No. 654,659. Patented July 31, 1900.

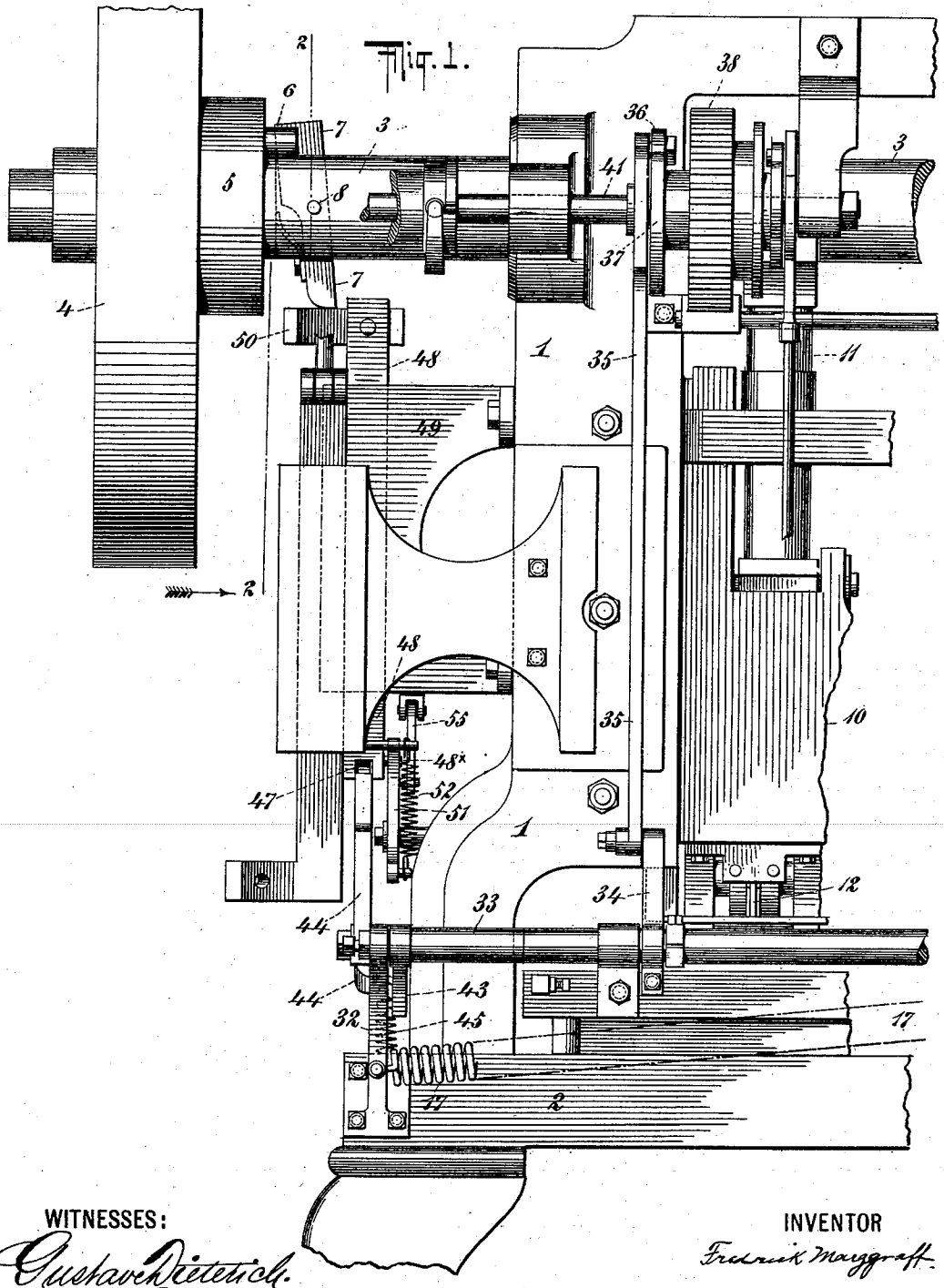
F. MARGGRAFF.

AUTOMATIC STOP MECHANISM FOR METAL WORKING MACHINES.

(Application filed Feb. 24, 1899.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



WITNESSES:

Gustave Dietrich.

Charles E. Smith

INVENTOR

Fredrick Marggraff.

BY Briesen & Knauth

his ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 654,659. Patented July 31, 1900.

F. MARGGRAFF.

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(No Model.) 4 Sheets—Sheet 2.

Fig. 2.

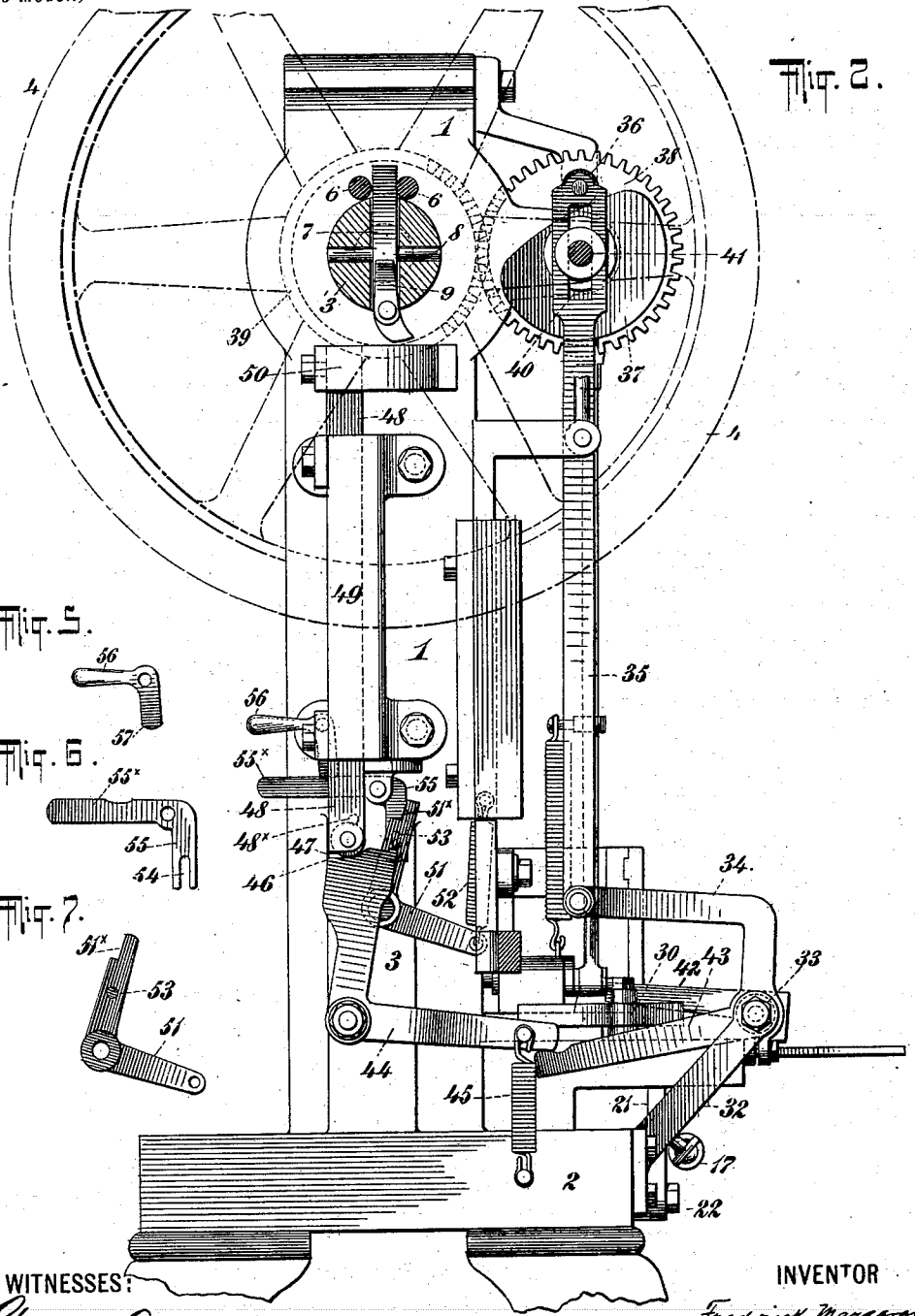


Fig. 5.

Fig. 6.

Fig. 7.

WITNESSES:

Gustave Dieterich.

Charles E. Smith

INVENTOR

Fredrick Marggraff

BY Briesen & Knauth

his ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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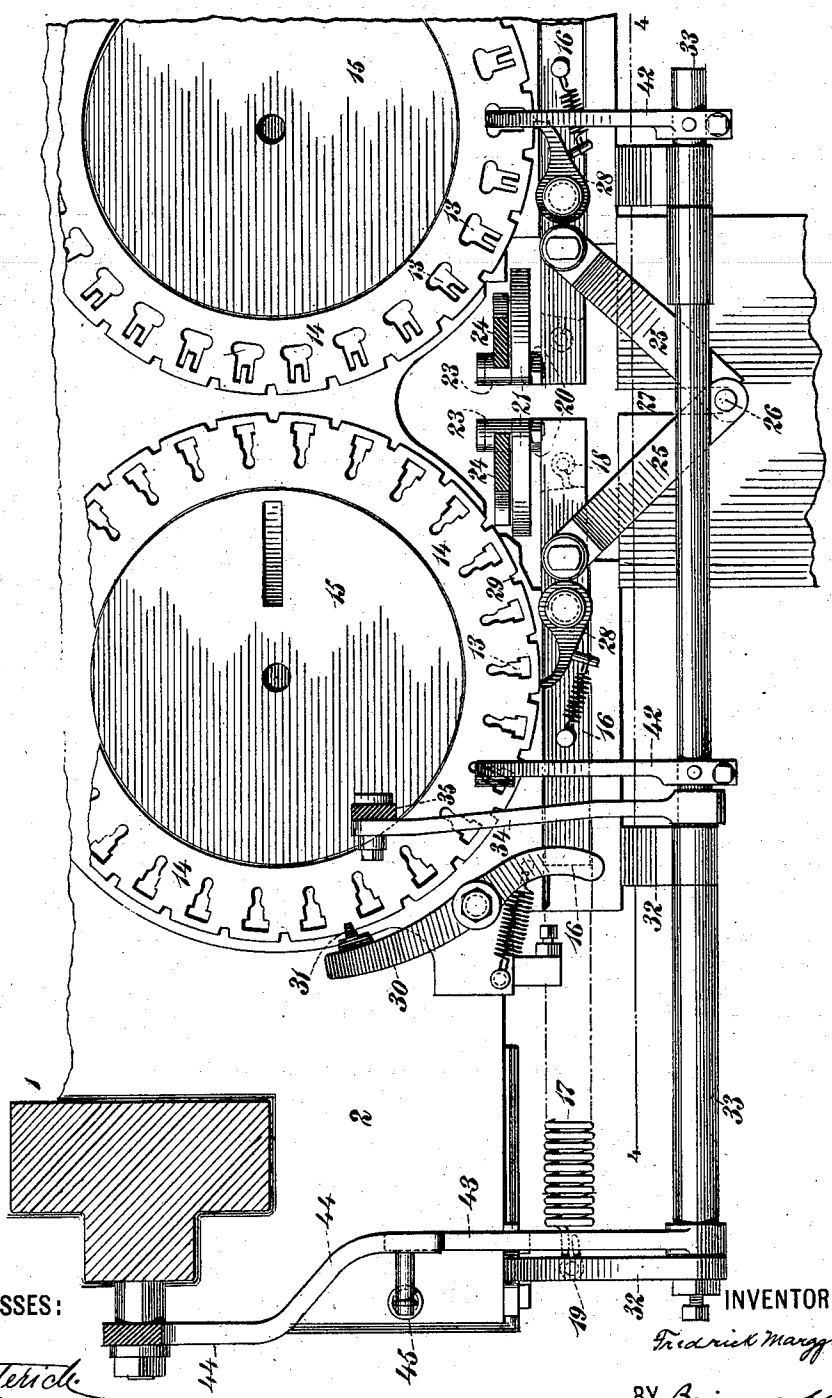
F. MARGGRAFF.

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(No Model.) 4 Sheets—Sheet 3.

Fig. 3.



WITNESSES:

Ge. Dieterich

Charles E. Smith

INVENTOR

Friedrich Marggraff

BY Briesen & Knauth

his ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 654,659. Patented July 31, 1900.

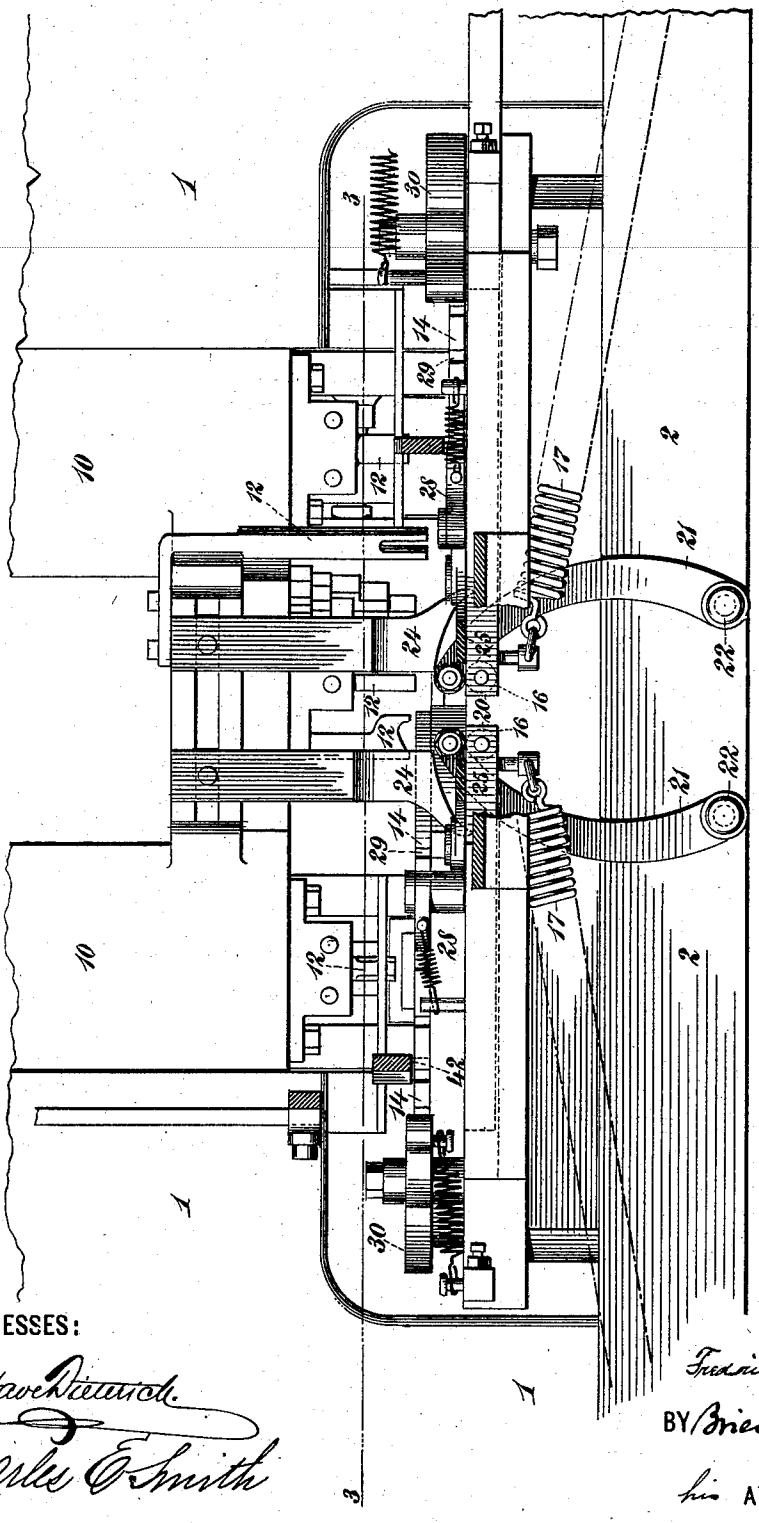
F. MARGGRAFF.

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(Application filed Feb. 24, 1899.)

(No Model.) 4 Sheets—Sheet 4.

Fig. 4.



WITNESSES:

Gustave Dieterich.

Charles E. Smith

INVENTOR

Frederick Marggraff

BY Briesen & Knauth

his ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FREDRICK MARGGRAFF, OF WATERBURY, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE SHOE HARDWARE COMPANY, OF SAME PLACE.

AUTOMATIC STOP MECHANISM FOR METAL-WORKING MACHINES.

SPECIFICATION forming part of Letters Patent No. 654,659, dated July 31, 1900.

Application filed February 24, 1899. Serial No. 706,657. (No model.)

To all whom it may concern:

Be it known that I, FREDRICK MARGGRAFF, a citizen of the United States, and a resident of Waterbury, New Haven county, State of Connecticut, have invented certain new and useful Improvements in Automatic Stop Mechanism for Metal-Working Machines, of which the following is a full, clear, and exact description.

My invention relates to automatic stop mechanism more particularly adapted for metal-working machines, though obviously the invention may be made use of in other machines where an application thereof would be feasible.

The object of said invention is to produce a simple and efficient mechanism for automatically stopping the machine in case the articles made by the machine are not properly discharged from the machine or a blank is not brought into exact register with the punch, thereby preventing injury to the machine.

To these ends my invention consists in the novel arrangement and combination of parts hereinafter described and claimed.

Reference being had to the accompanying drawings, wherein like characters indicate corresponding parts in the various views, Figure 1 is a front elevation of a sufficient number of parts of a metal-working machine to illustrate my invention. Fig. 2 is a vertical sectional view of the same, the said view being taken on the line 2 2 of Fig. 1 and looking in the direction of the arrow in said figure. Fig. 3 is a horizontal sectional view of a portion of the machine, the view being taken on the line 3 3 of Fig. 4. Fig. 4 is a front view of a portion of the machine with parts broken away to better illustrate my invention, the view being taken on the line 4 4 of Fig. 3. Fig. 5 is a detail side view of the hand-operated stop-lever to be hereinafter described. Figs. 6 and 7 are side views of certain portions of the hand-operated stop mechanism, which will be hereinafter described.

In the drawings, 1 represents the framing of the machine, which is supported upon a bed-plate 2. In this framing the operative parts of the machine are mounted. The main driving-shaft 3 is mounted in the upright standards of the framing, as indicated in Figs. 1 and 2, and is provided with a fly-wheel 4, which is connected with a driving-pulley 5, the fly-wheel and driving-pulley being loosely mounted upon the driving-shaft. Projecting from the driving-pulley are pins 6 6, (see Figs. 1 and 2,) spaced apart to provide a space for the reception of a spring-pressed latch or clutch-section 7, pivoted at 8 in a recess in the driving-shaft 3 and normally maintained in the engaged position by a spring 9. It will thus be observed that when the latch or clutch section 7 is in the engaged position between the pins 6 the driving-shaft and pulley 5 will be locked to rotate together and the end of the clutch-section 7 will extend from the shaft, as represented in Fig. 1 of the drawings.

Moving between the upright standards of the framing 1 is a gate or cross-head 10, which is operated by the main shaft through pitman-rods 11, which are connected to suitable eccentrics carried upon the main shaft 3. The cross-head or gate 10 carries the punches 12, which coöperate with dies 13 in dial-plates 14, which are adapted to be rotated around a fixed central plate 15, carried by the bed-plate of the machine. There may be several punches 12 for each dial-plate carried by the gate 10, and each punch may be adapted to perform a different portion of the work to be accomplished. Thus one punch may be the blanking-punch, a second a forming-punch, and a third an assembling-punch. Suitable mechanism (not shown) is provided for feeding the material to the punches, and the dial-plates are intermittently operated after each downward movement of the punches to bring successive pockets and the blanks carried therein to the punches to be operated upon.

The mechanism for intermittently moving the dial-plates is clearly represented in Figs. 3 and 4 of the drawings, wherein horizontal movable slides 16 are mounted in the machine and are normally maintained in the outermost position by coiled springs 17, one end of each of which is connected to a slide, as indicated at 18, the other end of each of said springs being united to a fixed portion of the framing of the machine, as indicated at 19. Each of these slides carries an antifriction-roller 20, against which the links 21 are adapted to bear. The links 21 are pivoted to the bed-

plate of the machine, as indicated at 22, and the upper end of each of these links is provided with an antifriction-roller 23, as indicated in Fig. 3. Coöperating with the antifriction-rollers 23 of the links 21 are cams 24, which are carried by the gate or cross-head 10, so that the links are moved toward each other at each downward movement of the gate, and the links bearing against the antifriction-rollers 20 of the slides 16 will cause them to be forced toward each other and against the tension of their springs 17. Each of the slides 16 is pivotally connected to a link 25, which links are connected, as indicated at 26, to a pivot which extends into a slot 27 in an extension projecting from the bed-plate of the machine. These links 25, connected in the manner described, will cause the machine to be stopped if one of the dial-plates is prevented from moving while the other is free to move, as will be hereinafter explained. Each of the slides 10 is provided with a spring-pressed pawl 28, which is adapted to engage in apertures 29 in the periphery of each of the dial-plates 14, which constitute the feeding device for the blanks, so that an outward movement of the slides from the center toward the ends of the machine will cause the dial-plates to be rotated a predetermined distance to bring the openings or pockets in the dial-plate into register with their coöperating punches. Centering spring-pressed pawls 30 are mounted on the bed-plate of the machine, and one of such pawls coöperates with each of the dial-plates 14, as indicated in Fig. 3, to maintain the dial-plate in the position into which it has been moved by the feeding mechanism. The cam-like projection 31 of each of these centering-pawls engages in an aperture 29 in the periphery of the dial-plate, but is adapted to be forced therefrom against the tension of the spring of the pawl when the feed mechanism is operated or the pawls may be otherwise operated.

Projecting from the bed-plate of the machine are brackets 32, in which a rock-shaft 33 is mounted. To this rock-shaft is rigidly connected an arm 34, which in its turn is pivotally connected to a link 35. The upper end of the link 35 is provided with an antifriction-roller 36, which is adapted to bear upon a cam 37. This cam 37 is connected so as to rotate with a gear-wheel 38, and the gear-wheel 38 meshes with a coöperating gear 39, carried on the main shaft 3 of the machine. The link 35 is likewise apertured near its upper end, as indicated at 40, and through this aperture projects a pin, which in the present instance consists of the auxiliary shaft 41, upon which the cam 37 is mounted. By this construction it will be observed that the link 35 is free to move independently of the cam 37 and reaches the lowermost position by its own weight, whereas the cam 37 operates to positively force the link into the raised position. It will likewise be seen that when the link 35 is maintained elevated to the highest portion of the cam 37 the said cam may continue to revolve without affecting the link 35 or the parts connected therewith.

To the rock-shaft 33 are rigidly connected a pair of arms 42, which extend toward the dial-plates 14, and each of these arms is provided with a finger at the outer extremity thereof that is adapted to be received in suitable apertures, which in the present instance consist of the pockets of a dial-plate as said dial-plate is rotated to bring the pockets successively to the punches. This finger, when it extends into the pockets of a dial-plate, should sink to a predetermined depth therein. I likewise rigidly connect with the rock-shaft 33 an arm 43, which is adapted to bear against one arm of a bell-crank lever 44, which is normally maintained in the position represented in Fig. 2 by a coiled spring 45. The other arm of this bell-crank lever 44 is provided at its upper end with a cam 46, upon which bears an antifriction-roller 47, carried by a gravity slide 48, which slides in a projection 49, extending from one side of the framing of the machine. An abutment $48^{\times}$ projects from one side of this slide and coöperates with the notched portion $51^{\times}$ of the lever 51 to support the slide in the elevated position. The upper end of this slide projects above the extension 49 of the framing and carries a cam-abutment 50, which is adapted to be projected into the path of the free end of the clutch-section 7 to disconnect the clutch. The bell-crank lever 51, which is shown in detail in Fig. 7 of the drawings, is pivoted to the framing of the machine and is connected by one arm to a coiled spring 52, and is provided with a pin 53, which extends into a slot 54 of a coöperating bell-crank lever 55. This bell-crank lever 55 is pivoted to the extension 49 of the framing and a hand-operated lever 56 is provided with an extension 57, that is adapted to bear upon the arm $55^{\times}$ of said lever 55 and maintain the parts in the position represented in Fig. 2 against the tension of the spring 52. It will be understood that when hand-operated lever 56 is turned upon its pivot from the position represented in Fig. 2 the spring 52 will force the lever 51 to a position where the notched portion $51^{\times}$ thereof will be brought under the abutment $58^{\times}$ of the slide 58 when the slide is elevated and to maintain the slide in the elevated position. By reason of the fact that the slide 48 is disconnected from the intermediate mechanism between the slide and the fingers on the arms 42 said slide may be maintained in the elevated position by the hand-operated mechanism without affecting the automatic operation of such intermediate mechanism and the slide may be operated automatically without affecting the hand-operated mechanism.

Having described the general construction of one form of apparatus embodying my invention, I will now proceed to describe the operation thereof.

The material to be operated upon is fed in

any suitable manner to the blanking-punches, and if the blank has been properly cut and the operation of the parts is correct in every detail the blank will be automatically conveyed by a dial-plate to the succeeding punches and will be finally brought to the assembling or closing punches, from whence the completed article may be discharged. If, however, for any reason the dial-plates be improperly fed, so that any one of the punches is not in exact register with a coöperating opening or pocket in the dial-plate, the finger carried by the arm 42, which coöperates with this dial-plate, will not pass into a pocket, but will rest on the upper surfaces of the dial-plate, and the arms will thus be maintained in an elevated position. This will prevent the rock-shaft 33 from turning to a position where the arm 43 will allow the lowest portion of the cam 46 of the lever 44 to be reached. In other words, the rock-shaft will be held in a position where the slide 48 is maintained on the highest portion of the cam 46, and the cam-abutment 50, connected to the upper end of the slide 48, will be maintained in the path of the clutch-section 7, so that as the free end thereof is rotated with the shaft and driving-pulley into contact with the cam 50 the clutch-section will be automatically thrown out of engagement with the pins 6 with which it coöperates and the driving-pulley and the fly-wheel 4 will be allowed to rotate independently of the main shaft, thus stopping the machine before the punches have an opportunity to descend. It will be understood that motion is transmitted to the rock-shaft 33 to bring about this movement of the parts by the link 35, which is elevated at each complete revolution of the gear 38 by the cam 37 connected therewith and drops to the lowermost position by its own weight. When the link 35 is maintained in the elevated position by a finger on arm 42 contacting with the upper face of the dial-plate, the roller 36 on said link 35 will be maintained above the highest portion of the cam 37, so that the cam may continue to rotate without in any way affecting the link 35 and the parts connected therewith. Instead of the fingers on the levers 42 passing into the blank-receiving pockets or openings they may pass into separate openings provided for this purpose, though I prefer to have the fingers pass into the blank-receiving openings, as additional advantages are derived thereby. Should the operator desire to stop the machine by hand, it is merely necessary to shift the hand-operated lever 56 from the position illustrated in Fig. 2 of the drawings, and thereby release the lever 55, when the tension of the spring 52 will force the notch $51^{\times}$ of the lever 51 to a point where the abutment $48^{\times}$ of the slide 48 will rest on the upright arm of the lever 51, and will thus prevent the slide 48 from reaching its lowermost position. In other words, it will maintain the slide in the position to which it has been elevated by the highest portion of the cam 46, and will thus maintain the cam 50 on the slide into the path of the clutch-section 7, which will be disconnected from the driving-pulley and the machine will be stopped.

If through any accident one of the articles should not be discharged from an opening or pocket in the dial-plate or one or more blanks be contained in a pocket when said opening or pocket should be free, the fingers on the levers 42 will contact with said article or blank and the effect will be the same as though the finger were maintained on the upper face of a dial-plate and the machine will be immediately stopped before the punch which coöperates with said pocket is depressed to operate upon the article.

It sometimes occurs that a blank will become jammed between a pocket in one of the dial-plates and the trackway of said dial-plate or between a pocket and one of the dies, so as to prevent that particular dial-plate from being moved by its feed-pawl, while the other dial-plate, being free from obstruction, will be fed regularly in the ordinary manner. The result of this would ordinarily be to have the punches of the jammed dial-plate work continuously in the same pockets, but without necessary injury to the machine, while the other dial-plate would be intermittently operated to carry the blanks around to the assembling or closing punch. It will be observed that in this manner many buckles might be destroyed before the attention of the operator is directed to the fact that all of the parts are not working properly and that buckles are being destroyed as a result. For this reason I have devised special mechanism to stop the machine in case both dial-plates are not fed to the same extent or in case one should become jammed, so as to be incapable of moving while the other is being properly fed. This mechanism comprises the links 25, which are connected to the two slides 16.

Referring now to Fig. 3 of the drawings, let us suppose that the left-hand dial-plate 14, which feeds the tongue of the buckle, has become jammed in the position shown. When the slides 16, which form a toggle-joint, are moved from each other a short distance by the springs 17, the pawl 28 will engage in an aperture 29 in the jammed dial-plate and further movement of the slide is prevented. This will leave the parts in substantially the position shown in Fig. 3, and a further movement of the other slide tends to swing the pivot 26 in the arc of a circle of which the pivot of the left-hand link 25 is the center. The effect of this is to jam the pivot against the right-hand wall of the slot 27, and thus prevent all movement of the slide at the right-hand side of the machine as well as that at the left. The relation of the parts is such that when the dial-plates are stopped in this manner a full portion of a dial-plate is brought under the fingers of one of the levers

42 and the clutch will be thrown and the machine stopped in the manner hereinbefore described.

It will be understood that by my invention means are devised which provide against damage to the machine in a manner in which damage most frequently occurs in metal-working machines. It will thus be seen that if for any reason the dial-plates are not properly fed to bring the pockets into exact register with the punches the machine will be instantly stopped before damage to the machine can result and that if the blanks are not properly contained in the pockets the machine will likewise be stopped before the punches can descend to damage the machine.

While I have shown and described with considerable detail one form of mechanism embodying my invention, I would have it understood that many changes may be made in the mechanism without departing from the spirit of my invention.

What I claim, and desire to secure by Letters Patent, is—

1. The combination of a plurality of punches one of which is a blanking-punch, means for automatically feeding sheet metal to said blanking-punch and a feeding device adapted to receive the blanks directly from said blanking-punch and to feed the blanks to the successive punch, means for operating the punches and mechanism for automatically throwing the punch-operating mechanism out of operation when the blank-carrying portions of the feeding device are out of register with the punches.

2. The combination of a plurality of punches, a plurality of feeding devices, having a series of blank-carrying portions, which coöperate with the punches, means for operating the punches, means for automatically bringing the blank-carrying portions of the feeding devices successively to their respective punches, mechanism for automatically throwing the punch-operating mechanism out of operation when a blank-carrying portion of the feed device is out of register with the punch; and means for preventing the movement of one of the feed devices when another of said devices is maintained against movement.

3. The combination of a punch and a feeding device for feeding blanks to the punch, means for operating the punch, automatically-operated stop mechanism for throwing the punch-operating mechanism out of operation when a blank in the feeding device is out of register with the punch and hand-operated means for controlling the automatically-operated stop mechanism.

4. The combination of a plurality of punches, a plurality of feeding devices, each having a series of blank-receiving openings therein, means for operating the punches, means for automatically bringing the blank-receiving openings in the feeding devices successively to their respective punches, automatically-operated stop mechanism for throwing the punch-operating mechanism out of operation when an opening in a feeding device is maintained out of register with the punch; means for preventing the movement of one of the feed devices when another feed device is maintained against movement, and hand-operated means for controlling the automatically-operated stop mechanism.

5. The combination of a punch, a feeding device having a series of blank-receiving openings therein, means for automatically bringing said blank-receiving openings successively to the punch, means for operating the punch, a clutch carried by a movable part of the machine for controlling the punch-operating means, a finger adapted to be moved into the openings in the feeding device, intermediate mechanism between said finger and the clutch, mechanism for automatically moving said finger at each operation of the punch and for projecting an abutment on the intermediate mechanism into the path of a section of the clutch and means for permitting the intermediate mechanism to remain inactive when the finger is prevented from reaching the full extent of its downward stroke.

6. The combination of a punch, a feeding device having a series of blank-receiving openings therein, means for bringing said openings successively to the punch, means for operating the punch, a clutch carried by a movable part of the machine for throwing the punch-operating means out of operation, a finger adapted to be moved a predetermined depth into one of the openings in the feeding device at each operation of the punch if an opening is in register with the punch, intermediate mechanism between said finger and the clutch, mechanism for automatically moving said finger and for moving a portion of the intermediate mechanism into the path of a member of the clutch and means for permitting the intermediate mechanism to remain inactive when the finger is prevented from moving the predetermined distance into an opening in the feeding device and thereby causing the clutch to be automatically released to stop the machine.

7. The combination of a punch, a feeding device having a series of blank-receiving openings therein, means for operating the punch, mechanism for controlling the punch-operating means, an automatically-operated finger adapted to be moved to a predetermined distance into an opening in the feeding device at each operation of the punch and to automatically throw the punch-operating means out of operation, if the finger is prevented from moving the predetermined distance into the opening in the feeding device and hand-operated means for controlling said intermediate mechanism.

8. The combination of a plurality of punches, a plurality of dial-plates, each having a series of blank-receiving openings that are adapt-

ed to be successively fed to the respective punches, a main driving-shaft for communicating motion to said punches, power-transmitting means coöperating with said shaft, a clutch interposed between said shaft and the power-transmitting means and adapted to rotate with said shaft, an abutment adapted to be interposed in the path of a section of the clutch, when openings in the dial-plates are out of register with the punches of said dial-plate; means for automatically so interposing the abutment, during each revolution of the main shaft, means controlled by the dial-plate for automatically maintaining the abutment in the path of the clutch-section, to disconnect the clutch, and means for preventing the movement of one dial-plate when another dial-plate is maintained against movement.

9. The combination of a plurality of punches, one of which is a blanking-punch, means for automatically feeding sheet metal to said blanking-punch, a dial-plate having a series of blank-receiving openings that are adapted to be successively fed to the punch, a main driving-shaft for communicating motion to said punch, power-transmitting means coöperating with said shaft, a clutch interposed between said shaft and the power-transmitting means and adapted to rotate with said shaft, an abutment adapted to be interposed in the path of a section of the clutch, means for automatically so interposing the abutment during each revolution of the main shaft, hand-operated means for maintaining the abutment in the interposed position and means controlled by the dial-plate for automatically maintaining the abutment in the path of the clutch-section to disconnect the clutch.

10. The combination of a punch, a feeding device having a series of openings adapted to be successively fed to the punch, a main driving-shaft for communicating motion to said punch, power-transmitting means coöperating with said shaft, a clutch interposed between the main shaft and the power-transmitting means, a finger and operative connections coöperating therewith, said finger being adapted to enter an opening in the feeding device solely by the weight of the parts, means for positively withdrawing the finger from the said opening and intermediate mechanism between the finger and the clutch, whereby the clutch may be automatically disconnected when the finger is maintained out of an opening.

11. The combination of a punch, a feeding device having a series of blank-receiving openings that are adapted to be successively fed to the punch, a main driving-shaft for communicating motion to said punch, power-transmitting means coöperating with said shaft, a clutch interposed between the main shaft and the power-transmitting means and adapted to rotate with said shaft, a finger and operative connections coöperating therewith, said finger being adapted to enter an opening in the feeding device a predetermined distance by the weight of the parts, means for positively withdrawing the finger from said opening, a movable abutment, intermediate mechanism between the finger and said abutment whereby the abutment will be automatically moved into the path of a section of the clutch when the finger is prevented from moving the predetermined distance into the openings in feeding device.

12. The combination of a punch, a feeding device having a series of blank-receiving openings that are adapted to be successively fed to the punch, a main driving-shaft for communicating motion to said punch, power-transmitting means coöperating with said shaft, a clutch interposed between the main shaft and the power-transmitting means and adapted to rotate with said shaft, a finger and operative connections coöperating therewith, said finger being adapted to enter an opening in the feeding device by the weight of the parts, means for positively withdrawing the finger from said opening, a movable abutment, intermediate mechanism between the finger and said abutment, said abutment being disconnected from the intermediate mechanism whereby the abutment will be automatically moved into the path of a section of the clutch when the finger is prevented from moving the predetermined distance into an opening and hand-operated means for maintaining the abutment in such position.

13. The combination of a punch, a feeding device having a series of blank-receiving openings that are adapted to be successively fed to the punch, a main driving-shaft communicating motion to said punch, power-transmitting means coöperating with said shaft, a clutch interposed between the main shaft and the power-transmitting means, a rock-shaft, a finger carried thereby, which finger is adapted to enter an opening in the feeding device, a link which is freely movable in one direction connected to a rocking arm extending from said rock-shaft, means for positively moving said link in the opposite direction, an abutment adapted to be moved into the path of a section of the clutch, intermediate mechanism between said rock-shaft and abutment whereby when the finger is out of an opening in the feeding device the abutment will be in the path of the clutch-section.

14. The combination of a punch, a feeding device having a series of blank-receiving openings that are adapted to be successively fed to the punch, a main driving-shaft for communicating motion to said punch, power-transmitting means coöperating with said shaft, a clutch interposed between the main shaft and the power-transmitting means, a rock-shaft, a finger carried thereby, which finger is adapted to enter one of the blank-receiving openings in the feeding device, a link which is freely movable in one direction connected to a rocking arm extending from said rock-shaft, means for positively moving said link in the

opposite direction, an abutment adapted to be moved into the path of a section of the clutch, intermediate mechanism between said rock-shaft and abutment and disconnected from said abutment and hand-operated means for maintaining said abutment in the path of the clutch whereby when the finger is out of a blank-receiving opening or the hand-operated mechanism is shifted, the abutment will be in the path of the clutch-section.

15. The combination of a plurality of independently-movable blank-apertured feeding devices, mechanism for operating said feeding devices, to bring apertures therein into alinement, and means for preventing the movement of said operating mechanism when one of said feeding devices is retained against movement.

16. The combination of a plurality of revoluble blank-feeding devices, mechanism for operating said feeding devices and means for jamming said operating mechanism to prevent a movement thereof when one of the feeding devices is retained against movement.

17. The combination of a punch, a plurality of revoluble blank-feeding devices therefor, mechanism for operating said feeding devices, means for preventing the movement of said operating mechanism when one of said feeding devices is retained against movement and mechanism coöperating with said feeding devices to stop the machine when a feeding device maintains a blank out of register with the punch.

18. The combination of a punch, a plurality of revoluble blank-feeding devices therefor, mechanism for operating said feeding devices, means for jamming said operating mechanism to prevent a movement thereof when one of said feeding devices is retained against movement and mechanism coöperating with said feeding devices to stop the machine when a feeding device maintains a blank out of register with the punch.

19. The combination of a plurality of movable blank-feeding plates, mechanism for operating said feeding-plates, toggle-links connected to said operating mechanism, a pin on said links and a grooved abutment in which said pin moves, whereby when one of said feeding devices is retained against movement, the operating mechanism will be prevented from moving.

20. The combination of a plurality of revoluble blank-feeding plates, mechanism for operating said feeding-plates, toggle-links connected to said operating mechanism, a pin on said links and a grooved abutment in which said pin moves, whereby when one of said feeding devices is retained against movement the pin will be jammed in the grooved abutment and the operating mechanism will be prevented from moving.

21. The combination of a punch, a plurality of revoluble blank-feeding plates therefor, mechanism for operating said feed-plates, toggle-links connected to said operating mechanism, a pin on said links, a grooved abutment in which said pin moves, whereby when one of said feeding devices is retained against movement the operating mechanism will be prevented from moving and mechanism cooperating with said feeding devices to stop the machine when a feeding device maintains a blank out of register with the punch.

FREDRICK MARGGRAFF.

Witnesses:
EMMA JUDGE,
HENRY W. MINOR.