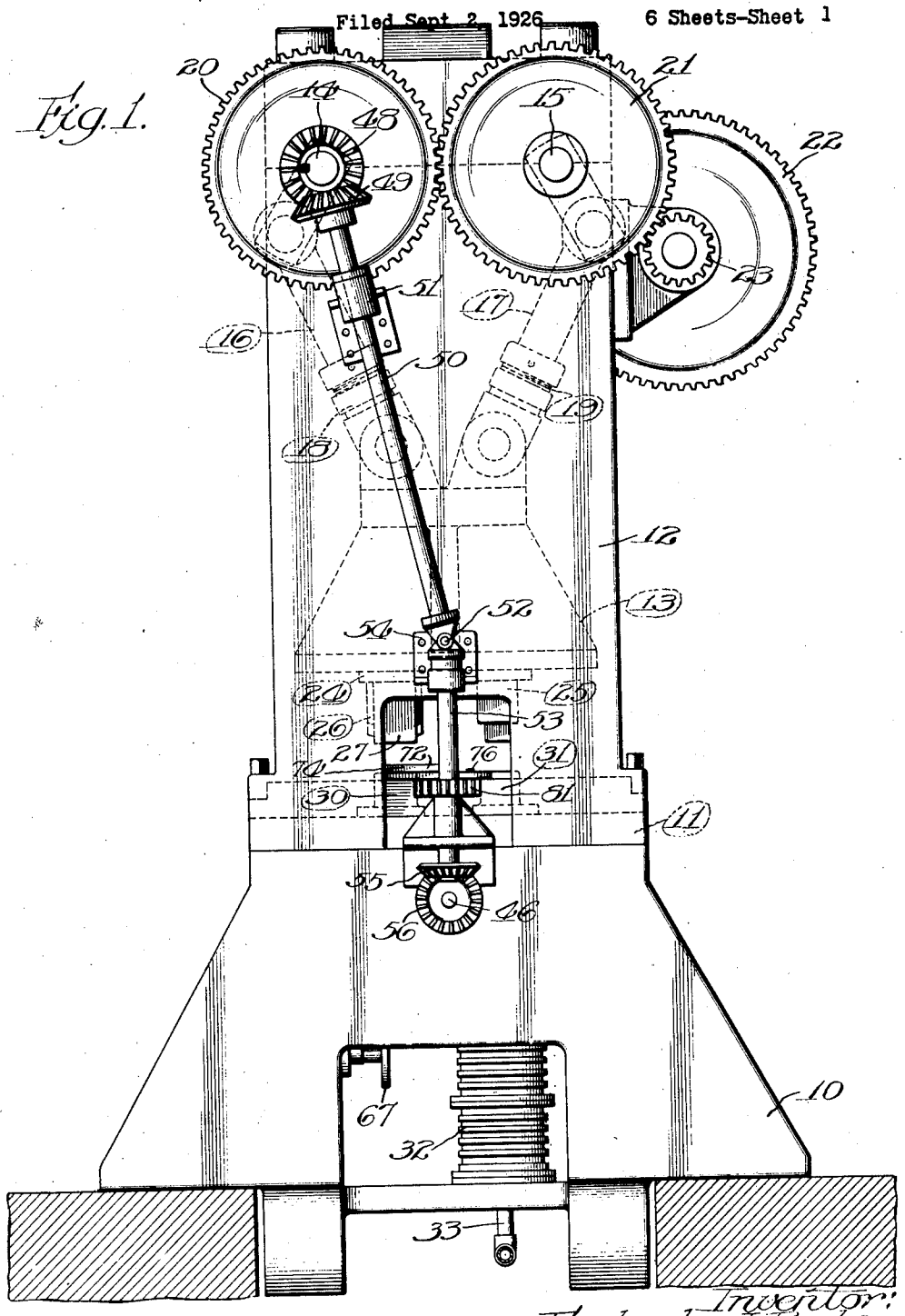
Aug. 14, 1928. 1,681,012

F. J. RODE

SHEET METAL PRESS

Filed Sept. 2, 1926 6 Sheets-Sheet 1

Fig. 1.



Inventor:
Fredrick J. Rode
By: [illegible] Atty.

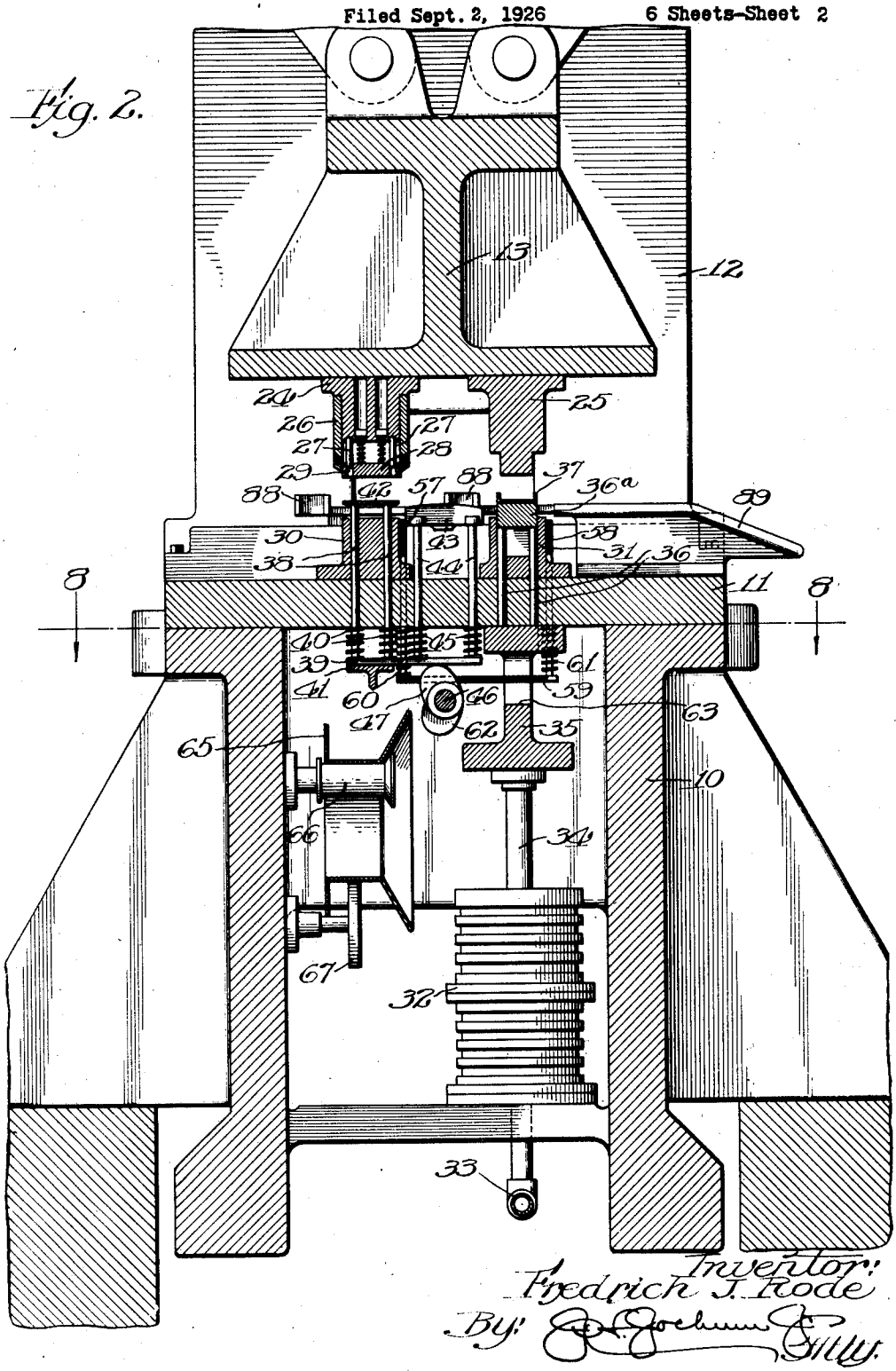
Aug. 14, 1928. 1,681,012

F. J. RODE

SHEET METAL PRESS

Filed Sept. 2, 1926 6 Sheets-Sheet 2

Fig. 2.



Inventor:
Fredrick J. Rode
By: [illegible]

Aug. 14, 1928. 1,681,012

F. J. RODE

SHEET METAL PRESS

Filed Sept. 2, 1926 6 Sheets-Sheet 3

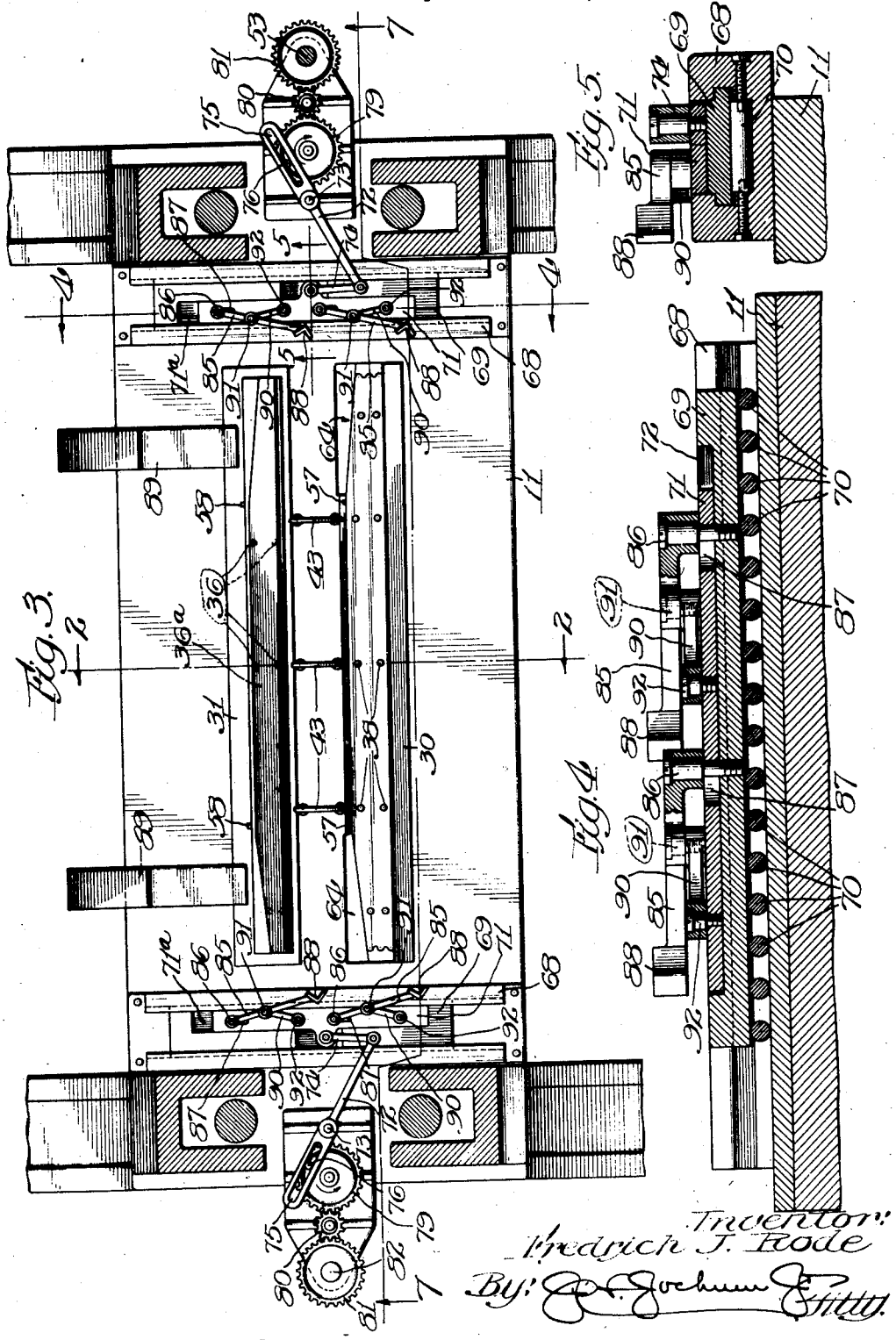


Fig. 3.

Fig. 5.

Fig. 4

Inventor:
Friedrich J. Rode
By: [illegible]
Attys.

Aug. 14, 1928. 1,681,012

F. J. RODE

SHEET METAL PRESS

Filed Sept. 2, 1926 6 Sheets-Sheet 4

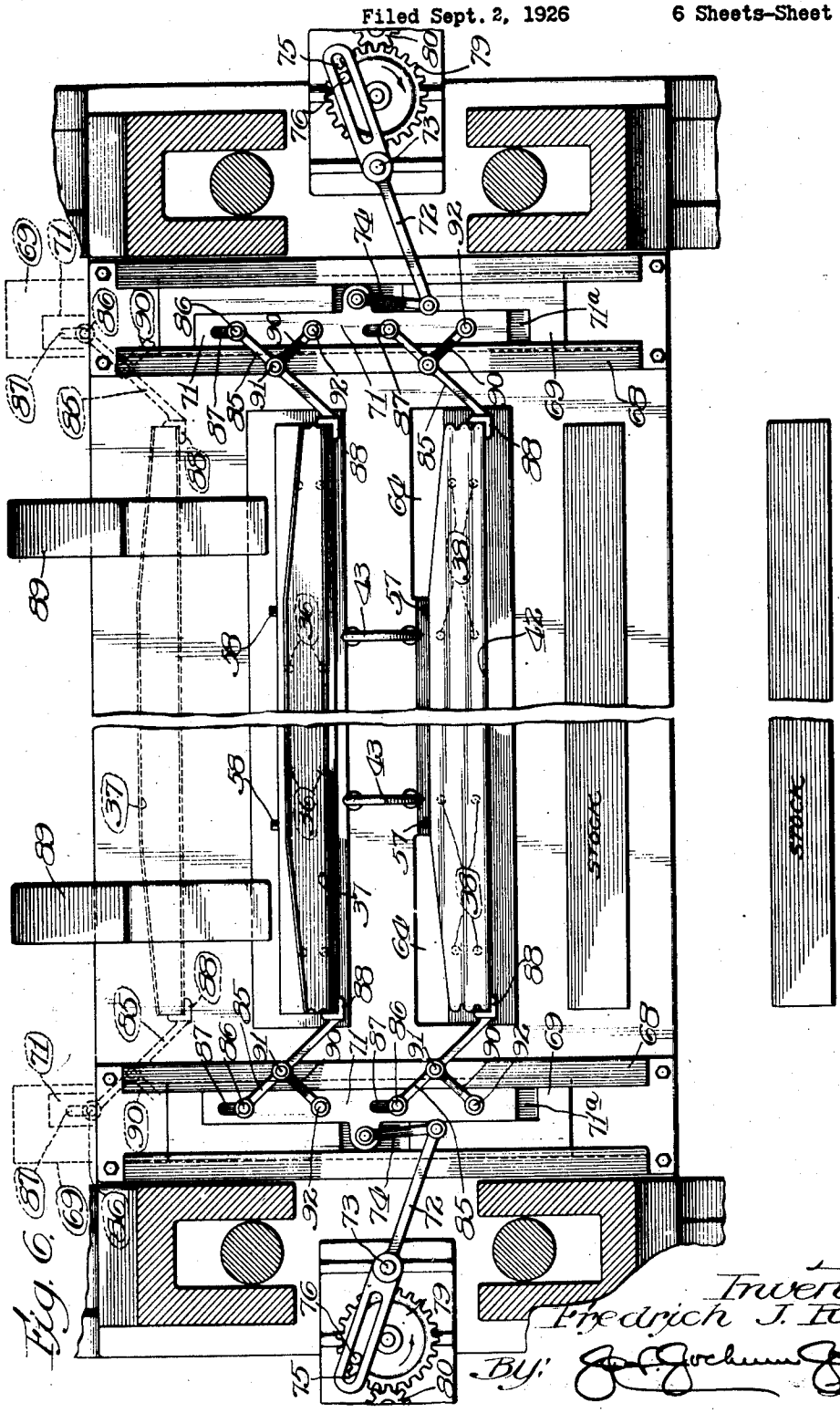


Fig. 6.

Inventor:
Fredrich J. Rode
By: [illegible]
Attys.

Aug. 14, 1928.

1,681,012

F. J. RODE

SHEET METAL PRESS

Filed Sept. 2, 1926

6 Sheets-Sheet 5

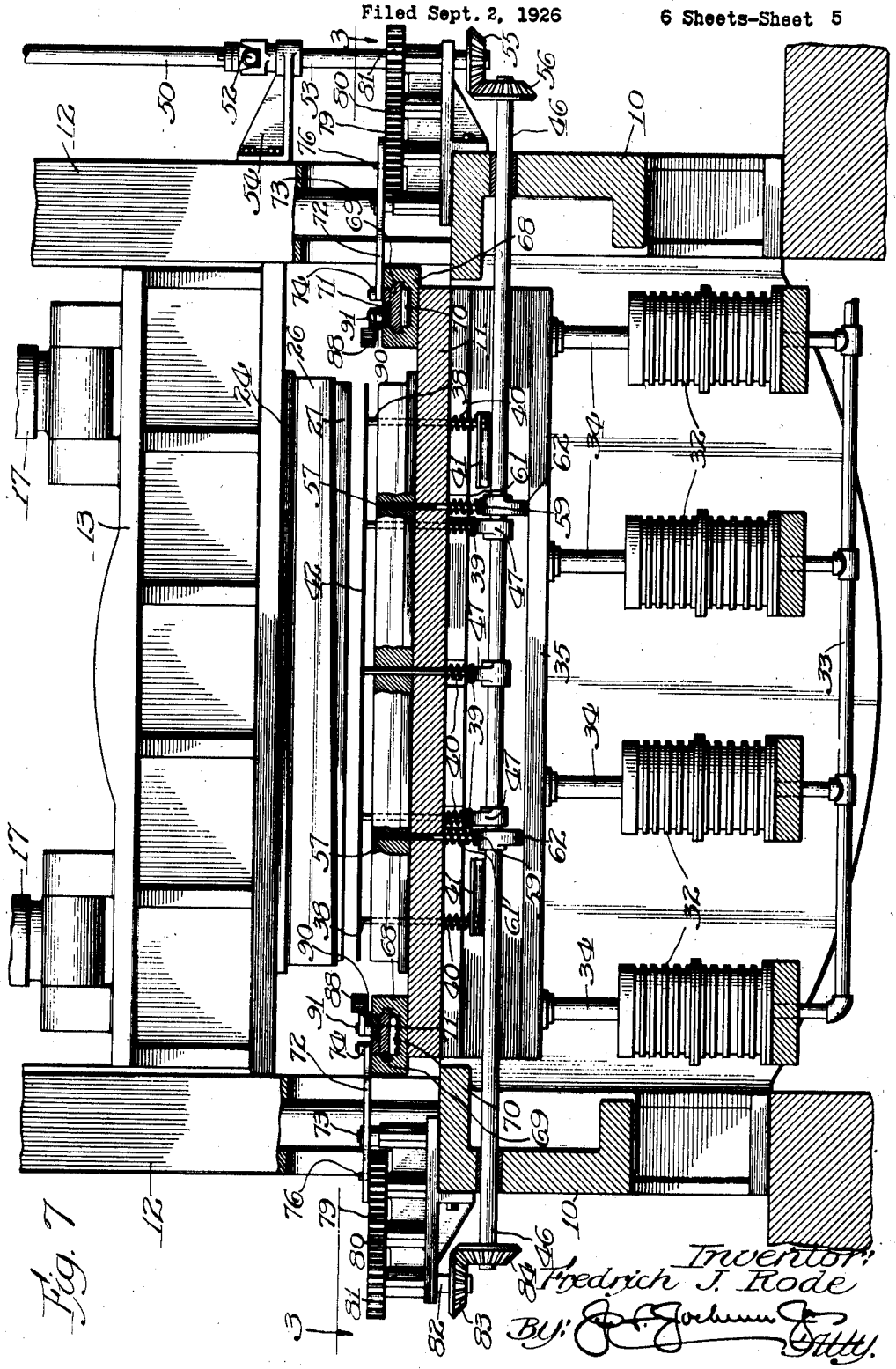


Fig. 7

Inventor:
Fredrich J. Rode
By: J. F. Jochum
Atty.

Aug. 14, 1928. 1,681,012

F. J. RODE

SHEET METAL PRESS

Filed Sept. 2, 1926 6 Sheets-Sheet 6

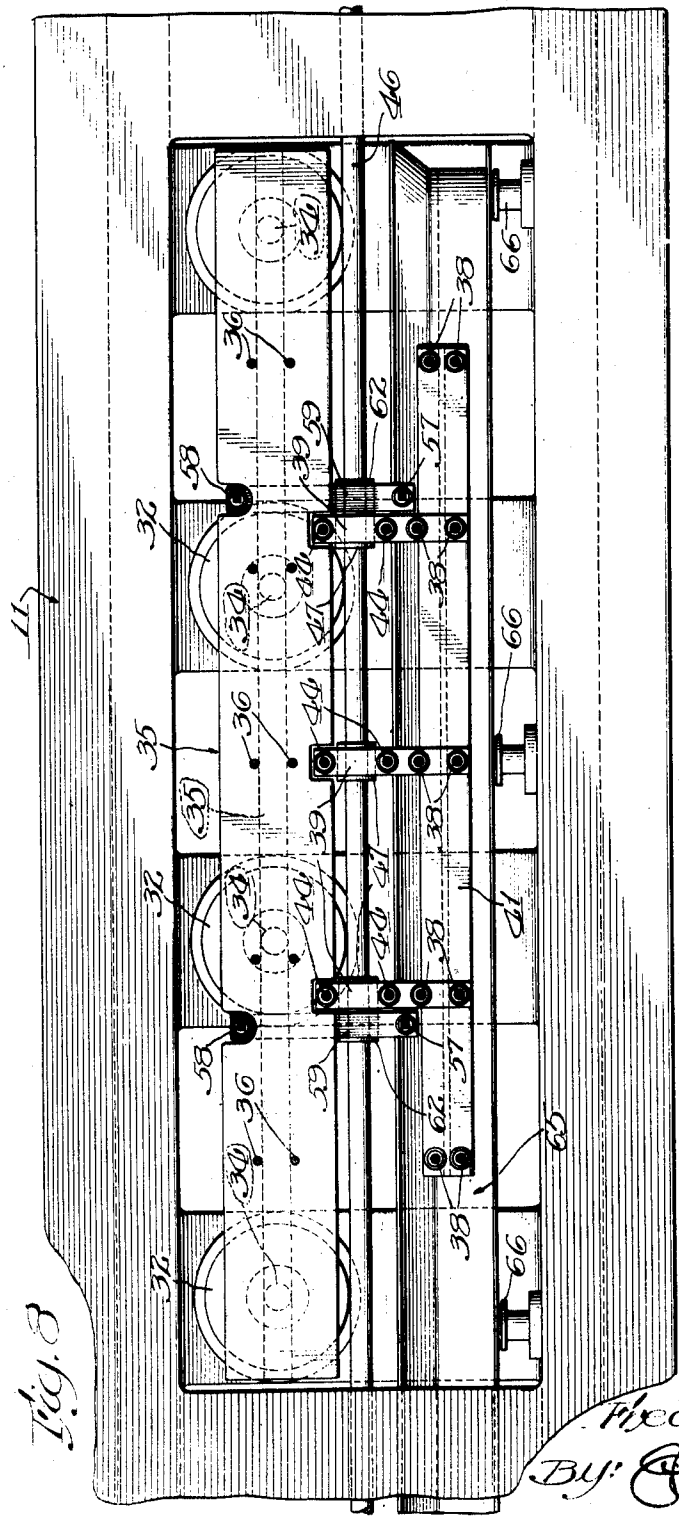


Fig. 8

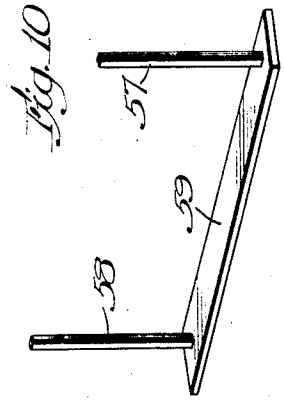


Fig. 10

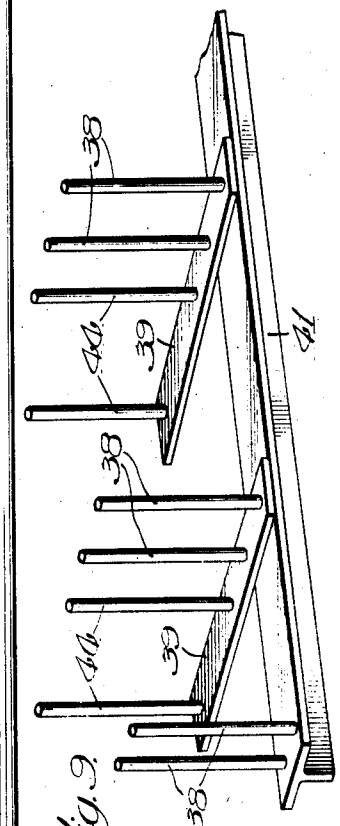


Fig. 9

Inventor:
Fredrick J. Rode
By: [illegible]
Atty.

Patented Aug. 14, 1928. 1,681,012

UNITED STATES PATENT OFFICE.

FREDRICH J. RODE, OF CHICAGO, ILLINOIS, ASSIGNOR TO MARQUETTE TOOL & MFG. COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

SHEET-METAL PRESS.

Application filed September 2, 1926. Serial No. 133,116.

This invention relates to improvements in sheet metal presses, and one of the objects of the invention is to provide an improved press of this character whereby after the first operation of the press, one blank will be cut and pierced, and at the same time another blank will be shaped or formed so that a complete article requiring several operations thereon, will be completed upon each subsequent stroke of the press.

A further object is to provide an improved press of this character having a plurality of dies operable upon the work to perform different functions and improved means for feeding the work from one set of dies and presenting the same in position to be operated upon by another set of dies.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawings illustrating this invention and in which

Figure 1 is a side elevation of a machine of this character constructed in accordance with the principles of this invention.

Figure 2 is a vertical, sectional view as taken on line 2—2, Figure 3.

Figure 3 is a horizontal sectional view taken on line 3—3, Figure 7.

Figure 4 is a detail sectional view taken on line 4—4, Figure 3.

Figure 5 is a detail sectional view taken on line 5—5, Figure 3.

Figure 6 is a view similar to Figure 3, showing the parts in different positions.

Figure 7 is a vertical sectional view taken on line 7—7, Figure 3.

Figure 8 is a horizontal sectional view taken on line 8—8, Figure 2.

Figure 9 is a detail perspective view of the work guide and knock out pins.

Figure 10 is a detail perspective view of the work positioning stops.

Referring more particularly to the drawings the numeral 10 designates a supporting base having a bed plate 11 thereon, and projecting above the bed plate are uprights or standards 12.

A reciprocating ram 13 operates above the bed plate and is given its motion by means of a pair of crank shafts 14—15 to which links 16—17 are connected, and the links in turn are connected with the ram 13. Adjusting devices 18—19 are respectively provided in the links 16—17, whereby the stroke of the ram 13 may be varied.

The crank shafts 15 are provided with intermeshing gears 20—21 and are driven preferably by means of a motor 22, to the shaft of which is connected a gear 23 that meshes with the gear 21.

The shafts 14—15 are laterally displaced from each other so that equal pressure will be exerted upon the ram on both sides thereof.

Carried by the ram is a cutting and piercing die designated generally by the reference numeral 24 and a shaping die designated generally by the reference numeral 25, and by reason of the arrangement of the crank shafts 13—14 and the links 16 and 17, equal pressure will be exerted upon both of these dies during the operation of the press.

The cutting and piercing die may be of any desired configuration according to the work that is to be performed, but preferably comprises a tubular punching or shearing member 26 and piercing members 27, the latter being arranged within the member 26.

A spring controlled member 28 is also arranged within the member 26 and is provided with apertures 29, through which the punches 27 pass.

When the ram is elevated, as shown in Figure 2, the spring controlled member 28 will be projected with respect to the punches 27 so as to extend below the cutting edges of the member 26, and this member 28 co-operates with another die member 30 mounted upon the bed plate 11, to form blank gripping or holding means.

The shaping member 25 also co-operates with the die 31 mounted upon the bed plate.

Disposed below the bed plate 11 and supported in any suitable manner are pressure cushions 32 which receive fluid from any suitable source of supply through a pipe 33.

Connected with or resting upon the piston rod 34 of the respective cushions is a pressure pad or pin plate 35, which supports pins 36, the latter in turn supporting a plate or member 36^a in the die 31, and which member co-operates with the punch 25 to form blank holding means. When the ram 13 is

lowered the member 36ª will be depressed against the pressure in the cushion 32 while the work 37 is being shaped.

When the ram ascends the pins 36 and members 36ª will be returned by the pressure in the cushion 32.

Passing through the die 30 are pins 38 which are connected with a plate or bar 39, and spaced below the bed plate 11, and disposed between the bars 39 and the bed plate are springs 40 which tend normally to lower the pins 38 so that the extremities thereof will be below the top of the die 30.

The die 30 is preferably of a considerable length and any number of pins 38 may be provided throughout the length thereof, the plates 39 upon which the pins 38 rest being in turn supported by means of a bar 41 running lengthwise of the die 30.

The die 31 also extends lengthwise of the press and the two dies 31—32 are disposed in proximity to and parallel with but spaced from each other, but in a position that the work 42 after it has been placed upon the die 30 and blanked and pierced by the die 26, may be fed or moved to a position to engage and rest upon the die 31 so that upon the next operation of the ram 13 the punch 25 will shape the work as shown at 37.

As a means for guiding the work from the position over the die 30 to the position over the die 31, suitable guides 43 are provided in the form of tracks or the like, any number of which may be employed. These guides 43 are adapted to be raised and lowered during the cycle of operation of the press, and for a purpose to be hereinafter set forth. To that end the guides 43 are supported by means of bars or rods 44 which pass through the bed plate 11 and engage and rest upon the plate or bar 39, springs 45 being interposed between the bed plate and the bar 39 to assist in lowering the guides.

During the cycle of operation of the press, when the ram 13 is lowered the springs 40 and 45 will respectively operate to lower the pins 38 and 44 so that the tops of the pins 38 will not project above the top of the die 30 and the top of the guides 43 will also be lowered.

When the ram 13 ascends the bar or member 41 is raised so as to elevate the guide 43 and also to project the ends of the pins 38 above the top of the die 30 to elevate the work 42 so that it may be moved, in a manner to be set forth, from the position shown in Figure 2, across the guides 43 and into a position that the dies 25 and 31 will co-operate to shape the work as indicated at Figure 7.

The pins 38 serve not only as a means for raising the work 42 from the die 30 but they also serve as supports having contact with the work 42 at different points throughout its surface, thereby reducing the friction of the work against its support while it is being moved from one position to another position in the machine to be operated upon.

After the work has been shaped by the dies 25 and 31 the pins 36 and member 36ª will serve as a knock out for removing the shaped work from the die 31.

The pins 38 may be raised in any suitable manner such as by means of a shaft 46 journaled in suitable bearings, preferably in the base 10 of the machine, and connected with the shaft 46 for rotation therewith are a plurality of cam shaped devices 47 which are adapted to engage the bars or plates 39 to raise the latter against the stress of the springs 40.

This shaft 46 may be operated preferably from the shaft 14 through the medium of intermeshing gears 48—49, the latter being connected with the shaft 50 journaled in a suitable bearing 51. The end of the shaft 50 is connected by means of a universal joint 52 with a shaft 53 journaled in a bearing 54. Connected with the shaft 53 is a gear 55, which in turn meshes with a gear 56 secured to the shaft 46.

The cams 47 are so timed with relation to the reciprocation of the ram 13 that they will raise the work 42 from the die 30 as the ram ascends, and as the ram descends the cams will assume positions to permit the springs 40 to lower the pins 38 and the springs 45 to lower the guides 43.

The co-operating dies 26—30 and 25—31 operate in unison so that after the first operation of the press to blank and pierce the work 42, upon each subsequent operation of the press one complete article will be formed, that is to say, a blank will be formed between the dies 26 and 30 and at the same time the dies 25 and 31 will co-operate and operate upon the work so as to shape the same as indicated at 37. After each operation of the press, the work 42 is fed from the die 30 on to the guides 43, the latter being elevated with the pins 38 so as to receive the work from the pins 38 in its elevated position above the die 30. From the guides 43 the work is positioned so as to be operated upon by co-operating dies 25—31.

Positioning stops 57 (see particularly Figures 2, 6 and 7) are provided adjacent the die 30 so as to insure the proper positioning of the work 42 with respect to the die 30, and similar positioning stops 58 are also provided adjacent the die 31 for insuring the proper positioning of the work with respect to the die 31 when it is fed from the die 30 to the die 31.

These stops are preferably in the form of pins which project through and below the bed plate 11, and engage a bar or plate 59, and springs 60—61 are provided between the bed plate 11 and the bar or plate 59 preferably to encompass the respective stops

57—58, and these springs tend normally to depress the stops so as to lower them below the surface of the die so that they will be out of the way and will not form obstructions to the feeding or ejecting movement of the blank or work. The stops are adapted to be actuated at predetermined times in the cycle of operation of the press, preferably by means of cam devices 62 which are connected with the shaft 46 and are so disposed with respect to the cycle of operation of the press and also with respect to the operation of the cam devices 37, that when the cam devices 47 operate to raise the pins 38 and guides 43, the stop devices 57—58 will be lowered and vice versa.

Obviously any number of these stops devices may be employed throughout the lengths of the dies.

The pin plate or pressure pad 35 is preferably provided with an aperture 63 therethrough (see particularly Figure 2) so as not to interfere with the raising and lowering movements of the stop devices 57—58.

The bed plate 11 is provided with openings 64, (see particularly Figure 3) through which the severed portions of the blank pass and these portions are adapted to be conveyed away from the machine preferably by means of an endless conveyor 65 located beneath the press bed.

The conveyor may be of any desired construction, but is preferably of the endless type of a trough like construction being supported by means of pulleys 66—67 and is operated from any suitable source (not shown).

Arranged upon the bed plate of the machine and at the ends of the dies 30—31 are guideways 68, in each of which a member 69 is mounted for reciprocating movement, and rollers 70 are preferably provided between the members 69 and the bed plate 11 to reduce friction between the parts.

Each of the members 69 in turn support a supplemental member 71 which is preferably mounted in a recess 71^a, the latter opening through the top of the member and the recess is of a length somewhat longer than the length of the supplemental member 71.

Levers 72 are pivotally mounted as at 73 intermediate their ends, and one end of each of these levers is connected by means of a link 74 with the respective supplemental members 71. In the other end of each of the levers is provided an elongated slot 75 in which a pin 76 connected with a gear wheel 79 is adapted to operate. This gear wheel 79 meshes with an intermediate gear wheel 80, which in turn meshes with another gear 81 carried by the shaft 53 so that when the shaft 53 is rotated, rotary motion will be imparted to the gear 79 on one side of the machine.

The gear 79 on the other side of the machine is rotated through the medium of the intermeshing gears 80 and 81. This latter gear is mounted upon a shaft 82 to which is connected a beveled gear 83, which in turn meshes with a beveled gear 84 mounted upon the shaft 46.

Thus it will be seen that when the shaft 53 is rotated from the shaft 14 through the medium of the shaft 50, both of the gears 79 will be rotated and this in turn will impart an oscillatory movement to the levers 72 to reciprocate the supplemental members 71 with respect to the members 69.

The supplemental member 71 is adapted for an independent movement with respect to the members 69 for a limited extent of movement of the respective levers 72 by reason of the recesses 71^a and through the medium of other mechanism, which will now be described.

Levers 85 are pivotally mounted by one end by means of a pivot pin 86 which passes loosely through elongated slots 87 in the respective supplemental members 71 and the pivot pins are connected with the members 69. These levers 85 are supported by the supplemental members 71 and carry at their free ends angular shaped portions or formations 88 that are adapted to respectively engage the respective corners of the work, to feed the work, one set of formations operating to feed the work 42 from the die 30 on to and across the guides 43, to a position against the stops 48 and over the die 31.

The formations 88 on the other levers 85 operate to feed the work from the die 31 on to and across discharge guides 89.

The levers 85 are oscillated about their pivots 86 by means of links 90, one end of each of which is connected as at 91 with the respective levers 85, and the other end of the respective links is pivotally connected as at 92 with the respective supplemental members 71.

With this construction it will be manifest that as the levers 72 are oscillated about their pivots 73, the following operation will take place, reference being had particularly to Figures 3 and 6.

With the parts in the position shown in Figure 3, the plunger has just performed its blanking and shaping operation on two of the pieces of work and is just starting to move upwardly. The gears 79 operate in the directions indicated by the arrows thereon and as soon as the gears 79 start to rotate the pins 76 will operate in the respective slots 75 and will start to rock the levers 72. The levers will then, through the medium of the links 74, move the supplemental member 71 upon the member 69, the latter remaining stationary until the ends of the slots 87 abut the pivots 86 during which movement of the members 71 with respect to the members 69, the levers 85 will be swung about their pivots 86 until they assume the posi-

tions shown in Figure 6, by reason of the fact that the pivots 86 will remain stationary until the levers 85 assume the position shown in Figure 6.

Just at that point in the cycle of operation of the supplemental member 71 with respect to the member 69 and when the ends of the slots 87 engage the pivot pins 86, a further movement of the gear 79 in the same direction will cause the work 42 to be shifted from the die 30 to the die 31 and the work 37 which is upon the die 31, from its position on to the discharge guide 89, or until the levers 85 assume the dotted line position shown in Figure 6.

Just at this time in the cycle of operation of the press the pin 76 of the gear 79 will operate upon the lever 72 to swing the lever in the opposite direction to withdraw the formations 88 on the levers 85 with a quick return movement before the dies carried by the ram engage the work.

The withdrawing of these formations and the rocking of the levers 85 in the opposite direction is accomplished as follows.

As the levers 72 are swung in the opposite direction the links 74 will impart an independent movement to the supplemental member 71 with respect to the member 69 by moving the supplemental member 71 in the recess 71ª in the member 69. As the pivots 86 of the levers 85 are stationary and as the links 90 are connected with the levers and also with the supplemental members 71, the latter will move in the recess 71ª until the other ends of the slots 87 engage the pivot pins 86, at which time the supplemental member 71 will then move the member 69 in the guide 68 so that the entire feeding and ejecting mechanism will then be retracted and in position to perform their functions during the next cycle of operation of the press.

It will therefore be seen that after one blank 42 has been formed, a complete article will be formed upon each subsequent cycle of operation of the press.

Obviously the cutting die 26 is so shaped as to perform a shearing operation upon the blank.

While the preferred form of the invention has been herein shown and described, it is to be understood that various changes may be made in the details of construction and in the combination and arrangement of the several parts, within the scope of the claims, without departing from the spirit of this invention.

What is claimed as new is:—

1. A sheet metal press embodying two separated stations for performing different operations upon the work, means for simultaneously performing said operations, means operating automatically to elevate the work at the respective stations after being operated upon, means for engaging and moving the work while thus elevated, from one of said stations to another station, mechanism for actuating the said work engaging and moving means, a guide for the work between the said stations, said guide being movable into and out of position, and means operating while the work is being done for positioning the guide to receive the work from one station and for directing it to the other station.

2. A sheet metal press embodying two separated stations for performing different operations upon the work, means for simultaneously performing said operations, means operating automatically to elevate the work at the respective stations after being operated upon, means also operating automatically to engage and move the work while thus elevated, from one of said stations to another station, mechanism for actuating the said work engaging and moving means, and stop devices individual to the said stations and automatically rendered active and inactive in timed relation with respect to the said work engaging and moving means.

3. Work feeding means for sheet metal presses embodying a pivotally mounted work engaging element, positive means for swinging said element into and out of engagement with the work, and means rendered active at a predetermined time in the operation of the first said means and responsive in its operation to the operation of the second said means for imparting a bodily movement to the work engaging element when the latter is in engagement with the work.

4. Work feeding means for sheet metal presses embodying a pivotally mounted work engaging element, positively operating means for swinging said element into and out of engagement with the work, and means in addition to the last said means for positively imparting a forward and backward bodily movement to the work engaging element, the last recited means being rendered active at a predetermined time in the operation of the first said means and responsive in its operation to the operation of the second said means, the second said means embodying mechanism for imparting a quick bodily return movement to the work engaging element.

5. Work feeding means for sheet metal presses embodying two members connected together for bodily movement and normally for independent movement one with relation to the other, a work engaging element, means operatively connecting said work engaging element with the said members whereby the said relative movement of the members will cause the said element to move into contact with the work and the said bodily movement of the said members will cause the said element to bodily shift the work, and means

for imparting such movements to the said members.

6. Work feeding means for sheet metal presses embodying two members connected together for bodily movement and normally for independent movement one with relation to the other, a work engaging element, means operatively connecting said work engaging element with the said members whereby the said relative movement of the members will cause the said element to move into contact with the work and the said bodily movement of the said members will cause the said element to bodily shift the work, and means for imparting such movements to the said members, the last recited means embodying mechanism for imparting bodily movement of the members forwardly at one rate of speed and rearwardly at a different rate of speed.

7. Work feeding means for sheet metal presses embodying two members one normally slidable upon the other and both adapted for bodily movement together, a work engaging element pivotally supported by one of the members, a link pivotally connected to said element and also pivotally connected to the other member whereby when a relative movement is imparted to said members the said element will be swung about its pivot, and means for imparting such bodily and relative movements to the said members.

8. Work feeding means for sheet metal presses embodying two members one normally slidable upon the other and both adapted for bodily movement together, a work engaging element pivotally supported by one of the members, a link pivotally connected to said element and also pivotally connected to the other member whereby when a relative movement is imparted to said members the said element will be swung about its pivot, and means for imparting such bodily and relative movements to the said members, the last recited means including mechanism whereby a different rate of speed of movement will be given to the said members in one direction from the rate of speed of its movement in the opposite direction.

9. Work feeding means for sheet metal presses embodying two members one normally slidable upon the other and both adapted for bodily movement together, a work engaging element connected with one of said members for movement relative thereto, a link connected with said element and also with the other of the said members whereby when a relative movement is imparted to said members the said element will be moved with respect to its supporting member, a lever connected with one of said members for moving them, an actuating element for the lever, and a pin and elongated slot connection between the lever and the said actuating element.

10. Work feeding means for sheet metal presses embodying two members one normally slidable upon the other and both adapted for bodily movement together, a work engaging element connected with one of said members for movement relative thereto, a link connected with said element and also with the other of the said members whereby when a relative movement is imparted to said members the said element will be moved with respect to its supporting member, a lever connected with one of said members for moving them, and means for rocking said lever, the last recited means embodying mechanism whereby a quick return movement will be given to the work feeding means.

11. Work feeding means for sheet metal presses embodying two members normally slidable one upon the other and both adapted for bodily movement together, a pivotally mounted element carried by one of the members and adapted to be moved into and out of engagement with the work, a link pivotally connected with the other member and also with the said element whereby when said members are moved relatively one with relation to the other the said element will be swung about its pivot, a lever connected with one of said members for moving them relatively one with relation to the other and also for moving them both together, means for limiting the extent of relative movement of said members, and means for actuating said lever.

12. Work feeding means for sheet metal presses embodying two members normally slidable one upon the other and both adapted for bodily movement together, a pivotally mounted element carried by one of the members and adapted to be moved into and out of engagement with the work a link pivotally connected with the other member and also with the said element whereby when said members are moved relatively one with relation to the other the said element will be swung about its pivot, a lever connected with one of said members for moving them relatively one with relation to the other and also for moving them both together, means for limiting the extent of relative movement of said members, and means for actuating said lever, the said lever actuating means having a constant direction of motion.

13. Work feeding means for sheet metal presses embodying two members slidable one upon the other and both adapted for bodily movement together, a pivotally mounted element carried by one of the members and adapted to be moved into and out of engagement with the work, a link pivotally connected with the other member and also with the said element whereby when said mem-

bers are moved relatively one with relation to the other the said element will be swung about its pivot, a lever connected with one of said members for moving them relatively one with relation to the other and also for moving them both together, means for limiting the extent of relative movement of said members, a gear, and a pin and slot connection between the gear and said lever for actuating the latter.

14. Work feeding means for sheet metal presses embodying two members normally slidable one upon the other and both adapted for bodily movement together, one of said members being movable for a limited distance in advance of the other, a pivotally mounted element carried by one of the members and adapted to be moved into and out of engagement with the work, a link pivotally connected with the other member and also with the said element whereby when said members are moved relatively one with relation to the other the said element will be swung about its pivot, a lever connected with one of said members for moving them relatively one with relation to the other and also for moving them both together, means for limiting the extent of relative movement of said members, and means for actuating said lever, the last means embodying mechanism for imparting to the lever a relatively slow forward movement and a quick return movement.

15. Work feeding means for sheet metal presses embodying two members slidable one upon the other and both adapted for bodily movement together, a pivotally mounted element carried by one of the members and adapted to be moved into and out of engagement with the work, a link pivotally connected with the other member and also with the said element whereby when said members are moved relatively one with relation to the other the said element will be swung about its pivot, a lever connected with one of said members for moving them relatively one with relation to the other and also for moving them both together, means for limiting the extent of relative movement of said members, a rotatable actuator for the lever, a pin and elongated slot connection between the said actuator and the lever, and means for rotating said actuator.

16. Work feeding means for sheet metal presses embodying two members slidable one upon the other and both adapted for bodily movement together, a pivotally mounted element carried by one of the members and adapted to be moved into and out of engagement with the work, a link pivotally connected with the other member and also with the said element whereby when said members are moved relatively one with relation to the other the said element will be swung about its pivot, a lever connected with one of said members for moving them relatively one with relation to the other and also for moving them both together, means for limiting the extent of relative movement of said members, a rotatable actuator for the lever, a pin and elongated slot connection between the said actuator and the lever, and means for rotating the said actuator continuously and in a constant direction.

17. A sheet metal press embodying spaced dies, a reciprocating member, dies carried by said member and co-operating with the first said dies to operate upon the work, means individual to the dies for elevating the work to remove it from the respective dies, means for engaging the work while thus elevated for moving it away from the dies, and stop devices automatically operating in timed relation with the last recited means to be engaged by the work for positioning the work with relation to the respective co-operating dies.

18. Work feeding means for sheet metal presses embodying two members normally slidable one upon the other and both adapted for bodily movement together, means carried by one of the members and adapted to be moved into and out of engagement with the work, means connected with the other member and also with the first said means whereby when the said members are moved relatively one with relation to the other, the first said means will be moved relatively to the first recited member which constitutes the support therefor, actuating means connected with one of said members for moving them relatively one with relation to the other and also for moving them together, means for limiting the extent of relative movement of said members, and means for imparting movement to the said actuating means.

19. Work feeding means for sheet metal presses embodying two members normally slidable one upon the other and both adapted for bodily movement together, means carried by one of the members and adapted to be moved into and out of engagement with the work, means connected with the other member and also with the first said means whereby when the said members are moved relatively one with relation to the other, the first said means will be moved relatively to the first recited member which constitutes the support therefor, a lever connected with one of said members for moving it with relation to the other member and also for moving both of the members together, means for limiting the extent of relative movement of said members, a gear, and a pin and slot connection between the gear and said lever for actuating the latter.

In testimony whereof I have signed my name to this specification, on this 17th day of August, A. D. 1926.

FREDRICH J. RODE.