities in the matters of concessions in exploiting raw materials and of transport rates. Purchase of indigenous products by Government is another way of encouraging industry. Government is also expected to procure experts for new industries and itself pioneer some difficult key industries. Besides all kinds of information must be provided by Government through such agencies as industrial museums, bureaux and publications of up-to-date statistics.

The most important function of Government, is however, technical education. Masters, foremen and skilled workers must be trained; a large number of technical schools and colleges must, therefore, be opened all over the country. For the higher scientific purposes of improvement in methods and testing processes, "Research institute should be established on the model of the one at Teddington in England or the Bureau of Standards at Washington. One such institute will be needed for each province to work in close association with the University and higher technical school's"; Also, "Industrial experimental stations like those in Japan, intended for carrying

out experiments in manufacture, should be established in every important city and smaller ones in every district, to work in conjunction with research institutes."<sup>1</sup>

How much is possible for a Government to help national industries, can be seen from the single example of Japan, whose phenomenal progress in fifty years is worth studying. **The example of Japan** "In Japanese industrial history, articles were not manufactured to meet the demand of the general public or with the primary object of supplying a market", but to industrialise the population. The type of industries were started in Japan and the old crafts were revived from 1854, first under the patronage of the higher classes but later on from 1872, under the direction of the State. Foreign methods were introduced, and Government missions sent to the Continent and America to visit international exhibitions at Vienna and Philadelphia in 1873, to study and bring back scientific methods of Industries. Thus up-to-date knowledge and the latest machinery, tools and equipment were made available to Japanese industries. In 1879, Japan itself had an Industrial Exhibition at Tokio, and while old crafts were set on their feet by foreign advertisement, the new industries received every kind of stimulus at the hands of Government. Model factories were started, samples exhibited, credit organisations established and local exhibitions held from time to time. By 1895, Joint Stock enterprise was started in entirely new industries and gradually the earlier manufacturers who were formerly aided by Government, came to be self-dependent.

The work of the State, however, did not stop at starting industries and handing them over to the people. It still carried on the duty of guiding, informing and instructing them. Markets were studied and statistics published. As to technical instruction in 1909, there were two faculties in Science and Engineering, at the Universities, five higher and thirtyfour secondary technical schools and seventy two artisan schools. The causes of fifty years' phenomenal development of New Japan are summarised by Count Okuma as "The admirably opportune measures adopted by the Imperial Government for the guidance and protection of our national industries, coupled with the indomitable energy, with which people succeeded in assimilating into one harmonious whole, the arts and manufactures of the East and West, the Nation's burning ambition to benefit by the application of advanced sciences, holding up before them the services which technical education would render to the cause."<sup>2</sup> S. Uehara also attributes Japanese progress to two main reasons among others: "The Government's strenuous and successful efforts to reorganise the economic system by the purposeful introduction of Western methods" and "An excessive protection policy."

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1. Sir M. Visweshwarayya, "Reconstructing India".
  2. Count Okuma, "Fifty years of New Japan",

We have seen earlier what the Indian Government has done as regards protection and other kinds of assistance. As to purchase of Government Stores, though the principle of stores purchase in India was enunciated long ago, it was not till after the Industrial Commission's recommendation, that the Indian Stores Department was constituted and India had the opportunity to supply some goods to its own Government. In the matter of technical education, the demand of the people is of long standing. The system of education was found to be faulty long ago; it has continued, creating diffidence and lack of enterprise and fostering the spirit of "cultured ease"

On the other hand, labour is illiterate. There have been a few listless and hap-hazard attempts for technical education on the part of the Government. A Government Resolution in 1888, asked the Provinces to look into technical and industrial training. The result, except for the already established Victoria Jubilee Technical Institute at Bombay, was nil. In 1901, through Lord Curzon's efforts Sciences began to be taught at the Universities and State Technical scholarships were introduced. Neither achieved much. The Industrial Commission in 1918, recommended a scheme of primary and higher industrial schools, training for organised industries, workshop classes for foremen and two Imperial colleges of technological research. But soon after, the reforms made Education a transferred subject and Provinces had no money to carry out any programme of technical education. In 1921, the recommendations of the Technical and Industrial Education Committee (in two Reports) of the European majority and the other of the Indian minority including the President could not, therefore, be considered. This is about all that the State has done for the Indian Industry.

"The political domination of one country by another attracts far more attention than the more formidable though unfelt domination which the capital, enterprise and skill of one country exercise over the trade and manufacture of another.

**Public Efforts:**  
**The swadeshi movement**

This latter domination has an insidious influence which paralyses the springs of all the varied activities which together make up the life of a nation."<sup>1</sup> Thus wrote forty years ago Justice Ranade, the father of Indian economic thought, deploring India's industrial backwardness. Economics and politics are indistinguishably mixed up in Indian affairs. All political agitation is for a better economic position for India and economic weapons like the boycott have come to be used in the struggle for political power.

The first Swadeshi Movement of 1905-06, therefore, was the outcome of the political agitation against the separation of Bengal. It was energetically sponsored in Maharashtra by the late Lok. Tilak and Mr. Joshi (Sarvajanic Kaka).

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1. Paper read at the Industrial Conference, 1898.

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Though, as mentioned earlier, private enterprises started on the wave of this enthusiasm failed, foreign capital quickly saw its opportunity and factories started manufacturing leather, cotton and woolen goods, sold as 'Indian' by foreign firms till this day. Though the national enterprises failed, suffering for the inevitable association of Swadeshi with politics, the spirit survived and during the next fifteen years, there was gradually greater realisation of industrial nationalism among the educated classes.

The ground was thus well prepared for the avalanche of the Second Swadeshi movement of 1921, which in conjunction with the Non-Co-operation agitation swept the whole country. The immediate reasons again were political—the dissatisfaction at the Montague Chelmsford Reforms and the Punjab outrages. This time the national feeling was much more wide-spread and intense. Two features characterised the movement on this occasion: firstly, foreign textiles as the symbolic objective of attack and secondly, the revolutionary economic ideal of ruralisation of industries as a counter-blast to the domination of machinery. The weapon in both cases was Khaddar—the cult of handspun and hand-woven cloth. Mahatma Gandhi, the man at the head of this movement, counted on the fact that the manual labour in their cottages by the poor millions of India was collectively a producing power more effective than any machinery in the world. It was an idea that challenged the very conception of modern industry and gave the economist something new to ponder upon.

Unfortunately, however it did not succeed, again owing partly to its being linked with politics and partly to the waning enthusiasm of the general public which wanted quick results. But the mark the movement left was permanent and Khaddar came to stay in the economics of the country. Organised industry however, seems to have gained little on this occasion except perhaps that of Indian textiles which played second fiddle to Khaddar. We finally come to the third Swadeshi Movement, which is almost current history and fresh in the memory of all. Divested of its political aspect, it was nevertheless a very powerful economic force and has acted upon industry in general, with as great an effect as War. For the first time in Indian History, we have had an organisation in the Congress, which brought buyers and manufacturers in mutual contact, acted as an information bureau, held exhibitions, in fact attempted every kind of assistance except that which the State alone can give. Another feature of the present movement is the participation of almost all shades of opinion. Swadeshi is no longer the concern of the 'Extremists' alone, as is demonstrated by the various Swadeshi Leagues, which are run by people as politically sober as any Government could wish for.

Yet all that is done, amounts to very little. Except cotton manufacture and various small manufacturing industries, there is little progress. We have still no Industries that matter, that breed a strong, keen and intelligent people and build up a powerful nation—the Key Industries; the solitary Iron

and Steel Works, a Chemical Works or two, a Refractory Kiln or so and a number of several struggling glass-works, is all India can show.

It is in receipt of the last Key Industry, that of Glass Manufacture, that we are to see how private effort unaided by the State, has to fight with odds; how disinterested work suffers by neglect; and finally what dogged determination can achieve. It is a vivid story of the birth of an Idea, the buffets of fortune it received in its evolution into a Force. We are about to learn how this force during the quarter of a century helped to build up some structure worth the name of industry.

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## Chapter III

# The History of the Paisa Fund

Like many other great ideas, that of the Paisa Fund had a modest beginning. It occurred to a small man in an obscure village. **Genesis** Mr. Antaji Damoder Kale was a poor school master in Khattalwada, a hamlet in Thana District on the West Coast. He eked out a living on the pittance of his teaching wages, supplemented by the yield of a small piece of land which he himself tilled. This struggle for existence would have made a fatalist of the average man and tempted him to indulge in the philosophy of despair. But, Kale was above the average. He was made of sterner stuff and refused to be cowed down by poverty. He had the restlessness of a born worker and an intelligent and enquiring mind. Though hardly literate in English, he was a voracious reader of newspapers and books that came his way, and was thus keenly alive to the happenings around him. It was his practice to talk to his fellow villagers with a view to awaken them to national consciousness. The villagers, however, construed his zeal as a mild form of lunacy and paid little heed to his words; for the man was known to be very outspoken and independent of spirit, and suspected of holding views opposed to untouchability. 'If the idiot Kale chooses to ruin himself by offending important people, the Sarkar and the Orthodoxy' thought the simple folk, 'it is a matter between him and his gods' and they ignored him. He was, however, gifted with the suitable missionary spirit impervious to indifference or jeers, and continued his work of enlightening the people around him.

In the famine of 1896, when the suffering of the people was as acute and wide-spread as any earlier famine, Mr. Kale was deeply moved by it, and pondering over the causes of the catastrophe, he grasped the fact (which greater minds had done before), that a population massed on agriculture, without alternative occupations, magnifies a mere failure of the crops into a country-wide famine. Considering the alternative occupations, he saw the abundance of India's raw materials, its idle capital and also the absence of equipment to turn them to account. He realised that there ought to be a sufficiency of trained men to work new industries, and to facilitate the training of men at home and abroad, a national industrial fund of the people was urgently needed since Government was doing nothing in the matter.

Kale was not the first originator of the idea of a national fund. The first man to whom it occurred was one Tarapad Banerji of Raniganj in Bengal, who wrote in 1865, a number of articles in the *Indian Mirror* on this subject, and received the support of a few leaders of the time. **Earlier ideas of a national fund** Popular sympathy, however, was not forthcoming and it was left to

Maharashtra to demonstrate the practicability of a national fund. About 1878, the people of Western India became acquainted with the idea and there was a series of attempts to interest the public in it.

G. B. Joshi of Bassein wrote an essay on "A PUBLIC PICE FUND BOX", but when his effort could hardly realise a hundred and fifty rupees, he gave up the attempt. Messrs. Oke, Risbud and Patwardhan issued some pamphlets, on the same topic with little success. G. A. Bhat, a Sub Judge of Mahad, wrote in 1894, a monograph, "Capital without interest" towards the same end and collected about fourteen hundred rupees but there it stopped. Gurjar and Thakur were two more enthusiasts, who distributed thousands of pamphlets on the same subject at the Bombay Session of the Indian National Congress in 1895, but to little purpose.

Next year, Pimputkar, Karulkar and Paranjpe, decided to experiment with the idea in the limited area of the Umbergaon Peta of Thana District. It was the brochure issued by these people that attracted Kale and set him thinking. He calculated that even if half the population of India (leaving the other half as hopelessly poor) gave their mite of one pice each every year, the total contribution would run into lacs and provide capital enough for any project of industrial training. Armed with a copy of the brochure, he went to Bombay and consulted one Mr. M. R. Bodas, a lawyer, upon the feasibility of collecting a national fund with the smallest minimum contributions. The learned lawyer certified the project as on the right side of the law, and returning to his village, Kale started propaganda.

He was however disappointed with his fellow villagers as his articles in the local press went unheeded. He therefore, wrote a small book in Marathi entitled "A picture of present conditions," in which he put forth the scheme of a Paisa Fund for money to the purpose of industrial revival in India. As he had no money to print it, he appealed to Justice Ranade for help, but failed to convince that great man. An appeal to the public in general, however, proved more fruitful; some advance orders for the book were secured and printing begun. In the meanwhile, Kale's superiors took exception to his activities and he resigned his teacher's job on 16 October 1899. Thereafter till his book was printed, he served his village people stricken by the famine of 1899, and witnessing their misery, took a vow to spread the Paisa Fund idea and serve no other master till the end of his life.

When his book was ready, he went with its copies to Lucknow to meet the leaders at the sessions of the National Congress and was introduced to Mr. Tilak and other Maharashtra leaders. They listened to his ideas and asked him to attend the Satara Session of the Bombay Provincial Conference in March 1900. On his way to Satara, he visited a good many places creating public opinion, with the result that when he again met the leaders they admitted the possibility of the project and asked him to carry on. From

this time, he travelled for nearly four years over most of the Marathi speaking districts, doing propaganda work. During this time he had also started a Paisa Fund Magazine and the Paisa Fund Encouraging Association, both of which proved shortlived.

Upon his return to Bombay, he attempted to interest the Bombay Presidency Association in his idea, but their terms did not suit him. In July 1904, however, he succeeded in getting together an influential provisional committee to test the veracity of the claim of the success in his propaganda. If enquiries of this Committee justified it, a central committee for Maharashtra might be formed. In the meanwhile, plague broke out in Poona and negotiations shifted to Bombay then preparing for the sitting of the Congress. The indefatigable Kale went to Bombay, again besieged Mr. Tilak and persuaded him to call a meeting of Maharashtra leaders then present for Congress. This meeting was duly held at Dr. M. G. Deshmukh's house and it was resolved to call a public meeting to consider the establishment of a Central Committee of the Paisa Fund.

The public meeting was duly held in Arya Samaj Mandir, Bombay, on 27 December 1904; a committee was appointed with Dr. Deshmukh as president, members, Secretaries and treasurers; and volunteers were recruited. A draft constitution was circulated and adopted and finally, on 16th October 1905, "The Industrial Fund or Paisa Fund" was duly registered at the office of the Registrar of Joint Stock Companies, under Act XXI of 1860. The tireless efforts of Antaji Damodar Kale were crowned with success at last and having delivered into responsible hands the idea he had nursed with such dogged determination he was content thereafter to be an ordinary Assistant Secretary, doing propaganda work.

The Industrial or Paisa Fund can be defined as a Central Reserve made up of contributions of one pice and above from all classes of society. People paying a reasonable minimum could have a voice in its administration which was in the hands of an elected body.

The constitution of the Paisa Fund provided for four classes of members, viz.

- (1) Patrons, paying Rs. 500 or more at a time
- (2) Associates, paying Rs. 100 to 500 "
- (3) Life members, paying Rs. 50 to 100 " and
- (4) Ordinary members paying Rs. 10 to 50 or rupee one per year.

Village Committees were recognised when there were in the village at least ten people each paying annas eight per year. Members of these were eligible for election into the central Committee as were members of the first three classes shown above. The Central Committee was the executive body vested with full powers for the proper utilisation of the Fund. The purpose of the Paisa Fund was to collect money in any amounts down to one pice from all classes of Society and to use it strictly according to the rules of the



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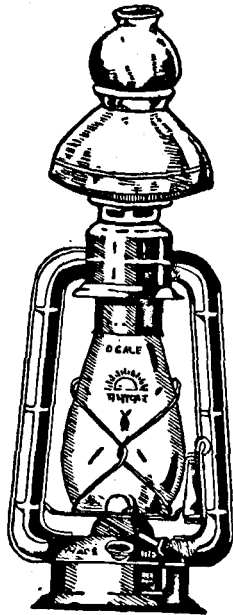
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institution, towards the revival of agriculture, trade and crafts of this country and the improvement of the economic condition of the people. Though this purpose was made perfectly clear at every opportunity, doubts in the minds of the general public had to be satisfied in the beginning, queries replied to and vague fears allayed. Once however, Lok. Tilak sponsored the cause, he took it upon himself to give wide publicity to the Fund through the columns of his powerful paper, the Kesari, and public opinion gradually brought round.

The Life of the Paisa Fund can be divided into seven well marked periods, each marking a different phase of its career. Excluding the years 1898 to 1905 which were spent in preparing the ground and popularising the idea with propaganda, we have the following time limits.

**Periods of Fund's History**

- ( 1 ) 1905 to 1908 Period of Infancy.
- ( 2 ) 1908 to 1909 Experimental period of glass Manufacture.
- ( 3 ) 1909 to 1910 Training in Theory and Practice of Glass-making.
- ( 4 ) 1910 to 1915 Period of lease.
- ( 5 ) 1915 to 1918 Self-dependence stage.
- ( 6 ) 1918 to 1925 Pottery experiments.
- ( 7 ) 1925 to 1933 Years of stability.

We begin with the year 1905-06 when the Fund was formally registered, its constitution decided upon, propaganda set afoot and a force of volunteers mobilised for collection. The stable and well-defined position of the Fund and the backing it had of well-known leaders, in addition to active early propaganda by Kale and Lawate had an immediate effect of increasing public subscription which rose from Rs. 2000/- to Rs. 7000/- within that year. The Central Committee, however, decided to wait before starting on any scheme, till at least Rs. 10,000/- were collected. When this limit was passed the next year, the question of utilising the Fund was discussed in a meeting at the president's house. There were four proposals before the Committee :

- ( 1 ) In view of the impracticability of starting a Sugar Factory, sugarmaking demonstrations with Haddy's machine.
- ( 2 ) Hand-loom classes with every kind of improved looms.
- ( 3 ) Instruction in the art of dyeing.
- ( 4 ) Teaching of Match and Glass making on a small scale.

Some members were in favour of small industries like buttons, oils or brushes and it was suggested that Prof. Gajjar's laboratory should be taken advantage of for the necessary training. There was also a suggestion from the Dhulia Town Committee to start an industrial training school in Poona; but ultimately the Committee decided upon glass and in January 1908, building construction for the Factory was begun at Talegaon.

It is necessary at this juncture to explain why the Committee decided upon glass-making and why Talegaon was chosen as the site for the factory. As to the selection of glass for manufacturing experiments, there is a little story behind it. It happened that, while the Committee were considering the above proposals, Mr. V. G. Joshi, Proprietor, Chitra-Shala Press, Poona, a member of the Central Committee and a staunch Swadeshist was travelling in Japan with a friend, keeping his eyes open for such things as might prove useful. Japan was then at the zenith of its industrial achievement and Mr. Joshi spent his time in close observation of Japanese methods. While in Osaka he was struck with the number of small glass factories scattered over the place and upon enquiries it occurred to him that the Paisa Fund had just about the right amount of capital to start an experimental glass works, big enough for initiating Indian boys in the mysteries of glass craft. He, therefore, wrote to the President, Dr. Deshmukh, in India, putting forward his suggestions. At that time, the Indian Glass Industry was in particularly bad straits. There were 9 factories, mostly in Northern India (not counting many that had already failed), making pressed and hollow ware from Indian raw materials under the direction of foreign 'experts'. They were also receiving some help from the local Government. In all, a capital of about sixteen lacs was invested in the industry yet it was not successful at all. Interested persons suggested that a tropical country like India was wholly unsuitable for glass making and the best way was to export raw materials. Even our own Indian 'experts' thought that without large capital and favourable railway rates, there was little hope for the Industry. There was thus an atmosphere of despair and an utter lack of self-confidence. People began to be persuaded that Indians were no good for undertaking industries, and agriculture was all they were fit for. Taking into consideration this state of affairs, the Committee decided to adopt Mr. Joshi's suggestion. They resolved to demonstrate that good glass and glass workers could be successfully made in India without an all foreign direction, and thus to revive self-confidence of the country. Besides, Glass had an added importance, being one of the "Key" industries and its development was a matter of national concern. Thirdly, glass making offered adequate scope for the linking of industry and science, and side by side, with the Factory a technological laboratory could be conducted with advantage.

Secondly, we come to the question, why Talegaon was chosen to be the site for the proposed glass works. This has been the point of many bitter disputes and has served various unsympathetic people as a handy cause to which they wanted to ascribe all the difficulties suffered by the factory in its early stages. Later on, we will discuss how far location affects an industry and whether the situation of the factory at Talegaon can justifiably be made a scape-goat for all the reverses the institution has suffered. The primary reason for erecting the glass factory at Talegaon Dabhade was the free land

offered to the Committee by the Samarth Vidyalaya at Talegaon. The latter was an institution on the lines of a public school started in 1906, when the Indian National Congress enunciated the principle of national education. The authorities of the school recognised the need of industrial training as a part of education and invited the Paisa Fund Committee to build their glass works on a piece of Inam land belonging to the School and to facilitate in return, the training of a few students. The offer was accepted. This association with the Samarth Vidyalaya (which was suspected of hatching revolutionaries and subsequently closed by Government) was the real bugbear of nervous critics who clamoured against the glass works being situated at Talegaon. Apart from the point of free land, Talegaon had many other advantages: it was situated on the main railway line between Bombay and Poona, and thus was in close touch with these commercial and educational centres; the climate was exceedingly salubrious; labour was cheap and plentifully available; and finally it was believed that suitable deposits of silica, the main raw material for glass, which was available in the vicinity would be useful.

Buildings were ready at last at a cost of about Rs. 7000 and with an addition of Rs 5000 the actual work of glass making was begun on 5 August 1908 under the direction of Mr. Ishwardas Varshnei, who had learnt glass technology in Japan and America. Mr. V. G. Joshi had met him in Japan. He was assisted by a couple of Japanese foremen. To begin with, there were two students under training, and thus began to take shape peoples' dreams of an institution for industrial training. Within a year, about thirteen thousand rupees were written off as expenses for instruction. A small laboratory was by this time attached to the works. In the meanwhile, the Committee turned their attention towards experiment in other industries and various loans were made to different people, viz.

- Rs. 8,000 to the Western India Button Factory,
- Rs. 1,000 for the manufacture of Soda,
- Rs. 200 to help a match factory; and
- Rs. 50 for experiments in making artificial silk.

The loan to the Match Factory was returned within a year. It was during this period that H. H. the Gaikwad of Baroda and Seth Narottam Morarji visited the works.

We now come to the next period 1909-10, one of development, in which instruction in glass technology was carried as systematically as glass manufacture. The laboratory was under the supervision of Mr. B. S. Karandikar, B. Sc., a clever Scientist, author of two books in Marathi on Geology and Botany, and formerly Head Master of the High School at Pen. A course of three years was prescribed for students educated upto Matriculation; during the first year they were to study at their own expense, get a scholarship for the next year and due renou-

#### Training in Glass making

neration during the third. Twelve such students were admitted, some of them being from the adjoining Samarth Vidyalaya as per condition referred to above. While Mr. Karandikar gave theoretical instruction in Physics, Chemistry and other necessary subjects, practical instruction was under the supervision of Mr. Ishwardas. There were also 7 or 8 lower class apprentices to learn blowing. The factory with not an inconsiderable impetus received from the Swadeshi and Boycott movements of the time, was running satisfactorily and showed promise of soon becoming self-sufficient in spite of the training expenses of 12 students every three years. In July 1910, three executive Councillors, Messrs. Chaulal, Lamb and Morrison of the Government of Bombay, visited the works and their approval of its working resulted in G. R. No. 4127 dated 26-8-10, which recommended the patronage as far as possible to Talegaon Glassware by Government Departments in their purchase of stores. This event had more than a mere selling value. It allayed the nervous apprehensions of many people and donations came in more freely. The services of Mr. Y. V. Nene, a well-to-do gentleman of Bombay, which were secured at this time, also gave some weight to the Fund's standing. Kale, who was doing very active propoganda for the last five years refusing monthly payment for his work, wanted some rest and a loan of Rs. 600 for agricultural experiments, which were duly granted to him. The irrecoverable expenses for training students this year were over Rs. 5,000. The most important event during the period, however, was the agreement between the Paisa Fund Committee and Mr. Ishwardas Varshnei. The Committee decided that for eht undisturbed performance of its primary duty, viz. the training in glass craft, the onus of conducting the factory at least on a self-sufficient basis must be shifted on to other shoulders. A separation of functions was therefore contemplated. Mr. Ishwardas could solely undertake to run the factory on behalf of the Committee, giving them some return on their capital, and the students adequate facilities for practical work, while Mr. Karandikar could take charge of the entire responsibility as to their theoretical training. An agreement was therefore drawn up, signed by both the parties and duly registered. The conditions were as follow:—

- (1) The Talegaon Glass Works were transferred to the exclusive possession and management of Mr. Ishwardas for five years, beginning from the 1st of March 1910.
- (2) Mr. Ishwardas was to pay Rs. 900 as interest for the first three years at the rate of 3 % on Rs. 30,000 (the estimated value of the works) and Rs. 1200 at the rate of 4% for the next two years.
- (3) Mr. Ishwardas was to give practical instruction, as well as theoretical when necessary, to the students under training, for which he was to receive Rs. 300 per year.
- (4) The expenses of the students training were to be paid by the Fund, the proceeds of the sale of their production being deducted; i

the amount of such proceeds exceeded the expenses, Mr. Ishwardas was to pay to the students 80 % out of it.

- (5) The students were to receive no wages, but scholarships from the Fund.
- (6) Mr. Ishwardas was to lay aside depreciatoin at the rate of 2 % annually.
- (7) During the five years of contract, any additional necessary machinery which the Committee might deem reasonable, was to be bought from the Fund.
- (8) Two additional buildings for Mr. Ishwardas were to be erected from the Fund at a cost of Rs. 2000.
- (9) There were to be periodic inspections of the school and the accounts by the Committee's representatives.
- (10) All disputes were to be settled by arbitration. After this agreement Mr. Ishwardas lost no time in pursuing a course of vigorous production. In a big illustrated advertisement in the *Kesari*, dated 9 August 1910, we see hollow ware and fancy goods of a variety of designs announced to be available to the trade, made in Paisa Fund Glass Works, Talegaon.

We now take a brief review of the five years' lease of the factory by

**The period  
of Lease**

Mr. Ishwardas. In March 1911, the *Kesari*, in a leading article had deplored the gradual fall in the Fund's collections, due in some measure to peoples fear that Government were hostile to the institution. However, in August of the same year, H. E. Sir George Clarke, Governor of Bombay visited the works and admitting that the work exceeded his expectation wished this useful enterprise increasing success. Peoples' apprehensions were thus relieved to some extent. In the official year 1910-11, more than six thousand rupees were spent on the students' training, while over a thousand were realised from the sale of their production. The next year opened with the Baroda and Hyderabad Durbars following the Bombay Government's lead in the matter of purchasing stores from the Paisa Fund Glass Works. In the December of 1911, when Their Imperial Majesties the King and Queen visited India for the Delhi Durbar, they witnessed the Glass Making demonstration by the Paisa Fund Glass Works in the Bombay Exhibition. Though the works were doing well, more money was always wanted by the Fund for training expenses. Subscriptions had again slackened owing to sundry criticism in the papers, and the redoubtable *Kesari* had to devote another leading article to answer the fault-finding and gratuitous critics. Some of its remarks in a caustic strain are worth repeating: "...To any one who sets out with the sole ambition of picking flaws, any number of them could be found in the Paisa

Fund of Maharashtra, e.g. why A has had and has been having a greater share than B. in the Fund's management ? Could the Chairman of the Central Committee say upon oath that he had not suspected a certain individual of laying hands on a few rupees here and a few annas and pies there, from the Fund's collections at various centres ? Why was the Paisa Fund Factory started at place X and why not at Y ? Why Glass of all commodities, and not sugar, cloth or matches was selected for manufacture ? Why was Ishwardas appointed ? Could the furnace not be built facing West instead of East ? Why were details that occurred to us (but of which we did not tell you) left out in your statement of accounts and your own details given ? Could not have there been a slightly more economical scheme than the one in which the Fund has invested ? . . etc.". Public opinion was happily soon re-assured and showed greater favour to the Fund.

It would be proper here to summarise the Fund's work to that date. Before the factory was leased to Mr. Ishwardas Rs. 14000/- were spent in experiments; strictly educational expenses totalled nearly Rs. 9000/- or Rs. 35/- per month; but at this cost there were now ten completely trained men, the real pioneer glass-makers in India. They were not only now able to earn at least Rs. 50 per month, but were also ready to run glass factories of their own. Besides these, were turned out many blowers and helpers able to earn at least Rs. 15 per month. When most of the Japanese workmen left in February 1912, in their place, the students carried on the work successfully. New projects such as bangles, pottery and enamelling were contemplated as was also the training of more students ; but unfortunately at the end of the year 1912, took place the premature death of Mr. Karandikar. He had, however, left a legacy in the shape of several well-trained young men, viz. :—

R. D. Chandorkar, L. V. Bhave, S. P. Ogale, K. M. Apte, N. M. Sohoni, P. G. Kale, R. M. Borkar, H. V. Pandit, G. G. Chaphekar and S. Iyer.

The next year, the Industrial Conference met at Bankipur and there Messrs. Kale and Lalit represented the Paisa Fund.

**What was achieved in 1915** Owing to the strong sponsorship of the Maharashtra leaders, the Fund was well advertised, its utility recognised and similar funds were advocated for every province. Bengali papers were especially sympathetic. They wrote that Maharashtra had demonstrated the feasibility of industrial training with the peoples' own initiative and funds. Apart from the success in production, there was an immeasurable benefit in industrial training and experience which could not be measured in rupees, annas and pies. The great Surendranath Banerji is reported to have said at that time, that Maharashtra scored over other provinces as regards lifelong devotion and selfless service, in spite of local difference of opinion. In July 1913, the Governor of Bombay, now the Viceroy of India and Lady Willingdon, visited the Glass Works and Lord Willingdon confessed to have spent a very happy afternoon and wished



the industry all possible success. This year, out of the batch of trained students noted above, four went to Baroda to help the new Glass Works there, two to the Western India Glass Works at Sunth Road, one stayed in Bombay, one studied glass chemistry at Madras preparatory to sailing abroad, one (the present Superintendent) travelled visiting glass-works all over India, and one proceeded to Kundal Road to begin what subsequently sprang up as the Ogalewadi Glass Works.

In the meanwhile, the Committee were interesting themselves in other small industries. Their earlier grants had not yielded much of success except in the case of the loan to Mr. Potdar who had successfully mastered the art of Soda manufacture and returned the loan. He received another loan of Rs. 1000/- for experiments in making copper sulphate. A loan of Rs. 1000/- was also made to the Kamble Umbrella Factory at Poona. It happened during the last two years of Mr. Ishwardas' lease that owing to the outbreak of plague, the factory was run intermittently and altogether closed for some months. During Mr. Ishwardas' management the producing capacity of the Works increased in value from fourteen thousand to fifty-two thousand rupees per year. Thus the commercial possibility of the concern became patent.

The Japanese workmen, useful as they had been in the early stages, had now fulfilled their utility. Many of the trained students were averse to mere paid jobs in other Glass Works. They therefore made the bold proposal to conduct the factory after the expiry of the lease. Pending that, the Committee gave four of them scholarships for works practice at Talegaon. The training of the subsidiary class of semi-skilled workers for minor helping processes, was also continued and it is significant to note that they were mainly from among the depressed classes who have never received any discriminating treatment at the Talegaon Works. This has demonstrated among other things that caste disappears on the common platform of industry. At the end of 1914-15, therefore, the institution had produced ten or twelve capable glass technologists and a large number of blowers and subsidiary glass workers. It had spent nearly Rs. 23000/- for this purpose as well as for giving Mr. Ishwardas facilities to experiment and gain experience by trial and error. And no one can say that the money was not well spent.

Probably the real history of Glass Works begins with this fresh start in May 1915 with the management of the select band of pioneer India-trained experts, after Mr. Ishwardas handed back the factory to the Fund at the end of the lease and went to Amballa. The handful of young men trained on the spot, had great enthusiasm coupled with a grim determination to succeed and they set out to justify the confidence the committee placed in them by entrusting the conduct of the works. There were six old students and a seventh, Mr. Sane, joined them only that year. Their

#### Self-dependence Stage

first year of management ( 1914-15 ) was so successful that, of the Rs. 5000/- granted to them by the Central Committee, they were able to return Rs. 3500/- at the end of the year. During this period, the Fund successfully came out of the ordeal of a surprise audit by the C. I. D. people, who conceiving a sudden suspicion of the Fund's activities, examined its books, but to their chargin, found them in order and free from any connection with political or revolutionary activities. Another stringent though welcome test was undergone by the Glass Works, when Mr. Dawson, Principal of the Victoria Jubilee Technical Institute, Bombay, at Government's instance, thoroughly inspected the works on 3 August 1915, and made an important report, in which the following points were noteworthy:

“ As to equipment, the buildings were adequate, but the producing capacity of the works could be increased to a much greater extent; the laboratory was inadequately equipped, but there were eight efficient workers and a number of boys under training for blowing and allied processes. In regard to the raw materials, local silica was unsatisfactory; in the case of other raw materials, the factory was on the same footing, as any other in India. Melting crucibles were imported from Japan; an attempt could be made to manufacture them locally. The articles produced lacked finish owing to the use of wooden moulds. The sales amounted to Rs. 2500/-per month, leaving a profit of about Rs. 100/-. In the matter of training, Chemistry students of the college standard could learn the work here with advantage; but, to be a technological institution, the present equipment was unsatisfactory. There were several proposals for improvement, viz.,

- ( a ) More capital outlay;
- ( b ) Erection of a power-driven grinding plant;
- ( c ) Investment in cast iron moulds and presses at the cost of Rs. 8,000/- each.
- ( d ) An experienced foreign foreman for 2 or 3 years on a salary of Rs. 350/- to Rs. 400/-.

Finally the report recommended encouragement to this factory by Government, by purchase of stores and an adequate grant or loan. The Committee thanked Government for the Report and assured the early adoption as far as possible of the proposals for improvement. Soon after this, the Great War broke out and Government through the Indigenous Industries Committee, showed a greater interest in the work. There was some correspondence between Government and the Committee as regards lease of forests for fuel, concession in railway rates and the services of an expert. There were, however, no results outcoming. This year, the Fund received a good deal of help, not only from the Maharashtra newspapers like the Kesari, Sandesh, Dnyan Prakash, Indu Prakash and Maharashtra, but also from Gujarathi papers like the Sanj Vartaman and Jam-e-Jamshed.

Propaganda was accelerated and it was decided to publish the annual report in four languages. The Committee granted a scholarship of Rs. 25/- per month to Mr. D. G. Bhagwat, B. Sc, for going to Japan to study ceramics. The seven ex-students who had undertaken to run the works, were made life members of the Institution. An expert committee was appointed to examine the Works periodically and experiments were started for making crucibles. The next year was a record one from the point of view of subscription receipts. Over Rs. 40,000/- were collected mainly due to the personal interest and propaganda by Lok. Tilak. Mr. N. C. Kelker, his able lieutenant in a lecture to the merchants of Poona, criticised the apathy of the commercial classes towards national enterprise which forced the inexperienced middle class to undertake manufacture, and emphasised that trade must not mean mere sale of foreign goods on a commission basis, but should be linked with new industries of the country, even at the risk of incurring losses. The year 1917-18 started briskly with Rs. 10,000/- granted to pottery section of the works, which had succeeded in making glazed ware under Mr. Marathe, and Rs. 6000/- for crucible making under the direction of Mr. A. D. Joshi, who had demonstrated its success. Another Rs. 10,000/- were granted by the Fund for pressed glass equipment. Apart from the grants to the works, Rs. 500/- were advanced to Mr. Hardikar of Sion to start a Gum factory. The match factory at Karad was unsuccessful and a loss of Rs. 1000/- was incurred upon it. Towards the end of this period, the Glass works were closed for some time owing to the Influenza epidemic and the shortage of coal due to the War.

The period 1918-25 which can be termed that of pottery experiments, opened auspiciously with the Industrial Commission's appreciation of the work of the Paisa Fund. On page 69 of Appendix E of the Commission's Report, we find the following remarks:—

**Pottery experiments** "Useful work has been done by the Paisa Fund at the Talegoan Glass Works in training glass blowers and the expansion of the industry under war conditions is chiefly due to the supply of men who have come from this place."

These remarks were repeated in the Industrial Hand-Book of the Indian Munitions Board in 1919. Shortly afterwards, Mr. Chaphekar, a life member on the staff of the Glass Works, went to Japan and America for studying industrial methods there and a sum of Rs. 1500/- was granted to him. Rs. 8000/- were loaned to Mr. H. N. Phadke of Karad for erecting mechanical engineering workshop. Scholarships and wages in the factory were increased in consideration of the high prices due to the war. At this time, the works, like many others in India, suffered from an acute shortage of coal and of railway wagons. But the difficulties in manufacture were counterbalanced by the importance of the institution achieved in a consultative capacity. Old students had already started glass works at various

places like Ogalewadi, Gondia, and Rao (Indore). Besides, many other concerns such as Glass Works at Karachi, Calcutta, Ahmedabad, Calicut and the Benares Hindu University sought and were given advice of all kinds. Sands and pottery clays received from several centres were tested and were reported upon. The next year Rs, 10,000/- were again granted to the pottery section in view of its satisfactory progress. The men in charge of the section, Messrs. Joshi and Phadke, applied for State Technological Scholarships, but were unsuccessful in the attempt. The heavy expenses of direct-fired furnaces were unanimously regarded as the main handicap of the industry and for a trial of the more economical gas furnace, Talegoan was suggested to be the proper centre.

About this time, the institution published, for the knowledge of the general public, the account of its work to that date, which can be summarised as follows:—

1. Nearly three hundred people were trained in different processes of the industry.
2. Successful Glass-making in Maharashtra was shown to be possible.
3. Advice on various points was given to and raw material tested for several States and capitalists; as a result of which
4. Many new Factories were started and
5. Others were conducted by men associated with Paisa Fund Glass Works.
6. Trained labour was supplied to some works; (There was demand for trained men even from Persia and Ceylon).
7. The experimental manufacture of crucibles, firebricks, pottery ware and bangles was successfully accomplished.

Production on a commercial scale, however, was possible only to a capitalist. Mr. C. R. Das in 1922-23 honoured it with a visit and wrote "I have inspected this factory and am pleased with it. India wants small factories of this type all over the country." Two pottery experts Messrs. Deb and Shah, also inspected the works at this time with much interest. During this year, advice was given in twenty five cases in various branches of ceramics, information was supplied, clays tested and furnaces inspected. The pottery section was enlarged and started with some machinery on a semi-commercial scale like the Glass Works. The next year Rs. 1500/- were sanctioned for the bangle making section and the products were displayed in Baroda and other industrial exhibitions. In the Poona Exhibition, the complete Bangle making process was demonstrated.

At this time Mr. Chandorkar, the Superintendent of the Works, who was touring the province giving lectures, presided over the Manufacturers, and Merchants' Conference in Poona. Technological advice was being continuously given to outsiders and the reputation of the institution thereby increasing.

One Sikh student came all the way from the Punjab to take training in glass making. As the Pottery section was becoming increasingly successful on a small commercial scale, necessary refractory materials were now being made on the spot. In a year, the Chinaware sales had doubled, the pottery working at full capacity. One expert Mr. V. S. Phadke, B.A., B. Sc. was sent to the Sorab Dalal Tile Works at Than Road, Kathiawar, in which the proprietor had invested a large sum but was not doing well. The foreign expert, it was reported, had wasted about two lacs in experiments. Within a short time, the production was improved by Mr. Phadke and stoneware jars to the value of 7 to 8 thousand rupees were put on the market every month. At this rate, it was expected that the whole market for stoneware could be captured within a few years and foreign goods completely displaced if a sufficient number of capitalists were forthcoming. The Proprietor of the Sorab Dalal Tile Works at Than Road was gratified with the Talegaon Experts' work and requested for more men.

It would be convenient at this stage to put to test the entire work of the Pottery section of the Paisa Fund Glass Works, comparing it with that of the J. J. School of Arts, Pottery section. This Government institution, during twelve years (1912-1924) spent Rs. 4,06,528-7-4 and trained about three students every year (total 42 till 1924,) very few of them making a living by actual work in high class pottery. The expert in charge during the period did little else than testing clays. The exhibits of the institution were by no means first class by scientific tests. It appears, glazing also did not receive sufficient attention. On the whole, therefore, it could be said without prejudice that little benefit had accrued to Indians from the J. J. School pottery section; only the foreign expert had obtained experience with Indian money. On the other hand, at Talegaon, with a modest start made by two Science graduates, who had no knowledge of glazing, in conjunction with a diploma holder of the J. J. School of Arts, Pottery Section, success in glazed earthen ware was quickly achieved and its commercial possibility demonstrated. At an expense of Rs. 1,84,49-8-2 there were now 8 high grade pottery experts, 45 students, 5 or 6 efficient foremen and about 30 trained workmen. A number of articles like jars, vases, curios, and other porcelainware could now be produced, and thus better results at a lower cost than J. J. School of Arts were shown by the Paisa Fund.

We now enter into the present phase of the institution's fortune with the year 1925-26. The pottery and crucible sections had achieved as much importance as the Glass Works proper. The Eastern Chemical Works and the Dharamsi Morarji Chemical Works had certified the earthenware acid jars to be satisfactory. Screw-top jars were now begun to be made. Five students were learning pottery. The Committee sanctioned Rs. 10,000/- for a new pottery furnace, Rs. 8,000/- for workshop machinery and tools

needed for the sundry mechanical equipment the factory had set up. Rs. 2,000/- were granted for the crucible shed and Rs. 1000/- for the laboratory. At about this time a Glass Factory was started in Hyderabad (Deccan) with a little State aid and the Talegaon Works supplied it with 10 or 12 trained workers. Two technical enquiries regarding glass manufacture were answered and so were several others about other industries. The need of a well-equipped experimental laboratory was badly felt.

The next year took place the Agricultural Exhibition at Poona. Though Chinaware and Glassware could not be exhibited in the show proper, Paisa Fund goods were displayed in the adjoining Modi Bag through the good offices of Dr. Chima of the Agricultural College. Shortly after this, the Glass Manufacturers met at Bajhoi to discuss prices and Mr. Chandorkar again emphasised that fuel cost was the main adverse factor in India and improved Gas or Electrical furnaces were the only resort. It was again urged that the experiment should be made at Talegaon, but it required a sum of Rs. 30,000/- and was therefore postponed. Messrs. Chandorkar and Joshi were invited by the Deccan Glass Works Ltd. at Hyderabad and in their visit they had a long discussion with the Director of Industries there about gas furnaces. The Travancore State sent some clay to be tested and it was reported suitable for Chinaware. The small producing capacity of the Talegaon pottery made it impossible for the factory to cope with the growing demand for Talegaon stone-ware. The Than Road Works under Mr. Phadke, the Fund's expert, was doing very well, and the production had risen to about Rs. 15000/- per month. A new student was sent from the Victoria Jubilee Technical Institute, Bombay, to take training at Talegaon.

The next year Mr. Chandorkar travelled in Gujrat for propaganda. Rs. 30,000/- were urgently needed for the trial of a gas furnace, the necessity of which was again emphasised at the session of the Glass Manufacturers' Association at Benares under the presidency of Mr. Ishwardas Varshneyi. Incidentally at this time, The Indian Ceramic Society was also founded and the first session held at Benares when Pandit Malaviya in his opening address, referred to Paisa Fund's work in the Ceramic line. The Paisa Fund delegates also read papers before the Conference. From this year Mr. Godbole, a philanthropist from C. P., offered a scholarship for one student to learn Ceramics at Talegaon and the Godbole Scholar, Kher, began his studies in pottery with special reference to drainage pipes.

The year came to a sad close due to the death of Dr. Nanasaheb Deshmukh, the veteran President of the Central Committee from the very first day of the Fund. Mr. N. C. Kelkar ably filled his place from the next year. Three higher students of Ceramics, University Graduates, were admitted for practical training. Messrs. Joshi and Bhave toured the Factories up-country for observing new methods. Shortly afterwards the Godbole Scholar finished his course and joined the Parashuram Pottery at Morvi, Kathiawar.

The production of the glasswares had by now reached over a lakh annually. The demand was growing, a high quality was maintained and acknowledged on all sides. The new line of Opal Glass also became successful. The year 1980-81 saw the production raised to about 1.3 lacs with a corresponding rise in the profits; but the prosperity was not to stay long. Considerable as the internal competition was, that of the foreign countries, particularly Japan, was growing more alarming. Soon after the presentation of the case of the Paisa Fund Glass Works by Mr. Chandorkar before the belated Glass Tariff Board early in 1982, the Japanese Yen suddenly depreciated to an extent which brought about the dumping of Japanese goods—a very menacing problem before the glass makers of India.

And at the time of writing, the situation has in no wise improved and urgent though the need is for protection to the glass industry, Government is showing no signs to deflect from its old policy of indifference and tardy help; the much awaited Tariff Board Report is not being even published, much less acted upon. The Railway rates far from being favourable, are actually made more prohibitive in the case of coal owing to the surcharge, which calculated upon mileage, victimises the factories distant from the coal fields. In the meanwhile, the Paisa Fund's collection, which has been falling owing to the slackened propaganda, needs all the impetus that can be given by the general public in recognition of its great work. The Glass Works should not be its only source of revenue, as it is run on semi-commercial lines and other industries have a claim upon the Fund. More donors must come forward, donors of the type of Mr. L. G. Marathe, a retired school master of Achra, a village in Konkan, who has, in 1981, given the munificent sum of Rs. 10,000/-, nearly the entire saving of his life to the Paisa Fund.

Thus after a hurried survey of over a quarter century, we arrive to the present time, and find that the Glass Works with its pottery and bangle sections is keeping up a grim fight in the face of heavy odds and the concern is self-supporting to the extent of returning almost the entire capital it had received from the Fund. It is worthwhile to any one to observe and interest himself in this plucky little enterprise—the first Glass Works of Maharashtra built on the foundation of popular subscription. Skirted by the Bombay Poona Line of the G. I. P. Railway amidst rugged rocks and wind-swept plains of Maval, a little group of sheds and simple buildings constitute the Paisa Fund Glass Works. Maval is a land full of historical legends of the Marathas.

Two hundred years ago, it has witnessed brave deeds in battles for political power by the sons of the soil; to-day it sees deeds as brave though less spectacular, in the struggle for industrial power. Instead of the romantic atmosphere of the clash of arms and the array of armies, the stately chimneys, roaring furnaces, glowing annealing chambers; gleaming heaps

of glass wares side by side with dull black stacks of coal, give a vivid picture of modern industry. Grim purposeful men moving busily, blowers and helpers working with clockwork speed and precision, the cheerful grinding and finishing gangs and the packing and transporting staff – all create an atmosphere, a veritable hive of industry. From the intolerable heat, noise and bustle of the furnace house, however, the pottery shed is a welcome change. The army of crucibles and the rows upon rows of jars drying in the shade, give the impression of a cool-almost sepulchral peace. Situated in a corner of the Works is a small library and a modest laboratory with a few serious young people, the apprentices of Industry and these really represent the ideal of the Institution.

Commercial success is not the “Be all and end all” of the institution. There is a lot of work ahead for it and though self-supporting, its mission of Technical Instruction will always need more and more funds. Its chief aim is to develop itself into a well equipped Technological Research Institute and its immediate projects ( to enumerate only a few ) are:—

- ( 1 ) Experiments in laboratory porcelain and glass-ware.
- ( 2 ) The building of a producer gas-furnace and the study of its working.
- ( 3 ) The manufacture of Sanitary porcelain-ware and hospital requisites.
- ( 4 ) The production of China Crockery.
- ( 5 ) Study of causes of crazing and peeling glazes.
- ( 6 ) Development of leadless glazes for temperatures to suit Indian clays.
- ( 7 ) Experiments in producing homogeneity in Glass etc.

Such undertakings are obviously ambitious and bound to need as strong a financial backing as is available. No single factory can afford to tackle these problems and yet their solution is a matter of great importance to the industry as a whole. The Paisa Fund Works, is probably the only institution ( in the absence of any other ) to undertake the experiment and its mainstay is the Paisa Fund-popular contribution. During the last twenty-five years the public have gallantly risen to the occasion whenever necessary. The Fund has not only had strong sponsors in papers like the *Kesari*, *Nava Kal*, *DnyanPrakash* and others, but it also had the support of almost all national minds as Appendix B “ Public Opinion ” will testify. The late Lok. Tilak made the Paisa Fund a matter of personal interest and his colleagues like Messrs N. C. Kelker, V. G. Joshi, K. P. Khadilkar and the late Dr. Nanasaheb Deshmukh were never lagging behind with their active work. Treasurers like the late Mr. Y. V. Nene and Mr. H. K. Gokhale and late Dr. V. N. Bhajekar have guarded the Fund with



jealous care. The share of Messrs. A. D. Kale the founder and R. D. Chandorkar, the Glass Works Superintendent and his co-workers in the Fund's prosperity is invaluable, and so is the collective sympathy of the five hundred patrons and life members all over India. The small subscribers' might form really the back bone of the Fund; their name is legion and though individual mention here is impossible, the credit of the Paisa Fund's success goes to them in no small measure. The present achievement is as much the result of the workers' efforts as of the millions of Maharashtra, who in spite of proverbial poverty, found sums small and large to help along the National Fund.

The village committees which have grown in number from 44 to 232 during the period, have been of utmost value as *via media* between the public and the Fund and among those, the Committees at Kalyan, Thana, Panvel, Devrukh, Umbergaon, Gholwad and Indore merit special mention owing to their exemplary work. The last though by no means the least on the list of honour comes the army of propagandists and volunteers headed by the ubiquitous Antaji Damodar Kale. More than the leaders and news papers it is these self-less and untiring workers, again too numerous to enumerate, who have come into close contact with the masses and mobilised so much public opinion. The huge section of the indifferent and unlettered public in the villages could have learnt about the Paisa Fund only through the efforts of these people. The propaganda work of Mr. A. D. Kale alone has given him enough material for a decent-sized book; how much more extensive would be that of all the workers together!

The force of volunteers has been another asset of the Fund and though, since recently, it has been found more convenient to adopt paid workers for propaganda and collection, it does not detract from the merit of the honorary workers' sacrifices. The close of the chapter of the Institution's history brings us on to the greater subject of Indian Glass Industry in general. It is only fitting that once the Paisa Fund has interested itself in this particular branch of ceramics, every available source of information upon it should be exhausted in order to present as comprehensive a survey of the Industry as possible. The following chapter, therefore, dwells at length upon the history of the Glass Industry in general and its vicissitudes in India in particular.

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## Chapter IV

### A brief history of Glass Making

One of the commodities that has figured in the relics of the oldest civilisations is glass. Though its history is wrapped up in obscurity, archaeologists have traced it as far back as the fourth millennium before Christ; the discovery of crude glass beads in Egyptian tombs of this period is probably the first available evidence of glass-craft in the world. The workmanship of these beads and other trinkets and charms of glass found in the tombs is assigned to Syrian craftsmen. The Glass was very elementary in composition being opaque and used more as an enamel for coating round a core of some other substance. On the walls of the tomb of Beny Hassann of ancient Thebes (3500 to 2000 B. C.) are found pictures believed to be of glass blowers and illustrations on the walls of the tombs of Tih (3800 B. C.) are also said to represent glass blowing. Tradition places the invention of glass at 1700 B. C. in Syria and Pliny mentions the Phoenicians as the first glass makers (Natural History—XXXVI P. 65–66). It is generally believed that the Assyrians of the 7th Century B. C. were fairly competent glass makers. There is another theory, not much credited, which ascribes the accidental discovery of glass to Phoenician traders who made a cooking fire between slabs of saltpetre on a sandy ground and found there a shining hard surface—glass—the next morning. Glass is referred to in the writings of Pliny, Tacitus and Herodotus. And Thebes, Sidon and Tyre are the places mentioned in this connection. It is not till the 16th or the 15th Century before Christ, however, that one can come across the manufacture of pure glass. Glass beads and ornaments of pure glass were discovered in the ruins of Memphis (1400 B. C.): Egypt was then the home of this art and small vases and jars of molten glass poured round a core of sand were the products of this period. In fact this was the only known process of glass making for many centuries, blowing being a comparatively later art, started about the beginning of the Christian Era. In those days, Alexandria was famous for its glass-ware, its special feature being the decolourising process. In course of time, the fame of Egyptian glass was carried abroad by the trading Phoenicians who themselves carried on the large trade in glass between Egypt and Imperial Rome.

The Romans were not slow to appreciate the value of the art of glass-making and one form of tribute from Egypt demanded by Caesar Augustus in 20 B. C. was a supply of glassmakers. However, Egypt still managed to preserve the export monopoly of glass for forty years more till the reign of the Emperor Tiberius. The Romans learnt glass craft very

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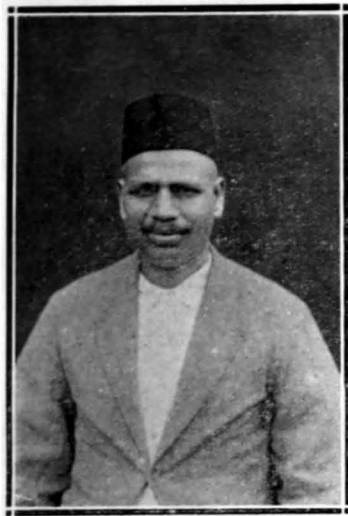
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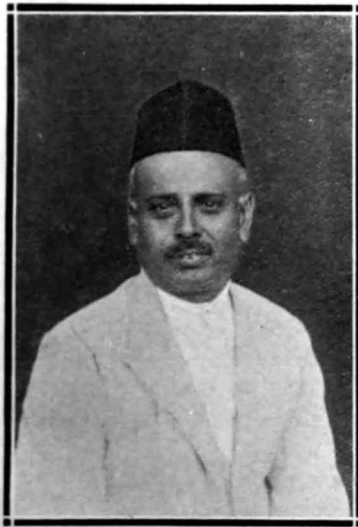
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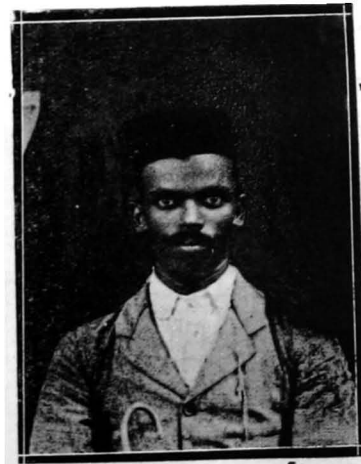
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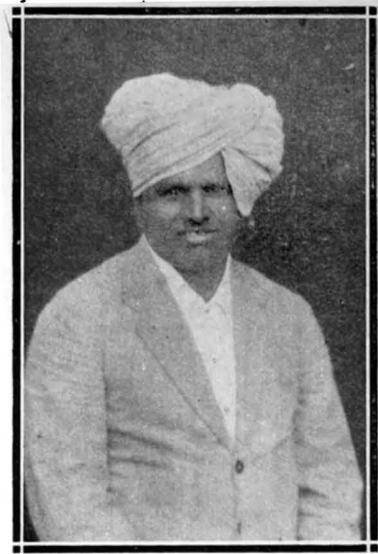


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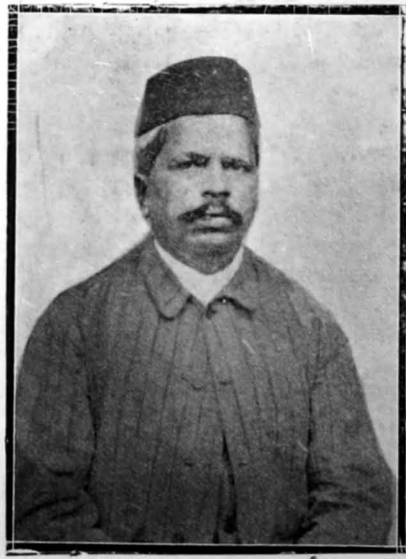


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*Life Members*

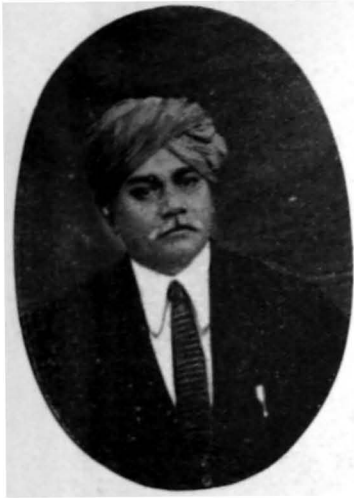


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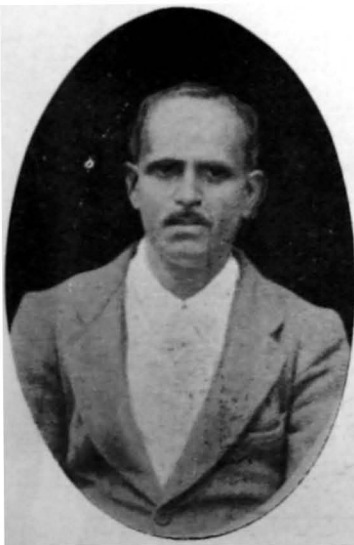
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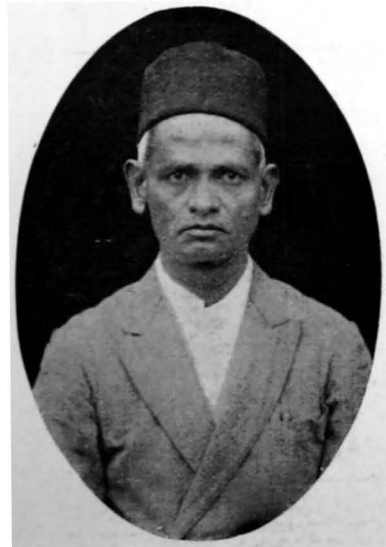
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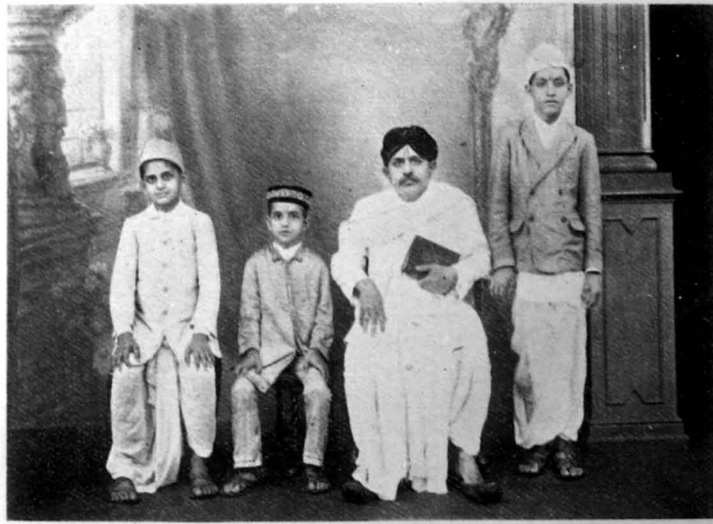
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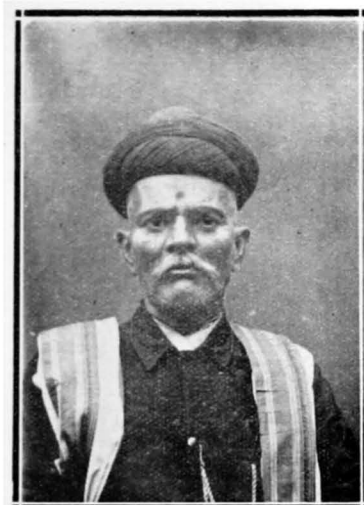
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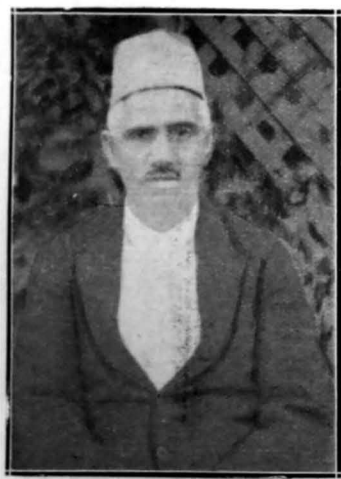
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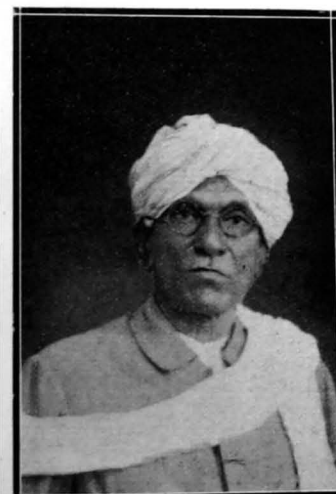
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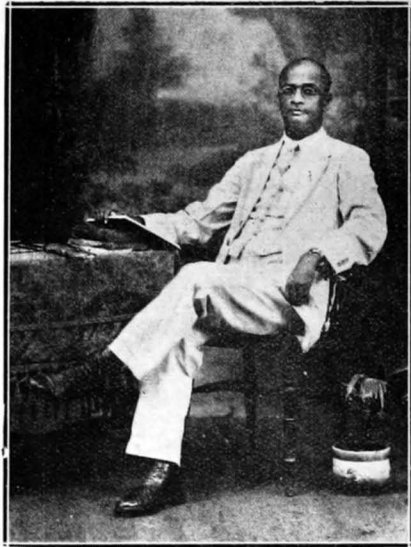


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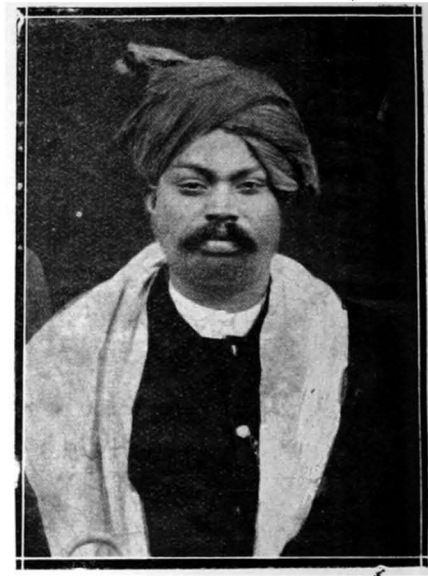


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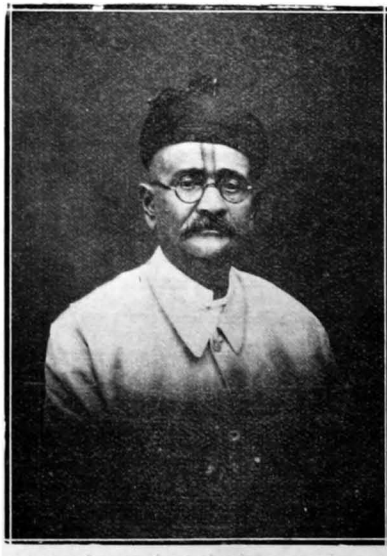
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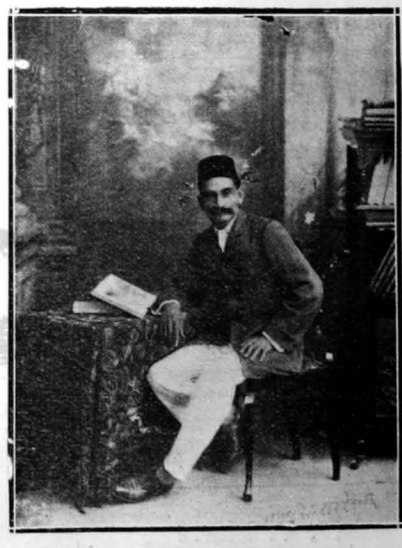
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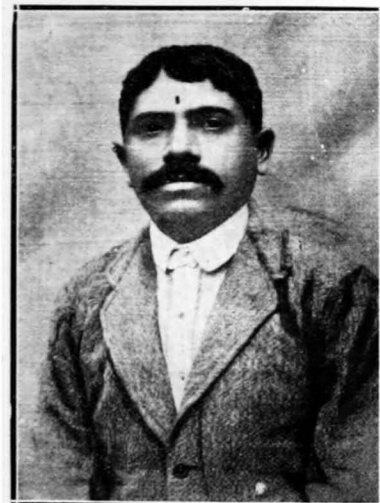


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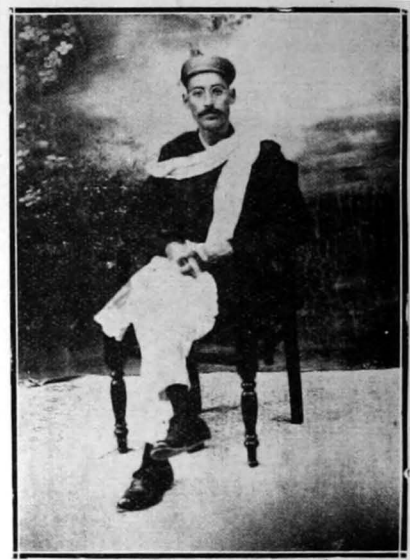


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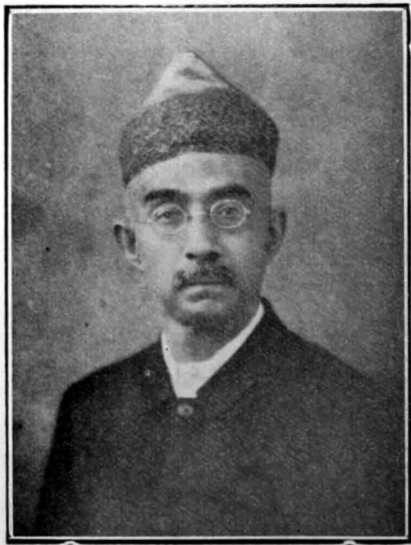
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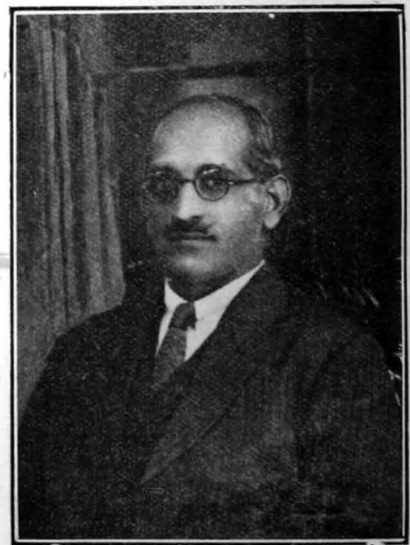
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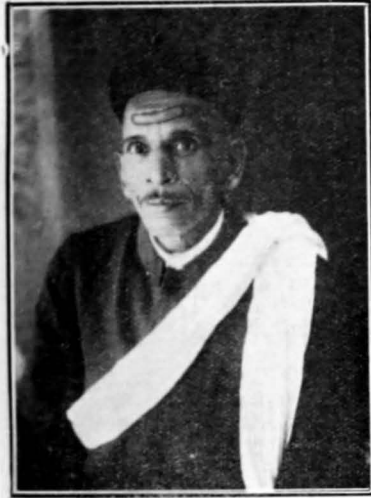


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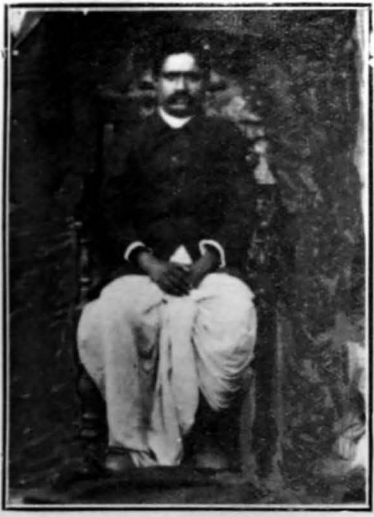
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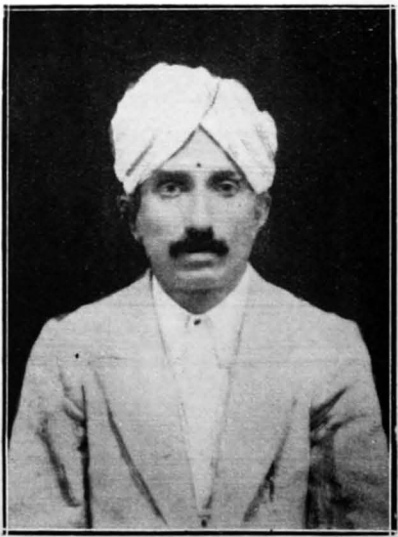
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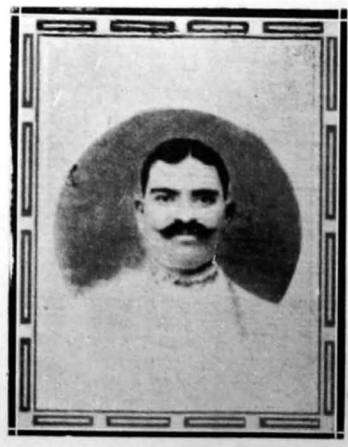
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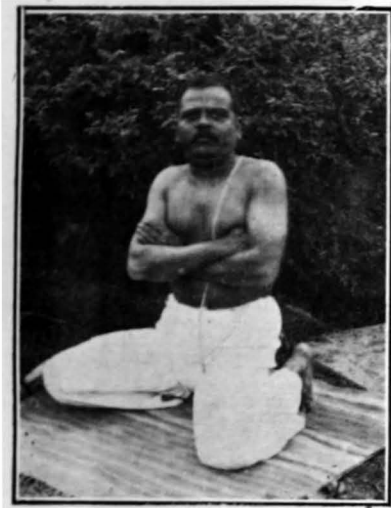
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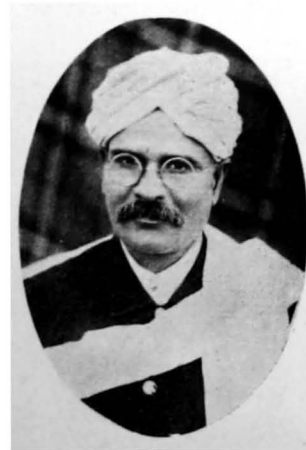
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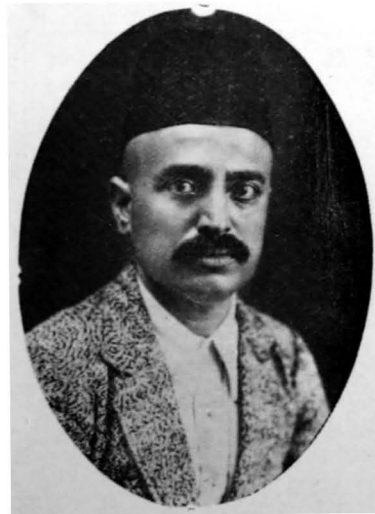
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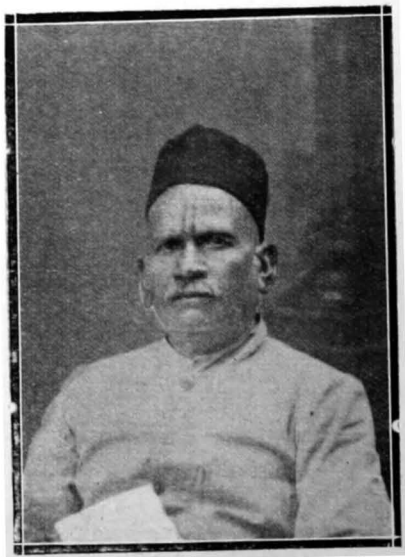
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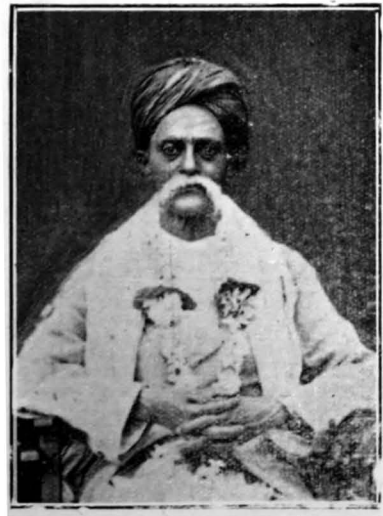
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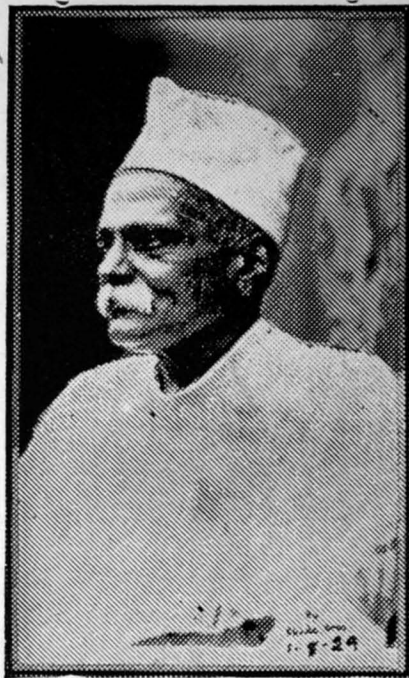


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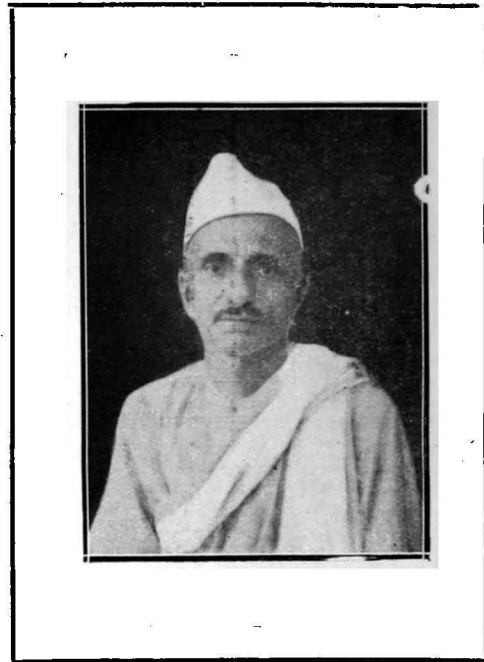


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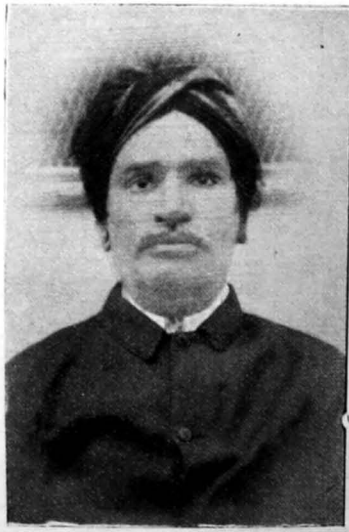
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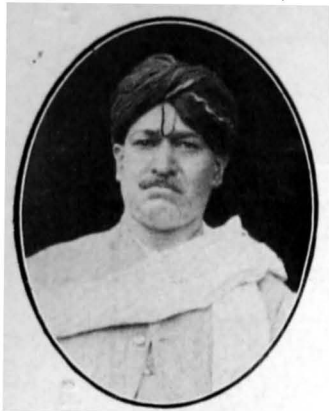


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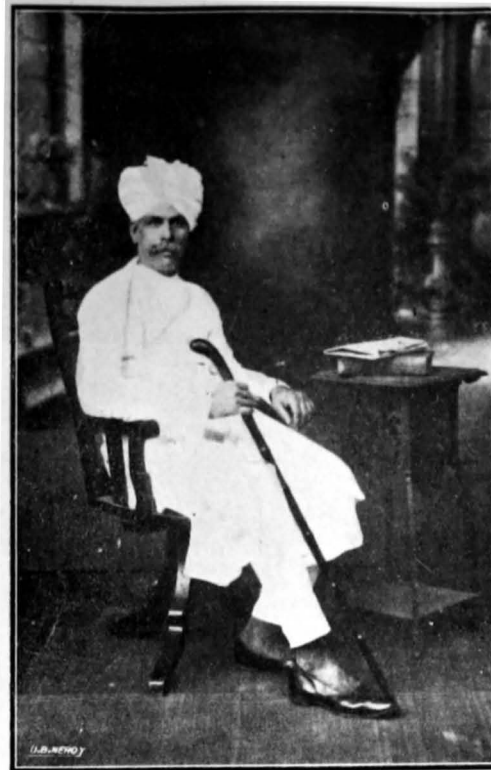


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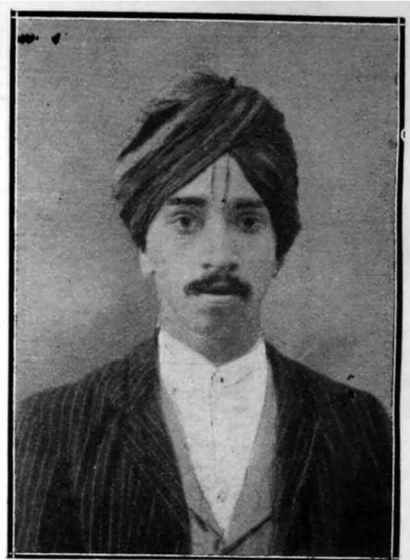


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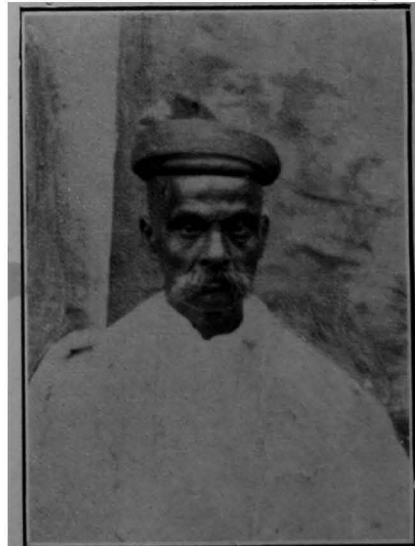
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quickly and developed the art throughout the period of their empire, till its conquest by the Gauls. At the end of the third century, Rome had a flourishing glass industry and made decorated glass and window glass.

Thereafter, while Greece alone produced no glass, there were glass works in Italy, Spain and Portugal, France, Belgium and the Rhineland in the 2nd to the 4th centuries A. D. when Britain also learnt the art from the Romans and Gauls. After the fall of Rome, it was to Byzantium, that the centre of the glass industry shifted. From the 3rd to the 5th century, with the impetus given to it by the Emperor Constantine and by Theodosius after him, glass makers had a period of great prosperity. All facilities like free seaports and remission of taxes were afforded to them. From the 5th century onwards, however, there was a decay in artistic glass craft till almost the 15th century. This period was remarkable only for achievements in stained church window glass.

Most of the processes in the manufacture, decoration and artistic work in glass dates back almost to as old a period as pure glass making in itself. Thus the making of imitation precious stones, Central Europe free-hand blowing, blowing into the mould, implement treating, mosaic glass (as of Alexandria), glass painting, cold and hot enamelling, gilding, and welding—all have been practised and perfected since the earliest times. The art of the lapidary, for instance, seen at its best in the famous Portland vase, dated back to the century before Christ. All of these various arts were freshly revived in what is known as the Venetian Era (18th to 16th Century A. D.) Venice recalled its workers from Constantinople and gave them every encouragement. Beautiful Venetian or Murano glass was famous the world over and the corporation of glass makers in Venice was a body of privileged persons. The knowledge of the art was jealously guarded and restricted to the kingdom of Venice alone. There is an instance of two workmen being murdered for disclosing the secrets of their art to King Leopold of Belgium. In spite of all prohibitive laws, made yet more stringent in 1763, many workers slipped off to other countries and gave them the benefit of their craft.

Among the glass workers of this period ( 15th Century ) the names of Angelo Beroviero, Dominico Injotti and Christopher Briana are famous for their work in coloured and other artistic glass. With the spread of knowledge of glass-making, other countries soon came in line with Venice. Window glass used to be made in Germany since the 10th Century and during the 17th Century, Johann Schaper of Nurenburg, Benchert, Keill and the Saxon chemist Kunkell became well known for their very high quality of work in glass.

It was in Bohemia that glass engraving was made successful in 1609 by Gasper Lehmann. Bohemia was the home of European glass for many years, especially in the middle of the 18th century when it was at its

zenith and when mirrors and beads of a very high quality were manufactured Bohemia was always famous for its optical glass. The early success of the industry in Bohemia was due to the special advantages of cheap and plentiful forest-wood fuel and potash. Small factories sprang up quickly and have continued their success even to the present times. Apart from the advantage of fuel, the Bohemian glass industry profited by other advantages like low wages, an entirely exporting market, long experience, enterprising and clever inventors, the system of working processes being practised as cottage industries and help of expert salesmen and financiers.

France started attempts to manufacture glass as early as the 14th century, but, it was not till nearly three hundred years later, that success was achieved. The minister Colbert brought, in 1665, twenty-five Venetian experts and started a factory for making mirrors at Cherbourg and another at St. Cloud for making flint glass. Thevart succeeded in 1788 to manufacture sheet glass and started factories at Paris and St. Gobain for manufacturing mirrors and lens glass. It was very gradually, however, that France succeeded in establishing a glass industry. Plate glass is now its speciality shared by Belgium where glass making was begun along with France. In most of the other European countries, the seventeenth century was generally the period of starting the industry in which they have met with varying success.

As far back as the year 674, attempts were made in Northumbria by Benedict Bishop to manufacture window glass, but the industry did not prosper owing to the dearth of skilled workers. State encouragement, however, was not wanting. Richard II imported glass and Chinaware duty free and later Elizabeth brought over two experts, Cornelius de Lannoy and Jean Quarre, with their men who built a factory similar to one at Antwerp. This was the first glass factory in England (1557). Though progress was slow at first, by 1700, when flint glass was made at Ravenscraft, the English Industry was in a flourishing condition. The invention of flint or lead crystal glass, a product of particular purity and brilliance, was solely an English achievement and it revolutionised the art of glass making.

The fame of fine quality English glass gradually overshadowed that of the Venetian product. The rapid development was further speeded up by the efforts of the second Duke of Buckingham, who imported Venetian workers and by the end of the 17th Century, the English industry was very prosperous, there being nearly 90 factories making bottles; plate, and window glass; flint, green and ordinary glass; and fancy articles in great variety. The use of covered pots for melting glass and of coal for fuel were likewise English inventions. The first large factory, which cast plate glass, was started in 1773 in London and gradually the industry spread out in the country. The ultimate success of the English Glass Industry was due to a number of factors

among which the chief were the system of small well distributed units, co-operative buying, proximity of coal as fuel, a well organised division of labour and finally a long experience of methods by trial and error. Hodking and Cousen in their 'Text Book of Glass Industry' divide English glass-making history in the following periods:—

- .... to 1845 ... .... Industry crippled by an unsympathetic Government.
- 1845 to 1875 .... .... Progress.
- 1875 to 1914 .... .... Competition and decline.
- 1914 to 1919 .... .... Revival.
- 1919 After .... .... Slow decline.

Coming to the recent times the industry in England has suffered owing to trade depression as in all other countries, but, as Prof. W. E. S. Turner says in his article in the Times, British Industries Number (1-11-32), "Without Tariff, the position of English Glass Industry would have been far worse". He reviews the position of the industry and his conclusion can be summed up as follows:— The Glassware for domestic use turned out by pot furnaces is in growing demand, but, sheet and plate glass is in need of protection. In 1930, Britain produced over five million sterling worth of jars and bottles, these being the speciality products. British production was highly efficient and in advance of other countries, and provided 90 % of the total demand of consumers. Sheet and plate glass worth nearly five million, was produced in the same year. Plate Glass has received a great impetus from the motor car industry which uses small plates. The production of sheet glass was satisfactory, a single factory turning out over a million square feet per day. Special Motor glass like Triplex was produced to the value of £ 885,000 in 1930, domestic and fancy ware £ 827,000 and illuminating ware worth £ 362,000. The share of scientific ware was the smallest while that of artistic ware was steady. The production of electric bulbs was adequate since the war. By an agreement with Continental Works, seventy million bulbs were produced per annum by two big firms. The Westlake automatic machine was in use producing 70 to 90 thousand bulbs per day. Two factories were recently started and two others have taken up this line. Great progress is visible in producing capacity. In fifteen years since 1916, the out-turn per furnace has grown from 65 tons to nearly 800 tons. Increasing economy has been effected during the same period, the consumption of coal falling from nearly 2 tons per ton of glass to 10 cwt.

The American glass industry like the country itself is thoroughly modern. The first effort took place in New Hampshire in 1790 by Robert Hewes, and turned out unsuccessful. But gradually the industry was revived and whereas upto the middle of the 19th century, the United States manufactured only window glass and bottles, every kind of glassware began to be turned out within fifty years. America has made the most

important contribution to the glass industry, viz. the inventions of automatic and semi-automatic machinery for producing enormous quantities of bottles and jars, electric bulbs, sheet and plate glass and tubing and rods.

Coming nearer home and before starting on the story of our own glass making, we can glance with profit at the account of the **Japan's Work** Japanese glass industry, without which no History of Glass can be complete. Beads and coloured glass were manufactured in Japan as early as the 8th Century A. D. (the Daiho Era), but, a real beginning was made in the 17th Century, when Hamada, a Nagasaki merchant, brought home from abroad the art of making optical glass. Later, a Chinese expert came over and taught the art to the people of Nagasaki. Another Nagasaki merchant, Harimaya, studied the art with Dutch merchants and brought it home.

Hitherto, only the making of trinkets and ornaments was practised, but Osaka made a start in glass blowing in the middle of the 18th century. The craft was supported by feudal lords and many old-fashioned factories were making optical glass, beads and bottles; but, the modern industry was introduced in the Ansei Era (1854-60) when Japan was opened to foreign trade. The manufacture of lampware replaced that of beads during this period. The Meiji Era (1868-1912) saw many internal disturbances and involved losses and gave a set back to the old-fashioned industry, still under the patronage of the feudal lords.

Upon the restoration, however, Government itself took a hand in the management of the modern industry. Experiments in plate glass were started and failed. Then British instructors and equipment were brought and set up in Tokyo and Osaka. They too did no better. Since 1876, Industries were a branch bureau of Government's Engineering Office and by it Japanese workers were sent abroad for training. There were good results in the manufacture of beer bottles, other bottles, and lampware, medical appliances, and tableware.

The industry reverted to private hands in 1885, when Government had incurred heavy losses. After that there was a series of more failures in undertakings, both Government and private. No less than seven big failures occurred during the period of 1876-1895; but they were compensated by a very valuable experience and a good training for workers. "The bitter experience of failures was the basis of the modern Japanese glass industry" as is observed in the history of Japanese glass industry in the Osaka Mainichi and Tokyo Nichi-Nichi, Japanese Glass Industry Number (31-8-1928).

Many skilled operatives were scattered all over the country and started concerns of their own. Considerable improvement was effected in furnaces, melting pots and other equipment, as well as in the knowledge of mixing. The development of the industry, especially in Osaka was largely due to

Keishin, the most influential pioneer of the Japanese glass industry. All operatives trained by him during 25 years, became in time, leaders in the industry. The Japanese Glass Manufacturing Company founded by him, resulted after its closure, in the starting of about a hundred concerns that flourished in 1890.

The subsequent history of Japanese domination in the glass market need not be told in detail. Suffice it to say, during and even after the Great War, Japan was a supplier of glass to almost every country in the world. Among the products, lampware was supreme till the advent of electricity. Tableware and bottles were always flourishing. Tokunaga patented several kinds of bottle-making machines. Beads and imitation pearls of all kinds had a steady market, chiefly in China and the United States of America. Production of chemical and medical appliances and electric bulbs was comparatively insignificant, but, Thermos flasks, Optical glass and Watch glasses were important lines of export. Plate Glass was attempted from very early times and very persistently, but has not yet been so successful as the other products. On the whole Osaka has been more successful in the glass industry than Tokyo and Japan continues yet to be one of the chief glass exporters of the world.

Though glass making is not one of the Fourteen Sciences and Sixty-four Arts of Indian tradition, Kanch is mentioned in Sanskrit writings more than 2000 years old. There is reason to believe that glass making was known even earlier (800 B. C.) In the Yajur-

**Glass Industry in ancient India** Veda glass is indicated as one of the articles of which female ornaments were made (Watts Dictionary of Economic Products of India, Vol. 8, page 504, line 7). It is also noted in the Mahabharat and in another old work, the Yukti-kalpataru which compares the effects of drinking water out of a glass vessel and a crystal cup. (Monograph on the pottery and Glass Industries of the North Western Provinces and Oudh, by Dobbs, 1895, Chapter 9, page 29). There are references likewise in the Ramayan, Ayodhya Kanda, Sarga 83, and the Yoga Vashistha. The theory of the Assyrians of the 6th century B. C. being the same as the Asuras of the Hindu Mythology might also give some support to the presumption of glass making knowledge among the ancient Hindus.\*

Pliny mentions Indian glass as one of a very high quality, attributing its superiority to its manufacture from crystal. He says in his Natural History that the Troglodytes took specimens of Indian Glass to Osifys (which is believed to be present Ghela near Bab-el-Mandeb). Rajendralal Mitra asserts in Indo Aryans, Vol. I, that glass made from quartz in ancient India was considered to be of a very superior quality. Miss Rivette Carnac, writing in the Journal of Indian Arts, says that religious relics found

\*Modern Encyclopaedia, Vol. 1, page 281.



at Benares and Cawnpore and now in the British Museum contain glass beads of Indian Manufacture in the years before Christ, "The Singhalese, who borrowed all the arts of civilised life from the Hindus, make mention, in the Dipvamsa, of glass mirrors (carried in processions) in the 3rd century before Christ, and of a glass pinnacle in the 2nd century before Christ." (Tennents Ceylon, I. 454). Admiral Fitzroy also speaks of the practice in India and Ceylon to keep glass balls on spires of buildings. Cunningham discovered ancient glass pieces (Now in the British Museum) at Mankiala in the Punjab and Forest found some old glass vessels in the Kaira district of Gujarat.

"The discovery, recently made near Peshawar by Dr. Spooner, of some bones of Buddha in a transparent rock crystal receptacle, reveals the existence of a relic of ancient Indian Glass. This receptacle from its make and composition was evidently of Indian Manufacture, just as the casket enclosing it, is supposed to be of Greek construction. The transparent receptacle found near Peshawar, being hexagonal in shape, hollow inside and with a hole on the top was apparently cast in a mould," (H. Hementakumar Ghosh). There is cause to suppose that the glass makers' art penetrated into so ancient a country as China through the northern Himalayan passes. "It is significant" says Stein in Ancient Khotan page 373, "that according to the Peo Shih, the first makers of Glass in China were traders from the country of the great Yulk-chih, i. e. from the old Indo Scythian dominion, for which the land route through Khotan was a more likely line of communication than the sea-route."

Finally, pieces of ancient Venetian glass in the Vatican Museum are said to be remarkably similar to those made by indigenous workers at Kapadvanj, in the Kaira District. It is inferred that the Assyrian contact brought the craft into India and was practised in ancient times with the raw material of pounded quartz melted in primitive furnaces burning wood fuel. It is a big gap from the ancient times to the 16th century, but the intervening period (corresponding to the Dark Ages of Indian Economic History) is wrapped up in obscurity. Since the early years of the Christian Era, the Indian glass-makers' art appears to have dwindled into insignificance, for it was not even heard of when glass making was flourishing in Alexandria. The next we hear of Indian Glass is in the 16th century, when "according to tradition", says Dobbs in his Monograph on the Pottery and Glass Industries of the North West Frontier Provinces and Oudh (1895), raw Indian glass was exported in large quantities to Europe and the North of Italy... The Venetians at one time obtained, if not their raw glass, at least its ingredients, from the plains of Hindustan" (which after all is not a very gratifying thought).

In the sixteenth century and even much later, the industry had not advanced beyond a crude stage—the making of bangles and small phials. A likely clue for this condition could perhaps be found in the instance of

poverty of heat in Indian furnaces quoted by Buchanan, who in his travels from Madras to Mysore, found that even the cullet (broken bits) of English bottles could not be melted in the furnaces he came across. In the seventeenth century we first hear of glass enamel probably under the patronage of the muslim rulers. There was, however, no remarkable progress and the Indian glass industry right upto the advent of the modern era (and even after) could not be said to be ever in a remarkably flourishing condition or celebrated for any particular product. The only Glassware in India with any pretensions to art, was produced before modern times according to Watt (Dictionary of Indian products), "at Patna: coloured articles, elegant but extremely fragile." The indigenous production till the last quarter of the 19th century, was restricted to the following localities:—

The Punjab—Lahore, Karnal, Jhelum and Hoshiarpur Districts.

U. P.—Bijnore, Lucknow and Saharanpur.

Bombay—Ahmednagar, Kaira and Baroda State.

C. P.—Seoni.

Bihar and Orissa—Patna.

Madras—North Arcot.

Rajputana States—Jaipur, Udaipur.

The chief articles of manufacture were bangles, beads, small bottles and coarse toys. Crude globes silvered inside with mercury and coloured glass pieces for mosaic were the specialities of the Punjab, Rajputana and Burma. Rajputana was particularly famous for artistic glass mosaics and the novel Shish Mahals (Halls of Mirrors), in which small silvered glass pieces set closely in the plaster of the walls and ceilings, reflected millions of tiny images.

The sixty years and odd of the life of Indian glass industry on modern lines, can be divided into two distinct periods separated by the brief interlude of the War. Thus the first period dates from 1870 when an attempt was made to start a glass factory in India, till 1915 when the Industrial Commission was instrumental in throwing some light on the condition of the industry. Abnormal conditions prevailed during 1915 to 1918, after which year till 1932 (when the Glass Tariff Board was appointed) elapsed the second period, much the same, it is to be feared, as the first. The Industrial Commission characterised the history of the glass industry upto that date as "a history of failures", and an account to the present times will hardly deserve a better name, but, for the redeeming feature of a few successful concerns—not the least important of which is the Paisa Fund Glass Works, Talegaon.

Appendix D gives a list\* of all the available names of glass works in India, numbering about 70. Counting about twenty-five of these, and a few others of which the information could not be traced, over thirty factories with a total capital of more than fifty lakhs had failed before the War. "The Indians seemed to have a peculiar fascination for the glass industry", said the Industrial Commission (also saying somewhere else that Indian capital was shy). Indians seemed to persist in investing in the industry but without taking any lessons from the earlier failures". Only three factories were working when the war broke out, nor were they working at a profit. "Though the Talegaon Factory" admits Sir Alfred Chatterton in the Industrial Hand-Book (Indian Munitions Board) "with the aid of the Paisa Fund, was paying its way on the somewhat peculiar and non-commercial lines on which it was run."

It would be worth while at this stage to go hurriedly over the first period. The first experiment was by one H. Whympier, Manager of the Murree Brewery, who sent samples of local products to European experts and upon receiving encouraging opinions from them, started the Punjab Glass Works at Jhelum in 1870. He brought a German expert and started the manufacture of bottles; the enterprise was soon abandoned as no gain seemed likely. The failure was due partly to the expert's ignorance of local conditions and partly to the impatience of the owner who wanted quick results for his money.

The second venture was undertaken in 1879 by one A. Smith, an indigo planter who with some Government aid, started a factory at Aligarh. He had to close within two months. The third attempt was made at Bhagalpore in 1882, by Wilson, who had visited Venice and had Government support. He failed before starting, not being able to generate sufficient heat.

The fourth was the first Indian enterprise. The Pioneer Glass Works of Titaghur was started in 1890 with a capital of 2½ lakhs, using Indian raw materials, under foreign (Austro-German) supervision and expert direction. For eight years the concern fought up the struggle, in spite of the desertion of the foreign workers. Ultimately it failed as its newly trained workers were lured away by other concerns.

This was the first Factory to train Indians in Glass making. After this, from 1890 to 1916, no less than twenty-five works were started in different parts of India, but, not more than five have survived viz. those at

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\* The list is compiled from the following sources:—

- (1) Mr. Ishwardas' case prepared for the Industrial Commission, 1916.
- (2) Mr. Chandorkar's articles in Lok-Shikshana, about 1914-15.
- (3) Information supplied by the Directors of Industries of some provinces.
- (4) Bombay Swadeshi League's classified list of manufacturers.

Amballa, Naini, Bahjoi, Kirloskarwadi (now shifted to Ogalewadi) and Talegaon. The first two, however, have changed hands more than once during the period. Incidentally these are the Big Five of the Industry even to-day under their latest names.

Among the works that failed, German, Austrian or Japanese experts were engaged by almost all; many had invested big capital and possessed excellent equipment, e. g. those at Hyderabad (Sind), Gwalior, Ahmedabad, Jubbulpore and Madras. One or two tried gas furnaces and tank furnaces, but to no purpose. The causes of failure are reported to be bad production in the most number of cases, heavy expenses in almost an equal number, experts' ignorance or desertion and furnace defects in quite a few, mismanagement in a good many, and the last but not the least occurring cause given is internal quarrels. The sponsors of some enterprises, notably those (that were) at Madras and Baroda State have grown so pessimistic that they doubt the economic wisdom of ever opening another glass works in those localities.

It is abundantly clear that incompetent organisation was partly responsible for the whole series of failures. There was seldom accord between the management and the experts; the managers, many a time, were totally ignorant and the experts too, i. e., specialised in one process only, say furnaces or blowing. The investors wanted quick results and stopped financing just when it would have made all the difference between success and failure. In short, the lack of economically sound organisation can to a great extent account for the almost total loss of the huge sum of fifty lacs thrown away on the glass industry before the war. And yet, it could have been turned to good account if only the Government would have done something.

We have seen how the Japanese Government itself suffered very heavy losses side by side with the private concerns in the manufacture of glass. Less than that, we have seen how the State had intervened for industry in most of the other countries; even that much would have been enough for India. There would hardly have arisen need to look for causes of failures of glass works. Most of them would not have failed had Government done the proper thing; trained Indians abroad and at home, given financial aid, given patronage to Indian glass products, arranged for favourable railway rates, and finally given protection against totally foreign interests. As it was, the most that Government did, was to lend a little money, and that was about all.

The dirge of thirty failures would have been perhaps never heard, but for the war. It was only then that the Industrial Commission and next the Munitions Board, realising that glass was a key industry after all, enquired into its condition, expressed a mild surprise at it and offered all kinds of causes of its failure without unduly stressing the chief cause, the complete absence of State aid. Evidence before the commission on behalf of the Paisa Fund

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Glass Works was given by the Superintendent, Mr. Chandorkar, who was armed with a well-prepared case for the whole industry.

Mr. Chandorkar, in his written evidence, stressed the need of Government help unhindered by interference except in matters like audit. He agreed to the necessity of pioneer factories but thought public institutions more suited to run them rather than Government itself. The duties of pioneer factories, he pointed out, were making the industry familiar, training labour, achieving quality in production and thus bringing it to a level of competition with foreign goods. He emphasised Government's duty towards the industry and enumerated at great length, the ways of Government help, e.g. purchase of stores, supply of experts, technical instruction, favourable railway rates, a protective tariff etc. In his oral evidence, Mr. Chandorkar was severely cross-examined by a certain member of the Commission, who went to the length of suggesting that the Paisa Fund was doing no good. But Mr. Chandorkar stood his ground well and the Report of the Industrial Commission shows how little it was influenced by its member's gratuitous efforts to damn a useful institution. The Commission (to admit it in all fairness) tried to draw the attention of Government to its duty to the industry; *Appendix E* of the Industrial Commission's Report dealt at some length upon the problems of the Indian glass industry and made a number of suggestions to Government. Sir Alfred Chatterton also wrote very sympathetically about the industry in his monograph on "The manufacture of Glass in India" in the Indian Munitions Board Industrial Handbook. He granted that "Useful work has been done by the Paisa Fund at the Talegaon Glass Works in training glass blowers and the expansion of the industry under the war conditions is chiefly due to the supply of men who have come from this place." He also stressed that "The glass industry has come to stay, but, without aid from the State, it is likely to make very slow progress in the future."

The temporary success of the glass industry from 1915 to 1918 according to the Industrial Commission "was due only to the abnormal conditions created by the war"; return to peace conditions was predicted to seriously affect its continuance. The industry was on a precarious basis, only a few factories working with profit. There were, however, two factors in favour of likely prosperity, viz., improbability of early return to pre-war conditions and the value of practical experience and the profit gained during the War. The state of the industry at the time was reached by imported experts and students trained abroad; the former had failed owing to their ignorance of local conditions and the latter, because the industry abroad was a closed trade jealously guarded and had given little training worth the name. Technical knowledge in the industry was found to be extremely

limited and unless this defect was remedied, Progress was not expected to be rapid.

On the whole, whatever measure of success was achieved, was by the Japanese experts who popularised the pot furnace and trained a few blowers. Among the products, bangles was the only important item. Though indigenous bangle makers were scattered all over India, it was at Phirozabad in U. P. that the industry was found to be most concentrated. The place possessed no natural advantage except that of trained labour. The output was 20 to 80 tons per day and a capital of about Rs. 4 lacs was invested. The Indian bangles supplied nearly one third of the total demand. The total value of annual glass production of organised factories together with Rs. 20 lacs as the value of bangles came to about Rs. 40 lacs in the year 1917, by the estimate of Sir Alfred Chatterton ( Industrial Hand-Book ).

During war time, the Glass Industry suffered from the same handicaps as many others—viz. the shortage of wagons and coal. Even those fortunate factories who obtained contracts to supply Government's needs, had this complaint. In spite of handicaps, however, most of the factories got some advantage of the fall in imports to nearly half during the War, and did good business for the brief period. It was the war profits and the subsequent boom that gave a temporary impetus to the industry and about thirty new factories were started.

The war boom lasted at the most till 1920; already by 1919, the imports from foreign countries temporarily checked by the war, had returned with double the vigour.

**Second period:** The Indian industry was in no way equipped to meet them and soon foreign glass-ware established its old sway over the Indian market. The erstwhile protection which the war had afforded had disappeared and Indian glass makers were left to fight, on their own ground but unprotected, practically over the whole world. They could never hope to survive against a concerted attack of powers like Japan, Germany and Austria; all their war-profits were gone and they had the bitter experience of watching their own market captured by foreign goods. About ten works were soon closed down and the others survived only by their sheer tenacity. The second Swadeshi Movement of 1920, no doubt, gave a helping hand to the industry for a while; but just as people's fervour waned, and the trade depression advanced, the glass industry was in the usual sore straits, till the third Swadeshi Movement of 1930 gave it another draught of life-saver.

During the decade 1920-30, a few more factories closed down and the second period thus became a painfully exact copy of the first. But the glass manufacturers who have been clamouring for well-nigh fifteen years for state intervention, at last succeeded in persuading Government to hold a Tariff Board enquiry over the glass industry, and it was duly held in March 1932.

The report, however, is not yet out and the situation continues to cause anxiety especially owing to the depression of Japanese currency which had enabled that country to dump glass-ware in India at cut-throat prices.

At present there are yet about thirty factories (*vide appendix D*) in India, of which twenty-five are on the list of the Glass Manufacturers' Association. Among the others, the most important is the Indian Glass Work, at Firozabad, which includes six factories which have recently organised themselves in the Bangle Makers' Association. Among the newest factories are the Kandivali Bangle Factory near Bombay, which has employed banglemakers from Firozabad, and the Central Glass Works, Nagpur, started in 1932.

Among the names of men connected with the industry, those of A. Kallus and Mozina, appear foremost among the foreign experts during the first period. Among our own countrymen early names are Rajwade, Wagle Shafi, Sinha and Kanga. But the veterans of the Glass Industry who have made a mark, are Rai Bahadur Panna Lal, Lala Ishwardas, Pandit Vishnu Dutt, Ogale and last but no way less important, the Paisa Fund contingent headed by Mr. Chandorkar.

The chapter on the history of Glass-making cannot be complete without noticing the progress in the technique achieved in the course of centuries. It has been already noted that most of the methods and arts of glass-making are almost as old as the industry itself, i. e. every thing that the craftsman does with molten glass to-day, was done since the beginning of the Christian era. Improvement has been effected only in the processes and not in the fundamental principles. Thus the 'batch' of raw materials had always the same primary ingredients of silicic acid and alkali. Silica came in the form of quartz, flint or sand free from iron, and alkali was either in the shape of potash from wood ash, or soda ash (rochetta salicor) or sea-weed ash.

The latter was exported in large quantities by Spain and Egypt in the middle ages. Potash glass was made from very early times in Central Germany where forests provided wood for potash and fuel. Since the 17th century, calcium in the form of chalk was used with great advantage as to clearness and purity in the glass. Bohemian crystal glass was an early example of this experiment. The addition of lead oxide was an English discovery, also of the 17th century. But while it accentuated the purity and clearness of glass and added to its high refractive power, lustre and a ringing tone, the process also made the glass more brittle and heavy. Manganese and arsenic (some times called 'the glass-maker's soap') gradually came to be used as decolourising agents; while for colouring, different metallic oxides were used and a wide range of variation in colours could be obtained accord-

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ing to variations in temperature and proportion of ingredients. The colouring efforts upto the 18th century were directed towards the production of imitation precious stones and towards this end, a large percentage of cullet was required, as it helped quick fusion. On the whole, therefore, improvement in materials to this day consists in using purified chemicals or chemically treated substances, additions of minor chemicals and changes in composition—otherwise the basic formula of silica-alkali-lime has been the same.

Till the 19th century, pot furnaces with a central fire of wood or coal was the practice, but, in 1860, F. & W. Siemens improved heating by preheated gas and air and by producer gas, thus having the regenerating furnaces. They are recently replaced by the recuperating furnaces. The first tank furnace was built in 1873 by F. Siemen. Kiln for annealing and lehrs or heated tunnels for the same purpose have been about a hundred years in use.

In the matter of products, bottle-making went through many processes such as the pipe and tools, the open mould, the closed mould, the marvering block and the revolving mould processes. The first bottle blowing machine was invented in 1888 by Ashley in England. Inventions in Europe and the United States of America soon followed and the later machines had a more semi-automatic construction. The first completely automatic machine was invented by Owen in the U. S. A. and a machine with automatic feeding by Brooke of New York in 1901. In the manufacture of Sheet Glass though small plates were cast in the 18th century, blowing had been the process in vogue for a very long time after. It was much improved during the last century. In 1857, Clarke of Pittsburg attempted to make sheet glass without blowing, but ultimately success was won by the Libby Owens Company. Plate glass was made in the 18th century at St. Gobain in France and also in England. The U. S. A. succeeded in 1879 to work the rolling process by machine as also annealing, grinding and polishing processes. The latest developments since 1892 are wired glass, heat resisting structural glass and triplex pattern unbreakable glass (from behind the fancied shelter of which, probably Katherine Mayo threw stones at India). For pressed ware, soda lime and potash glasses are preferred to lead glass and lately alkali barium was found to possess special strengthening qualities. In optical glass, Germany had the lead all along since the 18th century. German work had achieved particular technical perfection since the Jens Revival of 1884. An exceedingly pure glass and the cunning art of stirring the molten glass are said to be the important factors in the manufacture of optical glass. Japan has been trying long to master the art and so has been Britain since the War.

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## Chapter V

# Organisation of Indian Glass Industry

It is to be regretted that the Report of the Tariff Board, the only body competent to present a comprehensive view of the glass industry as it is in India today, is not available at the time of writing on the subject. In the absence of authoritative and complete information such as the Tariff Board could publish, the only material to go on with is that bequeathed by the Industrial Commission in 1916, information from various reports, and that supplied by a few manufacturers and some Provincial Directors of Industries. It is another matter of regret that out of about forty manufacturers approached with a questionnaire for information, only five or six were good enough to respond. As a result, no material worth tabulating was collected and no grounds for definite statements made possible. Instead, therefore, of the up-to-date account of the Indian Glass Industry which the present publication aimed to submit, it has perforce to confine itself to a general discussion, consigning to the *Appendices* the scanty information received.

The scope of this chapter is to consider the glass industry in India from the point of view of its relation with the various factors of production and to see if any constructive scheme can be evolved after taking all the favourable and unfavourable factors into consideration. *Appendix E* of the Indian Industrial Commission's Report examined six aspects of the industry, viz. raw materials, direction, labour, climate, location and market. It is convenient to copy the method, taking up the problem of market, first.

*Appendix D* at the end gives figures of sea-borne imports of glassware into India since 1905-06. The figures illustrated by the accompanying diagram give a clear picture of the State of affairs. It will be seen that from the beginning of the period under review, there was a gradual rise in imports till the year of the War (1914-15) suddenly checked them. Thus from rupees one crore and twelve lacs in 1905-06, the imports rose to nearly two crores in 1913-14 and dropped to only ninety-six lacs in the year of the war. Among the countries that exported glassware to India in this period, Austria had 85 % of the share, Germany and Belgium each 15 % and Britain 5 %. By ports, half the imports were landed in Bombay, 80 % in Bengal, 10 % in Madras and the rest in Karachi and Burma. The Chief articles of imports were bangles from Austria, beads from Austria, Germany, Italy and France, bottles from Britain and Germany, lampware from Austria, Germany and Britain, sheet

and plate glass from Belgium and Britain. During and after the War, Japan, which had been nowhere before, seized 20 % of the share and raised it to 60 % in 1920. Till that year, it exported every kind of glassware to India, and though its share fell to 40 % and finally to 25 % from 1921 to 1931, it yet kept up a respectable contribution to every kind of glassware except sheet and plate glass and Sodawater bottles. Britain got the next best advantage during the years of war and till 1922, 20 to 24 % of the trade in Bottles, Lampware, Sheet and plate glass, and scientific ware, coming a bad second to Japan in tableware. 1918-19 was a bad year to exporters, most of whom were now engaged in the war; but they returned with a vengeance the next year, and 1920-21 will probably ever remain a record year for glass imports into India, when goods worth rupees three crores and thirty-seven lacs was unshipped in Indian Ports. Though the lion's share of the spoils went to the allies—Japan and Britain, Germany and Czekoslovakia ( a part of old Austria ) soon rallied round and displacing strangers like the U. S. A., Italy ( and even China ! ) from the Indian market secured respectively 16% and 8% of the trade in 1921-22.

In the next ten years, we see Czekoslovakia running neck to neck with Japan each having about 25 % of the share. But there will be a different story this year, Japan probably soaring high again, thanks to its depreciated currency. Germany is steady with 15% and Britain with Belgium comes last among the important suppliers, each getting about 10 per cent of the foreign glass trade of India. Since the last seven or eight years, Bombay Port's share of the imports had gradually grown less in favour of Karachi and Madras. Among the articles imported, bangles continue their high proportion and beads and false pearls their next position; figures for both, though increased since the war, are steady for the last decade, which can be said of almost all the varieties except "other glass-ware". A growing demand is distinctly visible in bottles and phials, while that for Sheet and Plate glass seems to be falling. In Sodawater bottles, lampware, tableware, and scientific glass there has been little fluctuation. The steadiness in most figures during the last decade could be accounted for by the economic depression which has reduced the consumer's purchasing power. The distinct fall in each category in 1930-31 however, is definitely due to the national awakening in India, the Third Swadeshi movement. As regards the total trade, though it fell from the elevation of 1920-21 to a crore less the very next year, two and a half crores has been the average figure for the last decade. The Swadeshi movement, however, has told heavily upon the glass imports, reducing them to a crore and sixty lacs in 1930-31. How far it is possible to keep the figure down to this level, depends not so much upon the manufacturers or consumers, but upon the State, as an examination of other factors will reveal.

Apart from the imports, the thirty and odd modern factories together with the indigenous bangle makers contribute to supply India's demand for

glass. For want of figures it is impossible to estimate the value of annual sales of Indian glass works. A very rough computation can be made on the basis of the scanty data available. The Munitions Board calculated in 1919 (as referred to above) rupees twenty lacs as the value of annual out-turn of indigenous bangles and another twenty lacs as the production of organised glass works. Assuming the production of bangles to be about twenty lacs today and calculating 30 lacs as the total annual value of Indian factory production (at the average rate of one lac per factory) for 30 factories, the total yearly supply of glassware made in India today could be valued at about fifty lacs. This figure should not be far from correct as it represents the approximate difference between the last decade's average of imports and the imports in 1930-31, which were the minimum owing to the Swadeshi movement, the entire balance of demand being supplied by India.

Considering foreign competition in the various articles, Indian bangles supply about the same one-third demand as they did in 1919 and foreign beads have no competition in India. According to the Industrial Commission, bangles and beads are the articles of normal demand in India, and it will be paying to further exploit this market. Only two or three factories manufacture bottles with the help of machinery and it appears that this line of business is not profitable to them. In lampware, however, there is a tough fight between Indian and foreign goods, since this is the main item of production of all the factories in India, which supply roughly half the total demand of the country. A few factories are claiming a small portion of the scientific glassware trade but it will take some time apparently before tableware can be produced in India in adequate quantity and quality. There is one factory, producing sheet and plate glass and the fact that it demands cent per cent protection from the Tariff Board, can show how hard is its struggle with the foreign article. The market for other glassware is fickle and its capture is as much a matter of displacing foreign goods as creating demand among consumers.

The problem of internal competition takes a peculiar aspect in India. Assuming that the products of all the works are of a uniform quality, and leaving aside the question of foreign goods, the factors of labour, climate, direction and even markets become unimportant before the problem of raw materials. Raw materials, the costliest item in glass manufacture, is the determining factor for location, upon which, time and again, critics of the Indian glass industry have harped. Therefore, with the whole of India as a market (in which the vicinity of ports is an adverse factor), with approximately similar conditions as regards labour, climate, capital and direction, we find that factories in a particular sector are placed in so exceedingly advantageous a position over the others owing to their proximity of raw materials, that they can command the most distant markets and defeat the idea of a well-distributed industry. Thus the works located within easy reach of the Sand supplies at Baragarh near Naini and the coal fields of Bengal, can afford to

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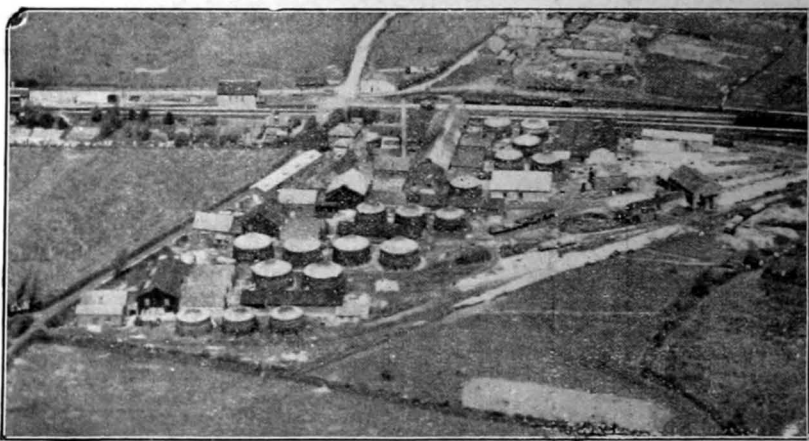
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so price their goods, that they can undersell the local products even in the Northern Punjab market or the market of Southern Maharashtra. There are, however, certain limitations to the above advantage:—

- (1) The present Railway rates which do not permit of transit with profit beyond a certain distance.
- (2) A stronger combination of other factors, such as direction and equipment, may permit production at a lower cost in distant works.
- (3) The better quality in production of distant works may yet command the market.

Internal competition among the glass manufacturers is at present both unfair and unhealthy. It is unfair in the sense that a few big factories, favourably situated, instead of meeting foreign competition in new lines, seek to capture the market in the same old articles that can sustain smaller and less fortunately placed concerns. Secondly, the competition is unhealthy in the sense that in the scramble for rate-cutting, the big concerns do not realise that though they might destroy the smaller ones, they will not survive long when ultimately left alone against foreign competition. At present, the repercussions of internal competition take place in widening circles in rather an interesting way; the concern which gets the worse in the competition in the U. P. — Bengal circle (the stronghold of the fortunate glass works) seeks fresh markets in the enclosing bigger circle of the Punjab, Rajputana, Bihar and Orrissa and the C. P. and drives out the concerns in these areas to seek outer markets. This process continues either till the port-zone is reached or the factories in the outermost circles are touched. These last are the most unfortunate; they have to fight the foreign goods from the ports on the one hand and the internal competitors on the other. It is a matter of pride for the Paisa Fund Works and one of its offshoots the Ogale Glass Works, that with these difficulties to contend with, they are keeping up a gallant fight, solely with the equipment of efficiency and quality.

The only way to remedy this evil of competition which has overtaken the industry at so early an age, is for all manufacturers to unite. They must either apportion the markets as the British shipping lines have done, or pool their products and compete with the foreign goods in a body, or find some other way of determining rates. Unless they adopt the policy of 'live and let live' among themselves, they have little chance to survive against heavy odds such as the Japanese competition, hostile railway rates and absence of a protective tariff. Over and above the huge Indian market, they have potential markets in the adjoining Asiatic countries and Africa. But even their own present market is likely to be lost unless some understanding among themselves is arrived at without delay.

As already pointed out, it is the nearness of raw materials that determines the locality suitable for glass works in India.

**Location** Because the main commodities, coal as fuel, sand as the main ingredient and refractory materials, together make up nearly half the cost of production. The country between coal producing Bengal and sand-supplying U. P. and refractory supplying C. P. is at least hitherto considered the ideal situation for the glass industry. It is, however, likely that other consideration like the vogue of gas or oil-fired furnaces, discoveries of suitable sands in different parts of India, or special adaptability to the industry of a particular people might, in future, cause the seat of glass industry to shift to new localities. It has also been seen earlier, that an efficient organisation of the other factors of production even now vitiates the handicaps of factories, away from the fortunate area.

We can now examine, in the light of further arguments, whether locality has not been made rather a bugbear by earlier students of the Indian glass industry.

In principles of Industrial Management, John Duncan enumerates the factors of determining the industrial location as markets, raw materials, labour and motive power, respectively in their order of importance, with climate, capital for investment and momentum of an early start, as secondary considerations. In placing markets, first he says that "When no other factors are to be considered, proximity to markets is the deciding one; if a market is accessible and all other things are equal, a plant to secure its greatest advantage, will always find it desirable to locate near raw materials (when they form an important element in cost)." The Glass Works in India must, therefore, be near raw materials only when the markets are also near. Considering that the Indian markets are extremely widespread and that cost of transporting finished goods is more than thrice that of raw materials, (with the present railway rates) it can be deduced that a situation commanding the widest market is at least as important as the one near to raw materials.

Thus distributing centres like Ahmedabad, Bombay and Madras may be away from sand and coal and be yet suitable for a glass works, if only for the wide market they can reach. The above author cites a few examples where proximity to raw materials counts for nothing. "The southern States contain the only cotton producing districts in the country (the U. S. A.), but Massachusetts is the greatest cotton manufacturing State; Illinois kills more cattle than any other State, yet Pennsylvania takes first place in tanning; Montana is the greatest producer of raw wool in the country, yet Massachusetts makes more woollen and worsted goods than any other State in the Union." In Japan, for the glass factories in Tokyo and Osaka, coal comes from Hokkaido and Kiyushu, which are respectively 600 and 400 miles off; nor is sand much nearer. Soda comes from England, and yet there are over 450 factories in the two cities. As a handicap against foreign competition, the argument of locality has not a leg to stand, as in England

itself the glass factories of London use sand brought all the way from Fontainebleau. The argument matters only as a factor in internal competition and how far it will be a handicap to a protected industry, remains to be seen.

We come logically to the next question, that of raw materials. The Industrial Commission was insistent upon the importance of a preliminary economic survey before any industry was started. There are, however, too many examples of successful industries which were started without any economic survey except that of the markets, and such disadvantages as might have arisen from ignoring some points, might very well have been compensated by special attention to others. Had the glass industry succeeded, the idea of a preliminary survey would perhaps never have occurred to any one; it is only when the industry failed mainly owing to want of protection and partly to want of direction, that all sorts of obscure theories appear to have been put forward to account for it.

Fuel, though not a raw material of glass, is yet the raw material of motive power—heat, and coal is found to be the best form of fuel for furnaces of glass works. Though coal is found in the C. P. and in the Hyderabad State, it does not attain the high fuel value of Bengal coal. Considering that a heat of 1800 C°. is necessary to melt glass, Bengal coal seems to be most adequate for the purpose. Wood is used in a few factories in India, but only as a supplementary fuel. Recently, however, the surcharge imposed on coal transit by the Railways, makes it prohibitive as they have for some factories like the Ogale Glass Works and the Amballa Glass Works, to bring it all the way from Bengal and they are constrained to look about for cheaper, though less efficient fuel. The fact that this surcharge is imposed upon distance and not quantity, is so strange that if one were to attribute motives (as Government attributed to the Indian economists upon their analysis of the Ottawa Pact), Government would appear to be deliberately favouring the railways at the expense of the collieries. Gas furnaces are expensive to construct and their superiority in India is not yet definitely established. They occur in two or three places and the Paisa Fund Glass Works is shortly going to erect one at Talegaon for experimental purposes. The application of electrically generated heat to melt glass is yet in the experimental stage and if it succeeds Talegaon can well avail itself of it as Tata's current passes within a furlong of the Paisa Fund Works. Crude oil is under examination as another possible fuel and will have a distinct advantage over coal if brought within the scope of utility.

Sand, Sand-stone or Quartz, the chief raw materials for glass, is found according to the Geological Survey of India in the following localities:—

Loghra and Baragarh near Naini; U. P.; Pedhamli, near Vijapur; in Baroda State (Sabarmati sand).



Allahabad; Madras; Amballa, Jubbulpore, and Hoshiarpur in the Punjab; Bikaner State; Sawai Madhopur in Jaipur State; Mangal Hat and Partapgarh in Rajmahal Hills (white sand stone) and Vindhyan quartzite.

A bibliography of Indian Geology (La Touche) gives the following localities: River Sand and bedded sandstone in unlimited quantities in the Santhal Paraganas, white quartz in the Southern area of Gwalior State, crystalline quartz near Buldhana in the C. P., deposits of powdered sandstone near Lahore and Jhelum in the Punjab, Chitaldroog quartz in the Mysore State. Jeto in Jullunder District and Ennore in Madras Presidency also have sand deposits. Besides the above excellent sand exists in the Hyderabad State and the Ogale Glass Works is also giving trial to sands near Gokak and Goa.

The Geological Survey of India is not complete and many untapped sources must exist in the unexploited regions of India. The various Works at present use the nearest supplies as far as possible, but the Naini Sand continues to be still the greatest single source of supply, owing to its superior quality and its vogue in the market. This sand and the one near Pedhamli in Baroda State are considered to be of the same high standard as the sand at Fontainbleau in France, the best of Europe; but the Pedhamli sand, as many others in India, is not yet exploited. Sandstone and quartz though available in unlimited quantities involve the process of pulverising and hitherto no Works in India appear to have found it worthwhile to replace sand with pulverised stone.

Of the alkalis, Soda or Soda ash is supplied mainly from East Africa. Magadi near Nairobi in Kenya was already cited as a near source of Soda supply by Sir Alfred Chatterton in the Industrial Hand Book (1919). Attempts in India to manufacture Soda, like the one in Dhrangadhra State, have not yet succeeded. There are great possibilities for Soda manufacture, however, with the impure deposits found in many parts of the country e. g., the deposits from Lonar Lake or on the Usar Soils in Northern India, or the alkaline efflorescence called *reh* found on many soils (as in the Kaira District) and formerly used by indigeneous bangle-makers. The manufacture of soda by Electrolytic method also appears to have immense possibilities in India, looking to the vast supplies of common salt available. Calcium (lime stone) is found in abundance all over the country. All the other chemicals like borax, potash and metallic oxides are hitherto imported. Refractory material is another important item. While fire-blocks, firebricks and fireclay of a sufficiently high quality are now available in India from Jubbulpore and Kumardubi, the problem of crucibles or melting pots is not so easily solved by all works. Those that make their own pots like the Paissa Fund (the pioneer crucible making glass works), the Ganga

Glass Works at Balawali and the Ogale Glass Works, as also some Works in U. P., have to bring the clay from a long distance—from the C. P., though Kaolin in a crude state is found all over India. Others, especially those near the ports mostly import pots from Japan. There is a promising future in India for this allied industry of crucible making.

Recently a new problem has arisen before the glass industry—the probable effect of the Ottawa Pact. Mr. B. B. Gupta, Lecturer in a Delhi College, as reported in the Bombay Chronicle of 28-11-1932, observed that most chemicals ( except Soda ) for the glass industry do not come from the Empire; they are imported from Germany or America and ( 1 ) a ten per cent *ad valorem* duty on them according to the Pact will therefore mean a rise in their prices by fifty per cent, since England's departure from the gold standard has already caused an artificial rise of 40 % in the prices of commodities imported from the above countries. This rise in prices of chemicals adds to the difficulties of an already struggling industry. (2) Glass and finished glass products are excluded from the agreement. Countries like Japan and Czechoslovakia will reap the advantage of this and not the Empire nor England, since a very small quantity of glass imports come from England. The only advantage the Empire is likely to get from the Pact will probably be the virtual monopoly of Soda to the Imperial Chemical Industries. Their probable manipulation of prices in the future (in absence of any foreign competition) will be yet another difficulty to the Indian Glass Industry.

Perhaps as much as raw materials, the factor of direction, in the spheres both of expert guidance and management, plays an important part in the organisation of the Indian Glass Industry. Late Justice Ranade, in the course of the inaugural address at the first Industrial Conference in 1890, said, "The superior skill of the foreigner must be freely availed of by importing it from other countries, till we can train up our own people for the work, first in Technical Institutes here and in foreign countries, and further in the far more practical discipline of factories and mills at work." These remarks uttered in the very infancy of the Glass Industry in the country can be kept as its guiding principle. Experience shows, however, that though the industry tried to follow these principles, it was hampered from the very beginning by the absence of equipment to rise above the foreign expert stage. The foreign experts were imported all right, but they showed little of superior skill and less of training inclinations. Barring a few exceptions, they were at the most second rate adventurers; the first class men, if any, did not get familiar with local conditions and had not their usual equipment; besides they fought shy of educated learners and above all, did not want to disclose what they considered as their secret knowledge. Finally, the glass industry needs not one but an army of experts—from the furnace builder to the packer and sales organiser; and an expert

in one line was totally a failure in others. The most that early foreign experts did in India, was to initiate the people in the elements of glass-making; whatever progress is made is made solely by the Indians themselves. Turning from the foreign experts for whom we have little use, we find the students trained abroad equally disappointing. Going over the names of a few of the many, we find that out of Rajwade (sent by Mr. M. C. Apte of Poona), Wagle, Potdar, G. D. Kelkar, G. P. Ogale and the Varshnei family, only the last two named people have shown some results; that too, because of the opportunity they had of working in the established works of their own. On other hand, men like Pandit Vishnu Dutt and the Paisa Fund Workers trained in India, in the hardy school of experience, have succeeded without ever leaving the shores of their country. It has been found that though theoretical training of a high order is available in foreign countries, little opportunity is given for practical work, without which mere theory is of little value, and it takes a long time after his return to India that a student (if at all he is ready to take off his coat and work) can make any use of his theoretical knowledge.

Thus we find that neither a foreign expert nor training does much good to the industry. The third alternative is of local training. The absence of any provision by the State for the training in Glass Technology is notorious. The Paisa Fund Glass Works was the only school, college, laboratory, or a technological institute for this purpose, till quite recent times and did its best with such equipment as its modest means permitted. Lately the Benares Hindu University (Department of Industrial Chemistry), the Forman Christian College at Lahore and one or two small institutions have started a course of Ceramic Technology; but considering the needs of India the provision, to put it mildly, is inadequate.

When we see the legion of primary technical schools, technological institutions and research laboratories in Japan and the elaborate curricula in ceramics of the Sheffield and Illinois Universities, we can see how poorly equipped is India in the matter of instruction in glass-craft. "It is the laboratories of Essen, Berlin and Groz Lichterfeld, that Germany wins her industrial victories. It is the brains of the Universities and of the technical schools which make Germany powerful in the markets of the world" (Sir Robert Hatfield—Germany's Commercial Grip on the World). The Industrial Commission suggested a co-ordinated organisation of experts (which of course, never materialised). Merely a batch of experts is of little use without the necessary hierarchy of technologists of all magnitudes to carry out the experts' ideas.

There is small likelihood of the State undertaking so ambitious a programme of technical instruction as is necessary. Even if it offers financial aid and protection, the glass industry in collusion with the Universities can yet arrive at an arrangement which will

be more practically useful than foreign training. Mr. Chandorkar, the Superintendent of the Paisa Fund Works, has submitted a scheme of technical instruction in Ceramics to the Tariff Board. Opportunity for experience, even by a trial and error method and facilities for laboratory research, should be more fruitful to the glass industry than a sketchy and vague knowledge of foreign methods.

The second aspect of direction includes management and organisation. A frequent reason of failure of glass factories in India has been given as want of accord between the expert and the management. The scarcity of experts formerly kept the factories at their mercy. A greater and varied supply of experts, locally trained, will no doubt allay such troubles. To place the expert in management is risky, unless he is also an able business man, which is not always the case. The best way, therefore, appears to be a complete separation of functions with the expert over the works and an organiser at the head of the office, both independent of each other, but responsible to the financier. At present, however, it is still true that when he himself is not at the head, the expert's domination over the concern, coupled with his ignorance of business methods, causes the owner great embarrassment.

Taking together the comparatively less important factors of the glass Industry, we find them almost satisfactory. Capital, **Capital, Labour,** as had been said earlier, is far from shy as far as this **Climate** industry is concerned. The tempting Indian market has persistently attracted capitalists in spite of the many and quick failures of factories. Given a reasonable guarantee of efficient organisation, there is no reason why fresh capital should not be forthcoming in the future. One thing, for which we should be thankful, is that hitherto at least no foreign capital has entered the field. If, however, the industry is protected by tariffs, there is a very real apprehension of foreign capital rushing in to take advantage of the better conditions. Though, from the instances in other industries, one cannot say that the evil may not have its good point, an all foreign glass factory in India may teach a thing or two to the local industry. Such a point is one which we can do without; and such a consideration need not weigh with us when we definitely want to guard against the entry of another thin end of the wedge of foreign capital in the Indian industrial system.

As to labour, though it is expensive to train, Indians are found to have as great an aptitude to it as any other people. The training of blowers and other minor craftsmen spreads quickly from the few to the many and though factories have failed, they have each left legacies of at least a few newly trained hands. The situation in this respect is much better than in the days of War and there appears to be no reason for anxiety in the future on this score. It is worth mentioning here that just as the industry in the U. P. has created a nucleus of glass workers in the North,

Talegaon has created another nucleus in the South, and while the latter did not have men with glass-making traditions like the Nagina and Najibabad workers to begin with, the Talegaon influence is as much in evidence as the other, if not more, all over India. The point of climate is of a very minor importance. The Indian worker is hardy and patient and high temperature and high humidity do not trouble him unless they go to extremes. In this connection, the humane point raised by Rai Bahadur Panna Lal of the Upper India Glass Works is worth noting: he rightly suggests that, in the hot season, the nights and cool small hours of the morning should be allowed to be utilised in glass works (by the Factories' Act).

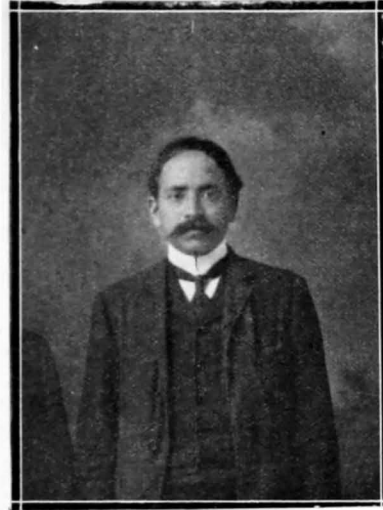
The makers of crude bangles and knickknacks scattered over the whole of the country and now surviving in a few regions, deserve some attention. The main localities in which they plied their trade before the coming of the modern industry were cited earlier. At present, though a very few still exist in the Ahmednagar District, Chinchni-Tarapur in the Thana District, and Kapadvanj in the Kaira District, their strong hold is the U. P., especially Firozabad. Bangle-making is a cottage industry in Saharanpur, Muradabad, Agra, Aligarh, Etah, Etawah and Pratapgarh; but Firozabad alone has twelve thousand banglemakers producing bangles worth seven lakhs of rupees every year. 4500 tons of Block Glass worth rupees two lakhs is made in Firozabad and the local banglemakers consume 60 % of this. There are six main works in the place; they have united themselves as the Indian Glass Works and organised as a Banglemakers' Association. The country bangle makers mostly buy coloured block glass from the factories. Formerly, they melted their own glass with cullet, pounded sand or flint, reh, alkali and lime, fused in a primitive furnace.

The bangle-making craft in the U. P. is mostly in the hands of the Muslims, who are poor, illiterate and in debt. They work from 50 to 80 hours a week and a well practised man makes two to three thousand bangles per day in nearly sixty varieties and in four or five elementary colours. Concentration in Firozabad has greatly improved the quality of Indian bangles, which can now stand competition in this respect with the foreign article. Recently a few Firozabad workers are brought at the Kandivali Bangle Works, near Bombay, under the management of Mr. Framroze. Finally, a brief reference might be made to a novel scheme suggested before the Industrial Commission (by the late Mr. Wagle), that of having, a high central block glass making Works in the sand and coal area and distributing the blocks to subsidiary bangle making factories all over India. The idea did not catch; for the waste of heat involved in cooling the blocks for transit and remelting them again, was not the least of the many objections against it.

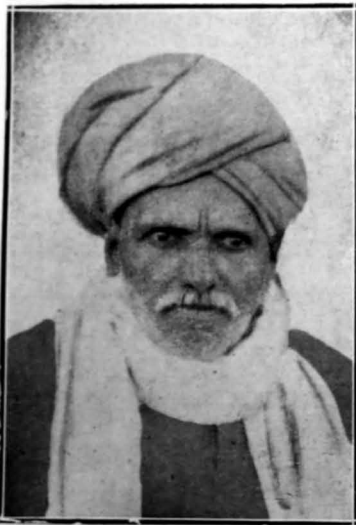
Persons Closely Related with Glass Industry



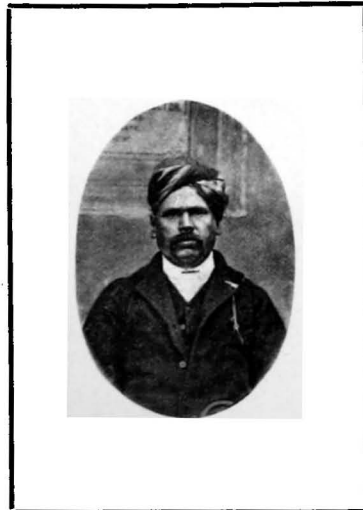
**G. P. Ogale**  
of the Prabhakar Lantern Fame  
Ogalewadi.



**G. N. Poddar B.A.**  
Chemical Engineer, Tokyo.



**Late V. G. Vijapurkar**  
Talegaon.



**Late P. G. Godbole**  
Founder of Godbole Scholarship for  
Glass and Pottery  
Paisa Fund Agents, Raipur.

PAISA FUND SILVER JUBILEE NUMBER



**Seth V. M. Dhanji**  
Indian Glass Ware Co., Bombay.



**G. M. Dhanji**  
Indian Glass Ware Co., Bombay.

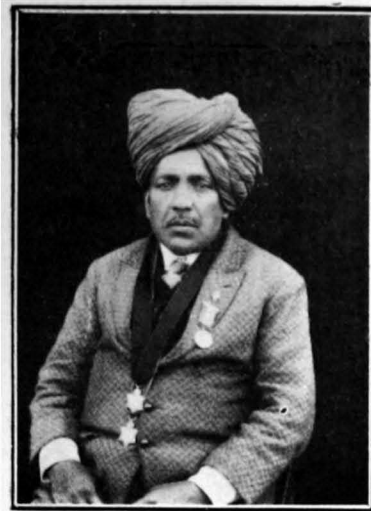


**Seth I. H. Sakur**  
Indian Glass Ware Co., Bombay.

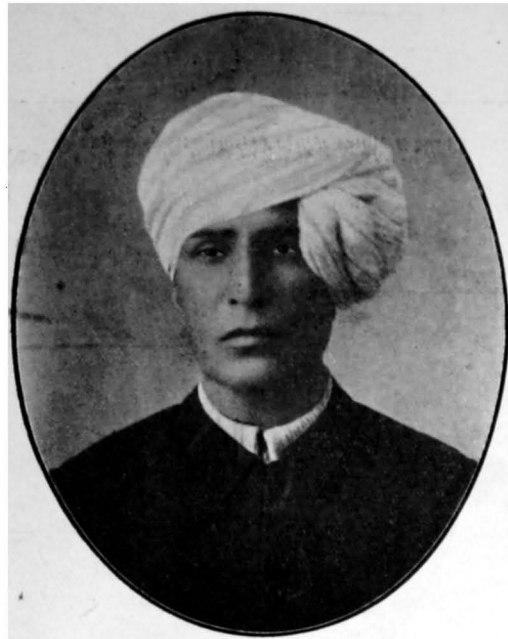


**K. B. Limaye**  
Paisa Fund Agent-Sangli.

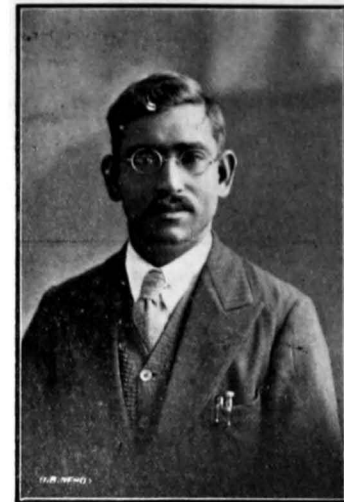
PERSONS CLOSELY RELATED WITH GLASS INDUSTRY



**R B. L. Pannalal**  
Governing Director,  
Upper India Glass Works,  
Ambala.



**Brijalal Sharma**  
*Proprietor, Paliwal*  
Glass Works, Shikohabad.



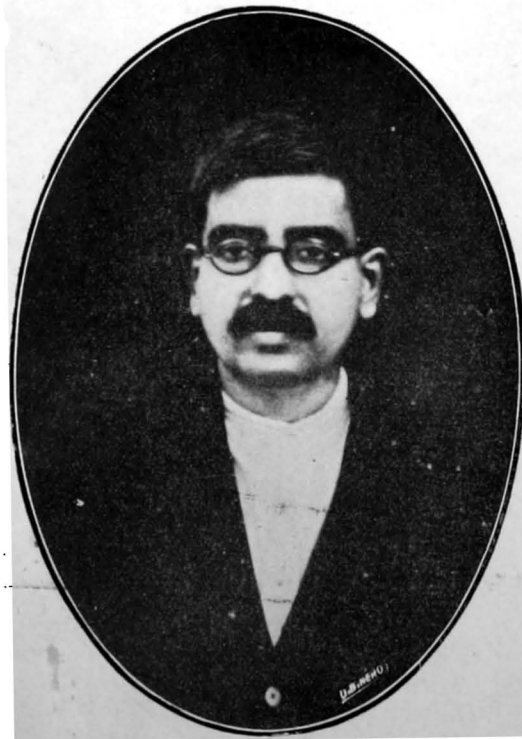
**B. D. Varshneya**  
Bahjoi, U. P.



PAISA FUND SILVER JUBILEE NUMBER



**Pandit Iswardas Varshneya**  
(With whose assistance the Paissa  
Fund Glass Works were started)  
Ambala.

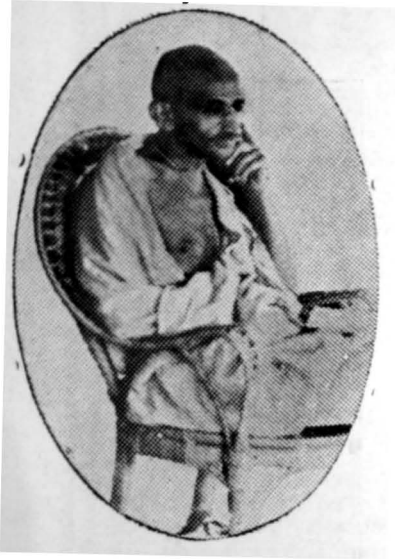


**A. V. Pandit B. Sc.,**  
Shri Onama Glass Works,  
Gondia, C. P.



**V. G. More**  
Shivaji Glass Works  
Howrah (Bengal).

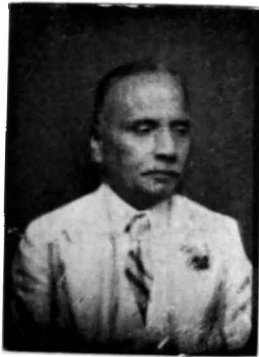
*A few of the Distinguished Visitors*



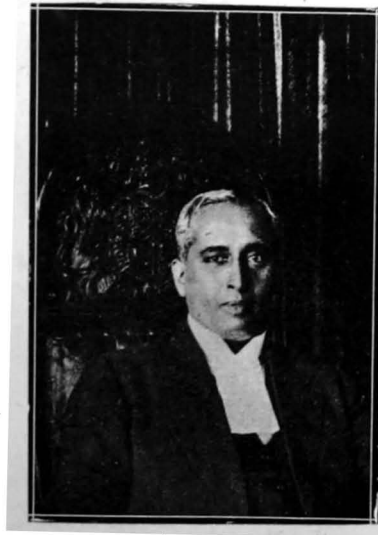
**Mahatma Gandhi**



**Subhash Chandra Bose**  
Bengal.



**The Hon'ble B. S. Kamat**  
Poona.

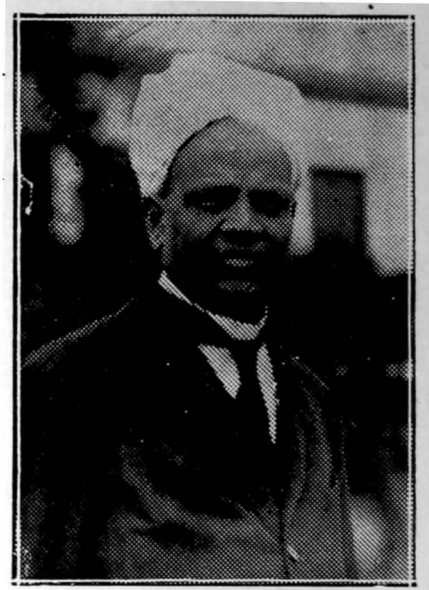


**A. A. Chitre**  
Chief Judges Small Cause Court Bombay

PAISA FUND SILVER JUBILEE NUMBER



**Dr. R. P. Paranjape**  
Vice Chancellor, Lucknow University



**Right Hon'ble Shrinivasa Sastri**



**Pandit Malaviya**  
Banares.



**Javaharlal Nehru**  
Allahabad.

Visitors



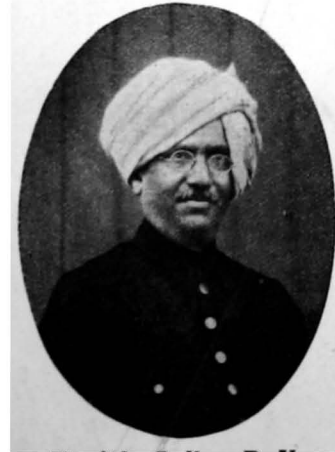
**Sreemant Balasaheb  
Pant Pratinidhi B. A.  
Chief of Aundh.**



**Dr. Balkrishna Ph.D.  
Principal Rajaram College,  
Kolhapur**



**D. K. Karve  
Founder, Womens' University,  
Poona.**



**Hon'ble Jadhav B. V.  
Satara.**

PAISA FUND SILVER JUBILEE NUMBER



Office and Factory Staff, Paisa Fund Glass Works, Talegaon.

One body of Glass makers, the Bangle Makers' Association at Firozabad has already been referred to above. There are two others—the Indian Ceramic Society and the Glass Manufacturers' Association. The first is a comprehensive organisation, including in its fold workers in pottery, refractories, and glass and mainly academic in nature. It was founded in April 1928, "to promote friendship and co-operation between all those who are engaged in the manufacture of Ceramic goods, or in teaching Ceramics or in any way connected with Ceramics and interested in the advance of the knowledge, art and technology connected therewith." The aims of the Indian Ceramic Society are to improve the condition of Ceramic industries in India and add to the fund of knowledge; to regain the lost ancient glories of India's Ceramic Products; to promote the general interests of this basic industry and to be of service to manufacturers. The programme of the Society includes holding periodic meetings of members, making information available through journals, papers, and directories, keeping a museum of raw materials and finished products both Indian and foreign, having a Central Ceramic Library, issuing technical literature in vernaculars, organising primitive Ceramists like the indigenous kumbhars ( potters ) and organising the industry to make united demands to Government. Sub-Committees are formed to establish co-operation between the industry and educational institutions and laboratories. The Society conducts a quarterly journal under the editorship of its able and energetic Secretary, Mr. T. W. Talwalkar, who himself is a Ceramic Engineer, holding a high degree in that science of a well-known American University.

The Glass Manufacturers' Association was started in 1926, when its first annual session was held at Bahjoi. Its aims and objects are "to watch, protect and further the interest of the Indian Glass Industry by all possible and available means." The members meet during every Easter and discuss the problems of the Industry. The present Secretary is Mr. S. P. Ogale of the Ogale Glass Works. There are twenty-six Works listed as members, but the interest of many in the Association is not keen, partly owing to long distances, which prevent their frequent intercourse and partly because of its want of power, which few manufacturers are willing to surrender to the Association. There is no doubt, however, that in course of time, the manufacturers will see light and vest the Association with strength and rights for the general good of the industry. The organisation ought soon to take the form of a powerful federation of glass manufacturers who can make co-operative purchases of raw materials, have mutual arrangements for training labour, fix rates among themselves and present a united front to foreign manufacturers and to Government, if necessary. At present, knowing the weakness of the Association, Government pays little heed to its representation e. g., the one for an earlier publication of the Tariff Board Report.

The second chapter has indicated what the State should do for industries and also how the State in India has done very little in the direction. It is our duty, at the risk of repetition, to reiterate the State's responsibility as regards each factor of production in the glass industry. As regards protection, ( the case for which is discussed in the next chapter ) it is a question *sub-judice* and it is enough to state here that, the other problems of the industry such as indiscriminate location and technical ignorance, could have been put up against the industry only after the State had done its utmost. As it is, it has done almost nothing and the manufacturers' share of blame for the failures is reduced to a large extent by omissions on part of the Government. Taking location and raw materials together, it is the duty of Government to help the unfavourably located glass maker by giving him every facility in transport, e. g., by lower railway rates. Government could also encourage allied industries as of chemicals for glass making, or facilitate the cheap availability of those chemicals by rebates to glass-works. In the matter of direction and organisation, Government could give loans on easy terms to glass factories and maintain a body of experts for advice in various processes.

As to technical instruction, the State could foster it by opening technical schools, higher research laboratories and experimental factories, giving technological scholarships here and abroad, keeping information bureaux and commercial museums. For training labour, it could make arrangements as recommended by the Fiscal Commission by subsidies to factories who undertook this work ; it could likewise make a special case of Glass Works and exempt them from the Factories' Act to the extent of facilitating them having their own hours, in view of the local climatic conditions. An important duty of Government would be to keep the glass manufacturers informed of the market conditions and itself to purchase its own requirements from them for Railways, Army stores etc. Finally, Government could improve the lot of old type glass-makers by giving them incentive by scholarships, loans, organisations etc., to improve their own lot.

Examining Government efforts for help upto the present time, we find that till 1918-19, it had given no aid to the glass industry except for a small loan or two. After that period the Provincial Departments of industries did only slightly better; for the resources with them were meagre though their intentions might have been pious. The Bombay Industrial Department e. g., is now adays prompt in doing whatever little it can, for manufactures in this province; it duly submitted its recommendation for protection to the glass industry before the Tariff Board. But on the whole, a bulletin or two by some academic expert, half-hearted efforts for arranging waggon and coal supply in the years of shortage, a few technological scholarships

abroad, a few loans (in the U. P.), one hopeless attempt to run a glass factory (Madras), one technological research laboratory (Bengal), these about make the sum total of the State-help to the glass industry. Let us hope that with the appointment of the Glass Tariff Board the State has inaugurated a period of greater active sympathy for the glass makers of India.

The possibilities of expansion of the Indian Glass market are already discussed above. Summarising the immediate needs of the glass industry to-day, we find, that a protective Tariff, a strong central organisation of manufacturers to apportion markets and determine rates, and a rapid improvement in the other factors of internal organisation, will result not only in the recovery of the great Indian Market, but, open up the whole Eastern market as well. In this connection it is worthwhile to consider the following remarks by F. Oertel (Notes on the Glass Industry in Europe) and the Industrial Commission (in *Appendix E*) respectively. "At present", said Herr Oertel in 1914, "all that can be attempted is to start the simplest kind of glass works where glass blowers and other workers can be practically trained. When the industry has once gained a footing, in its simplest form, the more advanced, branches of the manufacture of superior glass will follow of their own accord." The Industrial Commission, in saying, "There is no reason why India should not be self-sufficient in the matter of lampware of all kinds except in the very highest quality," prophesied a similar future for bottles and phials but expressed doubt about the productions of sheet and plate glass, "which required machinery and skill of the highest order." Today, blowers and minor workers are sufficiently trained in the small unit glass works all over the country; the industry is sufficiently advanced in its simplest form and is shortly expected to get a firm footing with a protective Tariff, when it should soon be self-sufficient in lampware, bangles and such simple products. Now is the time, therefore, for the manufacturers to look towards making the superior products. While the factories in the elementary stage could undertake the production of goods of every day demand, the more experienced and better equipped works would be free to make the better kind of glassware. They might not succeed so well as foreign makers in the beginning, but protection and an indulgent market would make it well worth their while to continue their attempts and ultimately achieve perfection. Even in the case of Sheet and Plate, protection will encourage the establishment of more factories with machinery and the necessary skill will not be wanting for long. Development into high class and artistic production, therefore, will be the logical stage in which an undisturbed industry would rise. Opportunity is shortly presenting itself for attempts in this direction, and shrewd manufacturers anticipating it are making themselves ready with plants for superior products,



one of the most important of which is the electric light bulb. The possibilities of this particular line are discussed in the special chapter at the end.

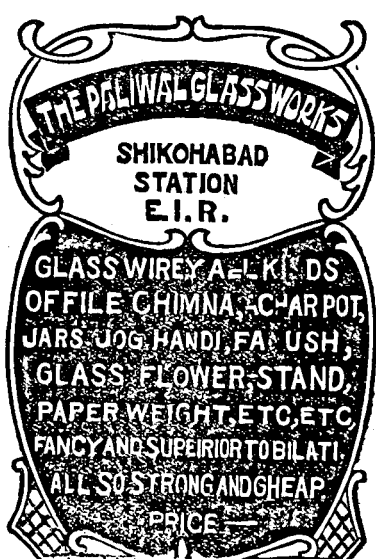
Before closing, it may not be out of place to cite Japan once more where the organisation of the glass industry is a model for any country. There is an elaborate division of labour for processes, such as preparing, re-melting, polishing and finishing. Export lines are worked on a large scale while the smaller factories attend to domestic needs. Specialisation is increasing and minor industries like bead-making are consigned to the cottage. Long term credits characterise the financing organisation. There is one main and three subsidiary organisations of manufacturers, with powers in matters like purchases, training and inspection of products. If the Indian Glass Industry wants guidance, it cannot do better than to study Japan, which is the nearest glass making 'power' and where conditions are similar to those in India in many respects except one—India has no national Government.

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## Chapter VI

### Protection to Indian Glass Industry

To any one writing on protection to Indian Industries in general, the task has been made considerably easier, not only by **Free Trade Vs. Protection** the writings of Indian economists from Dadabhai and Ranade to K. T. Shah and C. N. Vakil, but also by the Report of the Indian Fiscal Commission, which has given a carefully considered verdict for the adoption of a protectionist policy in India. Gone are the golden days of Free Trade which compelled Justice Ranade to take the trouble of proving that "many of the assumptions at the back of the dogmatical treatment (with a free trade bias) of the subject of political economy were inapplicable to India; and that public policy, if it were really to further the economic development of the country could not afford to ignore the many peculiarities exhibited by Indian conditions" (Jathar and Beri-Indian Economics). Free Trade now has a following only among a few theorists in Britain, the land of its birth, while the State itself in that land has long since dropped it overboard in favour of protection. The advantages of Free Trade, however, might be just mentioned before proceeding to enumerate those of protection.

Free Trade, according to the classical economists, would (a) cause all the resources of production in each country to be applied to the most economically advantageous industry, (b) result in a multiplication of the world's fund of goods and wealth, and (c) by its consequent international division of labour, benefit the consumer in general. There are, of course, limitations to these advantages, but they can be summed up in one sentence; "Free Trade must wait till the world becomes a single nation." In the meantime, as Taussig says, "the process of transition and growth (of a nation's industries) could be made easier and beneficial result could be reached, at an earlier date, by a temporary handicap on the developed competition of older countries" and a protective tariff is such a handicap. Prof. Pigou, summing up Frederick List's protectionist arguments, writes, "The main element of productive power, whose development involves a long process, is a population trained in the general atmosphere of industrial pursuits. If a country is entirely agricultural and has no important class of artisans or factory workers, the skill required for starting any particular kind of mill, will be very difficult to get. 'Masters, foremen and workmen, (says List in National System of Political Economy) must first be either trained up at home or procured from abroad, and the profitability of the business has not been sufficiently tested to give capitalists confidence in its success.' For a long time, therefore, it is improbable that any

works which may be started, will be able to compete on equal terms with established foreign rivals; and that in spite of the fact that the industry in question may be one for which the country has great natural advantages." Even John Sturat Mill admits that "The only case in which on mere principles of political economy, protective duties can be defensible is when they are imposed temporarily (especially in a young and rising nation) in hopes of naturalising a foreign industry, in itself perfectly suitable to the circumstances of the country."

Protective duties were described by Colbert as the "crutches to teach the new industries to walk." They result in the diversification of industries in the country and can be utilised towards national self-sufficiency within the limit of comparative cost, and from the view of national defence. They foster basic or key industries, which provide materials for other important industries whose prosperity depends upon the former. Increased revenue is another of the advantages of a protective tariff. Against these are offered the evils of protection such as (i) increased prices to the consumer (which however soon go down as the national industry progresses, as Taussig points out); (ii) encouragement of inefficient methods of production; (iii) possible dangers of political corruption and combinations. But in India, the middle classes fully aware of having to suffer most by high prices and of other possible evils of protection themselves insist upon it. Taking all those points in favour of and against protection into consideration, the Fiscal Commission found the balance in favour of advantage. The Report says in para 75, "We have now shown that India will derive very great advantage from industrial development, that the conditions for a rapid advance are suitable, and that without the stimulus of protective duties the advance will not be sufficiently rapid. All these considerations lead us to the conclusion that protection will bring a very material gain to the country."

In advocating protection, the Fiscal Commission (as its dissenting members rightly complained) 'confused policy with procedure' and was even apologetic, when it recommended a policy of protection hampered with the proviso, "to be applied with discrimination along the lines indicated in the Report." Its scheme for protection is, however, very elaborate and well conceived except on the point of the Tariff Board, which is its integral part. According to the scheme, an industry claiming protection has to satisfy the Tariff Board on three points, viz.,

- (1) The Industry must possess some natural advantages.
- (2) It should not be likely to develop without protection. i. e., protection must be indispensable to its growth.
- (3) It must eventually be able to face world competition without protection.

Additional favourable aspect of an industry, e. g., its ability to effect greater economy in production by increasing the output, or capacity for eventually supplying the needs of the whole country, would lend strength to its claim for protection. If protection to one industry is likely to affect others, the Board, after full publicity to its case and consequent enquiries, should favour such industry as would give the utmost economic advantage to the country. Protection would not be afforded as a rule to new industries, as such a step might cause great difficulty to the Tariff Board and loss to the community. A bounty would suit such a case much better. In the words of the Hon. Lala Harikisan Lal "Nurse the baby, protect the child and free the adult," would be the policy according to the age of the industry. In determining the degree of protection, the Tariff Board is to carefully weigh the comparative costs of production at home and abroad, and if the difference between them is large, see if the local industry really possesses any natural advantages at all. Protection to an unsuitably located industry might mean perpetuation of its mistake at the cost of the community; with the help of protection, new enterprises may start in favourable localities forcing the original ones out of the field, thus defeating the very purpose of protection. It should, therefore, not be allowed to such industries. If, however, the industry is hampered by the long distances in India and proximity to seaports, it deserves protection, but not to the extent of enabling it to compete in every possible market in India.

Referring to the industries of military value, the Commission has laid down that "Any industry which is essential for purposes of national defence, and for which, conditions of India are not unfavourable, should, if necessary, be adequately protected irrespective of the general condition which we have laid down for the protection of industries" (page 106). Basic or key industries upon which a number of other industries might depend, should be considered eligible for protection from the point of view of national economics, rather than the economics of the particular industry. If it is likely to stimulate the establishment of others of such importance that any interference with the supply, such as from a cessation of imports, would bring others to a standstill, it deserves development behind protection. Bounties might better meet the case of basic industries as also the cases of machinery and raw materials which should preferably be imported duty free.

It is the duty of the Tariff Board, in addition to imposing Tariff duties, to regulate them and abolish them when they have outlived their utility. This they have to do in the teeth of a vested interest, which would very likely spring up with the establishment of a powerful industry, which would be able to supply the country's demand and to produce goods of as high a standard as imported goods, but might no longer require protection,

Similarly, the Board may have to increase protection where it is found insufficient and abolish it when found to be doing no good to an industry. The Tariff Board will, therefore, have to be continuously watchful and will have to review periodically the effects of protection on industries.

Finally, the Fiscal Commission has recommended supplementary measures for the protection of industries e. g., an industrial bias for primary education, the training of apprentices and increased railway facilities. The most important supplementary measure recommended is, however, a provision against dumping of foreign goods to depend upon enquiry and report by a Tariff Board. The Government of India accepted most of the Commission's recommendations and the need for the last mentioned measure against dumping is keenly being felt just at present as will be seen later.

Early in 1931, six leading manufacturers from different parts of India ( the Paisa Fund Glass Works, Talegaon; and Ogale Glass Works Ltd., Ogalewadi, of Bombay Presidency; U. P. Glass Works Ltd., Bahjoi and Ganga Works Ltd., Balawali, of U. P., the Bengal Glass Works Ltd., Calcutta and the Shree Onama Works Ltd., Gondia of C. P. ) made a representation to Government for protection to the Glass Industry. The following are the main points of their case:—

- (1) The industry was struggling for twenty-five years, producing a fair and varied amount of goods and supplying the needs of the public, the Railways and the State to some extent.
- (2) It suffered very keenly from foreign competition since the War, when it met nearly 60 % of the Indian demand. Its foreign rivals are equipped with long experience, expert labour and latest machinery and are therefore very powerful.
- (3) The Glass industry satisfies the general conditions laid down by the Fiscal Commission:—
  - (a) It has natural advantages like raw materials, intelligent labour and a growing market.
  - (b) It is not likely to develop without protection as twenty-five years' experience has shown.
  - (c) Under protection, its labour will be trained up, improved methods and machinery freely used and out-put increased so as to supply nearly the whole demand of the country. Thus the industry would eventually be able to face world competition. Its potentialities were seen during the War, when 70 % of the lampware was

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supplied by Indian factories; and even at present the supply is more than 80 % of the total.

- (4) The Industry suffers by additional handicaps, as import duties on certain raw materials like chemicals and crucibles, and unfavourable railway rates, against which relief is also urgently required.
- (5) Japanese competition is very keen, particularly at present, (on account of favourable Yen value); some of the chief selling lines being sold at prices ruinous to Indian manufacturers, who are barely managing to exist.
- (6) The Indian Government was very anxious, during War time, for the glass industry, as was evidenced by letter No. 1-203/1 Simla, dated 29th July 1918 from the Intelligence Branch Indian Munitions Board, to the various factories asking for certain information; this fact coupled with the Indian Government's policy of discriminating protection, has raised great hope among the manufacturers.
- (7) While the choice of the form of protection might rest with the Government, the industry is anxious that it should be adequate, and suggests that, in addition to an exemption of duty on certain raw materials like chemicals and crucibles, there should be a uniform increase of duties by 10 % on all glassware, as also a bounty of 15 % for a period of 10 years.
- (8) The consumer is not likely to suffer much by such a tariff, as there will be soon more glass works, and keener internal competition, which will quickly bring down prices to the normal level.
- (9) Taking all the above favourable factors for protection into consideration and looking to the urgency of the case, Government may be pleased to direct an early enquiry by the Tariff Board into Glass Industry's claim for protection.

The representation of the glass manufacturers gave the minimum, though strong reasons for their case by

**More arguments for protection** showing that they satisfied the Fiscal Commission's formula and that their need was urgent. There are, however, additional

arguments in their favour. Most of the other strengthening factors for an industry's case, mentioned by the Fiscal Commission, are present in that of the glass industry. It is one in which the law of increasing returns operates. It is possible to eventually supply the needs of the whole country when the better equipped factories will produce the higher type of glassware, leaving the common articles such as lampware to the other factories. Protection to glass industry is not likely to affect adversely any other industry. It is not such a new industry



as requires nursing, and affords sufficient data from its working in India, for determining the rate of protection.

The difference between the cost of production in foreign countries and in this country is not so great, since the Indian industry has decided natural advantages. Though some works in the country are unsuitably located, their natural advantage is not lost. Moreover their unsuitability also includes the factors of proximity to seaports and the long distances inevitable in this country. Finally, the Indian market is divided so as to be fairly equally available to all the factories. Location, therefore, is not an adverse factor to protection as far as the glass industry is concerned and there is no apprehension of the community being taxed for any mistakes on the part of the industry. Further, though the industry is not one of a strictly military value, it is yet a basic industry upon which many others (e. g., bottle-using industries) could thrive, and a cessation in its supply will be a serious matter (as was seen in the last War). It has, therefore, to be examined in the light of national economics as much as its own, and there can be no doubt that after such examination its case for protection will emerge triumphant. Lastly, there is little fear of a vested interest springing up to resist the abolition of the protective tariff when it is no longer necessary and even if such a contingency arises, Government will be equal to deal with the vested interest, unless perhaps it is one of British capitalists.

In the beginning of the year 1932, Government was pleased to appoint a Tariff Board which began recording evidence in Bombay on 10 January 1932. The first important witness was the grand old man of the Industry, Lala Ishwardas Varshnei of the U. P. Glass Works,

#### Tariff Board on Glass Industry

Ltd., Bahjoi. He gave a very detailed evidence, demanding 100 % protection for Sheet Glass which he manufactured. A remarkable feature of this occasion was the presence of a representative of the Pilkington Glass Works, London, one of the chief exporters of Sheet Glass to India! This was probably the first instance in the history of Tariff Boards, when a rival foreign manufacturer was invited (presumably for obtaining information of local conditions and his personal delectation) to watch proceedings of a case hostile to his own interest. Incidentally, this step indicated how far the Tariff Board was prepared to consider Indian interest against British. Rai Saheb Tandon's evidence on behalf of the Allahabad Glass Works, Naini, asking for protection to bottles, phials, soda water bottles and Venetian glass, was likewise allowed to be heard by representatives of foreign manufacturers. One of the two Mr. Meyer Nissim opposed any duty on Sodawater bottles on behalf of the importers. His ideas of glass-making assisted by those of his adviser caused some amusement to those present, especially when he gravely told the Board that the water used in India for the manufacture of bottles spoil their quality!

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The evidence of Rai Bahadur Panna Lal (a veteran manufacturer) of the Upper India Glass Works, Ltd., Ambala, was spirited. He refused to give certain information in the written evidence, voicing his just apprehension that foreign capitalists might make use of it and starting factories in India, deprive Indians of even the little earnings they were making out of the industry. He demanded supplementary facilities like Government store indents to Indian Works, training schools for glass craft, permission for night work in the hot season and for the early starting of training boys before the age of fifteen. In the matter of training, he related an instance where a technical school started by the Punjab Government, was closed by the orders of the Central Government.

The Ogale Glass Works, Ltd., Ogalewadi, was well represented by Messrs. S. P. Ogale and S. G. Padhye, B. A. who urged for a general protective Tariff, repeated the lack of railway facilities with particular reference to the new surcharge upon coal freight.

Mr. Framroz of the Kandivali Bangle Works, coming next, declared the quality of Indian bangles to be competitive and also complained of railway rates. The Bangle-Makers' Association of Firozabad demanded protection for fancy bangles and pointed out that Government did not keep the promise of help given in the Times of need of the Munitions Board. They testified American Chemicals to be cheaper than any other.

Finally, Mr. Chandorkar with his usual ability, represented the Paisa Fund Glass Works, Talegaon. He said that no help had been received by the Works from Government, which ought to have come from the very beginning. In reply to the President, he expressed confidence in the Talegaon Factory's ability of developing into a Technological Institute, where research work could be done and standards fixed.

The Tariff Board soon closed its enquiry. Three years have since passed and its report is not yet out. Repeated representations for its early publication were made to Government by the Glass Manufacturers, but to no purpose. It cannot but be repeated, that the present publication could have been greatly helped, with the authoritative information the Tariff Board Report is bound to contain and it is a matter of regret, that Government have not seen their way towards its timely issue.

While the Industry was anxiously waiting for the verdict of the Tariff Board, an unexpected development took place in the middle of the year 1932, when Japan abandoned the gold standard. With the help of its depreciated currency, the country was able to push into India, goods of all varieties, glassware being one of the most important. The market received a rude shock which had its repercussions

on the glass manufacturers. There is no doubt that Japanese dumping was responsible to a certain extent for the closure of four works, during the year 1932. The misery of the Industry became aggravated and manufacturers had again to bustle about in feverish haste to acquaint the Tariff Board of the situation and request it to take notice of Japanese dumping in their recommendations.

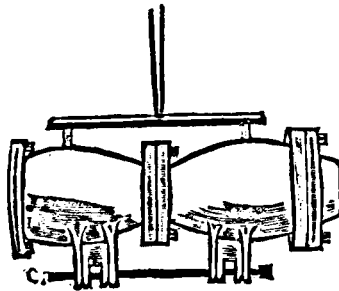
The question of Dumping is treated by the Fiscal Commission, who define it as the sale of imported merchandise at a price, lower than what is obtained in the country of its production. The word is also used to denote severe and unfair competition. Its cause might be accidental or deliberate over-production, or an intentional temporary lowering of rates by a foreign country in order to extinguish the local industry. The last measure is, however, dangerous to the Vendor country when practised for too long a period and when the Government of the market country is vigilant. The effect of accidental dumping will be temporary, and when the commodity dumped is not manufactured locally, the effect will be harmless; but when such goods as are already being manufactured in a country are deliberately sold there at a lower price by another, a sense of insecurity and panic is the result, and the State must intervene actively. It is found difficult to prove the existence of dumping and careful legislation in most countries ( especially the U. S. A., Canada, Australia and even Britain with its Safe-guarding of Industries Act ) has provision to deal with it. In addition to the above kinds of dumping, that arising out of the depreciated currency of one country into another, is also noted by the Fiscal Commission which recommended that a Tariff Board after enquiry, should prescribe the way of dealing with it. It is to be hoped that the Glass Manufacturers' representation upon this new phase of the market will be given due consideration in the Tariff Board's report, whenever Government choose to publish it.

The sum and substance of this cursory examination of the Indian Glass Industry would come to this : that the industry may have its own short comings like want of technical skill or uneconomic organisation; but the almost total absence of State aid has loomed large in its history, which is till now a tale of woe. The industry never had a real chance; it has always had an up-hill fight except in the brief years of War which only made its subsequent progress all the more difficult. A protective Tariff will give it the necessary chance to justify itself and if it fails inspite of protection, then alone will be deserved all the blame put upon it. Even the British Industry could not progress with all its experience and equipment till it had a Tariff, as pointed out earlier in the words of Prof. Turner. Another instance of the British cry for Tariff is found in the words of Sir Eric Geddes ( noted by the Journal of the Indian Ceramic Society, October 1931 ); " British Manu-

facturers in reproductive industry urgently need fiscal protection against mass-produced imports dumped in this country at far below full cost." Upon the recent levy of protective duties English Glass Industry rallied round so much as to produce even Tableware which was its least important line. There is no reason, why in similar circumstance, India could not, in time, manufacture the higher qualities of glassware, e. g., electric bulbs which we now import. If Great Britain need a Tariff so badly, how much more must Poor India need it. It is to be hoped that the present Government sees this need and have remedial measures in view, unless they want to justify the remarks of a leading Conservative paper, a few years ago, "You can have flourishing industries or a flourishing burocracy, but never both."

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## Chapter VII

### Man's Struggle for Light—A Survey.

In discussing India's possibilities of meeting the entire Glassware requirements of its own people, reference has been made to the fact that the Lampware is the stable product of its organised modern industry. It has been observed that sixty per cent of the total demand in the line was met by local manufacturers during the War and that even now they claim about fifty per cent. The subject of this special chapter (though sounding like a theological tract) is an examination of the further scope for the Indian industry for supplying the glassware connected with lighting. India is undergoing an evolution into modern ways of living, and its lighting needs must correspondingly change, to keep pace with the evolution. It would be interesting, therefore, to speculate upon the needs in the light of a brief historical survey of man's struggle for light. Moreover India is a world in itself, with every degree of civilisation found within its vast area, and an evolution in lighting may very well find a parallel here, with the time element replaced by that of distance; i. e., the same stages found in going earlier and earlier into history will be found in going deeper and deeper into the heart of the country. We will first of all see what history has to tell us upon the subject.

Among man's primary needs of food, clothing and shelter, light no doubt constituted part of his shelter from the earliest times. In his primitive stage he must have soon learnt the ways of the Sun and the Moon, and arranged his life so as to utilise their light to the utmost. In the short days of winter and the dark nights of the waning moon, pre-historic man surely had some 'Daylight (and moonlight) saving Bill' of his own! During that age, light was one of man's many masters. But the discovery of fire soon emancipated him. Free of the bondage of darkness (as well as of cold) he must have lit huge bonfires for nights together and danced round them in sheer transport of his wild joy. So base a use of fire, as cooking, must have occurred to him much later. It was as light that fire was supreme, and there is no doubt that the fact of its being a powerful weapon against nature, has a great deal to do with the worship of fire.

Till the 19th century, all lighting or artificial illumination was by fire-flame of one substance or another. The earliest light was a brand from

the fire; gradually the superiority of one wood over another in burning led to its adoption as lights e. g., the palmwood lights of the tropics. This discovery of the presence of oil in some woods was probably simultaneous with that of fat in the bodies of dead animals. The light giving faculty of oil was thus established. Before oil itself was used for lighting, however, resinous gums (wrapped up in leaves and then lighted as in the Malay islands), oily vegetables and fatty animal carcasses appear to have been employed for the purpose.

Oil lamps date since thousands of years from the very beginning of known history. Though Athenaeus of ancient Greece thinks them not to be of an origin older than the fourth century B. C., we can definitely say that in India at least, they are as old as the earliest civilisation. The earliest lamps were containers with some oil as the illuminant and some kind (mostly fibrous) as the burning medium; the containers have been of stone, terra cotta, clay, or even skulls (to judge from relics all over the world) and the oils—animal fats or vegetable oils (as in India). In candles, the origin of which like so many other things, is attributed to the Phoenicians, wax appears to have been the only ingredient till the 10th century, when tallow came to be used. Tallow candles were used in England in mediaeval times. The use of whale oil for this purpose was discovered in the middle of the 18th century and the whale spermaceti candles were in vogue till 1840, after which stearin and subsequently paraffin have been the main substances. The use of a glass enclosure to the flame for steady and increased illumination, is a comparatively much later development of the lamp, in the construction of which, there was steady improvement till the 18th century. In 1874, Argand of Geneva introduced a burner with the central air draft. The use of mineral oil necessitated many adjustments till we see the perfection achieved in the oil-burning lamp by Austria, Britain and America.

The first gas light is attributed to the Chinese who piped natural gas from salt mines, in Bamboo tubes. The origin of  
**Modern Developments:** the modern discovery is, however, in England; a  
**The Gas Lamp** natural gas-well near Wigan in Lancashire is closely related with the evolution of gas illumination. In 1664 the Rev. John Clayton investigated the origin of gas from this well and finding it linked with coal, made a combustible gas by distilling coal in a retort. From that time till 1802, the experiments of Minchellers, Lebon and Murdach (who also discovered the open flaming Bengal light) established the possibility of gas as an illuminant. After that, for nearly twenty years, burners were improved. In 1806 Wintzler, the pioneer of practical gas lighting, first succeeded in lighting the Lyseum Theatre in London and in 1810, assisted by Clegg embarked on the first central station lighting system in that town. The developments till 1885 consisted in finding a suitable mantle; ultimately in that year Welstach invented a mantle of cotton fabric saturated in certain salts. Such was the gas mantle

till 1929, when the possibilities of asbestos attracted attention. Other popular types of gas lights ( particularly the portable varieties ) are the carbide light discovered by Wilson in 1892, and the distilled oil lights ( of the Petromax type ) invented by Pintch, a German, and brought to America in 1880.

The most revolutionary invention in the history of artificial illumination and one characteristic of the modern age is, however, the electric light. Yet its origin is by no means recent. Since 1752, when Benjamin Franklin experimenting with Leyden jars, first stumbled upon nature's secret-lightning, till 1879, when Edison produced the first practical electric bulb lamps, scores of scientists have been working hard persuading electricity to give useful light. Early in the nineteenth century, Davy demonstrated the possibility of Volta's idea of an electric light, and the first attempt at an incandescent lamp was by De La Rue in 1820. In 1840, Grove obtained light from batteries and Foncault steadied it. The Wright arc lamp (1845) was the first to be patented. A successful incandescent light was made by Frederick De Moleyns in 1841, and four years later was produced the Starr-King lamp with a Carbon combustion rod. Stait Shepard, Roberts De Changy and Farmer in addition to the above students, carried on the experiments, but their current came from a battery as the dynamo was not perfected at the time. Sir Joseph W. Swan had made his attempts from 1848 to 1860 and had stopped. But the invention of the Sprengel Mercury Vacuum Pump (1865) and its consequent use in the radio-meter by Sir William Crookes in 1875, tempted Swan to resume his experiments, who assisted by Stern, produced in 1877, an electric bulb with Carbon wire. After that parchmented thread, graphite and carbon in nitrogen and vacuum, were the stages of development within the bulb. In the meanwhile the Gramme Dynamo perfected in 1875, together with the Sprengel Vacuum Pump, made possible rapid progress and Jeblochhoff's series of arc 'candles' ( which lasted one to three hours ) were the first electric lights of any utility.

In America, however, the scientists were not idle. Brush invented his arc light in 1877 and in 1879, the Brush Houdon Arc-Dynamo system was demonstrated in Philadelphia. Thomas Alva Edison, working on the illuminating possibilities of carbon burnt in vacuum ( mentioned by Prof. Jobaid of Brussels in 1838 ); ultimately succeeded in making an electric lamp, and in 1879 displayed a complete lighting system at Menle Park. Edison did not discover the electric light ( as is popularly supposed ) but he showed its possibility of distribution over a large area in multiple units by achieving three things; independent units, a practical filament and a perfect vacuum in the bulb. The first electric installation in the world ( which worked for 14 years ) was on the S. S. Columbia,

Thereafter, the progress has been very rapid. Marks invented in 1894, the enclosed arc lamp suitable for flood lighting. In 1907, pressed Tungsten Filament was introduced by Just and Henaman and drawn wire Tungsten Filament by Dr. Coolidge in 1910. Finally, gas-filled bulbs were invented by Dr. Coolidge and Langmuir in 1918 in the laboratories of the General Electric Company.

We revert to the more relevant problem and perceive that in India, we can find methods of lighting ranging from the most modern electric lights in Seaport cities like **India's Lighting system** Bombay and Calcutta down to the primitive torches of the forest tribes. In dealing with these methods, we have to remember that the evolution in the world's lighting system has been comparatively within a brief period, a little more than a hundred years. Mineral oil, gas and electricity respectively, for the purpose of general lighting, came in close succession with intervals of about fifty years since the close of the eighteenth century. In India, the evolution has been in an even shorter period of about forty years. Kerosene came first, gas a little later and electricity followed in quick succession.

Coal gas as a lighting agent had little opportunity in India except in a city or two. There has been a corresponding spread in India of these lighting methods. Kerosene, though it has just reached the villages has not penetrated into the jungles where over ten million of our bretheren of the primitive and forest tribes dwell. The remaining rural dwellers, numbering three hundred millions, are but indifferent consumers of kerosene, which can have a steady market only in villages and towns with population of over a thousand. The principal users of kerosene are therefore among the forty millions of urban population. Adding an equal number from the rural areas, we can presume that eighty million people or less than one fourth of the total population of India use kerosene. Now many rurals yet do not believe in chimneys for their lamps. Leaving these out, we arrive at seventy millions or one-fifth of the Indian population as the probable consumers of glass lampware. The above computation can indicate how after capturing the present share of the lampware market supplied by foreign goods, there is still a huge potential market for more and more lampware. Urbanisation though slow is bound to be progressive with the general development of industries; similarly a progress in literacy, however slow, coupled with industrialisation, is bound to improve the general standard of people's life. These factors (leaving out the possibility of general growth of the population) point towards an increasing vogue of better lighting, which should keep the ordinary glass works of India busy for any length of time.



This chapter, however, is concerned more with the purely urban population of forty million, who are not only the present users of lampware, but also the potential consumers of electricity and buyers of electric globes. The Oil-gas light except for its virtue of portability is obsolete in the Indian cities. It may have a field in the rural areas for public purposes only, but, in the cities it does not stand much competition with the electric light. In considering the future of electric lighting, therefore, we have the following factors in view:-

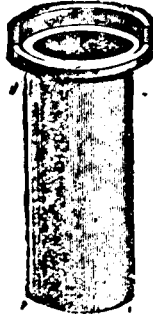
- (1) Hitherto not even half the urban population enjoyed the benefits of electric lighting, though--
- (2) there is an increasing electrification of towns; within ten years, all the district towns of India are expected to have electric lighting.
- (3) India has a huge potential power for generating electricity, which when harnessed will bring an even greater area under its influence. Ultimately huge organisations could find it paying to distribute electric current even to small towns. (The supply of Tata's electricity reaching down to Poona is only a beginning of the process.)

When we consider the above points, there cannot remain the least doubt that in course of time electricity will play a very prominent part in India's lighting system. We will now proceed to see how far the glass industry is concerned in this respect.

Curiously enough, the electric bulb does not come under the category of glassware in the Reports of the Sea-borne-trade of India. The figures of the electric lamp imports are given under 'apparatus, machinery and appliances'. We see that in 1922-23, ten years ago, India imported electric lamps (glow and other) worth Rs. 23,51,336/-. In 1926-27 the figures rose to Rs. 81,63,778 as the value of nearly four million lamps. Taking the glow lamps or bulbs alone, the imports of which ( 3,500,000 in number and worth over twenty lakhs in 1926-27 ) must have risen by now to nearly five million and worth about 25 lakhs, we can judge how rapidly India is taking to electric light and how vast is even the present field for manufacture in this line.

Indian Glass Manufacturers, consulted on the possibility of manufacturing electric bulbs in India, were unanimous in the affirmative, and one or two were even contemplating to embark upon it. Bottles and plate glass is now machine made by Indian manufacturers in India. With such enterprising manufacturers, equipped with suitable machinery, and

efficient scientists to advise, there appears to be no reason why India should not begin to claim the big present market and the bigger future market of the electric bulb. It is not so urgent to look to the twenty-five lakhs of imports of to-day, as to the huge prospects of to-morrow. A beginning must be made and as an immediate incentive to begin the manufacture of electric bulbs in India, even twenty-five lakhs should be sufficient.



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## Chapter VIII

# Technological Instruction

In the early pages of this work the importance of an industrially trained population is already emphasised ; particularly in the chapter on "The State and Industry," stress is laid on the duty of Government to provide for technological instruction. The work of the State in India, upto this time in this connection, is briefly surveyed and its deficiency in comparison with the work of national Governments in other countries, such as Japan, pointed out. This chapter proposes, in view of a more encouraging attitude of the public, to deal with, in greater detail, a scheme for a comprehensive and efficient machinery for technological instruction in India, particularly in the subjects connected with glass and pottery (Ceramics.) As seen earlier, provision by Government in this respect is practically nil. The private effort for such a provision, as already noticed, is infinitesimal when compared with the great need of the country. It is now proposed here to lay before the public a rough plan that will serve the purpose, whether undertaken by the Government or the public, though it is primarily incumbent upon the former to do so.

Like any other curriculum of technical education, that of Ceramics could be conveniently divided under three main heads: higher, intermediate and elementary instruction some what on the following lines:—

### Outline of the Scheme

#### I Courses in Ceramic Technology (Direct Instruction).

*A* Higher—1 University and Post Graduate standard in necessary applied sciences.

2 Research and Laboratory work.

3 Experimental Units.

*B* Intermediate—1 Diploma Standard in Scientific instruction.

2 Demonstration.

3 Practical experience for a certain period.

*C* Elementary—1 Elementary Instruction to suit the minimum literacy standard.

2 Apprenticeship.

3 Practical work in processes for a fixed period.

A valuable aid to ceramic knowledge of a general nature can be best afforded by museums and libraries; a scheme for these could be something like the following:

II Supplementary knowledge (General instruction).

*A (i)* Museums of finished articles in Glass and China of every kind of all periods and of all varieties of craftsmanship.

*(ii)* Museums of raw materials—Sands, clays, refractories, chemicals and fuels of different varieties and grades; also containing model furnaces and machinery.

*B (i)* Libraries: containing literature on all applied sciences pertaining to ceramics and branches thereof; periodicals, bulletins, pamphlets and brochures on the subjects.

Under miscellaneous provision can be included scholarships for technological studies in India and abroad, the supply of experts if necessary, pioneer factories etc. These belong, however, to a subsequent stage; the most urgent necessity of the day is direct instruction as indicated above. It may now be explained at some length.

There is a noticeable tendency in practical workers to belittle the value of theoretical knowledge. From the example of Western countries and Japan, however, we see that the importance of a sound theoretical knowledge cannot be over estimated. It is not necessary to repeat the words of Sir Robert Hatfield quoted earlier, in order to support the argument for theoretical training. Suffice it to say, that while practical work is indispensable, progress can never be possible without the guidance of theory. Direct instruction in Ceramic Theory could very well begin from the very elementary stage. The rudiments of science could be easily imparted to the ordinary literate apprentice, side by side with the practical work he begins to learn in a factory. Such a teaching would produce efficient workmen for the commonest and the most numerous glass-blowers, and helpers.

The intermediate stage in technical knowledge is a course for young men with a minimum matriculation standard. A fair knowledge of Physics and Chemistry, supplemented by demonstrations and a period of practical work, should enable them to achieve a diploma standard. This class would provide the foremen and the higher types of workers.

It rests with the Universities, however, to provide technological education of the highest standard. A curriculum on the lines of Sheffield, Illinois or a German University, prescribing a close study of the necessary applied sciences could be laid down to suit the B. Sc. standard and specialization e. g., in pottery or glass-making could also be provided for. Such a specialised study could of course be possible in a Science College such as the Royal Institute in Bombay or the Engineering College in Poona. In any case the study of Ceramics could be brought in line with other technological subjects such as mechanical engineering. A university chair in the subject could

be established at least in a central place like Bombay or Calcutta where provision for post graduate study and research could also be conveniently made.

This brings us to the highest stage of instruction—experiment and research. Though research institutes and laboratories solely devoted to Ceramics might not be possible from the very beginning, institutes with Chemical Engineering facilities could make room for this important department. Attached to such laboratories could be started experimental manufacturing units for the purpose of study as well as demonstration.

The machinery for general instruction to every grade of glass workers from the merely literate apprentice upto the research scientist (as well as the interested layman), would take the shape of museums and libraries. Ceramic museums would be of two kinds; the first would contain all inland and foreign samples of the primary raw materials such as sand, clay, lime and soda; fuel substances like coal and necessary chemicals of every description; models of furnaces, of modern factories and machinery equipments could also be housed in such museums as also demonstration outfits. The second kind would display glass and China products of every variety, of all possible periods and from all available countries. Starting with the most elementary and crude glass beads and some primitive earthen ware plates as made in India at one end, will be begun a series of exhibits ultimately culminating in a prismatic optical lens and some delicate piece of china, perfect products of the continent. The mute service of the museums would be supplemented by the eloquent aid of libraries. Books and periodicals of all countries on ceramics could be collected under one roof and such libraries would be maintained side by side with the museums. It is important that the museums and libraries should be in the same place as the directly instructing institutions (facilitating primary, secondary, collegiate and research work). Thus a comprehensive and upto-date unit of Ceramic Technology would be conveniently situated in three or four main centres like Bombay, Benares, Calcutta and Madras.

After arrangements for direct and indirect instruction are complete, arises the question of various supplementary measures, such as scholarships for study abroad and pioneer factories for the general benefit of the industry, but these are essentially later steps. The most urgent need is for the teaching of necessary sciences in schools and colleges; the equipment of museums and libraries comes next.

The Paisa Fund Institution can come in this scheme as a centre for higher Ceramic study. Whereas schools like the V. J. T. Institute

can train matriculates upto Diploma Standard, and a chair at the Royal Institute of Science could give the higher instruction for a Degree Standard, the Paise Fund nucleus at Talegaon with necessary help, could be developed into a Technological Research Laboratory and an experimental station for Ceramics. In the Bombay Presidency at least, it is the best centre for the purpose—it has a long and honourable tradition in glass and pottery work and has men graduated in the school of toil and independent study. The germ of a museum and a library likewise exists at Talegaon and an adequate development in this direction is also possible at that place.

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## Chapter IX

### An Appeal

On the vast placid surface of the listless inactivity of India's industrial life, a wind now and then sets a ripple in motion—  
**Speciality of  
Paisa Fund** a ripple of languid interest that gradually dies down as it reaches the shores of futility. There are disturbances below the surface and under-currents, but they seldom cause any effect. A minor splash or two on the surface attracts some attention; but on its subsidence the dull monotony goes on. Two or three storms, however, each with a greater force than the one preceeding, have disturbed this dreamy routine. The successive Swadeshi movements have repeatedly awakened the country from its comatose state, and one of the relics that still survive from the first storm is the Paisa Fund and its Glass Works. To an indifferent world it first appeared as a mere bubble on the ocean; but when instead of bursting after flashing for a moment, it kept up its steady shining existence, people peered more closely and found it to be a crystal rock monument of patience, erected on the coral atoll of unceasing toil.

During the quarter century of its career the Paisa Fund collected about five lakhs of rupees. Most of these came in small fractions from the slender purse of the enlightened middle classes; they represent not so much a capital made up of tiny but cheerful contributions, but the collective patriotic anxiety of millions for the industrial progress of their country—a sentiment that cannot be measured in terms of money. Maharashtra, which has no plutocrats to boast of, could not develop intensive finance on a dividend basis. It did better, it developed an extensive finance on a basis of pure sacrifice. But just as, in some water famine, huge reservoirs dry up and cause untold misery where extensive plenty reigned, some modest spring unnoticed before, continues to trickle with its spontaneous flow, the Paisa Fund has carried on its steady work where high finance has failed.

Twenty-five years is time enough to enable any one to appraise the value of an institution; an institution, which with a modest start in face of heavy odds fought steadily uphill to a definite position, will evoke the admiration of the most exacting critic. The  
**The Fund's  
Work** Paisa Fund is such an institution. People jeered at it in early days; at the best they were indifferent; but a team of determined men gradually brought them round and soon those very men who

had jeered, helped towards erecting a structure, the magnitude of which is surely as gratifying to them as to the builders themselves. Educating public opinion to the urgency of industrial development has, therefore, been the first achievement of the Fund. Its very growth represents the number of people converted to its ways of thinking. "But where is all this money"? some one may well enquire. The triumphant reply to this enquiry is, "Half the sum collected is represented by a prosperous Glass Works situated at Talegaon. It is now practically a self-sufficient unit and has nearly commuted for its financial independence. During the period of a quarter of a century this Works has trained hundreds of workers in glass, scores of men of the foreman class and a few selected experts of repute. It has improved nearly to perfection the quality of Indian glassware and thus restored to a large extent the confidence in the ability of Indians. It has done pioneer work in Pottery and demonstrated the success of many branches of this craft. It has spent thousands of rupees in experiments—irrecoverable expenses—but spent towards a definite purpose in the cause of Science. It has helped, with expert advice and men, many concerns in all parts of India and tested raw materials on behalf of various industrialists. It has, by its own production and by the production of other works, helped check, to a marked extent, the drain of Indian money to foreign lands on account of glass and pottery ware.

These points may have been repeated many times in the body of the volume, but no amount of repetition is enough to draw attention to this almost solitary example of a basic industry built up by a poor province. Next to the glass works, a large section of the Fund is invested in propaganda work for the purpose of multiplying the assets of a national concern. Here again, no amount of propaganda is enough to demonstrate the utility of the Paisa Fund. The Fund cannot have any maximum limit in view of the work it has undertaken—the work of building an Industrial India, of creating an industrialised population and thus trying to achieve prosperity and strength for the country.

With all this enumeration of achievements, one cannot but reflect that it is a mere drop in the ocean. Only a start ( though it is a sound start ) is made in the manufacture of glass, a mere fraction of the huge trade is captured, only the commonest qualities of glassware are made. In short, just a fringe of the market is touched and there is yet an immense task ahead. Looking to the greater issues, a relatively small section of the teeming millions is made aware of their responsibility and in comparison with the potential wealth of India, a very insignificant sum is collected and dealt with.



Nevertheless it is a sound beginning. The Paisa Fund has been through the ordeal by fire; it has been tested and found to be all it claims to be, and can now make a confident appeal to the general public. Now that the period of the Fund's probation is over, it reminds the public and compels their attention to lay its case before them.

In the absence of the state's interest, there must be a huge national fund to wrest industrial supremacy from alien hands. In the absence of one big Fund there could at least be hundreds of smaller funds all over India. The utility of such units of disinterested capital is now established. The Paisa Fund is the first successful demonstration of the idea, and in the absence of its extensive vogue, it is the duty of the public, to make up the want of extent by intensive contribution. The Fund has proved its success. Give it a chance, let it do more, there are no limits to its possibilities. Glass manufacture is only one of its services. The major portion of the glassware market needs replacement by Indian goods. Let the Fund undertake this task. Let it rise higher in its attempts. Lamp-ware and bangles is not the be all and end all of the Indian glass makers' ambition. There is tableware, plate and sheet glass, artistic glass, optical glass, electric bulbs—in fact a thousand and one varieties which could be tackled. Let Paisa Fund tackle them for the industry. Let it experiment, make mistakes, learn and succeed, and let it give the fruits of its hard labour to the industry.

Not only those interested in the manufacture of glass, but those interested in Indian Industry in general, those wishing to see India prosperous and her sons busily working and provided for, those wishing for advancement of Science in India, and even those longing for political power—let all these examine the Fund's ideal, its past work and its potentialities. It is not a question of one industry or one province. It is a National undertaking the Fund represents. It wants gains, not for itself or any particular group, nor for any particular industry but gain for the Fatherland in the long run. There are other important industries awaiting its help but let glass be mastered first because the way in this direction is clear. No definite sum is enough for the purpose. Lakhs don't count in a Nation's finance. But the Fund's demand is relatively moderate. Five lakhs is all it wants to begin with; five lakhs in five years. No one can call it an exorbitant demand. Our population is stupendous; advantage can be taken of the sheer strength of number. The minutest contribution of crores can make up the amount and five years is a sufficient time for that. Whoever, therefore, has the country's good at heart; whoever yearns for India to be a strong, vigorous and healthy organism—a living nation; whoever wishes for general prosperity; why even he who wants to sow the

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seed of ultimate material gain, let him contribute his mite to the Paisa Fund. In the very near future such a contributor will see that his humble contribution has borne fruit; he will have the gratification of having shared to serve a great end. In years to come he might tell his son or, may be, his grandson, how he gave a diffident copper and how the alchemy of a national enterprise turned that copper into gold and gave it to the country.

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## A List of Glass

No.	Name of Glass Works.	Place—Province.	When Started.	Capital in Rupees:	Products.
<b>(A)—Factories known to be closed.</b>					
1	The Punjab Glass works	Jhelum, Punjab	1870	..	Bottles
2	The Aligarh Glass Works	Aligarh, U. P.	1879	..	Bottles
3	The Bhagalpore Glass Works	Bhagalpore, Bengal	1882	..	Beads
4	The Pioneer Glass Works	Titaghur, Bengal	1890	2,50,000	Hollow and Pressed ware
5	Sodepur Glass Works	Sodepur, Bengal	1895	8,00,000	Hollow and Pressed ware
6	The Punjab Glass Works	Amballa, Punjab	1895	..	Hollow and Pressed ware
7	The Sind Glass Works	Hyderabad, Sind	1895	..	Bottles

**Works in India.****APPENDIX A.**

Management.	Expert.	Life.	Remarks.
English	German	Less than one year	Failed for want of sufficient capital and expert's ignorance of local conditions.
English	..	2 months	Received help from Govt., but failed owing to impatience and bad work.
English	Venice-trained English	Still-born	Received help from Govt., but failed to generate sufficient heat and was abandoned.
Austrian & Indian	Bohemian & English	8 years	First Indian Enterprise, Indian raw materials except Soda, local people trained. Block glass for bangles successful; failed because workers bribed away to other works.
European	European	8 years	Failed because annealing (and therefore production) was defective and experts left without training local men.
European	European	Not known	Closed owing to defective furnace and bad products; the owner intended to train students, but his employees quarreled among themselves and left.
German	German	Not known	Speciality-Gas furnace; heavy expenditure and incompetent expert caused the failure of this Works; machinery was bought in 1907 by Mr. Panna Lal.

No.	Name of Glass Works.	Place—Province.	When Started	Capital in Rupees.	Products.
8	The Ahmedabad Glass Works	Ahmedabad, Bombay Presidency	1897	1,00,000	Not known
9	The Himalaya Glass Work	Rajpur, U. P.	1898	3,00,000	Hollow and Pressed ware
10	The Oriental Glass Works	Sikandra Rao, U. P.	1905	63,000	Hollow ware
11	The Ennore Glass Works	Ennore, Madras	1907	3,00,000	Soda Bottles
12	The Scindia Glass Works	Morar, Gwalior State	1908	75,000	Hollow-ware & block glass
13	The Kashi Glass Works	Sitarampur, U.P.	1908	....	Bottles
14	The Panipat Glass Works	Panipat, U. P.	1908	..	Bottles
15	The Jubbulepore Glass Works	Jubbulepore, C. P.	1909	3,00,000	Hollow ware
16	The Bombay Glass Works	Matunga, Bombay	1909	1,00,000	Hollow ware
17	The Baroda Glass Works	Baroda State	1911	1,00,000	Hollow ware

Management-	Expert.	Life.	Remarks.
Not known	Not known	Not known	The factory failed in spite of modern equipment including a Siemens furnace and every other facility. No particulars respecting it are available.
European	German & Austrian	12 years	Failure owing to defective furnace and expensive production; started by Europeans and bought over by Mr. Harkisan Lal; finally failed.
Indian	Japan-trained Indian	Less than one year	Defective furnace; half gas furnace was attempted, but failed; internal dissention was also a cause of failure.
European	European & Japanese	2 years	In spite of funds, machinery, and equipment, glass-manufacture in Madras was decided as never likely to be economic, as no efforts could save the factory.
Indian	Indian	1 year	Three tank furnaces and good equipment could not prevent the factory's failure by mismanagement.
Indian	Indian	Less than one year	Failure due to insufficient funds.
Indian	Indian	2 years	Closed due to heavy expenses and bad production.
Indian	German	2 Years	Failure due to bad selling organisation, in spite of good equipment.
Indian	Japanese	6 Months	Closed in confusion and internal disputes.
Indian	Japanese	2 Years	Insufficient capital subscription and mismanagement caused failure.

No.	Name of Glass Works.	Place-Province.	When Started.	Capital in Rupees.	Products.
18	The Bengal Glass Works	Sodepur, Bengal	1912	.. ..	Hollow-ware
19	The Crescent Glass Works	Sewari, Bombay	1913	30,000	Hollow-ware
20	The Western India Glass Works	Sunth Road, Bombay	1913	1,50,000	Hollow-ware
21	The Alwar Glass Works	Alwar State	1911	Details not known	
22	The Lahore Glass Works	Lahore, Punjab	1918	do	
23	The Nagina Glass Works	Bijnore, U. P.	1915	do	
24	The Diamond Glass Works	Rao, Indore State	1915	do	
25	The . . . Glass Works	Piplod, Bombay	1916	do	
26	The Jewel Glass Factory	Jubbulepore, C.P.	1920	do	
27	The Deccan Glass Works	Begumpeth, Hyderabad ( Deccan ).	}	}	Details not known
28	The Sahibjada Glass W.	Kasur			
29	The National Glass Works	Ferozepur			
30	The Northern India Glass Works	Amritsar			
31	The Durbar Glass Works	do			
32	The Amritsar Glass Works	do			
33	The Empire Glass Works				
34	The Jain Glass works	Harangaon U.P.			

Management.	Expert.	Life.	Remarks.
Indian	German	2 Years	Insufficient capital and trouble by experts caused failure.
Japanese	Japanese	6 Years	Changed hands many times and closed.
Japanese	Japanese	8 Years	Running proved uneconomic, therefore closed.



No.	Name of Glass Works.	Place—Province
<b>( B ) Factories with particulars unknown</b>		
1	The Nainee Glass Works	Allahabad, U. P.
2	The Pioneer Glass Works	Tangra Road, Bangal
3	The Shri Gobindo Glass Works	Salkea, Howrah, „
4	The P. G. S. Glass Works	Belgachia, Bengal
5	The Daga Glass Works	Bikaner, Bikaner State
6	The Hanuman Glass Factory	Firozabad, U. P.
7	The Nandlal Glass Works	Mulakha, U. P.
8	The Modi's Factory	Nayagaon, Bombay
9	The Binapani Glass Works	Calcutta, Bengal
10	The Indian Glass Mfg. Co.	Matunga, Bombay
11	The Peer Mohamad Glass Works	Matunga, Bombay
12	The Imperial Glass Works	Shahpur, U. P.
13	The Raja Glass Works	Intally, Calcutta
14	The Reliance Glass Works Ltd.	Santra Gachi, Howrah
15	The Tara Glass Works	Ramrajtala „
16	The Sunderban Glass Works	Toliganj, Calcutta
17	The Satya Narayan Glass Works Ltd.	Belgachia, Calcutta
18	The Ashirin Glass Works	do
19	The Howrah Glass Works	Circular Road, Howrah
20	The Nalini Glass Works	Khurut Road, „
21	The Rahim Bux Glass Works	Gelliapara, Bengal
22	The East India Glass Works	Gobra „
23	The Belliaghatta Glass Works	Belliaghatta, Calcutta
24	The Pioneer Glass Works	Maniktola, Calcutta

No.	Name of Glass Works	Place—Province
<b>(C) Existing Factories</b>		
On the list of the Glass Manufacturers' Association.		
1	Bikaner State Glass Works	Bikaner
2	Wadhwan Glass Works	Wadhwan, Kathiawar
3	Gomtipur Glass Works	Ahmedabad, Bombay
4	National Glass Works	Mazgaon, Bombay
5	Ogale Glass Works	Ogalewadi, Aundh, State
6	Paisa Fund Glass Works	Talegaon, Bombay
7	Nagpur Glass Works	Itwair, Nagpur, C. P.
8	Shri Onama Glass Works	Gondia, C. P.
9	U. P. Glass Works	Bahjoi, U. P.
10	Ganga Glass Works	Balawali, U. P.
11	Krishna Glass Works	Hathras, U. P.
12	Paliwal Glass Works	Shikohabad, U. P.
13	Indian Glass Factory	Farukhabad, U. P.
14	Allahabad Glass Works	Nainee, U. P.
15	Upper Indian Glass Works	Amballa, Punjab
16	Bharat Glass works	Dum Dum, Bengal
17	Shivaji Glass Works	Howrah, Bengal
18	Bengal Glass Works	Dum Dum, Bengal
19	Calcutta Silicate Works	Belgachia, Bengal
20	Govind Glass Works	Ram Raj Tola, Hawrah
21	Union Glass Works	Calcutta, Bengal
22	Great Eastern Glass Works	Gobra, Bengal
23	Victoria Glass Works	Ghoosery, Calcutta, Bengal
Not on the list of the Glass Manufacturers' Association		
24	Central Glass Works	Nagpur, C. P.
25	Artistic Glass Works	Calcutta, Bengal
26	Indian Glass Works (Comprising of six bangle factories of the Banglemakers' Association.)	Ferozabad, U. P.
27	The Framroz Bangle Factory	Kandivali, Bombay
28	Laxmi Glass Works	Jalesar, U. P.
29	New Glass Works	Madras

No	Name of Glass Works	Place-Province
30	The Jamal Glass Works	Madras
31	The Government Porcelain Factory	Mysore
32	The Gwalior Porcelain Factory	Gwalior
33	Messrs. Kunte Enamel Works	Thana, Bombay
34	The Kabul Glass Factory	Kabul, Afganistan
35	Phalke Enamel Works	Nasik
36	The Calcutta Pottery Works,	Tangra Road, Calcutta
37	Parashuram Pottery Works,	Morvi, Kathiawar
38	Sorab Dalal Tile Works,	Than Road, Kathiwar

## The Central Potteries Ltd., NAGPUR.

The only China-clay Factory started and managed by students trained at Paisa Fund Kach Shala, Talegaon.

### *Some of our Principal lines.*

Jars of all sizes and varieties, China-clay dolls and images, Inkwells, Acid jars, Cups, Saucers in beautiful shapes and designs.

**BUY CENTRAL POTTERY PRODUCTS  
AND HELP SWADESHI**

**INDIAN CAPITAL AND INDIAN MANAGEMENT.**

Please pay a visit to our factory and get convinced.

## The Phoenix Chemical Works, Matunga, Bombay.

Proprietors:—Messrs. M. G. Kotibhaskar, M. Sc. Tech., A. M. I. Chem. E., A. I. C., R. N. Nerurker and K. G. Kotibhaskar are the proprietors of the Phoenix Chemical Works.

The Concern is owned and managed by Maharashtrians. This is the first Maharashtrian firm to manufacture Silicate of Soda on a large scale. Both Alkaline and Neutral varieties of Silicate of Soda are made. This is the first and the only firm to prepare both the Neutral and Alkaline clear Silicate equal to European and Japanese qualities. Silicate of Soda is made in a Reverberatory Furnace and the monthly output is 50 tons of finished Silicate.

The demand for Silicate of Soda for soap manufacture is growing and in spite of 4 factories in India, the quantity of imported Silicate is more or less unaffected. Out of the Silicate manufactured in India, that of the Phoenix Chemical Works is liked the best. To cheapen the cost of production of soap, several cheap soap makers use a turbid quality which contains in suspension some fine Silica along with precipitated Calcium Silicate. It is a speciality of the turbid quality of The Phoenix Chemical Works that it contains no Calcium Silicate and the suspended impurity is present in a much smaller percentage. The clearer the Silicate used, the better is the appearance of the finished soap, and hence all renowned and good soap makers use the clear variety of Silicate.

The Neutral Silicates are mostly used in Europe and America as most suitable for soap making. Somehow or other, Indian soap-makers are using only the Alkaline Silicate. Since the soap trade is in the hands, in many cases, of people who know soap making only as an art and not as a science, it has been difficult to persuade the soap makers to use the Neutral Silicates.

The Phoenix Chemical Works are using sand produced in Savantvadi State as they are anxious to help Maharashtra. They made use of red sand mixed with mud which no glass or Silicate manufacturer would use and removed the impurity chemically. Now the Savantwadi sand is available in a purer form.

## Imports of Glassware into India

( IN RUPEES )

Year	Bangles	Beads and false pearls	Bottles and phials		Lampware.	
			Soda-water	Common		
1905-06	88,76,726	17,77,054		6,23,055	5,51,687	
1906-07	42,78,558	24,02,442		6,50,645	6,94,188	
1907-08	55,67,401	25,89,787	Not given separately	6,34,284	9,07,781	
1908-09	83,26,644	23,23,967		7,66,932	6,61,561	
1909-10	47,63,447	16,88,176		7,65,314	8,71,511	
1910-11	55,75,125	28,07,055		8,45,430	12,24,060	
1911-12	61,97,685	23,69,175		8,00,370	9,51,810	
1912-13	61,92,615	30,25,005		5,56,260	10,91,205	16,31,850
1913-14	80,44,815	24,43,875		6,57,940	15,31,215	17,93,145
1914-15	27,54,735	15,30,800		5,55,510	11,06,625	10,00,020
1915-16	23,15,835	10,89,435		4,75,320	11,97,855	19,41,810
1916-17	43,22,555	20,65,695		8,79,390	15,82,995	11,51,415
1917-18	84,96,260	23,58,000	10,82,460	26,28,330	18,86,985	
1918-19	29,12,850	18,86,435	11,47,920	19,11,090	11,25,615	
1919-20	51,18,860	19,94,230	7,00,260	23,06,380	18,89,650	
1920-21	96,25,190	45,09,230	21,09,410	33,47,360	18,41,510	
1921-22	60,78,426	33,35,962	13,27,775	20,40,155	16,53,432	
1922-23	79,86,933	47,80,053	14,02,929	21,87,169	22,58,945	
1923-24	86,38,080	39,42,438	13,87,518	20,91,698	17,32,441	
1924-25	100,22,036	37,75,741	12,40,159	22,19,437	16,59,231	
1925-26	101,04,026	36,48,992	13,49,869	24,19,263	15,35,198	
1926-27	84,85,810	30,94,972	14,22,111	24,82,028	19,37,139	
1927-28	89,51,885	26,62,250	12,09,214	20,91,954	22,19,977	
1928-29	76,76,438	30,41,520	13,53,233	22,60,666	19,58,314	
1929-30	85,23,069	30,61,106	15,44,937	24,04,453	21,08,373	
1930-31	49,90,396	15,71,774	9,93,447	20,01,055	19,25,756	
1931-32	84,51,100	9,43,397	...	24,09,121	7,49,770	
1932-33	39,88,533	12,40,540	...	24,40,393	6,67,441	
1933-34	27,13,437	13,47,804	...	21,09,705	5,04,794	

( Since 1905-06 ).

Appendix B.

( IN RUPEES )

Scientific Glass-ware	Sheet and plate glass	Table-ware	Other glass-ware	Total Imports	Year	
Not given separately	16,51,159	Not given separately	27,67,460	1,12,47,108	1905-06	
	12,44,884		28,43,441	1,21,14,108	1906-07	
	14,10,983		33,41,538	1,44,51,774	1907-08	
	18,42,056		32,72,131	1,16,93,291	1908-09	
	18,27,826		34,37,135	1,28,52,909	1909-10	
	16,18,430		36,17,135	1,56,82,335	1910-11	
	15,45,285		35,42,685	1,54,37,010	1911-12	
	20,56,620	6,87,740	23,42,670	1,75,33,965	1912-13	
	22,85,330	7,95,980	19,47,045	1,94,52,795	1913-14	
	12,74,565	8,71,940	9,57,540	96,51,635	1914-15	
	18,88,810	6,47,685	11,38,245	1,06,44,495	1915-16	
	23,29,690	7,15,125	14,52,300	1,50,09,165	1916-17	
	22,88,270	9,91,095	15,34,485	1,62,45,885	1917-18	
	18,22,650	8,46,150	13,07,955	1,24,60,665	1918-19	
	55,380	86,00,540	16,45,660	26,74,980	1,99,80,940	1919-20
	2,13,980	71,11,080	15,45,320	34,58,740	3,37,61,820	1920-21
	1,64,037	37,94,707	17,34,993	21,19,895	2,22,49,432	1921-22
	2,31,413	36,91,800	10,52,095	23,69,130	2,59,60,467	1922-23
	1,88,310	32,90,056	10,22,849	22,80,347	2,45,74,237	1923-24
2,17,707	33,85,379	8,98,866	25,82,732	2,60,01,338	1924-25	
2,68,917	28,17,623	9,58,458	23,43,298	2,59,45,644	1925-26	
2,82,147	31,65,539	9,14,744	35,53,749	2,52,88,239	1926-27	
1,72,575	29,86,137	9,40,457	36,06,401	2,48,40,850	1927-28	
1,65,746	29,68,355	10,93,853	32,26,350	2,37,49,480	1928-29	
1,33,599	30,97,395	13,28,566	29,91,630	2,51,93,168	1929-30	
1,43,478	23,37,549	9,45,839	22,18,646	1,64,77,940	1930-31	
1,18,591	19,72,300	5,90,562	19,62,368	1,21,97,209	1931-32	
1,38,218	23,11,241	5,39,694	29,20,396	1,42,46,926	1932-33	
1,15,655	21,24,286	5,25,542	27,72,221	1,22,13,444	1933-34	

## Glass ( A classification. )

APPENDIX C.

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	Sub Class	Group	Varieties	Utility
<b>GLASS.</b>	<b>NECESSITY.</b>	<p>1. <b>Lamp-ware</b>—( for electric, gas, oil and candle lighting).</p> <p>2. <b>Bottle-ware</b>—(mouth-blown, machine-blown).</p> <p>3. <b>Sheet &amp; plate, including Venetian Glass &amp; Rolled.</b>— ( cast, pressed, drawn and blown )</p> <p>4. <b>Table-ware</b>—(pressed, blown cut, moulded).</p> <p>5. <b>Scientific-ware</b></p>	<p>Shades, globes, chimneys, covers, bulbs ( filament, gas-filled &amp; torches ).</p> <p>Bottles, jars, phials, flasks, decanters, sodabottles and other containers, fancy and plain.</p> <p>Plated—big and small, sheet-glass, window-glass, fancy &amp; plain, Venetian glass.</p> <p>Fancy &amp; plain, table-plate, tumblers, drinking glasses, bowls etc.</p> <p>( a ) Lenses &amp; Reflectors for microscopes, telescopes, cameras, helio-graphs, eye-glasses, projectors, etc,</p>	<p>Public lighting – roads, canals, docks, railways, ships, buildings: house-hold lighting in towns and villages.</p> <p>Chemicals, medicines, wines and spirits, mineral waters, inks, scents, house-hold purposes.</p> <p>Windows for public and private buildings, shops, show-cases, motor windows, partitions, screens, ordinary &amp; surgical furniture, picture &amp; photo framing, painting.</p> <p>Eating &amp; drinking purposes in house-hold and hotels, cafes, restaurants etc.</p> <p>For research laboratories, observatories, photographers, military and general public purposes.</p>

THE PAISA FUND SILVER JUBILEE NUMBER

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GLAS...	LUXURY.		<p>(b) Laboratory glass beakers, jars, tubes, retorts, stoppered bottles, plates etc.</p>	<p>For experiment and research in laboratories of all sciences, for Scientific museums &amp; Electric fittings.</p>
		6. Bangles	<p>Faceted, plain, round, cut, zig-zag; fancy, silken, coloured, multicoloured, painted.</p>	<p>For X-Ray apparatus, radio-valves etc. Partly religious necessity and partly luxury.</p>
		7. Beads, False pearls, Balls, Rods, etc.	<p>Plain, coloured and fancy.</p>	<p>Ornaments, decorations, novelties and toys.</p>
		8. Decorative & artistic glass ( Mostly hand-made ).	<p>Mirrors, plate, Cut glass-ware, Chandeliers, Vases, bowls etc. Figures, Lead glass, Stained glass.</p>	<p>Decoration.</p>
		9. Spun glass	<p>Glass yarn.</p>	<p>Laboratories</p>

GLASS ( A CLASSIFICATION )



## APPENDIX D.

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**APPENDIX E.****Public Opinion**

( Selected remarks of visitors to the Paisa Fund Glass Works, Talegaon. )

Note—*Remark included in the body of the volume are not repeated.*

" I was very pleased to see these Works and I wish prosperity to the enterprise. "

(Sd.) M. K. Gandhi  
 12-6-1916

" I have been extremely pleased to see these Works. A tribute of high praise is due to those who have developed the Works with the help of the Paisa Fund in their present stage of success. I wish further success to this patriotic endeavour. "

9-6-1988

(Sd.) Madan Mohan Malaviya,  
 Benares Hindu University.

" An interesting and instructive visit. The Institution appears to have a bright future. "

(Sd.) Javaharlal Nehru.  
 Allahabad.

" Going round India, I find in most glass factories, evidence of the Educational work done in this Institute. The present boom in Indian glass consequent on the War would have been impossible, but

for the supply of blowers trained here. More capital is obviously wanted for further developments."

(Sd.) Alfred Chatterton.  
Bangalore, 27-10-1917.

"Next to cotton goods, the imports from Japan that most attract attention are glassware and matches and attempts are being made to provide ourselves with these almost necessities of every day life. The Talegaon Glass Works have shown how this can be done for new Works elsewhere."

(Sd.) Dorab Tata.  
( Presidential Address, Industrial Conference, 1915 )

"Spent a very happy afternoon and wish the industry all possible success."

15-7-1918 } (Sd.) Willingdon,  
( Now Viceroy of India ).  
(Sd.) Marie Willingdon.

"We visited these interesting Works to-day and were much pleased to see the various processes of Glass and Pottery manufacture. The factory deserves widest recognition from our countrymen as a pioneer institution. We wish it every kind of success."

Poona, 5-9-1921 } (Sd.) R. P. Paranjpye  
Minister of Education.

There has been great improvement since I last saw the factory some seven years ago. The concern deserves the patronage of the public and I trust it will never fail to get it."

Poona, 20-8-1915. } (Sd.) V. S. Shrinivas Sastri,  
President  
Servants of India Society.

"Visited the Paisa Fund Glass Works *extempore* on the way back from Bombay. The attempt to train up country and thus spread the industry all over India is highly commendable. It is a matter of pride that four or five of the factories at least, are run in India by students trained at Talegaon."

Aundh 5-12-1924. } (Sd.) Balasaheb Pant,  
Chief of Aundh State.

"I visited the Paisa Fund Glass Works some three years ago and was delighted to find that articles of good quality were being turned out by the Factory. What appealed to me, still more, was the fact that several youngmen were regularly trained, who after gaining experience in the art of glass making, were able to start, independently, factories of their own.

The Paiss Fund Glass Factory has thus been the means of doing much good to the country. "

Calcutta, 2-12-1982. }

(Sd.) P. C. Ray,  
University College of Science.

" I visited the Glass Works with about 15 science students. The glass articles prepared in the works are quite good and there is every probability that all the different wares in porcelain will also be in near future prepared here. In explaining the various processes, the Managers take special pains and that is one of the features in which these Works differ from others of a similar type managed by Europeans. One feels at home while visiting the Works and gets confidence that Indians are capable of producing every finished article in the glass and ceramics provided he is afforded suitable facilities. "

Poona 8-4-23. }

(Sd.) G. B. Kolhatkar,  
Professor, Fergusson College.

" Having paid a flying visit here, I should like to state that I have found the works well appointed and conducted much beyond my expectations. Good order and cleanliness prevailing. "

23-6-1918. }

(Sd.) J. Elland,  
Government Glass Expert, U. P.

" We paid this visit to the works to see for ourselves the work done by the management in the face of the enormous difficulties they have to fight with. This is an example of the bull-dog tenacity with which any industrial problem has to be worked out here. The pioneering work done by this factory is invaluable to the country. We wish the management and the works complete success. "

Calcutta 4-7-1919.

(Sd.) K. B. De, B. A., B. sc. (Glas)  
Asstt. Secretary to the Coal Controller, Railway Board, Calcutta.  
Sd. S. N. Bose, M. A.

" I have gone through the Pottery Work done at the Works and I have found them quite good. I am afraid the work is hampered through the lack of funds and I believe better and higher class work of Pottery can be made if facilities are provided. "

Kathiawar, Than Road, }  
26-5-1923 }

(Sd.) C. P. Shah,  
Sorab Dalal Tile Works, Ltd.

Coming as I do from Madras Glass Factory with a long history of failures, it is impertinent on my part to write any remarks on this factory. Personally, I think the research work and the pioneering educating work they have done and are doing and its value as national asset is immeasurable. They bid fair to rise and be the best conducted glass factory in India.

Apart from the actual work, the most interesting aspect is the absence of difference between workmen and the heads. Above all this is the only institution whose object is to diffuse technical knowledge and make no attempt to conceal their knowledge.

Madras,  
27th & 28th Novembr 1916

( Sd. ) J. Narayan Murti, B. E.  
Personal Asst. to the Director  
of Industries, Madras.

I came with a party of students of the College of Engineering and I was surprised to see the work they are producing. After staying for 14 years in the Technical works of Europe, I find these works have a great future before it, if it gets good encouragement from everybody.

Poona  
18-7-22.

(Sd.) A. David,  
Professor of Mechanical Engineering.

Useful work has been done by the Paissa Fund at the Talegaon Glass Works and it is certain that the recent developments of the glass Industry in India have only been possible by reason of the blowers trained in this factory.

Industrial Commission's Remarks  
Page 69-Appendix E.

I have had much pleasure in inspecting this factory. The work exceeds my expectation and I hope that this *useful enterprise* will be increasingly successful.

20-6-1911.

(Sd.) H. E. G. S. Clarke.  
Governor of Bombay.

This is the pioneer factory of its kind in India and is turning out good work.

8-8-1912.

( Sd. ) J. H. Sathe, I. C. S.  
United Provinces.

The factory seems to be prospering as well as interesting. I was much pleased with everything I saw.

Poona,  
24-11-15.

( Sd. ) R. D. Bell, I. C. S.

I came from Poona with my friends to have a look at this interesting factory and was pleased to see this promising Institution. It would require considerable improvement still. Though the improvement now over the former state of things, I understand, is quite appreciable. Considerably more patronage from the public is needed to make this Institution a satisfactory success and an object lesson to similar institutions all over the country.

Madras,  
6-1-1916.

( Sd. ) H. G. Gharpurey, I. C. S.

I have long wanted to visit the Paisa Fund Glass Factory at Talegaon and have much enjoyed my visit to-day. The factory is handicapped severely by its dependence on England, Japan etc. for its raw materials and apparatus but the efforts which are being made to meet the difficulties are worthy of the men in charge of the factory. I think, I can see a very considerable future for the factory.

Agricultural College,  
Poona.  
26-9-1916.

( Sd. ) H. H. Mann,  
Principal.

We found everything that we saw very interesting and we wish the concern all success.

Darbhanga,  
Bihar & Orissa.  
Agricultural College,  
Poona.  
19-10-1916.

( Sd. ) S. B. Dhavle, I. C. S.

( Sd. ) Prof. S. L. Ajrekar

Visited the Glass Works with Mr. L. B. Phatak. The visit was very interesting and the new introduction of cast iron moulds in the making of glass materials ought to improve the finish and polish of the articles. I consider the factory deserves every patronage and should turn out a good business concern.

C/o Grindlay & Co. Bombay.  
4-4-19.

( Sd. ) K. G. Gharpure,  
Major, I. M. S.

I have enjoyed a visit to the Glass Works very much. It seems to be working on right lines, producing articles of everyday use. The Institution is worthy of every help.

Poona,  
12-2-20

( Sd ) G. B. Knight  
Principal, Agricultural College.

Have been much interested in my visit. The industry deserves every encouragement.

Simla,  
22-12-20.

(Sd.) R. H. Rolfe,  
Finance Dept., Simla.

I visited the factory this afternoon and was extremely pleased with the samples of works turned out. I wish the Institution every success.

Kolhapur,  
6-9-1911.

(Sd.) R. V. Subnis,  
Dewan of Kolhapur

The factory is turning out very nice pieces of glass and deserves every encouragement.

Morvi,  
24-4-1912.

( Sd. ) Gokuldas R. Meheta  
Manager Morvi Ry.

I visited the Institution to-day. It seems to be prospering and filling a want. I trust it will have many imitators.

Indore,  
16-7-1915.

( Sd. ) Sardar M. V. Kibe

It is such a pleasure to go through the Glass Factory here. And indeed, I was quite surprised to see so many young boys engaged on the work. They were doing this work quite skillfully too. The whole factory put me in mind of the glass factories at Venice.

I wish every success to this Swadeshi Enterprise.

Fort Mysore,  
24-7-1915

( Sd. ) M. N. Bala Rajurs

We visited the Paisa Fund Glass Works this morning, as part of our industrial tour to factories in Bombay and neighbourhood.

The visit was very instructive to us. It must be a matter of satisfaction to the committee of management of this Institution that their own scholars are now able to conduct the work as capable experts. Perhaps they may be able to extend their activities by helping to revive the Baroda Glass Works which is now defunct.

Baroda,  
5-5-16.

( Sd. ) C. H. Vora,  
Principal, Kala Bhuvan.  
„ S. G. Naravne,  
Professor of M. E.

Visited the Institution along with the company of Shrimant Sardar Balasaheb Vinchurkar, Dr. Bhagwat, and others and found every thing satisfactory. I am glad to say the *Institution* is *worth visiting* and *supporting*.

Bhor,  
1-8-16

( Sd. ) Shrimant Babasaheb Pant Sachiv,  
Son of H. H. the Chief of Bhor.

I visited the Glass Factory this morning. I was shown the process of both smelting and blowing the glass, and was very much pleased indeed to get a good deal of valuable information and instruction. In fact by actually seeing the practical work, many of my wrong ideas of glass making were removed in a short time. If time had permitted I should have spent usefully more time than I could do this morning in a hurried visit.

I wish the Institution every success ; both as a factory and as an educational institution.

Indore (C. L.) }  
27-5-1917. }

( Sd. ) G. R. Tambe.  
State Surgeon.

Visited the factory this morning in company with a few friends, including Mr. Sitole, the late Director of Agriculture, Baroda State. The articles turned out are of a superior quality and can stand competition with foreign goods well. The pottery branch too is very interesting. All that is necessary for the Industry is financial help and general sympathy and encouragement from patriotic capitalists and Indian Rajas especially as this factory is supported by charitable funds.

Baroda, }  
20-6-1919, }

(Sd.) Gunaji Rao R. Nimbalkar,  
Sarsuba. Baroda-State.

The one thing that struck most was that *Men of all castes* blew the pipes *without the least objection* on the score of castes. I was very much pleased to see the factory.

2008 Camp, Poona, }  
5-3-1916. }

(Sd.) V. R. Shinde.

We visited the Glass and Pottery Works and were very much interested to watch the various processes. The works show what great possibilities can exist for energetic workers with a will and aptitude to brave all difficulties.

Poona, }  
14-11-21. }

(Sd.) Prof. S. K. Belvalkar,  
Deccan College.

The work turned out is very nice and would be commercially successful and able to compete foreign imports if proper Government help be available. The *factory is silently solving the problem of untouchables* who were seen working freely with high class people.

Bombay, }  
20 Hornby Road. }  
81-12-21. }

(Sd.) Hon. G. B. Trivedi.

The work that is being done in the simple way commands admiration. I wish this laudable Institution all success.

45 Tangra Road. }  
Calcutta }  
11-12-22 }

( Sd. ) S. Deb.  
General Manager & Secretary  
Bengal Potteries Ltd,



Visited the Talegaon Glass Works and was greatly interested to see the different processes. I understand the factory is established more as an institution for imparting instruction and not as a commercial undertaking and it is satisfactory to learn that it is paying its way.

Bombay  
24-5-22.

(Sd.) Lt. Col. C. R. Bakhle, L. M. S.  
Abdulla House, Laburuum Road,  
Gamdevi.

Visited the factory this morning and was greatly interested in seeing the various processes.

Poona,  
20-8-24

(Sd.) M. V. Bhide, I C. S.  
Collector, Hoshiarpur,  
Punjab.

Was pleased with everything I saw. The factory is doing a great national service and as such has a claim over all.

Bombay,  
11-11-25.

(Sd.) B. V. Jadhav,  
Minister of Education.

I with my family visited this Institution. I am glad to see that this is the only first prosperous institution in the Deccan. I hope, it will continue to be the pride of Maharashtra.

Shahali Bunda  
Hyderabad, Deccan  
24-4-21.

(Sd.) Shamraj  
(Rai Rayan Bahadur)

In glass the factory has made enormous progress since old days and to-day the glass is just as good as foreign, especially chimneys and globes. Pottery Department is also doing good and useful work. The Industry is a very good and absolutely necessary one. I am sure all patriotically minded persons would support it. Wish it all success. The bangle-making experiment is also very promising.

Baroda.  
26-5-24.

(Sd.) S. M. Pagar,  
Director of Commerce & Industry.

I have had much pleasure in inspecting the factory. I wish the Industry all possible success. The different processes were carefully and intelligently explained to me.

Amalner,  
29th April 1921

(Sd.) Motilal Manakchand,  
Alias Pratapshet

I have inspected this factory and am pleased with it. India wants small factories of this type all over the country.

Calcutta,  
3-2-23

(Sd.) Chitta Ranjan Das,  
Barrister.

I visited with my family this day the glass factory and was much impressed with all that I saw. The articles are turned out with a nice finish. I recommend all people to use country-made articles as manufactured here at all times.

Victoria Lodge,  
Andheri,  
2-1-1924.

Jijibhai D. Khambata,  
Solicitor.

I was much interested in all that was shown to me. I think every citizen should make it his duty to encourage this Swadeshi Industry. The factory well deserves support and every encouragement.

Bombay,  
31-10-25

( Sd. ) Meyer Nissim.

"I was shown over the factory this morning and was extremely pleased to see such a vast improvement since I visited it 2 years back. The factory is really one of the most useful piece of work carried on in Maharashtra and deserves the sympathy and active support of true lovers of the country."

Fergusson College, Poona,  
25-5-32.

( Sd. ) D. D. Karve.  
& Party

"Visited the Works after twenty years. Great progress has been made in improving quality and reducing costs and the industry is now permanently established. We wish the Works success and Godspeed."

1-3-1933

( Sd. ) M. Vsihweshwarays.  
Cordially endorse the above good wishes.  
(Sd.) B. B. Advani,  
Director of Industries, Bombay.

By C. W. A. Turner, Secretariate, Bombay.

"A most interesting visit. The works seen to be well managed & deserve all the support they can secure."

24-11-27

(Sd.) C. W. Turner.

"We had visited the place ( Institution ) and were glad to see the young and promising workers doing their work quite skilfully and were active and zealous in their task."

Motibag Palace, Baroda.  
1-10-27

( Sd. ) Kamala Devi Gaekwar.

"His Highness was very pleased with all that was shown and wishes the factory every success."

26-9-28

(Sd.) Sadar Z. Shah,  
The Secretary.,  
Krishnaraja Wadiyar, H. H. the Maharaja of Mysore.

By Hon 2nd Justice S. S. Patkar, Huges Street, Chowpatty Bombay,

"I paid a flying visit to Paissa Fund Glass Works this morning with family and friends. The Institution is conducted more with a view to educate other peoples in starting similar institutions elsewhere in India than with the objects of commercialism. I was shown by Mr. Chandorkar all the processes from the mixing of ingredients which go to form Glass from crude materials to the last processes of finished products. The finished products prepared in the factory compare very favourably with products of foreign countries. The factory prepares glass articles of all sorts and also pottery. I understand that an effort is made to prepare cups and saucers. I wish the Institution every success and have no doubt that it deserves public support and encouragement."

10-5-1929

**Nagpur Glass Works Limited,**  
**NAGPUR, C. P., INDIA.**

We manufacture all kinds of lamp Chimneys, Globes,  
Glass Jars, clear Glass Bottles with narrow & wide mouths  
Glass Tumblers and *Unbreakable* Glass Tumblers etc. etc.

Our articles are smartly designed and are durable.  
They are cheaper than imported goods.

**PLEASE WRITE FOR PARTICULARS**

**TO**

**NAGPUR GLASS WORKS, LTD.**  
Nagpur, C. P. (INDIA.)

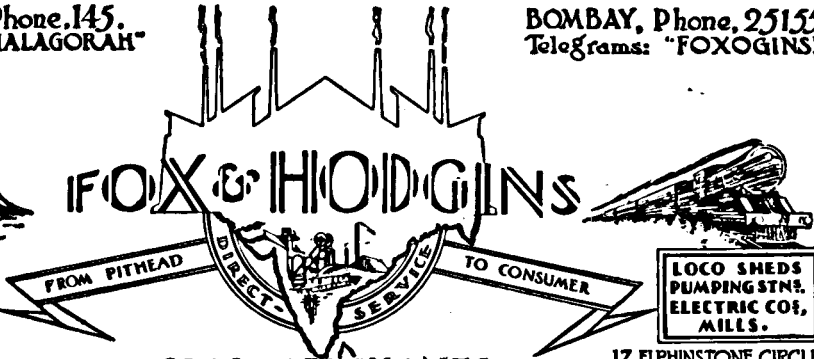
AHMEDABAD, Phone. 145.  
Telegrams: "BHALAGORAH"

BOMBAY, Phone. 25155  
Telegrams: "FOXOGINS"



FOUNDRIES  
GLASSWORKS  
CEMENTWORKS  
FACTORIES

RAILWAYPURA P.O.  
AHMEDABAD.



COAL MERCHANTS



LOCO SHEDS  
PUMPING STNS.  
ELECTRIC CO.,  
MILLS.

17, ELPHINSTONE CIRCLE,  
BOMBAY.

## Bhate and Co.,

5 Budhwar Peth, Poona 2.

The only place  
FOR  
Best and Prompt  
Typewriting work  
IN  
Poona.

## THE Poona Engineering Works

362 Sadashiv Peth, Poona 2.

A house  
FOR  
all sorts of  
mechanical jobs.

• • • •  
New machines designed  
Repairs undertaken  
Technical advice Given

## Techno-Chemical Works,

DHARAVI, BOMBAY 17.

Manufacture—

Light Caoutchoucine, Lousine

(ऊ-मारी) insecticide, Wood-preservatives

Washing Soaps etc. etc.

Supply—

Heavy Chemicals, Laboratory  
Chemicals and Apparatus.

Undertake—

Laboratory fitting and Industrial  
Analytical Work.

# The Clarion Call

---

Use Paisa Fund Glassware and Stoneware and show  
the way to others.

\* \* \* \* \*  
The Capital is *cent per cent Indian* as it is contributed  
by the General Public.

\* \* \* \* \*  
Paisa Fund Ware is durable, beautifully  
designed and cheap.

\* \* \* \* \*  
Packing of goods is supervised by an  
expert, eliminating breakage.

\* \* \* \* \*  
It is your duty to buy Paisa Fund Goods.

\* \* \* \* \*  
By helping This Pioneer Institution,  
You help Indian money to remain in India ;  
You help removal of unemployment ;  
You help Industrial Education ;  
You help growth of National Industries.

\* \* \* \* \*  
*The Paisa Fund Glass Works manufacture  
a variety of articles such as*

Chimneys and Globes, Glass Jars, airtight Glass Jars,  
beautiful Paperweights and Flower-pots, Battery jars,  
Dessicators; also Stone ware jars with or without screw  
caps, Flower pots, Inkwells, Garden tiles, Garden pots,  
Porous pots Cups and Saucers, Bangles, Glass Buttons, etc.

TO SEE  
**The Marvels of Glass Making**  
YOU MUST  
**Visit Paisa Fund Glass Works.**

Talegaon Railway Station.

ONLY  
**THREE HOURS RUN FROM BOMBAY**  
AND  
**ONE HOUR FROM POONA**

AND ALMOST  
**All Trains halt at Talegaon.**

**BEST TIME TO SEE THE GLASS WORKS IS**  
*8-12 in the Morning.*

**Paisa Fund Glass Works is always open to the Public**  
**except on Sundays and important holidays.**

IT WOULD  
**Save you much time and inconvenience**  
IF YOU

**Write to the Superintendent before hand.**

**The Paisa Fund Goods are available**

AT

**The Paisa Fund Depot, Laxmi Road,**

Poona 2.

Ahmednagar.

**The Deccan Commercial Company,**

Sangli s.m.c.

**Kelkar Bros.**

Nasik.

**All India Trading Corporation,**

Near Jubilee Garden, Baroda.

**The Indian Glass Ware Company,**

Chuokla Street, Bombay 3.

**Please write for particulars—**

**The Superintendent,**  
**PAISA FUND GLASS WORKS,**  
**Talegaon Dhabhade.**

## The Paisa Fund

# Arithmetic

India has a population of 350 millions.

If every Citizen contributes, only one pice in a year, the Paisa Fund can obtain a princely sum of Rs. 5,400,000 every year.

Taking four members in an average family, India has about 87 million families. If every family contributes only one Pice on the New Years Day towards the building up of National Industries, the Paisa Fund should get Rs. 14,00,000, enough to start a New Industry every year !

If the 5 % educated population of India alone become industrially minded and contribute their quota of one pice in the long 365 days, the Paisa Fund can raise Rs. 200,000, every year --a sum not to be trifled with.

Admitting morning & afternoon tea as a modern necessity, every one drinks on an average an extra cup of tea every day ! Can he not spare one pice in the whole year out of these " Extras ? "

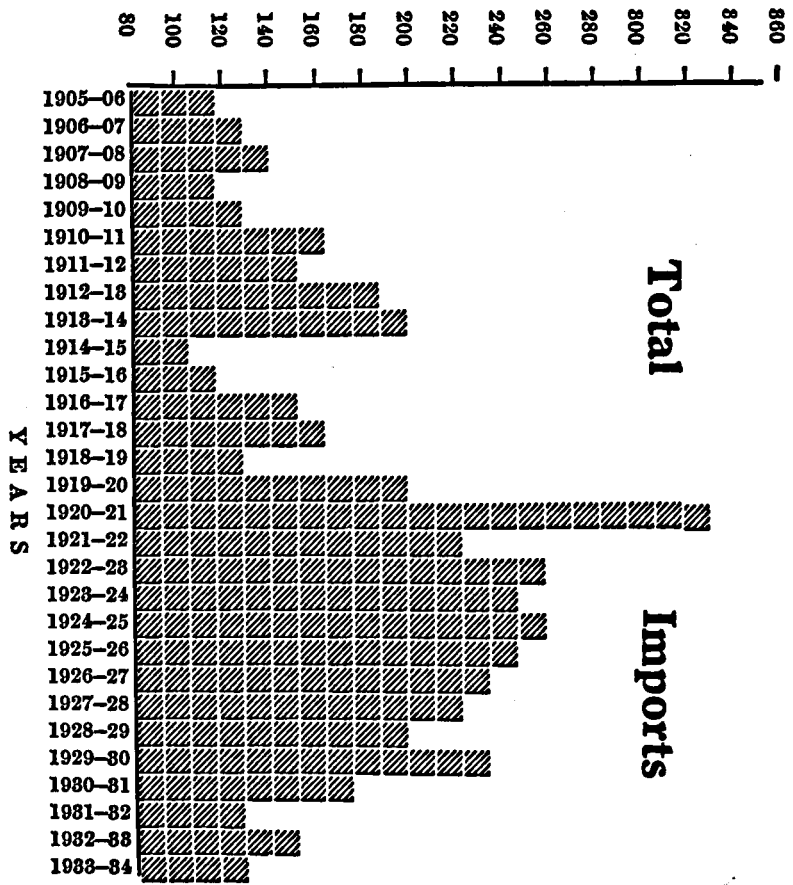
How much one spends on luxuries--smoking for example ? A pice out of one's annual bill for these will certainly not affect the degree of one's pleasure.

And how much does one throw on dramas, cine-shows and other forms of luxuries ? Certainly the expense of a pice once in a year would not be burdensome !

What is a pice, once in a year, in a man's or a family's finance ?

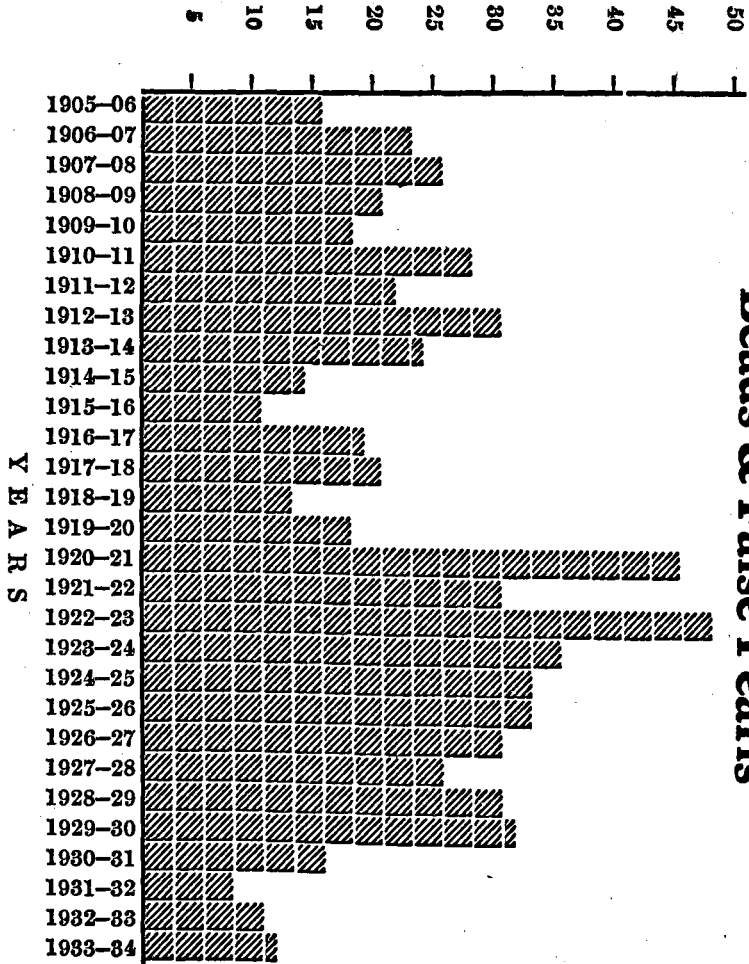
Even Japan has recently imitated the Paisa Fund. Every citizen will pay half a Yen to the Naval Fund.

RUPEES IN LAKHS



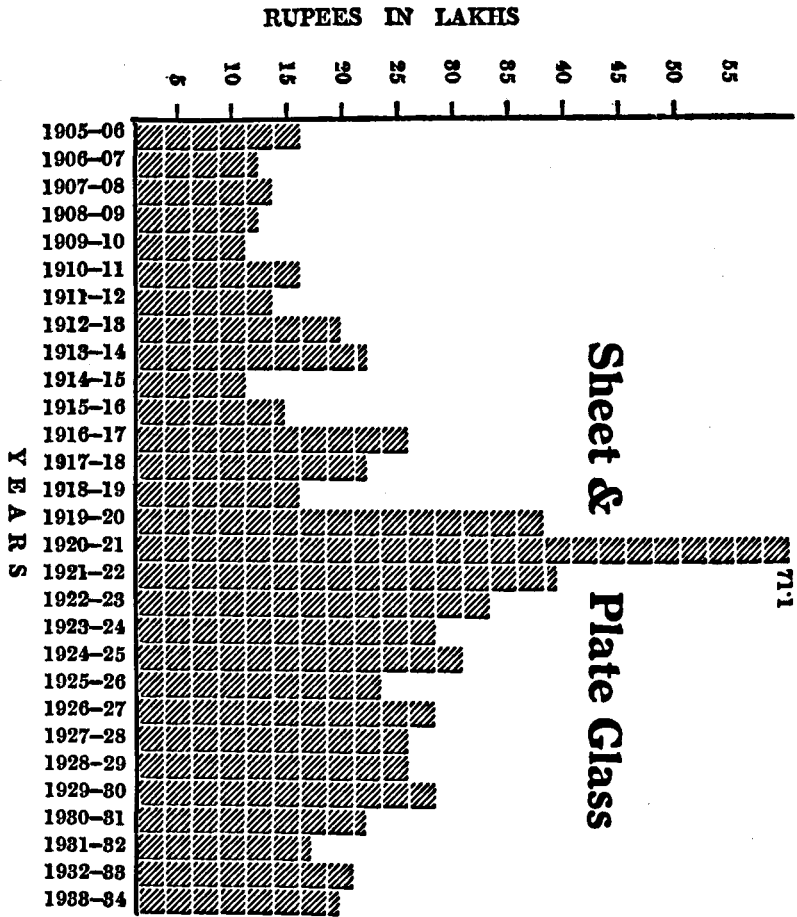


RUPEES IN LAKHS

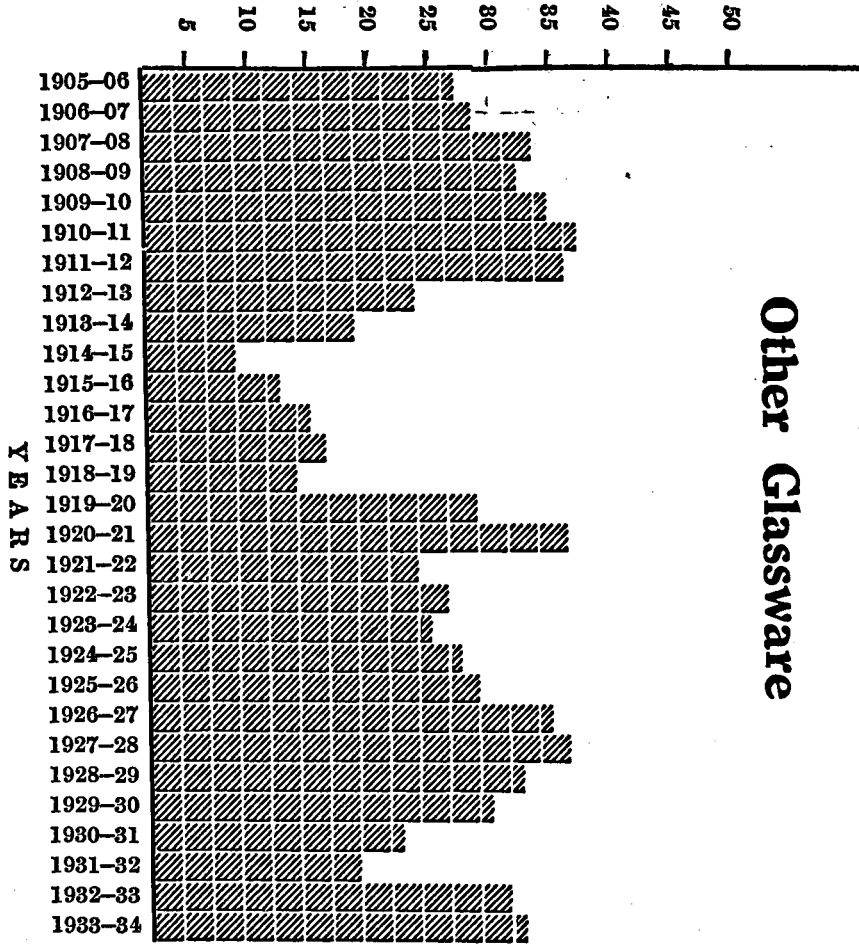


Beads & False Pearls

Y E A R S

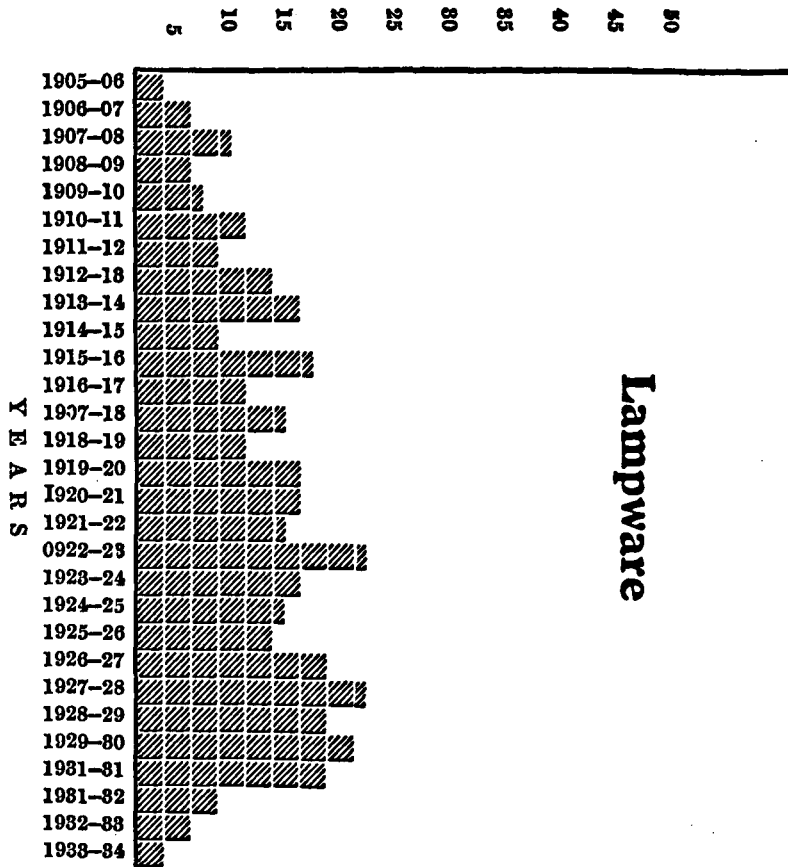


RUPEES IN LAKHS



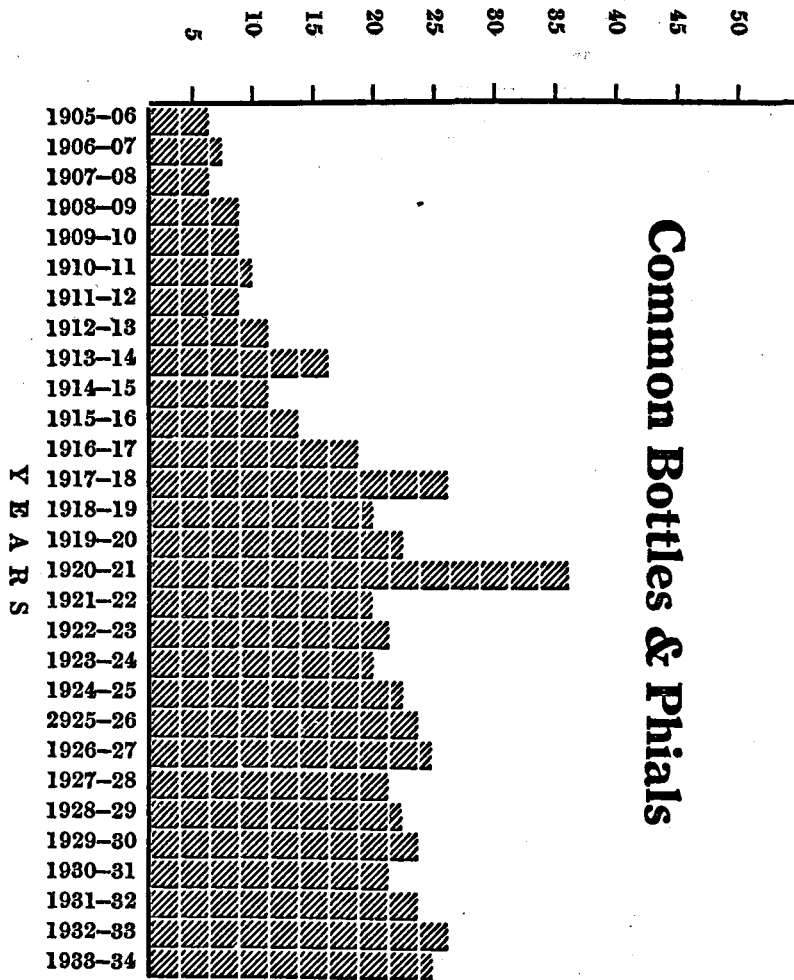
Other Glassware

RUPEES IN LAKHS

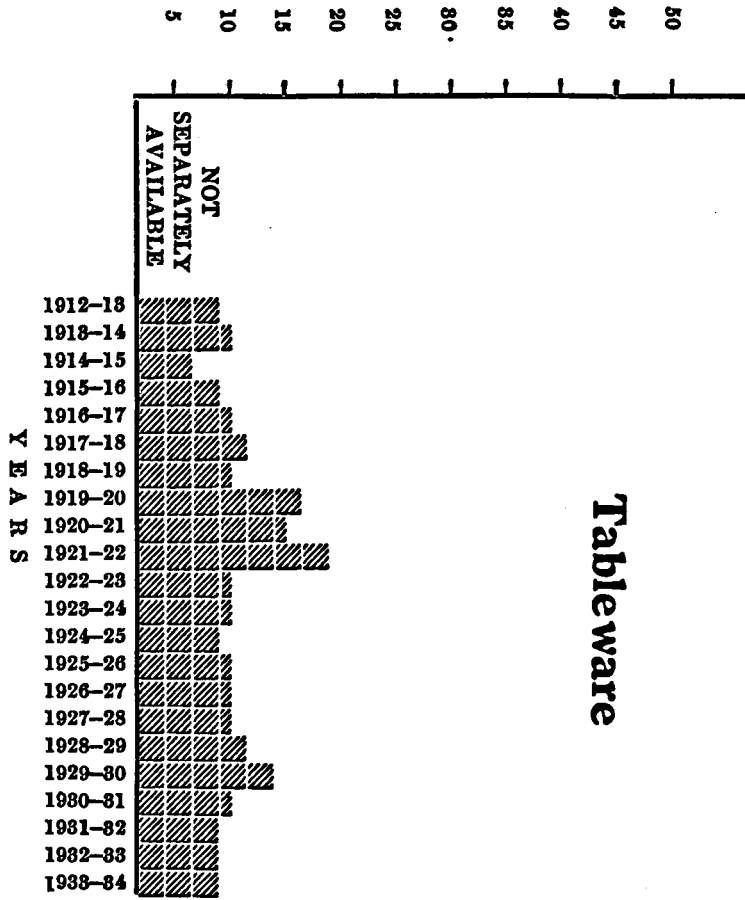


Lampware

RUPEES IN LAKHS



RUPEES IN LAKHS



Tableware

RUPEES IN LAKHS

50  
45  
40  
35  
30  
25  
20  
15  
10  
5

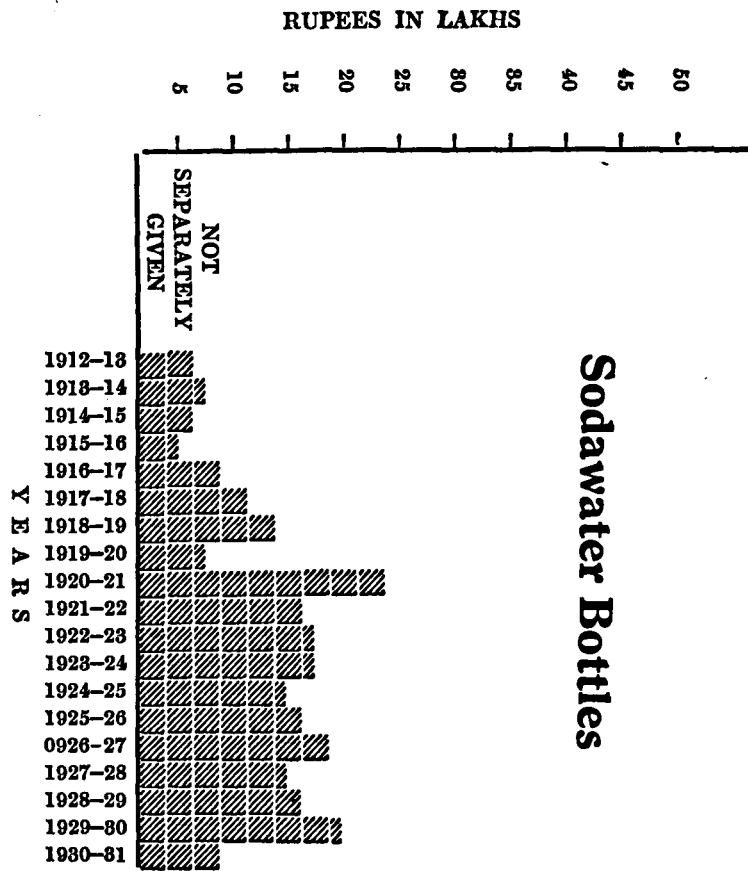
# Scientific Glassware

NOT SEPARATELY AVAILABLE

Y E A R S

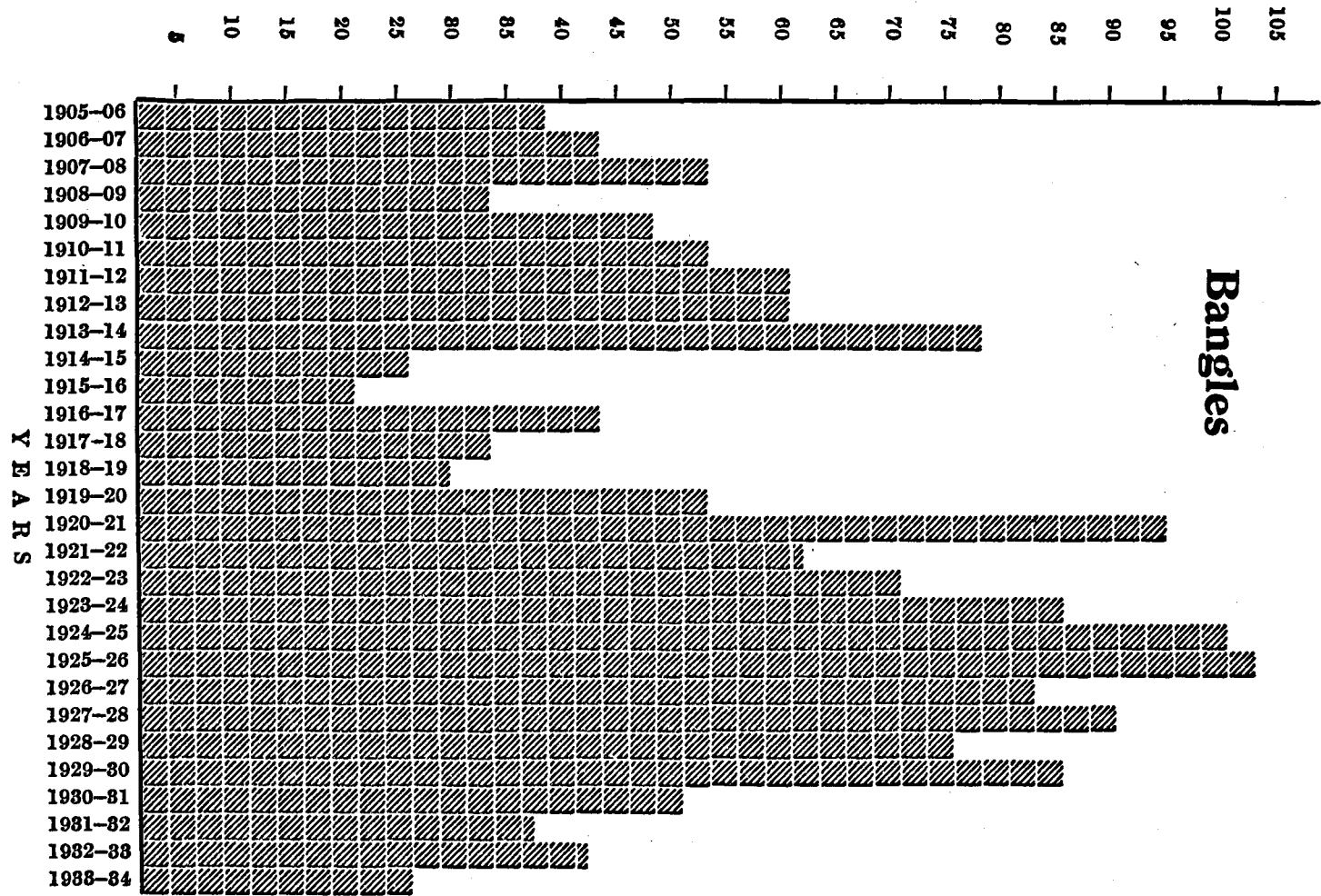
1919-20	█
1920-21	█
1921-22	█
1922-23	█
1923-24	█
1924-25	█
1925-26	█
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1930-31	█
1931-32	█
1932-33	█
1933-34	█

# Sodawater Bottles



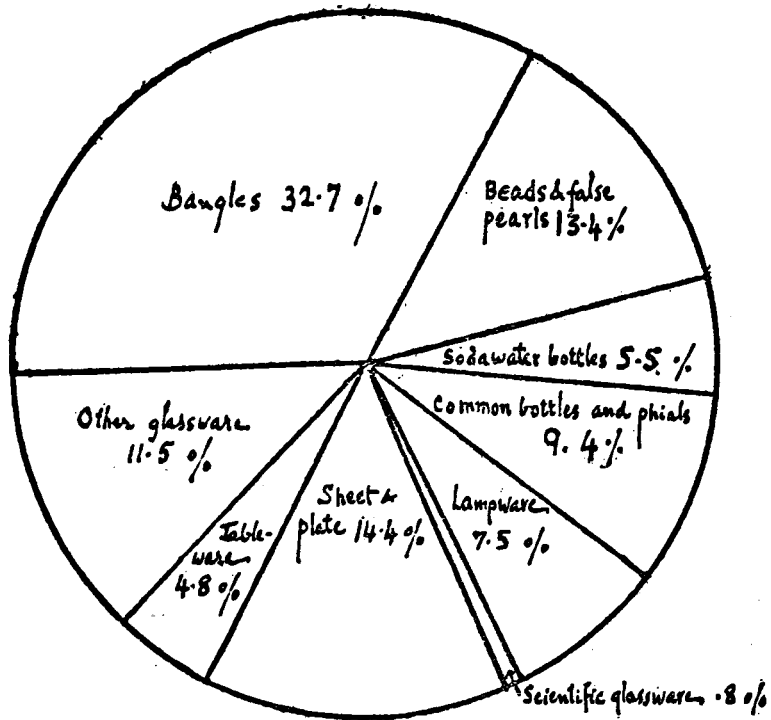


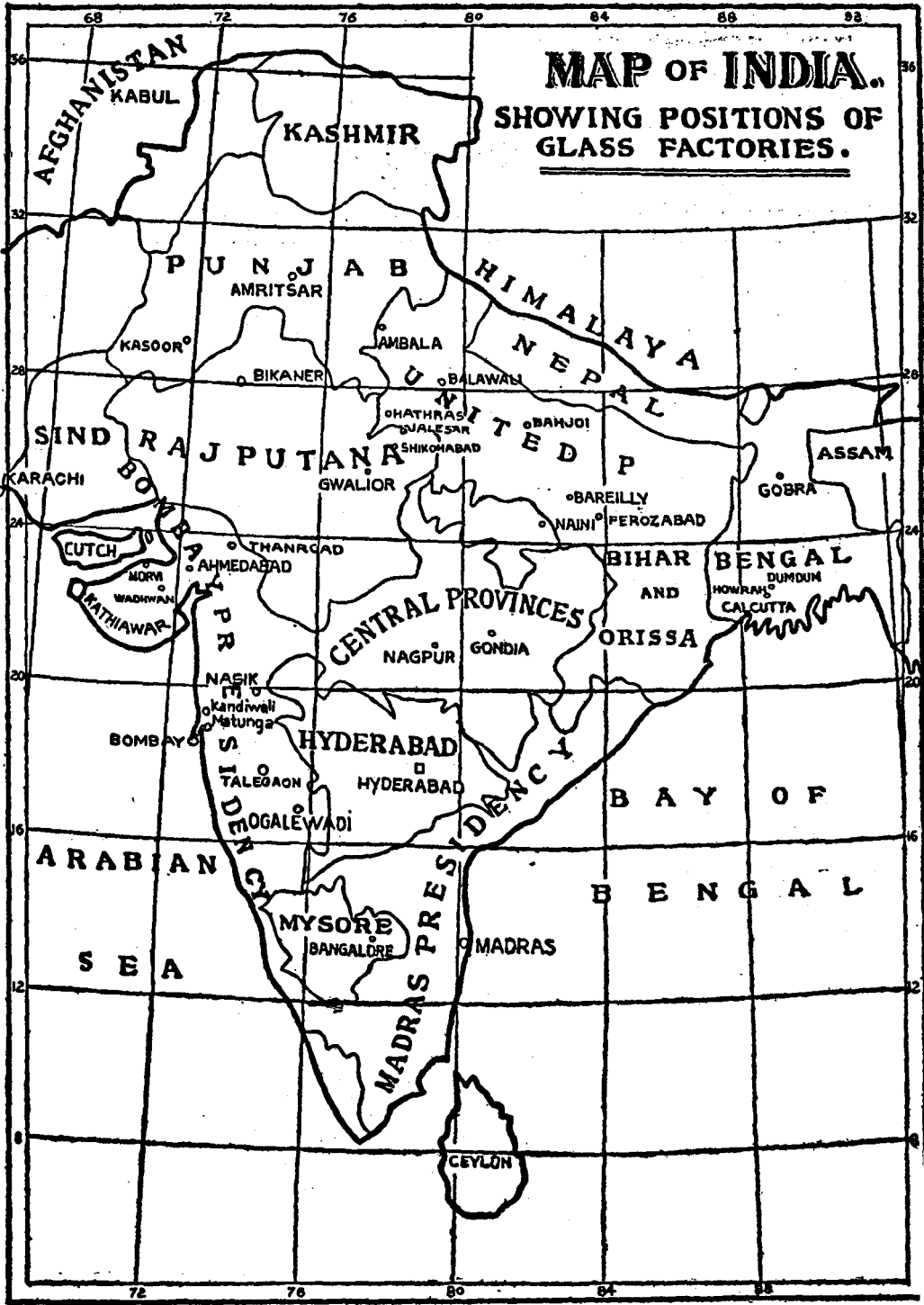
RUPEES IN LAKHS



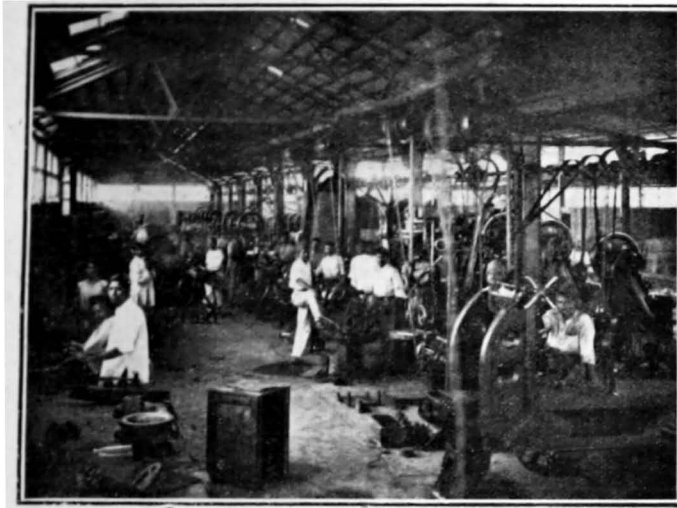
## GLASSWARE

### AVERAGE COMPOSITION OF POST-WAR IMPORTS

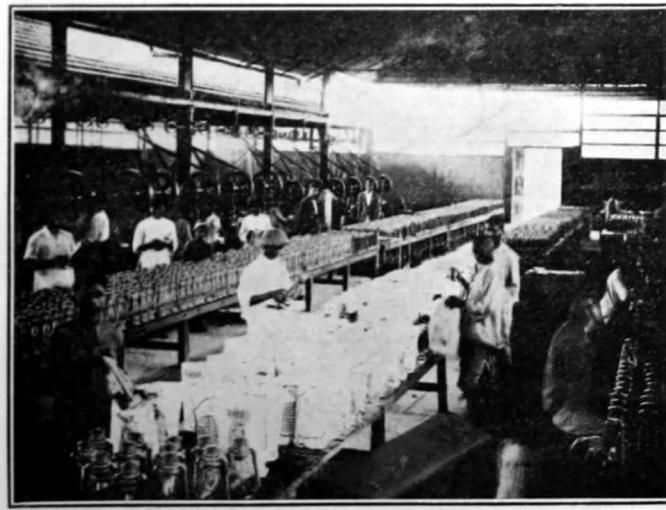




GENERAL VIEWS

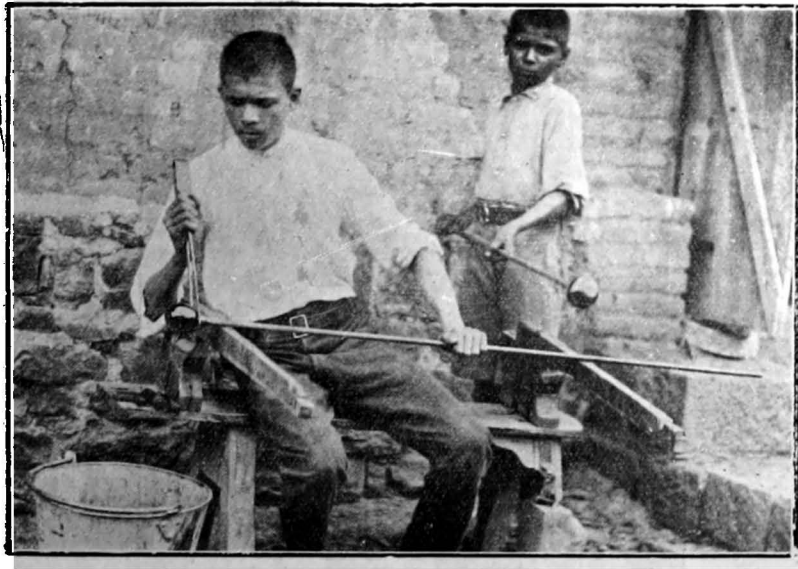


**Lantern Die Shop**  
Ogale Glass Works Ltd.  
Ogalewadi.

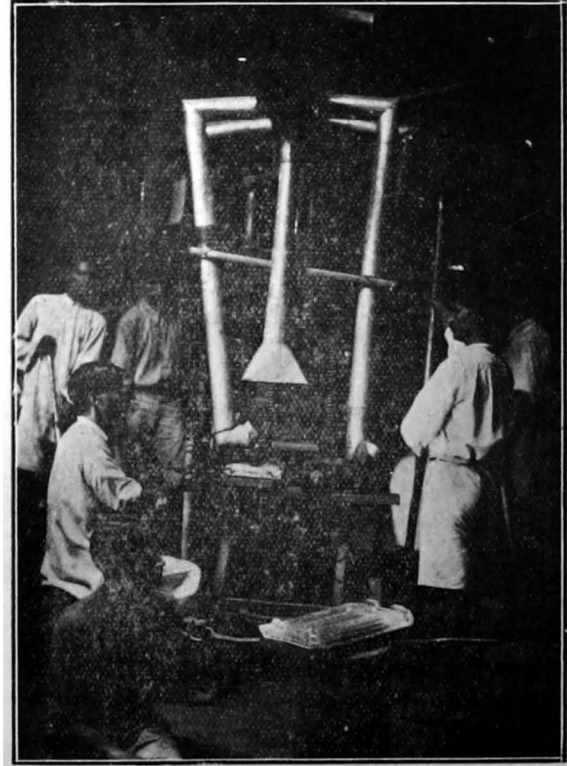


**Lantern Assembling Shop**  
Ogale Glass Works Ltd.  
Ogalewadi.

PAISA FUND SILVER JUBILEE NUMBER



**Paper Weights Making**  
Ogale Glass Works Ltd.  
Ogalewadi.

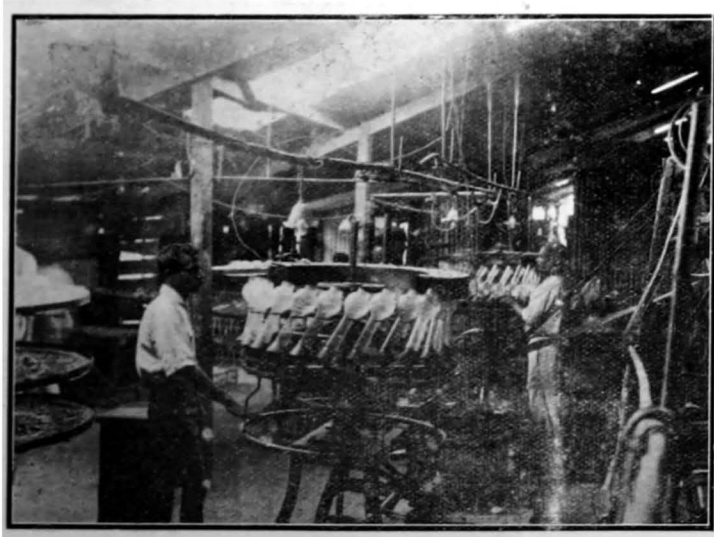


**Glass Tile Pressing**  
Ogale Glass Works Ltd.  
Ogalewadi.

GENERAL VIEWS

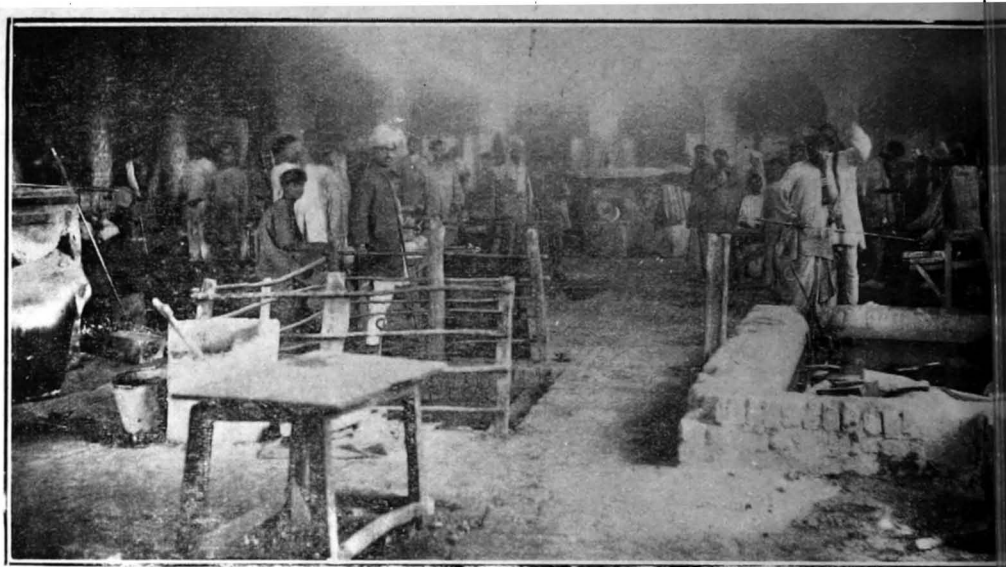


**Blowing**

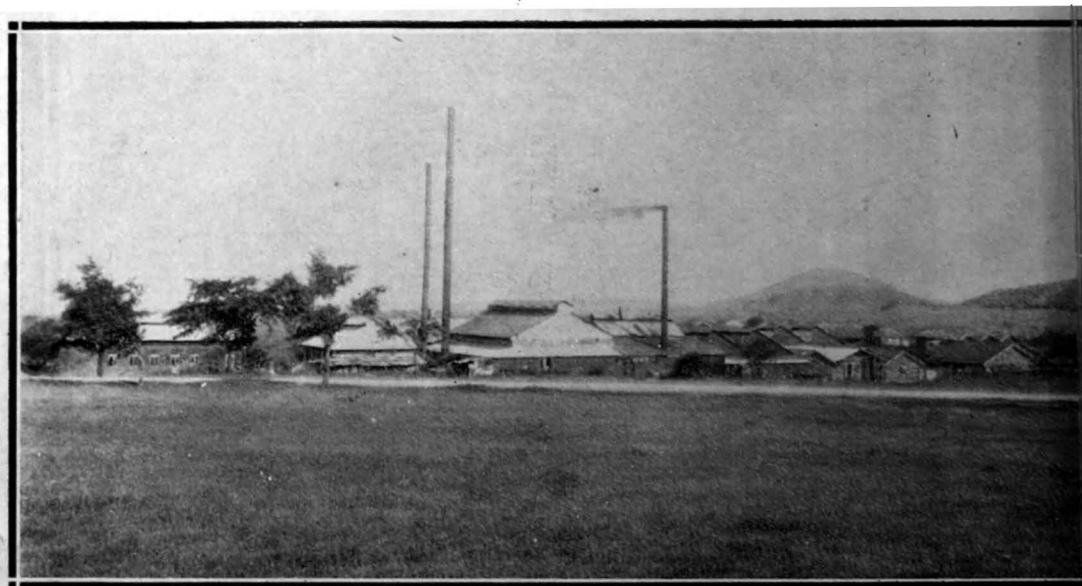


**G'ass Chimneys Tops & Bottoms Melting Machine**

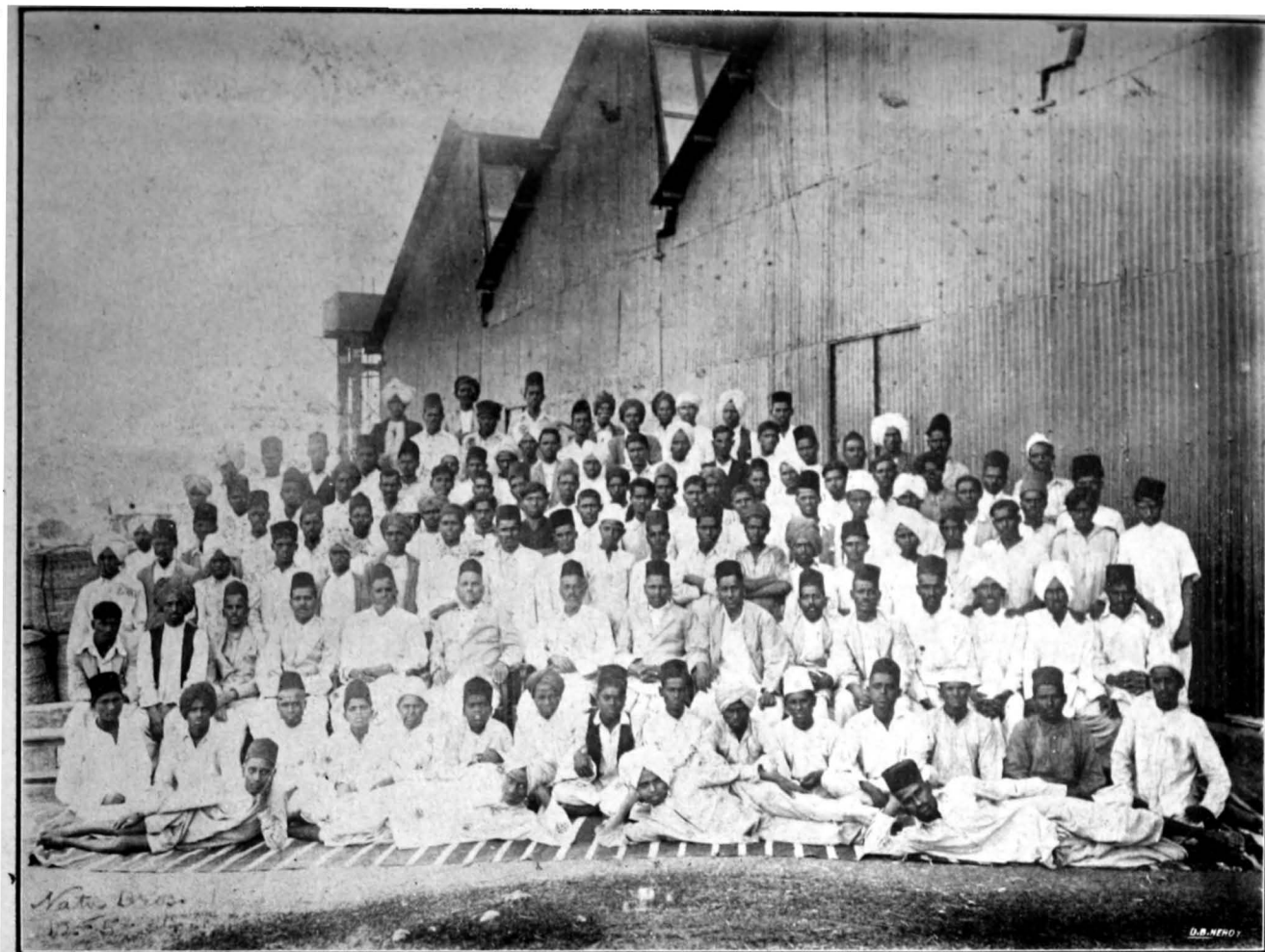
PAISA FUND SILVER JUBILEE NUMBER



**Blowing Room**  
Upper India Glass Works Ltd., Ambala.



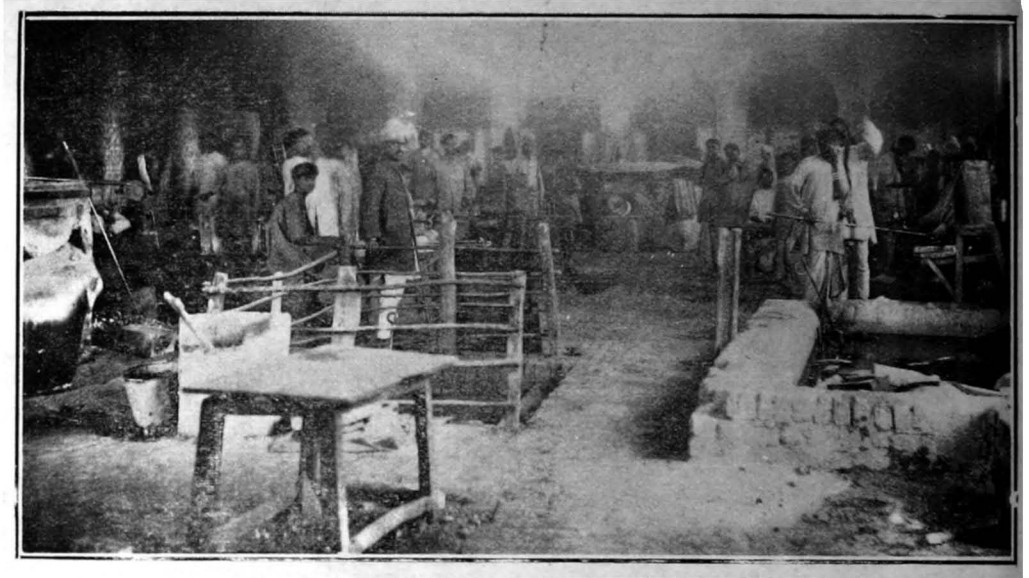
**General View**  
Paissa Fund Glass Works, Talegaon.



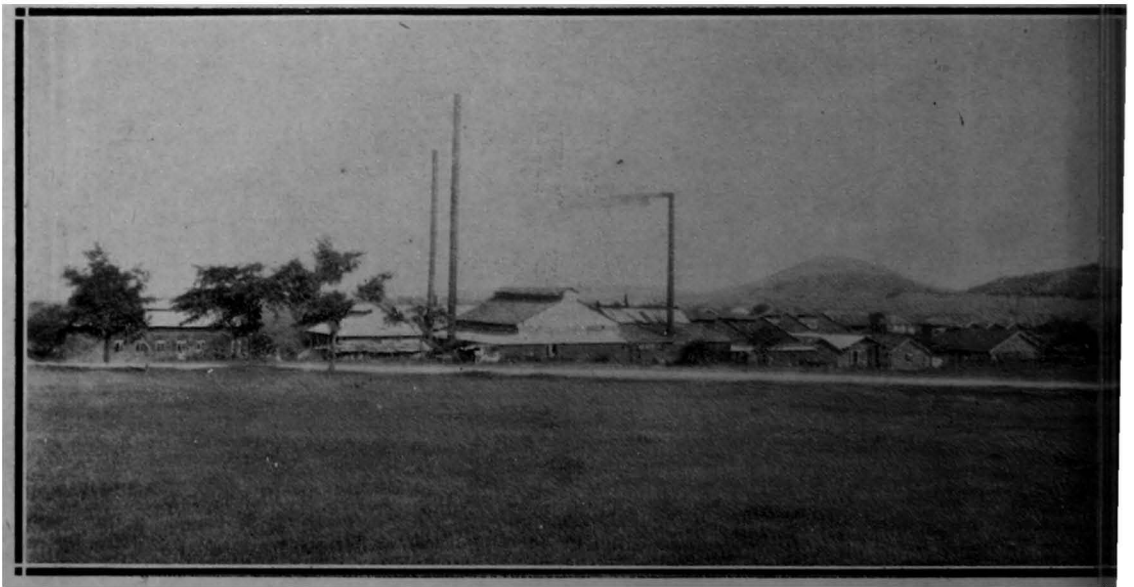
**Staff & Workmen, Paise Fund Glass Works, Talegaon.**



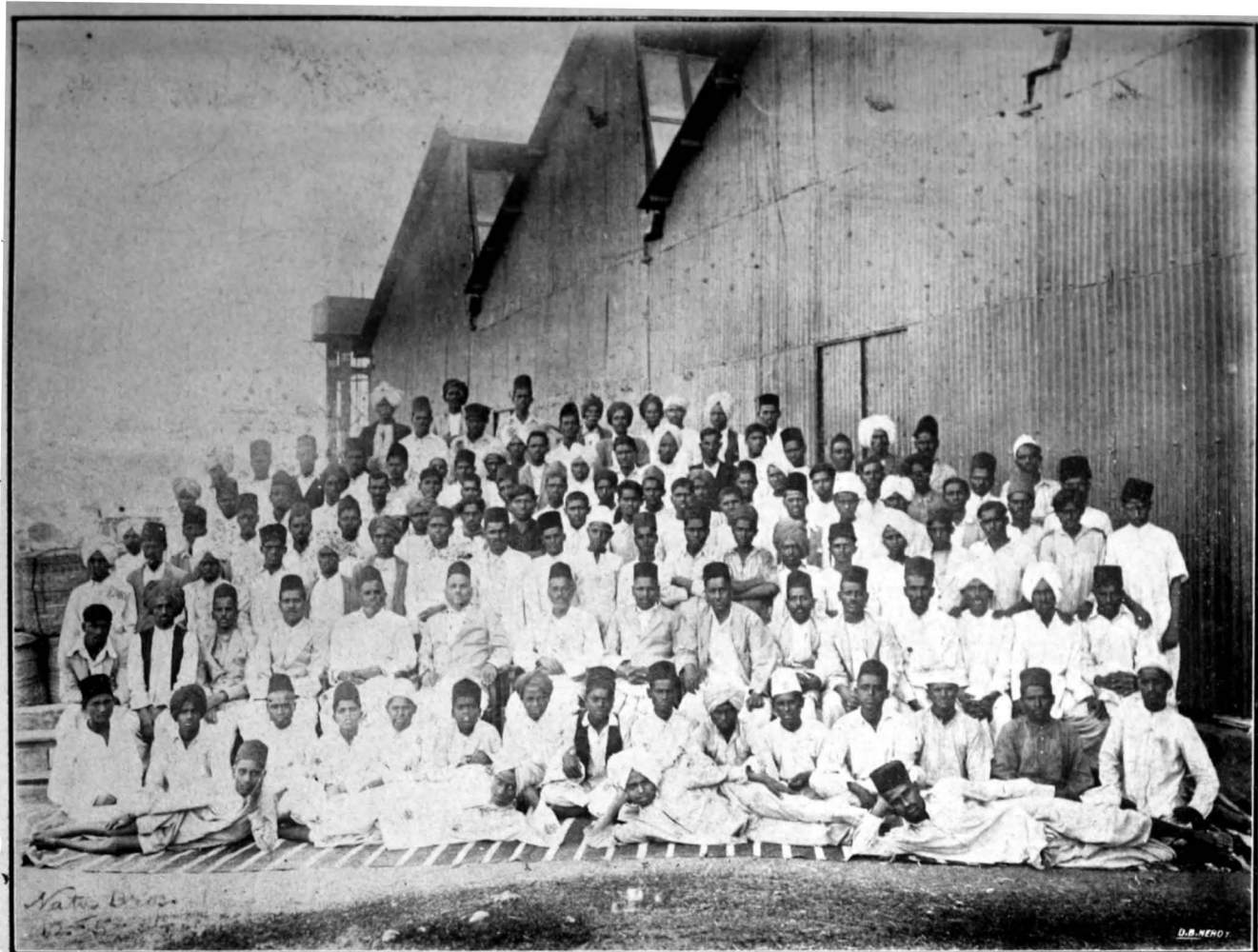
PAISA FUND SILVER JUBILEE NUMBER



**Blowing Room**  
Upper India Glass Works Ltd., Ambala.



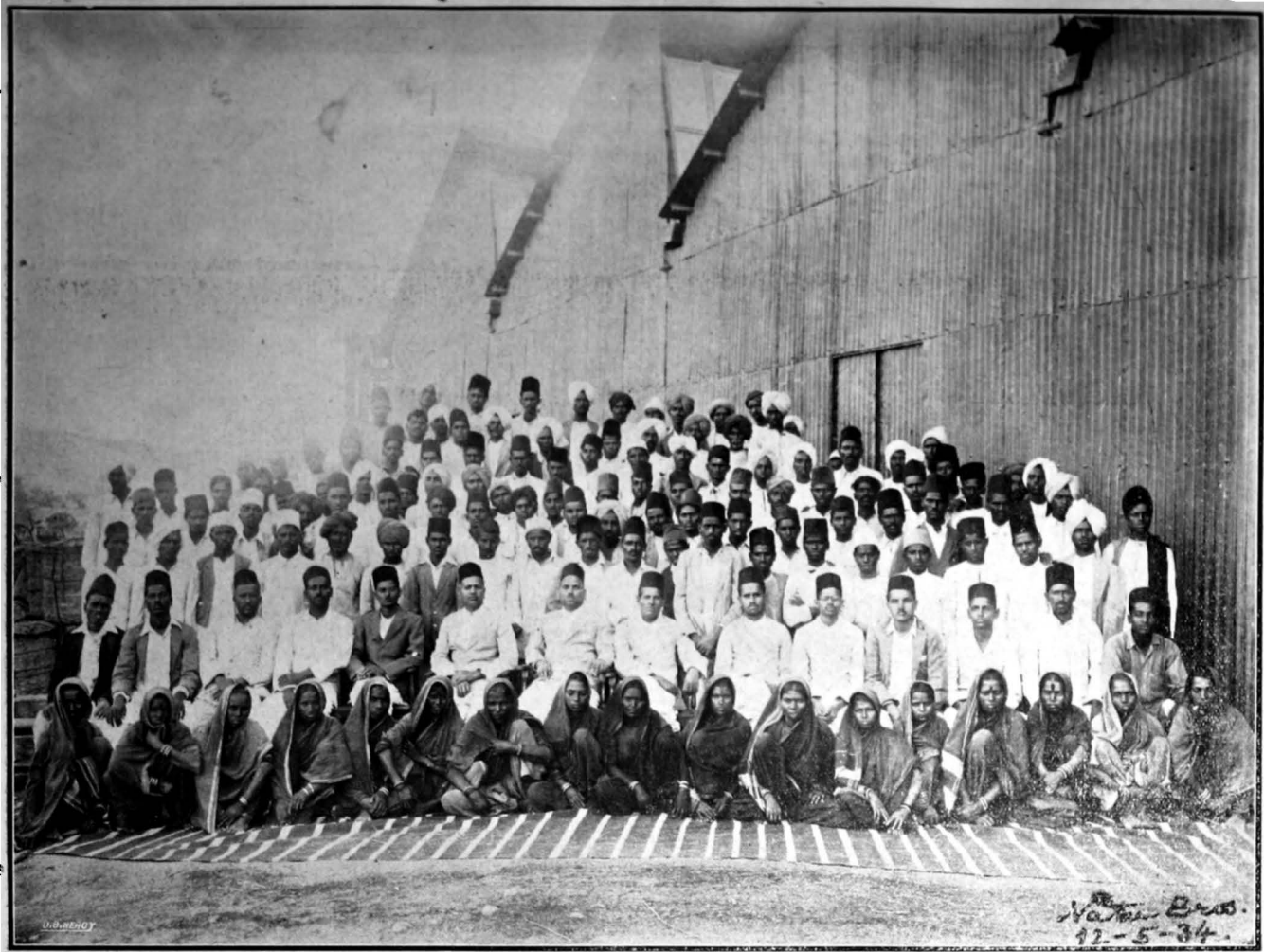
**General View**  
Paise Fund Glass Works, Talegaon.



**Staff & Workmen, Paise Fund Glass Works, Talegaon.**

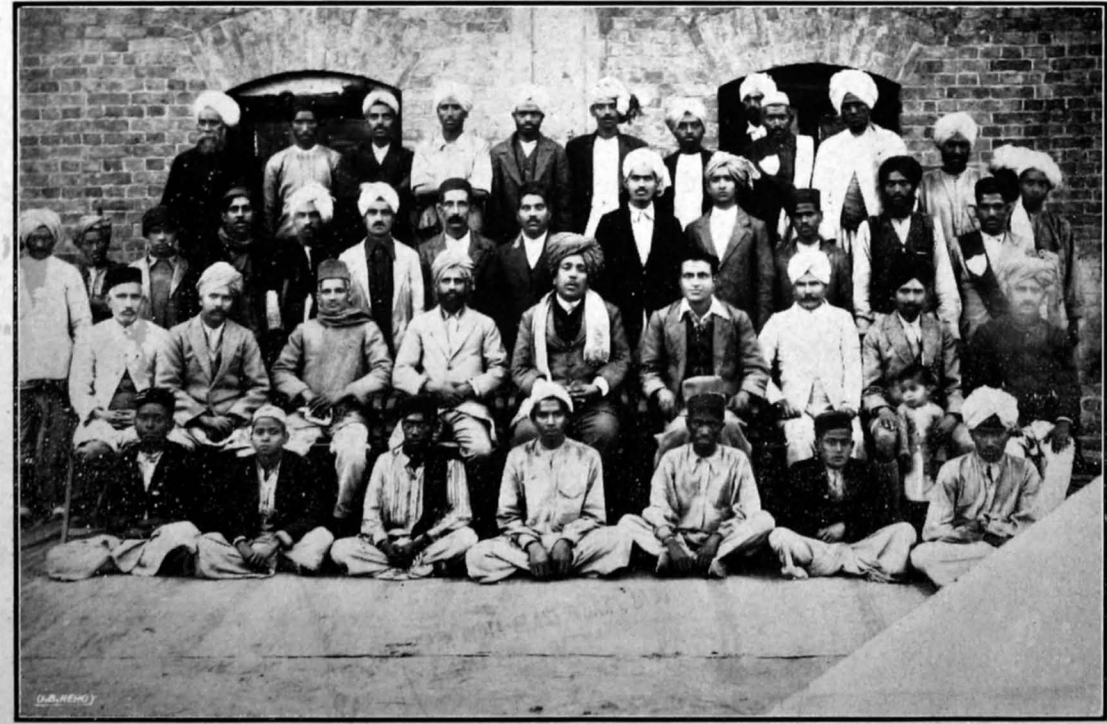


**Staff & Workmen, Paise Fund Glass Works, Talegaon.**



Staff & Workmen, Paise Fund Glass Works, Talegaon.

PAISA FUND SILVER JUBILEE NUMBER

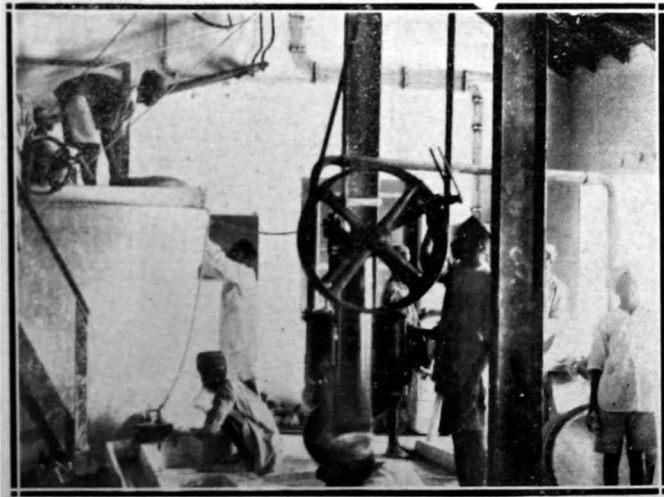


**Staff & Workmen, U. P. Glass Works  
Ambala City.**

GENERAL VIEW OF A FEW GLASS WORKS

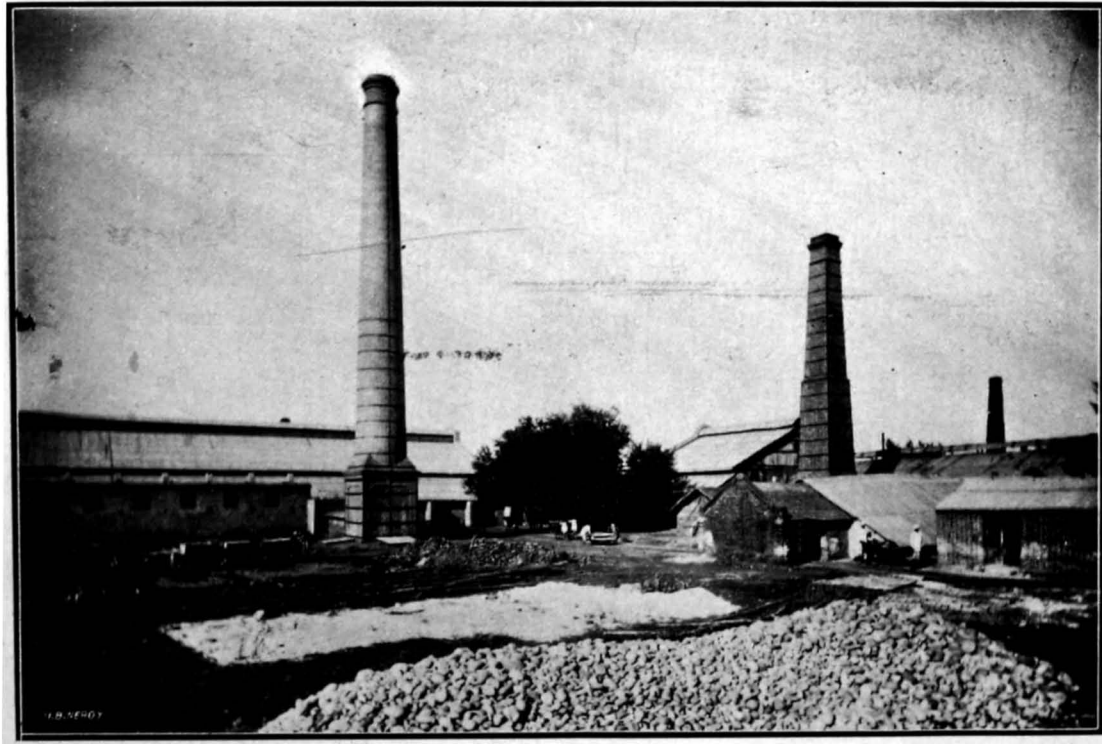


**Government Porcelain Factory**  
**Bangalore: General View.**



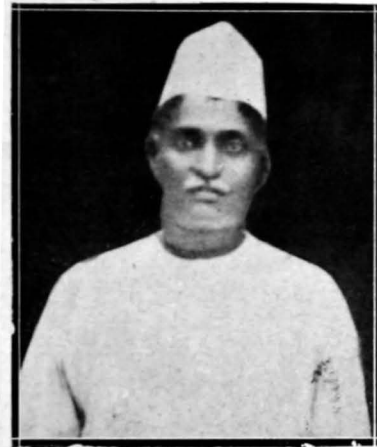
**Government Porcelain Factory**  
**Bangalore, Slip House.**

PAISA FUND SILVER JUBILEE NUMBER



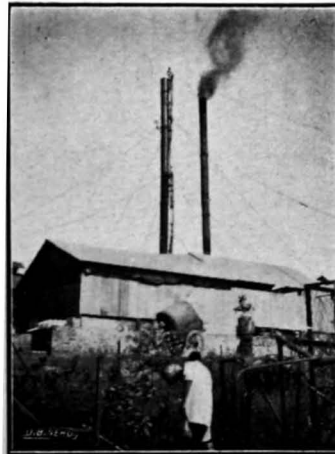
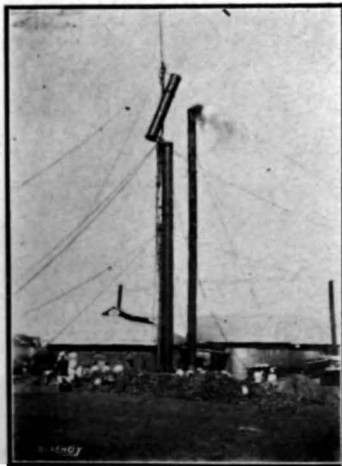
**Ganga Glass Works Ltd.**  
**Balavali U. P.**

LIFE MEMBERS



**G. D. Deshpande**  
(Life Member)  
Dharwar.

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**Hoisting the New Chimney**  
Paisa Fund Glass Works, Talegaon.

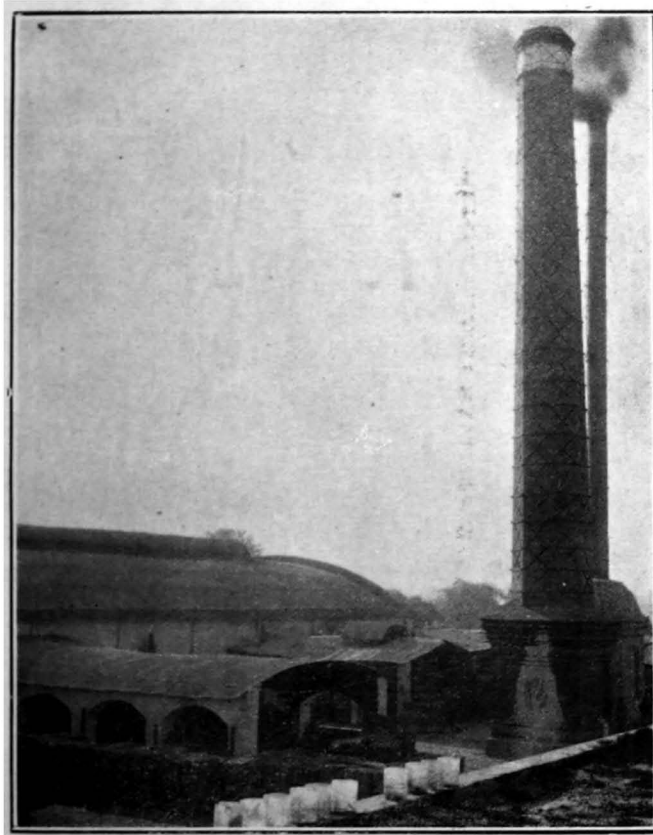


PAISA FUND SILVER JUBILEE NUMBER.



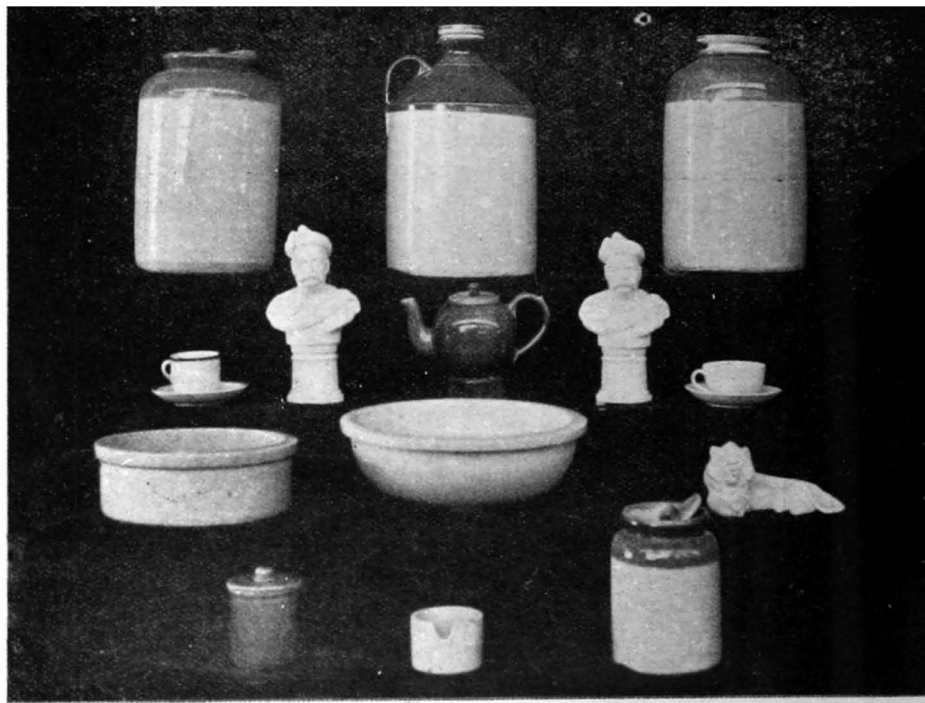
Articles of the Paisa Fund Glass Works  
Talegaon.

GENERAL VIEWS

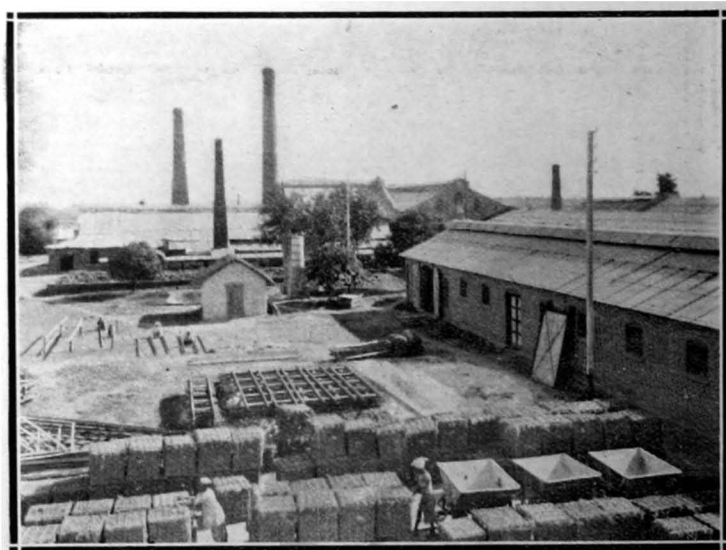


**Melting Shed**  
**Upper India Glass Works Ltd.**  
**Ambala.**

PAISA FUND SILVER JUBILEE NUMBER

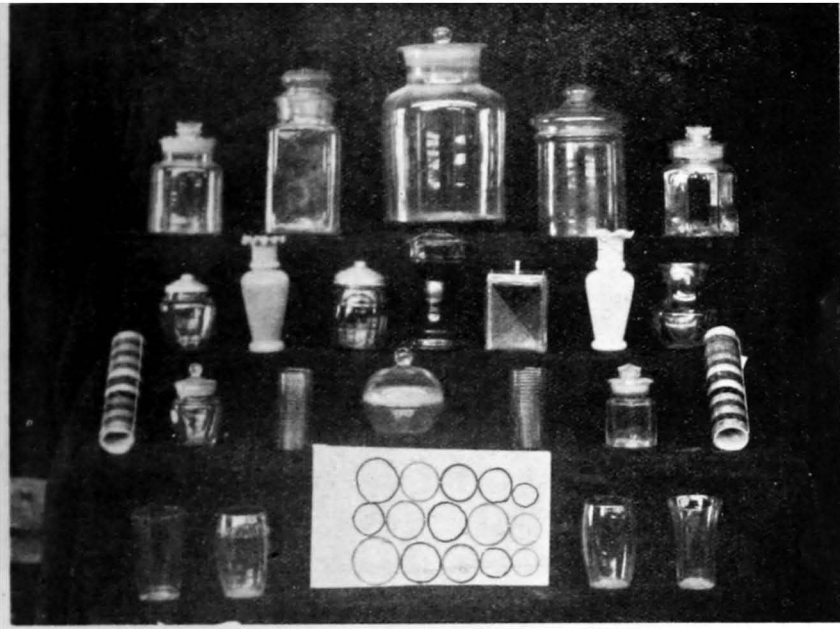


**The Paisa Fund Art-Pottery Section**



**Ganga Glass Works Ltd., Balawali, U.P.**

GENERAL VIEWS



**The Paisa Fund Art -Glass Section.**



**Packing Dept. Paisa Fund Glass Works**

PAISA FUND SILVER JUBILEE NUMBER



**Talegaon Railway Station.**

0707572  
40-6008