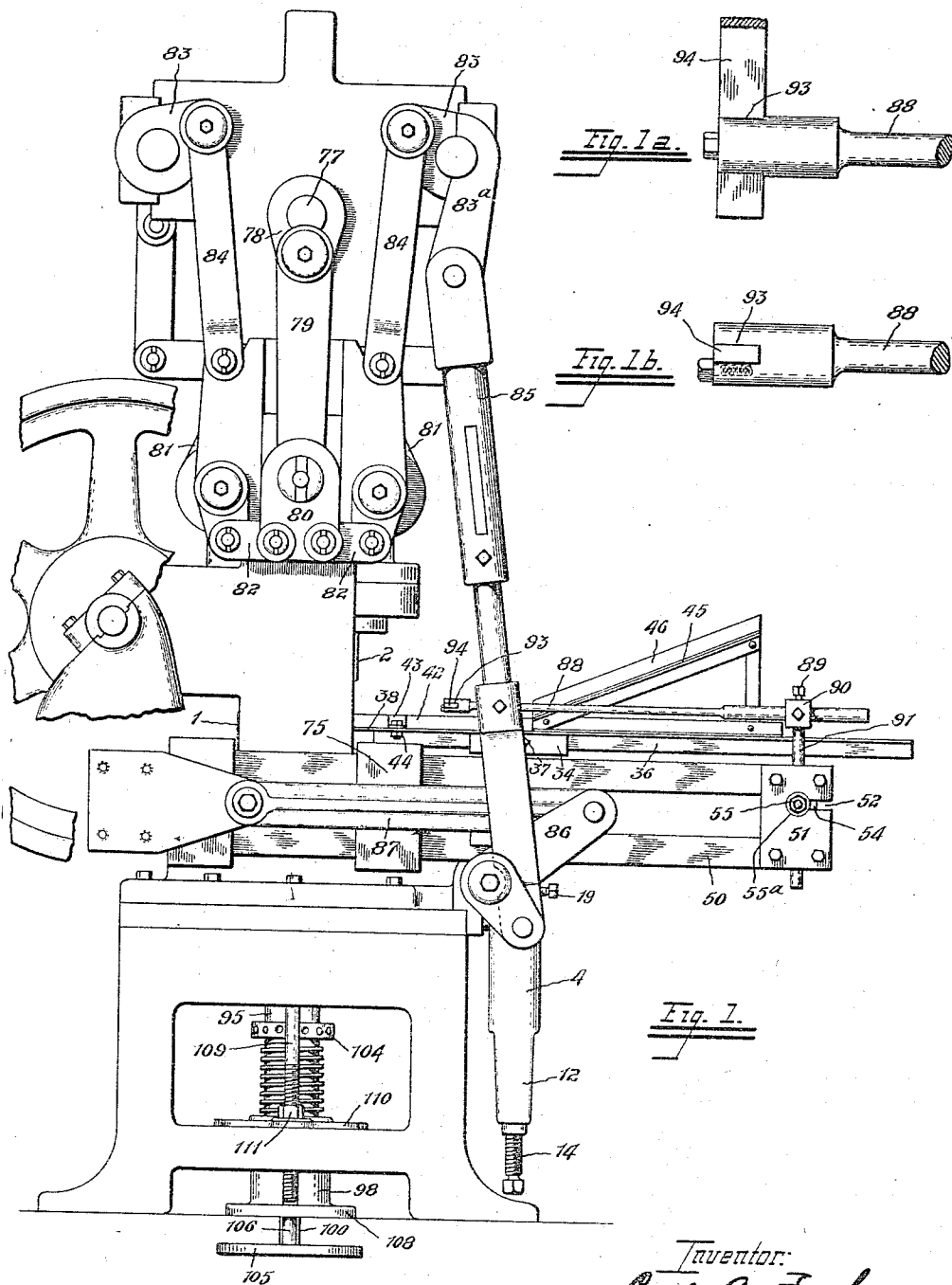


1,285,104.

C. A. FRAHM.
METAL WORKING PRESS.
APPLICATION FILED JUNE 16, 1916.

Patented Nov. 19, 1918.

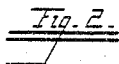
6 SHEETS—SHEET 1.



Inventor:
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APPLICATION FILED JUNE 16, 1916.

6 SHEETS—SHEET 2.



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6 SHEETS—SHEET 3.



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6 SHEETS—SHEET 4.

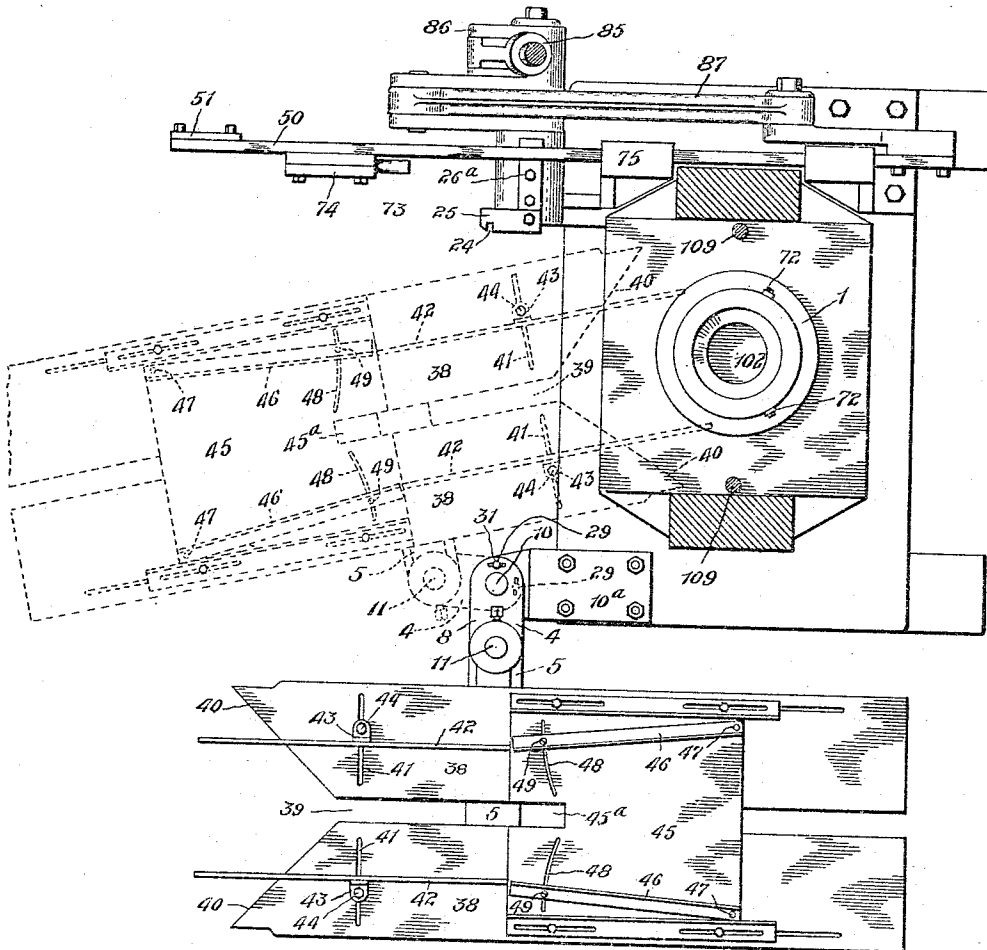


Fig. 4.

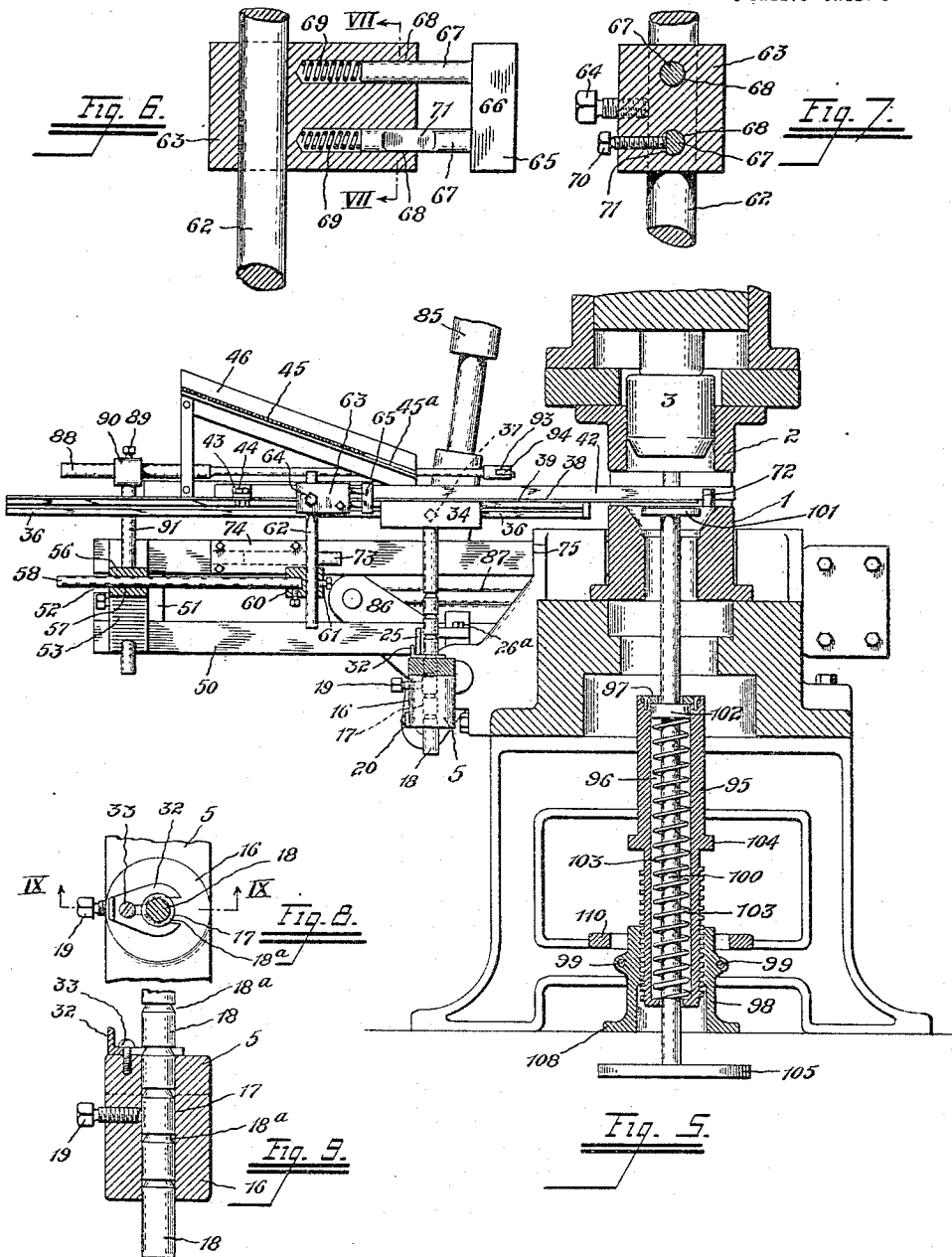
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Patented Nov. 19, 1918.

6 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

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METAL-WORKING PRESS.

1,285,104.

Specification of Letters Patent.

Patented Nov. 19, 1918.

Application filed June 16, 1916. Serial No. 104,107.

To all whom it may concern:

Be it known that I, CARL A. FRAHM, a citizen of the United States, resident of Canton, county of Stark, and State of Ohio, have invented a new and useful Improvement in Metal-Working Presses, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My invention relates to metal-working presses and particularly to automatically operated means for feeding the blanks to such presses, such as for instance are shown, described and claimed in my United States Letters Patent No. 1,207,390.

The object of said invention, broadly, is to provide efficient and economically operating means to effect such feeding operation.

The principal specific objects of the invention are first,—to arrange the mechanism so that a maximum amount of time is afforded for performing the manual operation involved; second,—to permit the feeding mechanism to be readily removed from the vicinity of the main body of the machine to allow ready access to the die for removal, replacement or adjustment of such die; third,—to permit a fine and ready adjustment of the feed-table; and fourth,—to provide improved means for ejecting the work or finished product from the die.

The annexed drawings and the following description set forth in detail certain means embodying my invention, the disclosed means, however, constituting but one of various mechanical forms in which the principle of the invention may be employed.

In said annexed drawings:—

Figure 1 represents a left hand end view of a drawing press provided with my improved feeding mechanism, portions being broken away to disclose parts in rear thereof.

Fig. 1^a represents on an enlarged scale, a plan of a fragmentary portion of the end of the work-discharging rod, and Fig. 1^b represents a side elevation thereof.

Fig. 2 represents a front elevation of the lower part of the press.

Fig. 3 represents a horizontal section taken upon the plane indicated by line III—III in Fig. 2.

Fig. 4 represents a view similar to that shown in Fig. 3, showing the feed-table swung into a position laterally of the main frame of the machine, and also showing an intermediate position of said feed-table in dotted lines.

Fig. 5 represents a vertical transverse section taken upon the plane indicated by line V—V in Fig. 3.

Fig. 6 represents, upon an enlarged scale, a vertical transverse section of a detailed portion of the feeding rod, and Fig. 7 a longitudinal section thereof taken upon the plane indicated by line VII—VII in Fig. 6.

Fig. 8 represents, upon an enlarged scale, a plan view of a fragmentary portion of the feed-table adjusting means, and Fig. 9 a section taken upon the plane indicated by a line IX—IX in Fig. 8.

Fig. 10 represents, upon an enlarged scale, a front elevation of part of the mechanism for locking the feed-table and the main frame of the machine, and Fig. 11 represents a section taken upon the plane indicated by line XI—XI in Fig. 10.

The illustrated embodiment of my present invention is associated with a metal-working press, which, in so far as relates to the pressing or drawing operation, is of any suitable well-known construction of the double-acting type, including a hollow die 1, Fig. 5, having a vertical axis, a vertically reciprocating holding-member 2, and a vertically reciprocating drawing-plunger 3, both member 2 and plunger 3 cooperating with die 1 to effect the drawing operation. The holding member 2 is actuated by a system of links and arms so arranged that the said holding-member will engage the blank previously placed in position upon the die, prior to the engagement of the plunger 3 with such blank, and remain in such engaging position throughout the entire operating or formative stroke of the plunger, as well as throughout the initial and a subsequent part of the return stroke of said plunger, all as is well-known to those skilled in the art.

The main part of my improved automatically operating feeding-mechanism is arranged in front of the press and derives its motion from one of the elements of said system of links and arms in a manner here-

inafter fully described whereby certain advantages are obtained, as will subsequently appear.

The blank-feeding means as a whole may be conveniently divided into four main elements, viz:—the feed-table and connected parts; the feeding rod and connected parts; the ejector-means; and the actuating mechanism.

I shall begin the description of my invention by first describing the

Feed table and connected parts.—This part of the mechanism comprises a feed-table supporting frame consisting of two component main frame-members, a primary member 4 and a secondary member 5, as shown perhaps most clearly in Fig. 2. Member 4, the primary frame-member, consists of a body-portion 6 having a vertical cylindrical bore 7 and provided with two laterally extending arms 8, 8, each of which is formed with a bearing 9 for receiving the ends of a journal pin 10. The latter is vertical and is fixed in a supporting member 10^a itself fixedly secured to the main frame of the press, Fig. 3, and to the right, as shown, of a vertical transverse plane passing through the die-axis, and in the direction of feed of the blanks, as will hereinafter appear.

Oscillatorily mounted in the bore 7 and vertically slidable therein is a rod 11, Fig. 2, projecting both above and below the frame-member 4, the lower projecting portion being embraced by a yoke 12 forming an integral part of said member. Engaging a threaded bore in the cross-piece 13 of such yoke is a vertical screw 14 vertically aligned with the bore 7, whose upper end supports the lower end of rod 11, as shown. This rod may in consequence be vertically adjusted by means of said screw, as will be understood.

On the upper projecting portion of said rod, is the secondary frame-member 5, secured thereto by means of a set screw 15.

This secondary member normally extends longitudinally of the machine and at right angles to the above mentioned transverse plane, as shown on Figs. 2 and 3, and is provided with two bosses 16, 16, each formed with a vertical bore 17. A vertical feed-table supporting rod 18, is seated in each such bore and secured therein by means of a set screw 19, Fig. 2. The axes of these rods normally lie in a plane perpendicular to the above-mentioned transverse plane, and the latter passes midway between said rod-axes.

It will be observed from the above-described structure, that the primary frame-member 4 may be swung upon the axis of pin 10 and the secondary member 5 may be swung either upon said axis or the axis of rod 11.

To the lower portion of that boss 16 lying

to the left of said transverse plane is secured the housing-member 20 of means for locking the frame-member 5 against oscillation, these means being shown in detail in Figs. 10 and 11. This member 20 is formed with a horizontal guide-way 21 in which is seated a bolt 22 and a spring 23 tending to actuate the bolt in an outward or left-hand direction. The outer end of said bolt engages an elongated vertical slot 24 formed in a member 25 secured to the main frame of the machine by means of cap screws 26, as shown in Figs. 2 and 10. A slot 27 is formed in the housing-member 20, adjacent to the bolt, through which thumb-piece 28 projects which permits the bolt to be manually actuated in opposition to spring 23, so as to disengage the bolt from the slot and permit member 5 to be swung upon either of its two axes of oscillation, as will be understood.

The provision of the elongated slot 24, it will be seen, permits the locking engagement of the bolt with the member 25, in any of the various positions which may be imparted to member 5 by the adjusting screw 14.

The upper arm 8 of the body portion 6 of the primary frame member 4 is provided with a vertical bore 29, Fig. 2, which registers with a vertical bore 30 formed in the member 10^a, when occupying its normal position; that is, when the two axes of oscillation lie in the aforementioned perpendicular plane. A pin 31 passes through bore 29 and into bore 30, as shown, and fixes and locks member 4, as will be understood, in this normal position, with reference to its axis of oscillation.

The supporting rods 18, 18, are of equal length and are formed with a series of circumferential grooves 18^a, equidistant from each other and the uppermost of the grooves on the one rod being removed a distance from the top of its rod equal to that of the uppermost groove of the other rod from its top. Two forked clips 32 are provided, one for each rod 18, adapted to engage these grooves and rest upon the upper adjacent surface of the member 5, as shown in Figs. 8 and 9, and thus support the rods. These clips are secured in place by means of screws 33, threaded into said member 5. The set screws 19 are placed so as to engage the rods 18 intermediately of two adjacent grooves, as shown.

The rods 18, 18, form what may be called the legs of the feed-table proper. The upper portions of these legs are each provided with a boss 34, formed with a transverse slot 35, in each of which is located a horizontal bar 36 secured by means of set screws 37. These bars extend to within a short distance of the die 1, as shown in Fig. 5, and each of same supports a horizontal plate 38, Fig. 3. These plates are removed

from each other at their adjacent inner transverse edges and form a groove 39. The rear edges 40 of each plate form an angle with each other and are tangent to a circle whose center is upon the axis of the die, said circle having a radius equal to the radius of the circular blank which is to be operated upon (the particular feed-table shown being adapted for use in feeding such circular blanks). Each plate is secured to the corresponding bar 36 in any desired manner, and is also provided with a slot 41 extending in a direction transverse with respect to the direction of feed. Mounted upon each plate is a guide bar 42 which has secured thereto a lug 43 secured to the plate by means of a bolt 44 passing through the slot 41. These guide-bars extend beyond the die, and on each side thereof and serve to guide the blanks to the die, as will be understood, proper lateral adjustment being secured by means of the construction described.

The front ends of the bars 36 carry the inclined feed chute 45 which is provided with the lateral guides 46 pivoted at 47 and having their lower ends adjustably secured by means of slots 48 and suitable bolts 49 passing therethrough, these slots being formed upon the arc of the circle as will be understood. The construction of this table proper is similar to that shown, described and claimed in the above-named application, and forms no part of the present invention. Further description thereof will hence obviously be unnecessary.

Inasmuch as these presses are used for performing various kinds of work, and inasmuch as in consequence thereof dies of different sizes and depths are used, it is necessary to frequently adjust the position of the feeding-table proper and the above-described adjusting-means is hence provided. When only a slight adjustment is required, same may be effected by simply rotating the screw 14. When, however, the amount of adjustment is greater than the distance between two slots 18^a on the rods 18, adjustment by means of the screw 14 would obviously be comparatively slow. In this case, however, a quick adjustment may be secured by removing the screws 33, pulling out the clips 32, then loosening the set-screws 19 and raising or lowering the rods 18 to approximately the desired position. The clips 32 are then caused to engage those grooves which are nearest to and above the upper surface of member 5 and the rods and table then permitted to drop so as to cause the clips to re-engage such surface. These clips are then secured in place by means of the screws 33 and the set-screw 19 caused to secure the rods 18. The final and fine adjustment of the table is then secured by rotating the screw 14.

The feeding-rod and attached parts.—

Forming an element of the actuating mechanism, which will be hereinafter fully described, is a horizontally reciprocating cross-head 50, Fig. 1, which is located upon that side of the press opposite that upon which the feed-table supporting-frame above described, is located, and which reciprocates in the direction of feed of the blanks.

The rear end of this cross-head consists of a plate 51 formed with a horizontally extending slot 52. A longitudinally and horizontally extending feed-rod supporting arm or bracket 53 is formed with an extension 54 which seats in the rear end of the slot 52 and is removably secured therein in any desired or suitable manner. As shown, the securing means consists of a cap-screw 55 which threads into the extension, a suitable washer 55^a being interposed between the head of said screw and the plate 51, Fig. 1.

The outer or free end of the arm or bracket 53 is provided with a boss 56 formed with a horizontal bore 57 whose axis intersects the line of the axis of the die, and seated in said bore is the front end of a rod 58, Fig. 5, adjustably secured therein by means of a set screw 59. Secured to the rear end of said rod 58 is a casting 60 formed with a vertical bore 61 in which is seated and secured the lower end of a rod 62 whose upper end project through a vertical bore in the feeding-head 63, the latter being adjustably secured upon said rod by means of a set screw 64. This head includes a yielding member 65 consisting of a contact-plate 66 carried by two horizontal pins 67, 67, extending into bores 68, 68, and whose inner ends engage coil springs 69, 69, respectively, as shown in Figs. 6 and 7. The yielding movement of the contact member is limited by a screw 70 extending into a recessed portion 71 in one of said pins 67.

The feed-rod and its contact-head just described are of a construction similar to that of the device shown and described in the above-mentioned application, and as in said device, the head travels in the slot 39 formed by the two table-plates 38, 38, and intersects the plane of the upper surface of the latter, a portion 45^a being cut out of the bottom of the middle of the chute 45 to permit the head to be drawn completely back of the front ends of said plates, as shown in Fig. 3.

Blanks placed upon said chute, will therefore slide down upon the plates 38, 38, be engaged by the head 63 and fed toward the die, suitable stops 72, 72, being provided for limiting this travel of the blanks, these stops having their limiting surfaces tangent to the circumference of the aforementioned circle to which the edges 40 of plates 38 are tangent, all as occurs in the case of the device of said above-named application.

In order to cause the feeding-head to al-

ways stop at exactly the same place at the ends of its feeding stroke, I provide a horizontally extending stop-pin 73, Fig. 3, adjustably secured by a plate 74, secured to the cross-head 50, and adapted to abut a member 75, fixed with reference to the main press-frame, in this case consisting of one of the guides for said cross-head. This stop is so placed that it may be adjusted to effect its engagement with the guide 75, at just the proper time and limit this end of the operative stroke to the exact point required.

The actuating mechanism.—The movement required of the feeding-rod is derived primarily from the main crank or cam shaft 77, Fig. 1, which directly actuates the drawing-plunger 3, in this type of machine. This shaft is rotated by suitable gearing (not shown) and extends beyond the left-hand side of the main frame, as shown. To the shaft end is secured the crank 78, which articulates with a connecting rod 79, itself articulating with a vertically reciprocating cross-head 80. The latter is connected with two oscillatory arms 81, 81, by means of toggle-links 82, 82, and these arms are connected with the two oscillatory cranks 83, 83, through the medium of link 84, 84. These cranks 83, 83, are mounted upon the shafts which directly impart to the holding-member 2, its reciprocating motion.

The construction of the actuating mechanism as thus far described is old and well-known and is such as to effect the required relative movement of said members 2 and 3, whereby, as before mentioned, the holding-member occupies a substantially stationary position throughout the operative portion of the downward stroke of the plunger 3.

In my present invention, I take advantage of this stationary condition or "dwell" of the holding-member, and so connect the parts as to utilize this dwell in connection with the blank-feeding means so as to give the operator a maximum time in which to feed the blank to the feed-table.

This result I accomplish as follows: One of the cranks 83, Fig. 1, is provided with an extension 83^a to which is pivotally connected the upper end of a connecting rod 85. The lower end of the latter is connected with one arm of a bell-crank 86, the other arm of which is connected with one end of a connecting-rod 87, the other end of which is connected with the previously described cross-head 50. These parts are so arranged that the cross-head will occupy its extreme forward position while the holding-member is in its lowermost or "dwelling" position, and concurrently the feeding head will likewise occupy its forwardmost position during such time. The required maximum time for performing the manual part of the feeding operation is thus afforded, as will be understood.

The ejector-means.—These means comprise a device for ejecting the finished product from the operative part of the die, and a device for discharging the product so ejected, from the machine.

The said discharging means comprises a horizontal rod 88, Figs. 1, 2 and 5, extending in a direction parallel with the direction of blank-feed, and adjustably secured by means of a set screw 89 in a block 90, carried by a vertical rod 91. This latter rod is secured in a vertical bore formed in a boss 92 forming a part of arm or bracket 53 by means of a set screw 92^a. The rear end of said rod is provided with a slot 93 in which is adjustably secured a horizontally and longitudinally extending bar 94, Fig. 3. The outer end of this bar extends over the slot 89 and is located a proper distance in rear of the feeding-head so that it will intersect the space above the die and discharge the product just finished by the preceding operation, before the next blank is fed into position, as will be understood.

Coaxial with and beneath the die 1, is a housing-member 95 formed with a cylindrical bore 96, and provided with a cap-plate 97 at the top. The lower part of this housing-member is externally threaded and engages a stationary internally threaded member 98, split so that it may be caused to bind and hence fix the position of said member 95, by means of bolts, as at 99, Fig. 2.

Extending through the bore 96, is a vertical ejector-plunger stem 100 provided with a head 101, and a collar 102, the latter in the bore 96. This collar is engaged by the upper end of a coil-spring 103 surrounding the stem and in the bore, the lower end of which engages the bottom of the latter, Fig. 5. The stem is of a length such that when collar 102 engages the cap-plate 97, the upper surface of the head 101 will coincide substantially with the upper surface of die 1, said spring 103 tending to force the ejector into such position.

Vertical adjustment of member 95 may be obtained by loosening bolts 99, and turning the member, a collar 104 being provided for the purpose, adapted to receive a spanner wrench. As thus far described, this feature of the illustrated device is substantially identical with similar parts shown and described in my above-mentioned pending application.

The lower end of said stem projects below the member 98 and is provided with a laterally extending plate 105, Figs. 2 and 5, to which are secured two vertical pins 106, 106, extending through guiding bores 107, 107, formed in a flange 108 forming part of the member 98. These pins are located upon opposite sides and equidistantly from the previously mentioned transverse vertical plane.

Secured to, at a suitable location (not shown), and depending from the holding-member 2, are two rods 109, 109, Fig. 2, to the lower ends of which is secured a cross-piece 110, provided with a central opening through which member 98 may pass, said rods being threaded and provided with nuts 111, whereby the cross-piece may be vertically adjusted. This cross-piece is hence caused to reciprocate with the holding-member, and is so placed that its path of reciprocation coincides, in part, with the path of reciprocation of the upper ends of pins 106, so that as the holding-member moves downwardly cross-piece 110 will engage the top of the pins, depress same, move the ejector-stem 100 downwardly against the action of spring 103, and move the head 101 downwardly through and out of the upper or operative portion of the die. When the holding-member moves upwardly, the reverse of the above action takes place, the spring causing the ejector-plunger to move upwardly and eject the finished product from the die.

During such ejecting action, however, it will be observed that the movement of the ejector is controlled by the holding-member through the cross-piece and connected parts, the tendency of the positively operating spring to cause the ejector plunger to forcibly eject the finished product from the die being modified by the holding member and connected parts. As a result, the finished article is not jammed against the bottom of the holding-member by the ejector-plunger, which jamming, in the case of light work, would result in its deformation and hence destruction.

The above-described parts are connected and coordinated so as to form a single drawing press provided with an automatically operating feeding-mechanism and operate as follows:

Assuming the parts to be in the position illustrated in Fig. 1, in which the holding-member and drawing-plunger are in their lowermost positions, the cross-head or slide 50, and hence feeding-head 63, are in their extreme forward positions. While in this position, the operator places a blank upon the chute, whereupon such blank slides down upon the plates 38, and in rear of said head 63. In this position the ejector-plunger will be in its lowermost position with its head immediately below the object which has just been formed in the die, or in case no object has been previously formed, immediately below the operative portion of the die, said ejector being held in this position by cross-piece 110. A further rotation of shaft 77 initiates the upward movement of the plunger 3, but holding-member 2 remains in position for a time and until the system of links and arms previously described causes it to

follow. As soon as the holding-member moves upwardly, the ejector-plunger spring is allowed to act and cause the ejector to follow and eject the finished product. In the meantime, the discharging arm will have reached a position in which it will engage and subsequently discharge such finished product. Concurrently, the feeding-head will push the blank which has reached and is resting upon the plates 38, rearwardly until it abuts the stops 72 at which time it will be in its proper position on the die, and ready for the drawing operation.

During the downward stroke of the plunger 3, and holding-member 2, the reverse of the above operation will take place, as will be understood.

When it is desired for any reason, such as necessity for removal of the die, to remove the feeding mechanism from the front of the machine, set screw 92 is first loosened and rod 91 and its attached parts removed. Cap screw 55 is then loosened and the arm or bracket 53 with its attached parts removed. The bolt 22 is then caused to disengage slot 24 and the frame-member then caused to swing on the axis of rod 10, thus allowing the feed-table to move in a direction substantially parallel with the direction of feed and so avoid the adjacent laterally located parts of the machine, as shown in dotted lines in Fig. 4. After reaching this position, it may then be swung upon the axis of rod 11 and caused to occupy its extreme lateral position, shown in full lines in said Fig. 4. When the feeding mechanism is in this position, it will be seen that full access to both front and back of the machine is afforded.

Having fully described my invention, what I claim and desire to secure by Letters Patent is:—

1. In a metal working press, the combination of a die; a drawing plunger reciprocable with reference to said die and means for effecting reciprocation thereof; a holding member reciprocable with reference to said die and means for effecting reciprocation thereof; a blank feeding member reciprocable toward and from said die; and means connecting the feeding member with the holding member whereby the reciprocation of said feeding member is controlled by said holding member, the construction being such that the movement of the holding member toward the die results in the immediate and concurrent movement of the feeding member away from the die and vice versa.

2. In a metal working press, the combination of a die; a drawing plunger reciprocable toward and from said die and means for effecting reciprocation thereof; a holding member reciprocable toward and from said die and independently of said plunger and means for effecting reciprocation thereof; a blank feeding member reciprocable toward

and from said die; and means connecting said feeding member with the holding member whereby the latter effects the reciprocation of said feeding member; said connecting member being arranged so that said feeding member will occupy substantially that position farthest removed from the die when said holding member is in the position in which it most closely approaches the latter.

3. In a metal working press, the combination with means for drawing the blank, including a reciprocating drawing plunger and a reciprocating holding member and means for operating the same; of a plunger for ejecting the work from the die, said holding member being adapted to hold the blank upon the die and being provided with means connected to said ejector plunger and adapted to retard the operation of the latter while and until said holding member is being removed from the die to prevent the jamming of the work by said ejector plunger against said holding member.

4. In a metal-working press, the combination with means for drawing the blank, including a reciprocating blank-drawing plunger and a reciprocating holding-member; of a spring-actuated plunger adapted to eject the work from the die; and means connected with said holding-member for completely effecting, in combination with the spring mechanism, the movements of said ejector plunger in both directions.

5. In a metal working press, the combination of a hollow die; a reciprocating holding member cooperating with the latter and means for moving said holding member; an ejector plunger extending within said die; a spring adapted to actuate said plunger to eject the work from the die, said holding member being adapted to hold the blank upon the die; and means connected with said holding member and connected to said ejector plunger for retarding the operation of the latter while and until said holding member is being removed from said die to prevent the jamming of the work by said ejector plunger against said holding member.

6. In a metal-working press, the combination of a hollow die; a reciprocating holding-member cooperating with the latter; an ejector-plunger extending within said die; a spring for effecting the ejecting movement of said plunger; a contact-member connected with said plunger; and a member connected with said holding-member having a path of movement intersecting that of said contact-member, the parts being so arranged that the movement of said holding-member toward the die will effect through said contact member and said second member the recession of the said plunger from the operative portion of the die.

7. In a metal-working press, the combination with means for drawing the blank, in-

cluding a hollow die having a vertical axis, a vertically reciprocating blank-drawing plunger, and a vertically reciprocating holding-member; a vertically reciprocating ejector-plunger extending into the operative portion of said die; a spring connected with said plunger and tending to actuate same upwardly through said die portion; a laterally extending member secured to said plunger and provided with two upwardly projecting contact pins; two downwardly extending rods connected with said holding-member and provided with a laterally extending cross-piece having a path of movement coinciding with that of the ends of said contact pins; said cross-piece being arranged so that it will be in engagement with said pins during its downward stroke.

8. In a metal-working press, the combination of a hollow die having a vertical axis; a vertically reciprocating drawing-plunger cooperating with said die and a vertically reciprocating holding-member also cooperating therewith; a vertically adjustable hollow housing-member having its axis coinciding with the die-axis; an ejector-plunger having a stem extending through said housing-member and adapted to have its upper portion traverse the operative portion of said die; a coil-spring within said housing-member adapted to effect the upward or ejecting movement of said plunger; suitable means for limiting such upward movement; the lower end of said stem being provided with a transverse member having secured thereto two upwardly extending pins located upon opposite sides of the plunger-axis; two downwardly extending rods connected with said holding-member and provided with a cross-piece adapted, during the downward stroke of said holding-member, to engage said pins to actuate said plunger so as to withdraw same from said die-portion during such stroke.

9. In a metal-working press, the combination with means for drawing the blank; blank-feeding means including a feed-table and a swinging frame for supporting the latter, said frame having two axes of oscillation.

10. In a metal-working press, the combination with means for drawing the blank; blank-feeding means including a feed-table and a swinging frame for supporting the latter, said frame having two vertical axes of oscillation.

11. In a metal working press, the combination of means for drawing the blank, including a die; blank-feeding means including a feed-table and an oscillatory frame for supporting the latter, said frame having two vertical axes of oscillation located laterally with reference to a plane parallel with the direction of feed and passing through the axis of said die.

12. In a metal-working press, the combination of means for drawing the blank; blank-feeding means including a feed-table and an oscillatory frame for supporting the latter; said frame having two axes of oscillation; and means for locking said frame with reference to both said axes.

13. In a metal-working press, the combination of means for drawing the blank; blank-feeding means including a feed-table supporting-frame; a vertically movable oscillatory rod forming the sole support for such frame; and means for adjustably supporting said rod.

14. In a metal-working press, the combination with means for drawing the blank; of a feed-table frame comprising a primary and a secondary member; said primary member being mounted upon the frame of the press and arranged to oscillate upon a vertical axis; said secondary member being mounted upon said primary member and arranged to oscillate upon the latter and also upon a vertical axis.

15. In a metal-working press, the combination of means for drawing the blank; a frame for supporting a feed-table and comprising a primary and a secondary member, the primary frame-member being mounted upon the frame of the press and arranged to oscillate upon a vertical axis; said secondary member being provided with a vertical supporting rod adapted to oscillate in said primary member; and an adjusting screw mounted on said primary member and adapted to adjustably support said oscillatory rod.

16. In blank-feeding means for metal-working presses, the combination of a feed-table; vertically adjustable rods for directly supporting said table; and a vertically adjustable frame-member carrying said rods.

17. In blank-feeding means for metal-working presses, the combination of a feed-table; two vertically mounted rods directly supporting the latter and provided with a plurality of circumferential grooves; a frame-member provided with vertical bores through which said rods extend; clips for engaging said grooves and said frame-member whereby the vertical position of said rods is fixed; and means for vertically adjusting said frame-member.

18. In blank-feeding means for metal-working presses, the combination of a feed-table; two vertically mounted rods directly supporting the latter and provided with a plurality of circumferential grooves; a frame-member provided with vertical bores through which said rods extend; clips for engaging said grooves and said frame-member whereby the vertical position of said rods is fixed; and a vertically operating screw for adjusting said frame-member.

19. In blank-feeding means for metal-

working presses, the combination of a feed-table; two vertically mounted rods directly supporting the latter and provided with a plurality of circumferential grooves; a frame-member provided with vertical bores through which said rods extend; clips for engaging said grooves and said frame-member whereby the vertical position of said rods is fixed; and a vertically-operating screw for adjustably supporting said frame-member.

20. In a metal-working press, the combination with means for drawing the blank, including a die; of blank-feeding means including a feed-table and an oscillatory frame for supporting the latter, the axis of oscillation being located laterally with respect to a plane parallel with the direction of feed and passing through the axis of said die, said feeding-means including also a removable reciprocating feeding arm supported upon the side of said plane opposite that upon which the axis of said frame is located.

21. In a metal working press, the combination of means for drawing the blank, including a die; blank feeding means including a feed table and an oscillatory frame for supporting the latter, said feeding means including also a reciprocating feeding arm; and a work discharging member carried by said arm and removable therefrom.

22. In a metal working press, the combination of means for drawing the blank, including a die; blank feeding means including a feed table and an oscillatory frame for supporting the latter, the axis of oscillation being located laterally with reference to a vertical plane parallel with the direction of feed and passing through the axis of said die, said feeding means including also a removable reciprocating feeding arm; and a work discharging member carried by said arm and removable therefrom.

23. In a metal-working press, the combination of means for drawing the blank, including a die; blank-feeding means including a feed-table and an oscillatory frame for supporting the latter, the axis of oscillation being located laterally with reference to a vertical plane parallel with the direction of feed and passing through the axis of said die, said feeding-means including also a removable reciprocating feeding arm supported upon the side of said plane opposite that upon which the axis of said frame is located; and a work-discharging member carried by said arm and removable therefrom.

24. In a metal working press, the combination of means for drawing the blank, including a die; blank feeding means including a feed table and an oscillatory frame for supporting the latter, said feeding means including also a reciprocating feeding arm;

and a work discharging member carried by, adjustable upon, and removable from said arm.

25. In a metal-working press, the combination of means for drawing the blank, including a die; blank-feeding means including a feed-table and an oscillatory frame for supporting the latter, the axis of oscillation being located laterally with reference to a vertical plane parallel with the direction of feed and passing through the axis of said die, said feeding-means including also a removable reciprocating feeding arm, supported upon the side of said plane opposite that upon which the axis of said frame is located; and a work-discharging member carried by, adjustable upon and removable from said arm.

26. In a metal-working press, the combination of means for drawing the blank; blank-feeding means including a feed-table and a swinging frame for supporting the latter; and means for adjusting said frame vertically.

27. In a metal working press, the combination of means for drawing the blank;

blank feeding means including a feed table and a swinging frame for supporting the latter, said frame consisting of two parts, one oscillatory upon the latter. 30

28. In a metal-working press, the combination of means for drawing the blank; blank-feeding means including a feed-table and a swinging frame for supporting the latter; said frame consisting of two parts, one oscillatory upon the other; and means for vertically adjusting one of said frame members. 35

29. In a metal-working press, the combination of means for drawing the blank; blank-feeding means including a feed-table and a swinging frame for supporting the latter, said frame consisting of a primary frame member oscillatory upon the main press frame, and a secondary frame member oscillatorily mounted upon said primary frame member; and means for vertically adjusting said secondary frame member upon the primary member. 40 45

Signed by me this 24th day of May, 1916. 50

CARL A. FRAHM.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."