No. 750,124. PATENTED JAN. 19, 1904.

F. RECHT.

METHOD OF PRODUCING BOTTLE CLOSURES.

APPLICATION FILED JAN. 27, 1902.

NO MODEL. 5 SHEETS—SHEET 1.

Fig. 1.

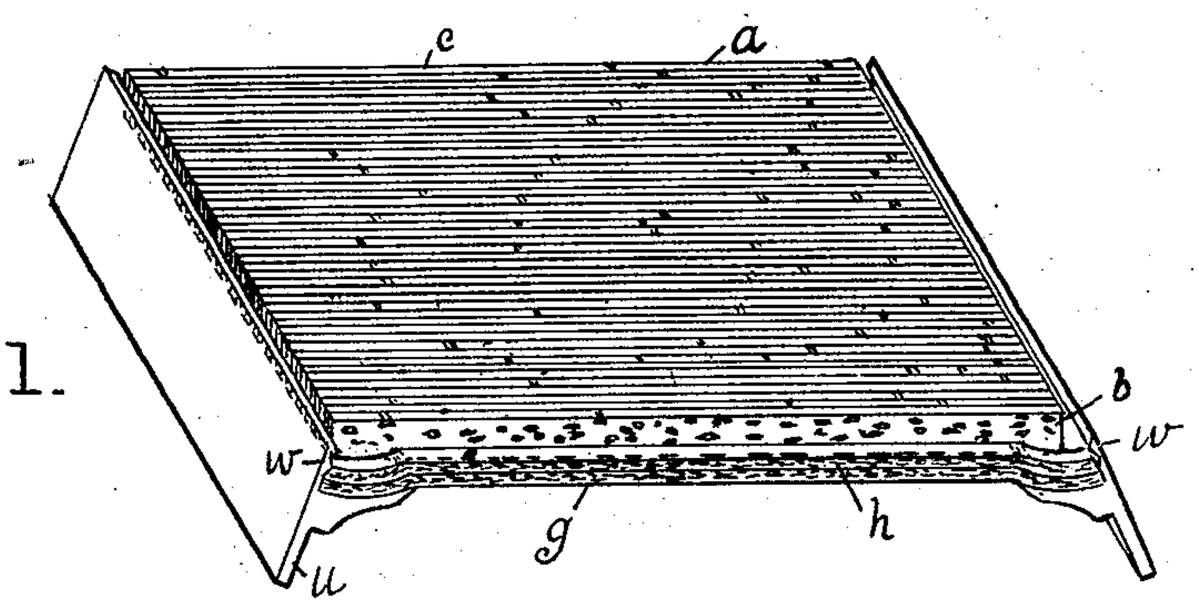


Fig. 2.

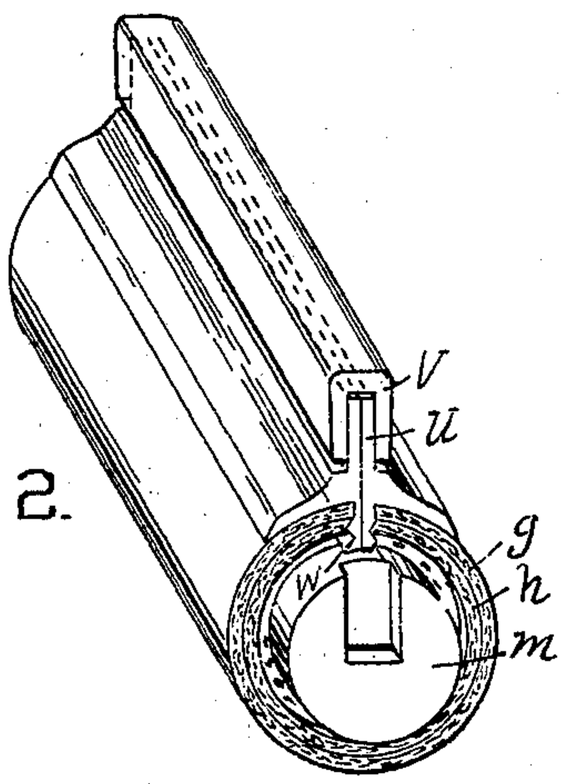


Fig. 3.

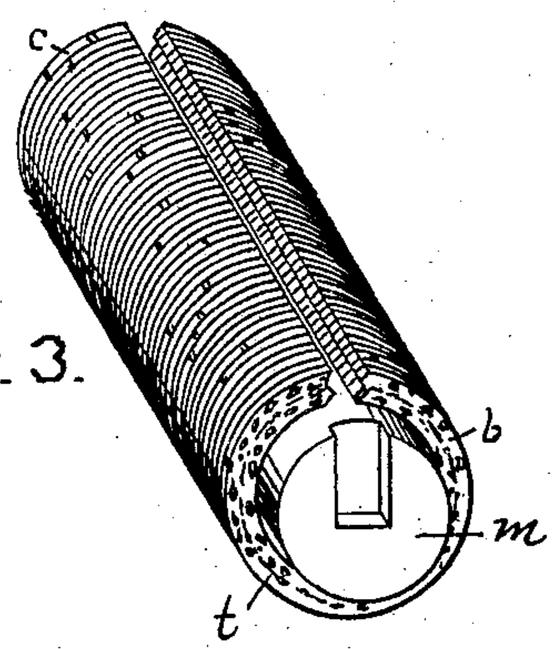


Fig. 4.

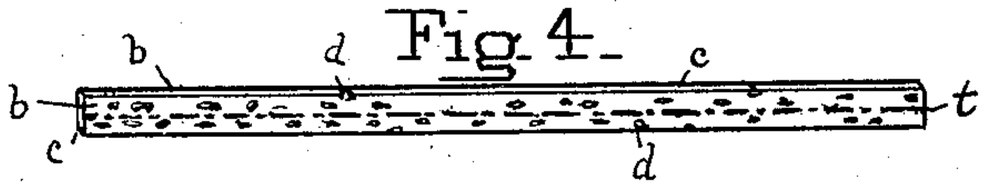


Fig. 5.

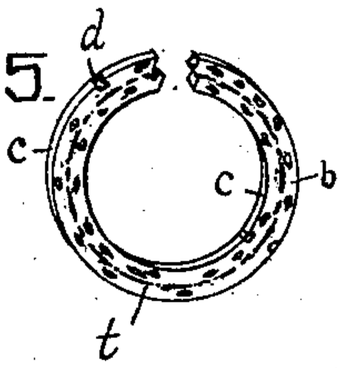


Fig. 6.

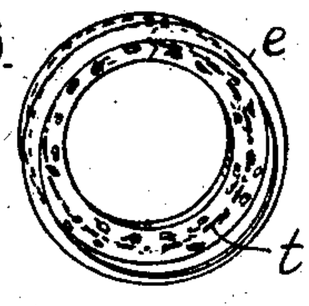
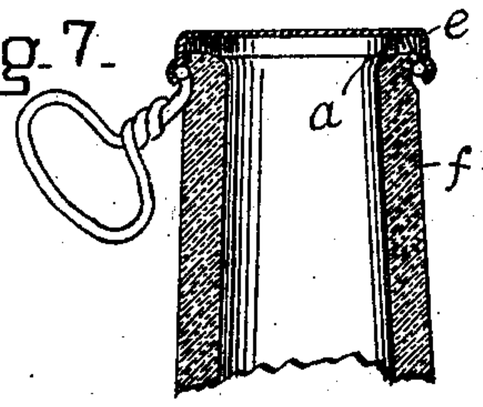


Fig. 7.



Witnesses=

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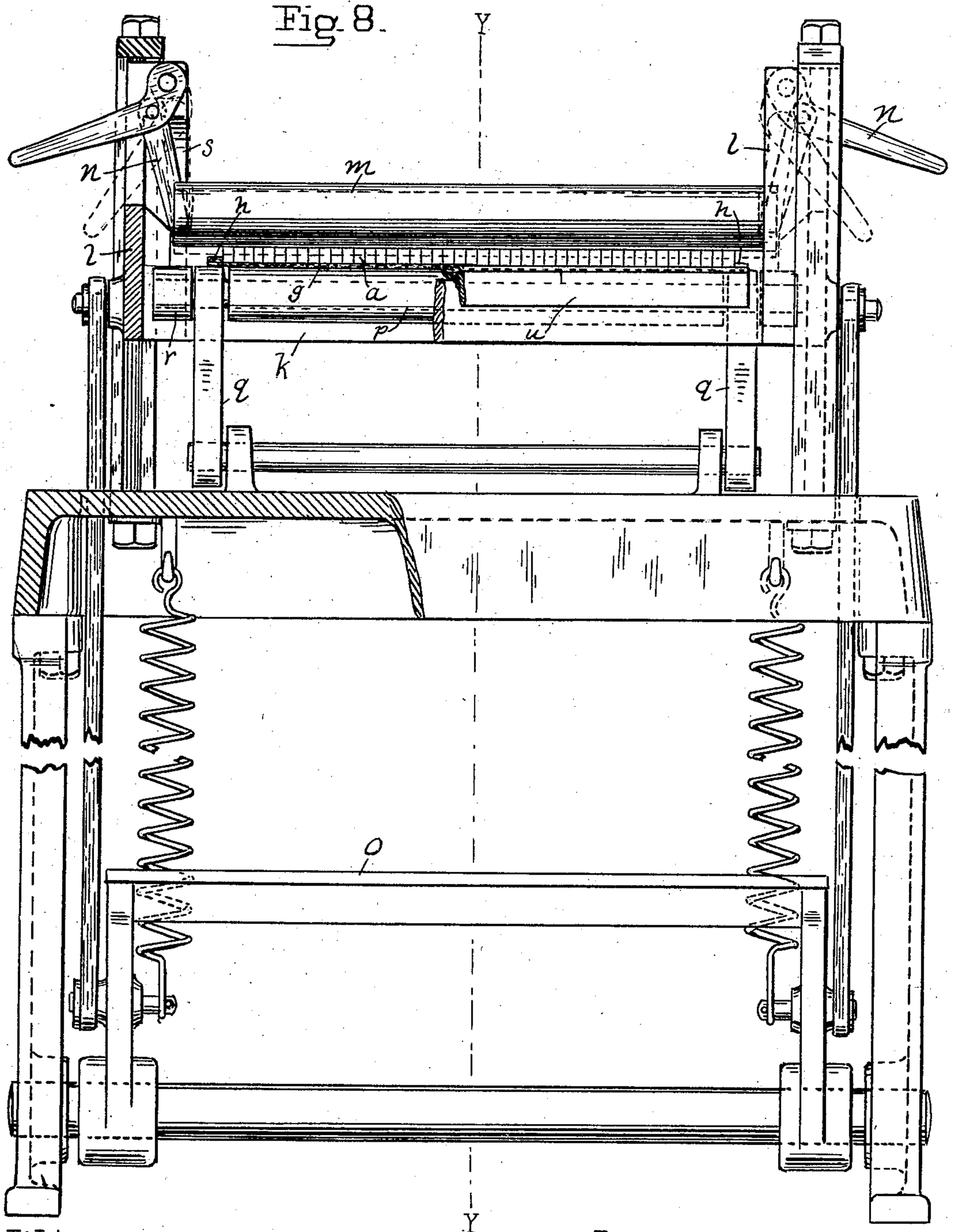
NO MODEL. 5 SHEETS—SHEET 2.

Fig. 8.



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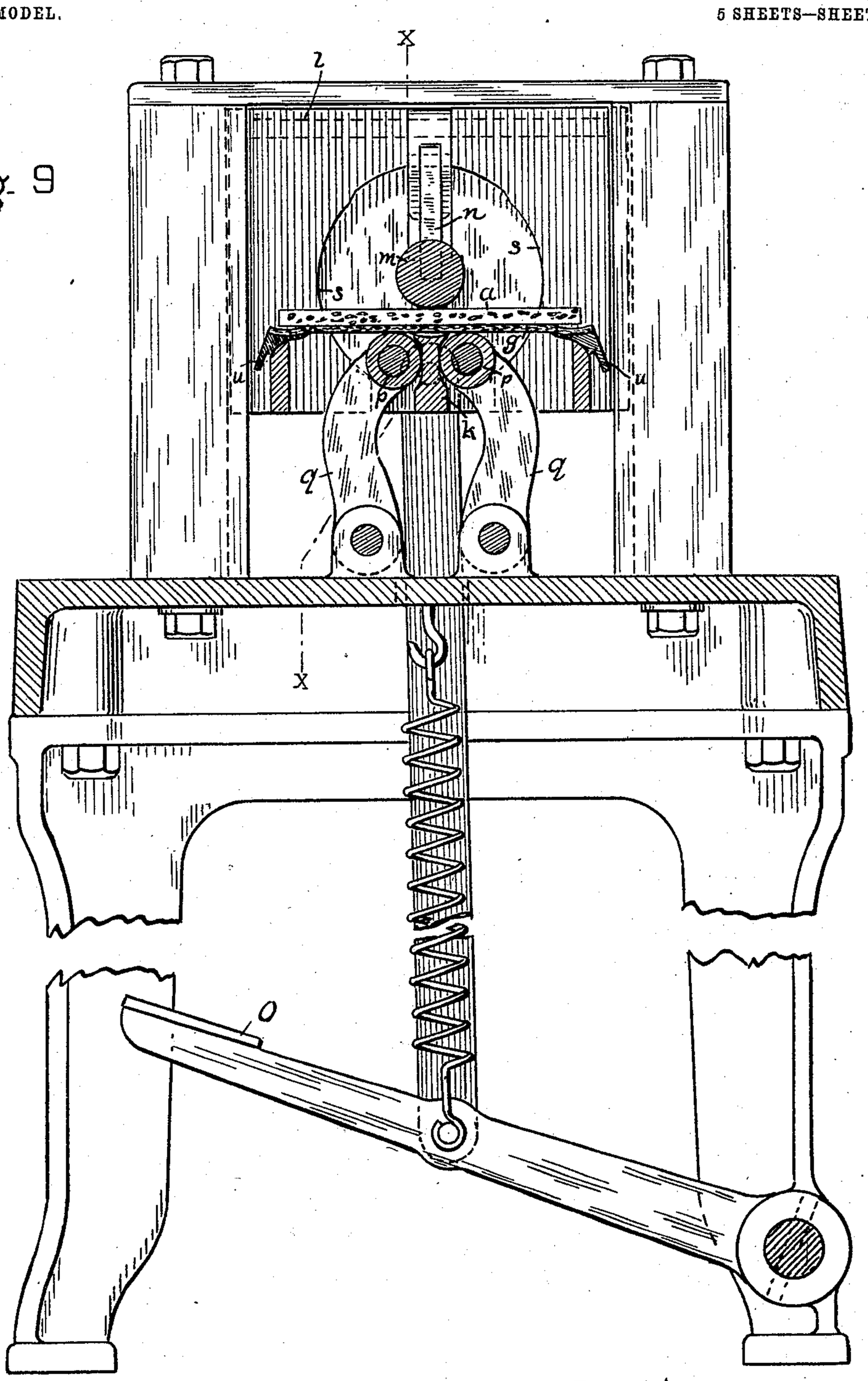
NO MODEL. 5 SHEETS—SHEET 3.

Fig. 9



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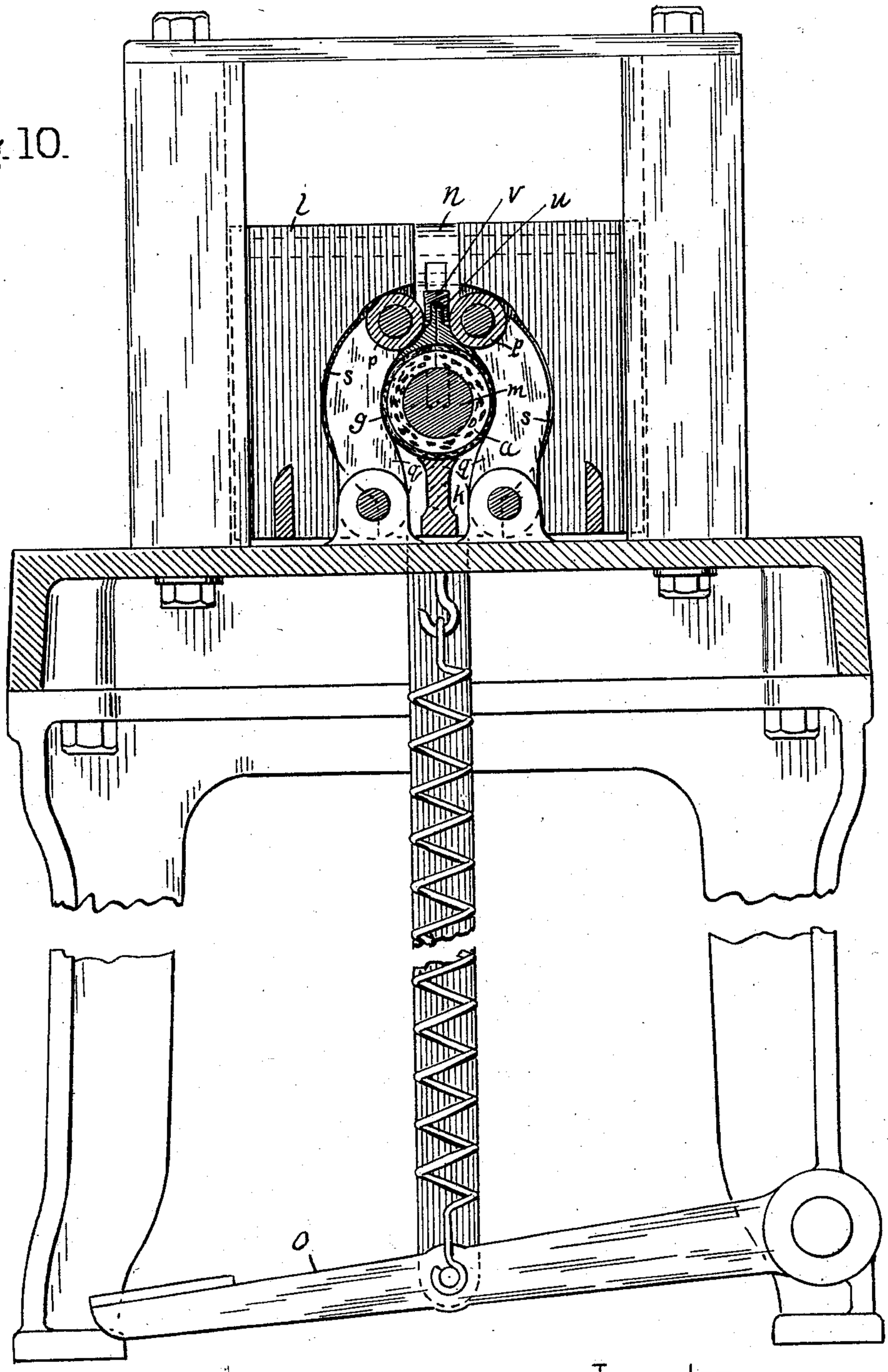
NO MODEL. 5 SHEETS—SHEET 4.

Fig. 10.



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NO MODEL. 5 SHEETS—SHEET 5.

Fig. 11.

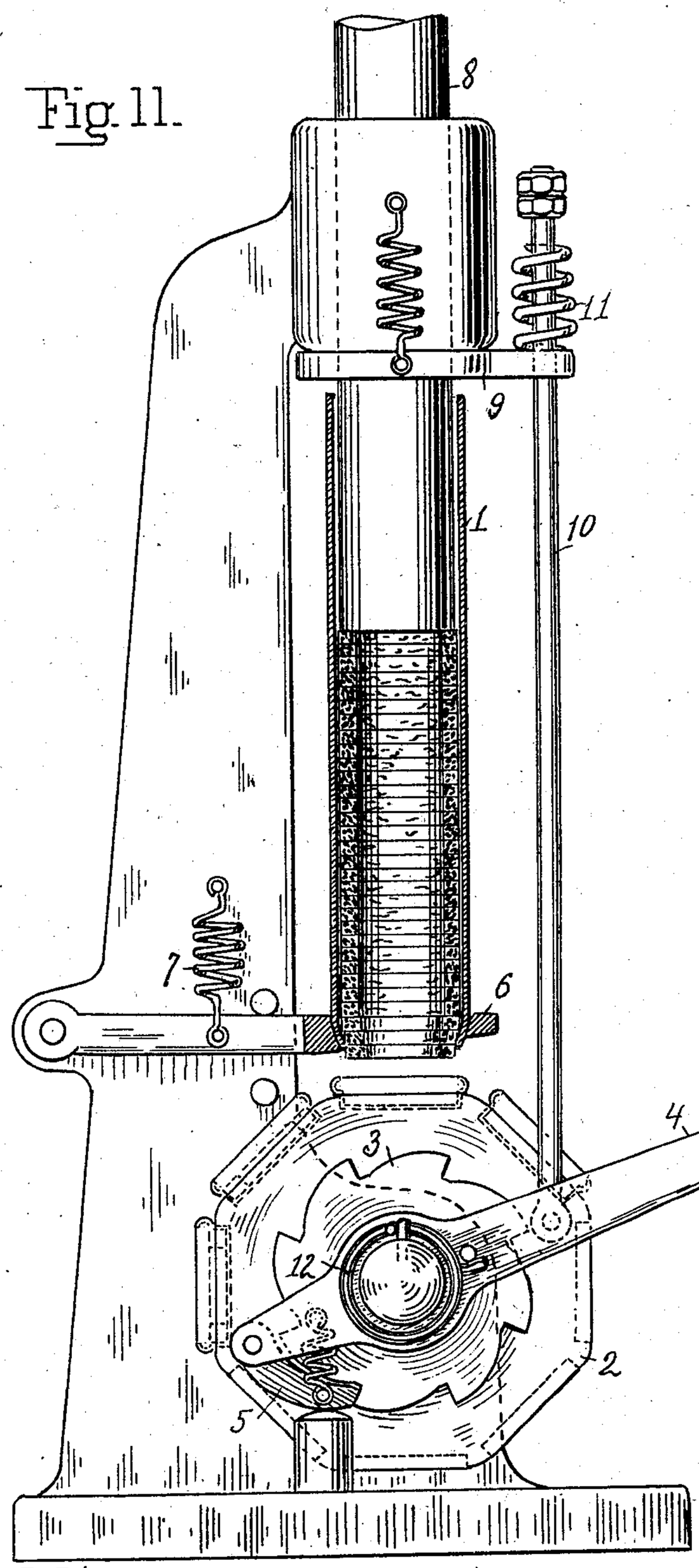
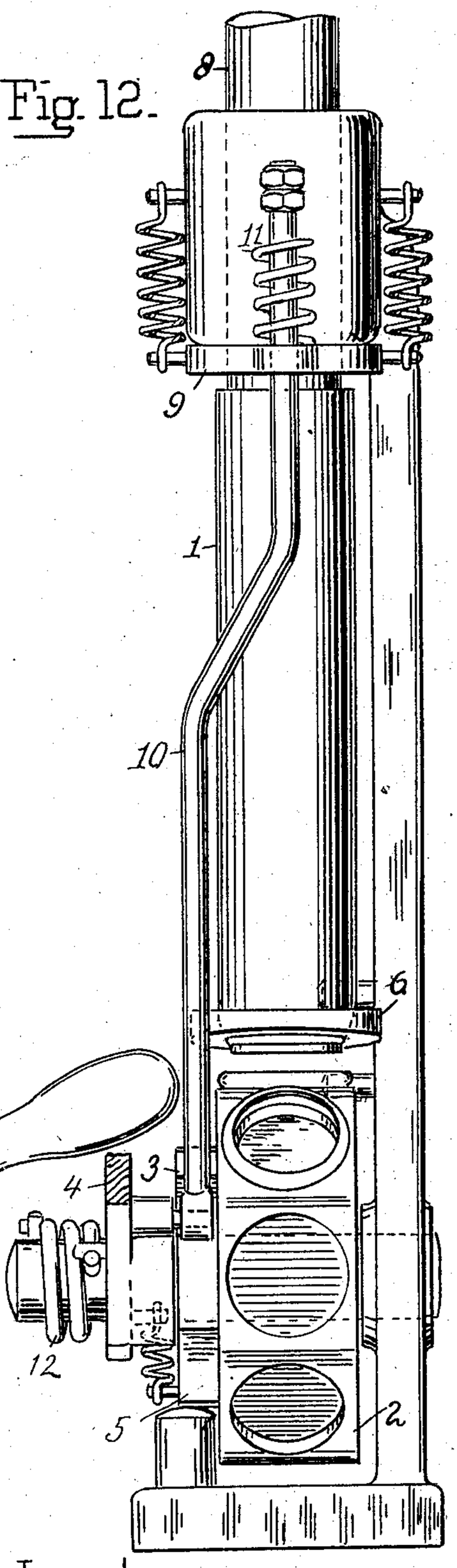


Fig. 12.



Witnesses

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No. 750,124. Patented January 19, 1904

UNITED STATES PATENT OFFICE.

FREDERICK RECHT, OF BROOKLYN, NEW YORK, ASSIGNOR TO REX CAP & CORK COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

METHOD OF PRODUCING BOTTLE-CLOSURES.

SPECIFICATION forming part of Letters Patent No. 750,124, dated January 19, 1904.

Application filed January 27, 1902. Serial No. 91,434. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK RECHT, a citizen of the United States of America, and a resident of the borough of Brooklyn, in the city of New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Methods of Producing Bottle-Closures, of which the following is a specification.

The invention herein claimed relates especially to a method of producing a cork packing-ring from a strip of cork, and hence a packing-ring which is discontinuous, especially for and in conjunction with a form of bottle-closure in which a flanged metal cap covers the mouth of the bottle and is locked to the bottle-neck, the locking being, for example, by indentations in the flange which engage under the lip of the bottle or by means of an intermediate locking-wire which engages matching grooves in the flange and bottle-neck, as is shown in my United States Letters Patent No. 646,627, dated April 3, 1900. In order to hermetically seal the bottle with such a cap, cork has proved to be the most satisfactory material. It is ordinarily used in the form of thin disks, which are of the interior diameter of the flanged cap and are snugly fitted in the cap. These disks are cut from cork slabs of the thickness required for the disks and are usually one and one-sixteenth inches in diameter. In cutting each disk an area of the cork slab amounting to one and one-quarter inches square, equal to 1.56 square inches, is required, the difference between this area and the area of the disk being wasted, and the central portion of the disk serves no useful purpose. One object of my invention is to devise a method by which a cork ring may be produced which will be a suitable substitute for such a disk and which in the making of the ring entirely avoids this waste of material. A strip suitable for a packing-ring that can be substituted for the disk and cut from a similar cork slab entails no waste in cutting and has a length of three and one-sixteenth inches and a width of one sixth of an inch, equal to 0.51 square inch. A comparison of the areas of the cork slab required for a disk with the areas of the cork slab required for each strip shows a saving of over two-thirds in favor of the packing formed from the strip. On forming or coiling such a cork strip into a packing-ring of the required proportions and utilizing it in a bottle-closure certain novel methods must be followed in view of certain properties peculiar to cork. These properties are, in brief, the great compressibility of cork, combined with slight tensile strength, the fact that under proper treatment when compressed cork will take a set and remain so, and the fact that there is a grain to cork, evidenced by the presence of pores running through the cork in a certain direction. Cork when subject to compression in any particular direction does not materially elongate in other directions. In other words, it condenses when subject to compression to a smaller volume. In this respect it is unlike other substances, such as rubber, which can only be deformed without perceptible reduction in volume. When cork has been subjected to external pressure, and thereby compressed and condensed in volume, and the external pressure removed, it does not return immediately, particularly if it has been subjected to compression for a considerable length of time, to its original form, but takes a set and remains substantially in the form imparted to it by the external pressure. If the cork is wet when the external pressure is applied, it is more easily worked; but it is then elastic, and if the external pressure is removed it will return immediately to substantially its original form. However, if the cork is dried while it is maintained in its compressed form and the external pressure is removed after it has dried it will take a set and remain substantially in the form imparted to it by the external pressure. By wetting the cork and drying it while subject to compression the set is produced more expeditiously.

The grain of cork is characterized by the presence of pores running through the cork in a particular direction.

In bending and coiling the cork strip ad-

vantage is taken of the compressibility of cork to superimpose on the bending strains, which would otherwise be both of compression and tension, additional compression strains that will substantially neutralize the tensile strains. The set in the cork from the treatment followed preserves the formed ring in shape after the forming pressure is removed. The strip from which the packing-ring is formed is so cut from the cork slab that the pores will lie transverse to the side walls of the strip, and the strip is coiled about an axis parallel to the direction of the pores. The pores are consequently transverse to the plane of the ring, and both ends of the pores will be covered by the bottle or cap.

The compression strains above mentioned, which are superimposed upon the bending strains, are transverse to the direction of the pores, and these compression strains, besides neutralizing the tensile strains, will also serve to force together the side walls of the pores.

In further explanation of the method reference will be made to the accompanying five sheets of drawings, which form a part of this specification.

Figure 1 shows a number of strips of cork laid upon a suitable flexible wrapper. Fig. 2 shows the wrapper folded around a mandrel and the edges locked together by a keeper with the cork strips coiled and confined between the wrapper and the mandrel. Fig. 3 shows the discontinuous cork rings formed from the cork strips as they appear on the mandrel after the wrapper has been removed. Fig. 4 shows one of the cork strips. Fig. 5 shows one of the discontinuous cork rings. Fig. 6 shows a bottle-closure consisting of a bottle-cap with a discontinuous cork ring contained therein. Fig. 7 shows a bottle with the bottle-closure applied thereto. Fig 8 shows a front elevation, broken away at the left on the line X X of Fig. 9, of a machine for folding the cork strips and the flexible wrapper around the mandrel. Fig. 9 shows a side section on the line Y Y of the same machine. The two foregoing figures show the machine in position preparatory to operation on the cork strips. Fig. 10 shows a side section similar to Fig. 9 of the machine operated. Fig. 11 shows a side elevation of a machine for inserting the discontinuous cork rings into the bottle-caps, and Fig. 12 shows a front elevation of this machine.

The cork strips *a* are rectangular in section, with side walls *b b*, which form the upper and lower sides of the packing-ring, and edge walls *c c*, which form the outer and inner edges of the ring. In cutting the strips the cuts for the side walls are made transverse to the pores, so that the ends of the pores will terminate in the side walls. In the coiled ring they are therefore transverse to the plane of the ring, and the ends of the pores *d* are covered by the top of the cap *e* and the rim of the bottle *f*. In order to economize material, the ring is made as thin as it can be and effectively pack the joint between the cap and bottle and compensate for irregularities in the opposing surfaces of the cap and bottle, between which the packing is interposed. Likewise the width of the side walls of the strip from which the ring is formed is for economy of material made no greater than is necessary for a tight joint between the packing-ring and the bottle and between the packing-ring and the cap. These conditions are met in a ring the thickness of which is less than the width of the ring and the width of the strip from which the ring is formed. In coiling the ring from the cork strip the strip is therefore coiled edgewise.

In order to expeditiously form the rings, a considerable number of cork strips are operated on at the same time. The strips are first thoroughly wet by immersion in hot water or steaming and are laid on edge side by side in a row on a flexible wrapper *g*, of leather or other similar flexible and substantially inelastic material. Flexible cleats *h h*, stitched or otherwise formed near the ends of the wrapper, confine the ends of the row of cork strips. The wrapper is placed in the machine for coiling the cork strips and rests along its middle line on a clamping-bar *k*, so that each strip midway between its ends will be directly over the clamping-bar. The ends of the clamping-bar are carried by two vertically-moving slides *l l*. A mandrel *m* is then laid on the row of cork strips and rests on their edges and parallel to the pores along a line midway between the ends of each strip. The mandrel is engaged by toggle-latches *n*, pivoted in the slides, and by these latches the cork strips midway between their ends and the wrapper along its middle line are clamped between the clamping-bar and mandrel. The mandrel is of the diameter of the holes in the packing-rings. The slides are then drawn downward by pressure of the foot of the operator on a treadle *o*. The slides carry downward the clamping-bar and mandrel, and the wrapper is engaged by folding-bars *p p* as the mandrel passes between them and folded about the mandrel. The cork strips are thereby coiled around the mandrel. The folding-bars are supported from the framework of the machine at the ends of the levers *q q*, and rollers *r r* opposite the ends of the folding-bars are engaged by cams *s s*, which are formed on the slides. These cams press the folding-bars toward the mandrel and are so formed that the cork strips will be subjected to compression widthwise, owing to the fact that the spaces between the folding-bars and the mandrel is less than the combined thickness of the wrapper and width of cork strip. As this compression is transverse to the pores of the cork, it also tends to close the pores.

Ordinarily when a bar or strip is bent or coiled by forces applied transversely to the

strip that portion of the strip between the convex edge and a medial line *t* midway between the convex and concave edges will be stretched and under tension and that portion between the medial line and the concave edge will be shortened and under compression. Consequently under such treatment the length of the medial line will be unchanged by the coiling, but when the cork strip is coiled by the machine illustrated that portion of the strip at the medial line and between the medial line and the convex edge is compressed to a considerable extent. This is because the friction between the wrapper and the strip prevents the stretching of the strip at the convex edge, and such stretching would necessitate a slipping of the strip on the wrapper. There is therefore an endwise compression of substantially all parts of the strip, and this compression is likewise transverse to the pores of the cork and tends to close the pores.

The operations of compressing the cork strip endwise along its medial line and widthwise and bending are performed progressively along the strip from the middle toward the ends, and in each portion this compression is substantially simultaneous with the bending of the same portion of the strip. It is immaterial whether the compression and bending be simultaneous or not, provided that the bending does not precede the compression, since the principal object in subjecting the strip to compression is to prevent tensile strains in the strip that will be liable to rupture the strip.

When the machine is operated and the wrapper is folded around the mandrel, the interior curvature of the wrapper is the same as the interior of the rim of the cap. Metal tongues *u* are attached to the edges of the wrapper. These come together on the operation of the machine and are locked together by a keeper *v*. The operative parts of the machine are then permitted to return to the off position, and the wrapper is held closed by the keeper and removed from the machine, with the inclosed coiled strips and mandrel, and the strips are maintained in their compressed and coiled form by the wrapper. The strips are thus held until they are dry. In the meantime the machine can be used with other mandrels and wrappers. On removing the wrapper after the coiled strips have dried they will be found to have taken a set and will hold their shape as discontinuous cork rings, except that the rings will open a trifle, as shown. Serrated cleats *w* may be placed along the edges of the wrapper, as shown in Figs. 1 and 2, to indent the ends of the strips, so that the ends will form a better joint. The cleats will also afford additional end compression for the strips.

The packing-rings are inserted in the caps by the machine illustrated in Figs. 11 and 12. The discontinuous cork rings are placed in a tube 1 of sufficient interior diameter to holds the rings loosely. At the lower end the tube is reduced in interior diameter to that of the caps in which the rings are to be inserted. A wheel 2 with pockets for the caps is located below the tube. It is provided with a ratchet 3, and a lever 4 and pawl 5 spaces the pockets past the lower end of the tube. The tube rests in a socket in the lever 6. A spring 7, attached to the lever, normally holds the lower end of the tube at a slight distance above the wheel, so that the caps supported thereby can be fed under the tube. A plunger 8 enters the top of the tube and rests on the column of cork rings. It is suitably guided by the frame of the machine and passes through a narrow collar 9, by which it is spaced downward. This collar is connected with the lever by a rod 10. On depression of the lever the rod pulls on the edge of the collar, causing it to cramp on the plunger and feed the plunger downward. The first effect of this is to bring the lower end of the tube in contact with the top of the cap below it, and further downward movement ejects a ring from the tube and forces it into the cap. A heavy spring 11 around the rod permits such further movement of the lever as may be necessary after the ring has been driven into the cap to insure the engagement of the pawl with the next tooth of the ratchet. The lever is returned by a spring 12, when the wheel is spaced and new cap brought under tube. In carrying out the method no particular form of apparatus is necessary, and the method herein claimed, resulting in the completed bottle-closure, can be carried out and the bottle-closure produced from a metal cap and a suitably-cut cork strip by coiling the cork strip by hand directly into the cap and exerting an endwise pressure on the strip while it is being coiled without the assistance of the wrapper or the other mechanism shown or any tools or mechanism whatever in their place.

I do not specifically claim in this application the structure of the bottle-closure herein described, as the claims thereon are transferred to my patent application, Serial No. 131,466, filed November 15, 1902, as a division of this application.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The hereinbefore-described method of forming a discontinuous cork ring from a strip of cork which consists in subjecting the strip to compression endwise along its medial line and coiling it to the desired curvature while subjected to compression.

2. The hereinbefore-described method of forming a discontinuous cork ring from a strip of cork which consists in subjecting the strip to compression widthwise and coiling it to the desired curvature while subject to compression.

3. The hereinbefore-described method of

forming a discontinuous cork ring from a strip of cork which consists in subjecting the strip to compression endwise along its medial line and widthwise and coiling it to the desired curvature while subject to compression.

4. The hereinbefore-described method of forming a discontinuous cork ring from a strip of cork in which the pores are transverse to the side walls of the strip, which consists in subjecting the strip to compression transversely to the direction of the pores and coiling it to the desired curvature about an axis parallel to the direction of the pores while subject to compression.

5. The hereinbefore-described method of treating a wet ring of cork in which the pores of the cork are transverse to the plane of the ring which consists in subjecting the ring to compression transversely to the pores and maintaining the compression until set.

6. The hereinbefore-described method of forming a discontinuous cork ring from a wet strip of cork which consists in subjecting the strip to compression, coiling it to the desired curvature and maintaining it in its compressed and coiled form until set.

7. The hereinbefore-described method of forming a discontinuous cork ring from a wet strip of cork which consists in subjecting the strip to compression, coiling the strip to the desired curvature, maintaining the strip in its compressed and coiled form, and drying the strip while maintained in its coiled form.

8. The hereinbefore-described method of forming a discontinuous cork ring from a wet strip of cork which consists in subjecting the strip to compression, coiling the strip to the desired curvature, maintaining the strip in its compressed and coiled form, drying the strip while maintained in its coiled form, and removing the external pressure.

9. The hereinbefore-described method of forming a discontinuous cork ring from a wet strip of cork in which the pores of the cork are transverse to the side walls of the strip which consists in subjecting the strip to compression transversely to the pores, coiling the strip to the desired curvature about an axis parallel to the direction of the pores, maintaining the strip in its compressed and coiled form, and drying the strip while maintained in its coiled form.

10. The hereinbefore-described method of forming a bottle-closure from a cork strip and suitably-formed metal cap which consists in subjecting the strip to compression, coiling the strip to the interior curvature of the cap while subject to compression, and inserting the strip into the cap.

11. The hereinbefore-described method of forming a bottle-closure from a wet strip of cork and a suitably-formed metal cap, which consists in subjecting the strip to compression, coiling the strip to the interior curvature of the cap while subject to compression, and maintaining the strip in its compressed and coiled form, drying the strip while maintained in its coiled form, and transferring the coiled strip to the cap.

Signed by me in New York city this 25th day of January, 1902.

FREDERICK RECHT.

Witnesses:
SAMUEL W. BALCH,
EDWARD J. MURPHY.