March 12, 1929. A. S. GREENE 1,705,185

MACHINE FOR FORMING TAPERED CORK STOPPERS

Filed March 11, 1925 3 Sheets-Sheet 1

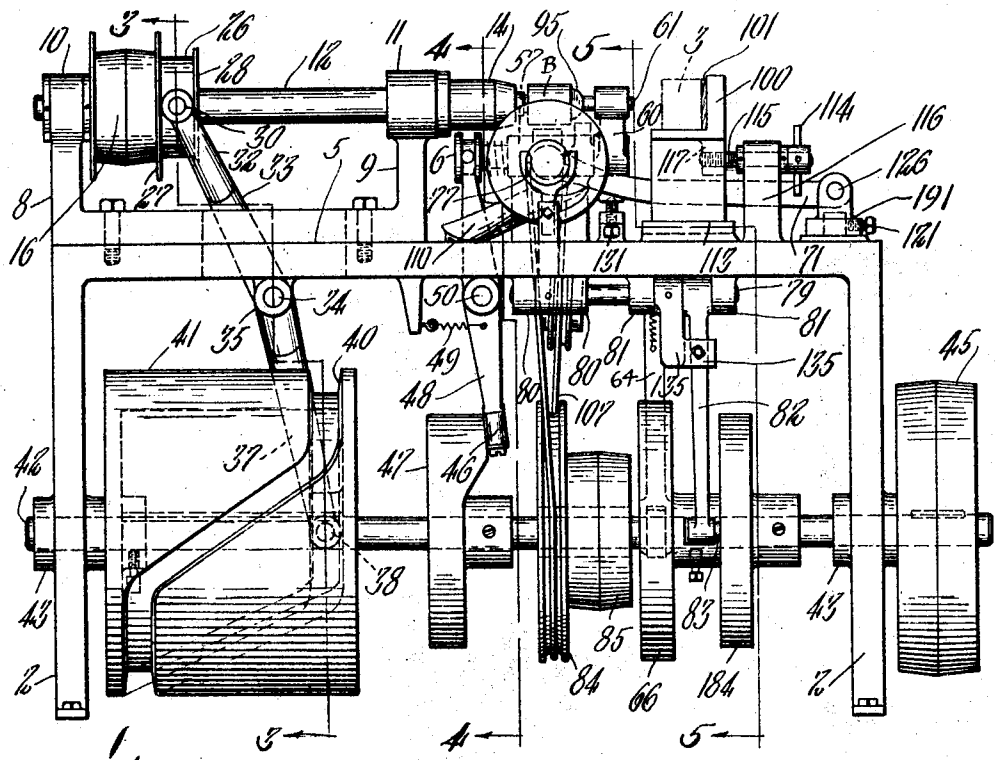


Fig. 1.

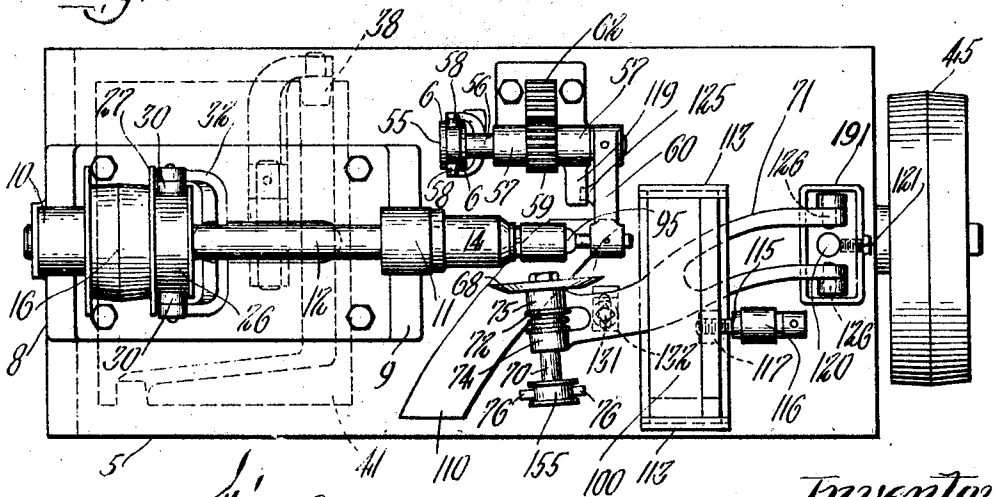


Fig. 2.

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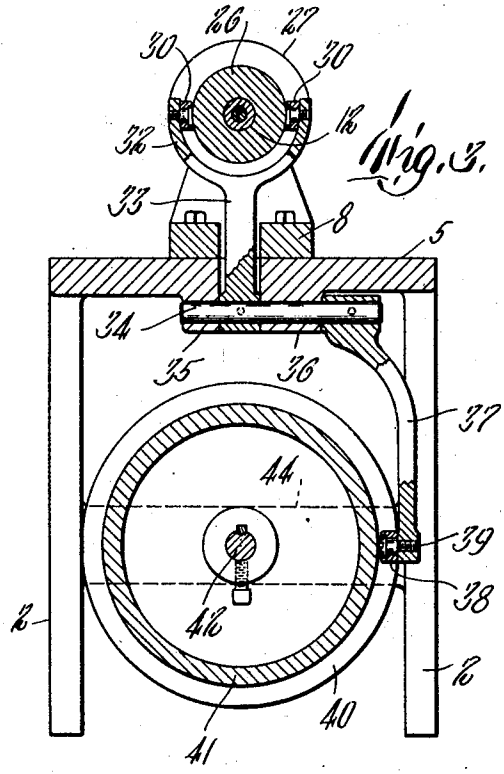


Fig. 3.

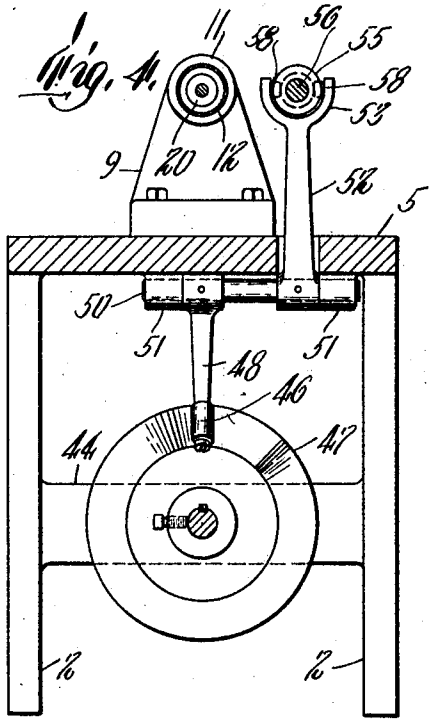


Fig. 4.

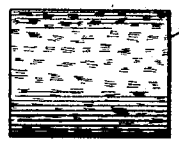


Fig. 6.

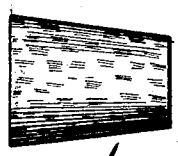


Fig. 7.

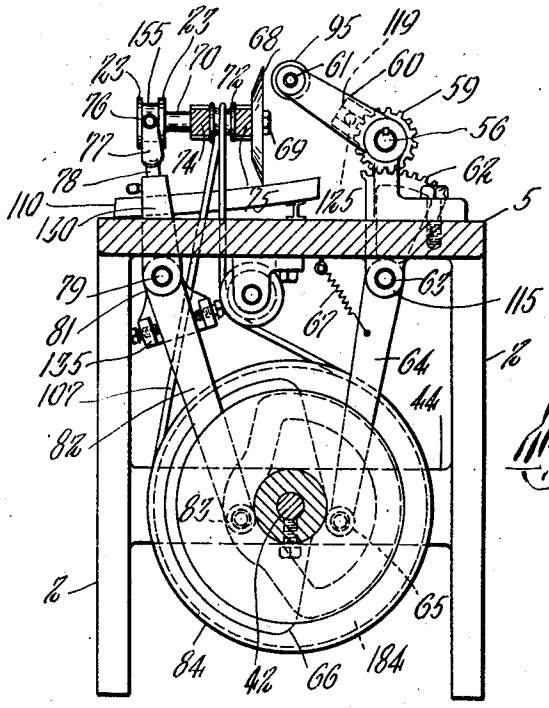


Fig. 5.

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MACHINE FOR FORMING TAPERED CORK STOPPERS

Filed March 11, 1925 3 Sheets-Sheet 3

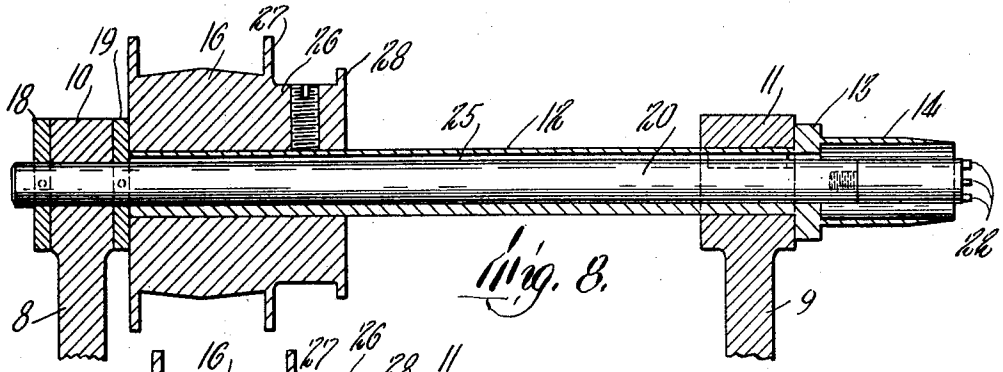


Fig. 8.

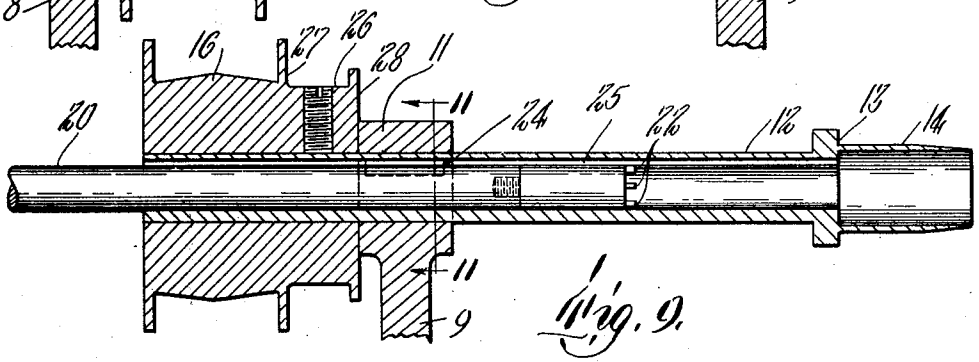


Fig. 9.

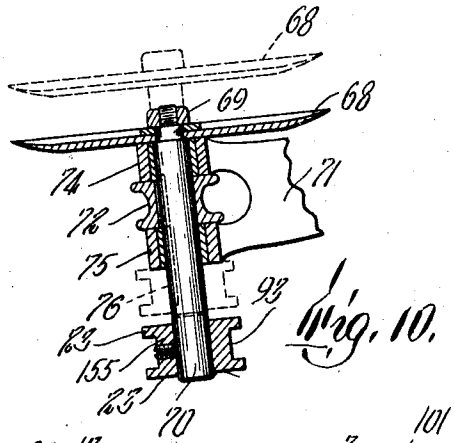


Fig. 10.

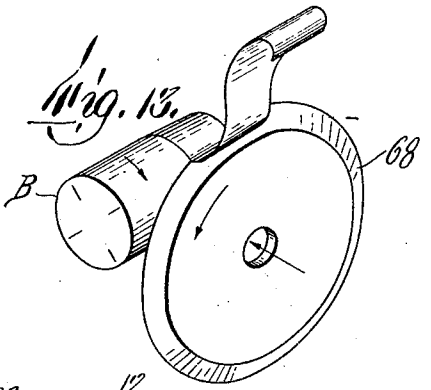


Fig. 13.

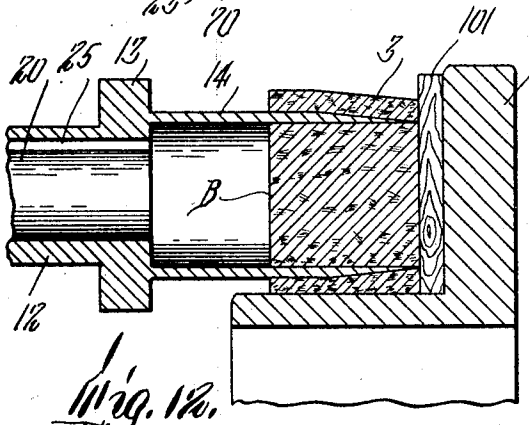


Fig. 12.

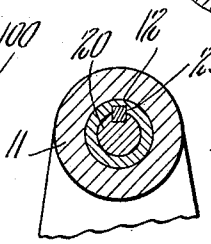


Fig. 11.

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UNITED STATES PATENT OFFICE.

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MACHINE FOR FORMING TAPERED CORK STOPPERS.

Application filed March 11, 1925. Serial No. 14,652.

This invention relates to a machine for the production of tapered cork stoppers.

Its object is to provide a machine for the production of tapered cork stoppers from strip or sheet material in an expeditious manner. This object is attained, briefly, by providing a machine with mechanism for punching a stopper blank from the strip or sheet material and mechanism for skiving the blank into tapered form while it is being held and rotated. The invention may best be understood by reference to the following description of the embodiment thereof shown on the accompanying drawings, in which—

Figure 1 is a side elevation of a machine embodying the invention.

Figure 2 is a top plan of the same.

Figures 3, 4 and 5 are vertical sections taken, respectively, on the lines 3—3, 4—4 and 5—5 of Figure 1.

Figure 6 represents the cylindrical blank formed by the blank punching mechanism.

Figure 7 shows a finished tapered stopper produced from the blank.

Figure 8 is in enlarged sectional view showing the blank punching mechanism in one position.

Figure 9 shows the blank punching mechanism in another position.

Figure 10 is an enlarged view, partly in section, of a portion of the skiving mechanism.

Figure 11 is a section on the line 11—11 of Figure 9.

Figure 12 is a detail section illustrating the manner in which a blank is cut from a strip or sheet.

Figure 13 is a detail perspective illustrating the action of the skiving knife on a blank.

The blank punching mechanism comprises a punching tube or die 14 which may be rotated and reciprocated, as hereinafter described, and which on its forward stroke punches a blank from a strip or sheet of cork material 3 resting against the side of a wooden strip or board 101 acting as a die block for a work-table 100. The table 100 is slidably mounted on a pair of ways 113, 113, and may be moved longitudinally by a handle 114 which is fixed to a threaded spindle 115 mounted on a bracket 116 and engaging a threaded boss 117 cut in the table, thereby affording adjustment of the table for different sized stoppers and their corresponding dies. Journaled in the bearing 11 carried by a bracket 9 which is secured to the table portion 5 of the machine frame, is a die carrying member or tube 12, the portion at one side of the bearing 11 having a flange or rib 13 beyond which extends the reciprocatory blank punching die 14. The other end of the tube 12 has fixed thereto a flanged pulley 16 which may be rotated by any suitable means. Centrally disposed within the tube 12 and journaled at one end in a bearing 10 beyond the pulley 16, is a spindle 20. The bearing 10 is supported by a bracket 8 which is secured to the table portion 5 of the machine frame. The other end of the spindle 20 extends beyond the punching die 12 when the latter is in its retracted position shown in Figure 8. The spindle 20 is rotated by the rotation of the tube 12, which is keyed thereto in the elongated slot 25, and which is capable of longitudinal movement relative thereto. (See Figures 9 and 11.) Longitudinal movement of the spindle 20 is prevented by the collars 18 and 19 fixed thereto on either side of the bearing 10.

The driving pulley 16 has a hub 26 integral therewith provided with an end flange 28 which is spaced from the flange 27 with which it forms an annular way, rollers 30, 30 pivotally mounted on a yoke 32 engaging in this way (Figure 2). The stem 33 of the yoke 32 is fixed to a rock shaft 34 journaled in the bosses 35 and 36 on the table portion 5 of the machine frame. Fixed to one end of the shaft 34 is an arm 37 at the free end of which is journaled a cam roller 38. The roller 38 engages in the cam slot 40 of a cylindrical cam 41 which is fixed to a main driving shaft 42 of the machine. The shaft 42 is journaled at its ends in the bearings 43, 43 which may be supported by cross beams 44 secured to the legs 2, 2 of the machine frame. The shaft 42 may be rotated by a pulley 45 fixed thereto at one end and driven by suitable power means (not shown). The rotation of the shaft 42 imparts a reciprocating motion to the pulley 16 and the punching die 12 fixed thereto, which together with the axially fixed spindle 20 is rotated by the pulley during this reciprocating motion.

In its forward travel the die 14 punches out a cylindrical blank B, as shown in Figure 12, from the cork strip 3. The die with the blank contained therein is moved backwardly until the inner end face of the blank encounters the end of the spindle 20, whereupon the blank is held against further retraction, so that by continued retracting movement of the die the ejection of the blank

therefrom is effected. During the ejection of the blank a support for its outer end is brought into engagement therewith. For this purpose a bell-shaped member 95 is swiveled on one end of a short spindle 61 fixed to the free end of an arm 60. The arm 60 is fixed to one end of a rock shaft 56 journaled in the bearings 57, 57 on the table portion 5 of the machine frame. Fixed to the other end of the shaft 56 is a collar 55 with spaced flanges 6, 6. A pair of rollers 58, 58 pivotally mounted on a yoke 53 engage between the flanges 6, 6 of the collar. The stem 52 of the yoke is fixed to a rock shaft 50 journaled in bosses 51, 51 on the table portion 5 of the frame. Fixed to the rock shaft 50 is a cam arm 48 at the free end of which is journaled a cam roll 46. The cam roll 46 rides on a face cam 47 fixed to the main drive shaft 42. The cam roll 46 is held firmly against the cam surface by a spring 49 fastened to a lug on the machine frame and engaging the arm 48. A gear 59 is keyed to the shaft 56 between the bosses 57, 57 in a manner such that axial movement of the shaft 56 relative thereto is permitted, the bosses preventing longitudinal movement of the gear. A segmental gear 62 meshing with the gear 59 is fixed to a rock shaft 63, which is journaled in the bearing 115 secured to the machine frame 5. An arm 64 is fixed to one end of the shaft, and at its free end is journaled a cam roller 65 engaging a face cam 66 fixed to the shaft 42. The cam roller 65 is held firmly against the cam surface by a spring 67 fastened to the machine frame and engaging the arm 64. The rotation of the shaft 42 imparts an oscillating motion to the arm 64 and causes the bell-shaped member 95 mounted on the arm 60 to move into and out of axial alinement with the spindle 20. When it is moved into alinement with the spindle, the arm 48 is rocked in a direction to move the member 95 toward the spindle so as to clamp the blank therebetween, this clamping being effected by the time the die is fully retracted and the blank ejected therefrom.

Thus, after the die has punched a blank B from the strip material and has started its retracting stroke, the segmental gear 62 is caused to rotate by the cam 66, bringing the bell-shaped member 95 into alinement with the die, which is at this time retracted sufficiently to permit such action. The cam 47 then causes the bell-shaped member 95 to move in the same direction as the die 14 from its retracted position to the blank engaging position shown in Figure 2, a pin 125 on the arm 60 engaging a grooved lug 119 extending from the bearing 57 and holding the arm 60 in a fixed position when the skiving mechanism is brought into engagement with the blank. The bell-shaped member 95 reaches this engaging position during the ejection of the cylindrical blank from the die, and supportably engages the face opposite to that engaged by the spindle. After this ejection has been completed, the blank is engaged on one face and rotated by prongs 22 of the rotating spindle 20, and is engaged on its other face by the bell-shaped member 95 which may rotate therewith. The blank is hence support during and after the period of its ejection from the die. While the blank is thus being supported and rotated, the skiving or finishing mechanism is brought up to the blank to form the taper on the blank and thereby to produce the finished product.

The skiving mechanism comprises a disk skiving knife 68 fixed to one end of a shaft 70, as by a nut 69. The shaft 70 is journaled in the bearings 74 and 75 carried by a bifurcated bracket 71, which is pivotally mounted on studs 126 carried by a plate 191. The plate is mounted on an axis 120 and is fixed thereto, as by a set screw 121. The angle formed between the axis of the shaft 70 and the axis of the spindle 20 is such that an acute angle is formed between the axis of the spindle and the plane of the knife 68. This acute angle may be varied to conform to the taper which it is desired to impart to the finished stopper, by releasing the set screw 121 and turning the plate 191 about the axis 120.

The shaft 70 may be rotated by a pully 72 splined thereon, which is positioned between the beadings 74 and 75, which hold it against axial motion, an elongated groove 76 in the shaft 70 permitting axial movement of the shaft relative to the pulley 72. The pulley 72 is connected by a belt 107 to a pulley 84, journaled on the shaft 42, by which the skiving knife 68 may be rotated at a high rate of speed. To effect this, a pulley 85, shown integral with the pulley 84, and which is also loosely mounted on the shaft 42, is belted to a suitable source of power (not shown). A collar 155 with spaced flanges 23 forming an annular way thereon, is fixed to the other end of the shaft 70, rollers 76 pivotally mounted on a yoke 77 engaging the flanges. The stem 78 of the yoke 77 is telescopically fixed to an arm 130, which is fixed to a shaft 79 journaled at one end in bosses 80, 80 and at the other end in bosses 81, 81. An adjusting screw 131 engages in an arcuate groove 132 in the bracket 71 and may be made to raise or lower the bracket, the telescopic arrangement of the yoke 77 permitting of adjusting the axis of rotation of the disk knife vertically for different sized stoppers. Between the two bosses 81, 81 is fixed to the shaft 79, an arm 82 which has journaled at its free end a cam roller 83 which engages a face cam 184 fixed to the shaft 42, this cam imparting a reciprocating motion to the disk-carrying shaft 70. The angle between the arm 130 and the cam arm 82 may be varied by the adjusting device 135 fixed to the rock shaft 79 and to the cam

arm 82. The stroke of the shaft 79 may thus be changed without changing its length of stroke, whereby it may be brought into cutting engagement with different sized stoppers.

While the cylindrical stopper blank is being held and rotated by the spindle 20 and the member 95, the rotating disk knife is caused to move toward it. The plane of rotation of the knife forming an acute angle with the axis of rotation of the blank, as shown in Figure 13, results in the skiving of more material from one portion of the blank than from the other portion, a tapered stopper being produced, as shown in Figure 7. The skiving knife is then retracted, whereupon the bell-shaped member 95 is retracted so as to release the now tapered cork, which drops down to the chute 110. The member 95 is swung out of alinement with the spindle and out of the path of the die on its succeeding punching stroke.

The complete operation of the machine may be summarized briefly as follows:

The machine operator places the strip of cork material on the work-table 100, with the die 14 in its retracted position. With the pulleys 16 and 45 rotating, the die 14 is moved forward and punches a blank from the strip 3. The die 14, with a blank contained therein, is retracted, the inner end face of the blank encountering the end of the spindle 20, whereupon the blank is ejected from the die. During this ejection of the blank from the die, the member 95 is moved into alinement with the spindle and is then moved toward the spindle so as to clamp the blank therebetween, one face of the blank being supported by the prongs 22 of the spindle 20, and the other face supported by the swiveled bell-shaped member 95. When the blank has been completely ejected, it is supported on both faces and is being rotated by the die spindle, the die 14 resting in the retracted position shown in Figure 1. The rotating disk skiving knife 14 is moved into engagement with the rotating blank, tapers it into the desired form, and is retracted. After the tapering of the blank, the bell-shaped member is retracted, releasing the finished stopper, and is swung out of alinement with the spindle to allow the succeeding punching stroke of the die to take place; the entire tapered stopper forming operation taking place during one revolution of the shaft 42. The operator now moves the strip 3 forward and the entire cycle of operations is repeated in sequence by the various mechanisms of the machine.

When a different sized stopper is desired to be produced, a correspondingly sized die may be secured to the die carrying member 12, or if integral, another die carrying member 12 with a die of the desired size substituted, and the table and the various adjusting means in the skiving mechanism made to conform to the different sized stopper.

It is, of course, understood that while the description of this invention has been confined to what is now believed to be the preferred embodiment thereof, as illustrated in the drawings, this invention is susceptible of various modifications and changes which are within the spirit of the invention, without departing from the scope of the appended claims.

What I claim is:

1. A machine of the class described, comprising a punching tube, means for rotating and reciprocating said tube, a blank ejector spindle rotated by said tube and disposed within said tube for engaging one face of the blank, means movable into position to engage the other face of the blank and to permit its rotation by said spindle, and means for finishing the blank as it is being held and rotated.

2. A machine of the class described, comprising a blank punching die, means for rotating and reciprocating said die, a blank ejecting spindle disposed within and engaging one face of the blank as it is being ejected, and means movable into position to engage the other face of the blank during its ejection, and means for tapering said blank while it is so engaged on both its faces.

3. A machine of the class described, comprising a die for punching cylindrical blanks, means for rotating and reciprocating said die, means for ejecting a blank from the die disposed within and rotating together with said die for engaging one face of the blank and for rotating it after ejection, a swiveled member movable into alinement and engagement with the other face of the blank, and means for tapering said blank into a finished stopper during such rotation.

4. In a machine of the class described, a blank punching die, mechanism for receiving a blank from said die comprising rotatable members adapted to engage both faces of a punched blank and finishing mechanism comprising a rotatable disk skiving knife, means for reciprocating said skiving knife to bring it into cutting engagement with said blank as it is being held, and means to adjust said finishing mechanism for different sized blanks comprising means for changing the limits of reciprocation of said skiving knife.

5. In a machine of the class described, a blank punching die, mechanism for receiving a blank from said die, comprising rotatable members adapted to engage both faces of a punched blank, and finishing mechanism comprising a rotatable disk skiving knife, means for reciprocating said skiving knife to bring it into cutting engagement with said blank as it is being held, and means to adjust said finishing mechanism for different sized blanks comprising means for adjusting the

angle of engagement of the knife with the blank to vary the taper of the finished product, means for changing the limits of reciprocation of said skiving knife, and means for varying the axis of rotation of said skiving knife transversely to the axis of rotation of the blank.

6. A machine of the class described comprising a blank punching die, means for reciprocating said die into and out of punching position, a spindle within said die acting to eject the blank during the retracting stroke, means for rotating said spindle, a rotatable member rocking into alinement with the spindle and moving toward said spindle to clamp the ejected blank therebetween, thus permitting its rotation by said spindle, and after a period moving from said spindle and rocking out of alinement therewith to permit the succeeding punching stroke, and means for finishing said blank while it is held clamped and rotated.

7. A machine of the class described, comprising a tubular blank punching die, means for rotating said die, means for reciprocating said die into and out of punching position, a spindle within said die and rotated thereby acting to eject the blank during the retracting stroke, a rotatable member rocking into alinement with the spindle and moving toward said spindle to clamp the ejected blank therebetween thus permitting its rotation by said spindle, and after a period moving from said spindle and rocking out of alinement therewith to permit the succeeding punching stroke, and means reciprocating into engagement with said blank for tapering said blank while it is held clamped and rotated.

8. A machine of the class described, comprising a blank punching die, means for reciprocating said die into and out of punching position, a spindle within said die acting to eject the blank during the retracting stroke of the die, means for rotating said spindle, a rotatable member, means for moving said member into alinement with the spindle and then toward said spindle to clamp the ejected blank therebetween and thus to effect rotation of said blank by said spindle and after a period moving said member away from said spindle and then out of alinement therewith to permit the succeeding punching stroke of the die, and means for finishing said blank while it is held clamped and rotated, said means comprising a skiving knife and means for reciprocating said knife into cutting engagement with said blank and then out of cutting engagement before said blank is released.

9. A machine of the class described, comprising a tubular blank punching die, means for rotating said die, means for reciprocating said die into and out of punching position, a spindle within said die and rotated thereby acting to eject the blank during the retracting stroke of the die, a rotatable member, means for moving said member into alinement with the spindle and then toward said spindle to clamp the ejected blank therebetween and thus to effect rotation of said blank by said spindle and after a period moving said member away from said spindle and then out of alinement therewith to permit the succeeding punching stroke of the die, and means for finishing said blank while it is held clamped and rotated, said means comprising a rotary disk skiving knife, means for rotating said knife, and means for reciprocating said knife into cutting engagement with said blank and then out of cutting engagement before said blank is released.

10. A machine of the class described, comprising a blank punching die, means for reciprocating said die into and out of punching position, a spindle within said die acting to eject said blank during the retracting stroke of the die, means for rotating said spindle, a rotatable member, means for moving said member into alinement with the spindle and then toward said spindle to clamp the ejected blank therebetween and thus to effect rotation of said blank by said spindle, and after a period moving said member away from said spindle and then out of alinement therewith to permit the succeeding punching stroke of the die, and means for finishing said blank while it is held clamped and rotated, said means comprising a rotary disk skiving knife reciprocable into and out of cutting engagement with said blank and arranged to engage said blank at an angle to impart a taper thereto, means for rotating said knife, and means for reciprocating said knife while it is rotating into cutting engagement with said blank, and then out of cutting engagement before said blank is released.

11. A machine of the class described, comprising a blank punching die, means for reciprocating said die into and out of punching position, a spindle within said die acting to eject the blank during the retracting stroke of the die, means for rotating said spindle, a rotatable member, means for rocking said member into alinement with the spindle and then moving it toward said spindle to clamp the ejected blank therebetween and thus to effect its rotation by said spindle, and after a period moving said member from said blank and rocking it out of alinement therewith to permit the succeeding punching stroke of the die, skiving means moving into cutting engagement with said blank while it is held clamped and rotated, and means holding said rotatable member against rocking motion while said blank is being rotated and cut.

In testimony whereof I have affixed my signature.

ANDREW S. GREENE.