June 5, 1928. 1,672,259

H. C. HOOK

BLANK FEEDING MECHANISM

Filed April 8, 1921 6 Sheets-Sheet 1

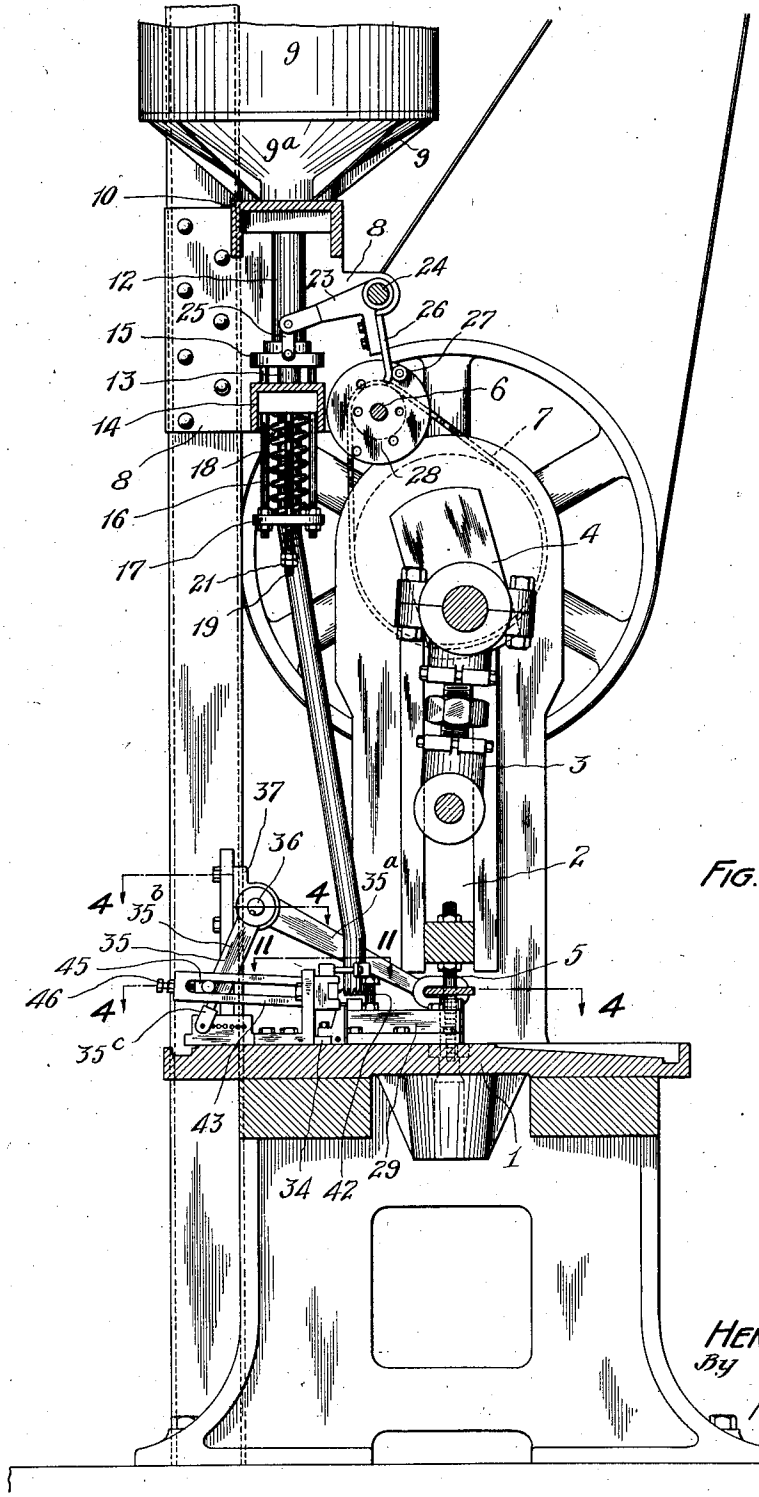


FIG. 1.

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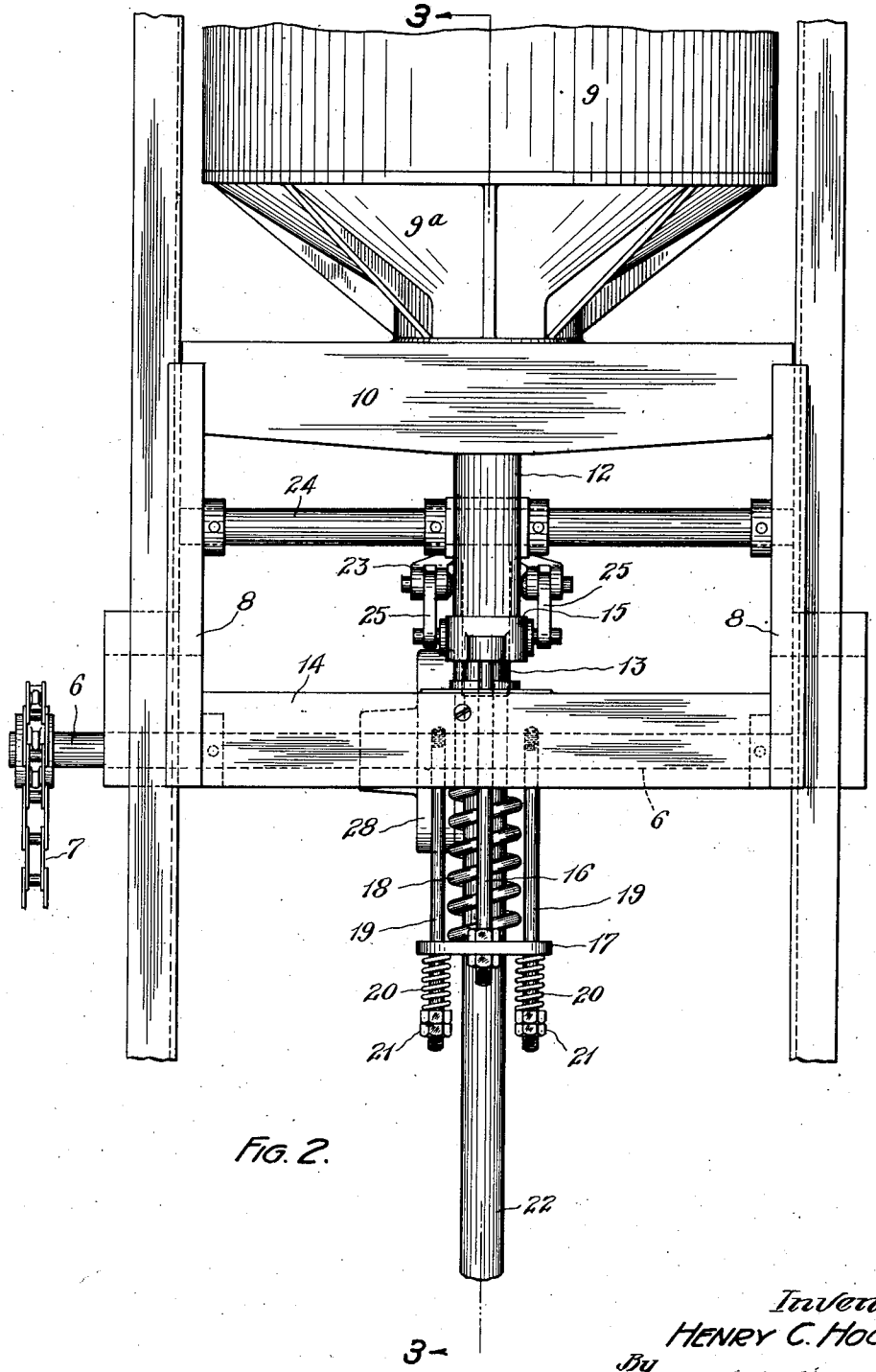


FIG. 2.

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BLANK FEEDING MECHANISM

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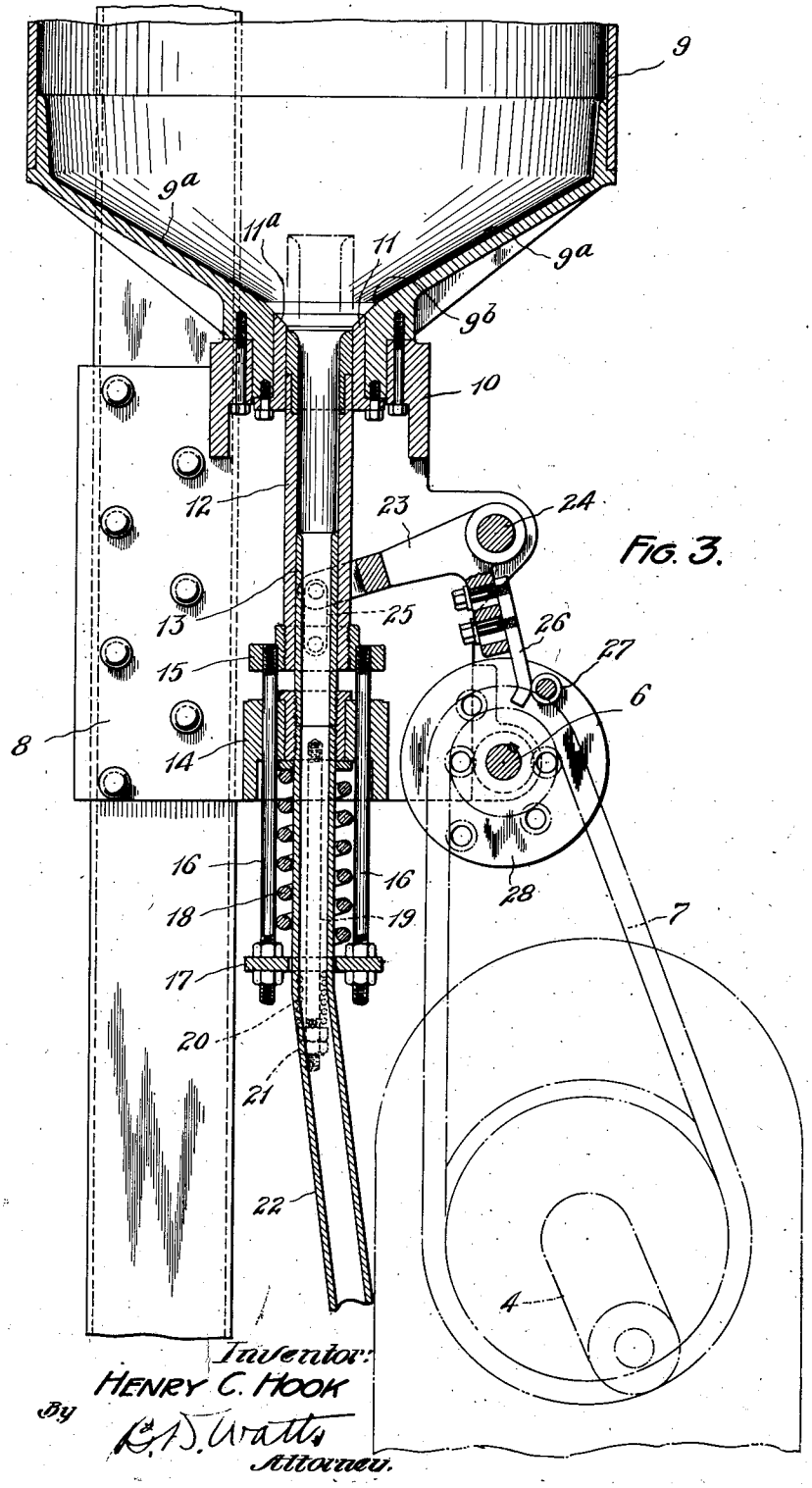


FIG. 3.

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BLANK FEEDING MECHANISM

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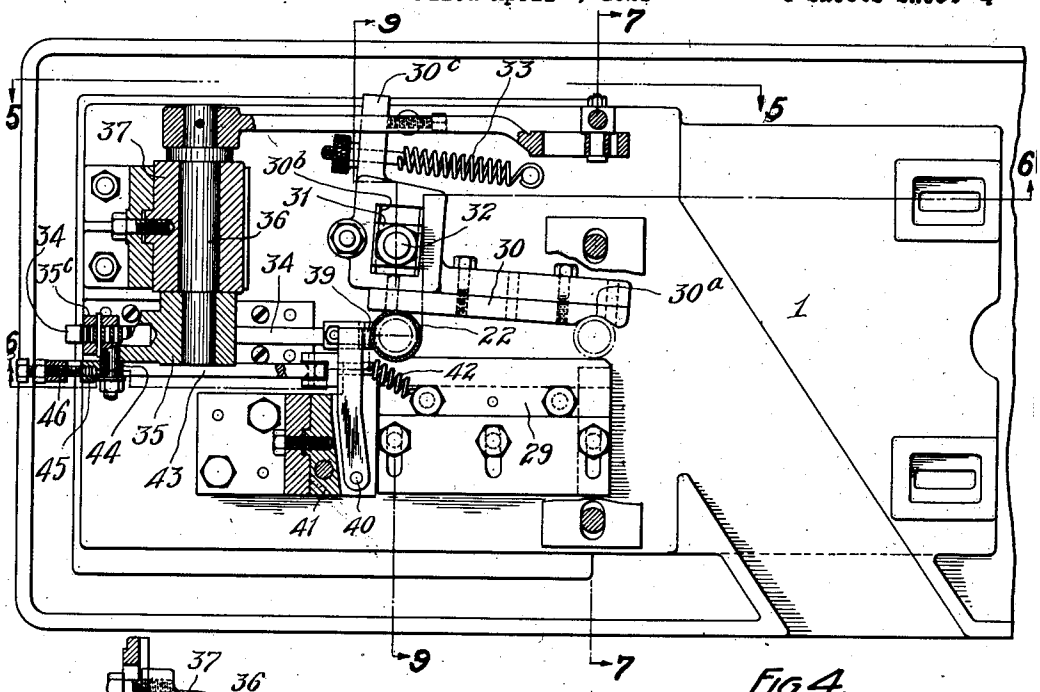


FIG. 4.

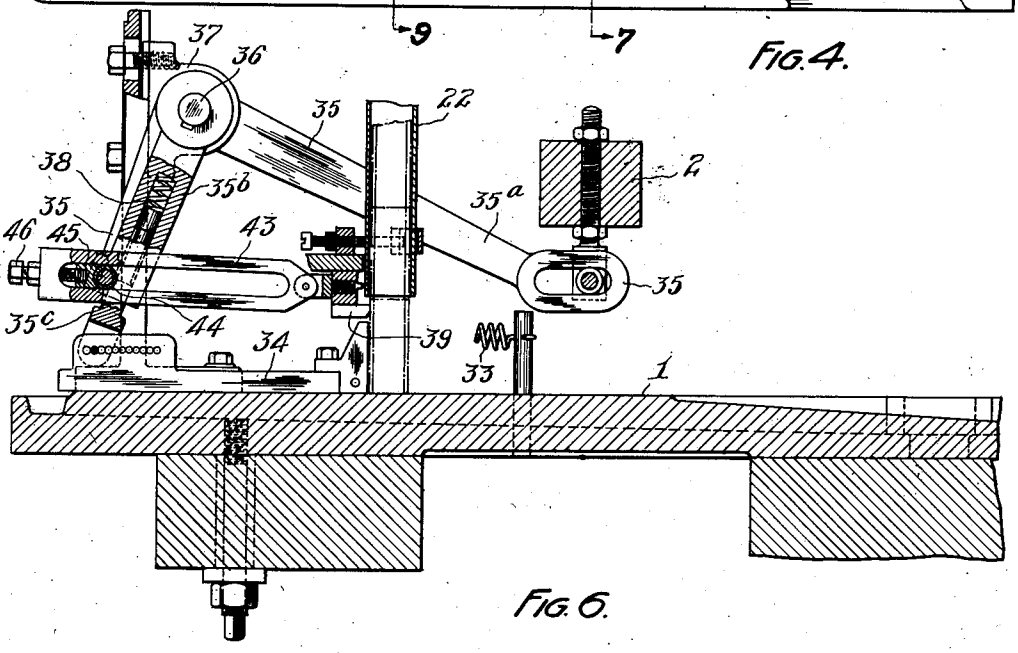


FIG. 6.

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BLANK FEEDING MECHANISM

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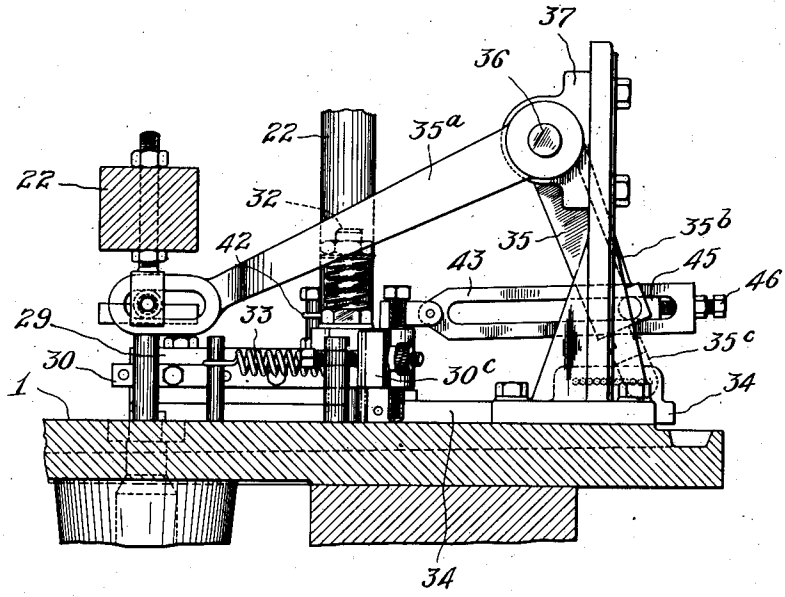


FIG. 5.

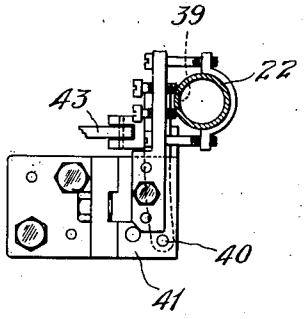


FIG. 11.



FIG. 10.

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BLANK FEEDING MECHANISM

Filed April 8, 1921 6 Sheets-Sheet 6

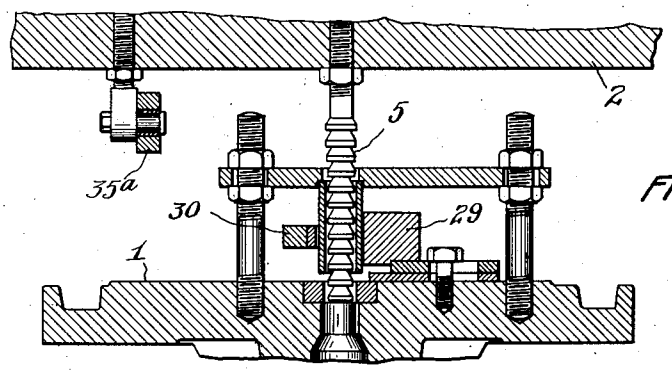


FIG. 8

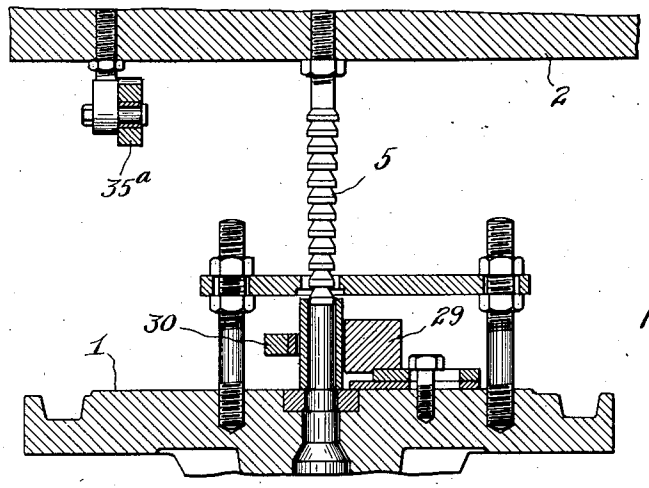


FIG. 7.

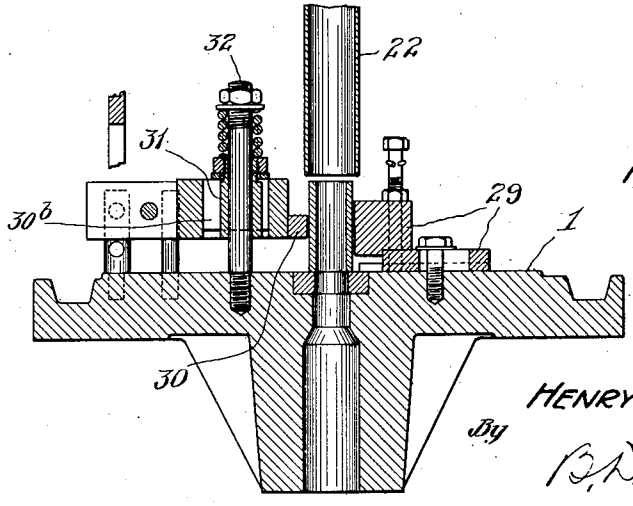


FIG. 9.

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Patented June 5, 1928. 1,672,259

UNITED STATES PATENT OFFICE.

HENRY C. HOOK, OF WINDSOR, VERMONT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ALUMINUM COMPANY OF AMERICA, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

BLANK-FEEDING MECHANISM.

Application filed April 8, 1921. Serial No. 459,791.

This invention relates to mechanism for feeding cylindrical blanks or bodies such as bearing bushings, to presses and other machines adapted to perform operations on the blanks.

One object of the invention is to provide a mechanism adapted to separate cylindrical blanks from a disarranged mass thereof, and feed them successively to the mechanism adapted to operate on the blanks.

Another object of the invention is to provide an improved mechanism for feeding cylindrical blanks forward in succession to an operating tool.

While my improvements are applicable to a wide variety of blanks to be operated upon, and to various forms of machine tools, they have been developed in connection with presses for broaching bearing bushings, and in the accompanying drawings I have illustrated the invention as embodied in a press of this character.

In the drawings,

Fig. 1 is a side elevation of the complete blank separating and feeding mechanism in connection with the co-operative parts of a vertical crank type press, many parts of the press being omitted and some parts being broken away to more clearly disclose the invention.

Fig. 2 is a rear elevation viewed at right angles to Fig. 1.

Fig. 3 is a side elevation, partly in section, of the hopper mechanism, the section being taken on line 3—3, Fig. 2.

Fig. 4 is a plan view, partly in section, of the platen and feeding mechanism, the section being taken on line 4—4, Fig. 1.

Fig. 5 is a section on the line 5—5, Fig. 4.

Fig. 6 is a section on the line 6—6, Fig. 4.

Fig. 7 is a section on the line 7—7, Fig. 4, showing the parts in the positions occupied as the broaching tool enters the work.

Fig. 8 is a section similar to that of Fig. 7, but showing the broach being retracted from the work, after the broaching operation.

Fig. 9 is a fragmentary section on line 9—9, Fig. 4.

Fig. 10 is a sectional view of a bearing bushing such as the machine is designed to broach.

Fig. 11 is a fragmentary plan view taken on line 11—11 of Fig. 1.

Referring in detail to the construction illustrated, 1 is the platen of the press, 2 is the crosshead thereof, guided in the frame and actuated in the usual manner by connecting rod 3 from the main shaft 4. The crosshead carries a broach 5.

6 is a countershaft driven by sprocket chain 7 from the main shaft 4, and having suitable bearing support in any suitable or preferred frame structure 8.

9 is a hopper formed with sloping bottom walls 9^a, 9^b, and supported in an elevated position on suitable frame parts 10. The hopper 9 is formed with a central opening in its bottom wall, and in this opening is fitted bushing 11. The upper end of bushing 11 is flared at 11^a, to form a continuation of the wall 9^b of the hopper.

A tube 12 has its upper end slidably mounted in the bushing 11, while its lower end slidably surrounds a smaller tube 13, which is fixedly mounted on frame part 14. The bore of tube 12 is flared at its top end to co-operate with the sloping bottom walls of the hopper structure. A flanged collar 15 is threaded to the lower end of tube 12, and this collar carries two depending rods 16, which slidably engage apertures formed in the frame structure 14. A ring 17 is secured to the lower ends of rods 16, and is engaged by the lower end of a coiled spring 18, the upper end of which abuts against the frame 14. The tube 12 is thus yieldingly held in its lowermost position by spring 18. Two rods 19 are secured at their upper ends to frame part 14, and have their lower ends slidably engaging apertures in the ring 17. Coiled cushioning springs 20, surround the lower ends of rods 19 between the ring 17 and nuts 21 on the ends of said rods.

An elongated tube, or conduit, 22 is secured at its upper end in the frame 14 and constitutes a downward continuation of the tube 13. The upper end of tube 22 serves as a guide, or support, for the spring 18, and also for the ring 17.

The tube 12 is vertically reciprocated through the bottom of the hopper 9 by means of a bell crank 23, which is mounted on shaft 24 and has its forked end connected by links 25 to the collar 15. The other end of the bell crank carries an adjustable cam plate 26, which is arranged to be engaged by an

anti-friction roller 27 carried by a disc 28 on shaft 6. With each revolution of the disc 28 the tube 12 is lifted to the dotted line position shown in Fig. 3, and is then retracted by the spring 18, the downward movement of the tube 12 and its associated parts being cushioned by the springs 20.

When a mass of cylindrical blanks, such as the bushings shown in Fig. 10, are placed in hopper 9, the upward movement of the tube 12 into the mass agitates the blanks and causes them, one after another, to work into the upper end of the tube 12, and thence downward into tube 13 and conduit 22. Thus, a series of the blanks are separated from the mass in the hopper and led downward, end to end, through the conduit 22 to the lower end thereof adjacent to the platen of the press.

In front of the lower end of conduit 22 is an adjustable stationary guide 29, and a movable guide 30. These guides are adapted to guide the blanks issuing from the lower end of the conduit 22 forward to a position in line with the reciprocating broach. The movable guide 30 is notched at 30^a to locate and hold the blank in proper position, as indicated in Fig. 4.

The movable guide 30 can be yieldingly held in position in various ways, but as shown said guide is adjustably pivotally mounted by means of a block 31, which is pivotally mounted on a pin 32, carried by platen 1, said block being adjustably secured in a slot 30^b in the guide 30. The guide 30 is formed with a lever arm 30^c, which is pressed forward by a spring 33 so as to swing the guide 30 yieldingly toward the guide 29. By adjusting the guides 29 and 30 they can be adapted to blanks or bushings of various sizes.

The cylindrical blanks issuing from the lower end of conduit 22 are advanced between the guides 29 and 30, by a plunger 34, which is slidably mounted on platen 1, and actuated by a bell crank 35 mounted on a shaft 36 carried in a bracket 37 on the platen 1. The forwardly extending arm 35^a of the bell crank has a pin and slot connection with the crosshead of the press, as indicated in Fig. 5, so that the reciprocation of the crosshead is transmitted to the bell crank. The other arm 35^b of the bell crank has a telescoping extension 35^c which is pivotally connected to the rear end of the plunger 34. A coil spring 38 presses the extension 35^c outward.

The delivery of the cylindrical blanks from the lower end of the conduit 22 is controlled by a trigger or detent 39, which is pivotally mounted at 40 on a block 41 secured to the platen 1. The trigger 39 is normally drawn forward by a coiled spring 42 so as to project beneath the opening of conduit 22 and form a supporting ledge for the blanks in said conduit and thus prevent such blanks passing out from the lower end of the conduit until the trigger is withdrawn. The trigger 39 is actuated by a slotted link 43 which is secured at its front end to the trigger and has an adjustable lost motion connection with an anti-friction roller 44 carried by the lower end of bell crank arm 35^b. This roller 44 slidably engages the slot of link 43, and is adapted to contact with a block 45 which is adjustably secured in the slot of link 43 by means of a screw 46. With this construction the roller 44 engages block 45 as the plunger nears the end of its retracting movement, and thus as the said plunger is withdrawn from beneath conduit 22, the trigger 39 is retracted and a cylindrical blank permitted to drop to the platen, in front of the plunger. Then, upon the next actuation of the plunger, the delivered blank is moved forward between the guides 29 and 30 to a point beneath the broach. As the forward movement of the blank begins, the trigger 39 is drawn forward by the spring 42 into position to receive the next succeeding blank in the conduit 22 and prevent it from moving downward and interfering with the plunger 34 until the latter has been retracted, whereupon the trigger is released, as above stated.

It will be seen that my improved hopper separating and delivering mechanism can be used for various blanks, and to feed blanks to machine tools of various kinds. It is also obvious that the table feed mechanism with the automatically actuated trigger device can be used in connection with various forms of mechanism delivering the blanks adjacent to plunger 34; in fact a combined hand and gravity feed of the blanks to the plunger might be employed in so far as the platen feed mechanism is concerned. It will be further understood that the forms of construction shown in the drawings as above described have been set forth principally for purposes of explanation and illustration, and are not intended to define the scope of the invention.

What I claim as my invention is—

1. In combination with a machine for operating on cylindrical work blanks, an upright frame carrying a hopper, a tubular body reciprocable through the bottom of said hopper, a shaft actuated by the said machine, a second shaft actuated by the first said shaft and adapted to move the said tubular body in one direction with respect to the said hopper, means to move the body in the opposite direction, and a conduit communicating with the said tubular body to deliver blanks therefrom to the said machine.

2. In combination with a machine for operating on cylindrical work blanks, an up-

right frame, a hopper carried thereby and having a bottom opening, a tubular body reciprocable in the said bottom opening, parallel shafts carried by the said frame and connected with each other and with the said machine to actuate the said tubular body up into the said hopper, spring means carried by the frame and adapted to retract the said tubular body, and a conduit communicating with the said tubular body and extending to a point above but adjacent to a surface on the said machine.

3. In a blank separating and feeding mechanism, the combination of a hopper having bottom walls sloping toward a central opening, a bushing in the said opening, a tube mounted to reciprocate in the bushing and to extend at one end of its stroke to a point well above the bottom wall of the said hopper, positive means to move the tube above the bottom wall in the hopper, spring means to retract the said tube, a conduit operatively connected to the lower end of the said tube, and separate positive means for releasing blanks from the said conduit.

4. A machine for broaching cylindrical work blanks comprising a crank shaft, a broach carrying cross head reciprocated thereby, a hopper for work blanks, means actuated by the crank shaft for removing cylindrical work blanks in end to end relation from the hopper, a tube adapted to receive the blanks removed from the hopper, and means actuated by the cross head to deliver blanks from the tube to broaching position beneath the said broach.

5. In a machine for broaching cylindrical work blanks, the combination of a crank shaft, a cross head reciprocated thereby, a broach carried by the cross head, a hopper for work blanks, means for removing cylindrical work blanks from the hopper in end to end relation comprising a tubular member forming a part of the bottom of the said hopper and capable of being moved to a position well above the hopper bottom, the said tube being operated into position above the hopper bottom by the said crank shaft, a tube adapted to receive blanks removed from the hopper by the said tubular member, and means operated by the cross head to deliver blanks one at a time to operative position beneath the broach.

6. In a machine for broaching cylindrical work blanks, the combination of a crank shaft, a cross head reciprocated thereby, a broach carried by the said cross head, a hopper for work blanks, means actuated by the crank shaft for removing cylindrical work blanks in end to end relation from the hopper, a tube adapted to receive the blanks so removed from the hopper, and means for transferring cylindrical work blanks from the said tube to position beneath the said broach comprising a bell crank having a pivotal connection at one end with the cross head and connection at the other end with a plunger, and a trigger adjustably connected to the bell crank.

7. In a machine for broaching cylindrical work blanks, the combination of a crank shaft, a cross head reciprocated thereby, a broach carried by the said cross head, a hopper for work blanks, means actuated by the crank shaft for removing cylindrical work blanks in end to end relation from the hopper, a tube adapted to receive the blanks so removed from the hopper, and means for transferring the work blanks from the said tube to position beneath the said broach comprising a bell crank having a pivotal connection at one end with the cross head and connection at the other end with a plunger, a trigger actuated by the bell crank in synchronism with the plunger and adapted to release a work blank from the said tube when the plunger is in retracted position and to support the next succeeding blank in the tube until the plunger has completed its forward movement and has approximately completed its rearward movement.

8. In a mechanism for feeding cylindrical work blanks, the combination of a supply conduit containing cylindrical work blanks in end to end relation, a guideway for the blanks located at an angle to the conduit, a reciprocating plunger movable in the said guideway and a retainer actuated by the plunger and adapted to release a blank from the said conduit during a part of the stroke of the reciprocating plunger.

9. In a blank feeding mechanism for machine tools, the combination of means for delivering the blanks to the machine in succession, a blank guideway extending from said delivering means to the tool that operates on the blank, a plunger in the guideway, means for reciprocating the plunger to advance the blanks individually and successively from the delivering means to the tool, and means operated in synchronism with the plunger to release one blank from the delivering means to the guideway when the plunger is retracted.

10. In a mechanism for separating and feeding cylindrical work blanks the combination of a hopper having an opening in the bottom wall thereof, a tube mounted to reciprocate through the said opening into and well above the bottom wall of the hopper, means to move the tube into and above the bottom wall of the hopper and out of the hopper, a conduit operatively connected to the tube to receive blanks from the tube and means for releasing blanks from the said conduit.

11. A machine for broaching cylindrical work blanks comprising a crankshaft, a broach carrying crosshead reciprocated thereby, a broach carried by the said cross-

head, a hopper for cylindrical work blanks, means actuated by the crankshaft for removing cylindrical work blanks in end to end relation from the hopper, said means comprising a tube capable of movement into and out of the hopper; conduit adapted to receive in end to end relation the blanks removed from the hopper and means actuated by the cross-head to deliver blanks from the tube to broaching position beneath the broach.

In testimony whereof, I hereunto affix my signature.

HENRY C. HOOK.