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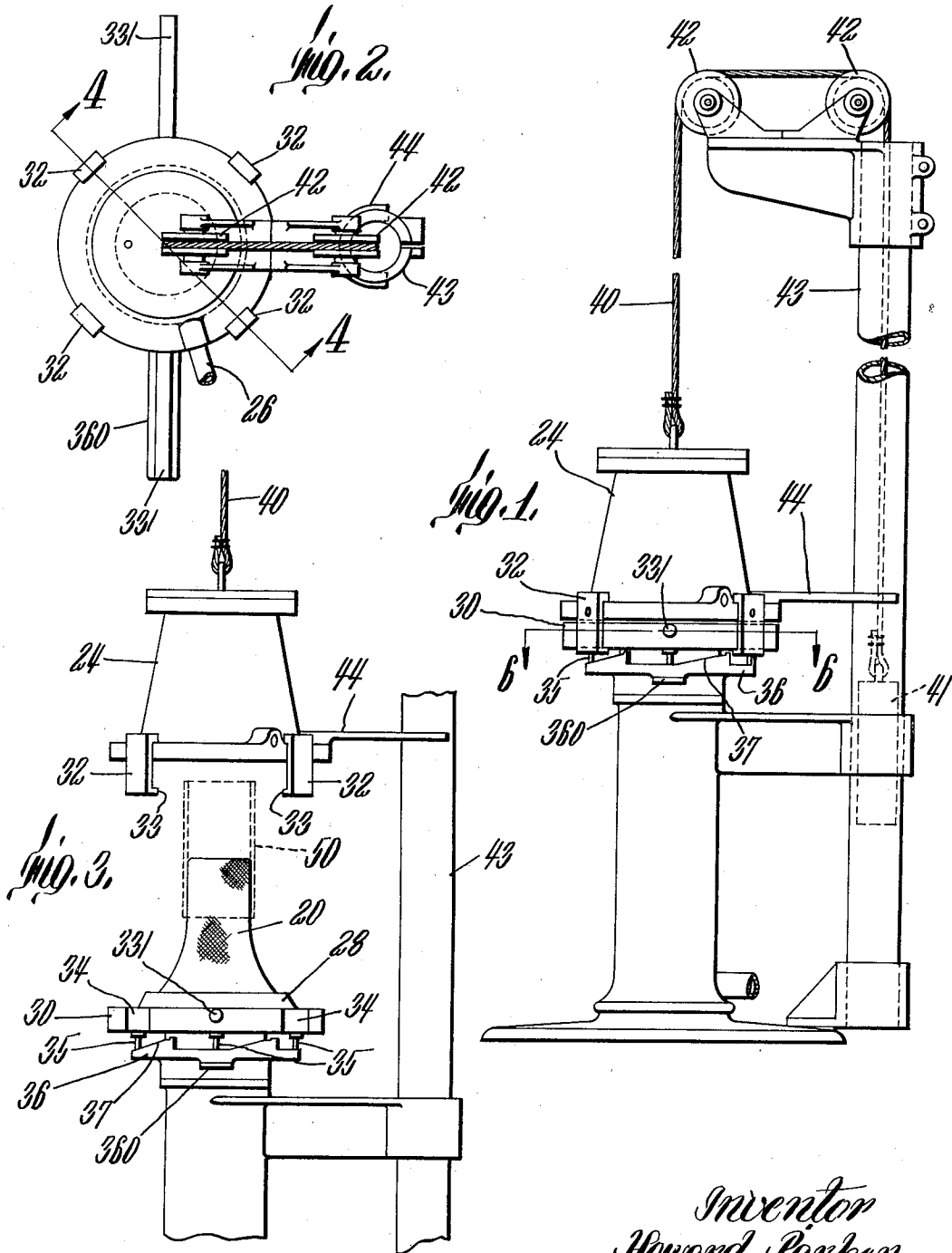
H. PARKER

1,929,535

APPARATUS FOR FORMING FIBROUS BELL MOUTH TUBE ENDS

Filed March 21, 1930

4 Sheets-Sheet 1



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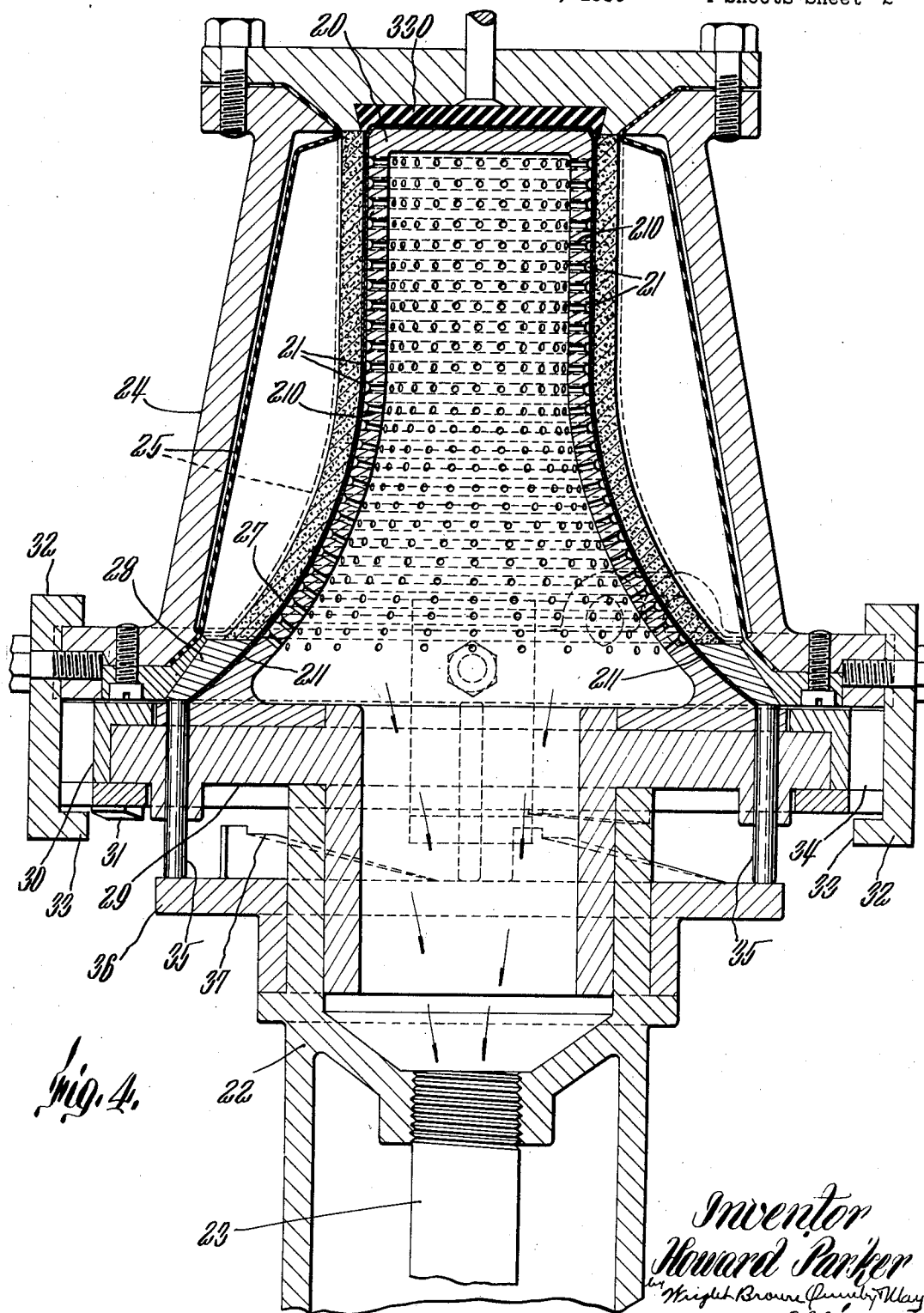
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4 Sheets-Sheet 2



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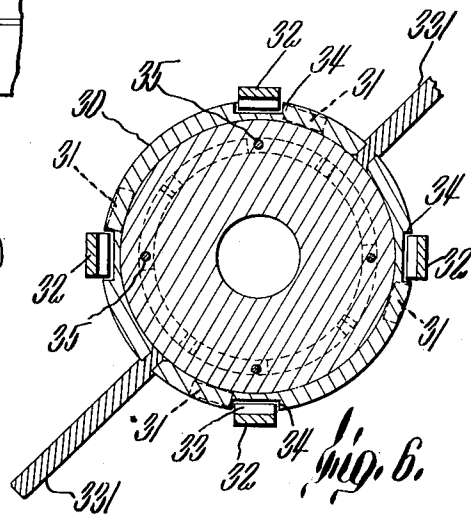
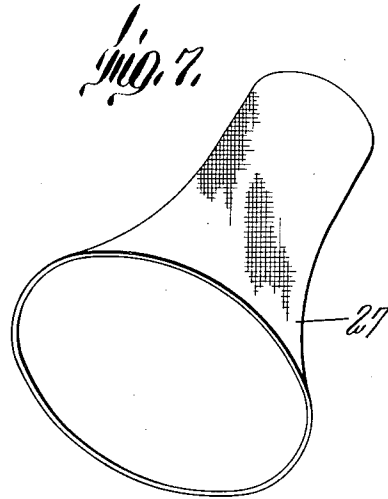
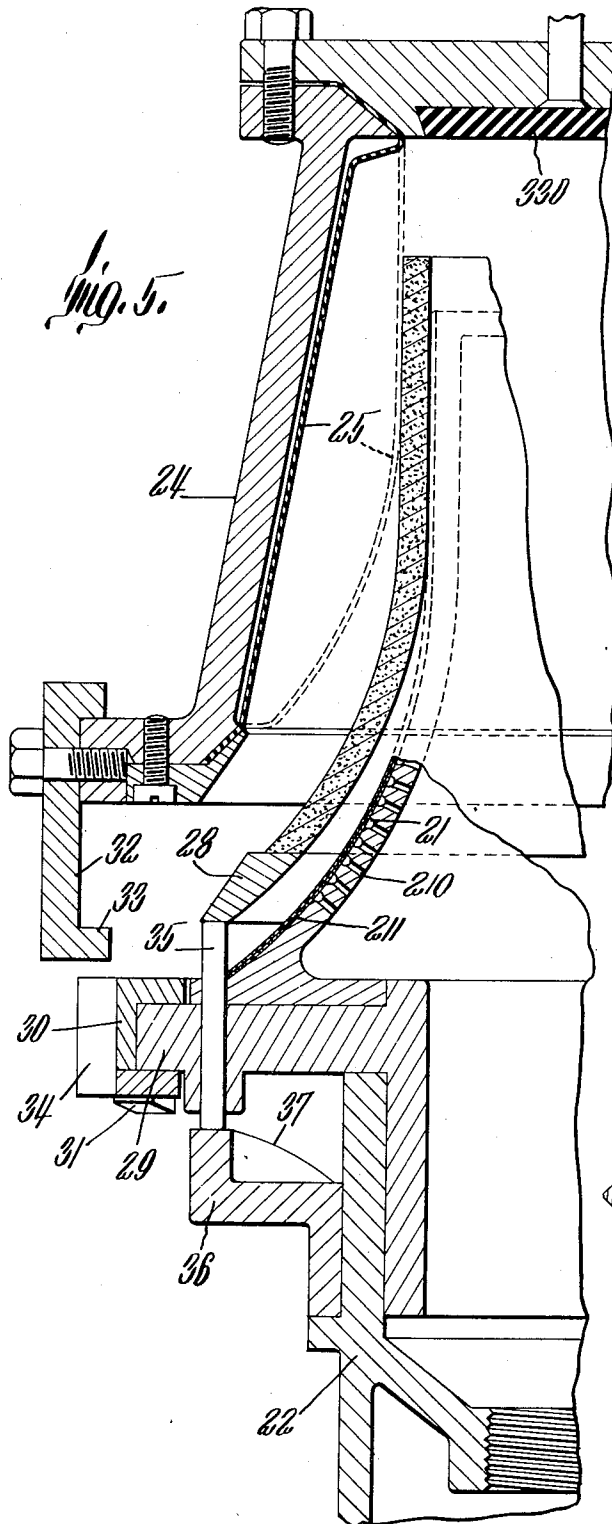
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4 Sheets-Sheet 3



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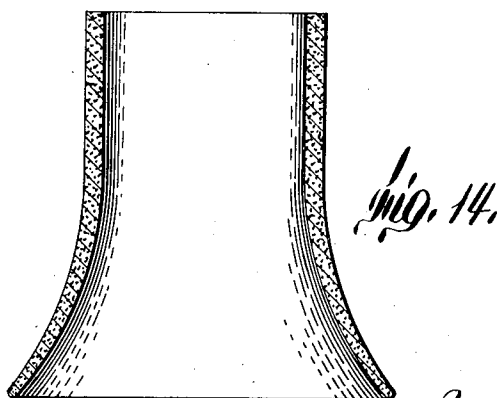
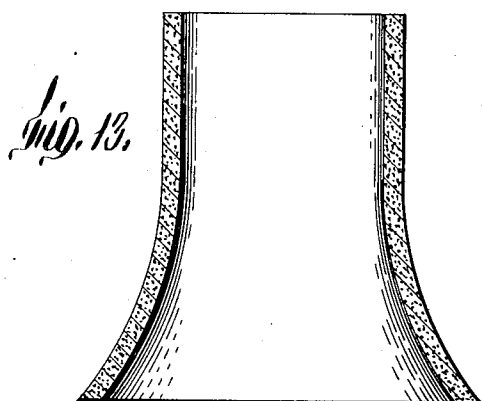
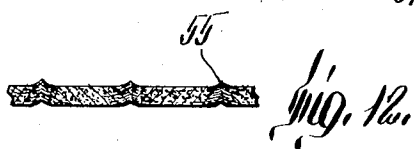
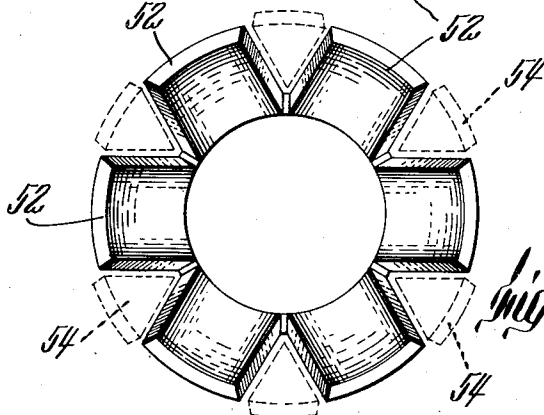
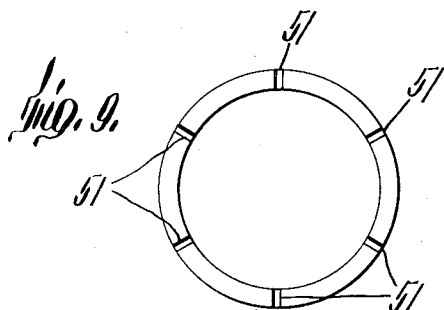
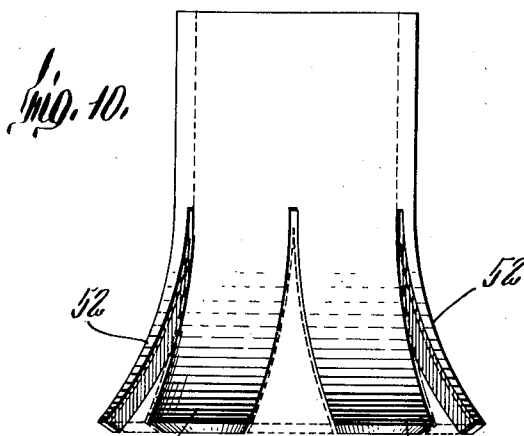
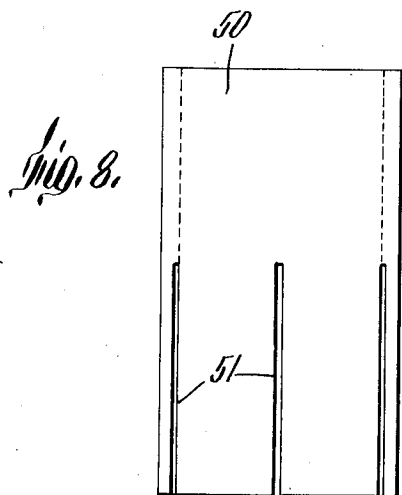
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APPARATUS FOR FORMING FIBROUS BELL MOUTH TUBE ENDS

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UNITED STATES PATENT OFFICE

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APPARATUS FOR FORMING FIBROUS BELL-MOUTH TUBE ENDS

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Application March 21, 1930. Serial No. 437,692

2 Claims. (Cl. 18—19)

This invention relates to apparatus for forming the ends of fibrous tubing into bell mouth shape. The use of fibrous tubing by telephone companies and other users of signal wires and the like in laying underground conduit to contain wires has rapidly grown in recent years. In order to provide access to the wires for changes and repairs, it is customary to interrupt the conduits at intervals by manholes into which the conduits open and through which the wires pass. Since in such manholes the entering wires are usually bent to follow the wall surface in the manhole so as to leave room in the hole for a workman, it is desirable that the ends of the several conduits at the manholes be widened out so as to reduce the sharpness of the bend of the wires. If metal or tile conduits be used, such bell mouth ends can be cast or molded to any desired shape. Where fiber conduit is used, however, the problem of forming bell mouth ends is more difficult, since the strength of a fiber article depends largely on the method of forming it, owing to the fact that the strength of such an article arises chiefly from the thoroughness with which the fibers are interfelted. If, for example, fibrous tubing be made by winding a wet web of pulp on itself on a mandrel, under pressure, the resulting tube, if properly dried, has comparatively great strength owing to the efficient interfelting of the fibers caused by pressing the wet layers together prior to drying. The mechanical strength of such tube is far in excess of that of a tube of similar dimensions made by pressing pulp into a mold. In order to retain the strength of the fibrous tubing made as described by winding a wet web on itself under pressure, the bell mouth embodying the present invention is preferably made from such tubing, the ends of a tube section being slit and spread to increase the diameter, fiber gussets being inserted in the openings to complete the structure.

According to the invention such a structure is preferably assembled while the materials are thoroughly wet, and the assembled structure is thereupon subjected to high pressure which not only gives it its finished shape, but also interfelts the separate parts into a well knitted unit. Apparatus for conveniently and efficiently applying such shaping pressure to the pulp structure is hereinafter described in detail.

For a more complete understanding of the invention, reference is had to the disclosure thereof in the following description and on the drawings, of which,—

Figure 1 is a side elevation of mechanism for pressing the fibrous bell mouth into shape.

Figure 2 is a plan view of the same.

Figure 3 is a side elevation of a portion of the mechanism shown in Figure 1, the parts being shown in a different position of operation.

Figure 4 is a section on the line 4—4 of Figure 2, the section being taken on a considerably larger scale.

Figure 5 is a fragmentary section similar to Figure 4 showing the parts in a different position of operation.

Figure 6 is a section on the line 6—6 of Figure 1.

Figure 7 is a perspective view of a cloth bag used in the apparatus.

Figure 8 is an elevation of a section of fiber tubing with its end portions slotted.

Figure 9 is an end view of the same.

Figure 10 is an elevation of a split tube section with the end elements bent outwardly.

Figure 11 is an end elevation of the same.

Figure 12 is a section of the tube wall showing how the edges of the end elements and the gussets may be worked together.

Figure 13 is a sectional view of a bell mouth as it comes from the press.

Figure 14 is a similar view of a bell mouth after being tooled to its final shape.

Referring to Figures 4 and 5, the press may comprise an inner bell-shaped mold 20 which is provided with a large number of surface channels 21 and perforations 210 therethrough for moisture which may be pressed from the fibers. Closely fitted on the mold 20 is a covering of fine wire screen 211. The mold is suitably mounted on a hollow standard 22, within which is a drain pipe 23 adapted to lead away the water pressed from the fiber bell mouth. A heavy cap 24 is adapted to be lowered over the bell-shaped mold 20 so as to press the pulp bell mouth against the mold. To this end the cap 24 is provided with an elastic lining 25 of rubber or the like, this lining being securely fastened at its upper and lower ends to the cap so as to form a water-tight receptacle between it and the side wall of the cap. Water or other fluid under pressure may be introduced between the side wall of the cap 24 and the elastic lining or bag 25 as by a pipe 26 shown in Figure 2. The bag 25 is thereupon forced inwardly by fluid pressure. The bag 25 is preferably made with a normal shape to fit against the fiber bell-mouth to be pressed, as indicated by dotted lines in Figures 4 and 5. From this position it is stretched by suction to the position indicated in solid lines in Figures 4 and 5 to permit the placing of the cap in operative position. This greatly extends the life of the bag by having the pressure therein applied when it is in its natural undistorted shape. A cloth or rubber bag 27 is preferably provided to fit over the screen cover 211 of the bell-shaped mold 20, to prevent the pressed fiber from clinging to the screen 211. The lower end of this bag may be held in place, as by a suitable ring 28 which is

shaped to fit against the lower portion of the mold 20.

The standard 22 is provided with an outwardly extending flange 29 on which is slidably fitted a ring 30 having cam lugs 31 on the lower face thereof. The cap 24 is provided with downwardly extending clamp members 32 having inwardly extending catches 33 adapted to pass below the ring 30 through recesses 34 in the outer periphery thereof. When the cap 24 is seated in place against the shaping outer face of the ring 28, rotation of the ring 30 on the flange 29 brings the cam lugs 31 into wedging engagement with the intumed elements 33 so as to draw the cap 24 downwardly against a slight compression of a resilient pad 330 which engages the top of the mold 20. A pair of suitable handles 331 may be mounted on the ring 30 to facilitate the firm clamping of the cap 24 on its seat. When the cams 31 are moved out of engagement with the catches 33, the pad 330 assists in moving the cap 24 clear of its wedging engagement with the ring 28. Extending loosely through the flange 29 are a number of pins 35 which are vertically slidable therein. The upper ends of these pins rest against the under side of the ring 28, the lower ends of the pins resting on a ring 36 which slides about the support 22, the upper edge of the ring 36 being provided with cam surfaces 37 on which the lower ends of the pins 35 ride. Thus when the ring 36 is rotated in one direction as by a handle 360, the pins 35, riding on the cam faces 37, are forced upwardly so as to raise the ring 28. As shown in Figures 4 and 5, the ring 28 is positioned around the lower portion of the bell shaped mold in such a way as to receive the lower end of the fiber bell-mouth which is to be pressed. When the pins 35 push the ring 28 upwardly, this, in turn, raises the bell-mouth after it has been pressed so that it is clear of the mold and is ready to be lifted out of the press to dry.

As shown in Figures 1 and 2, the cap 24 may be suspended by a cable 40, on the other end of which is a counter-weight 41 to facilitate the raising and lowering of the cap 24 which is somewhat heavy in structure. The cable 40 may pass over a convenient pair of sheaves 42 which are carried by a suitable standard 43. A guide 44 may be secured to the cap 24 to engage loosely the sides of the standard 43 so as to prevent the cap from swinging around. This guide keeps the clamp members 32 of the cap 24 suitably lined up with the recesses 34 of the ring 30 when the latter is in its position to receive the clamp members 32.

In forming a bell-mouth according to the invention, a short length of fiber tube 50 is thoroughly soaked in water. The end of this section is slit longitudinally at 51, these slits being preferably uniformly spaced around the circumference of the tube. The tube may be split either before or after soaking. The cap 24 is elevated as shown in Figure 3 and the screen 211 of the bell mold 20 is covered with a cloth bag 27. The soaked and split tube section 50 is then forced downwardly over the bell mold 20, thus causing the split end portions 52 to be spread outwardly as shown in Figure 10, leaving triangular openings between the successive spread out elements. The side edges of these elements 52 are preferably

bent outwardly slightly by the fingers of the operator and suitable triangular gussets or wedges 54 of thoroughly soaked pulp, which may be made by cutting up tubes, may be inserted in the triangular openings between the elements 52. The edges of these wedges may also be bent up prior to such insertion, as indicated at 55 in Figure 12. After the wedges have been inserted in place, the abutting edges may then be pressed down flush by the operator, loose wet pulp being pressed into any openings or depressions in the bell-mouth, this action taking but a very brief time. This serves to knit together the edges of the elements 52 and the wedges 54 so that interfelting of the fibers of these elements is promoted. The cap 24 is thereupon lowered until the inwardly projecting ends 33 of the clamp 32 are below the ring 30. This ring is thereupon rotated on the flange 29 causing the cam faces 31 to engage the elements 33 and to draw the cap 24 tightly into place. Pressure is thereupon introduced between the side wall of the cap 24 and the inner bag or lining 25 through the pipe 26. This forces the flexible bag 25 tightly against the bell-mouth and presses the bell-mouth into shape. After a suitable interval the pressure is relieved and the fluid is drained from the bag, whereupon the ring 30 is rotated to release the clamping elements 32. The cap 24 is thereupon raised and the ring 36 is rotated to force the pins 35 and the ring 28 upwardly and thus to raise the compressed bell-mouth with the cap 27 clear of the mold 20. The cap is then readily removed and the bell-mouth is ready to be dried and further treated as by saturation with waterproof materials.

I claim:

1. Apparatus of the class described comprising a support, a bell-shaped mold on said support, a rigid cap adapted to surround said mold and fit tightly against the base thereof, said cap having its side walls spaced from the mold to form a chamber, a resilient pad within the top of the cap adapted to engage the top of said mold when said cap is in place over said mold, a collapsible water-tight bag within said chamber adapted to be expanded toward said mold, and means for clamping said cap in place over said mold so as to compress said resilient pad.

2. Apparatus for pressing a fibrous bell-mouth, which comprises a bell-shaped mold having perforations in the sides thereof, a wire screen cover closely fitted over the sides of said mold, a flexible fabric cover fitted over said screen, a removable ring fitted on said mold at its base and adapted to clamp said screen and fabric covers to the base of said mold, a rigid cap adapted to surround said mold with its side walls spaced therefrom to form a chamber, the lower portion of said cap being fitted to the outer face of said ring, a rubber bag carried within said cap and adapted to be collapsed outwardly against the sides of the cap, a resilient pad carried within the top of said cap and adapted to press against the top of said mold when said cap is in place over said mold, means for expanding said rubber bag to press resiliently against a bell-mouth mounted on said mold, means for lifting said cap clear of said mold, and means for raising said ring from the base of the mold.

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