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**Government of Bengal**  
**Industries Department**

**Bulletin No. 57**

**Possibilities of manufacture of  
furniture and other articles of sheet steel  
as a small scale cottage or bazar  
industry**

*By*

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## Introduction.

The Department of Industries, Bengal, has in its records a widespread evidence of the existence of a sheet steel and tinsmith industry carried on in the bazars of most of the district towns of the province. This industry takes the form of the manufacture of steel trunks, boxes and other similar articles. The availability, however, of sheet steel and light angles at cheap prices in recent years, opens up further possibilities of manufacture of steel furniture and other articles in many places within the province. Such articles, as for example, almirahs, office tables, book-cases, stores racks, clothes racks, bed frames, office screens, shelves, chairs, etc., can all be manufactured into presentable and useful products by the use of black steel sheets 20 gauge in thickness, 72" x 36" in dimension and steel angle irons 1" x 1" x  $\frac{1}{8}$ " to any length desired, as the raw material. The necessary equipment for changing this raw material into articles as above described is quite small and inexpensive, and well within the range of any bhadrakol young man who has served a practical apprenticeship in some engineering workshop, and who wishes to apply himself to a useful and worthy small industry capable of yielding substantial profit and remuneration. All the equipment that is necessary is a suitable covered workshop or shed equipped with one or two hand-operated drilling machines, a foot-operated shears, a hand-operated angle shears, rivetting hammers, hack saws and other small tools of a practising engineering fitter. With nothing more than this equipment the articles whose designs, illustrations, etc., appear in this bulletin, together with detailed estimates showing the actual materials, rivets, bolts and nuts, locks, hinges, paint, etc., required for the purpose, can be easily manufactured. The universal experience in Bengal goes to show that the only possible wood from which furniture of this description can be made, and which will last the ravages of the climate and the white ants and other disintegrating pests, is teak wood. So much is this the case that practically all furniture and wooden fittings and equipment are made of this variety of wood. The result of this partiality for one particular wood, all of which is actually imported into the province, mainly from Burma, intensify the demands for the same as to make it one of the most expensive materials in any country of the world, the present price of seasoned teak wood being of the order of Rs. 6 to Rs. 8 per c. ft. when delivered by railway freight in any of the district towns. When it is under the form of a completely finished and painted steel article can be produced in a small workshop at a cost of practically half the cost of the

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same article made of teak wood, and with equal if not greater durability, it is permissible to express surprise that imported teak has maintained its expensive hold upon the needs of the community for so long a time. In order to substantiate these claims, there are appended to this bulletin drawings and detailed estimates of a comprehensive character showing the method of manufacture of four specimen articles, viz., an almirah, 65" in height, 30" width and 16" depth from back to front ; an office rack, 37" height, 36" wide and 11½" back to front ; a sieve, 15" length, 10" in width, 2" in height, such as is used for sieving sand and other similar materials, and lastly, an octagonal table, 2' 6" in height, with the top 36" wide across the corner. These estimates show the minimum cost, at which figure it is possible for these articles to be produced by workmen with ordinary skill and under supervision of technically and practically trained persons who can give the requisite practical direction and control to the manufacture of such articles. Generally speaking, the cost of production does not exceed one-half the price at which the similar articles made of teak are sold by jobbing workshops in Calcutta. It is impossible to give definite figures of the price which could be realized by the sale of such articles in district towns of the province. Suffice it to say that the almirah above referred to can be produced in Calcutta at a cost not exceeding Rs. 40, of which Rs. 15 would cover the actual labour including painting, while Rs. 25 covers the actual cost of the steel sheets and angle, the hinges and lock fittings, bolts and nuts and rivets and paint necessary for completing the almirah. A similar almirah manufactured in Bombay is offered for sale in Calcutta at approximately Rs. 150, retail—facts which speak for themselves.

This bulletin with its appendices is published with the object of demonstrating the possibility of an industry of this kind suitably located at a market or district town as a solution to the unemployment problem of a number of young men who have received technical and practical training and who in the present depression of trade and industry are at a loss for a worthy livelihood.

# Manufacture of a steel almirah as per illustration.

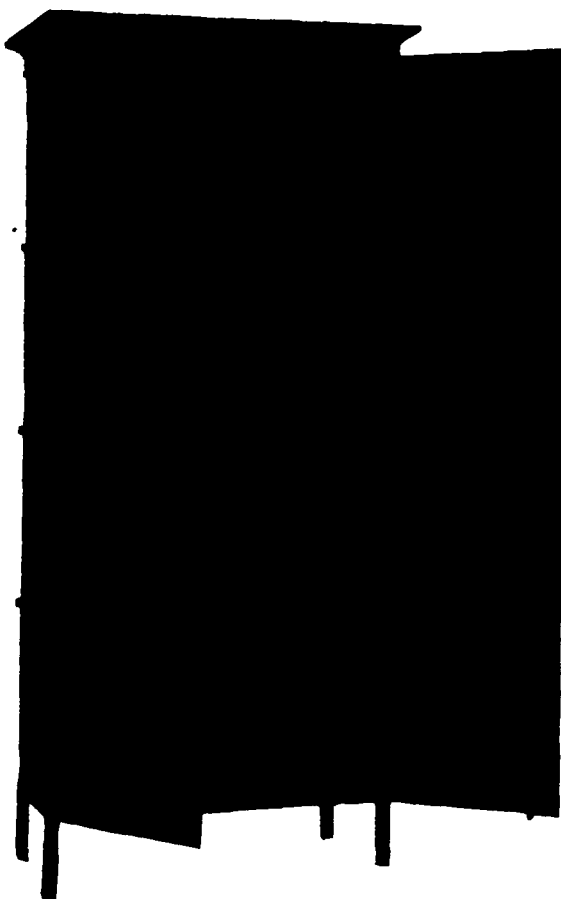
## RAW MATERIALS NECESSARY.

Diag.  
No.

- 1 5 Black sheets, thickness, 20 guage, size 72" x 36".
- 2 43 ft. Angles, 1" x 1" x 1/8" or cut lengths detailed in paragraph 2.
- 3 2 Locking bars, 32" long either 1/2" square or 1/2" round or 3/4" x 1/4" flat.

*Available from bazar.*

- 4 72 Bolts and nuts 1/2" x 1/2" long (hole 5/16").
- 5 50 Rivets 3/16" x 3/8" long R. H. (hole 1/4").
- 6 4 Hinges, size 2" x 1 1/2".



Almirah.

*Dimensions—*

Height, 65".  
Width, 33".  
Depth, 16".

Diag.  
No.

- 7 2 Brass handles.
- 8 1 Lock.
- 9 3 lbs. paint, preferably olive green, mahogany or oak colours.

*Sizes into which the above sheets and angles are to be cut.*

*(Sheets.)*

- 10 1 piece, 65" x 30", for the back.
- 11 2 pieces, 65" x 16", for the right and left sides.
- 12 1 piece, 67" x 17 1/4", for the left door.
- 13 1 piece, 67" x 17", for the right door.

Diag.  
No.

- 14 2 pieces, 64" x 7", for the reinforcement of doors.
- 15 1 piece, 32" x 17", for the top.
- 16 1 piece, 32" x 18", for the bottom.
- 17 3 pieces, 32" x 18 1/2", for the shelves.
- 18 1 piece, 38" x 6", for the front cornice.

Diag.  
No.

- 19 1 piece, 32" × 4", for the back cornice.  
20 2 pieces, 17" × 6", for the right and left sides of the cornice.  
21 2 pieces, 5" × 5", for the covering lockbar, joint, etc.

(Angles.)

- 22 1 piece, 14' 6", for the frame at the front, top and sides.  
23 1 piece, 14' 6", for the frame at the back, top and sides.  
24 1 piece, 2' 6", for the front bottoms.  
25 2 pieces 5' 5", for reinforcement of front frame sides only.

#### INSTRUCTIONS FOR USE OF MATERIALS.

*Holes and notches on angles.*—Drill holes along centre of one flange of each angle as per diagrams 22 and 23.

These holes are meant for fixing sheets at the top and sides. Holes for fixing up the back sheet will have to be made on the other side of the angle piece almost opposite the holes mentioned above.

Make 2 notches also in the same angle piece 72 inches from either end and after bending at right-angles solder joint. Diagram No. 22 shows the points for holes, notches and shape of the angle-piece after bending. Diagram No. 26.

*Top.*—Bend the top sheet piece one inch at right-angles on its 3 sides. Diagram No. 15.

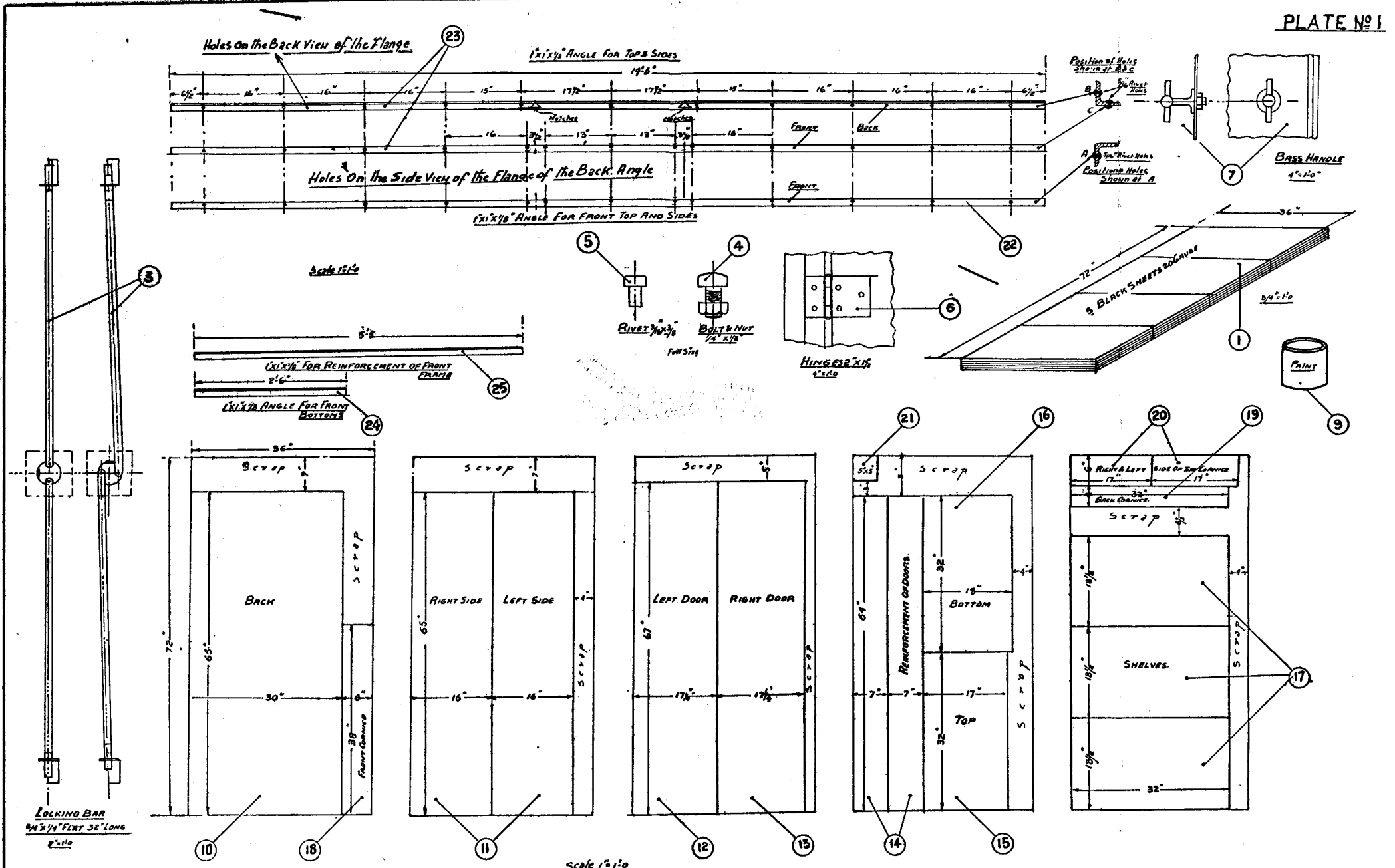
*Bottom.*—Bend the bottom piece one inch at right-angles on its four sides. Diagram No. 16.

*Shelves.*—Bend the three shelf pieces as in the case of bottom and double bend  $\frac{1}{2}$ " on the longer sides. Diagram No. 17.

*Assembling.*—Assemble the back of the almirah first and then its sides. Care should be taken to assemble the sheets on the interior of the angles. See back view of almirah. Diagram No. 10.

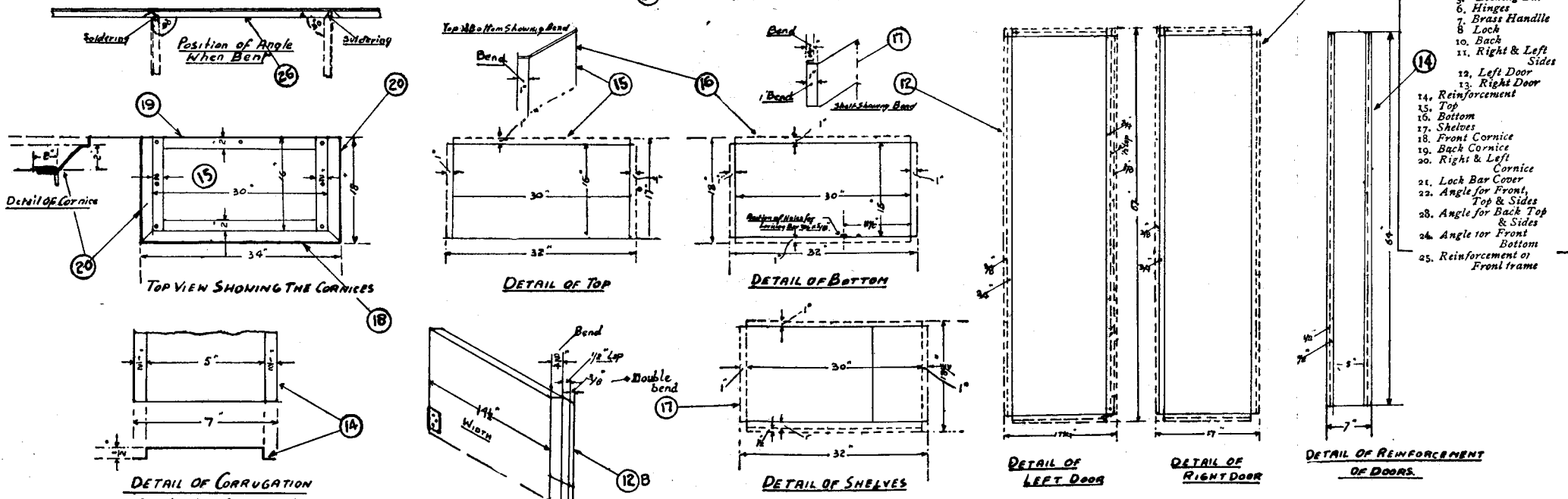
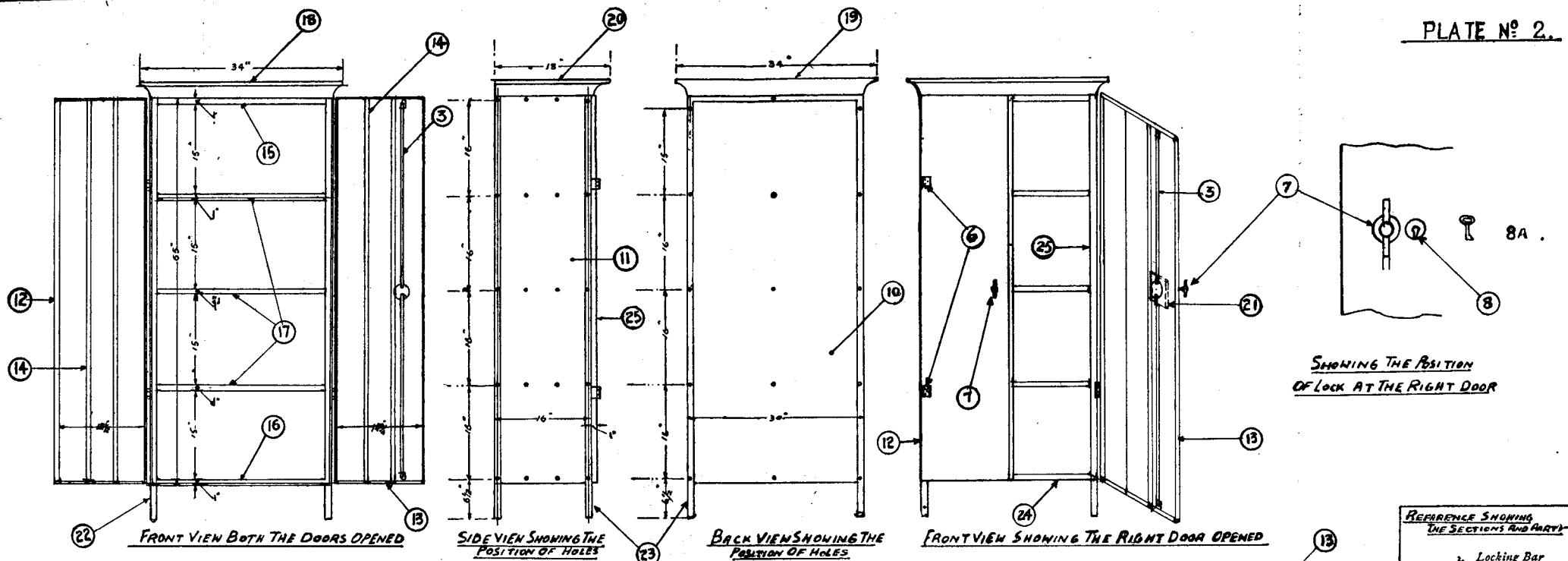
Now assemble the top, the bottom and the shelves. See that the double bent sides of the shelves come in the front and the edge goes downward. Two bolts for either sides and one for the back should be used for fixing up each shelf.

*Door.*—Bend the edge of the left door  $\frac{3}{8}$ " on four sides. Bend three sides  $\frac{3}{4}$ " at right-angles, the fourth side should be bent  $\frac{3}{4}$ " with  $\frac{1}{2}$ " lap. This will reduce



- DIAGRAMS SHOWING THE EXACT SIZES INTO WHICH THE SHEETS, ANGLES ETC. ARE TO BE CUT
- 1. 5 Black Sheets
  - 2. Angles (Doors, etc.)
  - 3. Locking Bar
  - 4. Bolts & Nuts
  - 5. Rivets
  - 6. Hinges
  - 7. Handles
  - 8. Locks
  - 9. Paint
  - 10. Back
  - 11. Right & Left Sides
  - 12. Left Door
  - 13. Right Door
  - 14. Reinforcement
  - 15. Top
  - 16. Bottom
  - 17. Shelves
  - 18. Front Cornice
  - 19. Back Cornice
  - 20. Right & Left Cornices
  - 21. Locking Joint
  - 22. Angle of front Top Sides
  - 23. " " " " " " " "
  - 24. " " " " " " " "
  - 25. " Reinforcement Sides

DRAWING OF SHEET DIAGRAM OF CUT SIZES AND NECESSARY DETAILS FOR STEEL ALMIRAH 65"X30"X16"



- REFERENCE SHOWING THE SECTIONS AND PARTS**
3. Locking Bar
  6. Hinges
  7. Brass Handle
  8. Lock
  10. Back
  11. Right & Left Sides
  12. Left Door
  13. Right Door
  14. Reinforcement
  15. Top
  16. Bottom
  17. Shelves
  18. Front Cornice
  19. Back Cornice
  20. Right & Left Cornice
  21. Lock Bar Cover
  22. Angle for Front, Top & Sides
  23. Angle for Back Top & Sides
  24. Angle for Front Bottom
  25. Reinforcement of Front frame

DRAWINGS FOR STEEL ALMIRAH 65"x30"x16" AND ITS DETAILS.  
Scale 1" = 1'-0"



the width of the door (when ready)  $14\frac{1}{2}$ " out of a  $17\frac{1}{4}$ " wide piece. Diagram No. 12-B.

Bend  $\frac{3}{8}$ " four edges of the right door. Bend same  $\frac{3}{4}$ " at right-angles. This will leave the width of the finished door  $14\frac{3}{4}$ " out of 17" wide sheet. Diagram No. 13-B.

The combined width of the (two doors) will be  $29\frac{1}{4}$ " after this. The remaining  $\frac{3}{4}$ " will be covered by the thicknesses of the side angles, the crevices at the hinges and the junction of the door regulating the free movement.

*Reinforcement of the door.*—Corrugate the reinforcement pieces 5" wide longitudinally. See diagram No. 14. Fix them on to the doors inside and then put on the locking bar (illustrated by diagram No. 3) inside the right door. Fix up the 2 handles to the doors and hinge up the latter to the almirah.

*Cornice.*—A cornice at the top will improve the appearance of the almirah. The back piece should be plain, while the front and side pieces should be shaped as shown in diagram No. 18. The ends should be cut at sides as shown in diagram No. 20.

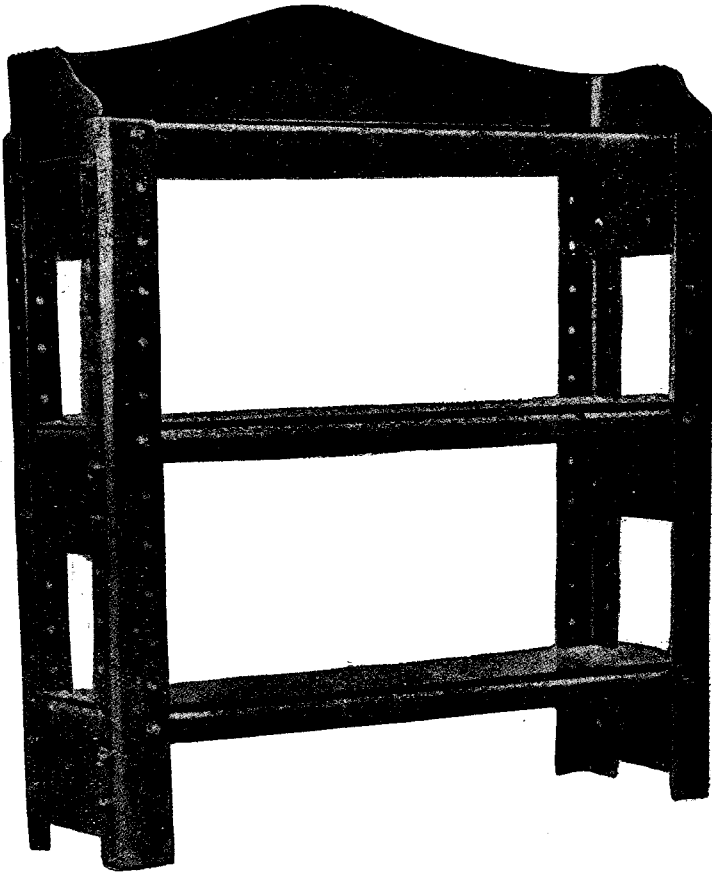
*Painting.*—Paint the almirah in any desired colour after cleaning thoroughly with pumice stone, kerosine oil or emery paper.

*Cost of production.*

|  | Rs. | A.    | P.   |
|--|-----|-------|------|
| One bundle of 5 sheets, weight 144 lbs., at Rs. 9-8 per cwt. | 12  | 4     | 0    |
| Angles 43' 0", 31 lbs. at Rs. 7-12 per cwt. ..               | ..  | 2     | 2 4  |
| 2 Lock bars, 3 lbs. ; fixed price ..                         | ..  | 0     | 3 0  |
| 2 Brass handles, fixed price ..                              | ..  | 0     | 12 0 |
| 4 Hinges, fixed price ..                                     | ..  | 0     | 6 0  |
| 1 Yale lock, fixed price ..                                  | ..  | 2     | 14 0 |
| Bolts and nuts ..  | ..  | 0     | 8 0  |
| Rivets ..  | ..  | 0     | 4 0  |
| Paint, 3 lbs. ..   | ..  | 2     | 8 0  |
| Labour ..  | ..  | 15    | 0 0  |
| Painter's wages ..   | ..  | 2     | 8 0  |
|  |     | <hr/> |      |
| Total cost ..  | ..  | 39    | 5 4  |
|  |     | <hr/> |      |

NOTE.—The calculation on cost of production is taken out at Calcutta. Taking into consideration the freight rates on steel for mufassal towns the above figures may differ slightly.

Manufacture of a steel rack as per illustration.



**Rack.**

*Outside dimensions—*

Height, 37".

Width, 36".

Depth, 11 $\frac{3}{4}$ ".

**MATERIALS REQUIRED FOR CONSTRUCTING A RACK.**

Diag.  
No.

1. 1 Black sheet, 72"  $\times$  36"—18G.
- 2 4 Angles (1"  $\times$  1"  $\times$   $\frac{1}{4}$ "), 3' 1" each piece, or total length 12' 4".
- 48 Roundhead bolts and nuts,  $\frac{1}{4}$ "  $\times$   $\frac{1}{2}$ " long (hole  $\frac{5}{16}$ "), 2 lbs. paint (any desired colour).

*Sizes into which the above sheets are to be cut.*

| Diag. No. | Number of pcs. | Cut size. | Bend.                | Ready side.                | Where used.    |
|-----------|----------------|-----------|----------------------|----------------------------|----------------|
| 3         | 1              | 36" × 14" | 1" × 1¼"             | 36" × 11¼"                 | Top.           |
| 3         | 1              | do.       | do.                  | do.                        | Bottom.        |
| 3         | 1              | do.       | do.                  | do.                        | Shelf.         |
| 4         | 1              | 59½" × 8" | None                 | As shown in diagram No. 4. | Edge of shelf. |
| 5         | 6              | 12" × 7"  | 1" on one side only. | 12" × 6"                   | Brackets.      |

## INSTRUCTIONS FOR BENDING.

*Top, shelf and bottom.*—The top, shelf and bottom have the same bends as in the case of the rack.

There are no bends on shorter which are to be bolted with brackets as shown in diagram No. 6.

Bend one longer side of each of the top, shelf and bottom piece 1" at right-angle per diagram No. 7.

Now bend the other longer sides of the same pieces ¼" flat first and then 1" at right-angle as shown in diagram No. 8.

*Edge of shelf.*—The edge of shelf should be shaped as shown in diagram No. 4, and then both the ends should be bent 11¼" at right-angles. See diagram No. 10.

*Brackets.*—Two rectangular notches, 2" × ¾", should be cut out on both corners of the longer end of the bracket. Now bend the same end (where notches have been taken out) 1" at right-angle for bolting with the top, bottom and shelf as shown in diagram No. 9, which shows also the position of holes ( $\frac{5}{16}$ ").

## INSTRUCTIONS FOR DRILLING HOLES ON ANGLES.

Drill holes ( $\frac{5}{16}$ ") along the centre of each flange of the angles as shown in different views of diagrams (No. 11). Then see diagrams (No. 12) which clear

the position of holes on other flange of the same angles. The extra holes on angles are meant for adjusting the shelf at any desirable space.

#### ASSEMBLING.

First assemble top, bottom and shelf with the brackets. Then bolt the same with the angles. The lug and top should be bolted together with the top and angles.

#### PAINTING.

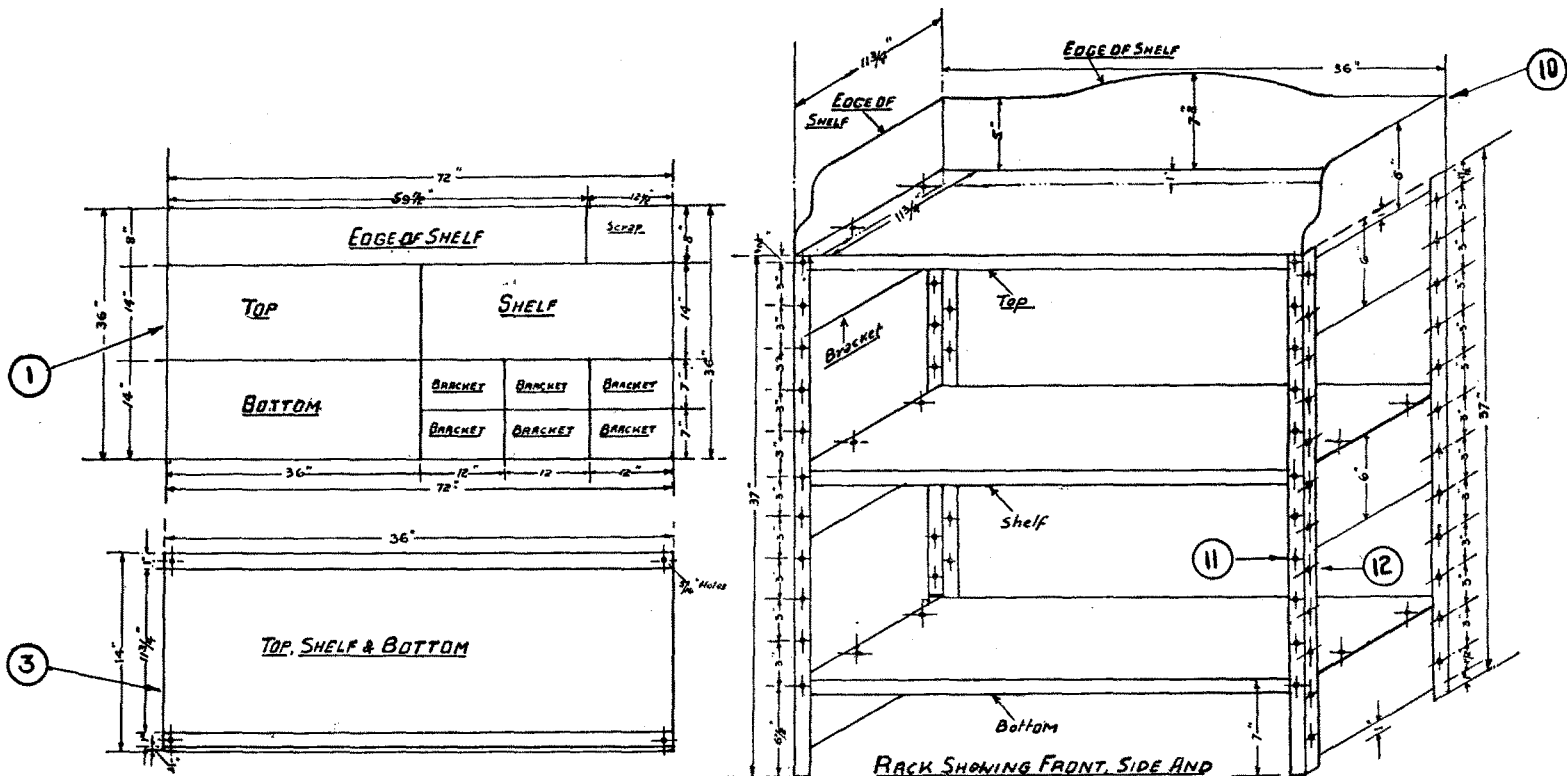
Before painting, the rack should be cleaned thoroughly with pumice stone, kerosine oil or emery paper. It is better to apply a coat of paint on the cut and ready size-parts before joining them together and then the finishing coat may be given.

#### *Cost of production.*

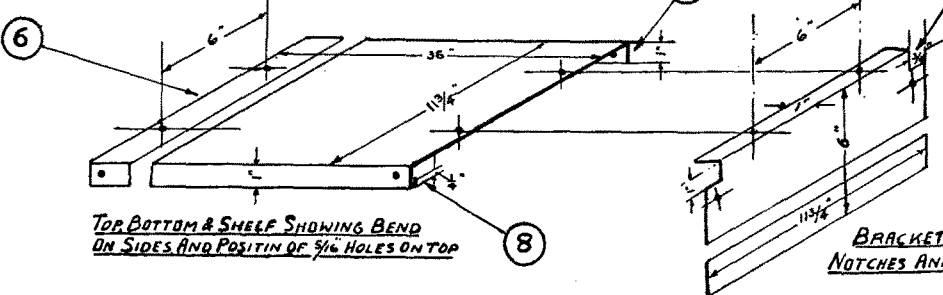
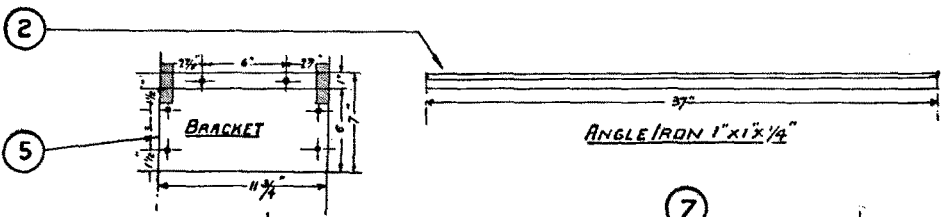
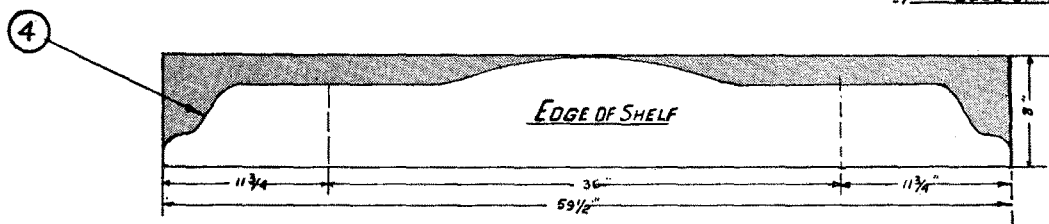
|  | Rs. | A. | P. |
|--|-----|----|----|
| One sheet, 36 lbs. at Rs. 8-8 per cwt. .. ..     | 2   | 12 | 0  |
| 12' 4" angles, 18 lbs. at Rs. 6-8 per cwt. .. .. | 1   | 1  | 0  |
| 48 Bolts and nuts .. ..                          | 0   | 6  | 0  |
| 2 lbs. paint .. ..                               | 1   | 8  | 0  |
| Labour .. ..                                     | 6   | 0  | 0  |
| Miscellaneous .. ..                              | 1   | 5  | 0  |
| Total cost .. ..                                 | 13  | 0  | 0  |

NOTE.—The calculation on cost of production is taken out at Calcutta. Considering the freight rates on steel for towns, the above figures may differ slightly.

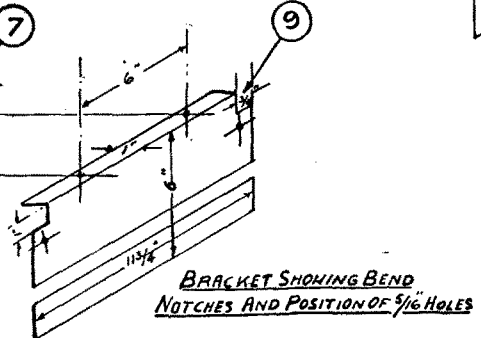
Every additional shelf will comparatively reduce the cost of labour.



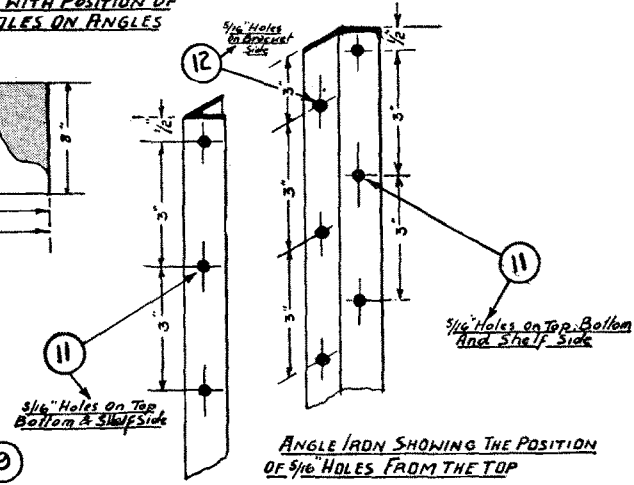
RACK SHOWING FRONT, SIDE AND TOP VIEW WITH POSITION OF 5/16" HOLES ON ANGLES



TOP, BOTTOM & SHELF SHOWING BEND ON SIDES AND POSITION OF 5/16 HOLES ON TOP



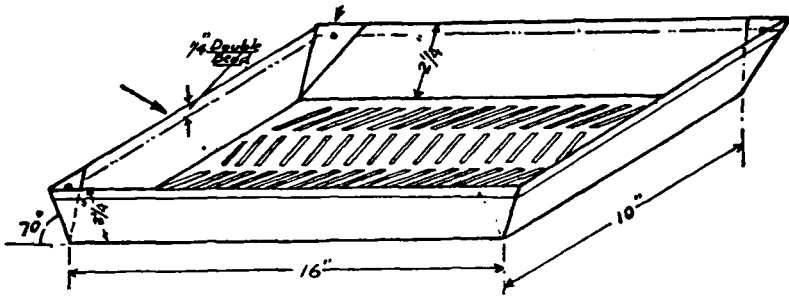
BRACKET SHOWING BEND, NOTCHES AND POSITION OF 5/16 HOLES



ANGLE IRON SHOWING THE POSITION OF 5/16 HOLES FROM THE TOP

**DRAWING IN DETAILS FOR STEEL RACK**  
 Scale 1"=1'-0" 2"=1'-6" 3"=1'-9" 6"=1'-0"

## Sieve.



Size from bottom—

Length, 15".

Width, 17".

Height 2" (not measuring vertically.)

SHEETS REQUIRED TO MAKE A DOZEN SIEVES.

Diag.  
No.

- 1  $1\frac{1}{2}$  Black sheets,  $84" \times 36"$ —24 gauge—22 lbs., 60 Rivets,  $\frac{1}{4}" \times \frac{3}{4}"$  long (punch hole  $\frac{5}{16}"$ ).
- 2 12 Rings, outside diameter  $1\frac{5}{8}"$ , inside diameter  $1\frac{1}{4}"$ . Thickness  $\frac{3}{16}"$  (this can be bought from bazar).

Sizes into which the above sieves are to be cut.

| Diag. No. | No. of pcs. | Cut size.        | Bend.  | Ready size.                |
|-----------|-------------|------------------|--|----------------------------|
| 3         | 12          | $21" \times 15"$ | $2\frac{1}{4}" \times 2\frac{1}{4}"$<br>$\frac{1}{4}" \times \frac{1}{4}"$<br>on four sides. | $16" \times 10"$ (Bottom). |

12 hooks for fitting the ring— $1\frac{1}{2}" \times \frac{3}{4}"$ .

INSTRUCTIONS FOR CUTTING MESHES AND BENDING ON THE CORNERS.

Cut meshes,  $\frac{1}{2}"$  apart,  $2"$ ,  $1\frac{3}{4}" \times \frac{1}{8}"$  wide at the bottom in four sets. The meshes of alternate sets are to be parallel as shown in diagram No. 4. As this sieve is used for separating wheat from gram,  $2" \times \frac{1}{8}"$  meshes are of usual size.

If the sieve is to be used for some other purpose, the meshes may be cut accordingly.

Cut four triangular notches of  $2\frac{3}{8}'' \times 1\frac{7}{16}'' \times 3\frac{3}{16}''$  on four corners of the sieve as shown in diagram No. 5. Now rivet the corners as shown in diagram No. 6.

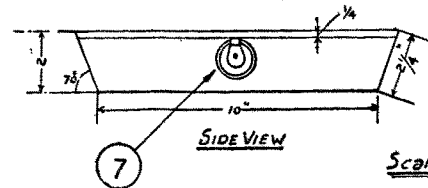
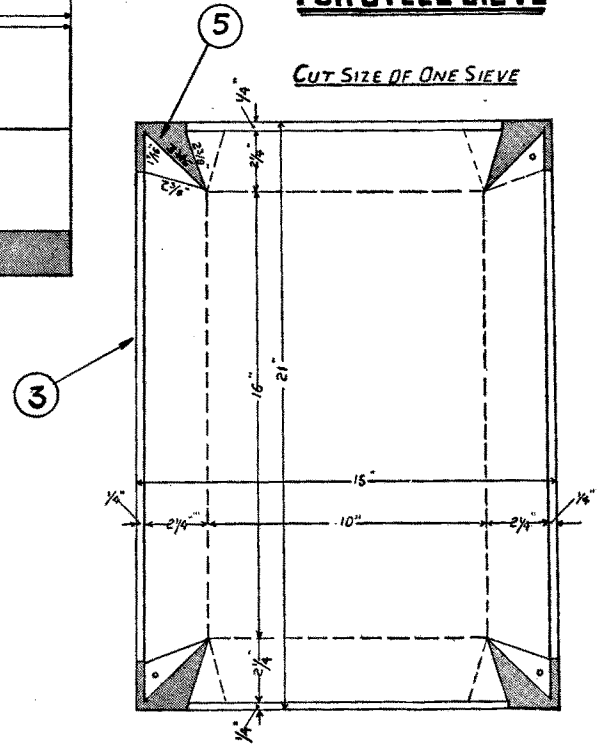
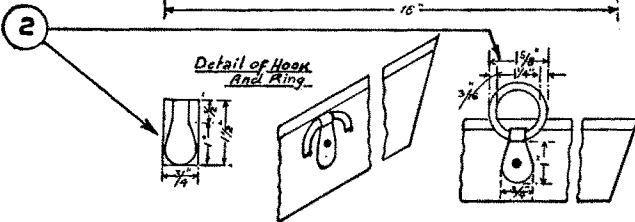
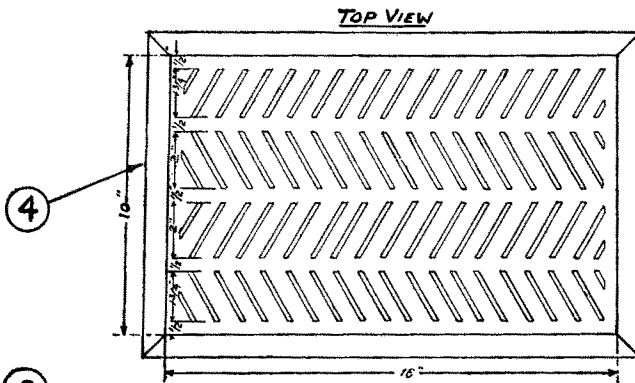
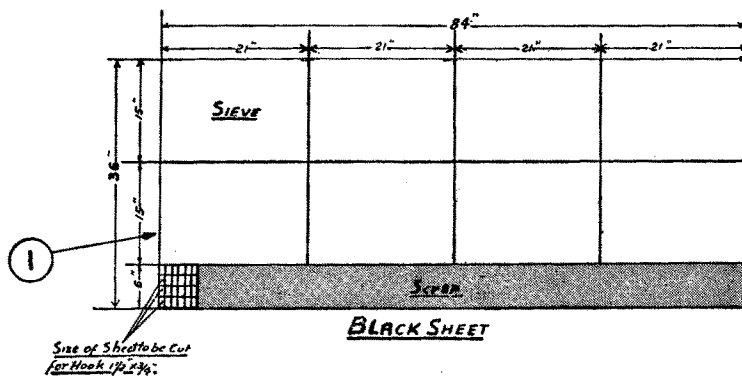
Bend  $2\frac{1}{4}''$  at  $70^\circ$  angle (outside) on four sides, giving  $\frac{1}{4}''$  double bend first as shown in diagram No. 6.

Now put the ring through hook and rivet same with one shorter side of the sieve for handle as shown in diagram No. 7.

*Cost of production for one dozen.*

|  | Rs. | A. | P.    |
|--|-----|----|-------|
| $1\frac{1}{2}$ Sheets $84'' \times 36''$ , 34 lbs. at Rs. 9-8 per cwt. | ..  | 3  | 10 10 |
| Rings per dozen .. .. .  | ..  | 0  | 12 0  |
| Rivets .. .. .   | ..  | 0  | 4 0   |
| Labour .. .. .   | ..  | 3  | 8 0   |
| Total cost per dozen   | ..  | 8  | 2 10  |

# DRAWING IN DETAILS FOR STEEL SIEVE



Scale 1" = 1'-0", 4" = 1'-0", 3" = 1'-0"  
And 6" = 1'-0"



**Manufacture of an octagonal table as per illustration.**



**Octagonal Table.**

*Size—*

Height 2' 6".

Top, 2' 9" (octagonal).

**MATERIALS REQUIRED TO CONSTRUCT THE TABLE.**

| Diag. No. | No. of pcs. |  |
|-----------|-------------|--|
| 1         | 1           | Black sheet, 72" × 36", 20G.                   |
| 13        | 4           | Leg-supports, 1" × 1/4" × 7' 4" Flat.          |
| 24        |             | Bolts and nuts, 1/4" × 1/2" long, holes 5/16". |
|           | 4           | Countersunk screws with nuts.                  |
|           | 1           | lb. Paint (any desired colour).                |

*Sizes into which the above sheet is to be cut.*

| Diag. No. | No. of pcs. | Cut size. | Bend.                              | Ready size.                | Where used.  |
|-----------|-------------|-----------|------------------------------------|----------------------------|--------------|
| 2         | 1           | 36" × 36" | 1" and $\frac{1}{2}$ " on 8 sides. | 33" × 33" Octagonal shape. | Top.         |
| 3         | 4           | 22" × 5"  | $\frac{1}{2}$ ", $1\frac{1}{2}$ "  | 22" × 3"                   | Top-support. |
| 4         | 4           | 30" × 5"  | $\frac{1}{2}$ ", $\frac{1}{2}$ "   | 2" × 2" Angle shape.       | Leg.         |
| 5         | 4           | 6" × 6"   | Right-angle                        | 3" × 3"                    | Bracket.     |

#### INSTRUCTIONS FOR BENDING, CUTTING AND DRILLING HOLES, ETC.

*Top.*—First cut top (36" × 36") octagonal shape. The notches, as shown in diagram No. 14, have to be taken out before bending on all the (eight) sides. Then bend  $\frac{1}{2}$ " first and 1" afterwards, both at right-angles as shown in diagram No. 6.

*Top-support.*—(22" × 5") should be bent  $\frac{1}{2}$ " on one side and  $1\frac{1}{2}$ " on the opposite side which will be bolted with brackets and top as shown in diagram No. 7. Diagram No. 3 shows the cut size, the position of holes, and cutting on four corners. It will hold legs and the top together as shown in diagram No. 11.

*Legs.*—See the cut size of legs, 30" × 5", the  $\frac{1}{2}$ " edge on both sides is to be bent double, and the position of holes is indicated in diagram No. 4. After bending properly, its shape will be as shown in diagram No. 8.

*Brackets.*—The cut size of brackets (6" × 6") is shown in diagram No. 5. After bending 3" as right-angles, its shape will be as shown in diagram No. 9, and its last position is shown in diagram No. 12.

#### HOLES.

The position and diameter of holes ( $\frac{5}{16}$ " ) is shown in different diagrams.

#### ASSEMBLING.

First assemble top-support with legs forming a square frame, then bolt each exterior corner of the frame with the interior of the angle-legs as shown in diagram No. 11.

Bolt four brackets along the centre of each side of the top-support as shown in diagram No. 12.

Next bolt the leg-support 4" above the ground as shown in diagram No. 13.

Finally, screw the top with brackets which are already bolted with the top-frame as shown in diagram No. 15.

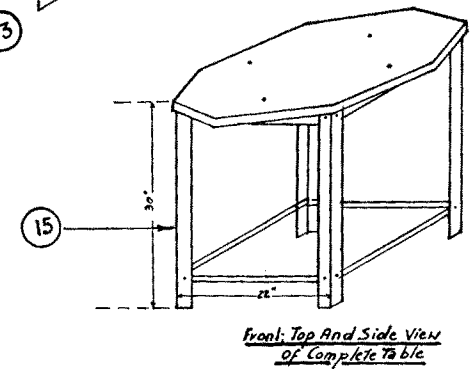
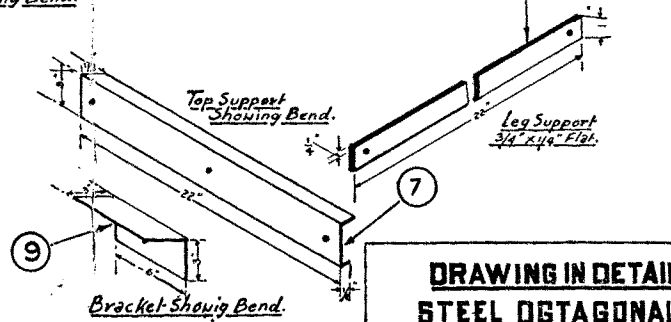
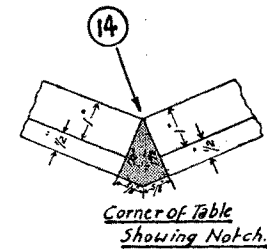
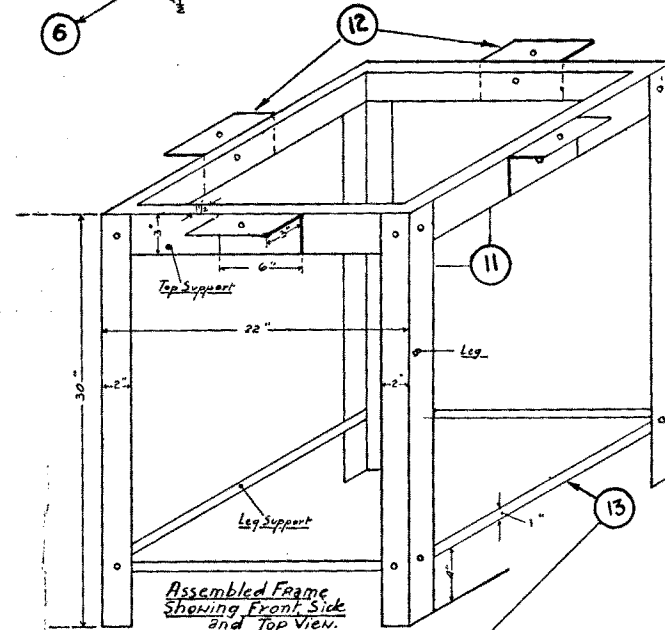
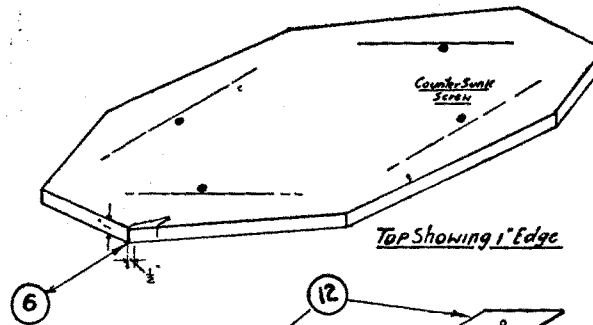
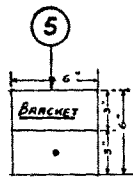
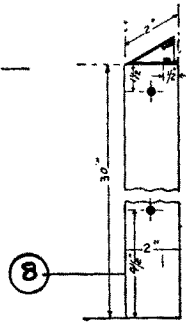
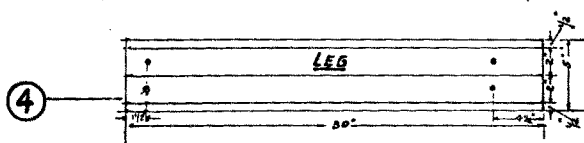
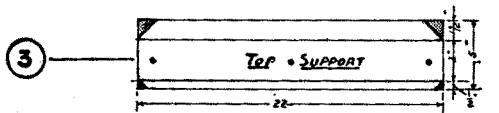
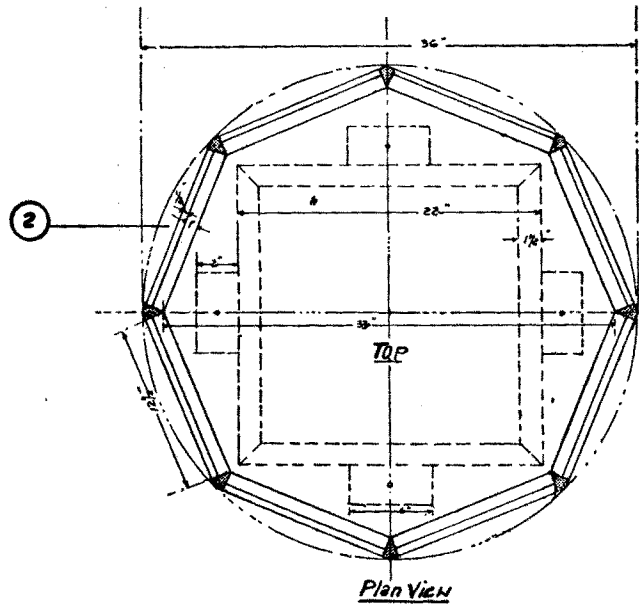
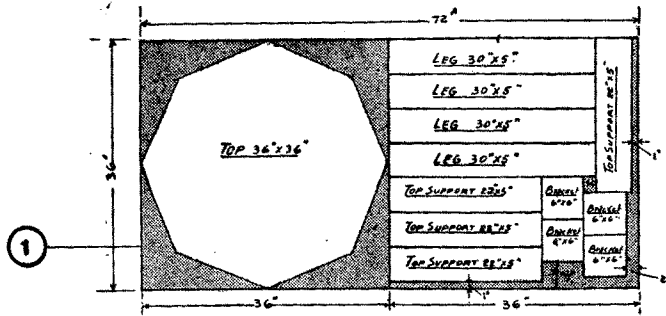
#### PAINTING.

Before painting the rack should be cleaned thoroughly with pumice stone, kerosine oil or emery paper. It is better to apply a coat of paint on the cut and ready size parts before joining them together and the finishing coat may be given after assembling.

#### *Cost of production.*

|   | Rs. | A. | P. |
|---|-----|----|----|
| Black sheet, 72" × 36" × 18G. 35 lbs. at Rs. 9-8 per cwt. . . | 2   | 15 | 6  |
| Flat 1' × ½' × 7' 4" at Rs. 8. per cwt. (6 lbs.) . .          | 0   | 6  | 0  |
| Bolts and nuts, ½" × ½" dia. 24 . . . . .                     | 0   | 2  | 0  |
| Paint, 1 lb. . . . .  | 0   | 12 | 0  |
| Labour . . . . .  | 5   | 0  | 0  |
| Total . . . . .   | 9   | 3  | 6  |

NOTE.—As the figures on cost of production have been taken out at Calcutta, there may be a slight difference if the same table is made in mufassal towns.



**DRAWING IN DETAILS FOR  
STEEL OBTAGONAL TABLE**

Scale 1 1/2" = 1'0" 2 1/2" = 1'0" 4" = 1'0"

SECRET  
2005-04