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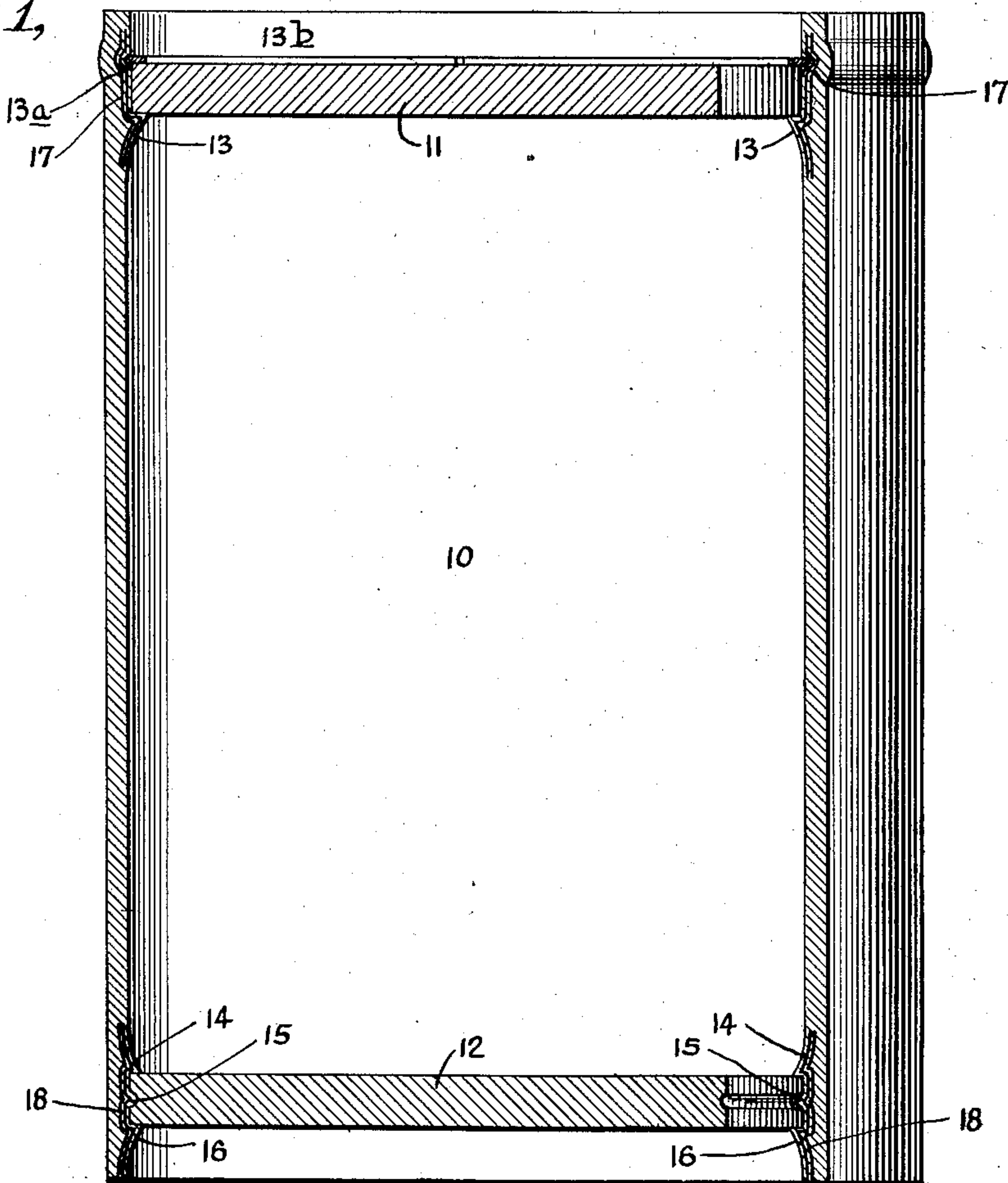
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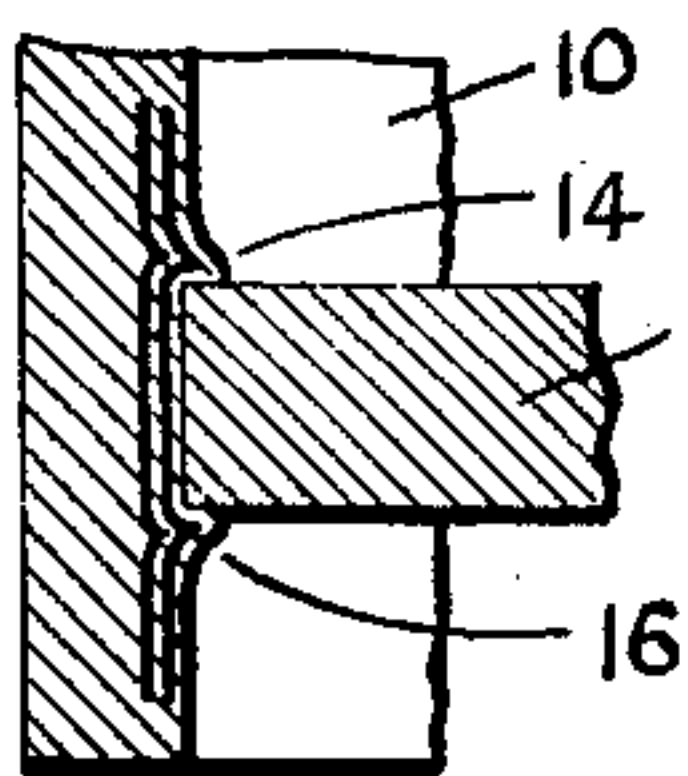
PAPER RECEPTACLE OR CONTAINER AND ART OF MAKING THE SAME

Original Filed Jan. 24, 1920 5 Sheets-Sheet 1

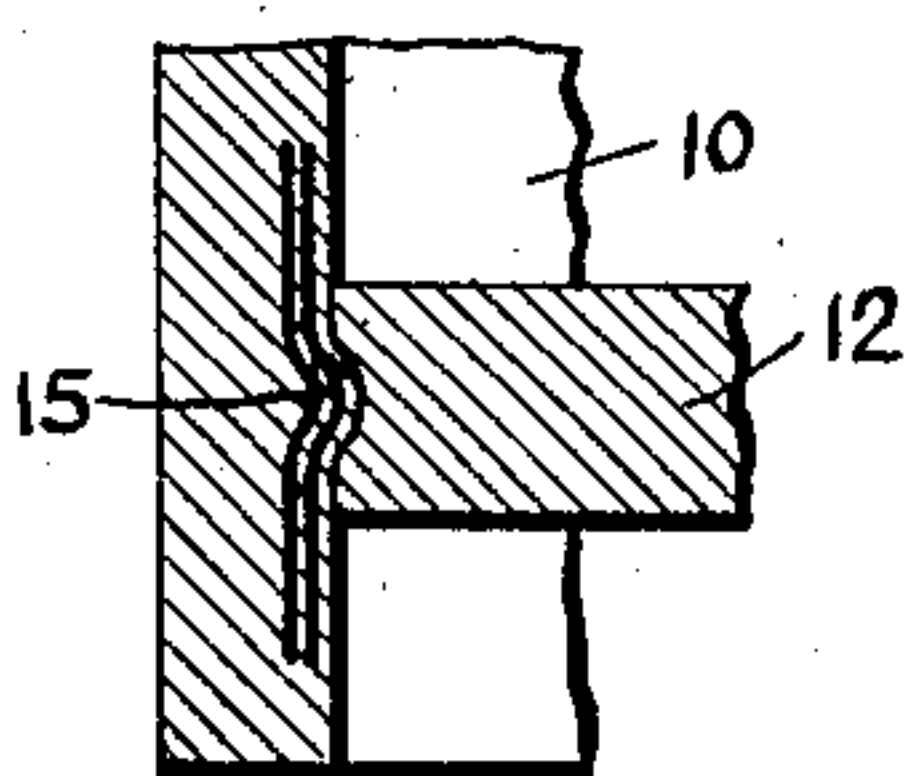
*Fig. 1,*



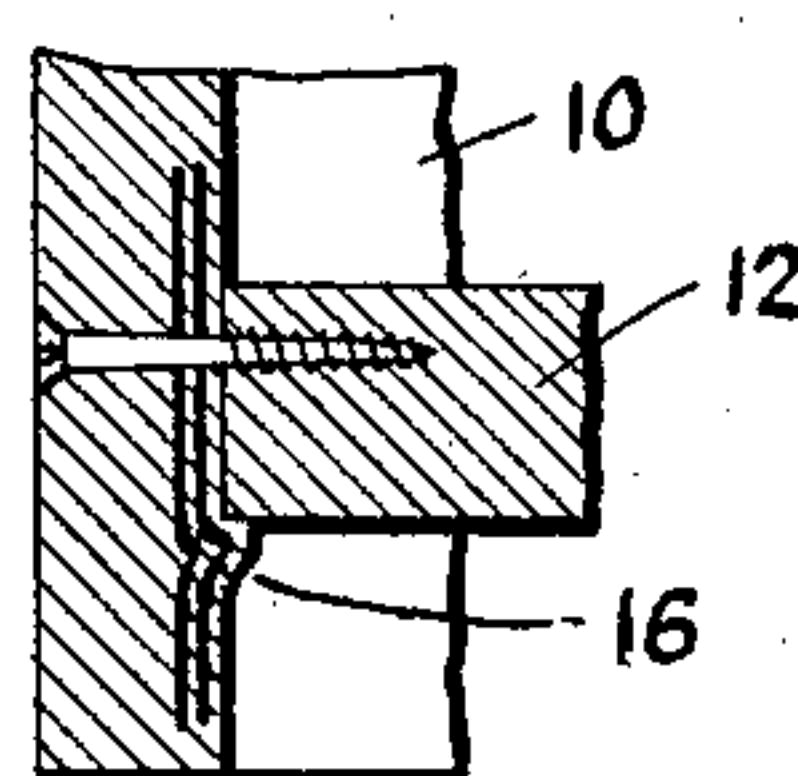
*Fig. 1a,*



*Fig. 1b,*



*Fig. 1c,*



Inventor

*Fred T. Nicholson*

By *His Attorneys*

*Cooper, Kerr & Dumbauld*

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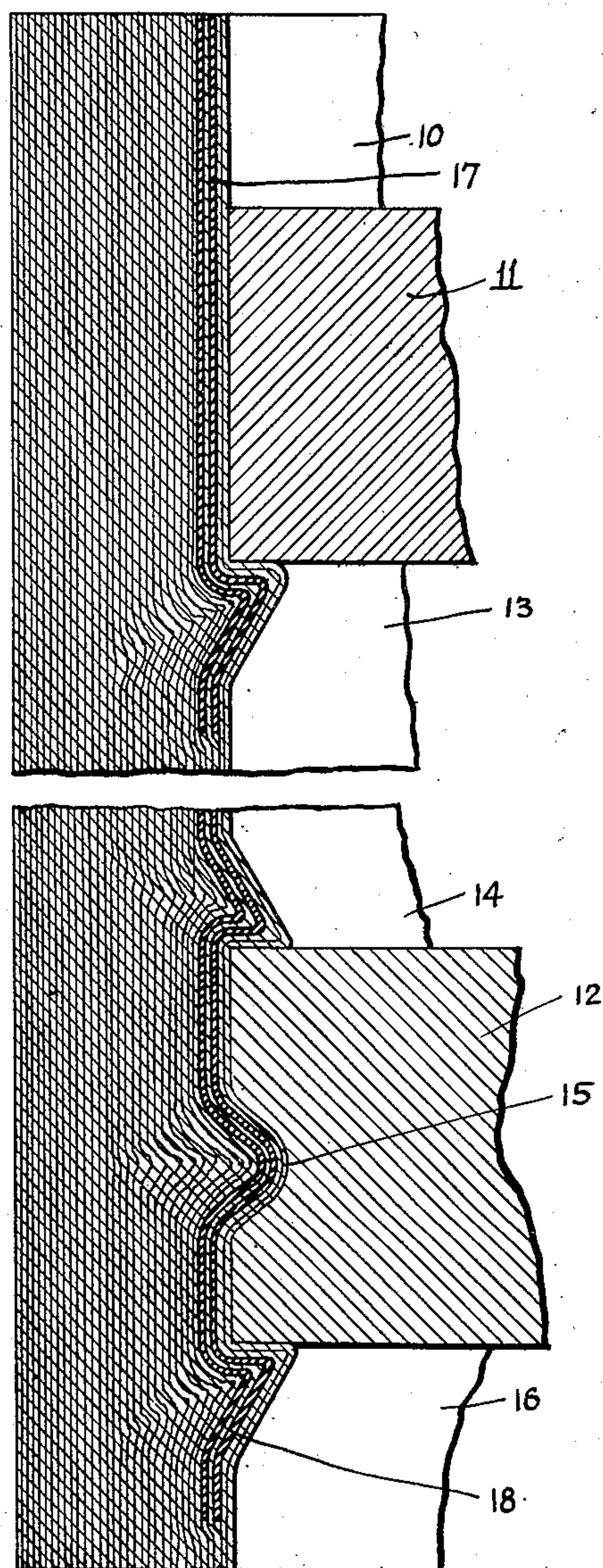
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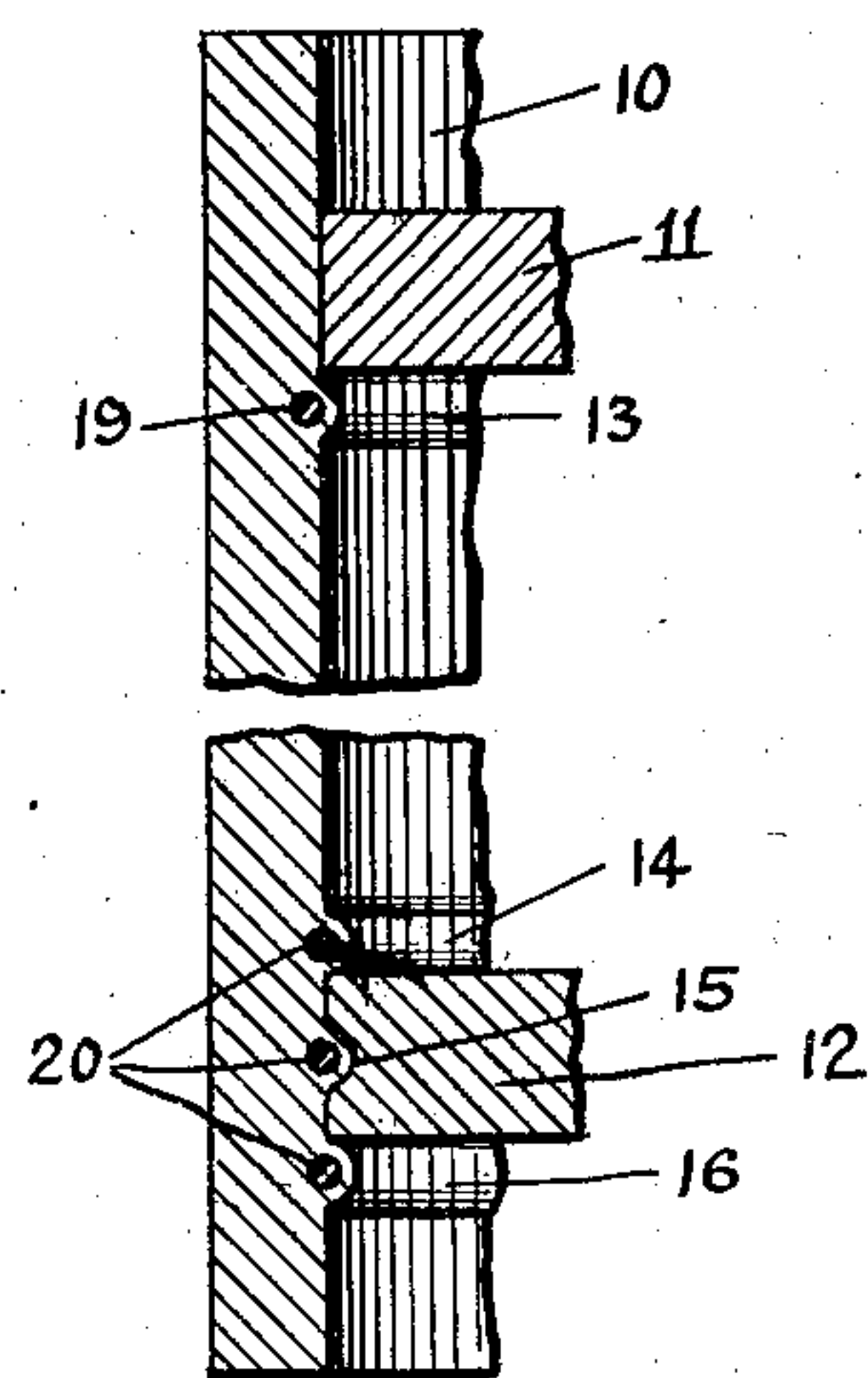
PAPER RECEPTACLE OR CONTAINER AND ART OF MAKING THE SAME

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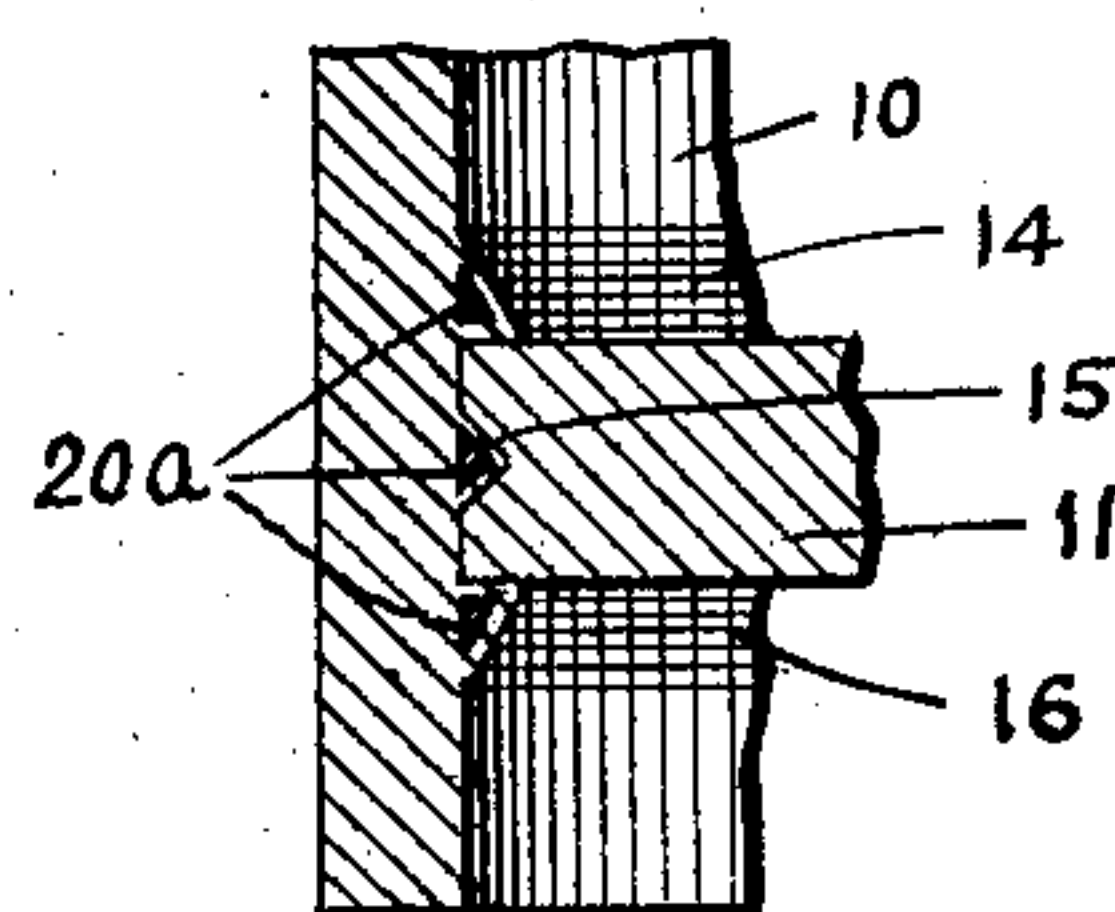
*Fig. 2,*



*Fig. 3,*



*Fig. 3a,*



Inventor

*Fred T. Nicholson*

By his Attorneys

*Cooper, Kerr & Dunham*



Sept. 4, 1928.

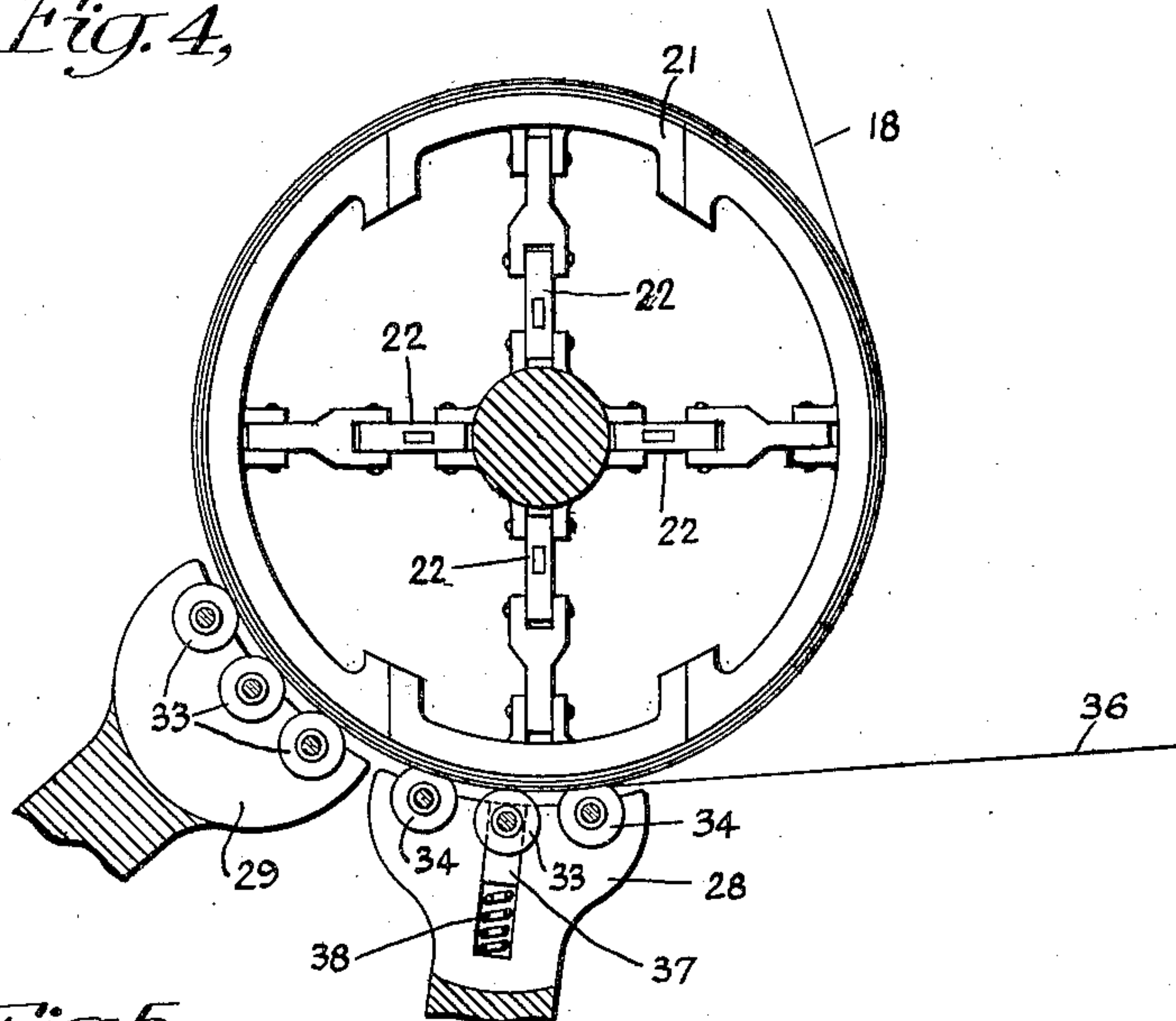
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F. T. NICHOLSON

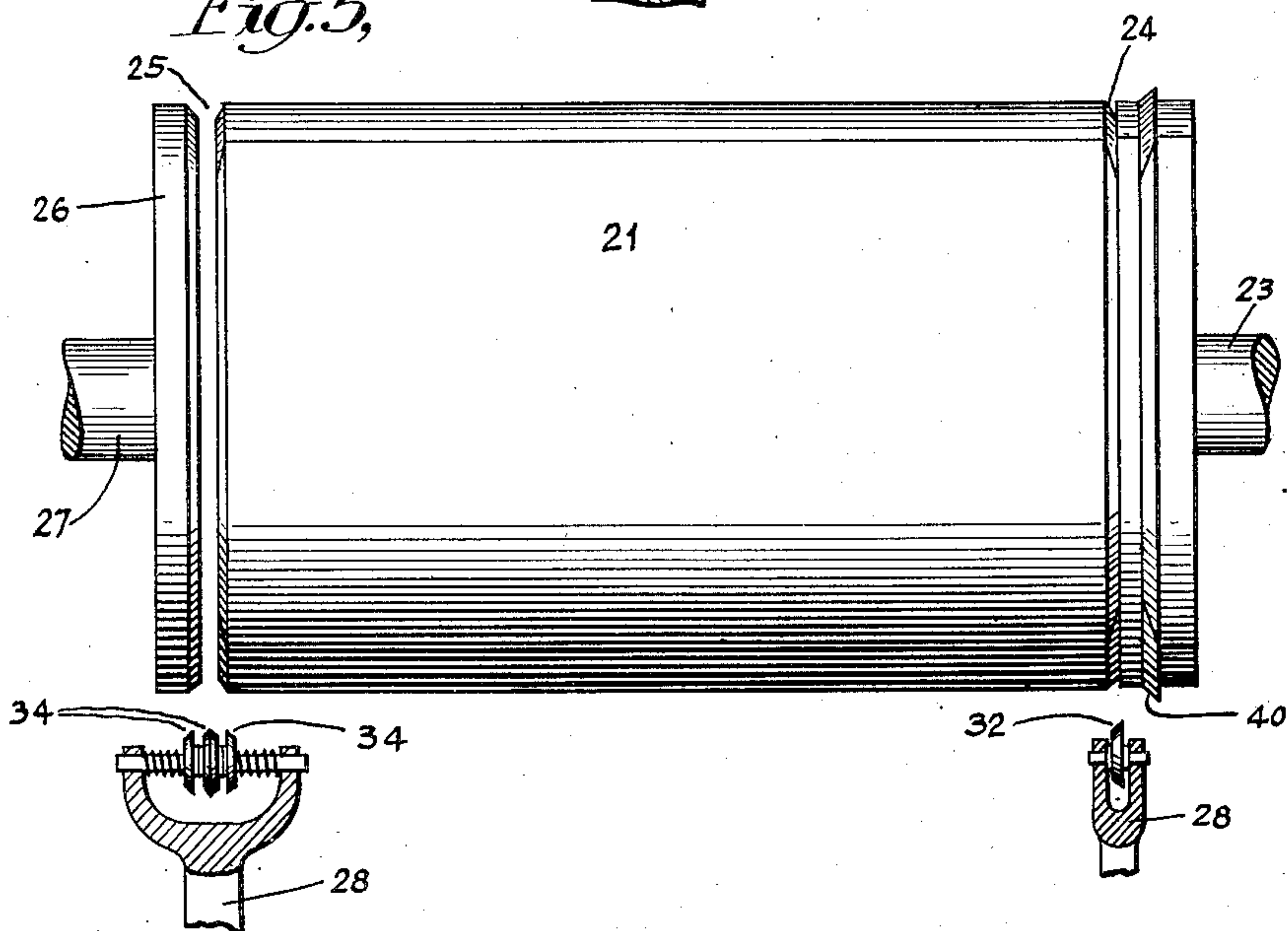
PAPER RECEPTACLE OR CONTAINER AND ART OF MAKING THE SAME

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*Fig. 4,*



*Fig. 5,*



Inventor

*Fred T. Nicholson*

By *his Attorneys*

*Cooper, Kerr & Dunham*

Sept. 4, 1928.

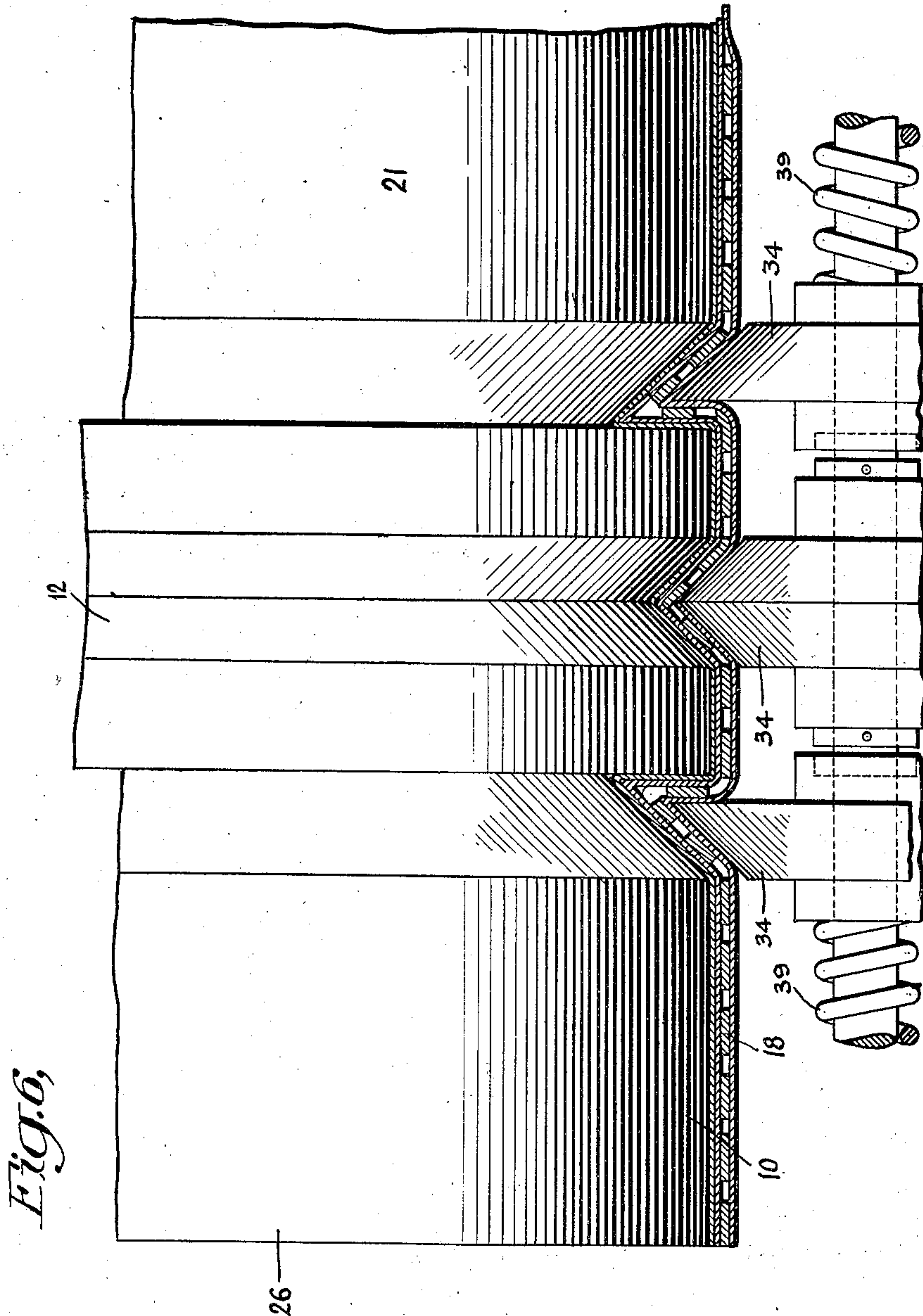
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F. T. NICHOLSON

PAPER RECEPTACLE OR CONTAINER AND ART OF MAKING THE SAME

Original Filed Jan. 24, 1920

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Inventor

*Fred T. Nicholson*

By his Attorneys

*Coper, Kue & Dunham*

Sept. 4, 1928.

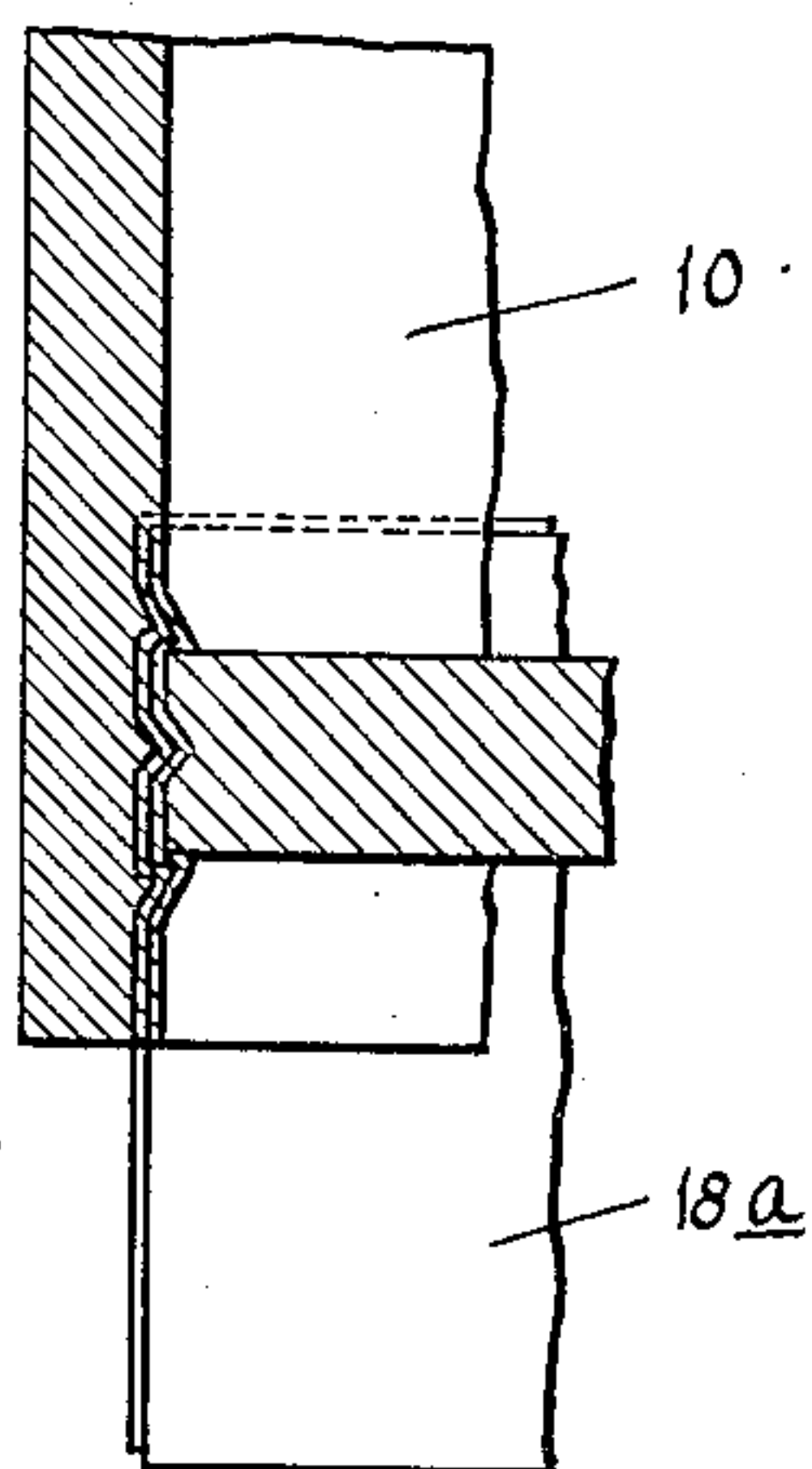
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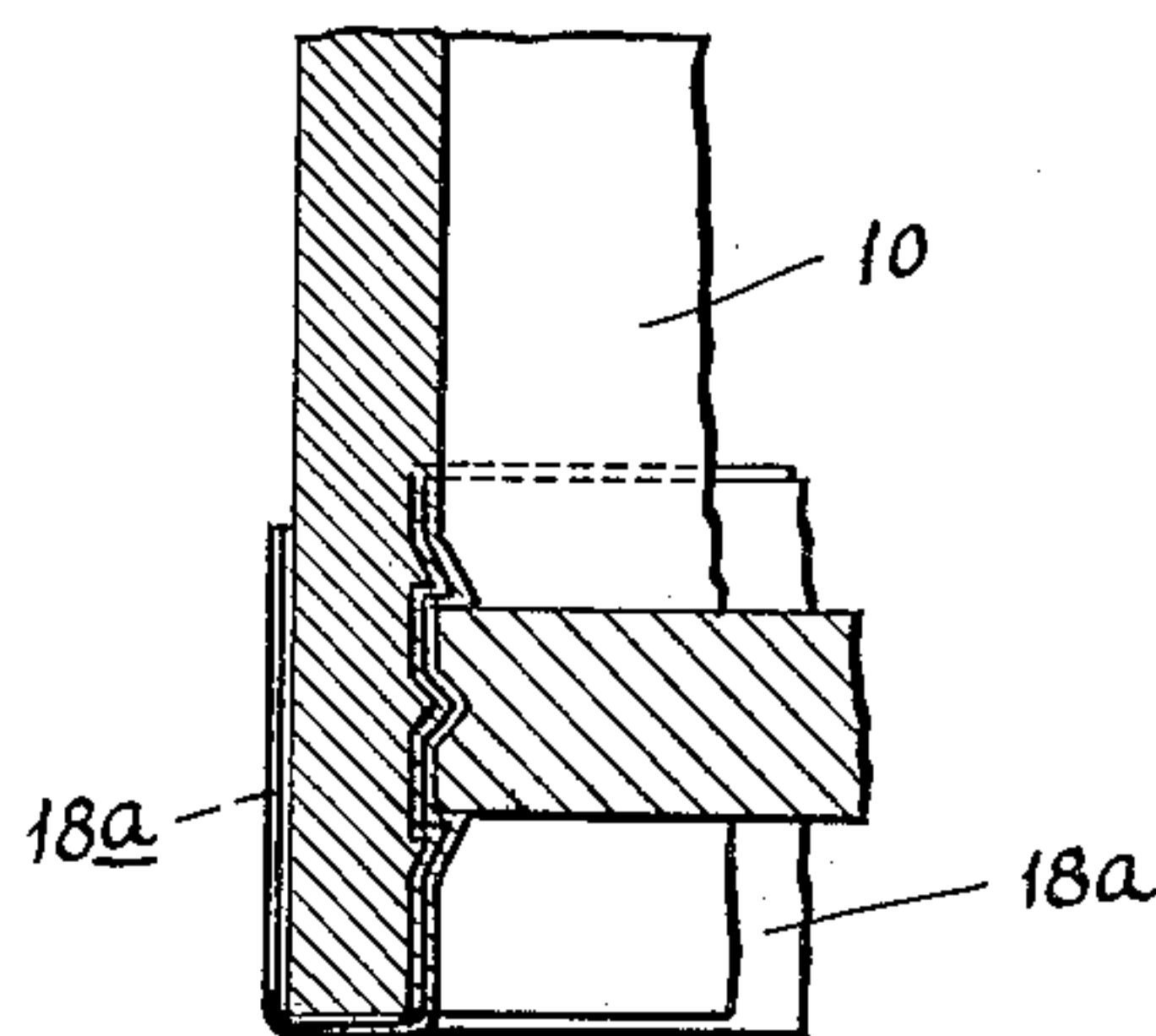
PAPER RECEPTACLE OR CONTAINER AND ART OF MAKING THE SAME

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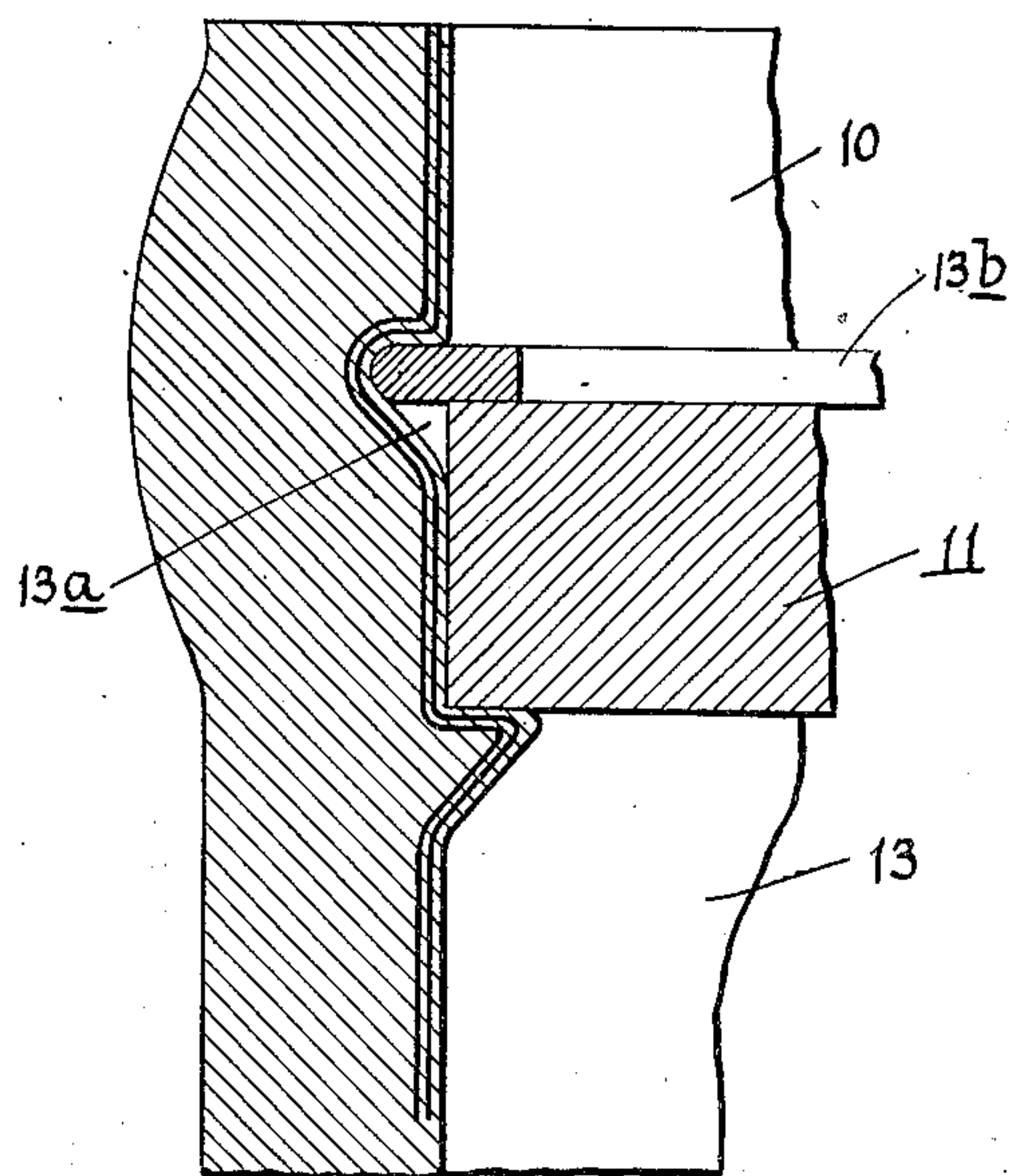
*Fig. 7,*



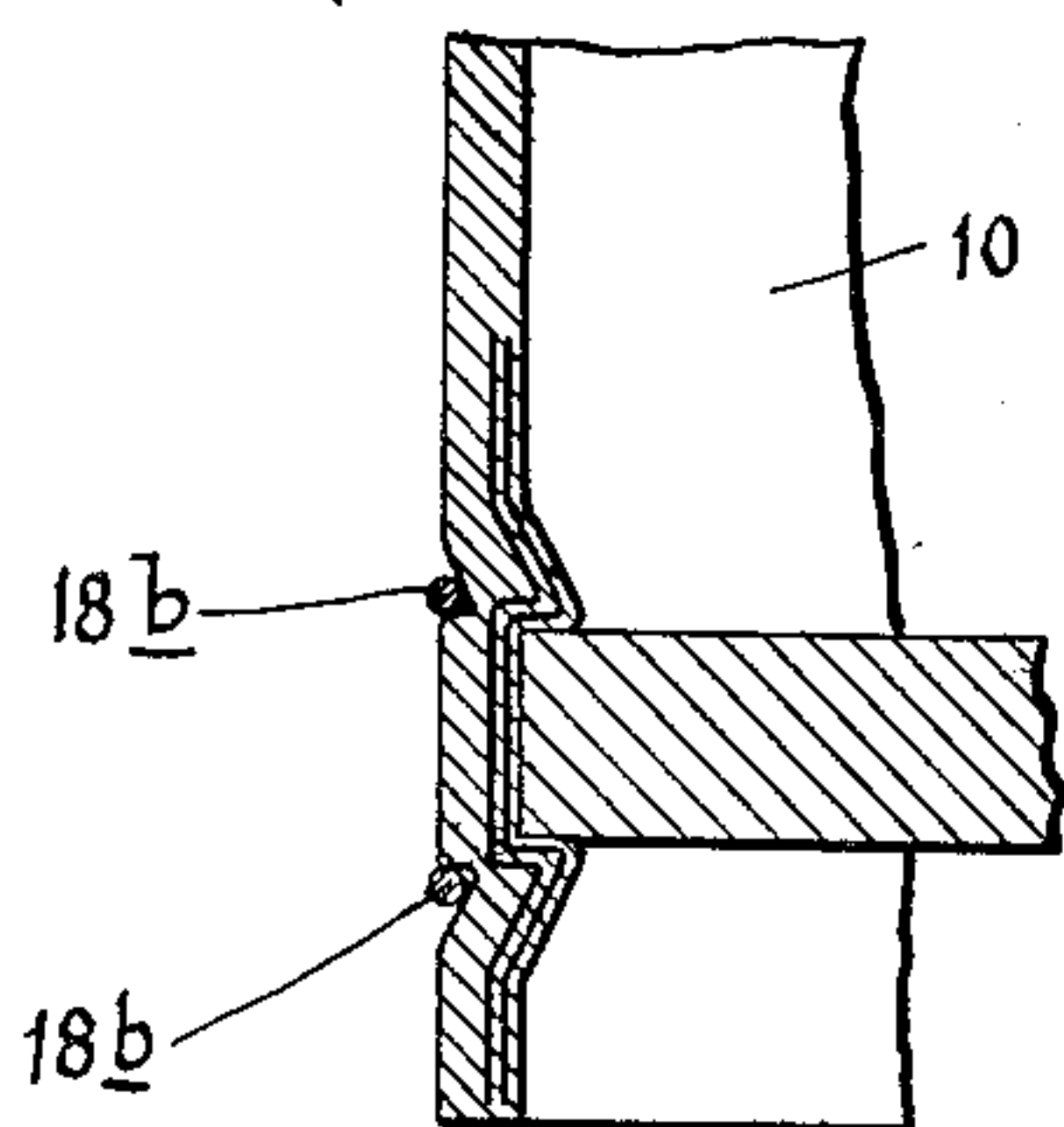
*Fig. 8,*



*Fig. 10,*



*Fig. 9,*



Inventor  
Fred T. Nicholson  
By his Attorneys  
Cook, Kim & Dunham



Patented Sept. 4, 1928.

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# UNITED STATES PATENT OFFICE.

FRED T. NICHOLSON, OF BLOOMFIELD, NEW JERSEY.

PAPER RECEPTACLE OR CONTAINER AND ART OF MAKING THE SAME.

Original application filed January 24, 1920, Serial No. 353,692. Divided and this application filed November 24, 1922. Serial No. 602,944.

This invention relates to receptacles or "containers" made by winding paper or other suitable material on a form or mandrel. Heretofore, in containers of this type, considerable difficulty has been experienced in securing the closures or heads in or on the ends of the tube, and it is accordingly the chief object of my invention to provide a container and method of making the same, in which one or both heads are secured in place, wholly or partly, by one or more inner ribs which are formed on the inside of the container in the course of winding the strip on the mandrel. These ribs, constituting seats for the closures, are formed by, or reinforced by, strips of metal or other material of suitable strength, which are introduced into the wall of the tube as the winding proceeds and are wound into place with the paper which forms the wall. To this and other ends the invention consists in the novel features hereinafter described.

Referring to the accompanying drawing, Fig. 1 is a sectional elevation of one form of my improved container. For the sake of clearness, in order to show the reinforcing strips as plainly as possible, the several plies or layers of papers composing the wall of the container are not indicated.

Figs. 1<sup>a</sup>, 1<sup>b</sup>, 1<sup>c</sup> are detail sectional views of modifications.

Fig. 2 is a detail section of the container on a larger scale, showing also the layers of paper.

Figs. 3 and 3<sup>a</sup> are detail sections on a smaller scale, showing another form of the invention. In these figures, as in Figs. 1, 1<sup>a</sup>, 1<sup>b</sup>, and 1<sup>c</sup>, no attempt is made to indicate the individual layers of paper.

Fig. 4 is an end view of a mandrel or form on which the layer and reinforcing strips are wound.

Fig. 5 is a side view of the same.

Fig. 6 is a detail view, on a larger scale, illustrating the forming of the circumferential heads or ribs on the inside of the container.

Fig. 7 is a detail sectional view illustrating one stage in making a form of the invention in which the reinforcing strip or strips are extended beyond the edge of the container.

Fig. 8 is a detail view similar to Fig. 7, showing the extended reinforcing strips bent over the edge of the container wall.

Fig. 9 is a sectional view of a form of the invention in which grooves are provided on the outside of the container wall, corresponding to the ribs on the inside, to receive reinforcing bands.

Fig. 10 is a detail sectional view showing a convenient method of securing a head removably in place.

My improved container may be of any suitable shape in cross section, for example circular, oval, elliptical, or polygonal, but the circular cross section is in general stronger and is therefore preferred, especially for barrels or drums of large capacity. In Figs. 1 and 2 a container of the cylindrical type is shown, having closures or heads 11, 12, which are held by or against inner circumferential seats consisting of beads or ribs 13, 14, 15, 16, reinforced by similarly ribbed or corrugated strips of sheet metal 17, 18. As explained hereinafter, these metal strips are wound into the wall of the container as the tubular body is formed, the strips being thus embedded in the wall. Instead of sheet metal, the ribs may be reinforced by wires of suitable cross section, as round wires 19, 20, Fig. 3, or triangular wires 20<sup>a</sup>, Fig. 3<sup>a</sup>. If one head is to be permanently secured in place I prefer to use three beads, as in Figs. 1, 2 and 3,—an upper bead 14 and lower bead 16 embracing the upper and lower edges of the head, and an intermediate or middle bead 15 engaging a groove in the edge of the head, but one or more of these beads may be omitted. Thus in Fig. 1<sup>a</sup> the middle bead is omitted, in Fig. 1<sup>b</sup> the middle bead alone is used, and in Fig. 1<sup>c</sup> only the lower bead is used. In any case, especially where only one bead is used, additional fastening means may be employed, as for example screws, as indicated in Fig. 1<sup>c</sup>, connecting the head and wall in any convenient and suitable manner, and the removable head (in general the head which is secured in place after the tubular body of the container is removed from the mandrel) can be secured in the same or any other way, as by means of a hoop or ring (not shown) inside of the chime and fastened thereto.

The reinforcing members 17, 18 may, if desired, be of perforated or foraminous sheet metal, as in Fig. 6, in which case the adhesive used to cement the turns or layers of paper together penetrates into the holes



and forms numerous dowels, so to speak, which afford additional resistance to shearing stresses.

In making the container in the preferred way the strip of paper or other material is wound on a collapsible mandrel of any suitable type, for example that shown at 21, Fig. 4, in which the sections are shifted in and out by means of toggles 22, actuated by any convenient means, not shown. The mandrel is mounted on one end of a shaft 23, Fig. 5, and at its inner end is provided with a circumferential groove 24. At its other end its edge is beveled, as at 25, and adjacent to this end is a beveled disk 26 of the same diameter as the mandrel, carried by a shaft 27. The latter is mounted in any convenient manner to permit it to be shifted axially away from the mandrel and then be swung transversely to permit the container to be slipped off axially after the mandrel is collapsed. The head which is to be permanently secured in place is arranged concentrically between the disk 26 and the end of the mandrel and is held frictionally by the firm pressure of the disk. The head and disk thus form in effect a part of the mandrel.

At each end of the mandrel I provide one or more roller heads, as 28, 29, movable radially toward and from the mandrel, and each carrying one or more ribbing or finishing rollers, as 32, 33, 34. As the paper 36 (under slight tension) is wound on, the roller heads are advanced (as by means of springs, compressed air, or other means, not shown) and the rollers are caused to bear on the surface. In this operation the cylindrical rollers 33 hold the paper in snug conformity with the surface of the mandrel, while the ribbing rollers 34, which have their edges beveled or otherwise suitably shaped for the purpose, indent the paper into the circumferential grooves in the mandrel. When a sufficient number of turns or layers of paper have been wound on, the reinforcing strips 17, 18 are introduced, as in Fig. 4. These strips may be just long enough to go once around the drum, with or without their ends overlapping, or they may be long enough to wrap several times, and preferably they are not ribbed or corrugated in advance but are flat, in which case the desired ribs or beads are formed by the beading rollers 32, 34, while the edges of the strips are held down by the cylindrical smoothing or finishing rollers 33. Where both kinds of rollers are carried by the same head, the cylindrical or finishing rollers are mounted in sliding bearings 37 actuated by springs 38, so that such rollers may be kept in firm contact with the paper as the wall of the tube increases in thickness. The grooves (formed by the ribs) fill up as the winding proceeds, and in order to keep as flat as possible the surfaces next to the head

(for example the head 12, Fig. 6) the outer rollers 34 are adapted to slide axially on their shaft but are urged inwardly toward the middle roller by springs 39.

As the winding proceeds, suitable cement, glue or other adhesive is applied, so that the successive layers are firmly united. Or a fusible and waterproof material may be used, as for example paraffin; in which case the paper or other fabric may be impregnated in advance and then heated as it is wound, so that the layers will unite, cooling means being employed, if necessary or desirable, to facilitate hardening or setting of the paraffin.

When the wall of the tube has been built up to the desired thickness, the rotation of the mandrel is stopped. The roller-heads are then withdrawn, and the disk 26 is withdrawn axially and swung out of the way. The mandrel being collapsed, the tubular body of the container, with one head or closure in place, can now be slipped endwise off the mandrel.

As hereinbefore stated, the reinforcing means used is not necessarily a flat strip. Other means may be used, as for example one or more wires, as in Fig. 3, already described. I may also use a flat strip wide enough to reach the edge of the tube, especially if the strip is perforated, as in Fig. 6, or it may be wide enough to overhang the edge at either or both ends, as indicated at 18<sup>a</sup>, Fig. 7. In the latter case, after the wall is built up to the desired thickness the overhanging portion of the strip or strips is bent down upon the outer surface of the wall, as in Fig. 8 by spinning or other suitable operation. By making the wall relatively thin or the ribs relatively deep, or both, the tube may be left with circumferential grooves on its outside, of greater or less depth, in which binding and reinforcing means may be seated, as wires 18<sup>b</sup>, Fig. 9.

One or both heads may be removably secured by the method illustrated in Figs. 1 and 10. In this case the container wall is formed with an inner bead 13 on which the head 11 rests, and with an inner circumferential groove 13<sup>a</sup> to receive a split ring 13<sup>b</sup> which is sprung into the groove and overhangs the edge of the head 11 all around. The ring may be stripped or "peeled" out of the groove when it is desired to remove the head. This groove may be formed over a rib 40 (Fig. 5) on the collapsible mandrel 21 by means of suitable rollers (not shown) bearing on the paper and the reinforcing strips or wires as the tubular body of the container is formed; or it may be made by cutting a groove on the inside after the body is removed from the mandrel.

Claims to the art or method of making the container or containers are not asserted in the present application but will be found in my application Serial No. 353,692, filed



January 24, 1920, and of which the present application is a division.

It is to be understood that the invention is not limited to the specific features of construction and manufacture herein described, but can be practised in other ways without departure from its spirit.

What I claim is—

1. In a container of the class described, a tubular body having a wall composed of a plurality of continuous turns or layers of paper, at least the inner layers being indented circumferentially to form an inwardly-extending circumferential rib and having reinforcing means for the rib, disposed between the turns or layers of paper without crossing a turn or layer of the paper, said tubular body having a circumferential groove axially spaced from said rib, a closure engaged by said rib and held thereby against displacement in one axial direction, and means adapted to seat in said groove and engage said closure for holding said closure against displacement in the opposite axial direction.

2. In a container of the class described, a tubular body having a wall composed of a plurality of continuous turns or layers of paper, at least the inner layers being indented circumferentially to form an inwardly-extending circumferential rib, said tubular body having a circumferential groove axially spaced from said rib and having reinforcing means for the groove, disposed between the turns or layers of paper without crossing a turn or layer of the paper, a closure engaged by said rib and held thereby against displacement in one axial direction, and an expansible member adapted to seat in said groove and engage said closure for holding said closure against displacement in the opposite axial direction.

3. In a container of the class described, a tubular body having a wall composed of a plurality of turns or layers of sheet material, at least the inner layers being indented circumferentially to form an inwardly-extending circumferential rib and having reinforcing means for the rib, disposed in the wall between layers thereof and extending more than once around the circumference of the wall without crossing any of the layers thereof; said tubular body having a circumferential groove axially spaced from said rib, a closure engaged by said rib and held thereby against displacement in one axial direction, and means adapted to seat in said groove and engage said closure for holding

said closure against displacement in the opposite axial direction.

4. In a container of the class described, a tubular body having a wall composed of a plurality of continuous turns or layers of sheet material, at least the inner layers being indented circumferentially to form an outwardly extending circumferential groove, said tubular body having an inwardly extending circumferential rib spaced from said groove, reinforcing means for the groove and rib, disposed between the turns or layers of sheet material without crossing a turn or layer of sheet material, a closure engaged by said rib and held thereby against displacement in one axial direction, and means adapted to seat in said groove and engage said closure for holding said closure against displacement in the opposite direction.

5. In a container of the class described, a tubular body having a wall composed of a plurality of turns or layers of sheet material, at least the inner layers being indented circumferentially to form an outwardly extending circumferential groove, and having reinforcing means for the groove, disposed in the wall between layers thereof and extending more than once around the circumference of the wall without crossing any of the layers thereof; said tubular body having an inwardly extending circumferential rib spaced from said groove, a closure engaged by said rib and held thereby against displacement in one axial direction, and means adapted to seat in said groove and engage said closure for holding said closure against displacement in the opposite direction.

6. In a container of the class described, a tubular body having a wall composed of a plurality of turns or layers of sheet material, at least the inner layers being indented circumferentially to form an outwardly extending circumferential groove, said tubular body having an inwardly extending circumferential rib spaced from said groove, reinforcing means for the groove and rib, disposed in the wall between layers thereof and extending more than once around the circumference of the wall without crossing any of the layers thereof; a closure engaged by said rib and held thereby against displacement in one axial direction, and means adapted to seat in said groove and engage said closure for holding said closure against displacement in the opposite direction.

In testimony whereof I hereto affix my signature.

FRED T. NICHOLSON.