

C. D. McDONALD.
AUTOMATIC FEED FOR DIE PRESSES, &c.
APPLICATION FILED OCT. 28, 1904.

3 SHEETS—SHEET 1

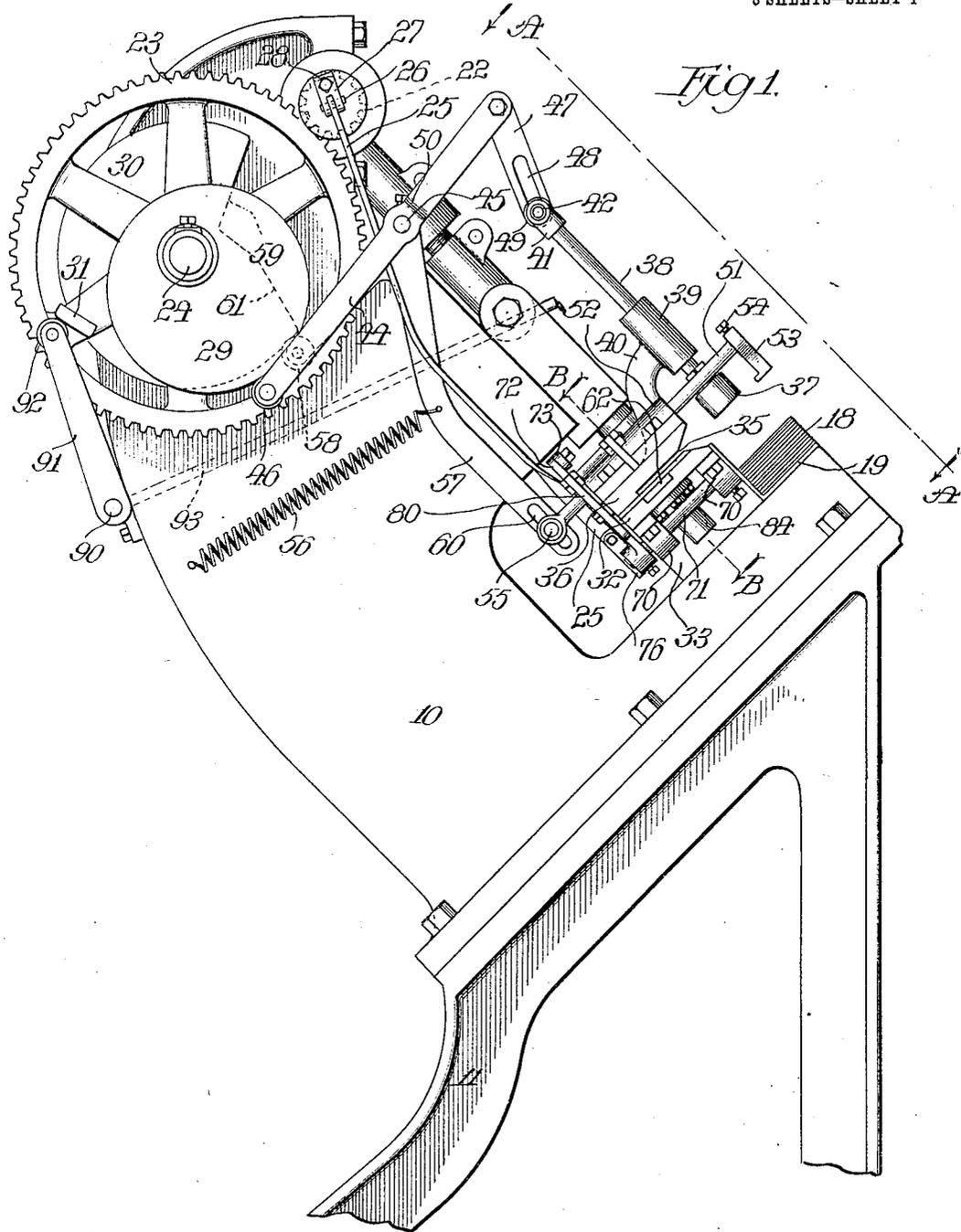


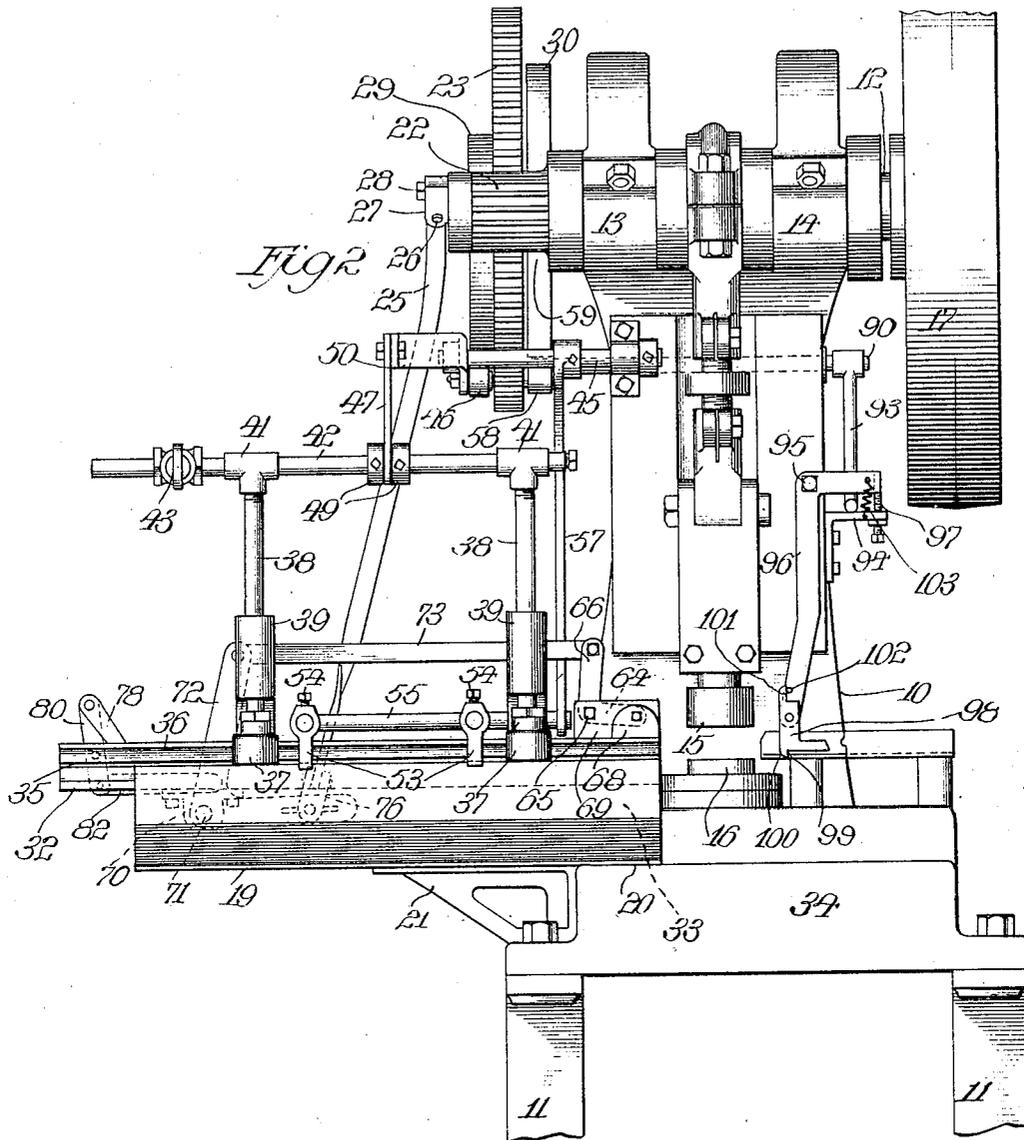
Fig. 1.

Witnesses:
Edw. P. Barrett
Julia M. Bristol.

Inventor:
Charles D. McDonald,
by John Howard McChoy
his Atty.

C. D. McDONALD.
AUTOMATIC FEED FOR DIE PRESSES, &c.
APPLICATION FILED OCT. 28, 1904.

3 SHEETS—SHEET 2.

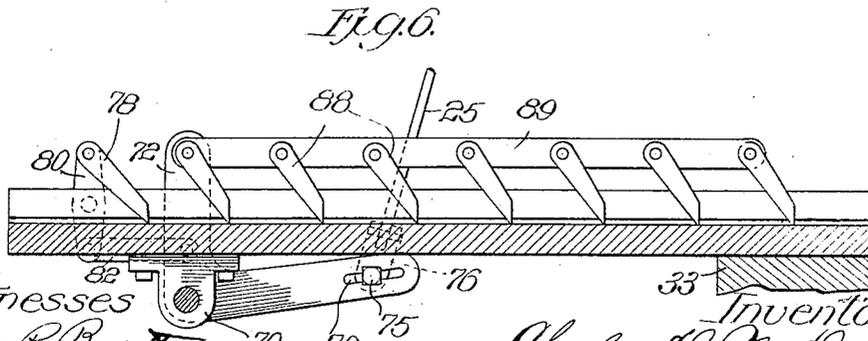
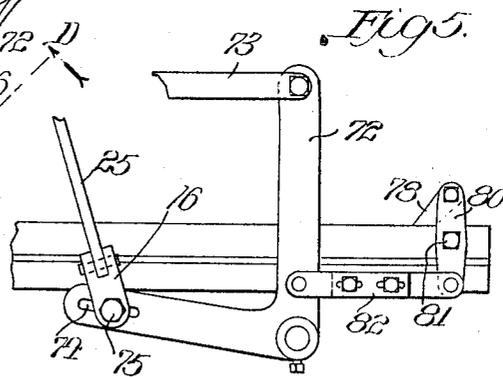
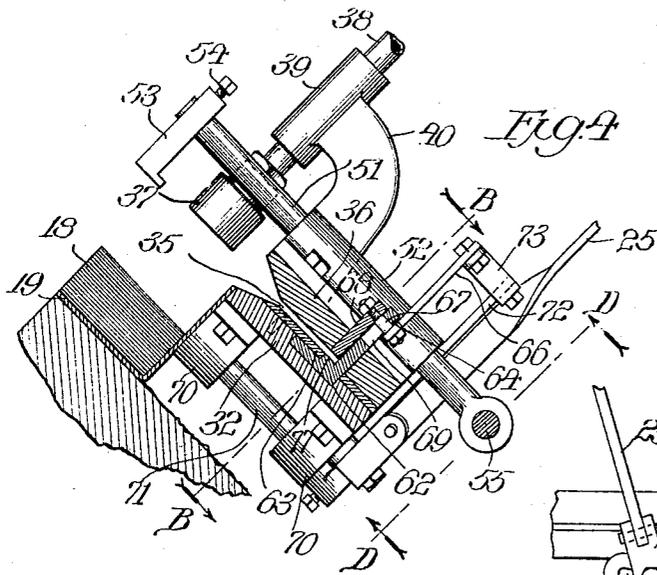
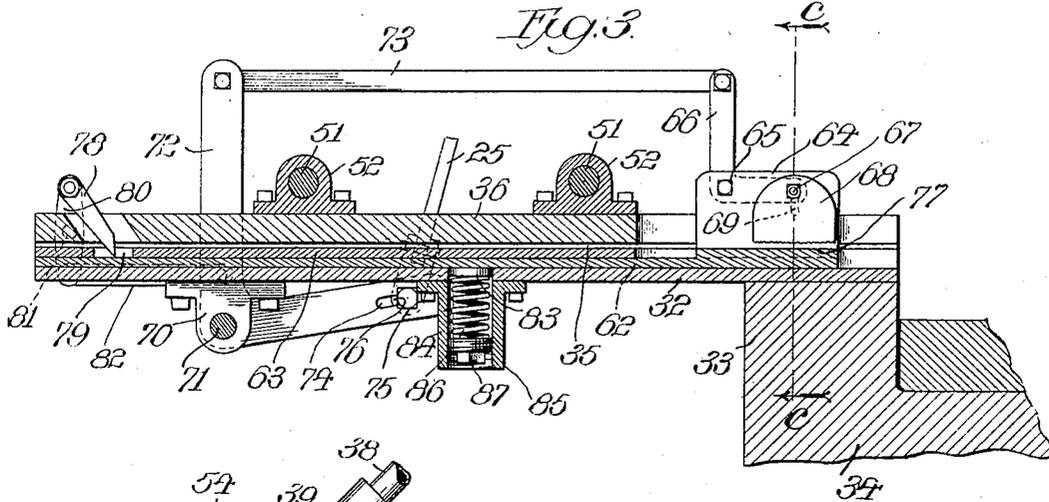


Witnesses:
 Edw. P. Barrett
 Julia M. Bristol.

Inventor:
 Charles D. McDonald,
 by John Howard McElroy
 his Atty

C. D. McDONALD.
AUTOMATIC FEED FOR DIE PRESSES, &c.
APPLICATION FILED OCT. 28, 1904.

3 SHEETS—SHEET 3.



Witnesses
Edw. P. Barrett
Julia M. Bristol.

Inventor:
Charles D. McDonald,
by John Howard McClary,
his Atty.

UNITED STATES PATENT OFFICE.

CHARLES D. McDONALD, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO CHARLES B. McDONALD, OF CHICAGO, ILLINOIS.

AUTOMATIC FEED FOR DIE-PRESSES, &c.

SPECIFICATION forming part of Letters Patent No. 784,415, dated March 7, 1905.

Application filed October 28, 1904. Serial No. 230,316.

To all whom it may concern:

Be it known that I, CHARLES D. McDONALD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Feeds for Die-Presses, &c., of which the following is a specification.

My invention is concerned with a novel feed mechanism for die-presses and similar machinery by which blanks are automatically separated one by one from a pile and each one after it is separated is fed automatically to the press in step-by-step feeds of the proper length for the particular die, so that an entire pile of blanks will be cut up automatically without any manual attention.

I am aware that heretofore feeds have been provided for taking care of a single strip and feeding it forward by intervals; but so far as I am aware I am the first to produce a feeding mechanism thus operating automatically on a plurality of blanks.

My invention is also concerned with certain novel features in a step-by-step feed for a single blank *per se*.

To illustrate my invention, I annex hereto three sheets of drawings, in which the same reference characters are used to designate identical parts in all the figures, of which—

Figure 1 is a side elevation of a die-press having my improved feed applied thereto. Fig. 2 is a front elevation of the same as seen from the line A A of Fig. 1. Fig. 3 is a longitudinal section through the feeding mechanism on the line B B of Fig. 4. Fig. 4 is a vertical section on the line C C of Fig. 3. Fig. 5 is a detail of the feeding mechanism as would be seen from looking in the direction of the arrows D D of Fig. 4; and Fig. 6 is a view similar to Fig. 3, but showing a modification.

I have shown my invention as applied to a die-press having its frame 10 mounted on the customary standards 11, the main shaft 12 being journaled in the bearings 13 and 14 and the punch 15 reciprocating in suitable guide-ways and operated by an eccentric from the shaft 12 in the customary manner and cooper-

ating with the die 16 in the customary manner. The shaft 12 is driven from the belt-wheel 17, to which it is connected by a clutch in the customary manner. The die-press itself forms no part of my present invention, but only in combination with the novel elements which I will now describe.

The pile of blanks 18 is placed in a holder 19, which is preferably composed of an angular strip of sheet metal set at an angle, as shown, so that the blanks will readily lie therein and retain their proper relative positions. The inner end of the holder rests upon the offset 20 of the frame 10 of the press and is preferably supported to some distance therefrom by means of the bracket 21 extending therebeneath and secured to the frame of the press. The step-by-step feeding mechanism, to be described at length hereinafter, is of course operated at each rotation of the shaft 12, which has its other end from the belt-wheel 17 formed into or carrying rigidly secured thereto a gear-pinion 22, which meshes with a gear-wheel 23, journaled upon a stud-shaft 24, projecting outwardly from and suitably supported by the framework 10. The relative size of the pinion 22 and the gear-wheel 23 is such that one complete rotation is given to the gear-wheel 23 during the time that it is necessary to separate and feed forward a single blank. The feed mechanism is operated at each rotation of the shaft 12 by means of the link 25, which is pivoted at 26 in a yoke-shaped piece 27, journaled on the pin 28, secured eccentrically upon the end of the pinion 22. The separating mechanism is operated by the eccentric cam-disk 29, secured to the gear-wheel 23 on the outer face thereof, while the translating mechanism to carry the blank from the separators to the feeding mechanism is operated by the cam-disk 30, also secured to the gear-wheel 23 on its other side. The discharge mechanism for throwing each blank from the machine after it has been completely punched out is operated by the cam-lug 31, secured on the wheel 23 on the same side as the cam-disk 29. The feeding mechanism is carried by a base-plate 32, which is supported at its inner end from and secured to the

lug or abutment 33, projecting upward and rearward from the forwardly-extending base portion 34 of the frame 10 of the press. A channel 35, in which the blanks are held while they are fed forward step by step, is formed between this base-piece 32 and a somewhat similar cover-piece 36, which coöperates therewith and is secured thereto at its rear edge, as best seen in Fig. 4. The adjacent corners of the front edges of these plates 32 and 36 are beveled, as best shown in Fig. 4, in order to form a flaring entrance into which the blank is carried by the translating mechanism. The separating mechanism is composed of one or more (preferably two) lifters 37, which consist of cups secured or formed on the lower ends of the pair of tubes 38, which reciprocate in the elongated bearing-sleeves 39, supported by the brackets 40, extending upwardly and rearwardly from the cover-plate 36. These sleeves or tubes 38 are connected by the T-shaped unions 41 with the horizontal pipe 42, which is preferably provided with the cut-off cock 43 and has its outer end suitably located to be connected by a hose with a vacuum-pump or some other suitable source of diminished pressure. At each operation of the machine the suckers fall by gravity upon the uppermost blank of the pile, to which they adhere on account of the suction, and they are lifted, carrying the uppermost blank with them, by means of the lever 44, pivoted upon a bearing-stud 45, projecting outwardly from the frame 10. The inner end of the lever 44 coöperates with the periphery of the eccentric cam-disk 29, preferably by means of the antifriction-roller 46, mounted on the inner face of the inner end of said lever. The other end of the lever 44 has pivoted thereto the link 47, which has the elongated slot 48 therein, through which the pipe 42 passes and which is held in suitable relation thereto by means of the collars 49 on either side of the link, which are secured to the pipe 42. The forward arm of the lever 44 is preferably offset, as at 50, in order to engage the pipe 42 at a point substantially midway between the two lifters. It will be apparent that the elongated slot 48 permits of a certain amount of lost motion, which will be necessary as the number of blanks in the pile is increased and which of course diminishes as the number in the pile is decreased. By means of this mechanism I am enabled to dispense with the mechanism usually employed in similar devices for keeping the pile of blanks at a certain level.

The translating mechanism consists of a pair of rods 51, mounted to reciprocate in the elongated bearings 52, formed upon or secured to the upper surface of the cover-plate 36. The outer ends of the rods 51 are provided with the hooks 53, which are preferably adjustably secured thereon by means of the set-screws 54. The rear ends of the rods 51 are secured to the connecting-rod 55, preferably

by having eyes thereon through which said connecting-rod passes. This connecting-rod is reciprocated quickly at the proper time to carry the separated blanks into the channel 35 by means of a tensile spring 56, connected at one end to the frame and at the other end to the bell-crank lever 57, which is pivoted on the stud 45 on the inner side of the lever 44 and has its inner end coöperating with the cam-disk 30, preferably through the medium of the antifriction-roller 58. The abrupt shoulder 59 on the cam 30 permits the spring to act very quickly to draw the hooks 53 rearward and downward to carry the blank into the channel, the lever 57 coöperating with the rods 51 through the medium of the elongated slot 60 in the lower end of the lower arm through which the rod 55 passes. The hooks 53 are promptly returned to their outermost position, where they will not interfere with the lifting of the next blank, by means of the cam-surface 61 on the disk 30.

The jaws of the feeding mechanism are carried by the elongated slide 62, which, as best shown in Fig. 4, reciprocates in a channel formed in the upper surface of the base-plate 32 and is held in place by the strip 63, screwed to or otherwise secured upon the upper surface of the plate 32 and constituting the operating upper surface of the channel 35. At its inner end the strip 62 is provided with the vertical extension or lug 64, which has pivoted thereto at 65 the bell-crank lever 66, the end of the horizontal arm of which carries the pin 67, upon which is secured the clamping-jaw 68. The pin 67 passes through the vertical slot 69 in the extension 64, so that the jaw 68 is free to rise and fall as the bell-crank lever 66 is swung. Toward the outer end of the base-plate 32 there is secured to the under side thereof a bearing or bearings 70, in which is journaled a rock-shaft 71, which has secured to the outer end thereof a bell-crank lever 72, the vertical arm of which is connected with the vertical arm of the bell-crank lever 66 by the link 73, while the substantially horizontal arm thereof has the elongated slot 74 in the end thereof, through which passes the pin 75, by which the yoke-piece 76 is adjustably secured to said lever. Pivoted in the upper end of the yoke-shaped piece 76 is the link 25, which has been previously described as reciprocated at each rotation of the shaft 12 by means of its eccentric connections thereto. The result of the downward reciprocation of the bell-crank lever 72 is first to rock the bell-crank lever 66 sufficiently so that the jaw 68 grips the blank between it and the coöperating surface 77 upon the slide 62, after which the continued movement of the bell-crank lever 72 moves the slide 62 and the gripped blank therewith inward the proper distance to constitute a single feed for the blank, and upon the return movement of the bell-crank lever 72 its first action is to rock the bell-

crank lever 66 back, so as to release the jaws, after which the jaws and slide 62 are moved back to get a fresh grip upon the blank. The blank is held from being carried back accidentally by reason of the punch engaging the blank just prior to the beginning of the backward movement.

To assist in moving the blanks forward at the beginning, I may employ the dog 78, the free end of which passes through the slot 79 in the plate 63, so as to be sure of engaging with the end of the blank which is fed into the channel 35. This dog 78 reciprocates with the feeding mechanism, but in the opposite direction, by reason of its being pivoted to the short vertical lever 80, which is pivoted at 81 to the rear of the cover-plate 36 and has its lower end connected by the preferably adjustable link 82 with the bell-crank lever 72. To regulate the friction of the sliding plate 62 and prevent the possibility of its accidentally moving before the bell-crank lever 66 has been rocked, I provide a tension device, which is shown as consisting of a disk 83, located in the upper end of the vertical channel 84, formed by the sleeve 85, secured to the under side of the base-plate 32. The necessary tension is secured by the helically-coiled expanding-spring 86, which is mounted in the sleeve, and the amount of tension regulated by means of the nut 87, which is screwed into the threaded interior of the sleeve 85.

In Fig. 6 I have illustrated a modification of the feed mechanism in which the same bell-crank lever 72 is employed and is actuated in the same manner; but instead of the gripping mechanism employed I have substituted the series of reciprocating pawls 88, which are spaced apart a distance equal to the step-by-step feed to be given to the blank and pivoted to the bar 89, which in turn is pivoted at its inner end to the upper end of the vertical arm of the bell-crank lever 72. By means of this mechanism it will be apparent that when the blank is fed in the dog 78 will feed the outer end into proper position to be engaged by the outermost of the pawls 88, and during the first reciprocation of the feed the blank will be fed forward by the outermost pawl engaging with its rear end, and during the second feed it will be fed forward by the second pawl, thus engaging it, and so on until the feed is completed.

To discharge the blank which has been completely fed forward, I mount in suitable bearings, secured upon the rear side of the frame 10, the rock-shaft 90, whose outer end carries the arm 91, the upper end of which is engaged by the cam-lug 31, preferably through the medium of the antifriction-roller 92, journaled on the end of the arm 91. The other end of the rock-shaft 90 has secured thereto the arm 93, which extends forward and normally rests upon the bracket 94, secured upon that side of the frame 10. Pivoted at 95 upon the

frame 10 is the bell-crank lever 96, the short horizontal abutment of which extends over the end of the arm 33 and rests upon the set-screw 97, which is mounted in the bracket 94. The lower arm has loosely pivoted thereon the dog 98, which is of the shape shown in Fig. 2 and which has the shoulder 99, which is suitably located and positioned to drop into the recess punched out of the blank near the edge thereof and which has the inclined portion 100 back of said shoulder, so that as the blank is fed forward the dog will yield and fall back into position as the uncut portion of the blank passes. The position of the dog, which is overweighted on one side, as shown, is controlled by the arm 101 thereof contacting with the pin 102, projecting from the bell-crank lever 96. The operation of this ejector will be apparent, as the lug 31 is so located that the arm 96 remains stationary during the ordinary feed of the blank. When the last feed has been given to the blank and the die has punched out the last hole, the shoulder 99 is resting against the edge of one of the cut-out holes, and at this instant the lug 31, acting through the mechanism described, serves to throw the outer end of the arm 93 up quickly, and this in turn throws the dog 98 forward very suddenly, and thus carries off with it the blank which has just been released by the press and leaves it free for the reception of another blank. The lever 96 is designed so that it will return by gravity in the position shown; but, if desired, I may reinforce the action of gravity by means of the contractile spring 103, interposed between the end of the horizontal arm of the lever and the bracket 94, in the manner shown.

The operation of the complete device will be readily apparent. The blanks are lifted and separated one by one and carried into the channel from which each blank is fed by intervals to the press until the cycle of movements is completed, when a fresh blank is furnished, and so on until the supply of blanks is exhausted or replenished.

While I have shown and described my invention as embodied in the form which I at present consider best adapted to carry out its purposes, it will be understood that it is capable of modifications and that I do not desire to be limited in the interpretation of the following claims, except as may be necessitated by the state of the prior art.

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

1. In a device of the class described, the combination with the blank-holder, of a separator for the blanks, and means for automatically feeding each blank after it has been separated to the machine intermittently so as to be operated on thereby a plurality of times.

2. In a device of the class described, the combination with the blank-holder, of a separator for the blanks, means for automatically feed-

ing each blank after it has been separated to the machine intermittently so as to be operated on thereby a plurality of times, and mechanism for translating the separated blank from the separator to the feeding means.

3. In a device of the class described, the combination with the blank-holder, of a separator for lifting the blanks one by one, and means for automatically feeding each blank after it is separated longitudinally to the machine intermittently so as to be operated on thereby a plurality of times.

4. In a device of the class described, the combination with the blank-holder, of a separator for lifting the blanks one by one, means for automatically feeding each blank after it has been separated longitudinally to the machine intermittently so as to be operated on thereby a plurality of times, and mechanism for translating the separated blank transversely from the separator to the feeding means.

5. In a device of the class described, the combination with the blank-holder, of a sucker for lifting the blanks one by one, and means for automatically feeding each blank after it has been separated to the machine intermittently so as to be operated on thereby a plurality of times.

6. In a device of the class described, the combination with the blank-holder, of a sucker for lifting the blanks one by one, means for automatically feeding each blank after it has been separated longitudinally at intervals to the machine operating thereon, and transversely-moving hooks for dragging the separated blank from the sucker and carrying it to the feeding means.

7. In a device of the class described, the combination with the blank-holder, of a separator for the blanks, means for automatically feeding each blank after it has been separated to the machine intermittently so as to be operated on thereby a plurality of times, and a discharge mechanism for throwing the blank from the machine when it has been fed there-through.

8. In a device of the class described, the combination with a die-press, of means for automatically feeding a blank to the press intermittently so as to be operated on thereby a plurality of times, and a discharge mechanism for automatically throwing the blank from the press when it has been fed there-through.

9. In a device of the class described, the combination with a blank-holder, of a lifter cooperating therewith, means for carrying away the separated blanks one by one from the lifter, mechanism having a fixed movement to operate the lifter, and lost-motion connections between said mechanism and lifter to permit it to accommodate itself automatically to the height of the blanks.

10. In a device of the class described, the combination with a blank-holder, of a sliding

lifter cooperating therewith, means for carrying away the separated blanks one by one from the lifter, a cam-shaft, a lever operated by the cam-shaft, and a slotted link connecting the lifter and the lever, substantially as and for the purpose described.

11. In a device of the class described, the combination with the die-press, of a blank-receiver adjacent thereto, and a reciprocating gripper cooperating therewith to feed the blank forward step by step.

12. In a device of the class described, the combination with the die-press, of a blank-receiver adjacent thereto, and a reciprocating gripper cooperating therewith to feed the blank forward step by step, consisting of a sliding member, a bell-crank lever pivoted thereon, a jaw carried by the lever and cooperating with the sliding member, and a horizontally-reciprocating link connected to the lever to first swing it and then slide the member.

13. In a device of the class described, the combination with the die-press, of a blank-receiver adjacent thereto, a sliding gripping member, a bell-crank lever pivoted thereon, a jaw carried by the lever and cooperating with the sliding member, a second bell-crank lever pivoted to the framework of the machine, an eccentric-pin on the press-shaft, a link connecting said pin and the second bell-crank lever, and a link connecting the two bell-crank levers to first close the jaws and then slide the member.

14. In a device of the class described, the combination with the die-press, of a blank-receiver adjacent thereto, a bell-crank lever, connections between the lever and the press for reciprocating the lever, means for advancing the blank step by step operated by said lever, a pawl to cooperate with the end of the blank, a second lever on which the pawl is pivoted, and a link connecting the two levers so that the pawl moves in the opposite direction to the main mechanism for advancing the blank.

15. In a device of the class described, the combination with the blank-holder, of the reciprocating lifter cooperating therewith, and translating mechanism consisting of transversely-movable hooks, a spring to draw them in one direction quickly, and a cam to return them.

16. In a device of the class described, the combination with the blank-holder, of the reciprocating lifter cooperating therewith, step-by-step feeding mechanism for the separated blanks, and translating mechanism to carry the blanks from the lifter to the feeding mechanism between certain advances thereof, said mechanism consisting of transversely-movable hooks, a spring to draw them in one direction quickly, and a cam to return them.

17. In a device of the class described, the combination with the blank-holder, of the reciprocating lifters cooperating therewith, a

blank-receiver, step-by-step feeding mechanism cooperating with said receiver to advance the separated blanks, and translating mechanism consisting of transversely-movable hooks, a spring to throw them in one direction quickly, and a cam to return them.

18. In a device of the class described, the combination with the die-press, of a step-by-step blank-feed therefor to cause the same blank to be operated on a plurality of times, and ejecting mechanism adapted to discharge the blank when it has passed completely through the press.

19. In a device of the class described, the combination with the die-press, of a step-by-step blank-feed therefor, and ejecting mechanism to discharge the blank when it has passed completely through the press, consisting of a pivoted lever, a dog pivoted thereon so as to hang in a recess in the blank, and means for giving the lever a sudden movement just after the last punch is made in the blank and it is released from the die.

20. In a device of the class described, the combination with the die-press, of a step-by-step blank-feed therefor, and ejecting mechanism adapted to discharge the blank when it has passed completely through the press, consisting of a pivoted lever, a dog pivoted thereon so as to hang in a recess in the blank, and means for giving the lever a sudden movement just after the last punch is made in the blank and it is released from the die, consisting of a cam-shaft, reducing-gearing between it and the main shaft of the press, a short cam on the cam-shaft, and connections between the cam and the lever.

21. In a device of the class described, the combination with the die-press, of a step-by-step blank-feed therefor, and ejecting mechanism adapted to discharge the blank when it has passed completely through the press, consisting of a pivoted lever, a dog pivoted thereon so as to hang in a recess in the blank, and means for giving the lever a sudden movement just after the last punch is made in the blank

and it is released from the die, consisting of a cam-shaft, reducing-gearing between it and the main shaft of the press, a short cam on the cam-shaft, and connections between the cam and the lever, consisting of a rock-shaft having two arms, one cooperating with the cam and the other with the lever.

22. In a device of the class described, the combination with the die-press, of a blank-receiver adjacent thereto, a sliding gripping member cooperating therewith, a bell-crank lever pivoted thereon, a jaw carried by the lever and cooperating with the sliding member, a horizontally-reciprocating link to first swing the lever and then slide the member, and a tension device cooperating with the sliding member.

23. In a device of the class described, the combination with the die-press, of a blank-receiver adjacent thereto, a sliding gripping member cooperating therewith, a bell-crank lever pivoted thereon, a jaw carried by the lever and cooperating with the sliding member, a horizontally-reciprocating link to first swing the lever and then slide the member, and an adjustable tension device cooperating with the sliding member.

24. In a device of the class described, the combination with the die-press, of a blank-receiver adjacent thereto, a sliding gripping member cooperating therewith, a bell-crank lever pivoted thereon, a jaw carried by the lever and cooperating with the sliding member, a horizontally-reciprocating link to first swing the lever and then slide the member, and a tension device cooperating with the sliding member, consisting of a disk pressing against the sliding member, a helically-coiled expanding-spring engaging the disk, and means for regulating the tension of the spring.

In witness whereof I have hereunto set my hand this 20th day of October, 1904.

CHARLES D. McDONALD.

Witnesses:

JOHN H. McELROY,
ROSE L. McCLEMENTS.