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REPORT

ON THE

INDUSTRIAL SURVEY

OF THE

CENTRAL PROVINCES AND BERAR,

1908-09.

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REPORT

ON THE

INDUSTRIAL SURVEY OF THE CENTRAL PROVINCES AND BERAR, 1908-09.

Chapter I.—PREFATORY.

Introductory. 1. Before making any attempt to set forth the results of this inquiry, it seems necessary to say a few words regarding the way in which the proposal arose, and certain difficulties under which the inquiry was conducted.

Reasons for the enquiry. 2. Brief inquiries of the nature of an industrial survey, mostly with a view to proposals for technical education, had been made from time to time in this as in other provinces. On the present occasion, the idea of a survey was under consideration by the Local Administration, on a reference from the Government of India, when a letter from Rao Bahadur R. N. Mudholkar raised the question in a definite form. This gentleman had for long been the guiding spirit of the Indian Industrial Conference, and was in a peculiarly favourable position for knowing exactly what the section of the public that he represents wanted Government to do in the matter. Briefly, his proposals, so far as they affected the present inquiry, were as follows :—

(1.) A Government Institute of research and bureau of commercial information.

(2.) Model factories for instructional purposes.

(3.) An industrial inquiry or survey, to set forth the economic position of the various local industries in full detail, and to ascertain and describe the natural resources of the province in such a way as to assist existing workers in the industrial field, and to secure the sympathy and support of capitalists, at present holding back from untried paths owing to feelings of timidity.

The orders of the Local Administration.

3. These proposals, though sound in themselves, were so wide-reaching, and would have taken so long to carry out, that the Local Administration did not see their way to accept them in full, but confined themselves, apart from certain measures

for the improvement of technical education, to the appointment of an officer to conduct an industrial survey. With him was to be associated a strong committee, mostly unofficial. This committee decided, at their first meeting, that a note should be drawn up embodying the existing information regarding provincial industries. They agreed to confine their efforts to domestic industries, on grounds which will be explained in paragraphs 19 and 20 below.

Preliminary
note.

4. The note, which was based mainly on the annual industrial monographs, partly also on certain other special reports, with the help of trade and census statistics, showed that the information available was not free from deficiencies. Notably, the question of the cost of production was often insufficiently treated; and, though much emphasis was laid on the injury inflicted on domestic industries by machine-made articles, no information was forthcoming regarding the comparative cost and efficiency of these latter. Nor did the monographs afford much indication as to the method in which the industries were financed, the capital available, or what extent of popular support might be expected, should Government decide to attempt the improvement of any of them.

The conduct
of the enquiry.

5. The various districts were asked to appoint committees to assist in the enquiry, and a set of questions was drawn up to guide them in their investigations. It was at this time that the organisation of the recent provincial Exhibition was set on foot; my services were lent also to the Exhibition Committee, and this work assumed so much larger proportions than was at first anticipated, and necessitated my remaining so much at headquarters, that I was only able to make a very brief visit to some fifteen of the twenty-two districts, in order to explain matters to the local committees and set them to work. It must be candidly stated that the Central Committee's request for information was but little more successful than that of Rao Bahadur R. N. Mudholkar, a year or two before, on behalf of the Indian Industrial Conference. Non-officials, while, as was amply proved by the success of their work for the Exhibition, ready to work hard and well for an immediate object with official assistance, are difficult to interest in an abstract and tedious enquiry with no immediate results to show; and the work of the local committees languished. Many of these very committees, be it understood, were at the same time doing excellent work in the collection of exhibits and eliciting support for the Exhibition. It thus came about that, when the Exhibition was in working order, and I had time to devote to the Industrial Survey, I found that very little had been done, at least along the lines originally laid down, and I had to appeal to Government for official assistance to complete the enquiry. The services of three officials,

Mr. Jageshwar Rao, E.A.C.; Mr. Saranjame, E.A.C., and Mr. Chandorkar, Naib Tahsildar, were placed at my disposal for this purpose. The state of my own health at that time precluded my taking much direct part in the rest of the enquiry, and I had to leave India early in February. The amount of information that was required to complete the note already prepared was not, however, really considerable, and the scope of the enquiry had by that time narrowed itself down to some four or five particular industries.

The Central Provinces and Berar Exhibition.

6. This result was due to the Exhibition, for which a thorough perquisition of our provincial industries had to be made; and a completely illustrative collection of their products was available, side by side with the corresponding articles manufactured in other provinces and countries. The services of experts, too, were requisitioned from all parts of India to judge the exhibits, and I was enabled to discuss with them questions regarding the development of local industries, and to partake of their experience in these matters in their own provinces. Some of the results of the industrial surveys of other provinces had by that time become available, and it was possible, safeguarded by a careful comparison of their manufactures and circumstances with our own, as ascertained in discussion with the experts, by an examination of the exhibits, and by a perusal of the available literature, to derive considerable assistance from the proposals of Madras, the United Provinces, and Bengal. The amount of popular interest, too, aroused in the question of industrial progress by the Exhibition was really considerable. On the whole, then, it appears probable that the results of the inquiry are likely to be more practical and satisfactory than would have been the case had there been no Exhibition, and had I been free to devote my entire attention to the industrial survey proper. I must, however, draw attention to the fact that my illness, continued over the whole of December and January, prevented my obtaining as much information as I could have wished from the results of some of our competitions, or from the visitors from other provinces.

Chapter II.—GENERAL.

Industrial divisions of the province.

7. The physical characteristics of the Central Provinces and Berar, so far as they affect those provinces from an industrial point of view, divide them naturally into four tracts. The first is the wheat tract of the Nerbudda valley; the next, Berar and the Nagpur country, where cotton is the staple, and the people are, both industrially and agriculturally, more advanced than elsewhere. The third has for its distinctive crop rice, which is grown mainly in the Wainganga valley and in the great plain

of Chhattisgarh. The fourth comprises the upland districts in the centre of the province where cultivation is in a comparatively backward state and the resources of the people are scanty; but the country is covered in many places with useful forests and contains valuable minerals.

Their comparative importance.

8. It is only the second and the last of these whose products naturally lend themselves to industrial development on any considerable scale. Neither wheat nor rice provide work for any one but the farmer or the railroad man. The only industries that these tracts possess are, speaking generally, the relics of a past time, when difficulties of transport forced every region to be self-supporting, or have developed to meet the needs of the towns which have grown up round trading or administrative centres.

The cotton tract, on the other hand, has for its chief product a raw material, the working up of which forms what is almost the chief industry of the world. Although by far the larger portion of the locally produced cotton is exported, enough is worked up locally to give a decidedly industrial bent to the populace of such towns as Nagpur, Akola, and Burhanpur; and the export and manufacture of cotton have built up a wealthy class of traders and industrialists, that have placed this tract in point of resources very far ahead of any other part of the province, however fertile its soil. The complete development of the possibilities of the upland tract is not yet in sight, and at present its inhabitants, whose wealth and methods of cultivation are inferior, and who are as yet incapable of availing themselves of the natural resources of the country they live in, are for the most part the poorest in the province.

The wheat tract.

9. The above description is enough to give a general idea of the comparative development of the various tracts, but before proceeding to describe their characteristic industries, some further details are required.

The Nerbudda tract.—This tract comprises the districts of Jubbulpore, Narsinghpur, and Hoshangabad, lying in the Nerbudda valley, as well as Saugor and Damoh, which are situated mainly on the Vindhyan plateau, but resemble in many respects the first three districts. The staple crop is wheat, mostly reaped by labourers who come down from the plateau districts for the harvest every year. The only crops industrially important are a little cotton and hemp, and a considerable area of oilseeds. In Saugor and Damoh, where much land has gone out of cultivation owing to bad seasons, cattle-breeding is important; a great deal of ghee is exported; and there is a large trade in jerked meat and hides from such centres as Garhakota, where many cattle are slaughtered. The forests of this tract are comparatively unimportant, save for agricultural purposes, though there is a good deal of inferior teak and other species in

most parts, and the lac crop is considerable. There are important mineral deposits in the Jubbulpore district, consisting of manganese, manganiferous iron, bauxite, china clay, and steatite; the deposits of copper, gold, &c., are not as yet proved to be of commercial value. There is a coal field at Mohpani in the Narsinghpur district, which has been worked with varying success for a long time and is now in the hands of the Great Indian Peninsula Railway Company. Extensive beds of iron ore are known to exist in the districts of Narsinghpur, Jubbulpore, and Nimar, and at one time an attempt was made by a private company, though unsuccessfully, to work the last-named deposit. The manganiferous iron ore of Jubbulpore has not proved a success, being generally too low in manganese contents to pay for export. The Jubbulpore iron ores have been worked for generations by the local Agharias, and it has been thought that they were the source of the famous Damascus steel, the slight natural admixture of manganese lending to them a special toughness. But the present state of the local industry is a hopeless one, although many attempts have been made to encourage it. No extensive system of charcoal smelting can be carried on in such poor forests as are found in that part of the province, and the iron trade is emphatically not one that can succeed as a domestic industry.

There are two important potteries in Jubbulpore city, which chiefly produce tiles and pipes, though plenty of material for finer manufacture is to be found close at hand. The same town also contains a cotton mill. One of the potteries is owned by a European firm, Messrs. Burn & Co., of Raneegunge and Calcutta; the other, as well as the cotton mill, by the local firm of Raja Gokuldass. The Government Gun-carriage Factory is also situated at Jubbulpore. There is no very noteworthy cottage industry to be found there, though weavers are fairly numerous. The next most important town is Saugor. It can boast no organised manufactures, but hand weaving is important, and there are the usual complement of other domestic industries, such as pottery, shoemaking, and brasswork. Harda, on the western border of the tract, possesses a few gins, and is a thriving wheat and cotton centre. No other town is specially important industrially, nor are there any other large aggregations of domestic industries.

Communications are entirely adequate to and even in advance of the industrial requirements of the tract. The Great Indian Peninsula Railway traverses the Nerbudda valley, and all its important towns lie on the railway. The Indian Midland connects the headquarter towns of the Saugor and Damoh districts with the main line at Katni and Bina.

The cotton tract.

10. *The Cotton tract.*—This tract comprises the whole of Berar, and the districts of Nimar, Wardha, Nagpur, the east of Bhandara, and the north-east of Chanda. Here the cotton crop has gradually covered more and more ground till the food crops

over large areas no longer suffice for the population, who import *juari*, rice, and other food grains. This has long been the case in Nimar, and is becoming the custom in parts of Berar, Nagpur, and Wardha. In view of the industrial importance of the cotton crop, it is desirable to describe briefly the nature and possibilities of the local varieties. A comparatively long staple was at one time the chief crop of these districts. This crop, however, gave a far smaller yield, and was less hardy in the valley tracts than what is now called *jari*, a short stapled variety which has almost entirely ousted the longer stapled *bani* from everywhere save the upland tracts of South Berar. Even the *jari*, called in Berar *kanta vilayati* to mark its external origin, is a shorter stapled and freer yielding variety than the old *jari* of Berar. The price paid for the longer stapled *bani* does not compensate for its smaller yield. The result is that a variety spinning counts of from 10's to 15's has replaced varieties spinning counts of from 20's to 40's. The remedy for this state of things appears to lie in the improvement of the length of staple of the inferior kinds now grown, while preserving their heavy yield and comparative hardiness, and the Agricultural Department are doing their best to evolve a variety that shall fulfil these conditions.

Local consumption of cotton.

11. Of the cotton produced by far the larger portion is exported. All the cotton is ginned at as early a stage in the process of transportation as possible, so that the cotton areas are dotted in all directions with small ginning centres. The owners of the gins in almost all cases purchase the cotton before ginning it. These concerns have habituated the local capitalist to some extent to the idea of joint capital working, and the use of machinery has had an important effect in creating a demand for mechanical engineers, and in accustoming the people to the idea of factory labour. How far the necessity of putting cotton through various mechanical processes before transporting it has been responsible for the local mill industry is an interesting question. There are spinning and weaving mills at Nagpur, Badnera, Hinganghat, Akola, and Pulgaon. There are also large concentrations of hand-weavers at Nagpur, Burhanpur, and at Pauni, Mohari, Chanda, and Umrer. Generally speaking, it is owing to the superior skill of the local weavers and to the greater wealth of the *entrepreneur* class, that the hand-weaving industry has survived to a greater extent in the cotton tracts; the latter reason, combined with the greater purchasing power of consumers, is responsible for the better position held by most cottage industries in the same area. How far this is due to the greater enterprise and intelligence of the Deccani peasant and how far to the peculiar suitability of the tract for the growth of cotton, it would not be easy to say.

Mineral resources of the tract.

12. The tract is not devoid of other natural advantages. There is a coal field in its centre, which has already been

worked at Warora and Balharpur, and manganese deposits are found all along the foothills of the escarpment which separates this area from the plateau districts. Railroad communications leave something to be desired, but the system will be greatly improved when the projected lines to Pisgaon, Basim, and Akot are made, together with the very important Nagpur-Itarsi line now under construction. The rate of wages in this tract greatly exceeds that of any other part of the province. The seasonal demand for labour in the cotton fields brings large numbers of workers from the poorer tracts to the north and east; the numerous gins, factories, and mines have accentuated this demand. Although there is so great a call for unskilled labour, cottage industries do not seem to have suffered so much as might have been expected from this cause, which has had its most marked effect in the increasing scarcity of agricultural labour. The proximity of a manganese mine, for instance, draws not one single Koshti from his loom, nay, it adds to his earnings, but it raises greatly the wages of agricultural labour, and farmers find it very hard to obtain all the hands they require. The forests in this tract are being largely drawn on by the big towns, and the prices of forest produce are on the increase, to the disgust of the agriculturists who live near and have hitherto satisfied their requirements at nominal rates.

The rice tract.

13. *The Rice tract.*—This tract, which lies just to the east of the last named, and comprises the Chhattisgarh Division and most of the Balaghat, Bhandara, and Chanda districts, is the most backward of the better developed agricultural tracts, owing to the price of its staple crop having till recently been low, and in places to lack of skill in its cultivation and to the general absence of protection for a crop so dependent on abundant rainfall. The rise in the price of grain and the irrigation policy of Government are gradually changing this, but the tract will for many years be lacking in accumulated resources. Rice is by far the most important crop, but cotton was at one time somewhat extensively grown in western Chhattisgarh; now, however, in accordance with the trend of Indian agricultural conditions, it has been concentrated in the more suitable Nagpur-Berar area. The management of the Central Provinces Mills at Raj Nandgaon, however, have succeeded in inducing local cultivators to grow a fair amount of cotton, with varying success. The tract possesses few mineral resources. Manganese deposits are found along the northern hills, which belong more properly to the fourth tract; there are several important iron deposits, and there are possibilities of the discovery of other minerals, of which promising indications have been found here and there.

Industrial
characteristics
of the rice
tract.

14. The principal demand for labour is for rice transplantation in the western and for weeding in the eastern parts of the tract; and the condition of the labouring classes in the

past has been very precarious, depending unusually closely on the vicissitudes of the seasons. The Chhattisgarhi labourer, once a proverbial stay-at-home, has of late years shown a disposition to migrate freely to Bengal in search of labour, and this factor, together with the generally greater demand for workers, has improved the condition of the local cooly, but wages are still lower here than elsewhere in the province.

Railway communications are still very inadequate, and there is much to be done before they are on a scale proportionate even to the existing state of development, to say nothing of their being able to render possible the exploitation of the vast areas of culturable waste land to be found in the feudatory States and Zamindaris of Chhattisgarh and Chanda. The Central Provinces Mills at Raj Nandgaon have already been alluded to. These, with an oil mill at Raipur, are the only instances of organised industries in the rice tract. The cottage industries are, with one or two trifling exceptions, simply those required to supply the wants of consumers in their immediate neighbourhood. There are numerous weavers, mostly in rather small and scattered colonies; with the exception of the tasar cloth woven mainly in the east of the Bilaspur district, there is no outside demand for their wares. The more skilful colonies of weavers who inhabit the villages of the Balaghat and Bhandara districts on the western fringe of this tract belong more properly to the industrial system of the cotton tract. There is a very large export of hides from Chhattisgarh; Raipur and Champa are centres of the timber trade and there are a good many carpenters to be found in the former town. Lac and other forest products, such as myrobalans, are very important, and the *mahua* tree (*Bassia latifolia*), the chief local source for spirit distillation, is found almost everywhere in abundance. No serious attempt, however, has yet been made to work up the lac into any kind of manufactured product, except toys and bangles.

The plateau tract.

15. *The Plateau tract.*—This tract is not only less developed but less capable of development than any of the others. It has a few fertile tracts, growing rice, wheat, or cotton, but its general style of cultivation is inferior, being characterised by the predominance of crops that flourish on poor soil with an inferior tilth, such as the hill millets. A few commercial crops are produced, such as oilseeds and sann hemp (*Crotalaria juncea*), and there are possibilities of improvement in the agricultural practice with the extension of irrigation, where circumstances are suitable.

The forests are extensive and valuable, and produce, besides a moderate amount of valuable timber, a good deal of inferior timber and bamboos, as well as lac, myrobalans, and *mahua*.

The mineral deposits of the tract are, so far as known, considerable. What is claimed to be the finest coal field in the province is situated in the Pench valley; inferior coal measures

underlie a large area in the Chhindwara and Betul districts, while the finest manganese deposits in the world are found along the hills that form the southern boundary of the tract. The railways, existing or under construction, are not much behind its reasonable requirements.

It is hardly to be expected that a tract so backward in developed resources should stand high industrially; and, putting aside the usual small colonies of weavers, and the ordinary village workers, there is no domestic industry of more than local importance, save perhaps the bell-metal work of Mandla.

Industrial
state of the
province in
early days.

16. The general industrial position of the province may be indicated in a very few words. In early times every part of the province was practically self-sufficing in point of most manufactured necessities, and the only exporting centres were Burhanpur and Nagpur and its neighbourhood, where the existence of a native court had led to the establishment of important industries. Most of their products, however, were expensive articles of clothing, rather luxuries than necessities; indeed, with the difficulties of transport experienced in those times, only such articles as were especially valuable in proportion to their bulk, could pay for the cost of distant carriage. Organised industries were unknown, and domestic industries supplied almost all needs.

Its subsequent
development.

17. The import of foreign and mill-made goods began to be considerable with the coming of the railway. Since then the province has made great strides agriculturally; but industrially, with the exception of the establishment of three or four cotton mills and such gins and presses as are necessary to prepare the locally produced cotton for transport, very little use has been made of its natural advantages. The indigenous domestic industries, with one or two exceptions, declined with the import of machine-made goods. There was but little rise in the rate of wages till recently; and the casual labourer, as soon as prices had risen above the old cheap level, was a constant anxiety to the Administration with every season of short crop. During the last six or seven years a great change has come about. The diminution of the labouring population owing to famine and plague, the greater demand for agricultural labour to make good the losses in cropped area caused by bad years in the past, the greater importance of cotton, the sudden extension of mining enterprise, are the chief factors in the very considerable improvement of the position of the labouring classes. To a slight extent owing to the increased cost of cultivation, to a far greater extent from economic movements in other parts of the world, prices of agricultural produce have risen to a pitch which promises to place the farmer in the possession of means to pay his increased labour bill, or to reduce it by the employment of machinery. This, with an

active irrigation policy, seem to promise a great improvement in the methods and results of agriculture, and in the purchasing power of those dependent on it. The people will also become more familiar with the use of machinery, and a more intelligent class of operatives may gradually be evolved.

Its future prospects.

18. The attempt to revive, on patriotic grounds, the industries of the country, has thus come at an opportune moment, synchronising with an improvement in the position of the labouring and agricultural classes and a more scientific knowledge of the resources of the country. But the obstacles to the improvement of the industrial position along modern lines are considerable. Foreign capital is not easy to attract into a country at once too well and too little known, and local capital is inadequate and timid. The existing industrial and financial organisation is primitive; the small investor has yet to learn confidence in the prospects of organisations financed by subscribed capital; and the financier and industrialist has to acquire the habit of sound management in the common interest. The growth of all this is necessarily a work of time; direct assistance by Government for organised industries is, as will be shown, possible, but only to a very limited extent, and it is desirable to see whether there are not other directions in which help can usefully be given. It is this reason among others which has induced my committee to recommend that Government assistance should be afforded to the most promising of our domestic industries.

The case for domestic industries.

19. The foregoing paragraph affords the main arguments for the proposal to assist domestic industries, but for the present not to attempt any more ambitious programme. But in addition to this there are others. In the first place, the objections to the factory system are doubly strong in a country like India. Family life is the highest and most vivifying principle in the Indian social organisation; the factory system is a foe to it. The centralisation of the artisan classes in large towns is more than ever undesirable in the trying atmosphere and exigent sanitary conditions of the tropics.

The strength of domestic industries in India.

20. But all these arguments would not avail against the economic necessity put forward with such apparent force by the supporters of the factory system in other countries, were it applicable. There is, however much reason to believe that in the case of certain industries it is not applicable. There is great vitality in many of them, notably that of weaving; and such must continue to be the case, so long as machines are dear and Indian labour is still as cheap as at present. Again, before all the domestic industries are crushed by the advance of the power mill and the factory, a great change must come about in the system of Indian rural economy; and there is good reason to believe that such a change will need many years for its

accomplishment. Great pressure and unhappiness must inevitably be felt in the course of this change by the classes most affected, and it is the duty of Government to alleviate these as much as possible. It will be long before the creation of new factory industries absorbs the labour displaced by the disappearance of cottage industries; it is desirable in the meantime to mitigate as far as possible that curse of Indian rural economy, the class of unskilled and unattached agricultural labour, into which the displaced cottage operative must in the meantime drift.

Domestic and factory industries.

21. These arguments suffice in my mind for supporting cottage industries, even assuming their cause to be a doomed one. But it is by no means certain that it is so; indeed the results of enquiries go to show that in some cases it is a question worthy of very serious consideration and even prolonged experiment at some considerable outlay, whether the cottage industry is likely to be finally ousted by the factory. In one case, at any rate, a considerable lease of life can, it would seem, be assured to a domestic industry, that of weaving, provided its workers adopt a few simple and inexpensive improvements in the appliances of their craft.

Probable ability of the consumer to pay a better price for a better article.

22. It may be objected that many of the proposals that I am about to make, involve some increase of price to the consumer in return for a slightly better article. To this I would reply that the price of the articles in question (neither the objection nor my reply to it refer to weaving) has already risen greatly in the past few years, without any improvement in the articles themselves; but the rise has been easily met by the increased spending power of the consumer. The standard of comfort and the resources of the poorer classes have shown an especially large rise in the last four or five years; and I am sure that a slightly better article will meet a ready sale in most cases, even at a slightly higher price, provided it does not thereby bring itself into competition with cheaper or better articles produced by factory labour, a condition which I shall show does not exist in the particular industries for which I have made such proposals.

Principles to be observed in the selection of particular industries.

23. The principles which have governed the selection of the particular industries which I am recommending for the assistance of Government are the following:—

- (1.) That the industry should be an important one, practised by a considerable number of persons; one of which the disappearance would be a loss to the province generally, and to an important section of its industrial population in particular.
- (2.) That it should be one which special reasons exist for carrying on as a domestic industry.

- (3.) That there are items in the process of the industry, that seem at first sight to admit of improvement, while maintaining its character as a domestic industry.

It is obvious that a classification based on the above lines cannot at the present stage be a final one, inasmuch as recourse has not yet been had to expert knowledge; and actual experiment may prove it impossible to help some of the industries recommended for assistance; while experience may suggest the desirability of assisting some of those now passed over. But, since the number of industries for which expert examination and instruction can be provided, is necessarily limited, a satisfactory beginning will have been made, if we select some four or five industries to start with; the expert staff required for these will in no very long time develop, as has been the case elsewhere, into a department, which will make it its task to search the industrial field for existing industries which can profit by its help, as well as to discover openings for new ones.

With these remarks, I pass on to the detailed consideration of the individual industries examined during the course of this enquiry.

Chapter III.—WEAVING.

Selection of
weaving in-
dustry for
assistance.

24. There is a general consensus of opinion among those best qualified to judge, that the weaving industry can be substantially improved in several directions. What these are will be seen in the course of this note.

Weaving popu-
lation.

25. The following extract from my preliminary note will show the extent and importance of the industry in the province.

“There has been a large decline in the population engaged in this industry. The exact extent of this is obscured by the fact that the census of 1891 does not separate the figures for mill and home workers, and does not show separately the numbers of workers and dependents. The total population engaged in the cotton industry in the Central Provinces was as under:—

	1891.	1901.
General population	617,168	390,608
Ginners and cleaners	25,582	20,298
Spinning and weaving mills	2,038	9,616
Spinners, sizers, and yarn beaters	144,615	53,045
Weavers	419,724	278,408
		(of whom 184,189 actual workers).

Even deducting the factory hands employed in spinning and weaving in 1891, who are an insignificant proportion of the whole, the decrease is enormous. The very small proportion of the mill

workers, compared to the large proportion of mill-made goods, is noticeable.

Trade statistics.

Year.	Exports of raw Cotton.	Imports of raw Cotton.	Net Exports.
1891	Maunds. 276,703	Maunds. 11,853	Maunds. 264,850
1905-06	5,865,011 (of which Berar 3,941,263).	87,972 (of which Berar 8).	5,777,039 (of which Berar 3,941,255).

"The figures for cloth were as under:—

	<i>Exports.</i>	
	1891.	1905-06.
Yarn	Maunds. 7,924	Maunds. 112,762 (Berar 3,632).
Piece goods	37,509	71,092 (Berar 5,496).
Total cotton goods	45,648	185,946 (Berar 9,286).
	<i>Imports.</i>	
	1891.	1905-06.
European yarn	Maunds. 28,813	Maunds. 73,864 (Berar 5,995).
European piece goods	100,865	254,351 (Berar 90,290).
Indian yarn	36,766	31,024 (Berar 2,057).
Indian piece goods	29,308	44,546 (Berar 23,808).

"Imports of Indian-made goods have not increased.

"The local mill production was as under:—

	1896-97.	1905-06.
Yarn	17,611,811	28,367,226
Piece-goods	5,061,882	7,938,185

"The products of local mills have therefore held their own well.

"Assuming that all the yarn not exported was consumed either by local mills and local hand weavers, and allowing a very small addition to the mill-made yarn used by the latter on account of hand-made yarn, we have for the year 1905-06:—

	Maunds.
Yarn locally produced	28,367,226 lbs. = 345,941
Yarn imported	104,888
	<u>450,829</u>
Deduct exports of yarn	112,762
Nett	<u>338,067</u>

"The mill-woven piece-goods amounted to 7,938,185 lbs.=96,807 maunds; which would account for, say, eleven-tenths of their weight in yarn, or for 106,487 maunds. This leaves a balance of 231,580 maunds.

"The total workers in the hand-loom industry were:—

Central Provinces	-	-	-	-	184,109
Berar	-	-	-	-	9,263

which gives 1.66 maunds of miscellaneous yarn per working weaver.

Mill-woven cloth.

27. "The mill-woven piece-goods produced or imported were:—

	Maunds.
Indian imported	44,546
European imported	254,351
Indian local mill-made	96,807
Total	395,704
Deduct exports	71,092
Nett consumption	324,612

"The hand-woven goods consumed locally are, therefore, to the mill-made goods, allowing for the hand-woven goods exported, nearly as two is to three.

"The area under cotton in 1891-92 was 693,095 acres.

"The corresponding figure for the Central Provinces in 1905-06 was 1,637,914 acres.

"The most important castes engaged in weaving are the Koshtis in Nagpur and Chhattisgarh, the Momins in Nagpur, the Balahis in Nimar, the Mahars in the Nagpur country and in the north of the province, Pankas in Chhattisgarh, Koris in the Jubbulpore Division and in the Nerbudda valley, and Bhulias in Chhattisgarh. Of the above, the Balahis, Mahars, and Pankas are weavers of coarse cloth.

Original state of the local hand-weaving industry.

28. The history of the industry for the past five or six decades is well summed up by Mr. Jageshwar Rao, E.A.C., an extract from whose note I give below:—

"In the pre-British period weaving was confined to the Koshtas and Maharas in the southern, and Koshtas, Salis, and Koris in the northern districts. The Koshtas and Salis wove superior kinds of cotton and silk cloth, with silk and lace borders of artistic designs. Such cloth was largely in demand, as the wealthier and middle classes considered silk and lace clothing as a mark of position, and could easily afford to buy it, the cost of living being remarkably cheap. This kind of cloth was also exported in large quantities to other countries. The Koshtas and Salis, therefore, fared very well, and were in a prosperous condition. The cloth required for the lower classes was manufactured by the Mahars and Koris. It was generally a white pair of *dhotis* and *khadas*. This was used by the lower classes to cover their waists, and also by the middle classes for their short coats and mantles. This cloth was also used for making *razais* and *toshaks*, which were largely used for bedding by all classes, when dyed and printed. The floors were in most cases covered with *jatus* made by dyers and printers. The fine cloth was used by the higher classes for their long coats,

and rich and poor could not go without a turban prepared by the Koshtas. Females wore *saris* with silk borders, and among the lower classes, rough cloth dyed red or blue.

Changes since
the intro-
duction of
British rule.

29. "The introduction of British rule brought about a material change in the costume of the people. The desire for articles embroidered in gold and silver gradually disappeared to such an extent, that even young boys now do not like to use them. The long coat made of fine cloth was replaced by coats and pants of coarse cloth, and the turbans by caps and *phetas*. This increased a demand for coarse cloth. To this is to be added the improved condition of the lower classes, who were able to afford better clothing, in consequence of their being employed on works of public utility, such as the roads and railways, that mark the introduction of British rule. Naturally, therefore, the prices of coarse kinds of cloth rose to a very high pitch, consumption having been immensely increased, and the supply remaining comparatively limited. The result was, that a number of Koris and Momins from Northern India poured into the province, the largest number being found in Jubbulpore, Burhanpur, and Kamptee. They were better workmen than the Koris and Maheras, and could compete with the Koshtas, but instead of attempting more costly work, they contented themselves with starting their business on a small capital, and supplying the growing demand. They confined themselves to the manufacture of *khadas* and turbans, which met the wants of the lower classes. But the lower classes, as they found their wealth increased, became naturally desirous of having such *saris* as were worn by the higher classes. The Koris and Momins, who were the suppliers of the wants of the former, invented *suti saris* (cotton imitations of silk bordered *saris*), as they are now called, which came to be largely in demand, as they looked very much like the silk-bordered *saris* used by higher class women; their price was in those days as high as Rs. 7 per piece. The trade became very paying, a considerable profit being left to the manufacturers. Thus, with the introduction of British rule, the Koshtas and Salis, who wove superior kinds of cloth ornamented with lace and silk, began to lose their customers, and their prosperity was transferred to those who wove coarse cloth and *suti saris*. The Koris and Momins had their turn of misfortune with the opening of the railway. The advent of the railway brought mill-made and foreign goods of the kind required by the bulk of the population to the different markets, and the novelty of these goods, combined with their superior appearance, attracted the attention of all classes, and the native products were largely driven from the market. The only alternative for the indigenous weavers was to reduce the price of their goods to compete with the foreign goods, till at last it was brought to a level which left a margin of two annas per diem for the maintenance of their entire families. Thus the Koshtas, Salis, Koris, and Momins have all been reduced to their present condition by a change in the popular taste, caused by the introduction of British rule, and a large import of foreign goods, facilitated by the opening of railways."

Injury to the
industry
caused by
adverse finan-
cial conditions.

30. The census figures already quoted show clearly the great decline in the population employed in the weaving industry. Apart from the fall in the actual market value of the goods, the decline of the industry has been accelerated by the hard financial conditions imposed on a class of workers for whose products the demand is so precarious. The credit

prices for yarn are high, varying from half an anna to one and a half annas in the rupee in excess of the cash price, in the Nagpur and Chanda districts, and from two to five annas per ten pound bundle of yarn (known as a *pura*), the usual cost of which is from Rs. 4 to Rs. 7, according to count. The poorest weavers, who want the longest credit, naturally have to pay the highest rate of interest. It is generally agreed that it is unusual for weavers to buy for cash. Besides this heavy charge, at the rate of 40 or 50 per cent. per annum for a month's or a fortnight's credit, the weaver, unless he can find an immediate market for his goods, has to sell them to the *shetia* or dealer for about one anna in the rupee less than the usual market price. The loss to the weaver, who lives from hand to mouth, and cannot afford to wait, and the large gains made by the middleman are shown in an extract from Mr. Jageshwar Rao's report, which I append below :—

Methods of
retailers.

31. "It is a prevailing practice in Burhanpur and Jubbulpore for the weavers to come to the market place in the evening with the goods that are ready, and offer them for sale. The consumers, either residents of the town or of other places, purchase the articles from the manufacturers. If the goods are not thus sold to the consumer, the weaver takes them home to be offered for sale next day here, or in another weekly market in the neighbourhood, if he has got money to live on till the goods are sold; otherwise he sells them to a bania or middleman, who purchases them at a discount of about one anna in the rupee. The latter keeps the goods, and sells them when he gets a good opportunity. He has at the time of purchase gained two annas on two rupees, *i.e.* 6½ per cent. per mensem, if he sells them in a month at the market price. A consumer goes to the bania's shop, if he fails to obtain what he wants in the market. The bania, seeing that the customer does not get them in the market, raises the price by two annas. Thus, goods valued at Rs. 2 in the market, are bought by the middleman at Ree. 1 annas 14, and sold for Rs. 2 annas 2, *i.e.* he gains four annas on Ree. 1 annas 14, or 13½ per cent. If he sells them in one year, he clears a profit of over 1 per cent. per mensem, but he is not required to keep them so long. Ordinarily they do not remain with the bania more than a month or two."

Thus it is clear that the finance of the industry is, from the weaver's point of view, unsatisfactory.

Artistic
fabrics.

32. This inquiry does not profess to concern itself with the artistic interest of the valuable fabrics of the Nagpur country and of Burhanpur. The beautiful cloths of gold and silver lace, many coloured silk, or cotton thread of the finest, find few purchasers in these utilitarian times; and the only way in which their manufactures could be helped would be either (1) by opening a market for them in England or America, or (2) by improving the finance of the industry. The latter point could easily be taken up by industrial co-operative credit associations, started primarily with the object of helping the weavers of cheaper cloth. It will be seen later that it is at present impossible to improve existing methods for the manufacture of these fine goods. Before they can obtain a vogue in western markets, it will probably be necessary for the weavers to

abandon the present sizes of cloth, which are obviously unsuitable for making up into dresses to be worn by western ladies, or even for decorative purposes. The effort, however, is worth making, and I propose before I return to India to seek the advice of some of the London business houses engaged in the trade.

Better wearing qualities of hand-woven fabrics.

33. Returning to the industry of ordinary weaving, there is yet another reason why it deserves assistance. Hand-woven goods are admittedly of better wearing quality than the corresponding mill-made articles. Mr. Jageshwar Rao, E.A.C., states that a hand-woven *khada* (coarse) *dhoti* lasts for a year, and is still capable of being used as a covering for the shoulders for a year after that, while a mill-made *dhoti* lasts only six months. Chintz, he says, is not one-fourth as durable as the corresponding *lahenge ki patti*; and the hand-woven goods are also warmer. In his note on the cotton weaving industry in the Raipur district, Mr. Chandorkar states that hand-made *lugras* will last a year, and hand-made *dhotis* for 10 months. Mill-made *dhotis* lasts from four to six months, and mill-made *saris* for four months. The cost of a mill-made article is usually about three-quarters of the cost of the corresponding hand-made article. Thus a *sari* of 20 by 20 counts, width 14 by 2 cubits, costs, if hand-made, Rs. 2 annas 8; if mill-made, Rs. 2. A *luga* of 40 by 30 counts, width 18 by 2½ cubits, costs, if hand-made, Rs. 4 annas 12; if mill-made, Rs. 3. It is thus clear that the purchaser is really better off if he buys an article costing even 50 per cent. more if it lasts him twice or three times as long; but the superior appearance, combined with the lower price, carry the day, and many much more civilised purchasers than the Indian peasant are swayed by similar reasons in their choice of goods. The above remarks will have shown wherein the strength of hand-weaving lies; and any attempt to improve the industry must preserve the special qualities, which help it so much at present.

Case for assisting the industry.

34. It will be necessary to give a somewhat detailed description of the method and cost of the various local weaving processes before it can be shown exactly in what ways they can be improved; but assuming for the present the possibility of the improvement, it is clear that substantial reasons exist for attempting to assist this industry. We find a large section of the population, trained to the exercise of a trade in which their dexterity, considering the inferiority of the appliances with which they work, is marvellous; and forming a once prosperous and still important element in our larger villages and towns, not directly dependent on agriculture. If this industry is crushed out by the competition of machinery, those who once practised it and their descendants will lose their skill, and degenerate into mere general labourers, a class which, though owing to causes not likely to continue indefinitely, fairly

prosperous at present, is in the long run the worst off in every community. And should experience prove, after all, that the economic world has a place for hand-weavers, it will be impossible to restore by teaching the manual dexterity that has been lost.

Local distribution of weaving castes.

35. The chief castes engaged in weaving are the following:—

District.	Caste.	Class of Work.
Chanda, Bhandara, Nagpur.	Halbi Koshtis - Salewars - Mahars - -	Silk bordered cotton. Pure cotton, of fine counts and considerable width. Pure cotton, of lower counts and narrow width, usually 20's and under.
Nagpur, Kamptee -	Momins -	Medium counts, mostly coloured and check handkerchiefs and <i>pagris</i> .
<i>Northern Districts.</i>		
Generally distributed, main centres being Gadarwara, Burhanpur, Sangor, Jubbulpore, Garhakota, and Hoshangabad.	Koshtis, Salis, Koris.	Mostly coarse goods.
Nimar - - - Jubbulpore, Burhanpur	Balahis - - Momins -	Very coarse goods. As in Nagpur country.
<i>Eastern Districts.</i>		
Country districts of Chhattisgarh.	Pankas - -	Very coarse goods.
Raipur Town - -	Momins - Salewars -	As in Nagpur country. Ditto.
Raipur District - -	Katiyas - -	Coarse counts.
East of Chhattisgarh -	Gandas, Mahras	Ditto.
East of Bilaspur -	Halbi Koshtis -	Tasar.
Berar Districts - -	Koshtis, Salis, Halbis, Momins, Kolis.	Information not forthcoming, but almost certainly same as for Nagpur country.

Weaving implements; the reed.

36. The loom used throughout the country is of a simple type. It is in all cases a pit loom, though in Burhanpur I have seen the ordinary country loom raised on a frame. The loom consists of:—

(1) A reed, through which the ends are passed; it varies very much in width, *e.g.*, in Chanda the Mahars have a reed

16 *panjas* (10 *panjas* = 1 cubit) wide, and the Salewars one 22 *panjas* wide. The reeds are made by a caste called Fani-bands, "of four thin bamboo sticks, with thin strips of the outer "skin of the reeds fixed between. The reeds are strung in a "bamboo frame so thickly knitted together that they cannot "move from the place. The strings over the bamboo sticks are "coated with gum so as to prevent the threads from moving "from their places. The worker has to get his supply of reeds "from the forest, for which he has to pay a license fee of one "rupee per cart load. Of the reeds brought, only one-fourth "are fit for use. The reed he wants should have a good length "between the nodes. In the sample obtained by me, I found the "space 19 inches long, but it was rejected by the manufacturer "as it was not quite straight. The workman is ordinarily paid "Ree. 1 annas 8 for a *fani* or reed of 16 *panjas*; 60 reed holes in "the *fani* are used for one *panja* of yarn. An ordinary *fani* is "for 16 *panjas*; thus for each *panja* he is paid 1 anna 6 pies. "The *fani* is also made for 20 or 24 *panjas*; in that case he is "paid Rs. 3 or Rs. 3 annas 8. A *fani* of 16 *panjas* takes him "four days to finish it. He thus earns 6 annas a day; against "which should be debited the cost of material used by him—

" Bamboo sticks	-	-	-	2 pice
" Thread	-	-	-	4 pice
" Cost of reed	-	-	-	4 pice
				—
" Total	-	-	-	10 pice

"The net wage is 3½ annas a day. It might be a convenience "if the forest duty on reeds, which must bring Government a "very small income, were altogether remitted. For the repairs "of a *fani*, the workman gets two annas for repairing the space "of one *girha* (*girha* = 1½ *gaj* of 33½ inches). The Kuchbandas "are a wandering class; they go from place to place, and "repair the brushes (*kuchas*); a new brush costs Rs. 4 or "Rs. 5."

In Chanda the reed only costs one anna per *panja*.

Other parts of
the loom.

37. (2) The shuttle. This costs from Ree. 1 to Ree. 1 annas 4. Extra shuttles up to five in number are needed for solid bordered cloths, with a pair of *saras*, costing three annas.

(3) The *thun* is a wooden roller to wind the cloth on, when woven. It costs Ree. 1 annas 8.

(4) The *hatta* is the slay; it costs eight annas.

(5) The *kansara* is a wooden bow, for keeping the cloth stretched to its proper width.

(6) The healds; these wear out after 20 *saris* have been made, and it costs 8 annas to renew them for cloth *sari* work, and Ree. 1 annas 6 for silk *sari* work, the healds for which give way after four or six *saris* have been made. The healds for *golias*, which are 30 *gaj* (*gaj* = 33½ inches) long and only 6 *girhas* wide, last the weaving of four *golias* only, and cost four annas. The healds are made by Jogis. To make a set of healds in the first

instance costs from Ree. 1 annas 4 to Ree. 1 annas 8; the thread used costs 14 annas, and the healds take three days to make.

(7) Besides these, there are the pedals (*paolis*) and the frame of the loom. The whole cost of a country pit loom varies from about Rs. 7 to Rs. 15. Looms for fine weaving with complicated patterns have a large number of pedals, as it is unusual to use dobbies, though a weaver was found doing so in Burhanpur. These treadles work the extra sets of healds. In Burhanpur as many as 17 sets of treadles and healds are used. The replacement of these complicated looms by automatic contrivances is not a promising field for effort, but such a loom is a good deal more complex in working than almost any form of hand loom; and its use shows the skill of which an Indian weaver is capable.

There is no attempt at any kind of taking up motion in any indigenous form of loom in the province; the warp is simply hung from a beam above the loom, and, as it is used up, the weaver lets out more to go on with from time to time.

Hand spinning.

38. The question of spinning may be dismissed in a very few words. Before the intrusion of factory products into the economic system of India, thread was spun by women of various castes, and by Mahars. The speedy replacement of this industry by the mills is of itself almost sufficient proof that there is no opening for the making of cotton thread by hand. One or two machines for hand spinning have been put forward of late years, but I do not gather that they have met with any economic success. The spinning of thread is so mechanical a process, that it seems peculiarly adapted for machinery. And, most important reason of all from the point of view of the present inquiry, there are very few persons employed in hand spinning, and these are in no sense solely dependent on it for a livelihood. It is therefore advisable to leave hand spinning out of the question, at any rate unless and until a machine for hand-spinning is invented, capable of holding its own against the elaborate and highly developed spindles of the mills.

Sources whence yarn is obtained.

39. Thread is obtained at present from Indian or European mills. It is put up in bundles of 10 lbs. weight, known as *puras*, which contain from 16 to 30 *muttas*, and each *mutta* from 5 to 10 *lattis*, according to count :—

Count.	Price at Mill.		Cost to Weaver.						
			Cash.			Credit.			
	R.	A.	P.	R.	A.	P.	R.	A.	P.
12	3	6	3	3	8	0	3	9	0
16	3	13	6	4	0	0	4	1	0
20	4	2	6	4	4	0	4	6	0
30	5	6	6	5	10	0	5	12	0
40	7	1	0	7	4	0	7	8	0

These are the prices charged at Chanda, and the profit taken by the retailers is much the same in other districts, save Nagpur, where the rate is a trifle less. Thread for warps is obtained from the Nagpur, Pulgaon, Hinganghat, and other local mills, as well as from Bombay, while the weft is obtained from the same sources and occasionally from Glasgow. In 1905-06, the latest year for which I have statistics available, 112,762 maunds of yarn were exported from the province; while 73,865 maunds of European and 31,024 maunds of Indian yarn were imported. Seeing that 345,941 maunds of yarn were locally manufactured in the same year, it is clear that the Bombay and European imports were unimportant, and the local industry is practically self-sufficing.

Sizing and
warping.

40. The yarn has to be made up into these *puras* or bundles at the mills by winding into hanks from the reels on to which it is wound. Yarn which is required for weaving in the mills is beamed directly from the reels; and the weaver thus has to pay for the cost of winding into hanks, and again has to unwind the hanks, and warp them himself. The method of warping is as follows. The yarn is first washed, then each hank is placed on a winding implement, called a *dhol*, and wound on an *asari*; each of these implements costs one anna. The thread is then warped by stretching on a frame called a *tansari* or *jatar*, with a number of upright pegs varying according to the length of the warp. Some castes stretch the warp from reels, between two erections of crossed sticks, one at each end, with leasing rods at intervals. The sizing is applied with a brush, and consists in some cases of *kani* root, in others of a little oil, with rice, wheat or *juari* paste, according, it would appear, to the kind of grain most readily obtainable in the district. Weavers who stretch the warp at length, size it by dipping the reels in the size, and warp after drying the reels. The castes, mostly Koshtas, Salewars and Koris, who use the *jatar* or *tansari* dip the warp in size, stretch it and dry and clean it by brushing it. In either method, after being thus prepared, the warp is then passed through the healds and reed, and joined to the beam. Mr. Jageshwar Rao states that some Momins in Burhanpur prepare warps by hand-worked machinery of the same type as the mill warping frame, only smaller and of rougher make; 56 ends are warped at a single operation. In the same town Banias get warps prepared by hand, and sell them to the weavers. The labour costs the Bania $2\frac{1}{2}$ annas for each *phala*, and he charges half an anna profit in addition. There are other instances of the subdivision of the work of weaving and warping to be found; and this is an important fact, in considering the probability of the weaving class being willing to purchase ready made warps. Ready made warps are freely bought by weavers in other parts of India. I have seen warping machinery at work at Baroda, and the warps were readily purchased by weavers of the town.

For the weft, pirns are filled with the thread, and are ready for use; there is no special point that calls for notice in this process, except that the local type of pirn is unsuited for the flyshuttle loom.

Cost of yarn
to the weaver.

41. Having now brought the process to a stage at which the loom is ready to begin its work, we have a convenient point at which to consider the financial aspect of the last described stage of the industry. There are obviously two respects in which the cost to the weaver can be reduced, (1) the retailer's profit; (2) the cost of the process of winding and warping. The correct way of estimating the fairness of the profit taken by the retailer is to consider the incidence of his profit on the nett earnings of a weaver on the cloth woven by him from a given quantity of yarn. Take a *lugra* of 18 by 2½ cubits as described in the Chanda report. This takes the following quantity of thread:—

Warp	-	-	5 <i>muthas</i> of red yarn of 40's.
Weft	-	-	3 <i>muthas</i> of black yarn, of 30's, and 1 <i>mutha</i> of mixed colours.

The above cost the weaver Rs. 2. 13. 3; of this the retailer's profit at about 1½ annas in the rupee on dyed yarn comes to (say) 3½ annas. The weaver sells the article for Rs. 4. 12. 0. He therefore earns in 7 days Rs. 1. 14. 9, out of which the retailer takes between 9 and 10 per cent. Mr. Jageshwar Rao gives another instance. A Damoh Koshta bought one bundle of turkey red yarn for Rs. 5. 6. 0. The cost of this to the retailer was Rs. 5. 2. 3, after paying freight, and his profit was Rs. 0. 3. 9. The weaver used five such bundles in a month, which meant that he gave away Rs. 1. 2. 9 in profit to the retailer. As the earnings of such a weaver would in no case exceed Rs. 10, and probably in the north of the province only amount to about 3 annas a day, or under Rs. 6 a month, it is clear that too large a share of the weaver's earnings are taken by the retailer for supplying thread. Where thread is dyed locally, the retailer's profits are a good deal more. Over and above these profits, the retailer charges interest of not less than one anna in the rupee per month, if longer credit is needed; and, as has already been stated, if the weaver sells him the cloth from inability to find a private customer, he charges a considerable profit on that as well. It would thus be no exaggeration to say that the cost of the retailer's services to the weaver vary from one to two rupees a month, or from one-tenth to one-sixth of the weaver's earnings. A substantial reduction of this item by an improved method of financing the weaver would thus be a real benefit to him.

Cost of warp-
ing and sizing.

42. To take the next point, that of the cost of winding and warping, Mr. Chandorkar states that a woman can wind 6 *phalas* a day and spread 6 *phalas* in a day. Her wages for doing this would be 1½ annas in each case; this amount is low, since the woman is a member of the weaver's family. Warping costs one anna a piece, and sizing two annas, if work is done by hired

labour for *entrepreneurs*. This is more than the work may fairly be considered to cost the weaver, if done at home. According to Mr. Jageshwar Rao, 3 *phalas* cost the weaver from 1½ to 2 pice for warping and sizing. In Jubbulpore, the rate is 3 annas a piece, in Burhanpur, 2 annas a *sari* of 8 yards long, 2½ annas for 12 yards of turban stuff, usually about 6 *girhas* (*girha*=one-sixteenth of a *gaj* of 33½ inches wide), of counts 40 by 20. The only figures that I have available for the cost of professional warping and sizing are those given by Mr. Chatterton on page 205 of the Report on the Third Indian Industrial Conference of 1907; where Mr. Chatterton gives figures for the cost of warping and sizing in "fairly efficient warping mills, by men who do nothing else." They are as follows:—

Class of Work.	Counts.	Length in Yards.	Breadth in Inches.	Cost.	Percentage of Total Cost of Weaving.
Turbans	100 by 100	24	28	R. A. P. 1 8 0	17·2
<i>Angavasthrams</i>	100 by 100	12	45	1 2 0	15·9
<i>Dhotis</i>	60 by 60	100	54	4 7 0	10·5
<i>Saris</i>	60 by 60	54	45	2 9 0	7·9

I am unable to compare these rates with the rates for indigenous warping, for lack of sufficient knowledge, but, as the cost of the operation increases a great deal with the number of the count, I imagine that they will be found a good deal cheaper than local rates. The charge made by the Empress Mills for warping and sizing for the hand loom competition at Nagpur was as follows:—

Counts.	Charge per lb.
20	Pies. 18
30	21
80	32

This would amount to 15 annas for a 10 lb. bundle of 20's; the cost of sizing and warping this, on the data given by Mr. Chandorkar, would be Rs. 1. 7. 11. It is not certain if mill sizing is as good as hand sizing, but there are strong reasons for the adoption of professional sizing and warping, which gives longer, more even, and better wound warps; and we may fairly assume that it would be possible to save on the present cost, and at the same time to give the weaver better warps.

Methods of
warping.

43. The question of the best method of preparing warps for improved hand looms is a difficult and important one. It is clear, as Mr. Chatterton points out, that if we greatly increase the pace of the loom, it will require a greater quantity of warp than the women and children of the family have been hitherto able to prepare. Further, it will require a longer warp in a piece, and, unless the weaver adheres to the old device of keeping the warp hanging in festoons, which those weavers who make long warps have hitherto practised, beamed warps will be needed. A taking-up motion of automatic device for releasing a little of the warp as the cloth is woven, produces a more even cloth and saves the weaver's time, though it doubtless makes the work harder and the loom more costly. No more rapid method of sizing is possible unless a machine sizer called a "slasher" is used; and this requires very long warps or else it is not economical. It is a question whether these long warps would not be too long even for the more speedy loom, locking up more money than the weaver could afford, while the length of time that he would take before the warp was finished might cause the sizing to deteriorate. If the beamed warps were supplied by the mills, they would probably charge a good deal more for short warps. They would also find it difficult, if not impossible, to produce warps of any great variety of counts or colours. Moreover the hand sizing is said to be one of the causes why hand-woven goods are more durable than mill-made ones. In any event, a more evenly spread warp is needed for a quicker loom with, at any rate, equally good sizing. In view of these difficulties, Mr. Chatterton suggested in 1906 a warping factory to cost Rs. 9,000 for buildings and plant, and to supply from 100 to 150 looms.

Proposals as to
warping.

44. There are three alternatives:—first, to buy ready-made warps from the mills; secondly, to set up a hand or small power warping factory; thirdly, to get the warp prepared by hand by a separate set of workers. Various combinations of (2) and (3) are also possible according to the greater or less elaboration of the machinery employed; (1) saves trouble, but might result in the production of inferior cloth, and we are unaware if the mills would give us the diversified colours and counts that we require; (3) would probably prove the most expensive, though the product ought to be quite satisfactory. I suggest that experiments might be tried with a mill-made warp; but that a factory of a simple nature should also be started simultaneously with experiments on the lines of (3), until experience showed what combination of (2) and (3) gives the best results. I doubt if a factory with elaborate machinery will give better warps than the mills, while the cost will probably be higher and the difficulties the same. The expert whose appointment I am about to propose, should, after ascertaining the various classes of goods woven in the areas where demonstration schools are to be started, consult the manager of the Empress Mills and visit

Salem, Baroda, and other places where specialised warping is in vogue. He would then be in a position to purchase the necessary plant and engage the labour required. A lump sum provision for each factory of Rs. 5,000 for machinery, the sum named by Mr. Chatterton, and Rs. 2,000 for building, instead of the Rs. 4,000 that he proposes, might be made in each case. The lesser sum takes into consideration the fact that the cost of building will be shared by the weaving instruction sheds and other offices. I feel it very difficult to estimate the cost of establishment, but expect that a sum of Rs. 160 per mensem would suffice. This should pay a foreman on Rs. 80, two mistris on Rs. 20 each, and four or five hands. This estimate is based on general considerations, and is only put forward for budget purposes. The establishment, like the equipment of the factory, must be left for expert decision. Along with the question of warping, comes that of pirn winding. A different style of pirn is required with the fly shuttle to that in use in the country loom; and some difficulty is experienced by the women and children of the weavers in winding pirns in the new style, unless they have been trained to it. This will have to be arranged for.

Divisions of weaving industry according to counts of yarn woven

45. We now come to the stage of weaving proper, and here, in order to arrive at the profits earned by the weavers, it is necessary to consider the various kinds of cloth separately. They may be for the present purpose divided into the following heads :—

- (1.) Coarse cotton cloth.
- (2.) Fine cotton cloth
- (3.) Silk bordered cotton cloth, pure silk, or mixed silk and cotton, or silk with gold or silver thread.
- (4.) Tasar, considered solely with regard to the weaving mechanism.

Coarse weaving.

46. The great importance of the coarse counts in hand weaving may be judged from the following estimate of the expenditure of yarn in India, given by Rao Bahadur Raoji Patel :—

Nature of Cloth.	Counts of Warp.	Counts of Weft.	Used by Hand Looms (000,000's of Yards).	Used by Mills (000,000's of Yards).	Imported (000,000's of Yards).
Coarse -	6 to 16	6 to 20	900	60	300
Coarse and medium.	20 to 26	20 to 40	150	500	1,100
Medium -	26 to 40	30 to 50	450	40	750
Fine -	Over 40	Over 40	150	—	350

Coarse weaving is especially important in this province, and it is unfortunate from our point of view, that the only really reliable data regarding the cost of weaving on improved looms (those given by Mr. Chatterton) relate almost entirely to higher counts, which, though no doubt important in Madras, are far less so in Central and Northern India. The principal types of coarse cloths made in the province are:—

District.	Caste.	Name of Article.	Length and Breadth in Cubits.	Counts.	Colours, &c.	Cost of Material.	Price.
Chanda	Mahar	<i>Dhoti</i>	18 by 2½	16 by 12	White, with a little silk.	R. A. P. 2 10 0	R. A. P. 3 0 0
"	"	<i>Khadi</i>	18 by 2½	16 by 12	White	1 0 0	1 8 6
Raipur	Kattas and Pankas.	<i>Dhoti</i>	18 by 2½ (double length).	12 by 12	White, red bands of 30's	1 6 6	1 8 0 to 1 12 0
Drug	Gonds and Pankas.	"	10 by 2½	16 by 16	White, red bands	0 9 6	1 0 0
"	"	<i>Patuka</i>	12 by 1½	16 by 16	" "	0 8 6	0 14 0

No similar details for coarse goods are available for Berar, or for the north of the province, but the *khadi* and coarse *dhoti* are woven in every district of the province with which I am acquainted, and form the general wear of the labourer and small farmer. The class who weave them are the poorest and most backward among the weaving castes, and not infrequently combine weaving with agriculture. The work is of the simplest, and the colour is either plain white, or with red stripes in the warp on each side, not usually solid woven. Mill-made articles do not compete much with this grade, but their competition with the next higher grade must tend to depress the price of the coarser cloths.

Coarse and medium weaving.

47. *Coarse medium cloths.* Although the data available are very incomplete, there is a far greater variety of fabrics of this sort woven in the province, although, looking at the consumption of the coarser counts of yarn, it would be a mistake to consider this a more important section of the industry, than the making of coarse cloths.

District	Caste.	Name of Article.	Length and Breadth in Cubits.	Counts.	Colours, &c.	Cost of Material.	Price.
Chanda	Mahar	<i>Ban</i>	18 by 2½	20 by 20	Red, black, and yellow.	R. A. P. 1 10 0	R. A. P. 2 4 0
		<i>Icar</i> (Mahomedan).	12 by 1½	20 by 20	Red or yellow	0 11 0	1 0 0
		<i>Pheta</i>	12 by 1½	20 by 20	"	0 12 0	1 2 0
		Double <i>Ja</i>	12 by 1½	20 by 20	"	0 12 0	1 4 0
Nagpur	Mahars and Mousins.*	<i>Sari</i>	14 by 2	20 by 20	Red and black checks.	1 1 7	2 4 0
		<i>Sari</i> or <i>Icar</i> .	16 by 2	20 by 20	"	?	2 4 0 to 2 8 0
		<i>Ramal</i>	64 by 2½	20 by 20	"	?	4 2 0
Berar	Similar to Nagpur, except that prices seem to run higher.						

* The Mousins make very long warps and cut the cloth into pieces.

District.	Caste.	Name of Article.	Length and Breadth in Cubits.	Counts.	Colours, &c.	Cost of Material.	Price.
Raipur -	Salewars*	Dhot -	10 by 2½	20 by 16 (with finer counts mixed).	Red and white -	R. A. P. 1 0 6	R. A. P. 3 0 0
		Sari -	15 by 2½	20 by 20 (with finer counts mixed).	Red, white, black, and green.	1 6 4	3 0 0
	Halbis -	Dhot and Sari.	6 by 2	20 by 12 (with 40's mixed).	White and red -	0 7 0	0 11 0

* This caste prepare long warps and cut the cloth into pieces.

Similar details as to counts are not available for the northern districts, but the above data show the typical kinds of cloth for this class. Two kinds of weft, which entail two different shuttles, are mostly used. I am not aware how many sets of pedals are employed, but I do not think more than two, if so many.

Medium weaving.

48. Medium cloths :—

District.	Name of Caste.	Name of Article.	Length and Breadth in Cubits.	Counts.	Colours, &c.	Cost of Material.	Price.
Chanda -	Salewars -	Lagra -	18 by 2½	40 by 20	Red - - -	R. A. P. 2 13 3	R. A. P. 4 13 0
		Rumal -	18 by 1½	40 by 30	Red and white -	2 6 0	3 4 0
	Majars -	Doria -	18 by 1½	40 by 20	- - - - -	0 10 9	1 8 0

No details are available for the remaining districts.

Fine weaving.

49. *Fine cloths.* No separate details are available for fine cloths. Most of the weaving in counts above 40's falls under the head of silk bordered cloths.

Silk and lace weaving.

50. *Silk, silk bordered, gold and silver lace weaving.* This class of weaving is chiefly confined to Nagpur, Umrer, and certain towns in the Bhandara and Chanda district, Saugor and Burhanpur. In Chanda and Bhandara counts of from 30's to 60's are mostly used; in Nagpur counts up to 80's are regularly woven, though both here and in Burhanpur a good deal of work is done in still higher counts. The silk used in Burhanpur is of two kinds; China silk, brought from Poona, where it is sent from Bombay to be bleached and dyed, owing to the superior quality of the water, which is said to be more suitable for dyeing; and Bengal silk, which comes from Murshidabad to Bombay, and is thence brought by dealers to Burhanpur. A third kind of silk, called locally jute silk, of an inferior kind, is brought from Italy. This seems the same as the Kashi silk, woven in Benares, which is spun in Italy from refuse silk and spoiled cocoons. The cost of Bengal and China silk is said to be three tolas per rupee, or Rs. 24 per seer of

72 tolas. Jute silk only costs Rs. 4 per seer of 72 tolas. The Burhanpur term for this silk is *sann* or *arnas* silk. In Nagpur the Marwaris buy silk from Malda and retail it undyed and unprepared at Rs. 11 to Rs. 16 per seer of 80 tolas. A "hank" contains nett 1 maund 9 seers of silk, and its carriage to Nagpur costs Rs. 7 annas 12. Bombay silk of an inferior kind to Bengal silk is stated to be used in certain places in the Nagpur district, where the principal centres are Umrer for *saris* with silk borders, and Nagpur for coloured *saris*. Silk is exported from Nagpur to Chanda and Bhandara, where it is sold at the rate of Rs. 7 per 22 tolas cash, and Rs. 8 on credit. This rate presumably includes dyeing. The silk is dyed in Nagpur by Patwis, and the town of Umrer has a considerable reputation for its silk dyeing, which is attributed, as in the case of Poona, to the quality of the local water. As dyeing will be separately treated in this report, no further details are given here. The imports and exports in 1905-06 were as follows:—

Material.	Imports in Maunds.	Exports in Maunds.
Raw silk - - -	3,251	271
Piece goods - - -	86	10

Most of the raw silk was imported into Chhattisgarh from Bengal, and must have been principally *tasar*; 104 maunds of silk were imported from Bombay. But so much silk is brought by passenger train or post that the above figures are of little use.

Tasar, called in the Nagpur country *dongri*, or jungle silk, is also used by the weavers of this class of cloth.

The making
of gold and
silver lace.

51. Gold and silver thread is of various kinds; the genuine from Burhanpur and Benares, and the imitation from Europe. The cost of real gold thread depends on the numbers of *mashas* of gold per *passa* or rod of 57 *tolas* of silver and three *tolas* of copper. Thus; 12 *masha* thread costs eight annas a piece of 125 *gaj* (*gaj*=33½ inches long), weighing 4½ *mashas*; 24 *masha* thread costs 13 annas.

Castes en-
gaged in silk
weaving.

52. The castes who practise silk and cotton weaving are the Halbi and Maratha Koshtis. They are said to be much indebted, in Chanda especially, where only 5 per cent. of the weavers are independent, the remainder working for the dealers on wages of three annas a day. In Nagpur the workers on a daily wage are said greatly to outnumber the independent workers. The industry is stated to be flourishing in Nagpur, and Mr. Napier says that the Koshtas told him that their looms

had increased from 3,000 in 1896-97, to 6,000 in 1908-09. This is borne out by Mr. Dewar's remarks in his monograph, and it is certainly an argument in favour of the factory system for hand weaving, to find a trade so largely in the hands of capitalists in so flourishing a condition.

Profits of the industry.

53. The articles made in the various districts for which details are available are as follows:—

District.	Name of Article.	Counts.	Length and Breadth in Cubits.	Cost of Silk, &c.	Total Cost.	Sale Price.
Chanda	Lugri	50 by 40	60 by 2½	B. A. P. 3 0 0	B. A. P. 5 7 7	B. A. P. 9 0 0
	Patal	50 by 50	60 by 2½	Rs. 2 (gilt thread).	4 13 4	9 0 0
	Dhoti	40 by 30 and 50 by 40	20 by 2½	2 5 0	4 3 0	6 0 0
	Uparna	40 by 30 and 50 by 40	10 by 2½	1 5 0	3 6 0	4 8 0

The warps used in these cases are all very long, about 100 to 120 cubits as a rule. The profits earned are from 4 annas to 7 annas a day. (The details for Nagpur and Bhandara are very similar to those given above for Chanda, except that, where weavers work on daily wages, the cost of subsidiary operations, such as winding, warping and sizing, but not dyeing, equals about half the profits that a weaver makes when working independently. The wages of weavers engaged on this class of work in Burhanpur are stated to have fallen from 33 to 40 per cent. since 1865, and are at present about 4 annas a day.)

The rates for dyeing a 10-lb. bundle of yarn of the higher counts are said to be as follows:—

Count.	Amount.
30's	Rs. 5
40's	6
50's	7
60's	8

The very finest products of Burhanpur and Nagpur, consisting of pure or almost pure silk and gold or silver thread, are not nearly in as good demand as was once the case. The ordinary silk bordered goods, for which details have been given above, and which account for by far the greater bulk of the industry under this head, are still in great demand; and it is to this class of goods that most of my remarks relate. The silk borders, which entail the use of thread of varying fineness

in the warp, would make it impossible to beam the warp on single rollers; as most of them have solid woven borders, it would similarly be impossible to introduce the fly shuttle. But obviously a great deal could be done to improve the finance of the industry, of the profits of which the retailers get more than their proper share.

The *tasar*
industry.

54. *Tasar*.--The question of the *tasar* industry has already been thoroughly inquired into by the late Mr. Mukerji, a sericultural expert from Bengal, and it is unnecessary to discuss the subject here. Suffice it to say that, in spite of a greatly improved demand, the industry has declined, owing to a falling off in the supply of cocoons. Government is attempting to remedy this, and until this is done it is idle to make any attempt at improving the methods of manufacture. A more efficient loom would only make the difficulty of supply more acute. The Japanese reeling process, which was tried a few years ago, proved quite unsuited to local conditions.

Wages in the
Nagpur
country.

55. The wages earned by the weavers depend mainly on the length of time that they take to weave the cloth and on the price that they get for it when woven. The first factor is the resultant of their skill and of the efficiency of their loom; the second, of the demand for their product and of the proportion of the profit that they are enabled to obtain, *i.e.*, on the finance methods of the trade. The profit of the weavers on the various classes of articles made by them and the number of days that they take to make them, are as follows:—

Article.	Profits.			Number of Days.	Daily Earnings.		
Coarse Weavers.							
	R.	A.	P.		R.	A.	P.
<i>Dhoti</i> - - - - -	0	6	0	2	0	3	0
<i>Khadi</i> - - - - -	0	8	0	2	0	4	0
<i>Dhoti</i> (Raipur) - - -	0	5	6	2	0	2	9
<i>Dhoti</i> (Drug) - - - -	0	6	6	3	0	2	0
Medium Coarse Weavers.							
<i>Ban</i> (Chanda) - - - -	0	10	0	3	0	3	4
<i>Izar</i> (Chanda) - - - -	0	5	0	2	0	2	6
<i>Pheta</i> (Chanda) - - -	0	6	0	2	0	3	0
Double <i>jin</i> (Chanda) -	0	7	0	2	0	3	6
<i>Doriya</i> - - - - -	0	13	3	3	0	4	5
<i>Sari</i> (Nagpur Momins)	18	7	3	40	0	7	2
<i>Dhoti</i> (Raipur Salewars.)	1	0	0	2½	0	6	2
<i>Lugra</i> (Raipur Salewars.)	1	9	8	4	0	6	0
<i>Dhoti</i> (Raipur Halbis)	0	8	0	3	0	2	8

Article.	Profit.			Number of Days.	Daily Earnings.		
Fine Weavers.							
	R.	A.	P.		R.	A.	P.
<i>Lugra</i> (Chanda) -	1	14	9	7	0	4	0
Mixed Silk and Cotton.							
<i>Lugra</i> (Chanda) -	3	8	5	10	0	5	6
<i>Patal</i> (Chanda) -	4	2	8	10	0	6	6
<i>Dhoti</i> (Chanda) -	1	13	0	7	0	4	2
<i>Uparna</i> (Chanda) -	1	2	0	5	0	3	6
<i>Dhoti</i> (Bhandara) -	1	13	6	10	0	3	0
<i>Uparna</i> (Bhandara) -	1	9	1	5	0	5	0
<i>Sari</i> (Bhandara) -	3	4	0	8	0	6	6
<i>Patal</i> (Bhandara) -	1	12	2	5	0	5	6

The rates for weavers of mixed goods in Nagpur, allowing for cost of subsidiary operations, such as winding, &c., are :—

Article.	Profit.			Subsidiary Charges.	Days Worked.	Daily Rate.		
	R.	A.	P.	R.	A.	P.	A.	P.
<i>Dhoti</i> -	2	8	0	0	10	0	3	0
<i>Lugra</i> -	2	8	10	1	11	6	1	10

With reference to the last set of figures for Nagpur, I have to remark that if the weaver be assumed to get all subsidiary operations performed by members of his family, excepting dyeing, he earns, in the case of *lugras*, about 3 annas, and in the case of *dhotis*, about 4 annas a day. The earnings of weavers of this class of goods are stated to be in a good year from Rs. 10 to Rs. 15 a month, and there seems reason to believe that the daily rate arrived at on the data above is too low. It may be stated that, out of the wages given, the weaver has in all cases to pay for the cost of sizing materials and the wear and tear on his loom. It is improbable that these amount to anything like as much as half an anna a day.

Wages in the northern districts.

56. The daily wages reported for the northern districts are as follows :—

A weaver working for daily wages in Burhanpur on *saris* of mixed silk and cotton received 4 annas a day. A weaver earned 2½ annas profit a day on medium coarse *suti saris*, on the

improbable assumption that he has to pay for preliminary operations. The wages earned by weavers in Berar are stated to be from 3 to 4 annas a day.

Comparison of
hand-loom and
mill workers'
earnings.

57. There are further considerations, however, to be taken into account. In the first place the weaver is not certain of selling his goods at the rate assumed in calculating profits above. In a bad year he gets a good deal less. Then every 12 years a *singhas* year occurs in which there are no marriages, which reduces the demand to a minimum, and is a most serious obstacle to any attempt to improve the finance of the industry. Most weavers are more or less indebted, and the interest charged is never less than 12 per cent. a year and is often higher. Again, the daily wage of the weaver is earned by the help of his entire family; and this must be considered when comparing the wages of hand weavers with those of factory weavers. If the hand-loom worker makes from Rs. 5 to Rs. 15 a month, a family employed in a cotton mill can earn a good deal more. The mill weaver can make 5 annas a day, or allowing for unemployment, Rs. 8 a month, according to the returns appended to the report on the working of the Factories Act for 1906. The officers who conducted the present enquiry for the place factory hands' wages at from 8 to 10 annas a day. Where a man, a woman, and a child are working the family must earn at least Rs. 15 a month, so that it seems probable that only the best employed class of weavers, such as the Momins of Nagpur and the most skilful weavers of silk bordered goods in the Nagpur country, make as much as this.

The weavers of the north of the province seem to learn less than those of the south, as is the case with most classes of labour.

Rate of picking
with indige-
nous looms.

58. The question of wages is very much bound up with that of the rate of working; and it will be convenient to discuss together the rate of working both of the indigenous and of the improved looms.

Mr. Chandorkar states that the weavers of silk bordered goods in Chanda can do 10 picks a minute, but stoppages and adjustments account for one-fourth of the weaver's time. In Nagpur the rate for such work is stated to be 12 picks a minute. For solid bordered goods of cotton yarn, the rate is said to be 10 picks a minute, exclusive of stoppages. The Momins of Nagpur, who make check and other goods in cotton, are said to reach 20 picks a minute, when solid borders are not made and only a single shuttle is used. The same rate is quoted for the Drug weavers. Mr. Jageshwar Rao gives 20 picks a minute as the rate for cotton *saris*, and 60 for *golias*, which are only about 13 inches wide. But he admits that, if this rate were kept up, the weaver should weave 9 yards of cotton *sari* in a day, whereas he only weaves 4½ yards; thus half his time goes in mending breakages and making adjustments, and I should think this

estimate a good deal nearer the truth than Mr. Chandorkar's. Mr. Saranjame for Berar gives 18 to 20 picks as the rate for common cotton cloth, and six to eight only for silk bordered cloth; and he states that stoppages account for from two to three hours out of the working day of from eight to ten hours. This is nearer Mr. Chandorkar's estimate.

Rate of picking with improved looms.

59. Turning now to the output of improved looms, the rate of picking at the different competitions for cloth of various counts and widths was as follows:—

Competition.	Type of Loom.	Width of Cloth.	Counts.	Rate of Picking per Minute.	Period worked in Hours and Minutes.
		Ins.			Hrs. Mins.
Nagpur	Clarke	36	20 by 20	52.4	11 50
	Salem	36	20 by 20	63.2	13 50
	Belgaum	36	30 by 40	65.6	13 50
		44	80 by 100	52	12 5
Calcutta	Belgaum	36	20 by 20	60	13 50
	Serampur type	40½	40 by 40	33.6	7 15
	Japanese	40	40 by 40	34.6	7 30
	Sayaji Factory.	42	40 by 40	31.2	7 30
	Sayaji pit	42	?	20	7 30
	Sayaji cottage	43	?	30	7 30
	Salvation Army.	40½	40 by 40	37.3	7 30
Madras	Hattersley	22	40 by 40	92	5 30
	Sayaji Cottage	36	20 by 20	35	24 30
	Salvation Army.	35	20 by 20	37	24 30

Other looms competed at Madras, but the report does not clearly show the exact type to which they belonged.

Effective speed of improved looms.

60. Rao Bahadur Raoji Patel, in his paper read before the Indian Industrial Conference in 1906, quotes Mr. Chatterton's results as showing that a loom with an effective speed of 160 picks per minute could only actually attain a speed of 60 over a day's working. The worst enemy to the speed of the improved hand loom is, he considers, the constant breakages that occur, which increase in number very greatly as the speed grows higher. He considers that 75 picks on a 45 inches loom is the highest working speed, and an effective speed of 50 picks, allowing for 17 per cent. of stoppages, should be aimed at. Mr. Churchill does not agree with this limitation. Mr. Chatterton stated before the Indian Industrial Conference of 1907, that 20 to 25 picks per minute on fine cloths was very good work. The Salem weavers had a working speed of 80 to 100 picks per

minute; but only one-fourth of their time was available for actually plying the shuttle. The workers at the Calcutta competition were completely exhausted, he states, at the end of 7½ hours' work. He doubts if the effective speed can ever rise to more than 40 or 50 per cent. of the working speed.

Comparative efficiency of indigenous and improved looms.

61. It would seem from the above instances that the improved hand loom can work at any rate twice, and possibly three times, as fast as the indigenous machine. Besides this, the relative efficiency of the fly shuttle, compared with that of the indigenous loom, rises considerably as the width of the cloth increases.

Types of improved looms.

62. *Characteristics of improved looms.* This is a part of the subject where it is unsafe for anyone but an expert to express an opinion. The looms that have been most prominently before the public of late years are the following:—

(1.) The Bengal or Serampur loom, which is a frame loom, much like the old English fly shuttle loom.

(2.) The Hattersley and Raphael looms. These are almost exactly like power looms, and have expensive cast-iron frames, with taking-up motion, overhead dobbies, &c. They are very costly, and are said to be too heavy for the Indian weaver. They are, I believe, employed a good deal in some parts of Europe. Mr. Chatterton has tried the Hattersley loom, and has seen the Raphael loom at work, and he states that they were not a success, being too heavy for the weak Indian weaver. This was under factory conditions; under the conditions of domestic weaving, there would be the added difficulty of repairs. Mr. Chatterton believes that they might be a success in a small factory, if driven by an oil engine.

(3.) The Sayaji loom. There are various grades of this loom, varying in cost. In the type seen by me the entire work is done by the thrust of the beam by the weaver's hand and the pulls of the pedals by his feet; the picking motion is not given by a string, as is the case in some fly-shuttle looms. This is a pit loom and is not suited for beamed warps.

(4.) The Japanese loom has not been a success save in one case at Benares, where it was used for weaving Kashi silk. It is stated to be costly and heavy and ill-devised. I have not seen the loom and do not think it necessary to describe it.

(5.) The Salvation Army loom has been extensively tried in the United Provinces and is stated in the Notes on the Industries of the United Provinces to be a fairly satisfactory loom for coarse counts. This is a frame loom with an automatic picking and taking-up motion. It was retired from the competitions at Nagpur and Madras.

(6.) The Salem loom, which is a frame loom with an automatic taking-up motion. The shuttle is worked by hand. It was generally approved, as was the Sayaji loom, by two of the judges at the Nagpur competition; the third, Mr. Davis, the Bengal Government Jail weaving expert, preferred this to

the Sayaji loom. The bulk of the weaving at the Salem factory is in counts of 60's to 100's, which is finer than nearly all of our pure cotton weaving.

These are the leading types. In addition there are several others, of which the Buckoo loom, an expensive contrivance resembling the Hattersley loom, the Bombay Loom Factory Automatic, the Belgaum Automatic loom, on lines similar to, but less elaborate than the last, the Clarke cottage loom, a pit loom without taking-up motion and not suited for beamed warps, with the picking motion worked by a string, were seen at the Nagpur competition.

My recommendation is that two types of loom should be tried, one with beamed warps and one without. Neither of these should be of the expensive Hattersley type, and the latter loom should be one of the various cheap types of fly-shuttle attachment worked as a pit loom.

Fabrics for which improved looms cannot be used.

63. It must be remembered that the fly-shuttle cannot make solid bordered cloth, i.e., cloth which has different coloured borders woven with a warp and a weft of one colour, and not with the same weft as that of the rest of the cloth; and it is very doubtful if any of the other modifications, such as beamed warps, taking-up motion, &c., will be of any particular use for such work, in the absence of the fly shuttle. Improved healds and reeds, which will be required with the fly shuttle, may, however, help the workers in solid bordered cloth, and we can at any rate offer them the benefit of improved finance. The question of improved warping has already been dealt with.

Importance of selecting looms suitable for type of cloth which it is proposed to weave.

64. Other provinces are proposing central experimental factories. I doubt if anything quite so elaborate is needed for our province at present. The results of the experimental factories of other provinces will no doubt be available for our use; and I think it would be best to take advantage of these rather than to expend our smaller resources on an inferior institution of such a type.

The establishment which I am about to propose will provide sufficient staff and appliances to make full use of the results obtained in Madras and in the United Provinces, and to devise the small modifications necessary to make them applicable to local conditions. I would once more draw special attention to the importance of the coarse and medium coarse counts. Mr. Chatterton informed me that it was necessary in starting a hand-loom factory to decide first of all what kind of cloth it was proposed to manufacture and then to equip the factory with suitable looms, as far as possible all of a single type. It is a mistake, he says, to take up miscellaneous work of any kind that comes along. I have no doubt but that the same important considerations apply with almost equal force to an instructional factory.

Prospects of
success.

65. We have seen the general conditions of the hand-weaving industry in the province, and, in giving some account of the attempts made elsewhere in India to improve the industry, have briefly noticed the various types of improved appliances. We are now in a position to state the problem for solution.

The province contains a large number of weavers of cotton cloth, mostly in coarse or medium coarse counts, and a smaller but still important number of weavers of silk and other valuable mixed fabrics. They are scattered about the province in communities, varying in size from the colonies of Momins and Koshtis in Nagpur and Burhanpur, to the few dozen weavers in the smaller country towns and the half dozen looms that many villages can show. These weavers are possessed of considerable skill but are bigoted and ignorant to a degree, are set against innovations, and are heavily indebted and much in the hands of the retailers, who seem *primâ facie* likely to oppose any attempt to improve the financial position of their *clientèle*. We have seen that in other parts of India numerous attempts have been made to introduce improved handlooms of varying type. Partial success has been attained in two places; in Madras, where it has been found necessary to work the improved looms on a small factory system, a modification which it would be inadvisable for Government to attempt in this province, at any rate until it had proved impossible to retain the domestic character of the industry, while improving its appliances; and in Bengal, where the Serampur loom has attained a vogue among domestic workers in certain areas. On the other hand, the record of failures has been very long, though in most instances it has been due to a lack of technical knowledge or of capital or to inadequate organisation. I have myself seen several cases where weavers were taught by missionaries or other philanthropic persons the use of the improved loom; in almost all cases they abandoned it very soon after leaving the training institution and being thrown on their own resources. But in spite of failures the general opinion among those best qualified to judge is that the best types of improved looms are capable of increasing the weavers' earnings.

The example
of the Agri-
cultural De-
partment.

66. We may obtain some help towards our solution of these difficulties from a consideration of the history of the Agricultural Department. In the first place, little good accrued to the agriculturists of the province before trained experts were appointed and enabled to work at experimental centres. In the next place the teaching of the experts could never have reached the people without demonstration plots, lectures at fairs, agricultural associations, and the like. Progress in matters industrial must be on similar lines. Though most of the experimental work will probably be done for us at the more elaborately equipped centres of other provinces, yet some establishment is necessary to enable us to adapt to local conditions the details of the results there obtained. One or more local stations are required, where approved principles,

tested at the central institutions, may be demonstrated. It is quite clear that there are two things that we should not attempt: we should not recommend any loom that has not been thoroughly tested, nor for any class of work on which we have not tried our loom with success. I think it would be inadvisable to have anything to do with silk or mixed silk and cotton weaving, until more work has been done on it at the experimental stations of other provinces. I think it unwise to attempt a demonstration station among so large a weaving community as that which exists in Nagpur. The weavers there have heard a good deal about the fly shuttle, and have witnessed the failure of more than one attempt to introduce it among themselves. They are too large a body and present too large a mass of inertia for a new movement easily to make headway among them. I do not overlook the great advantage in supervision which the location of a demonstration station in Nagpur itself would offer. Success at so central a spot, moreover, would more rapidly affect the province as a whole. But my opinion is that success will not be so easily attained, that any means of securing it can be neglected on account of other considerations. A demonstration station should be located at a place where the weavers are specially likely to be amenable to the influences that we can bring to bear on them, and no means of influencing them should be neglected.

Importance
of improved
finance.

67. Among these subsidiary means of benefiting the weavers, first of all and most important is the improved system of finance on co-operative lines that we have seen is so important for the future success of the industry. A co-operative bank for weavers should certainly accompany any attempt made to introduce improved methods in weaving. Such banks have proved successful in other provinces; and a very promising one was started not long ago in Burhanpur. The success of such an institution would be a considerable inducement to a weaver to give his attention to what the Government experts, who would manage the bank, had to say about improved methods. A weaving community, not too large for us to make an impression on, and reasonably accessible to inspecting officers, is desirable, and, if possible, one which is accustomed to be on friendly terms with Government officials and is readily amenable to their advice. Such places might, I consider, be found in the town of Burhanpur, Bhandara, Umrer, and perhaps in Chanda; or, if it were thought better to start in an even smaller place, Waraseoni or Katangi in the Balaghat district would be suitable, though they are not so accessible* as might be. It must be remembered that Burhanpur, Bhandara, and Umrer contain a very large proportion of weavers of cotton mixed with silk who, for the present, fall outside our proposals for the mechanical improvement of weaving.

* NOTE.—The Balaghat Katangi Railway would obviate this difficulty.

Co-ordination
of financial
and mechanical
improvements:

68. Having decided on the location, efforts should be made to combine a fair number of weavers, not less than 50, into a co-operative society. As the industrial staff will presumably be under the orders of the Director of Agriculture, there should be no difficulty in co-ordinating their work with that of the Registrar's Department, which is under the same official head. It may prove advisable, but this is a point which should be left to expert decision, to start simultaneously a small warping and sizing factory under one or other of the schemes already sketched, to supply sized and beamed warps for the use of the weavers.

Types of exist-
ing Industrial
Co-operative
Credit So-
cieties.

69. I have been able to discover details regarding three different types of credit societies for weavers. The first type is represented by a bank started by missionaries at Sholapur during one of the recent famines. It appears to be a purely philanthropic institution and to contain none of the co-operative principles. The bank advanced yarn at one anna per bundle over cost price on one month's credit; it made advances on finished articles which it took over and sold, retaining the sum advanced, plus interest at three per cent., and handing over the balance of the sale price to the weaver. It also made advances on personal security at the same rate of interest. The society at Tiruchengoru limited the number of weaver members to 20, with not more than 50 looms. It purchased yarn in bulk and sold it at favourable prices to its members for cash or on credit. It also gave out cash loans not exceeding Rs. 5 per loom, and only in exceptional cases, for periods not exceeding one month. The interest charged was six pies a month for every Rs. 5, or $7\frac{1}{2}$ per cent. per annum. The Society borrowed its working capital to start with, but its members had to take shares of Rs. 10 annas 8, which they paid up in instalments of 2 annas a month. All net profits were credited to the reserve.

In the Big Conjeeveram society, the rules are similar, but this society sells or lends improved hand looms to the members, and buys cloth from them, or sells it for them.

The Benares Silk Weavers Association consists of a number of banks, belonging to the different mohallas of the town, affiliated to a central society. The central bank obtains orders for work, and distributes them among the various branch societies. It advances cash and material to them at $12\frac{1}{2}$ per cent. interest. The cloth is valued by appraisers for the central society. Besides obtaining orders for cloth, the central bank keeps a stock of cloth, which it sells as it finds buyers. This society is said to have aroused the hostility of dealers, as any society so constituted is bound to do; and therefore had to find markets for the work of its members. I am not aware of the exact measure of success of any of these various types, but I have heard generally that the Benares society is doing well at present. It is a very large society, and it would not be advisable in this province, to start with such large numbers, or

so complete an organisation, as the hostility of dealers might prove a stumbling block. It would be better at first to attempt to sell the cloth through the ordinary channels, at a more favourable rate. But the society should be organised on lines that would admit, if necessary, of its completely financing its weavers, supplying them yarn or warp, selling or lending them improved looms, and finding them a market for their wares. Any society to be successful must build up a reserve or be able to command other funds, to enable it to carry considerable stocks through a *singhast* year. I see no reason why some measure of help might not be given to a well organized society in the form of a Government loan, for perhaps the first year of *singhast*. The society should be open, not only to weavers who are working with the improved loom, but to other weavers; for the weavers of mixed silk goods can, it would seem, be benefited in scarcely any other way, at least for the present. If the locality contains any members of other industries that Government is trying to assist, it may prove advisable to allow them to form branch societies affiliated under a central bank with the weavers' society, or it may be best to keep the societies of different industries on a separate financial basis. Such details are better left to the experience of actual working.

The training
of weavers
in improved
methods,

70. With the advantages offered by a well considered scheme of co-operative finance, the work of instructing the weavers would start under favourable conditions. A small weaving shed would be required, with room for 20 looms. It would be necessary to offer wages to the weavers while learning, otherwise the hand to mouth existence of the workers would prevent their taking advantage of the instruction provided. A sum of Rs. 10 a month, and a proportionately smaller allowance for lads with fewer family responsibilities should suffice. Unless we offer a wage sufficient for the better class of workmen, we shall attract no one but the wastrels and inferior workers, a fact which has been the ruin of more than one attempt to introduce the improved loom. The length of time necessary to teach the use of the improved loom is a question for actual experience; it may be assumed for the purposes of a financial estimate as four months. Besides the teachers, one of whom would not be able to deal with more than six looms at a time, there should be not less than two practical weavers, to help the teachers in explaining difficulties to the learners, and to exhibit the improved looms to visitors. They would be especially necessary at the beginning of operations, to attract the interest of spectators. Rao Bahadur Raoji Patel of Baroda tells me that he always sends out his teachers in pairs, one passed student, of the literate classes, who has been trained to work the improved loom, and one weaver; for, as he says, no student, capable as he may become of teaching, can ever attain the working proficiency of a professional weaver; and without that proficiency, it is impossible to gain the confidence and respect

of the weavers, whom we are seeking to influence. Turning once more to the Agricultural Department for an illustration, it will not be forgotten what a large share was taken by the labourers of the Nagpur farm in the success achieved by demonstrations. The weaver, on being passed out from the training shed, would be allowed to join the co-operative society, if not already a member, and would be set up with an improved loom, for which he would have to pay. Part of his earnings might be given him in the form of deferred pay, which would be available towards the purchase money, and the rest met by a loan from the society. The society, as already suggested, should begin its work at once among the untrained weavers and need not wait for trained workers. This would secure its position, and accustom the local weaving community to the help of Government officials, and increase its confidence in their good intentions. The training institution, the warping factory if one is found necessary, and the co-operative credit society, should be under the local control of a Superintendent, subject to the orders of the Registrar, in respect of the last named institution, to the same extent as any other Government official acting as the secretary of a society would be.

The question
of staff.

71. I think it would be best to begin with not more than two demonstration stations. These two, with the central station in Nagpur, which would train students, effect any adjustments and repairs that the carpenters at the demonstration stations could not deal with, and carry out the small amount of experimental work that might be found necessary, would all be under the orders of the weaving expert, subject to the control and supervision of the Director of Agriculture.

A man of the type required for Superintendent, Mr. Chatterton tells me, might be obtained for Rs. 150 to Rs. 200 a month.

The question of the appointment of an expert and the salary he is to receive, is a more difficult one, and must be considered with that of the appointment of experts for other branches of industrial work; my proposals under that head will be found at the end of this report.

An estimate of the probable cost of these proposals is appended to this report.

Chapter IV.—POTTERY, BRICK AND TILE MAKING.

Population en-
gaged in the
industry.

72. The number of potters and makers and sellers of pots and pipes in the Central Provinces fell from 57,940 in 1891, to 51,567 in 1901; and the number of brick and tile makers and sellers fell from 12,796 to 8,703 between the same years. In spite of this, it is the generally accepted opinion, that the industry is by no means in a bad condition. The number of Kumhars, the potter caste, fell from 102,682 to 99,206, a decline much less than the all round provincial decrease of 8 per cent. How far the census figures adequately represented the state of the brick and tile trade in 1901, I am not prepared to say; but there is no doubt that the brick and tile industry has greatly increased of late years, owing to the general prosperity, and more extensive private and Government building operations. Numerous other castes, such as Mahars, Gonds, Chamars, and Telis, have taken up brick and tile making, which does not require the hereditary skill of the potter's craft. As far as this latter branch of the industry is concerned, opinions differ, but the general weight of evidence is to the effect that the industry is in a flourishing state. It fell off but little in the famine years, as the comparatively well-to-do who sold their brass vessels replaced them by earthen ones, and even the poorest were compelled to use earthen vessels for any food that they might procure. Since the famines some inroads must have been made on the field supplied by the industry by the extended use of iron and brass vessels, owing to the increase of prosperity. Earthen *chalnas*, for instance, have been almost entirely replaced by iron buckets or kerosine tins; iron *tawas*, or cooking plates, have taken the place of earthen ones, and generally brass or iron, enamelled or tinned ware, are more used to hold liquids or for purposes requiring a power of resisting heat. Foreign earthenware or china is used very little at present, and only in the towns. *Barnis*, or glazed earthenware jars, however, have a certain vogue among the better-to-do for holding jam, pickles, ghee, &c. On the other hand, there has been a great increase in prosperity among the labouring classes, who nowadays form the potters' chief customers, and in spite of the rise in prices I do not believe that the production has fallen off much, if at all. The improvement in the brick and tile industry, though by no means the sole perquisite of the Kumhar, has assisted him a good deal. The improvement in communications, owing to the advent of the railway, has extended the sale of metal vessels, which are now readily available everywhere, but it is of little use to the potter, whose goods are too cheap and too fragile to stand transport. It is for this reason that the caste live in such

widely scattered communities. The principal districts where potters are found are :—

Saugor	-	-	4,513	Damoh	-	-	2,905
Jubbulpore	-	-	8,052	Narsinghpur	-	-	4,083
Nagpur	-	-	2,798	Chanda	-	-	2,454
Raipur	-	-	5,456	Bilaspur	-	-	3,696

Materials for
pottery

73. The principal materials used for the common earthenware pots are (1) the red clay from sloping or high-lying land, and (2) the black clay, from the banks of streams and places where water has stood. The surface soil is said not to be suitable for pottery, no doubt because it contains too many stones, sticks, &c. These two materials, with the addition of a few colouring materials, and a glaze, which will be described below, comprise the raw material of all the indigenous pottery of the province. There are, however, fine pottery clays to be found in the carboniferous tracts of Warora and Yeotmal, Bagra, and no doubt elsewhere; there is fire clay in Jubbulpore, and china clay, either in the form of degraded mica schists or decayed felspar, is to be found in several districts of the province, where transition or archaic rocks predominate. None of these superior materials are used except by Messrs. Burn & Co., at Jubbulpore, and by the Government Tile Factory at Warora. Messrs. Burn & Co. complain of the lack of demand for glazed earthenware; and there is some reason to doubt if there would be any local demand, at any rate at present, for any of the wares that could be worked up from the fine materials above mentioned. In any case, their utilisation would only be on a factory scale, and is outside the scope of the present enquiry.

Glazes and
colouring
matters.

74. The glazes and colouring materials used are as follows :—(1) Red earth, an ochreous clay or powdered soft rock of a similar character, mixed with water, and applied in the form of a paste, for ornamental purposes. (2) Micaceous clay, called *sip*, *jhip*, or *bhismati*, from Betul and other places, used to give a glittering appearance to vessels. (3) In the Bhandara district, an alkaline earth, called *pakhan mati*, or *chopan mati*, is obtained from a village in the Sakoli Tahsil named Pohra, and from another village near Rohra in the Bhandara Tahsil. The earth is said to be of a salty nature, resembling the earth of saltlicks. This earth is prepared by dissolving it in water, throwing away the sediment, and then (so far as can be understood from the description), allowing the remaining solution to evaporate, a process accelerated in the rains by boiling; the residuum consisting of alkaline crystals, mixed with a little clay, is dissolved, and two or three coats of it are applied both inside and outside the vessels to be glazed, which are baked inside another vessel, with blocks of wood, though what is the use of these is not clear. The containing vessel is placed on three pots of fuel, and its mouth firmly closed. This glazed ware is said to command a ready sale, and to be exported even

as far as Berar. Small pots of this ware sell at half a pice to two pice each. Besides this, sand, dung and various alkalis are occasionally mixed with the clay, the latter, it is said, to render the ware porous.

Cost of raw materials.

75. The cost of the materials used varies in different places. As a rule, nothing is charged for the earth used by the Kumhar, though he sometimes gives the owner of the land a few pots. He has, however, usually to pay for the red ochreous clay, which, in Bhandara, costs 12 annas a cart load. In some places, however, either because of the extensive use of the clay by the potters or brickworkers, or because it is specially valuable, payment is demanded. Sometimes a small cash payment, varying from four annas to four rupees, is taken to cover all the earth the Kumhar may remove in the year. A charge is made at Tilli, near Saugor, of one pice for two donkey loads. In Khandwa, each Kumhar has to give 3,000 bricks, valued at Rs. 15, to the malguzar, annually. In the same town, where the Kumhars are prevented from working in the neighbourhood of the inhabited area by a municipal rule, they have to pay for water at the rate of three rupees a month for the use of one *pakhal* (water carrying bag), which is increased to Rs. 6 in the hot weather. In Jubbulpore, cartmen bring the clay and sell it to the Kumhars at four or five loads to the rupee. In Burhanpur, a cartload of clay costs two annas. The price of fuel varies according to locality. In some places village rubbish and sweepings are allowed to be removed free by the Kumhars. In other places, where there is a use for this kind of fuel as manure, the Kumhar has to pay for it. Horse-dung costs a rupee a cartload in Saugor. The price of cow-dung and wood varies very greatly from place to place, according to the neighbourhood of forests, and the general demand for fuel. The price of firewood has risen so much in Khandwa, owing to the demand of the ginning factories, that Mr. Jageshwar Rao thinks brick-making there is likely soon to be abandoned. The difficulty regarding the fuel supply is one common to many industries, and it need not be discussed here. It would, however, be desirable to consider whether coal, which can be obtained in most parts of the province for about Rs. 11 a ton, might not advantageously replace wood, especially were improved kilns introduced, though the managers of ginning factories still seem to find wood less expensive. I am informed that a ton of Chhindwara coal costs Rs. 6. 9. 0. at Kamptee, while a ton of wood costs Rs. 6. 12. 0. ; a ton of wood will bake 2,000 bricks, and a ton of coal 6,750 bricks; the use of coal produces bricks of a superior quality to those baked by wood.

Preparation of clay for pottery making.

76. The process of manufacture seems almost everywhere the same. The earth is sometimes passed through a sieve; it is then placed in a pit lined with stones, mixed with water and trodden under foot. The gritty impurities sink to the bottom,

and the finer portion rises to the top. This, in the form of a creamy mud, is removed to settling pits near by, where it is allowed to remain till the water evaporates. The clay is then kneaded, and sometimes mixed with sand and horse-dung, when it is ready for use. Clay intended for common brickmaking is simply mixed with water and used at once. For tile making the process is similar to that of preparing clay for pottery making, though less carefully conducted. A Kumhar with his family can prepare one cartload of clay in a day. About half of the material, as brought from the claypit, is rejected in the course of the process of preparation for pottery clay.

The potter takes a lump of the prepared clay and places it on the centre of his wheel. This wheel, which costs about a rupee to make, consists of a wooden frame, of two crosspieces, running on a centre pivot of stone, with a frame of bamboo, filled in and weighted with clay round the circumference. It is placed horizontally on the ground, and has a stick projecting upwards from it, with which the potter spins it. The vessel is moulded by the potter with both hands, while it is rotated by the wheel. When completed he cuts it off with a piece of string. The wheel is very cheap, and quite as efficient as is required for the class of work. Messrs. Burn & Co., at Jubbulpore, use the same wheel for their earthenware. The unbaked pot is then allowed to dry partially for a few days in the shade, care being taken that it does not dry too quickly, or else it is liable to crack. When partially dried, the potter places a smooth stone wrapped up in a rag of sackcloth inside the pot, and then beats the outside of the pot against the stone with a stick, to thin down and equalise the irregularities, it is said. This is so essential a part of the process that the accepted way of asking a Kumhar in most districts whether he works at his caste profession, is to say, "Do you beat pots?"

**Making of
bricks and
tiles.**

77. Wheel tiles are moulded on the wheel in the way above described, in the form of hollow truncated cones, and then cut in half. Ordinary flat and round tiles are made by hand or moulded, the flat form on the ground on a board, and the curved on a round piece of wood. Allahabad tiles, as made in Saugor, are manufactured as follows:—The clay is mixed with water, and allowed to settle. This process is carried out three times in separate reservoirs. It is then passed through a pugging mill, and is now ready for moulding, which is done by hand in different shaped moulds.

For bricks a level piece of ground is selected, and sprinkled with dry earth. On this the mould is placed, well wetted with water. It is filled with clay, and smoothed off with water at the top. The mould, which has no top or bottom, is then removed, and the brick is ready for baking. Table bricks are made with rather better mixed clay, and vary a good deal in quality and price, according to the care exercised in the process. The mould is placed on a board, which has a projection on its

surface, to indent the brick. The mould and the board are sprinkled with dry earth, or sand, and the clay forced into the mould. The top is then smoothed off with a piece of wood. The mould is turned upside down on another board and removed, leaving the brick to be carried off on the board for baking. The process of baking bricks, tiles, and pots are various, but none of them are in any way elaborate.

Local types
of kilns for
pottery.

78. The usual kind of kiln for baking pots is as follows:— A quantity of wood and rubbish are mixed together and laid on the ground. Over these is placed a layer of pots; then another layer of fuel, and so on. Another method is to place the pots and fuel in a pit about four feet deep. They are covered with earth and broken potsherds, leaving a hole in the middle, through which the kiln is lighted. Usually about 100 or 125 vessels are baked at once.

For black pots sheep's dung is placed in the kiln, and the smoke prevented from escaping by placing *kodo* chaff or some similar material over the kiln. For articles coloured with red or white earth the pigment is applied before firing. Mr. Jageshwar Rao says that he found in Khandwa that small kilns, containing about 75 pots, were made by placing the pots over a layer of cow-dung cakes and straw. A burning piece of cow-dung was placed in each pot to secure gradual heating. The pots in this case were baked in an hour, the usual time taken being from two to three hours.

Local types
of kilns for
bricks and
tiles.

79. For brick baking, a layer of large logs of wood and cow-dung cakes is made about a foot-and-a-half high. On this are placed three rows of bricks. Another layer of fuel is placed on these, and then four rows of bricks, and a third layer of fuel. On top of this two or three rows of bricks are placed. The length and breadth depend on the quantity of bricks to be burned, but the usual dimensions are about 30 feet long, 20 feet broad, and 10 or 15 feet high. The whole mass is then covered with sweepings and straw, which are kept in place by a layer of kutch bricks, placed outside. The kiln is fired at one end, and when it has well caught ashes are placed over the hole to keep the fire low. Openings for air are left in places. The firing takes about 15 days. Another method practised in Burhanpur is to place the layers of bricks and fuel between two long high walls, made by loosely piling baked bricks on top of one another. At one end is a low wall about 3 feet high, and the other end is left open. The kiln is fired at the open end, and as the fire gradually works through, the bricks it leaves behind it are ready for removal. Thus it is not necessary to wait for the whole mass to be baked before removing any bricks. Allahabad tiles at Saugor are baked in a close kiln, at the bottom of which fuel is inserted, the flames and smoke passing between the tiles and out at the top. I have no information of value as to the proportion of bricks and tiles

spoiled in making. About one-eighth of the pots placed in a kiln are said to be spoiled, but the amount of loss varies greatly, and a little ill luck in the matter of weather, or carelessness in firing the kiln, may result in spoiling half or even all the batch.

Data regarding cost of brick and tile making.

80. The following data regarding the time taken and the cost incurred by the workers in making the various articles are of interest :—

Kumhar labourers get one rupee four annas for moulding a thousand bricks or tiles. It takes two men four hours to mix enough clay for 2,000 bricks. Kutcha bricks sell at one rupee eight annas to two rupees four annas per thousand. In Burhanpur Rs. 16 are paid for making 25,000 kutcha bricks, or 10 annas a thousand. Three persons can mould 1,000 bricks in a day. In Khandwa a man and his wife were found to earn eight annas a day by moulding 500 bricks. In Narsinghpur a couple earned 12 annas by moulding 750 bricks. This work was completed by 4 p.m., and the rest of the day was taken in preparing the clay for the next day's work. It takes three men eight days to pile 15,000 bricks in a kiln. Good table bricks fetch from Rs. 10 to Rs. 12 per thousand. Inferior table bricks are sold at about Rs. 5 per thousand at Khandwa. Ordinary bricks fetch two rupees eight annas to two rupees per thousand at Harda, and table bricks four rupees. Kutcha bricks for the former cost Rs. 14 per 25,000 to make, and one rupee eight annas per thousand in the case of table bricks. Two men can make 250 kutcha table bricks in one day for six annas; they can make 750 ordinary kutcha bricks in the same time, for which they get $6\frac{3}{4}$ annas. The following figures represent the cost of making 10,000 bricks in Burhanpur :—

	Rs.	A.	P.
400 donkey loads of clay at one rupee four annas per 28 loads	-	-	- 17 3 4
Cost of moulding at 12 annas per thousand	-	-	- 7 8 0
Cost of piling in kiln, one person at two annas a day for eight days	-	-	- 4 0 0
Fuel (6,000 cakes of cow-dung at 500 to the rupee)	-	-	- 12 0 0
Total	-	-	- 40 11 4

The cost of making is thus about Rs. 4 per thousand, and the bricks sell for Rs. 5 per thousand. The master thus gains Rs. 10, and the time taken would be about 24 or 25 days. A man and his wife can make 1,000 kutcha tiles in a day, for which they get eight annas. Three men can make 1,000 wheel

tiles, for which they get one rupee four annas. The cost of making 1,000 flat tiles in Jubbulpore is as under:—

	Rs.	A.	P.
One cartload of clay	-	-	-
Making tiles	-	-	-
Cost of firing	-	-	-
Octroi	-	-	-
Total	-	-	-
	2	10	0

The tiles sell at Rs. 4 annas 8 per thousand.

Cost of making 14,000 wheel tiles in Saugor:—

	Rs.	A.	P.
35 buffalo loads of clay at 1½ annas a load	-	-	-
Cost of manufacture at one rupee per thousand	-	-	-
Cost of firing	-	-	-
Cost of piling	-	-	-
Total	-	-	-
	22	4	6

They sell for Rs. 2 or Rs. 2 annas 8 a thousand. The profit is thus, at Rs. 2 annas 4 per thousand, Rs. 9 annas 3 pies 6.

Types of indigenous pottery ware.

81. The prices and description of the articles of pottery ware sold in Bhandara are as follows:—

Marka.—Black or red water pots, from one to six annas each, according to size.

Gangal.—Basins, one anna each.

Parai.—Dishes or lids of pots, two for one pice.

Chelna.—Buckets for water, one pice each.

Ganj.—Cooking pots, one anna each.

Karhai.—Ladles, two to three pice each.

Mathan or gor.—Very large store jars, three to eight annas each, according to size.

Nand.—Large wide-mouthed jars for holding water.

Kunda or gamla.—Flower pots, two pice to one anna each.

Surai.—Pots for cooling water, one to two annas each.

Diblani.—Small saucers for lights, used at the Diwali, 1 to 1½ annas a hundred.

Garga.—Small black or red round pots, three or four for a pice.

Chilam.—Tobacco pipes, two for a pice.

Kelyache marke.—The glazed pots already mentioned.

These sell, when of small size, at half to two pice each.

They may be compared with *gargas*, which are not quite so tall, and perhaps a little smaller, and, as already stated, sell at three or four for a pice.

Cost and price of pottery ware.

82. The price of pottery ware has, it is generally agreed, increased considerably in the last 20 years.

The cost of making pots at Bhandara is as follows :—

From four cartloads of clay the vessels below can be made in the time given against each :—

50 *markas* in two days.

50 *parais* in one day.

25 *gangals* in two days.

50 *ganj* in one day.

The baking of these takes one day. Thus one man's time for six days would be taken in making the whole of the above from four cartloads of clay. The cost is—

	Rs.	A.	P.
Carting four loads earth - - - -	3	0	0
One cart fuel - - - - -	1	4	0
Colouring earth - - - - -	0	1	0
Total - - - - -	4	5	0

The pots will sell at the following rates :—

	Rs.	A.	P.
50 <i>markas</i> - - - - -	3	2	0
50 <i>parais</i> - - - - -	0	12	6
25 <i>gangals</i> - - - - -	0	12	6
50 <i>ganj</i> - - - - -	0	12	6
Total - - - - -	5	7	6

The profit of Re. 1. 2. 6. represents six days' work at the rate of three annas a day. A cartload of earth will make any one of the following :—

Bricks - - - - -	50		<i>Gangal</i> - - - - -	25
Tiles - - - - -	1,000		<i>Chalna</i> - - - - -	100
<i>Markas</i> - - - - -	50		<i>Ganj</i> - - - - -	50
<i>Math</i> - - - - -	6		<i>Gamla</i> - - - - -	100
<i>Parai</i> - - - - -	50			

In one day he can make any of the following, either *markas* 20, or *parai* 50, or *gangal* 12, or *chelna* 25, or *ganj* 40, or *gamla* 20, or *diblani* 500, or *garga* 60, or *chilam* 40.

In Burhanpur, where they are burned in a small circular kiln, about 3½ feet across by 3 ft. 4 ins. high, one cartload of fuel will suffice for 2,400 small pots, 600 in each kiln. The process takes two hours. Firewood costs Rs. 2 per cartload. The potter can make 200 or a little more in a day. In three days 600 vessels are made and cost 8 annas to bake, selling for Re. 1. 8. Thus, in three days the potter earns one rupee. A woman, usually his wife, helps by painting the vessels. The women generally do their fair share of the work, in mixing the clay, carrying mud to the potter, carrying away the unbaked bricks and tiles, and in the decorative work, which is of the simplest.

Mr. Jageshwar Rao estimates that the Kumhar's earnings vary from 2½ to 4½ annas a day.

Imported earthenware.

83. Foreign earthenware competes very little with indigenous pottery ware. *Barnis*, holding from half a pound to 14 pounds, cost from 14 annas to Rs. 9 a dozen at Bombay. Plates cost from $1\frac{1}{2}$ to 4 annas a dozen. These are all glazed articles of earthenware or coarse china. The cost of carriage to Khandwa and the retailer's profit add about 20 per cent. to the price paid by the consumer.

The real competitors with the potter's wares are enamelled iron and the local brass and bell-metal ware. These cost so much more and last so much longer than pottery that no useful purpose would be served by making a comparison.

How the industry is financed.

84. It is unusual for the articles to pass through the hands of a middleman, as they are troublesome to handle. The middleman's place in the brick and tile trade is as an employer of Kumhar labourers, or in the passing on of orders received to the small working Kumhar. In large towns potters sometimes sell their wares to a shopkeeper, who charges about 100 per cent. profit, but more usually they take them to the weekly bazar, or hawk them round and so sell direct to the consumer. Only a few superior articles made in one or two places, such as Shahabad or Pohra, are exported. Potters are seldom much indebted, as their industry is not in a bad state, they sell direct, and their raw materials cost them little. The brickmaking class, however, sometimes are heavily in debt. The Malvi Kumhars of Khandwa owe from Rs. 200 to Rs. 1,000 apiece, for which they pay from 1 to 3 per cent. a month; they conduct their whole business on borrowed capital. In Harda it was found that loans are repaid by delivery of bricks at less than the bazaar rate. Thus, a Kumhar takes an advance of Rs. 100, and has to deliver 50,000 bricks at Rs. 2 per hundred, the market rate being Rs. 2. 8. The creditor, being a well-to-do man, will often wait till the price of bricks goes up to, say, Rs. 3 per thousand, and clear a handsome profit.

Wages of potters and brick-makers.

85. The potter is very often unable to work in the rains. If it is very wet he cannot mix his clay, nor partially sun-dry his pots, nor work his kiln. A decidedly extensive range of shedding would be needed to cover all the above operations in the case of a brickmaker; in the case of a potter it might be possible, though here too a difficulty might arise from the clays being full of water. During the rains the potter no doubt fills in the idle intervals by casual labour. The industry of brick and tile-making is in a far more flourishing condition than it has ever been. The industry of the potter is in a fair way. The potter probably makes from 3 to 5 annas a day, and gets pretty constant employment. His livelihood is not threatened by the products of factories; and metal ware will only replace a limited number of the articles that he makes. The brick and tile maker earns, if a daily labourer, from 3 to 4 annas a day; if a small master-worker, working with his men, anything from Rs. 10 a month upwards.

Methods in
which the
industry can
be assisted.

86. The two points where the pottery industry seems in need of assistance are (1) some form of mixing or pugging machine, to make a better mixed and finer clay ; (2) an improved kiln to consume less firewood, give more certain results, and not spoil so many pots. It would also be possible to put the industry in the way of turning out a slightly superior article, by first investigating the local materials available for glazing, such as exist in Bhandara and Sakoli ; secondly, by introducing a kiln which will bake the pots without allowing flame and smoke to come into contact with them. It seems probable that there is a demand for a slightly superior article to the weak, porous, ill-compounded ware at present made by the village potter, at a slightly higher price. The demand for *barnis*, though growing, is not very large ; but a slightly inferior article to the *barni*, like the Bhandara glazed pots, only made of better mixed clay would, at a lower price than the factory-made *barni*, have a good sale. A small improvement in the quality of the ware would enable it to stand the cost of transport, and open to it a more extensive market. As for brickmaking a cheap pugging mill and an improved kiln are wanted. The usefulness of these is generally known and admitted, but the means of the Kumhars do not extend as a rule to their purchases. Without attempting in any way to raise the Kumhar to the level of the large contractor or wholesale brickmaker, the supply of a cheap pugging mill would help him a great deal and improve incidentally the general standard of building. It would be possible to supply pugging mills through industrial co-operative societies. A suitable design would have to be selected and its cheap reproduction by local blacksmiths arranged for. As for kilns, I am in doubt whether it would be possible to arrange for the construction of joint kilns to serve groups of potters. Further inquiry is needed on this point, and as to whether it would be possible to arrange for the potters working under cover.

Proposals.

87. I think there is a good case for the appointment of an expert. His duty would be first to examine the local potter's industry, and see what improvements can be made in their methods of mixing clay, and baking pots, while keeping the cost of production at a figure that would not discourage sales. Secondly, he could select suitable designs of mixing or pugging machines, and train local or other workmen to produce them. Thirdly, the co-operative credit department would decide, with his advice, on one or more centres, to start banks, which would assist the Kumhar to purchase these appliances.

At the risk of repetition, I may again state that rising wages and prices make all articles dearer than they were ; and consumers are ready and willing to pay a slightly increased price for a better article.

Chapter V.—TANNING AND LEATHER WORKING.

Population engaged in the industry.

88. There were 96,168 persons engaged in the leather industry in 1901, against 145,344 in 1891. The districts which contain the largest number of workers are:—

	1891.	1901.
Saugor - - - - -	23,018	11,896
Damoh - - - - -	17,514	8,879
Jubbulpore - - - - -	19,618	11,730
Narsinghpur - - - - -	10,393	7,540
Hoshangabad - - - - -	15,825	11,059
Nagpur - - - - -	6,993	6,539
Raipur - - - - -	10,240	7,882
Bilaspur - - - - -	5,873	5,601

The northern districts, which contain the largest number of leather workers in proportion to their population, show the heaviest decreases. Chhattisgarh contains the lowest proportion, owing, probably, to the absence of large towns.

Export of hides and the rise in their price.

89. The export and import of hides and leather in 1891 and in 1906-07 were as under:—

	1891.	1906-07.
	Maunds.	Maunds.
Export of hides - - - - -	51,880	167,108 (of which nearly all raw).
Imports of leather and leather goods - - - - -	1,923	8,420 (of which 7,004 maunds wrought leather).

The reason for the decline in the number of workers is seen in the above trade returns. There has been of late years a great demand for raw hides, owing to the increase in the world's consumption of leather, and particularly to the introduction of the chrome process of tanning, for which raw hides are greatly preferred to partially dressed ones. The rise in the price of hides may be seen from the figures below, giving the rates at Calcutta from 1897 to 1906 per 20 lb. weight of hide taken from dead cows:—

	Rs.	A.	P.		Rs.	A.	P.
1897 - - - - -	8	3	1	1902 - - - - -	10	10	8
1898 - - - - -	9	10	6	1903 - - - - -	11	15	8
1899 - - - - -	9	14	10	1904 - - - - -	13	0	6
1900 - - - - -	9	8	0	1905 - - - - -	15	6	0
1901 - - - - -	9	7	0	1906 - - - - -	16	0	10

The above figures do not bring out the real rise, which, owing to the lesser demand in the early years, and the consequently

greater power of selection open to purchasers, was much higher than the 95 per cent. that the above figures indicate. Since 1906, there was a further rise of from 10 to 15 per cent. in 1907, but since then there has been some fall. It would be safe to say that the price of hides has risen 100 per cent. in the last 12 years.

The effect on
the local
supplies of
leather.

90. The number of cattle and buffaloes in the Central Provinces and Berar in 1905-06 was 10,470,357. Allowing an average life of eight years to each animal, the available supply of hides would be 1,308,794 per annum. In almost all districts the original village custom was that the village watchman, or some low caste man, should take the hides and dispose of the carcase, often in return for services performed for the village community. When the recipient was not, as often was the case, the villager Chamar himself, he usually sold the hides to the Chamar, by contract or otherwise. Since the caste feeling against the purchase of hides has weakened, and the price has risen, owners of cattle are less disposed to adhere to this custom; and there is a growing tendency for them to claim the hides of their own dead animals. Some of this tendency is also accounted for by the larger cattle mortality of famine years, and the imputation, true or false, against the hide handling castes, of wholesale cattle poisoning. Mr. Trench in his monograph on leather (1904) says that a hide costs a Chamar as much as it does anyone else. Most commercial centres contain a number of Kachis or other Mohammadan merchants, who purchase hides for export. These send out Chamars with advances of money to buy up as many hides as possible at a profitable rate. The large slaughter establishments of the Saugor district supply a quantity of hides, which are superior to those taken from animals that die from natural causes. Mr. Jageshwar Rao says that 1,000 cattle are slaughtered every day at the three slaughter houses at Saugor, Rahatgarh and Khurai. He states that the largest hides are worth locally Rs. 8 or Rs. 9, and the smallest Rs. 3 or Rs. 4, while a goat skin sells at ten or twelve annas. In former days a bullock's hide could be bought at two rupees and a buffalo's hide at three or four rupees. It is clear that the lessened prejudices against the trade and the greater facilities for the sale of hides have made themselves felt, as well as the rise in prices, and the local increase has thus been more than that given above for Calcutta. Mr. Chandorkar gives two or three rupees as the price of bullock hides in Raipur, and four or six rupees as the price of buffalo hides. Chhattisgarh cattle are smaller and in worse condition than those of northern districts. A *sambhar* skin may be had for from five rupees to eight rupees. For Berar the prices are said to be—

Cow's hide	-	-	-	Rs. 2 to Rs. 3.
Bullock's hide	-	-	-	Rs. 4 to Rs. 7.
Buffalo's hide	-	-	-	Rs. 5 to Rs. 10.

Injury to local tanning industry from import of factory-made articles.

91. Another factor has also come into account against the profits of the village leather worker's trade. All tanners do not manufacture leather articles, though almost all villagers tanners do. The factory-made boot or shoe has supplanted the better class of indigenous shoe in the towns, and even to some extent among the richer classes of villagers, at any rate for town use. Mr. Wali Mohamad, E.A.C., the contributor of an interesting article on the industry for the Raipur district, states that the loud creaking of the factory-made shoe is a great attraction, as it advertises to all and sundry the owner's possession of up-to-date footwear. Figures will be given below, when discussing the leather industry; but it suffices here to mention the change in popular taste in order to complete the tale of the burdens that the village Chamar's trade has to suffer under.

Tanning materials.

92. The village tanner requires for his work the following articles :—

Lime.

<i>Ghont</i> (<i>Zizyphus xylopyra</i>)	-	-	Fruit.
<i>Aonla</i> (<i>Phyllanthus emblica</i>)	-	-	Fruit and leaves.
<i>Dhaora</i> (<i>Anogeissus latifolia</i>)	-	-	Leaves.
<i>Rohini</i> (<i>Soymida febrifuga</i>)	-	-	Bark.
<i>Babul</i> (<i>Acacia arabica</i>)	-	-	Bark.
<i>Saj</i> or <i>Yen</i> (<i>Terminalia tomentosa</i>)	-	-	Bark.
<i>Harra</i> (<i>Terminalia chebula</i> and <i>belerica</i>)	-	-	Fruit.
<i>Kahua</i> (<i>Terminalia arjuna</i>)	-	-	Bark.
<i>Tendu</i> (<i>Diospyrus melanoxylon</i>)	-	-	Leaves.
<i>Amaltas</i> (<i>Cassia fistula</i>)	-	-	Bark.

He is not reported to use *Hewra* (*Acacia leucophloea*) nor *Cassia auriculata*, both of which are found in parts of the province.

The tanning process.

93. The account in Mr. Trench's monograph is full and complete, and other reports received by me do not add to it. I quote it below :—

“The tanning of heavy skins is conducted on the same lines all over the provinces, differences being traceable in most cases to the presence or absence of those forest products which are essential to the tanning process. Tanning Chamars are frequently to be found in a separate little hamlet, the huts of which form a ring, in the middle of which are set the pits, wells, and large earthen vessels, belonging to the trade. These settlements are generally in the neighbourhood of *malguzari* jungles, whence the supplies of tanning material can be drawn. Having obtained his hide, either by right or by purchase, the Chamar cleans the inside with a '*khurpa*,' i.e., knife, or a '*rapi*' or '*rampi*,' i.e., a chisel like implement, with a short blade, 4 inches broad, and a thick stout handle. The hide is then immersed in a pit some 4 feet square, and three-quarters full of water, in which about five seers of lime have been mixed.

Twice or three times a day it is taken out and well shaken and rubbed. At the end of ten or twelve days any hair that may still be clinging to the skin is removed with a blunt 'rapi.' At this stage—the first of the three tanning stages—care is taken that the hide should remain in the shade, since the heat of the sun will very quickly spoil a raw hide irretrievably. Frequently, before immersing the hide, wood ashes are rubbed on the inside and the hide is stretched in the shade or in weak sunlight for a day or two. If the skin is particularly thick, a preliminary twelve hours' soaking in pure water precedes the lime process. The skill of a good tanner appears in the absence of superfluous inner skin, fat, or flesh remaining to be removed after the hide is finally taken out of the lime pit. Next, the hard berries of the *ghont* tree (*Zizyphus xylopyra*) are poured into a large earthen vessel sunk in the ground, and water added till the mixture is so thick as to become barely liquid. In this the folded hide is dipped three or four times a day, undergoing meanwhile a vigorous rubbing and kneading. The average duration of this, the second stage in the tanning process, is eight days, and if the mixture be of *ghont*, it is renewed at least once during this period. Sometimes, *e.g.*, in Mandla district, the place of *ghont* is supplied by the broken twigs and dried leaves of the *dhau* tree (*Anogeissus latifolia*), and sometimes the entire process (the object of which is somewhat obscure) is omitted altogether. Other substitutes for *ghont* are the leaves of the *aonla* (*Phyllanthus emblica*), used when a pale coloured leather is required; the bark of *rohini* (*Soymida febrifuga*), or of *babul* (*Acacia arabica*), or of *yen* (*Terminalia tomentosa*), is employed to give the hide a reddish tinge, while a yellowish colour is produced by making a decoction with myrobalans (*Beleric myrobalan*). In the Chhindwara district, this second process is recognised as being merely for colouring purposes, and no tanning efficacy is ascribed to it. Most Chamars, however, are of the opposite opinion, though they may be unable to state how the hide is benefited by the decoction. Probably the process bears small part in the actual tanning of the skin.

The third stage of the process.

94. "The third stage is that during which, according to European ideas, the hide is really subjected to a tanning process. Using as thread the bark of the roots of the ubiquitous *palas* tree (*Butea frondosa*), the Chamar sews the hide up into a mussuck-shaped bag, open at the neck. The sewing is admirably executed, and when drawn tight, the seams are nearly, but purposely not quite, watertight. The hide is then hung on low, stout, scaffolding, over a pit, in such a way that the contents of the bag can be easily seen by anyone standing up. It is then filled with a decoction which varies considerably from district to district. The typical *masala* is beyond a doubt the dried and semi-powdered leaves and twigs of the *dhau* tree, mixed with pure water. As the decoction trickles slowly out

through the underneath seams, more is poured in from above, and from time to time the position of the hide is reversed in such a way that the tannin permeates each part in turn. Sometimes only one reversal of the hide takes place half-way through the process, which occupies, as a rule, some eight days. But energetic Chamars continually re-turn and re-fill the skin, until satisfied that it is thoroughly saturated with the tannin. After washing in clean water, the hide is now considered to be tanned.

"This third process is the most important of all, and it is interesting to note the various ingredients used in the tanning mixture by Chamars of different localities. The Mandla report, which deals with the subject most exhaustively and thoroughly, gives two possible substitutes for the decoction of *dhau* leaves, viz., the powdered bark of both the *kahua* tree (*Terminalia arjuna*), and the *saj*. The former bark is also used in the Hoshangabad district, but of the three methods, that of the *dhau* is almost certainly the best. Specimens of leather tanned with *kahua* bark show a rough brittleness and an uneven distribution of the tannin mixture, whereas the effect of the *dhau* treatment is to produce a soft, pliable, and homogeneous piece of leather, with no patches or stiff places. Raipur tanners mix powdered leaves of the *tendu* (*Diospyros melanoxylon*), with the *dhau* and *babul* decoction. Next in importance to the *dhau* trees, so far as universality is concerned, are the myrobalans, the seeds of which are used in every district where they are obtainable cheaply. The bark of the *babul* acacia is eagerly sought, in the belief that by employing it a better quality of leather results; but this bark, possessing some commercial value, is difficult to obtain. In any case, its tanning efficacy seems less esteemed among leather workers than its colouring properties."

* * * * *

Finishing stages.

95. "On the conclusion of the third or mussack process, the hide is considered tanned and ready for use. But the best workers again immerse it in a solution of *dhau* or *aonla* leaves, and after a day or two's soaking, spread it out to dry. It is then thoroughly pummelled, kneaded, oiled, and thumped with a mallet, called a *santh*, until it is soft and pliable. From start to finish, the tanning of a hide takes from 15 to 30 days, according as it is undertaken in the hot or the cold weather. In the latter event, the action of the tannin on the hide is weak and sluggish. A buffalo hide takes a week longer to tan than a cow's.

"As a rule, tanning Chamars work in couples, and two men can tan eight hides simultaneously, though this would involve hard and unremitting labour. The constant changing of the mixtures, turning and handling the sodden hides, and, chiefly, the sewing up of the mussack, render the actual tanning stages very laborious. Spare time is occupied by journeys to the

jungle, to bring in *ghont*, *aonla*, &c., and by a constant examination of the half-tanned hides, to discover flaws or putrefying places.

The tanning
of skins.

96. "The preparation of 'light' hides which are called generally '*nari*' is carried on mainly by Khatiks and Musulmans. The typical process is as follows. The Khatik boils wheat flour and salt together, and lets the mixture cool. The skin is then immersed in the decoction, and left there for eight days or a fortnight, according to the season of the year. The hairs are then removed with a knife. This constitutes the first stage in the treatment, and it is sometimes preceded by a drysalting extending over two days.

"Next, the skin, white like paper, is again left to soak in the same mixture for four to eight days. The colouring of the leather now commences. If red is required, a mixture of red lac (*Coccus lacci*) and water is rubbed on the hair side of the skin, the process occupying about half-an-hour for each skin. A mixture of the pounded bark of the *amaltas* (*Cassia fistula*), salt and water is then prepared, and the skin plunged into it. The *masala* is changed twice in every three days, and the process lasts some 8 to 10 days. The professed object of this second bath is to deepen the colour of the hide; drying in a cool place and rapid cleaning with a wet cloth renders the skin ready for sale. As a rule, only goats' skins are dyed red. Others, those of sheep or blackbuck, are left in the paper-white condition to which they are reduced by the first or salt and flour stage. Yellow and blue colours are produced by the application of the usual dyes, *harra* and indigo.

"In Chhindwara district, however, these light skins are dealt with by an entirely distinct method, which merits special mention. After the separation the skin is plastered over with a coating formed of salt and the fresh chopped-up leaves and stalks of either a creeping plant, called '*dudhi ka bela*' (*Technocarpus frutescens*), or the *utran* (*Dacmia extensa*); the skin is then carefully folded up and left to soak in water for three or four days. What hair remains is removed with a potsherd; the plaster is taken off and the skin washed. Powdered myrobalan (half a seer for each skin) is then mixed in boiling water, and the decoction allowed to cool. The skin is immersed in this, and well kneaded by hand. After four days' soaking it will have a clear yellow colour. It is then considered ready for use, but usually a little salt is rubbed in, as an extra precaution, before the skin is put away."

Colouring
properties of
local tanning
agents.

97. I would add to the above that *babul* bark gives a hide a pale red colour; *saj* gives it a deep red, and hardens it for sole leather; *tendu* tans a hide white; *amaltas* bark or *harra* fruit, yellow, a colour for which tumeric is also used; and *sal* (*Shorea robusta*) in parts of Raipur is used for a lighter red than *saj*;

kahua tans a rather lighter red still. *Dhaora* is considered the best tanning material, and it gives a yellow tinge. *Ghont* berries and *aonla* leaves are said to have the effect of removing the traces of lime.

Cost of tanning and tanning materials.

98. Lime is said to cost from six to nine pies a seer. A bullock's hide takes from two to three seers of lime, and a buffalo's hide four seers. Mr. Chandorkar gives the cost of tanning a bullock's hide as under:—

	Annas.
2 seers lime - - -	- 1
8 seers <i>harra</i> - - -	- 4
1 headload <i>babul</i> bark - - -	- 4
	—
Total - - -	- 9
	—

The full process ought to take a month, but the worker cannot afford to wait so long, and usually finishes in 15 or 20 days. Mr. Jageshwar Rao calculates the cost of tanning materials as follows:—

	Rs. A.
One cartload of <i>dhaora</i> leaves, three men to cut leaves at three annas a day - - -	0 9
Forest license - - -	0 4
Cart hire - - -	1 0
Cost of pounding leaves - - -	1 0
Octroi - - -	0 2
	—
Total - - -	2 15
	—

The forest department in Hoshangabab refuses to allow *dhaora* leaves to be removed, but small *dhaora* trees are common enough in most *malguzari* forests.

	Rs. A.
One cartload of <i>ghont</i> berries, 24 baskets at two annas a basket - - -	3 0
Cart hire (more than for <i>dhaora</i> leaves owing to greater distance) - - -	2 0
License fee - - -	0 4
Octroi - - -	0 2
	—
Total - - -	5 6
	—

The cost of bringing two cartloads, one of *kahua* bark and one of *amaltas* bark, to Hoshangabad, was said to be as follows:—

	Rs.	A.	P.
Three coolies at six annas a day, for 15 days	16	14	0
Estimated value of wages of six persons of tanner's family, at three annas a day	-	16	14
Paid to Malguzar, including his charge for bark and for cart hire	-	-	18
Octroi and sundries	-	0	14
			6
Total	-	-	52
			10
			6

This material was said to be enough for 140 hides. This is the estimated cost of materials to a town tanner working on a large scale; the village Chamar mostly gets his material in headloads, and pays, no doubt, less. The cost of tanning materials for a single hide was estimated by Mr. Wali Mahomed at two annas only, excluding lime, which would cost two annas more. I think Mr. Chandorkar's estimate is too high, and the cost of materials is not likely greatly to exceed six annas for an average hide in the case of the small village tanner. Mr. Jageshwar Rao states that a cartload of *dhaora* leaves will tan eight or nine large skins, or 20 to 25 small ones; a cartload of *ghont* berries will tan 30 hides. The cost of tanning the 140 hides mentioned above was, including 53 rupees 12 annas for the cost of bark,—

	Rs.	A.	P.
Cost of bark	-	52	10
			6
Nine maunds lime at Rs. 1 annas 4 a maund	-	11	4
			0
<i>Ghont</i> berries	-	7	0
			0
Sundries	-	1	8
			0
Labour of six men for two months at tanning (estimated cost of work of members of family at 3 annas a day a head)	-	67	8
			0
Cost of hides	-	433	4
			0
Total	-	573	2
			6

The cost of tanning was thus as nearly as possible Rs. 1 per hide, of which about 1 anna went on materials. Had the Chamar used *dhaora* leaves instead of *kahua* and *amaltas* bark

he could have tanned his 140 hides at 12 annas a hide. Mr. Jageshwar Rao gives value of the country tanned hides as under :—

	Rs.	Rs.
Cow or bullock	-	4 to 8
Buffalo -	-	6 to 10
Goat or sheep	-	1 to 3

Mr. Trench estimates the profits on a bullock's hide at from 12 annas to Rs. 2, and up to Rs. 4 on a buffalo's hide. On the figures before me I should estimate the present profit at from 8 annas to Re. 1 annas 8 on a bullock's hide, and at about Rs. 2 on a buffalo's. As the process takes not less than 15 days, it is clear that, unless the Chamar can work on at least four bullock's hides at once, he cannot make a living wage, and as a matter of fact the Chamar usually ekes out his livelihood by labour or agriculture.

A good goat's skin costs, according to Mr. Trench, from 6 annas to 12 annas. Lac costs Rs. 8 a seer which will colour seven skins. Each skin takes one-third of a seer of salt and the same amount of wheat flour. Reckoning the cost of bark at Rs. 4 a cartload, which will suffice for 80 skins, Mr. Trench makes the net profit on a goat's skin at from 10 annas to Re. 1. In view of the estimates of the cost of bark already given and of other considerations, this sum seems to be too high at present.

Methods of
chrome tan-
ning and its
cost.

99. I had the opportunity of discussing the question of the efficiency of country tanning with Mr. Tressler, of the Madras Industrial Department, who had been judging the leather exhibits in the Central Provinces and Berar Exhibition, and had read some papers which I gave him about the methods of village tanners in this province. I append the following notes of our conversation.

The next process to liming should be "bating" or "puring," which consists in steeping the hide in certain unpleasant substances that set up a bacterial action in the hide and delime it. In chrome tanning lactic acid is also used for deliming.

The bad quality of the leather made by village tanners is due to the fortuitous character of the process. The Chamar has no idea of what is happening to the leather and cannot foretell what sort of an article he is going to turn out. The bad wearing quality of the leather is probably due to insufficient deliming.

In the scientific process, the hides after tanning are "fat liquored," which makes them absorb a good deal of oil, and they are then stretched over a bar which produces a similar effect to that of beating them with a mallet. Bark tanning is highly complicated, depending on bacterial action, and wants

very close and skilled attention. Chrome tanning is chemical rather than bacterial, and is so far simpler. In the chrome process the leather is, after liming, delimed with lactic acid, washed, pickled with alum and salt to keep it. When it is required for tanning it is, in a factory, placed in a drum with chrome alum, bicarbonate of soda and sulphuric acid, and the drum is rotated. For a village worker Mr. Tressler thought that rotating in a pot might serve the purpose. The chrome tanning process takes about five days, which is far shorter than the bark tanning process. Care has to be taken that the hide is not under or over tanned. After removing the hides from the drum the remaining acid is neutralised with borax, and the hide washed, dried, fat liquored with castor oil, dyed and staked, *i.e.*, dragged over a blunt knife. For further details, a reference may be made to Mr. Chatterton's paper read at the Indian Industrial Conference of 1906. The chrome process has not yet been tried on a domestic scale, but I am told it is being tried on a very small scale in Madras after having proved a success in a small factory, and it does not seem a very difficult process. Bad hides are not suited to the chrome process. The cost of tanning at the Madras Chrome Factory is 3 annas a pound, a rate which is considered capable of reduction. Mr. Chatterton states that a bark-tanned hide weighs nearly the same as the original hide in a flint dry state. The same hide, chrome tanned, will only weigh about three-fourths as much. The charge by native tanneries in Madras is stated to be from 2 to 2½ annas a pound. Assuming the weight of a raw hide to average 7 lbs., the process of chrome tanning would thus cost about 16 annas for a hide, which is exactly what the cost to the Hoshangabad Chamar was found to be in the instance given above. Even if it cost him a trifle more than the cost under the factory process, the item of Rs. 67 annas 8 for labour, representing over an anna a pound on 140 hides, is part of the tanner's profits, as it represents the estimated cost of his own and his family's labour.

Readiness of
local tanners
to improve
their methods.

100. The local tanner is generally represented as ready to learn improved processes. It is also stated, and I have seen myself, that Chamars are very ready to help one another in their work. It is thus not improbable that where tanners live in a small community, as is not infrequently the case, some element of co-operation could be introduced. Common vats, decently constructed, one or two drums for revolving by hand, and other similar inexpensive appliances, might in such a case be found possible. The Chamar at present turns a fairly decent hide into abominable leather; and the price of the hide is getting too high for him, and seems likely to touch a point at which the shoe made from the Chamar's leather will so nearly equal in cost the factory or locally made article made from imported leather, that the superior wearing qualities of the latter will bring it into universal use.

Cost of
leather.

101. That this is not a mere supposition, the figures below, showing the rise in the price of various kinds of country shoes, &c., will demonstrate.

Articles.	Price at present.	Price 3 Years ago.	Price 20 Years ago.
	Annas.	Annas.	Annas.
Men's shoes	10 to 12	8	6
Women's shoes	5	4	3
Slippers	8	6	4
Shoes	16 to 20	14 to 16	10 to 12
<i>Barha</i> } Ropes and straps {	14	10	6
<i>Nanha</i> } for cattle. {	4½	3	2

Forty years ago the price was said to be even lower still.

These figures are for Chhattisgarh, where very few *motes* are made, but there is no reason to doubt but that the price of *motes* has risen in the same proportion. I can, during my own service remember a time when they cost only half as much as they do now. In some districts, the Chamar is a regular village servant, who gets yearly dues in grain, and provides the cultivators with leather ropes, and even shoes. But this practice is tending to die out, and in any case cannot survive the disappearance of the Chamar's right to the hides of cattle dying in the village. The cost of sufficient raw hide to make a pair of *bandhai* (men's shoes) is said to be one-eighth of Rs. 2 annas 8 = 5 annas. A pair of *astaria* (women's shoes), one-twentieth of Rs. 4, or 3½ annas; a pair of *alga* (slippers), one-fifteenth of Rs. 4, or 4½ annas. Thus the raw hide accounts for at least half the selling price of the finished article. It seems a pity to spoil so expensive a form of raw material. To take another point of view. There are small tanneries, of a grade rather superior to the ordinary village tanneries, at Kamptee, Amgaon, and Raj Nandgaon. The rates for leather from these places are compared below with leather from the scientific tanneries at Cawnpore, and from a village tannery.

Tannery.	Price of Leather.
Amgaon	- Rs. 1 annas 4 per seer.
Kamptee	- Rs. 1 annas 8 a seer.
Raj Nandgaon	- Rs. 1 annas 8 a seer.
Cawnpore	- Rs 2 a seer.
Village tannery	- Rs. 4 per hide, or, allowing 3½ seers a hide, about Re. 1 annas 2 pies 4 per seer.

Considering that the raw hide is worth probably three rupees, or 7 annas per seer, the difference in the value of the leather produced by the various methods is very great.

The village cobbler, and what he makes in the eastern districts.

102. I now pass on from tanning to the manufacture of articles of leather. The trade of the village Chamar, who combines the making of shoes, *motes*, leather thongs for cattle, and other similar articles, with the work of tanning, is of a very different nature to that of the town Mochi, who works mostly in imported leather, or at any rate in something better than the product of the village Chamar, and can make shoes of European pattern.

I take first the work of the village cobbler. The chief articles that he make in Chhattisgarh are *bandhai* (men's shoes), *astaria* (women's shoes), *alga* (slippers), (all worn by labourers and the poorer cultivators), Hindustani shoes, which are worn by well to do cultivators, *nanha*, or bullocks' ropes, *jota* or *barha*, bullock's neckstraps. The table below shows the materials and labour required for their making.

Name of Article.	Cost of Hide.	Cost of Tanning Materials.	Days taken in Tanning.	Days taken in making Article.	Number of Articles for Quantity of Hide in Col. 2.	Price of that Number.
<i>Bandhai</i> -	R. A. P. 2 8 0 (bullock).	R. A. P. 0 9 0	15	4	8	R. A. P. 6 0 0
<i>Astaria</i> -	4 0 0 (buffalo).	0 9 0	15	5	20	6 4 0
<i>Alga</i> -	4 0 0 (buffalo).	0 9 0	15	3	15	7 8 0
*Hindustani shoes.	8 0 0	1 6 6	15	15	15	18 12 0
<i>Barha</i> -	2 8 0	Raw hide.	Nil.	4	4	3 8 0
<i>Nanha</i> -	2 8 0	Raw hide.	Nil.	4	12	3 6 0

* 1½ bullock hide; 1 buffalo hide for soles.

The time these articles are said to last is as under:—

<i>Bandhai</i> -	-	-	-	-	5 months.
<i>Astaria</i> -	-	-	-	-	3 months.
<i>Alga</i> -	-	-	-	-	4 months.
Hindustani shoes	-	-	-	-	8 months.
"	"	of Sambhar	-	-	10 months.
<i>Barha</i> and <i>Nanha</i>	-	-	-	-	2 months.

The first three of the above types of shoes are usually sewn with a strip of leather taken in and out through the sole and the upper. Shoes are stitched with waxed thread. There are a number of locally distinct varieties of shoes, such as the Bundelkhandi shoes of Saugor and others, described by

Mr. Trench, but the precise nature of these varieties, though they are often of picturesque and distinctive appearance, is of no importance from the present point of view.

The same in the northern districts.

103. In addition to the articles above enumerated, the northern and western districts require the following :—

Article.	English Equivalent.	Price.
<i>Tobra</i> - - -	Horse's nosebag -	Re. 1.
<i>Massak</i> - - -	Water carrier's bag	Re. 1 to Re. 1 annas 8.
<i>Pakhal</i> - - -	Bullock water bag -	Rs. 7 to Rs. 8 a pair.
<i>Mote</i> - - -	Bag for lifting water from well.	Rs. 8 to Rs. 12.

Also saddlery of a very rough description.

Twenty years ago a *mote* cost Rs. 5, and 40 years ago only Rs. 3. The prices of other articles are said to have risen in similar proportion. There is not the large area of cultivation depending on well irrigation that is to be found in the United Provinces or in Madras, but there is a good deal of garden and sugar cane cultivation, and wheat irrigated from wells, and the rise in the price of *motes*, unaccompanied by any improvement in quality, is a serious tax on a poor class of agriculturists. The *mote*, especially the variety that automatically empties itself through a neck on arriving at the top of the well, is, considering the small area irrigated and the available power for working it, about as efficient a means of irrigation as is possible. Similarly the country shoe is excellently adapted for its purpose, handy to slip on and off, and when made of good leather, calculated to stand plenty of rough wear. It is only the material in each case that is inferior.

The town mochi.

104. I pass now to the last division of the industry, that of the manufacture of articles in European style. Opinions from different parts of the province differ as to the prosperity of the industry. There seems no doubt but that the number of Mochis and other persons making boots and shoes and saddlery of European pattern in the Jubbulpore district, especially Jubbulpore town, Bilehra, and Murwara, has increased a good deal, and their trade is an active one, in spite of the comparative nearness of Cawnpore.

The Mochi community in Raipur, on the other hand, are said to be suffering from the competition of factory-made articles. It is probable that the difference is due to the greater demand for such articles in Jubbulpore town, and to the greater skill of the local workers. The Mochis of Raipur number about 50 families, some of whom make for retailers, and some for customers on order. The Mochis purchase leather

from the places and at the prices given in paragraph 110 above.

The Mochis use lasts and other ordinary cobblers' appliances, but not the sewing machine, except in a few cases in the larger towns. The prices of the articles made by the Mochis are as follows:—

Articles.	Price.			Cost of Material.			Length of Time in making.
	R.	A.	P.	R.	A.	P.	
Shoes - - -	1	12	0	1	2	3	1 day.
Boots - - -	2	5	6	3	0	0	2 days.
Hindustani shoes -	1	8	0	1	1	2	10 pairs in 9 days.
Chandrapuri shoes (for weddings).	0	12	0	0	10	7	10 pairs in 7 days.
Slippers - - -	1	4	0	0	13	0	1 day.

The time that the above articles last is as under:—

Shoes - - -	6 months.
Slippers - - -	4 months.
Boots - - -	5 months.
Hindustani shoes -	1 year.
Chandrapuri shoes -	4 months.

Agra and Delhi shoes are imported into Raipur; they are of smart appearance, but there is not much wear in them. Factory-made articles from Cawnpore and Bombay are more expensive, but more lasting.

Articles.	Agra or Delhi.		Bombay factory-made.	
	Price.	Period of wear.	Price.	Period of wear.
Shoes - - -	R. 1 A. 10 P. 0	2 months -	R. 3 A. 12 P. 0	} 8 months.
	to R. 1 A. 12 P. 0		to R. 4 A. 8 P. 0	
Slippers - - -	R. 1 A. 8 P. 0	2 months -	R. 2 A. 12 P. 0	
Boots - - -	R. 3 A. 0 P. 0	3 months -	R. 5 A. 8 P. 0	

Obviously it must be only the superior appearance that constitutes the attraction, even in the case of factory-made shoes, unless the figures are wrong. The locally made shoes wear as long and are far cheaper.

The financial aspect of the shoemaking industry.

105. The financial aspect of the industry is, so far as village tanners and cobblers are concerned, similar to that of most petty domestic industries. In Chhattisgarh, the village tanners are below the status in which more than the most trifling credit is obtainable. Their debt does not exceed a few rupees, except where they own land and gain a living as cultivators. They do not usually get more than one or two hides a month to tan. The town Mochis in Raipur do not, as a rule, obtain materials on credit, and their average debt does not exceed Rs. 50. Mr. Jageshwar Rao has much the same state of things to report from the northern districts. He does not consider the class much indebted, and most of their debt, he thinks, arises from their intemperate habits. The average debt ranges from Rs. 30 to Rs. 50; but things are different in the case of tanners who work on a somewhat larger scale. He found a tanner in Hoshangabad who had borrowed Rs. 300 to buy 140 hides for tanning (*see* above), on which he hoped to clear Rs. 200. Such a man could obtain credit owing to the lenders' knowledge of the extent of his transactions. In Saugor there is a Bania who regularly lends to Chamars on the high interest of Rs. 2 to Rs. 6 annas 4 per mensem. The average capital required by the smaller town tanners is, he says, from Rs. 50 to Rs. 300. At the rate of one rupee profit on each hide such a man can clear 15 per cent. on his working capital. The retail trade in ready made shoes is a very profitable one. Owing, Mr. Jageshwar Rao thinks, to the ill odour in which such a trade is held by respectable Hindus, the dealers are not content with the smaller profits of an anna or two in the rupee which are usual in most retail businesses, but add a profit of 50 per cent. to the wholesale prices. Carriage adds about 20 per cent. to that price. The following is an account of the cost of importing Rs. 50 worth of shoes from Indore :—

	Rs.	A.	P.
Wholesale price - - -	50	0	0
Commission to agent in Indore - - -	3	2	0
Packing - - -	0	6	0
Hamali and cart hire to station - - -	0	8	0
Railway freight - - -	1	0	0
Hamali from station - - -	0	1	0
Total - - -	55	1	0

The profits on tanned leather sold by the piece are not so large and do not exceed 25 per cent. It seems likely that, as custom and the hope of profit diminish the sentiment against the sale of shoes, the retailer's profit will fall considerably, and render the factory-made shoe an even more formidable competitor to the product of the village cobbler.

Recommendations for the improvement of the tanning industry.

106. I now submit my recommendations. There seems a strong case for supporting the village tanning trade, which has been hard hit by the rise in prices. Its methods are inferior,

but, considering the poorness of the leather, the manufactured product, or country shoe, is well made, and of excellent wearing quality. If, then, shoes were made of better tanned material, they would answer all requirements. Some increase in price would be necessitated by the new process. Hides are costing more all over the world, and the Indian peasant has had to pay more for his footwear. In spite of this he does not get a better article. If he likes to pay from 50 to 100 per cent. more he can have a showy, cheap factory article, which is not so well suited for his needs, and will not wear nearly as long. The land has always to be cultivated, and its tillers have to move about on ground which is hard in the dry season and wet in the rains; thorns abound, and the cheap factory article is never likely to be used by men working under such conditions. If it is possible to teach the village tanners some such* process as chrome tanning, this will enable him to give his customers what they require, a shoe of the ordinary village shape in better leather. I see that Mr. Watson, on page 5 of his "Enquiry into the desirability of developing the Tanning Industry in the Province of Bengal," dismisses as hopeless the prospect of tanning as a domestic industry, on account of the impossibility of conducting the work with the necessary uniformity on a small scale. This might very well be true of vegetable tanning; but there seems some reason to believe, from my conversation with Mr. Tressler, that it need not be true of chemical tanning. The village tanner might be taught this as dyers have learned to use aniline dyes. At any rate I think the experiment worth making. I propose that we should communicate with Mr. Chatterton and ask him what his opinion of the prospects of such an industry are. If he approves of the proposal we should obtain a suitably trained expert, and set him to work out chrome tanning on lines suited to our local Chamars. Should his efforts be successful we can then approach the village tanners, who will be, I believe, much more ready to take up any improvement than the weavers are. If the attempt succeeds it will greatly benefit a depressed class; if it fails it is only a year's salary and a small amount of plant and material wasted. It might even be possible to arrange for, at any rate, the preliminary stage of the experiment to be conducted in the Madras Government factory.

Proposal to
appoint an
instructor for
town mochis.

107. I have no proposals to make regarding the village shoe making industry, until the result of this experiment be made known. As for the town Mochi, he is not in an unfavourable condition at present. Instruction might be given at Nagpur, Jubbulpore, and Saugor in improved methods, and small industrial credit societies might help him to buy improved implements such as the sewing machine. The class is not numerous and does not need help nearly as much as the village tanner and cobbler. But I do not see why a teacher, who might be an experienced Indian factory employé with a practical knowledge of hand working, should not be engaged, and

classes opened for the instruction of Mochis in large towns; he might spend six months at each place if proper supervision can be arranged for.

Assistance in improving hides for export deprecated.

108. Government might certainly do much to improve the average quality of hides for exportation, as Mr. Watson points out, but the question is not one that can be dealt with here, nor is it, in my opinion, one that very particularly invites our sympathy. Sooner or later India will establish enough factories to make all the leather she wants for her own use; and for the present much will have been done to pave the way for this if we succeed in improving the methods of the village tanner.

Chapter VI.—MISCELLANEOUS AND NOVEL INDUSTRIES.

The oil pressing industry.

109. Little further information is available in addition to the data given in my preliminary note. The issue seemed to be so simple a one that the compilation of further statistics was useless. Moreover, the agency at my disposal was hardly suitable for experimenting on the efficacy of the indigenous oil mill. This latter costs in Berar about Rs. 25, and with the help of two bullocks it will extract from 25 to 28 seers of oil in a day.

Import and export of oil-seeds.

110. I repeat the relevant matter in my note. In 1891 there were 89,705 oil pressers and sellers in the Central Provinces, in 1901 63,814, and in Berar 11,628. The industry therefore has declined in greater proportion than the provincial average of 8 per cent. The reason for this is seen at a glance. The imports of kerosine in 1891 were 142,815 maunds, in 1905-06 they were 757,304 maunds, of which 256,154 maunds were to Berar. Even after deducting the last figure the increase is enormous. The rise in the imports of other oils was from 12,769 maunds in 1891 to 97,000 in 1905-06, of which 33,204 went to Berar. It is thus clear that the reduction of the oilsellers' industry is due to the following causes:—(1) The import of kerosine; (2) the increase in the factory oil-milling industry, mostly outside the province. The most important point is the continual export of oilseeds, of which 3,920,902 maunds were exported from the Central Provinces and Berar in 1905-06.

Proposals.

111. While fully recognising the extreme desirability on economic grounds of substituting an Indian oil-milling industry for this large export, it is clear that the only agency by which this can be done is by the power mill. The forwarding of this end is not the subject of this report, though it is one which I think Government might be able to assist. All I have to

propose is that experiments be made by the Agricultural Department in the relative efficacy of the indigenous and of improved oil mills of a small size worked by bullock power; and if any really substantial assistance to the village oil-presser would result from the use of any type of improved mill, that he be allowed the opportunity of using it. He should be brought into touch with co-operative credit societies to obtain loans for the purchase of improved oil mills and of oil seeds at the harvest time when they are cheap, and when loans are repaid by other agricultural members. This would afford a means of employing some portion of the society's funds during the idle period. Oil-pressers seldom live in large communities, and a few might well be allowed to join agricultural societies. I do not claim that my proposals will have any effect on the export of oil seeds, but they will at any rate help the Teli for the present, and I imagine that a certain small proportion of oil seeds will always be pressed locally for private consumers. Windmills are only now beginning to die out in England, in spite of the many years for which power mills have been competing with them. The task imposed on the Agricultural Department would be a very light one and might fairly be taken as falling within the scope of their work.

The woollen industry.

112. Workers in wool decreased from 20,432 to 14,736 between 1891 and 1901. The castes engaged in this industry are Dhangars in Berar and in the Nagpur division, Kurumwars in Chanda, and Gadarias in the northern and eastern divisions. Some of the shepherd castes do nothing but keep sheep, some weave blankets, and some do both. The districts with the largest numbers of workers in wool are:—

Raipur	-	-	3,451
Jubbulpore	-	-	1,646
Nagpur	-	-	1,828
Chanda	-	-	1,514

The number of sheep in the Central Provinces in 1905-06 was 304,283, and in Berar 187,322.

Trade statistics.

113. I quote from my note the figures below, showing the trade movements:—

“In 1905-06, 554 maunds of raw wool were imported, mostly from Bombay to Berar. In 1891, 733 maunds were imported; a very big decline, if we allow for the accession of the Berar figures in the later year. In 1905-06, 395 maunds were exported, 324 maunds from the Nerbudda block to Bombay, and 167 maunds of carpets and rugs were imported, mostly from the United Provinces to Jubbulpore and the Nerbudda block. Exports of manufactured articles of wool were nominal.

“Of European woollen piece goods, 357 maunds, worth Rs. 33,030, were in the last named year imported as against 319 maunds in 1891 (152 maunds from Bombay to Nagpur).

"Of Indian woollen piece goods, 590 maunds were imported, worth Rs. 67,885, of which Berar took 478 maunds, 402 maunds being from Haidarabad. There is likely to be a good deal of import by road into Berar from Haidarabad as well.

"The imports of other woollen goods were in 1905-06 4,537 maunds, worth Rs. 4,07,498; of which 2,203 maunds were from Bombay to Berar, which took in all 3,122 maunds, of which 426 maunds were from Haidarabad. The total woollen goods imported in 1891 were 2,186 maunds, against exports of 548 maunds.

"The export of other woollen goods in 1905-06 amounted to 416 maunds, worth Rs. 12,480, mostly from the Jubbulpore, Nagpur, and Berar blocks."

Cost of
blankets.

114. As I do not intend to formulate any proposals for improving the methods of the industry, I pass briefly over this part of the subject. The wool is sorted and carded by hand, spun by the women, and woven in a very clumsy loom, in which the shuttle is not thrown but pushed or dragged through the shed. In no case does the industry afford a living throughout the year, and the workers always have some subsidiary employment. It takes three days to make a blanket 6 by 2½ cubits, of which carding and spinning account for two days and weaving one day. The wool is sized with tamarind liquor. The two seers of wool required for the blanket cost one rupee, and the completed article sells for Re. 1 annas 12 in Bhandara. A white blanket made of imported wool sells for Rs. 2. It takes three days to prepare, and the wool costs one rupee for 1½ seers. The work goes on only in the hot weather, the March shearing being the best. In Buldana a blanket is said to fetch from Rs. 2 to Rs. 3, and to take three seers of wool to make it. The price of wool and blankets has everywhere risen. The cause is said to be the decline in the number of sheep. Blankets are said to last from two to three years. Numdahs are made of country wool felted together with soap.

Competition
of imported
articles. In-
sufficient
supply of
wool.

115. The imported article is said to be making little headway in Bhandara. An imported blanket costs Rs. 4 in Buldana, and a fine blanket from Pandharpur or Hubli, Rs. 8 to Rs. 10. The sale of foreign blankets in Wardha is said to be limited on account of which the retailers charge high profits, amounting to 12 annas on a blanket costing Rs 3 annas 12. The imported blanket, though softer and better looking than the locally made black blanket, does not stand wear nearly as well and is less good at keeping out the rain. It costs more money but is probably a good deal warmer. The black blanket, being made from the fleece of the local sheep, is more like hair cloth than woollen cloth. The local sheep will yield as much as 6 chittacks at a clip, which takes place three times a year. I consider my previous estimate of 2 chittacks at a clip, three times a year, for all animals rather too high, allowing for the usual proportion of young animals. The amount of wool

produced locally is quite insufficient for local needs, and the type of article imported does not really meet the requirements of the poorer classes. I feel sure that the present local output of wool and blankets might easily be doubled or trebled without meeting the full demand.

Proposal to improve the local breed of sheep.

116. The industry as it exists is practiced by so few persons, and is so entirely subsidiary, that it is not worth trying to do anything for it; but I certainly think it would be an excellent thing if the local breed of sheep could be improved. More wool is wanted locally, and an improved type of sheep would pay far better for his keep than the present coir coated brute does. I do not consider that the diminution of the number of sheep, if a fact, is wholly due to the lessening of pasture grounds; another very important cause is famine and the advanced price of grain. Sheep feed freely in the cotton and juari stubbles as soon as the crops are reaped, and any tract with plenty of black soil open-field cultivation, whether of wheat or cotton juari, will carry a fair number of sheep. I think that the Agricultural Department would certainly be justified in taking up the question of an improved breed of sheep, and, if they succeed, we may expect a wool industry to spring up worthy the name, which the present is not.

Remarks by Mr. Davies on exhibits at the Central Provinces and Berar Exhibition.

117. Mr. G. A. Davies, of the Bengal Educational Department, who was one of the judges at the Central Provinces and Berar Exhibition, has offered some valuable remarks on the woollen industry, which I reproduce below:—

“Woollen goods and hosiery. In this direction considerable advance appears to have been made of late years. Some of the blankets exhibited were of very good appearance and quality, but here again we have the bazaar, with its cry for a cheap article, which retards progress. Blankets of a very good class can be made on handlooms, but two considerations have to be met:—First, a loom of a proper description is an expensive item; secondly, for a blanket of good appearance, considerable care must be expended on the yarn spun. The ordinary blankets made in strips sewn together, made of dirty yarn, exceedingly coarsely spun, give weight and warmth combined with cheapness, and such find a ready market among the poorer classes. Probably, with proper handlooms and a little care exhibited in yarn spinning, an equally warm clean blanket of half the weight could be supplied at the same cost, but the purchaser would feel that he was not obtaining full weight for his money. In such a blanket there would be a considerable saving of material, but there would be increased labour charges, both in spinning and in weaving, as the yarn would be lighter and the texture closer. In spite of the objection above noted as being probable on the part of the purchaser, I am convinced that a medium quality blanket, properly made on a suitable handloom, would find an increasingly rapid sale year by year, more

especially if they could be made in brilliant colours, such as the people love. The advance in hosiery is noticeable of late years. The hand knitting machine is firmly established in the country, and the outturn will probably increase very rapidly. Many of the items made are of good quality, and are suitable to the bazaar requirement."

Proposals for improved weaving methods.

118. I do not think that the present caste of wool weavers, who are as a caste shepherds first and weavers only incidentally, are in the least fitted for an improved wool weaving industry. Any attempt to introduce improved weaving with imported wool should be taken up as a new industry. The introduction of a hand knitting machine is a most useful suggestion, and it might be commended to the notice of missionary bodies, if not taken up by Government.

Dyeing and calico printing.

119. The enquiries made add nothing to the information already available in my note compiled from the monograph. It has been suggested in the note on industrial surveys in the United Provinces that, owing to the high prices of dyed yarn, there is room for the establishment of small dyeing factories, to dye yarn for handloom workers. This suggestion would not appear a very advantageous one in this Province, from the point of view of the domestic industry of dyeing. Mill dyeing is very little dearer than hand dyeing; and any such course would probably hit the local industry very hard, if successful.

Count.	Cost per 10-lb. bundle of plain Yarn.	Cost of 10-lb. bundle of Yarn dyed Indigo or Black.			
		At Mills.		By Dyers.	
	R. A. P.	R. A. P.	R. A. P.	R. A. P.	
30	5 12 0	11 0 0	5 12 0	+	5 0 0
40	7 8 0	14 0 0	7 8 0	+	6 0 0
50	10 0 0	18 0 0	10 0 0	+	7 0 0
60	12 0 0	21 0 0	12 0 0	+	8 0 0

Prices of yarn in all cases represent cost to the weaver or dyer. The above are rates for yarn intended to be woven into superior silk bordered goods. For the material of commoner goods, dyers charge Rs. 2 annas 8 per bundle of 20's, and Rs. 3 annas 8 per bundle of 30's. The dyer's profit is considerable, as will be seen from the figures below.

Cost of dyeing one 10-lb. bundle of 20's :—

	Rs.	A.	P.
One seer dye (inferior) - - -	2	8	0
Railway charges - - -	0	2	9
Lime and <i>tarota</i> - - -	0	1	6
Total - - -	2	12	3

Profit (on two day's work) Rs. 2 annas 3 pies 9.

Superior dyeing of one 10-lb. bundle of 30's :—

	Rs.	A.	P.
One seer dye - - -	4	0	0
Railway charges - - -	0	2	9
Line and <i>tarota</i> - - -	0	2	0
Total - - -	4	4	9

The dyer charges Rs. 5; profit 11 annas 3 pies on one day's work. Dyers usually dye yarn or cloth for weavers or shopkeepers, by the job; when they cannot get this to do, they buy yarn and dye it on their own account, charging one rupee per 10-lb. bundle profit; and if they sell it through a retailer, he charges a rupee or two per bundle as his own profit.

Improved
methods of
dyeing.

120. The dyer, so far as the above figures show, seems in little need of assistance. In regard to his methods, it is probable that he does not get as good results as might be from the aniline dyes, but the manufacturers, such as the Badischer Anilin Fabrik, Leopold Casella & Co., send out, I believe, instructions with their dyes; and they would no doubt be ready to assist us with information as to the results a dyer should get from a given quantity of dye, and the best methods for him to adopt. The cost of dyed and undyed yarn has already been discussed in my note on cotton weaving; and any measures taken to improve the weaving trade in this respect might very well be extended to the small class of dyers. These, too, suffer from the lessened sales in a famine or singhast year, and from the competition of mill-made goods; in fact, the industry is almost entirely dependent on hand weaving. The work to be done in improving the methods of aniline dyeing will not be extensive or elaborate, nor need any great technical skill, so far as I can see; and I do not expect its result will be very important. It may well be taken up by the same agency that is concerned with the improvement of the weaving industry, though they should not attempt it until the introduction of the improvement has been set on a thoroughly satisfactory basis.

Profits of
calico print-
ing.

121. The calico printing industry, which is mainly found in Nimar, Wardha, and Nagpur, though its most skilful exponents live in Chanda and Wun, is on a different footing. The

following figures collected by Mr. Chandorkar show the profits of the industry.

The following is the account of 8 *jazams*, each measuring 9 by 4 cubits. The workers begin the work of 8 *jazams* at a time.

	Rs.	A.	P.
<i>Harra</i> $\frac{1}{2}$ seer, at 1 <i>chittack</i> a <i>jazam</i> -	-	-	0 0 9 $\frac{1}{2}$
Printing charges—			
	Rs.	A.	P.
Gum, 1 $\frac{1}{2}$ seers -	-	0	8 0
Alum -	-	0	1 9
Yellow earth, $\frac{1}{2}$ seer -	-	0	0 3
			<hr/>
			0 10 0
Last printing—			
1 seer of red dye -	-	1	0 0
$\frac{1}{4}$ seer of <i>dhandi</i> flower -	-	0	0 6
Fuel -	-	0	2 0
			<hr/>
			1 2 6
Cost of 8 <i>khadi</i> cloths -	-	-	12 0 0
			<hr/>
Total -	-	-	13 13 3
			<hr/>
Wages for washing 8 <i>jazams</i> at 4 annas each -	-	-	2 0 0
			<hr/>
Total -	-	-	15 13 3
			<hr/>

In 4 $\frac{1}{2}$ days 8 *jazams* can be prepared, and each *jazam* is sold for Rs. 3; the selling price would be Rs. 24 for 8 *jazams*. Rs. 8 is the profit on 8 *jazams*. The wages come to Rs. 1.12.0 to Rs. 1.13.0 per day, if they do printing also; if they get it done by others they pay 8 annas a *jazam* as printing charges.

The profits are thus considerable, and the workers earn from Rs. 15 to Rs. 20 a month. I have nothing to add to the description of the process given in my preliminary note.

Competition of mill-made goods; proposals for improvement.

122. Opinions differ as to the extent to which mill-made goods compete with the industry, but I should be inclined to believe that the entire class of goods represented by this industry, whether hand made or mill made, is falling out of fashion, and is being replaced by carpets, woollen or semi-woollen coloured fabrics, American cloth, oilcloth, and cheap linoleum, &c. The taste for printed floor cloths, bedspreads, cart covers and the like, is far more pronounced, it would appear, in the United Provinces than in the more civilised parts of the Central Provinces and Berar. Still, the falling off of the demand is not very great at present, and it would seem that something may be done for the industry in the following ways:—

- (1.) Fresh patterns of a more interesting type may be introduced. I consider that mythological figures

should be more largely used. I understand that they are much in vogue in the United Provinces, and they are certainly appreciated in the Central Provinces. They might be obtained from the United Provinces, or designed by the Chitaris of Nagpur, and the patterns executed by the Chanda carpenters, who make stamps for the calico printers. The assistance of the latter might be invited in reproducing the designs with such modifications as might be necessary to fit them for calico printing.

- (2.) A more extended market might be provided. This could be arranged for by inducing retailers in other parts of the province to stock a few of these goods to sell on commission, or even by sending them farther afield. It would almost certainly be necessary to give the workers an advance on the goods so sent out, to enable them to tide over the period of waiting; and this might be done by a co-operative credit society. This point will be dealt with more generally in the concluding part of this report.

Comparative
unimportance
of the in-
dustry.

123. An extended market is by far the most important direction in which help can be given to this industry. Any investigation into its methods would need highly trained expert guidance. The question of gums, mordants, and stamping machines would have to be investigated. I doubt if very important results would be forthcoming, unless the footing of the industry were almost entirely changed by elevating it to the standard of a small factory industry. Lastly, the numbers engaged in the industry do not warrant assistance on very extensive lines. The census figures for the Central Provinces are:—

Cotton printers—

1891	-	-	-	-	2,572
1901	-	-	-	-	289

The dyeing trade is far more important:—

Cotton dyers—

1891	-	-	-	-	15,444
1901	-	-	-	-	6,960

The calico printing and dyeing industry are, however, both far more important in the United Provinces than in this province, and I understand that experimental work in both dyeing and calico printing is to be undertaken there. Probably we shall be able to profit by their results.

Brass and
copper ware.

124. No special inquiry was made into this subject. I remarked in the last paragraph of my preliminary note that "more information is needed as to the selling price of imported "brass or copper ware, and the present cost of unwrought "brass or copper, and of locally manufactured brass and copper

“ware ; also as to the relations of the handicraftsmen with the “dealers.” I had overlooked at that time the extraordinary fluctuations in the price of copper, which form a favourite gambling counter with a well-known clique of American financiers ; these make it practically impossible for any extensive benefit to be gained by the workers from any co-operative society of the type that it is possible to establish at present. Loans can be given, but any attempt to purchase and stock brass and copper sheets for sale to the workers would be sure to end in disaster. This objection has been made by the writer of the report on the Industrial Survey of the United Provinces ; and he has also pointed out that the large and varied stock that a vendor has to keep is a fatal objection to co-operative selling. It may be that industrial co-operative credit will reach a stage at which its accumulated resources will free it from any fear of ordinary market fluctuations, but even in that case a metal which is liable to vary in price by nearly 50 per cent. within a year or two, while its cost forms so very large a proportion of the selling value of the completed article, is perhaps the last thing for a co-operative society to invest in. There is therefore little to be added, except a few remarks on some of the articles shown in the Central Provinces and Berar Exhibition, to my note, which was based on a full and good monograph, though of rather ancient date (1894) ; and I reproduce it, with one or two alterations, below :—

Population
and trade
statistics.

125. “Workers in this industry have decreased from 17,961 in 1891 to 16,367 in 1901, or by 8·9 per cent., corresponding closely to the provincial decline of 8·3.

“The castes are said to be Kaseras, who work in *kasa*, or bell metal ; Tameras, who work in copper ; Otkaris, Khadras, Bharewas, Audhias.

“These castes have slightly increased in actual number during the census period.

“Kaseras are found mostly in the following districts :—

Mandla	-	-	-	-	-	379
Hoshangabad	-	-	-	-	-	933
Chhindwara	-	-	-	-	-	480
Wardha	-	-	-	-	-	851
Nagpur	-	-	-	-	-	1,022
Bhandara	-	-	-	-	-	349
Raipur	-	-	-	-	-	1,439

“Tameras are found as under :—

Saugor	-	-	-	-	-	729
Jubbulpore	-	-	-	-	-	961
Narsinghpur	-	-	-	-	-	571
Raipur	-	-	-	-	-	750

“Khadras are entirely confined to Raipur and Sambalpur.

“Audhia Sonars live in Mandla.

“Otkaris mostly in Chanda, Bhandara, and Balaghat.

“The Monograph of 1894 says that some of the richer Tameras are engaged in financing the working Tameras. The same is the case, I am aware, in Harda with Kaseras. The Tamera hammers brass sheets, the Sonar works in copper alloys by casting. The

former are said in the Monograph to be very ill-educated ; details as to education of the caste are not available. I should have thought they send their children to school at least as frequently as the average artizan castes. The greatest number of workers in these metals are found in :—

Jubbulpore	-	1,371	Nagpur	-	782
Sangor	-	1,142	Bhandara	-	1,026
Narsinghpur	-	690	Raipur	-	3,311
Hoshangabad	-	821	Bilaspur	-	1,506

“Jubbulpore and Raipur show increases, but there is a very large decline in the brass-workers of Nagpur.

“The increase in prosperity favours the use of metal instead of earthen pots, which is always a sign of wealth ; moreover, the import of cheap brass and copper sheets has lessened the cost of the goods. On the other hand, fuel has risen in price, and it is stated in the Nagpur report that the decline is due (1) to the decay of the village commercial system and the specialisation of manufacture ; (2) to the middlemen absorbing too much of the profits ; (3) to persons of position ceasing to purchase large or valuable articles ; (4) to the competition of imported glass or china ware.

“Cheap transport has caused specialisation and concentration of the trade in certain places. There is stated to be a decline in the artistic quality of the ware.

“The note on Handicrafts in the Central Provinces states that the import of rolled sheets has destroyed the brass smelting and hammering industry of Bhandara. The competition of European brasswork has depressed the industry there, and the number of brassworkers has fallen from 200 to 50 or 60. Some workmen in Nagpur and Bhandara can do work resembling but inferior to the engraved Benares work. The brass industry at Lodhikhera in the Chhindwara district has died out as a special skilled handicraft since the opening of the railway to Nagpur.

“The statistics as to imports and exports are :—

	Imports in Maunds.			
	1891.	1890.	1905-06.	Berar, 1905-06.
Copper, unwrought -	954	1,456	896	48
Brass, unwrought -	14,696	12,470	19,164	891
Copper, wrought -	4,760	3,969	15,702	9,833
Brass, wrought -	9,956	9,319	26,879	13,879

“Exports, save a little wrought brass and copper to Bombay and Berar, were trivial.

“The imports of unwrought ware and of wrought ware have increased in almost exactly the same proportion, but it is extraordinary how very little Berar does to make its own brass and copper ware. Most of its wants are supplied by importation from the Deccan, Jubbulpore, Mirzapur, and Benares.

Methods of
manufacture.

126. “The pieces required are cut out by scissors or chisels, hammered by a wooden mallet on a stone anvil, and then the parts

are brazed together with a solder made of three parts brass to one zinc.

"The cuttings are used for solder and small work.

"The pots when made are cleaned with sulphuric acid.

"The copper is obtained in sheets and the zinc in slabs; they are cut up into pieces about 1 inch by 1 inch and smelted in a clay crucible (*vide* page 5 of the Monograph). The liquid metal is then run into moulds and smoothed on a lathe, which one man turns, while another holds the chisel to the pot. The pot is planed with a plane. Sometimes the brass is run into flat slabs, which are hammered into shape. Articles so made are preferred, as cast articles are exceedingly brittle.

"Water pots and dishes are said in the Saugor report to be mostly hammered; drinking and cooking pots, instruments, and images or toys are mostly cast. Another description is given on page 5 of the Monograph of the preparation of the moulds, which seem to be more careful and elaborate in Saugor than in Chanda; in the former place the *cire perdue* process is used.

"Copper ware is not much used locally, as it has to be tinned, Hindus are said in the Census Report (1901) not to like this, as they think it a Mahomedan custom. Traders import copper vessels from Poona and Cawnpore. Bombay Province accounts for about two-thirds of the imported wrought copper. Copper sheets are worked up in two ways: (1) by ordinary hammering, which results in vessels of insufficient strength, the sheets being too thin; (2) by cutting the sheets up into slabs, heating and hammering them together, and moulding them into the shape required. Sometimes they are soldered together. The copper sheets used in Chanda are said to come from Nasik. Sometimes pots are made of brass with a copper rim.

Alloys.

127. "The chief alloys are:—

"(a) Three parts of copper, two of zinc. It can only be hammered when cool. (I doubt the correctness of this.) It is said to be better than rolled brass sheets, but has been displaced by them as it is dearer.

"(b) Five parts copper and four zinc. It is lighter and harder than the last, and can be beaten hot or cold.

"(c) Eight parts copper and nine zinc, which is still lighter and made near Mirzapur.

"(d) Four parts copper and five zinc, which is called *tora* and used for women's ornaments; it is grey in colour. This seems to be the same as the *bharat* of Balaghat, which, however, contains three metals, as far as I recollect. It is said that a light-coloured form of bell-metal is also used for ornament.

"(e) *Kasa* or bell-metal. This is resonant, lightish in colour, takes a high polish, is brittle, will not stand fire, but is not affected by the ordinary acids that occur in household cooking. It is made of four parts copper to one part tin. Tin is imported from Bombay in coils. In Jubbulpore *kasa* is said to be made of one part pewter to four of copper.

"There is a great deal of skill in the casting of *kasa*, the mould being prepared with much care and turned in a lathe (a detailed account is given on pages 7 and 8 of the Monograph).

Cost and ways.

128. "*Balaghat*.—Panchals get 4 annas a seer for copper work, and 6 annas for *kasa*.

" A workman can earn Rs. 10 or Rs. 12 a month. Cast metal fetches 14 annas a seer, beaten brass Rs. 1. 2. 0, and beaten copper Re. 1. 4. 0.

" *Saugor*.—Large ornaments fetch Re. 1. 4. 0 a seer, and small ones Rs. 4 to Rs. 5.

" *Damoh*.—Brass vessels fetch 14 annas to Re. 1. 4. 0 a seer, and *kasa* vessels Re. 1. 8. 0 to Rs. 2 a seer.

" The Monograph states that in Chanda the raw material is made over to the Panchal, and for a fortnight's work on 28 seers brass he can make Rs. 12; he has to spend the following sums:—

Rs. 3 on charcoal.

Rs. 3 on labour.

Re. 1 on solder.

" The dealer makes about 5 per cent. on his outlay.

" The details of the profit made on brass sheet work in Hoshangabad are given below:—

<i>Receipts.</i>		Rs.	A.	P.
20 vessels of 2 seers each	-	50	0	0
<i>Expenditure.</i>				
1 maund brass sheets	-	36	0	0
2½ maunds charcoal	-	2	0	0
Labour	-	5	0	0
Sulphuric acid	-	0	7	0
Pitch, ochre, oil	-	0	1	3
Total	-	43	8	3

" Pots fetch about 15 annas a seer. Kaseras get 7 annas a seer for molten brass, and 4 annas a seer for sheet brass.

Nature of articles manufactured.

129. " No enamelled or inlaid work is made. Besides pots and pans and ornaments, bells for bullocks, tips for their horns, bangles, pipes, rings, are the usual articles manufactured.

" Copper horns are made at Malthon in the Saugor district called *ramtulas*, and a sort of bugle called *turahi*. Scroll and inscribed work is done in Saugor and Bhandara; Mandla is most famous for its bell metal which is made in simple but very artistic shapes. Lodhikhera in Chhindwara and Chanda have also some reputation.

" The only ornamental designs are in inscribed and scroll work.

" In spite of the remarks in the Industrial Survey of 1889, there seems no reason to doubt but that the brass industry is holding its own. Bell-metal work is, perhaps, being replaced by brass on account of its more expensive character."

Remarks by Mr. G. D. Ganguli on exhibits at the Central Provinces and Berar Exhibition.

130. I append some interesting remarks by Mr. G. D. Ganguli, Curator of the Lucknow Museum, and one of the judges at the Central Provinces and Berar Exhibition.

" Hollow metal ware.—There is an increased demand for brass and copper utensils among both the rural and urban population, and the trade in these goods shows no visible sign of decline. A possible danger to the metal-ware industry lies in the growing demand for aluminium ware. But the use of aluminium pots by a limited class is not likely to interfere with

the trade in brass and copper. Apart from its comparatively high price the extreme lightness of the metal, coupled with the difficulty of keeping it bright and clean by ordinary methods, are objections to an extensive use of aluminium ware which do not weigh lightly with a large section of the people. China, from its fragile nature, does not find favour in Indian families, which otherwise have no scruples in using it.

"Only a few samples of the famous bell-metal ware of Mandla were on view at the Exhibition. I, however, saw a large selection of it placed on sale in the bazaars of Nagpur by people who had originally brought it for the Exhibition. The vessels were plain but well finished, and should find ready purchasers in any town where Hindus predominate.

"A real danger to the metal-ware of this country is apprehended from a different source. The importation of German silver vessels in shapes and sizes suited to Indian taste threatens to oust the indigenous bell-metal from the market. Some of the ornamental brass-ware of Nagpur compares favourably with the ornamental brass of Jaipur and Lucknow. The art, if carried on to the extent of producing trays, plates, &c., has a fair chance of success. Any attempt to transfer it to large and cumbersome articles, such as a doorframe with doors, should not be encouraged. The production of grotesque images in brass which the artisans now indulge in cannot be too severely condemned."

Suggestions
for improve-
ment.

131. The chief suggestions regarding the improvement of the industry on domestic lines contained in the note on Industrial Surveys in the United Provinces are: (1) wooden moulds, to save the trouble of constantly making earthen ones; (2) punching machines and improved hand-lathes; (3) dies for stamping vessels into the required shapes. I think that these points could be taken up and worked out by an agency that very shortly will be in actual existence; I mean the school for blacksmithery and carpentry to be started at Nagpur.

There seems to be a very large opening in Berar for skilled brass workers. If previous enquiries do not disclose any sufficient objection to such a course, it might be a good idea to invite immigrants to Berar from any centre of the trade in the Central Provinces where the industry seems unduly congested. Retail sellers of hollow ware in Berar might be willing to help in financing such a movement. Care would have to be taken not to awaken a suspicion on their part that any attempt was being made to attack their trade.

Finally, the industry should be brought as far as possible within the general scheme of industrial co-operative credit, though little can be done for the workmen beyond the supply of cheap loans and improved tools on loan or hire.

Tassar and
mulberry silk
production.

132. I have nothing to say on the first of the above two subjects, which has already been thoroughly examined by an

expert, and action is being taken, I understand, on his suggestions. When an adequate supply of raw material is assured, it will be time enough to discuss the question of improved reeling and weaving apparatus. The matter is at present in the hands of the Agricultural Department. I wish, however, to put on record that I am not satisfied, on a perusal of the available papers, that there was good cause for the abandonment of mulberry growing in the Central Provinces. It was only tried, apparently, at Seoni, and there in black cotton soil, which was reported to be unsuitable for it. There are not a few isolated trees, introduced in most cases by European officers, in villages in Baihar, and, I believe, in Seoni; such as I have seen grow on light soil, and in spite of total neglect, had kept alive, and produced an attempt at fruit. I see no reason why, with irrigation and protection from frost while the trees are young, mulberries should not be grown on the Satpura plateau. They grow in the Telinkheri gardens, which does not appear *prima facie* a very suitable place. There seems no reason why, a sufficient supply of mulberry leaves being available, one or other species of the mulberry silkworm should not be reared. The industry would yield large profits, if successfully conducted, and I certainly think that the Agricultural Department should attempt it. The knowledge of sericulture in India is far greater than when the first crude attempts were made; and I think we should soon be able to tell whether the experiment was a hopeful one or not. There are plenty of Dhimars and Kewats and similar castes who live in places where mulberries might be grown, while there is no jungle for *tasar* insects. A properly paid and qualified sericultural assistant or superintendent would have to be procured from Bengal or Kashmir, or sent there for training. At present we only have an assistant, who, when I held charge of the Department, had no training, except in *tasar* production.

Mat and
basket
making.

133. Owing to the increased prosperity of the country, the price of these articles has trebled within the last 25 or 30 years. In all places where there are bamboo forests at a reasonable distance from the railway, the industry is a very thriving one; and naturally the Forest Department have to some extent increased the rate of license fees for bamboos. I have myself seen the results on the bamboo workers of the coming of the Satpura railway, which raised them within two years from a state of precarious and inadequate employment to one of lazy and drunken independence. These men only make coarse mats, baskets, grain receptacles, winnowing fans and the like; they have no time for the finer work. Basket makers tend naturally to concentrate at places where they can work on favourable terms, and they are a somewhat migratory caste. It would be impossible and useless to attempt to teach them finer work under such conditions. There is a little fine work, such as measures, baskets for holding liquids, boxes

of basket work, &c., turned out here and there, mostly, I believe, in the east of Chhattisgarh ; and there might be some demand for such work in the larger towns, and possibly outside the province. But I do not know of any suitable class who are in lack of such employment, to whom the industry might be taught, at any rate at present. The suggestion might prove acceptable to missionary bodies, and it might be a good thing to collect samples of the kind of fine basket work that has the readiest sale in towns outside the Central Provinces, and to see if the price will stand the cost of transport. Enquiries might then be made for persons willing to learn the art. Little could be done, unless small communities of basket makers would take up the idea.

Hosiery.

134. Hand knitting machines seem to have established themselves in several parts of India. The machines are not expensive, I believe, though I am unable to ascertain the exact price of the cheaper kinds. The manufacture and knitted underwear might form admirable employment for some of the superfluous hand weavers. The point should be taken up by the agency which I propose for the employment of the weaving industry. The demand for such wear is a greatly increasing one, and is at present supplied almost entirely from Japan.

**Cotton rope
and tape
making.**

135. There is a certain amount of tape weaving in various places, both in Berar and in the Central Provinces. People used to go from Bilaspur to Kawardha, if my memory serves me, to purchase *newar* (tape). It is at present largely a jail manufacture. A Panjabi exhibitor showed a cheap and ingenious tape weaving machine at the Central Provinces and Berar Exhibition ; and I believe there are many kinds of machine on the market. One or other of these might be introduced with advantage. Mr. Jageshwar Rao states that he found a man making cotton ropes in Jubbulpore with a simple machine that might, he thinks, be easily improved. The outturn, with four persons engaged, was 20 seers daily, selling at 14 annas and yielding a profit of Rs. 4. The cotton from which these ropes are made is, I understand, inferior. There is a big demand for ordinary cotton rope, and there would be a very fair demand from the mills for superior hand-made cotton ropes for driving machinery, made from long stapled cotton. The textile staff may be able to take up this suggestion. It might be possible to extend the industry to other materials than cotton, *sann* hemp, for instance. Such an industry might absorb some of the poorest weavers of very coarse fabrics.

Toy making.

136. Lac toys are made in Saugor by Kunderas in very large quantities, and also in various places in the Bilaspur district for the Ratanpur fair, and no doubt elsewhere. They are turned in wood and lacquered in various colours. They are mostly models of various household implements, small boxes, &c.

The Kunderas are said to earn only three or four annas a day. Other kinds of toys are made in Jubbulpore and Saugor by more skilful workers, who earn larger sums. Earthenware toys, mostly for special festivals, are made all over the province, but especially in Nagpur, Saugor, and Burhanpur. They are made of well-prepared clay, which is pounded between stones and mixed with cotton and horse-dung. They are either modelled by hand or moulded, and are baked or merely dried. They are then covered with a coat of whitewash and painted. It is suggested by Mr. Jageshwar Rao that they might be glazed, and judging from the information available about glazing, this seems practicable. In this case they would doubtless stand transport better. He has also suggested that the moribund industry of paper-making at Panchamnagar, in Damoh, and at Zainabad might be set on its legs again if the pulp were used as *papier mâché*, for making toys and other articles. I fear, however, that it would be impossible to teach the paper-makers an art requiring such a high degree of skill as moulding and lacquering, while the persons who practise these arts are not found near where paper is made, and would perhaps find it difficult to work in so unfamiliar a material. Generally, the difficulty under which makers of toys labour is, that the demand for their goods is local and intermittent. The only means of putting it on a firmer footing would be (1) to put the workers in the way of making toys more attractive in appearance and of greater variety, and in materials that will stand transport; (2) to open fresh markets to them in the large towns, especially outside the province. This could only be done by a general organisation, with correspondents outside the province prepared to sell goods on commission.

Blacksmithery
and carpentry.

137. I have not touched on the industries of blacksmithery and carpentry, as the school for handicrafts, which is being started in Nagpur, should cover all the ground which I could recommend our attempting at present. Co-operative credit societies might, however, advance money to village smiths and carpenters for improved forges and lathes, under the advice of the Instructor of the School of Handicrafts. I am proposing means for bringing the school into close touch with all parts of the province; and there will be plenty of scope for a man of originality and initiative as instructor.

Chapter VII.—GENERAL PROPOSALS.

Importance of
co-operative
credit.

138. It will be understood from a perusal of this Report, that I attach great importance to the organisation of industrial co-operative credit. The application of co-operative credit to industrial development, though familiar in other parts of the world, is a new thing, practically speaking, in the province. But there are not wanting precedents in other parts of India, and I trust that my account of the severe financial conditions under which most domestic industries are carried on, will have proved the necessity for some such expedient. The object of Government in passing the Co-operative Credit Societies Act was primarily to assist agriculture, but the credit question is even more urgent with the domestic worker. I consider that, with small men, the principle of unlimited liability is the soundest, but it is doubtful whether groups of workers will have the requisite solidarity for such a constitution.

The financing of the societies is likely to present greater difficulties than is the case with agricultural co-operative credit societies, as the choice of localities is more restricted, and the trade connection of the exploiting classes will be more directly attacked.

Proposed ap-
pointment of
an Industrial
Assistant
Registrar.

139. Highly technical industrial questions as to the quality and price of goods, methods of working, &c., are likely to arise, and will cause considerable difficulty in the working of the societies to start with. We shall need the help of experts and of local industrialists to advise us on these points, and we shall require the influence and local knowledge of the executive staff to help us in choosing localities for our societies, in finding local helpers, and in eliciting the support of the moneyed classes. Agricultural banks should by the end of the next year or two have reached a point at which the money market will be open to them, and their improved credit will no doubt be of great service to industrial societies.

The extension of co-operative credit to the industrial classes will greatly increase the burden of the Registrar's Department, not so much at first on account of the mere volume of the work, but from its variety and intricacy, and from the close supervision that will be necessary at the beginning. It will be necessary to strengthen the staff of the existing department.

There are further points belonging to the financial aspect of the question. The improvement of the supply of raw material, and the opening of fresh markets for the manufactured products, must be worked *pari passu* with the financing and general management of the societies. Many workers will require advances if their goods are sent to distant markets for sale. Some societies may find it necessary to purchase raw material for their members, or even to sell their manufactured products for them. Where this can be done on the spot, the society will no doubt find its own means, sooner or later, of

arranging for such sale or purchase, but where distant markets are dealt with, the departmental organisation will have to assist until a trade connection has been established. The same necessities will arise in the case of workmen not affiliated to a society. I do not think that the appointment of a travelling commercial agent could be justified, but an Industrial Assistant Registrar could do all that was necessary, and would be compelled by the nature of his duties to travel a good deal, and even to make occasional journeys into other provinces to examine the methods of industrial societies. These journeys would afford him excellent opportunities for finding fresh markets for his societies' goods.

It seems desirable that the agency which controls the banks should also be responsible for helping the members to buy and sell, where help is needed. No generalisation, however, can be made, and the decision must be left in each case to actual working. But I would, at any rate, point out that the employment of a man with some commercial experience and a knowledge of Indian markets to manage industrial co-operative credit societies is highly desirable. Experience in dealing with exhibition canvassers has shown me that while a really good man is not easy to get, he is of the greatest possible use. Such a man, if possessed of sufficient commercial knowledge, would be of great assistance in keeping institutions like the School of Handicrafts at Nagpur in touch with the outlying districts, and would be of the greatest help to the experts in the commercial side of their work.

Funds for industrial co-operative credit societies.

140. As regards the funds for the societies, I propose that Government should give substantial assistance, at any rate at first. I do not suppose it would be possible to use more than Rs. 10,000 or Rs. 15,000 of Government money during the first three years, as it will be inadvisable to extend our financial schemes greatly in advance of our industrial work proper; most of the above sum will be required for weavers' societies.

Appointment of experts.

141. I have proposed, in the course of my report, the appointment of three experts—one for each of the weaving, pottery, and leather industries. The first-named, with his establishment, may be regarded as practically permanent, and should be engaged on a five years' covenant with one year's probation; the other two will be engaged for a much shorter term, not exceeding two years. If the result of their work shows the necessity for it, permanent appointments can be made. For the present, at any rate, it is obviously necessary for them to work independently of each other under the control of the Director of Agriculture. Sufficient salaries should be offered to attract really good men, and though I speak on such a subject with great diffidence and lack of knowledge, I should not think a salary of less than Rs. 600 per mensem for the two latter appointments, or Rs. 500 for the former appointment,

would attract the stamp of men that we require. Mere knowledge of the methods of manufacture is not enough; intelligence and a power to apply technical knowledge to new conditions is required.

Appointment
of an in-
structor in
shoemaking.

142. I have proposed, in addition to the expert in tanning, a teacher of shoemaking for town Mochis. This man, who should receive a salary of Rs. 60 to Rs. 100 a month, can hardly work immediately under the Director of Agriculture, and I see no alternative but to confine him to Nagpur to start with, and place him under the orders of the Instructor of the School of Handicrafts. When the leather industry has its regularly appointed expert, he can then be put under his orders. It would be a mistake to hamper a man engaged on investigation work with the task of supervising work which is somewhat different to his own.

Distinction
between com-
mercial and
industrial side
of the work.

143. The textile expert will have entire charge of the operations for the improvement of hand weaving, and will also take the necessary steps for pushing the hosiery, ropemaking, and tapemaking industries; and will carry on the small amount of work involved by my proposals regarding dyeing. I see no objection to this, as he has practically no experimental work to do. But I do not think that he should be required to do much towards finding new markets for goods. The industrial and commercial sides of a trade require different qualities, and are best entrusted to separate hands. Any suggestions, however, that may occur to him would be welcome, and would be considered by the Director, and orders issued by him to the Assistant Industrial Registrar. The ideal system would be to have a separate commercial agent for each industry, under the orders of the expert in charge; but I do not see my way to recommend this at present.

The only important industries where fresh markets will be required at first all fall under the control of the textile expert, and, though he will be relieved from the details of this work, his advice will be useful to the Director. He will of course be responsible for the introductions of fresh patterns when required.

Help from the
public on the
commercial
side.

144. In addition to the agency of the Assistant Industrial Registrar it will be possible, within the limits of the province, to obtain the assistance of public spirited retailers who will stock goods and push their sales on commission. I think this course far preferable to that of displaying goods in Industrial Halls, which are not likely to attract either retail traders or the purchasing public, and are expensive to erect and maintain. Should it be decided, as I hope it will, to hold a series of Divisional Exhibitions on an annual roster, these will afford a ready means of advertising goods. It may be possible, in some districts where the operations of the Industrial Department are

extensive, to form industrial committees, who will assist with advice, stock and sell goods, and help to finance the credit societies. Assistance in obtaining information regarding openings for goods in other parts of India, and no doubt in many ways, would, I feel sure, be readily accorded by the Indian Industrial Conference.

The small factory and its prospects.

145. It is probable that the work undertaken by our experts will attract the attention of local industrialists and capitalists, and lead to the founding of small factories for weaving, tanning, pottery, and the like. I venture to suggest that the advice of our experts be freely available for the promoters of such undertakings, so far as this does not interfere with the performance of their regular work. It should be remembered that the present proposals are not an attempt to assist directly the general cause of Indian industrial progress, but only to help certain classes whose trade is suffering from various reasons. But it seems most probably that the industrial regeneration of the country will have at any rate its beginning in a system of small factories, and any action of Government that tends to encourage such a movement is so much to the good.

The Nagpur School of Handicrafts.

146. The School of Handicrafts at Nagpur should form a nucleus for the dissemination of improved methods in iron and brasswork and in carpentry throughout the province. Pupils may be sent up from outlying communities; these on their return will make known the improved tools whose use they have learned, and something of the same sort may also be accomplished by the instructor in his vacation. When more funds are available for industrial work, an expert should be appointed for domestic wood and metal industries, but I think my proposals will involve as much money and make as large a call on our available mechanism for supervision as can well be met at present.

Acknowledgment of assistance.

147. I cannot close my report, without expressing my indebtedness to some of the district committees, especially Raipur, Jubbulpore, Buldana, Nagpur, and Damoh, as well as to the three enquiring officers, especially Mr. Jageshwar Rao, whose previous study of the subject enabled him to make several useful original suggestions, and to Mr. Chandorkar, whose detailed descriptions of the financial side of the various industries show very painstaking work.

SUMMARY OF PROPOSALS.

Summary of proposals.

148. (1.) *Textile*.—The appointment of an expert to select and introduce the best type of loom.

A small workshop and experimental weaving shed at headquarters; two instructional centres, each under a Superintendent, with a small staff.

(Possible). A warping factory at one or other of the above centres; co-operative credit societies, who would

(a) Give loans in cash.

(b) Sell yarns or warps and sell or lend improved looms.

(c) Sell cloth made by members.

(d) Help members in *singhas* or famine years.

The introduction of rope, tape, and hosiery-making machines.

An inquiry from makers of dye stuffs regarding the efficiency of existing methods of hand-dyeing, and if necessary an attempt to improve it.

The provision of fresh patterns and more extended markets for the calico printers.

(2.) *Tanning and Leather work*.—The appointment of an expert to see if any improvement is possible in the tanning industry on domestic lines.

The appointment of an instructor for town Mochis.

Co-operative credit societies, to advance money to tanners and shoemakers for the purchase of materials and improved implements.

(3.) *Pottery and Brickmaking*.—The appointment of an expert to report on the best type of clay-grinding and pugging mills, and to see if any improvement can be effected in the type of kiln at present in use; or if glazing can be introduced.

Co-operative credit societies, which would at present confine themselves to advancing money to small brick and tile makers.

(4.) *Oil pressing*.—The Agricultural Department should enquire for and introduce, if possible, an improved type of bullock power oil mill. Co-operative credit societies to advance money to oil pressers for the purchase of seeds and improved mills.

(5.) *Wool industry*.—The improvement of the breed of sheep by the Agricultural Department. The introduction at a later stage of an improved loom for weaving imported wool and the instruction of the weaving castes in its use.

(6.) *Brass, Copper, and Blacksmithery*.—The School of Handicrafts in Nagpur to be put in touch with workers throughout the province, who will be sent there and taught the use of improved implements.

(7.) *Silk-rearing*.—The Agricultural Department should attempt to introduce the mulberry silkworm.

(8.) *Basket-making*.—To collect a few samples of the finer basket work sold inside and outside the province, and to suggest the introduction of finer basket-making to missionary societies.

(9.) *Toys*.—To open up fresh markets, and if enquiries by the pottery expert show it to be practicable, to introduce the manufacture of glazed toys.

(10.) *General*.—To appoint an Industrial Assistant Registrar of Co-operative Credit Societies, who will be responsible for the working of such societies, assist their members to get into touch with fresh markets, and be generally of assistance in the commercial side of the Department's work.

To enlist the assistance of retailers for the local sale of goods, appoint district industrial committees in suitable places, and to exhibit goods at divisional exhibitions.
