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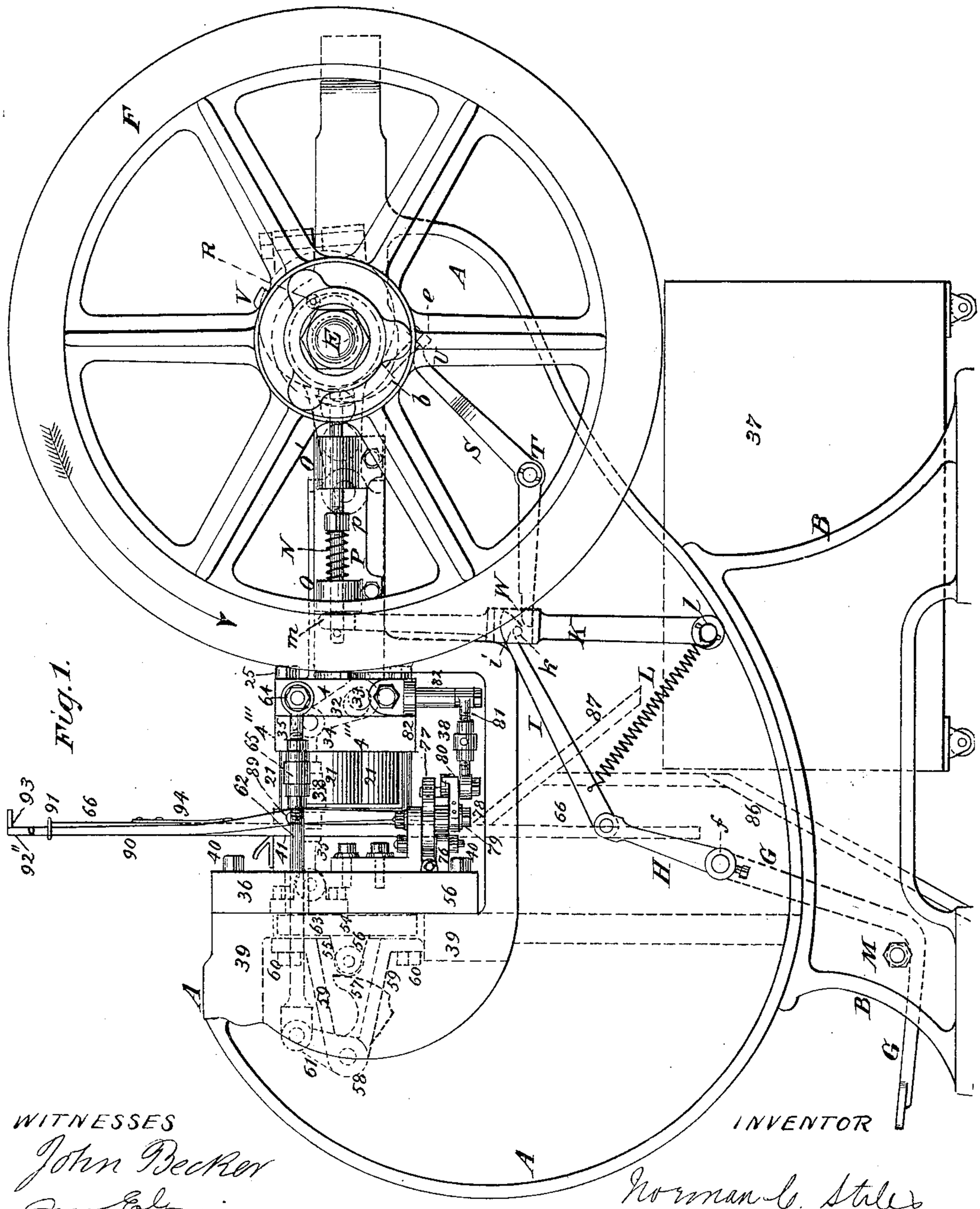
N. C. STILES.

PRESS FOR CUTTING AND STAMPING ARTICLES OF SHEET METAL.

No. 369,970. Patented Sept. 13, 1887.



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(No Model.) 6 Sheets—Sheet 2.

N. C. STILES.

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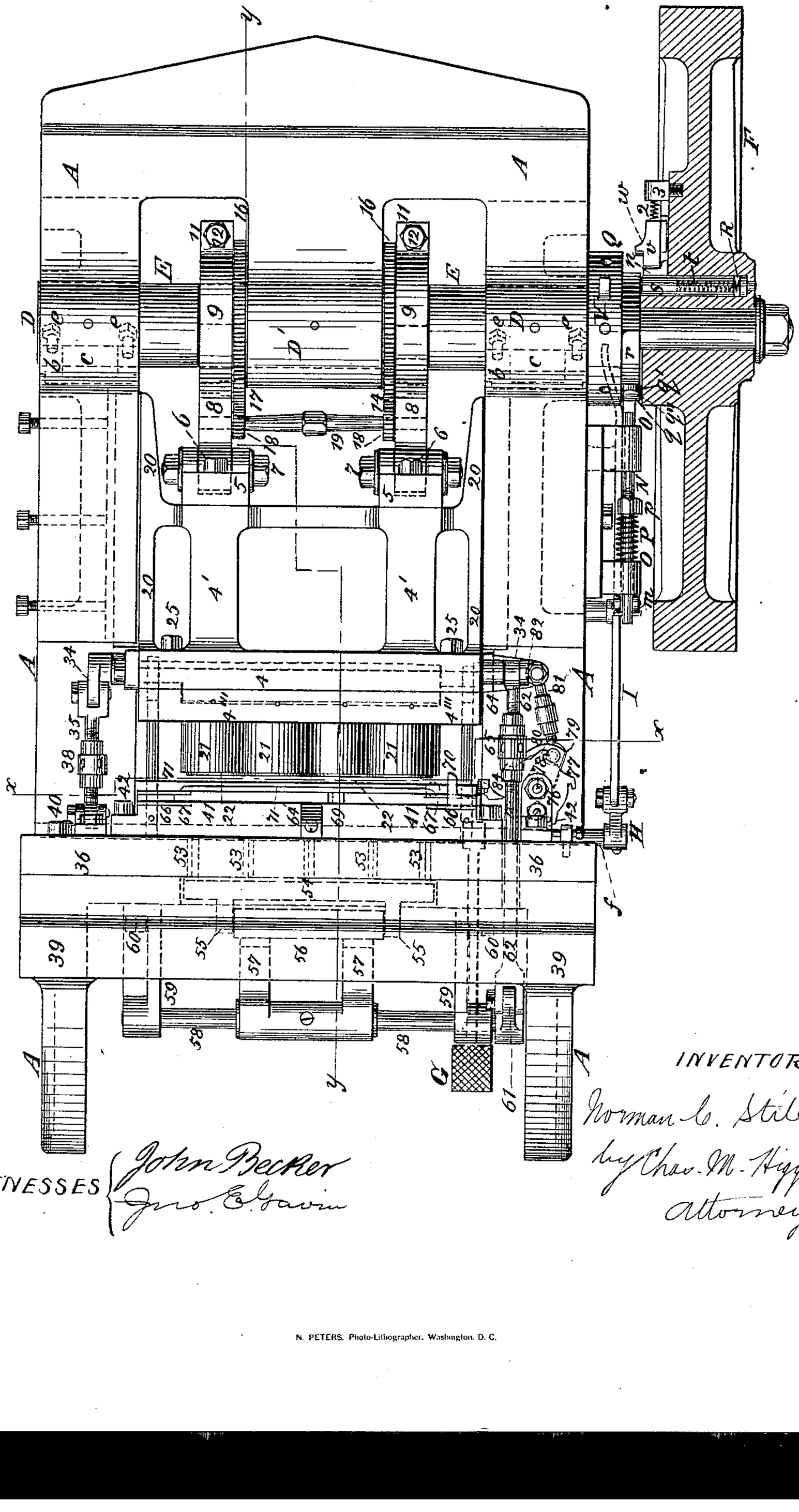
Fig. 2.



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PRESS FOR CUTTING AND STAMPING ARTICLES OF SHEET METAL.

No. 369,970. Patented Sept. 13, 1887.

Fig. 3.

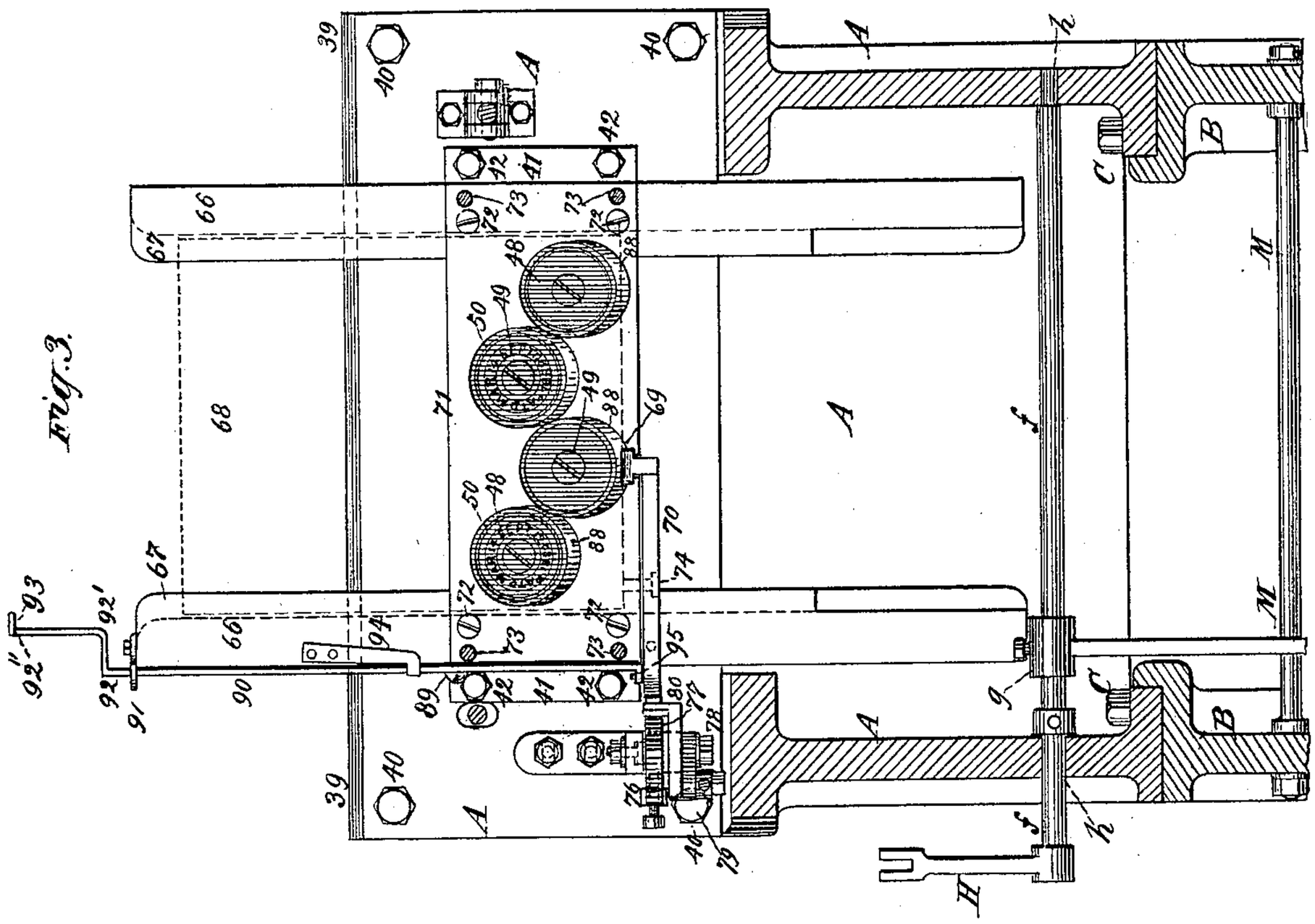


Fig. 4.

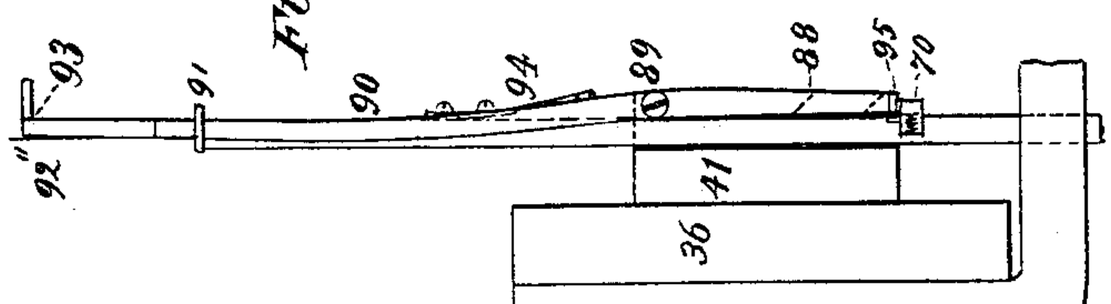


Fig. 6.

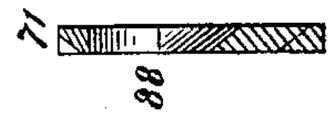


Fig. 5.

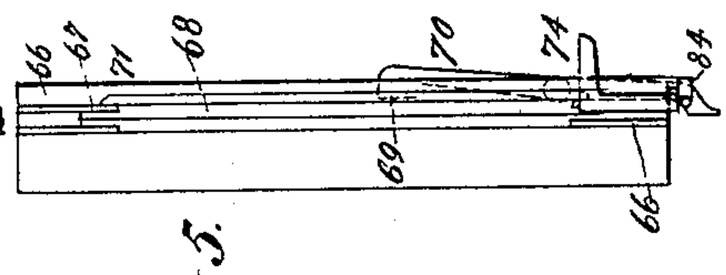
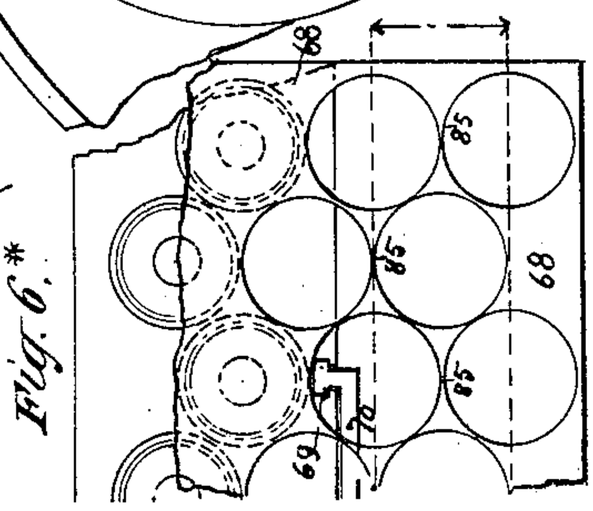


Fig. 6.*



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N. C. STILES.

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No. 369,970. Patented Sept. 13, 1887.

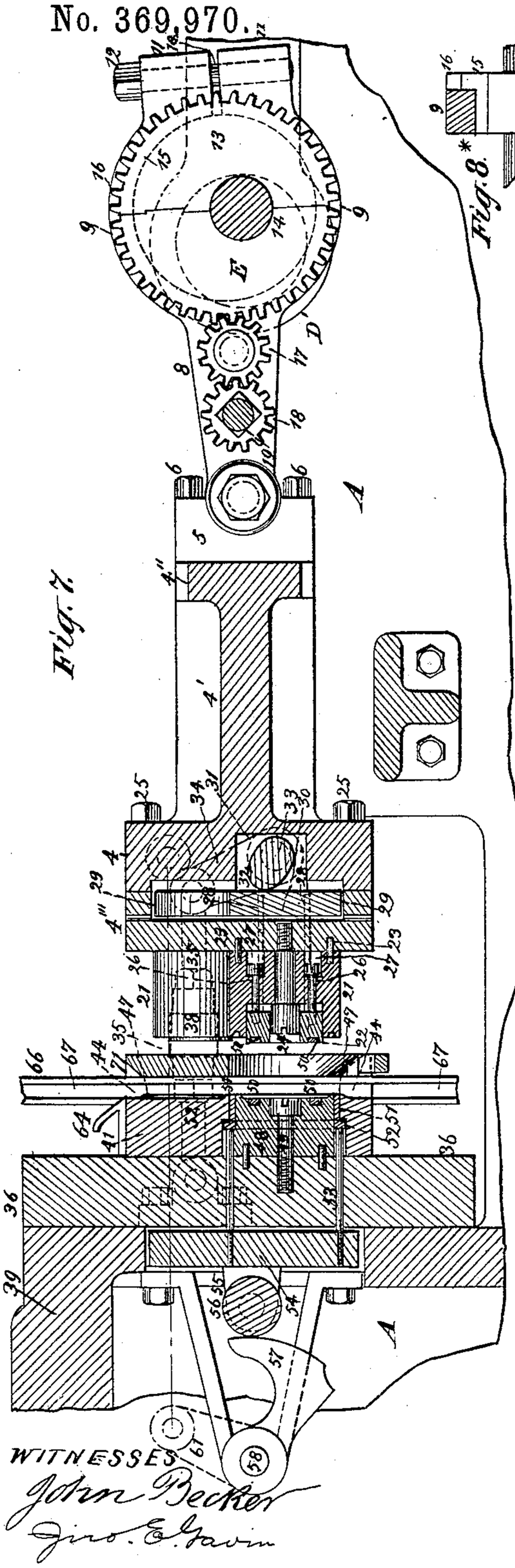

Fig. 7.

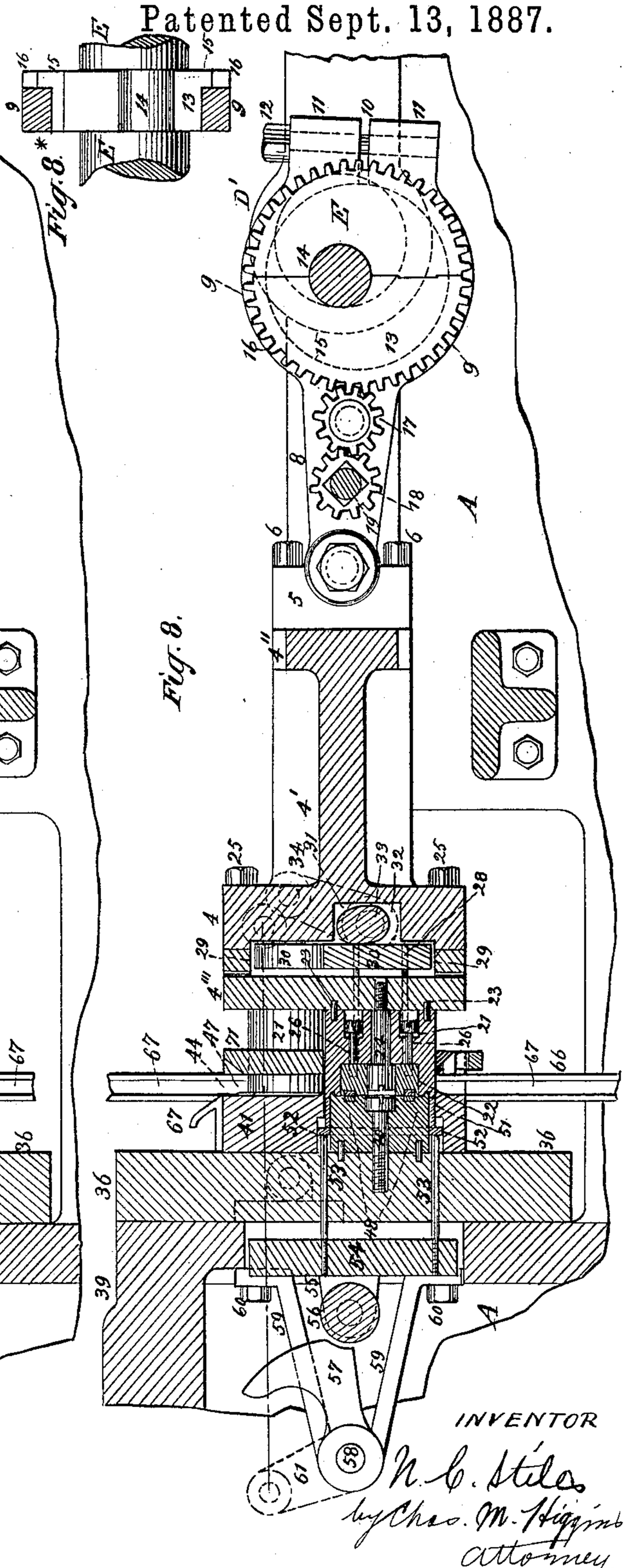

Fig. 8.

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Fig. 11

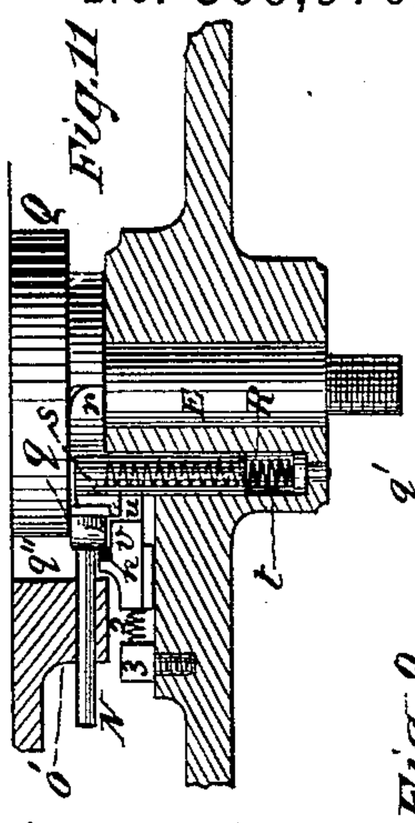

Fig. 13

Fig. 12

Fig. 9

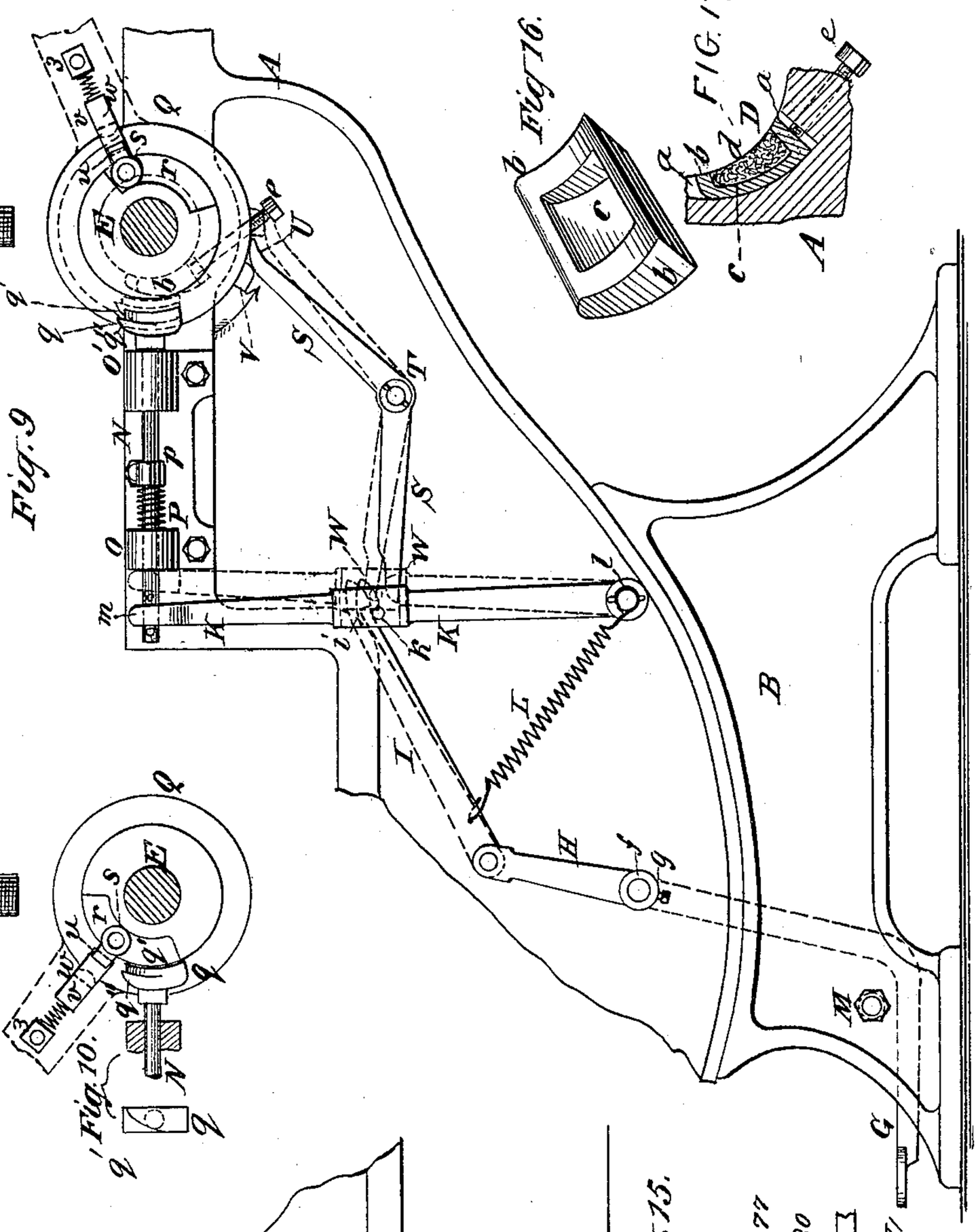

Fig. 10.

Fig. 16.

FIG. 17.

Fig. 14.

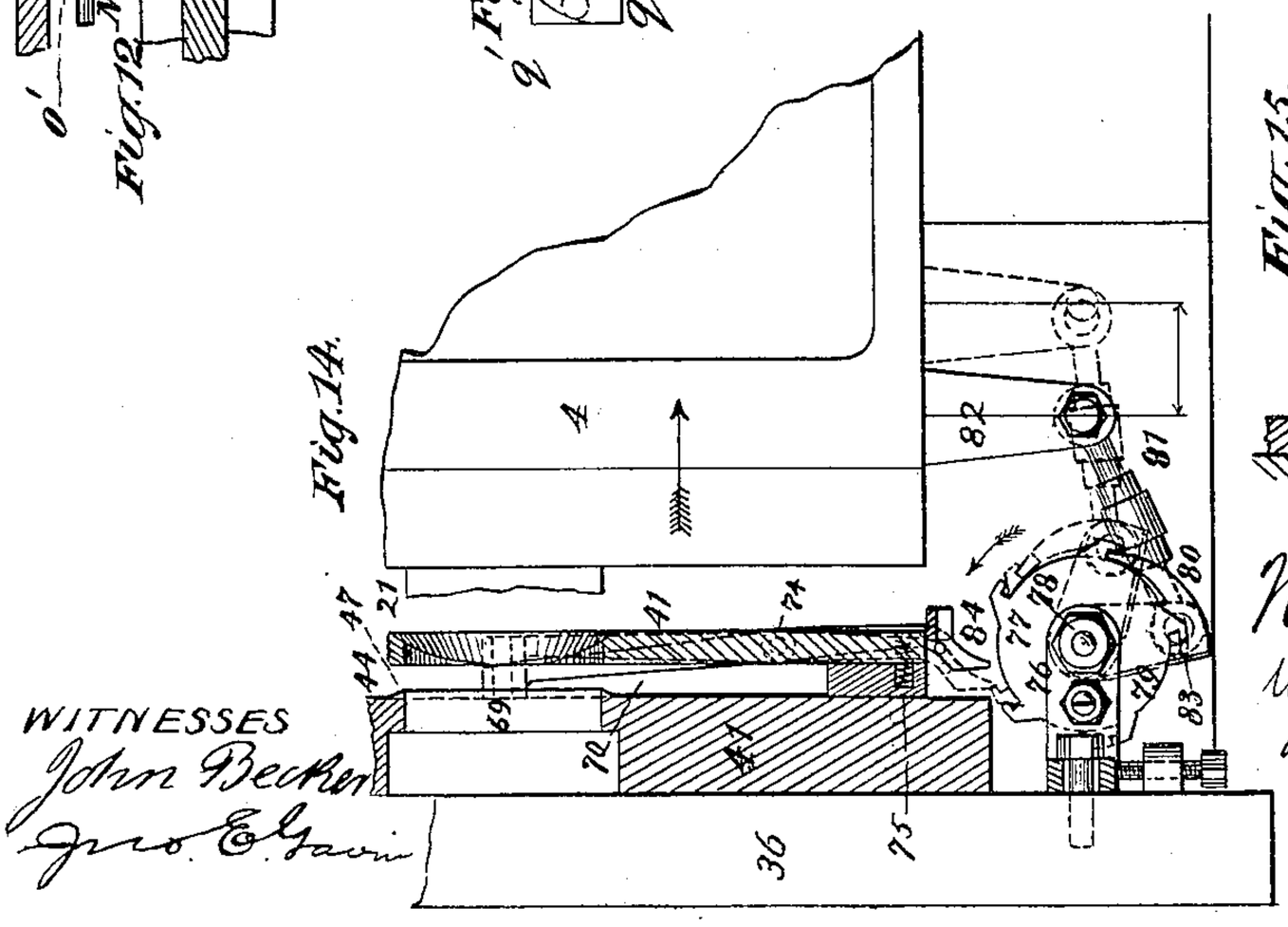

Fig. 15.

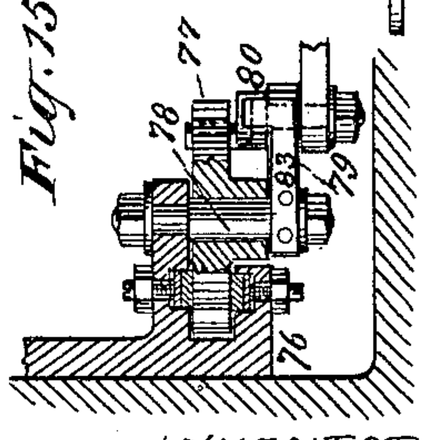

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Fig. 18.

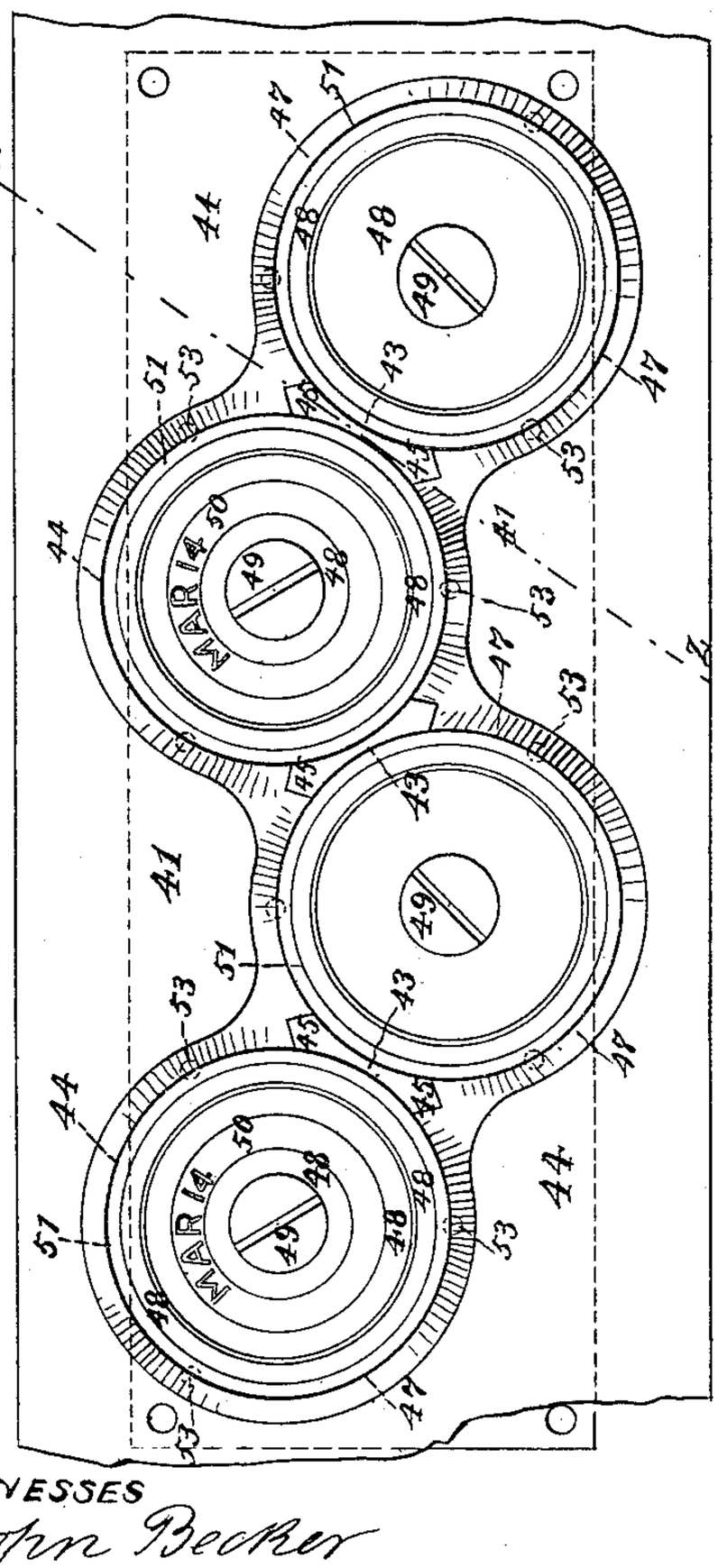


Fig. 19.

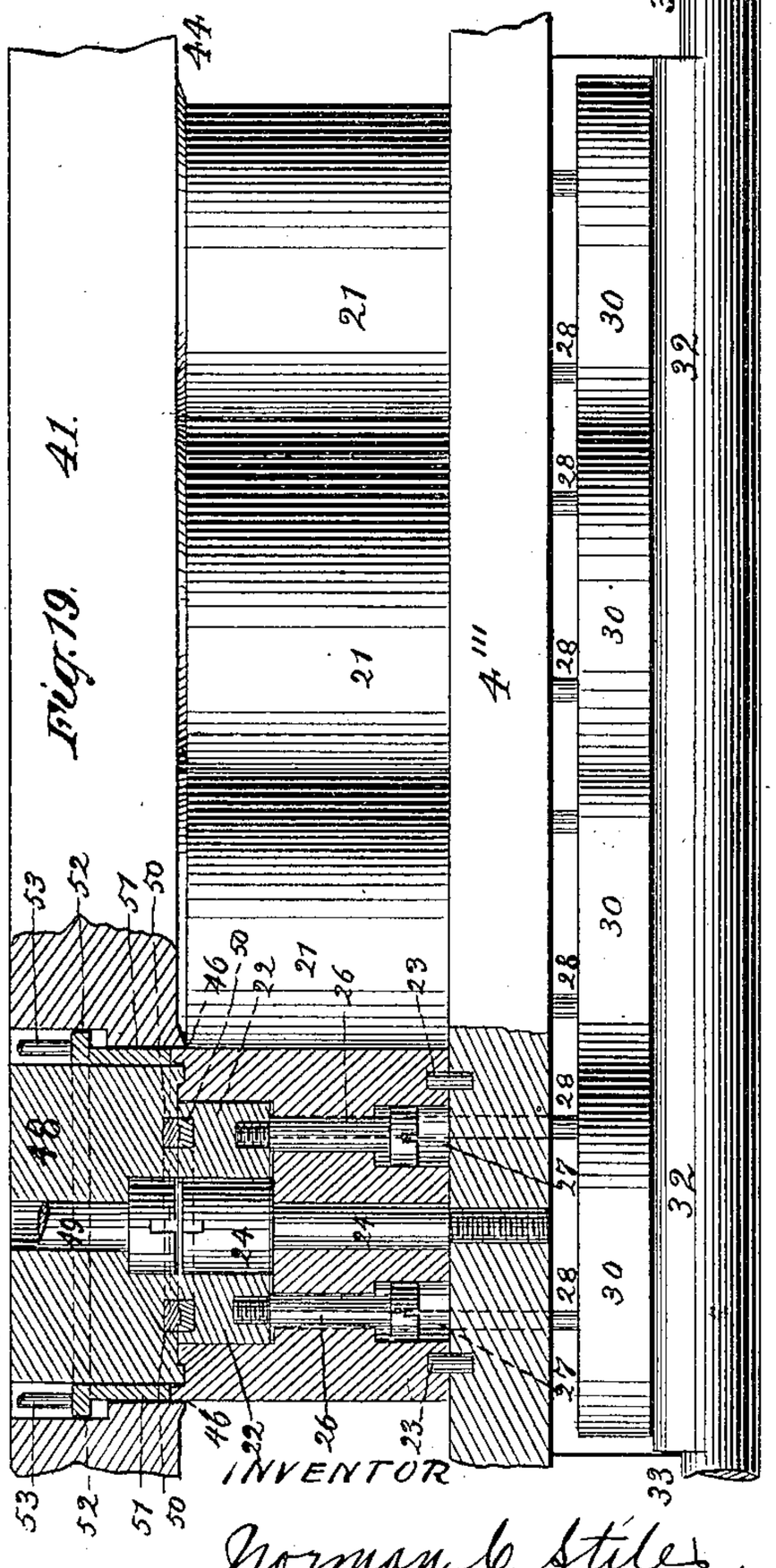


Fig. 20.

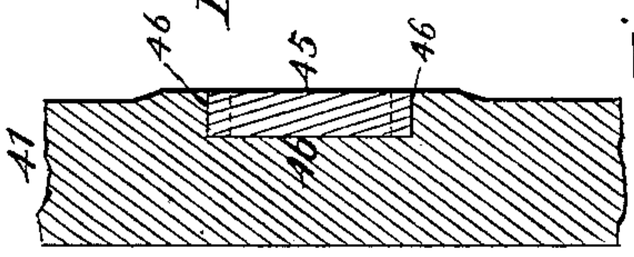


Fig. 21.

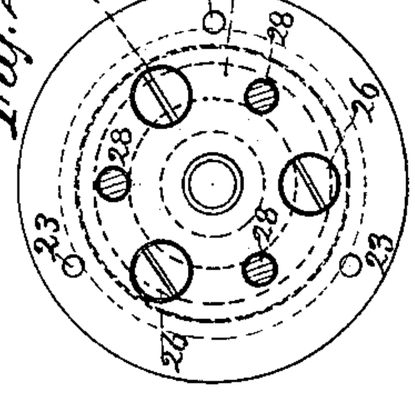


Fig. 22.

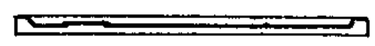
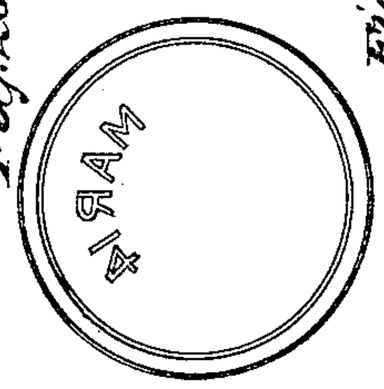


Fig. 23.



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UNITED STATES PATENT OFFICE.

NORMAN C. STILES, OF MIDDLETOWN, CONNECTICUT.

PRESS FOR CUTTING AND STAMPING ARTICLES OF SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 369,970, dated September 13, 1887.

Application filed September 7, 1886. Serial No. 212,889. (No model.)

To all whom it may concern:

Be it known that I, NORMAN C. STILES, a citizen of the United States, residing at Middletown, Connecticut, have invented an Improvement in Presses for Cutting and Stamping Sheet Metal; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

My invention more particularly relates to that kind of presses usually driven by power taken from some prime mover for cutting and stamping into form such articles as the tops of cans or boxes; and it has for its objects to supply a press to which standard-sized sheets of metal to be cut and stamped into the articles specified or other analogous articles may be fed entire to the machine, thereafter to be automatically fed to the punches and dies to produce the articles sought in such manner as to economize the material to the utmost possible, to perform its work with great rapidity and accuracy, and with a minimum amount of wear, while at the same time combining extreme compactness of construction, accessibility of parts, and facility for manipulation and adjustment.

The improvement consists in various constructions, details of construction, and combinations of the same, which cannot well be set forth in general terms, but which will appear from the following description and the drawings.

Figure 1 is a side elevation of a machine comprising my invention. Fig. 2 is a plan view of the same, the fly-wheel being shown in cross-section. Fig. 3 is a section on line *x x* in Fig. 2. Figs. 4, 5, 6, and 6* are details of construction. Figs. 7 and 8 are sectional details showing certain parts of the mechanism in different positions, the section being made on the line *y y* in Fig. 2. Figs. 19 to 17, inclusive, are also details, sectional and otherwise, of various parts of the machine. Fig. 18 is a face view of a gang of dies employed in the machine, and it illustrates certain important features of construction. Fig. 19 is a plan view of said gang of dies, one pair of the dies being shown in horizontal section to illustrate other important features of construction. Fig. 20 is a sectional detail made on the line *z z* in Fig. 18. Figs. 21 to 23, inclusive, are other detail views deemed necessary to fully illustrate the invention.

A, Figs. 1, 2, 3, 4, 7, 8, and 9, represents the frame or bed of the machine, which is preferably made of cast-iron all in one piece and of the form shown, which combines great strength with economy of material. The frame or bed A is fitted to a pedestal, B, Figs. 1, 3, and 9, and bolted to said pedestal, as shown at C, Fig. 3.

At D, Figs. 2, 9, and 17, in the frame A, are formed bearings for the main driving-shaft E, Figs. 1, 2, 6, 7, 9, 10, 11, and 12. Said bearings are of peculiar construction and are made as follows: In casting the bed A holes are cored through the metal of the bed at D, Fig. 2, and in the periphery of each of these holes is cored out a recess, *a*, as shown in detail in Fig. 17, and also in dotted outline in Figs. 1 and 2, which shows a portion of the frame adjacent to said bearing and said recess. The peripheral side of said recess is a curve eccentric to the periphery of the bearing-surface of the shaft, and in this recess is fitted a gib, *b*. (Shown in dotted outline in Figs. 1 and 9 and in full detail in Figs. 16 and 17.) This gib has an outside curvature corresponding to the curvature of the side of the recess against which the gib bears and an inner curvature corresponding to the periphery of the shaft against which it bears. On the inside of each of said gibs is formed a recess or pocket, *c*, Figs. 16 and 17, in which wool, cotton, cotton-waste, or other absorbent material, *d*, may be placed for absorbing and retaining oil for lubricating the bearings of the shaft E. Through that part of the frame which lies below the thicker part of the gib *b* are tapped holes for the reception of set-screws *e*. (Shown in dotted outline in Figs. 1 and 2 and partly in full outline in Figs. 9 and 17.) The gibs and the holes through the bed for the shaft-bearings are made to accurately fit the bearings by boring, and the shaft is of same diameter between the bearings as that of the bearings themselves; but other mechanism than the set-screws may be used for moving the gibs circumferentially for tightening the shaft in its bearings, and I do not, therefore, confine myself to the use of set-screws for this

specific purpose. This construction not only permits a more perfect lubrication to be maintained than could be done without it, but it also enables all wear of the shaft-bearings to be taken up in the line of the thrust, and when the gibs are placed on that side of the bearings which faces the dies, as shown in the drawings, the shaft is set up by its action against that side of the bearing which, by reason of the thrust, wears most when in use. There is also a stout bearing, D′, between the bearings D.

Motion is imparted to the shaft E by means of a fly-wheel, F, Figs. 1 and 2, which is preferably also made to perform the function of a band-wheel, taking power from a driving-pulley and delivering it to the machine; but a separate band-wheel might be used.

Whether the fly-wheel F be used as a band-wheel or a separate band-wheel be employed, the connection of such wheel with the shaft is effected by a peculiarly-constructed clutching-gear, through the action of which the shaft is prevented from making more than a single turn on its longitudinal axis without stopping, though the wheel itself may revolve continuously at a uniform speed. Other machines of this kind are constructed with clutch-gear and releasing-gear, which insures that only a single revolution of the main shaft shall be made without stopping, if, when the foot is placed on the treadle which operates such clutch gear, the foot is removed from the treadle again before a complete revolution of the shaft is accomplished; but if the foot be kept on the treadle by a careless operator the shaft will again revolve without a stop. In many machines in the use of which the feeding is entirely done by hand the repeated rotation of the shaft would result in no damage to the work or material operated upon, but only in a loss of time; but in a machine intended to automatically feed the material to the dies, as does the one herein described, such repeated rotation might result in the engagement of the material operated upon by the dies before such material had reached the proper position relatively to the dies to be cut and stamped as desired, and this might result in serious waste of material, which it is the object of this part of my improvement to avoid, as well as to obviate danger of damage to the dies, which might also result.

G, Figs. 1, 2, 3, and 9, is the treadle, which, through a system of links, levers, and other devices, causes, when depressed by the foot, the engagement of the band-wheel F with the shaft E; but said treadle has nothing to do with the disengagement of the band-wheel from said shaft, such disengagement being automatically effected, as will hereinafter appear, and being also so timed that only a single and practically exact revolution of the shaft can occur, although the treadle may be kept depressed. It will be seen from this that when the treadle is depressed by the foot, in order to cause an engagement of the band-wheel with the shaft, it is first necessary to allow the treadle to be raised, as hereinafter described, and then to depress it again by the action of the foot in order to effect the desired engagement. In other words, the engagement of the band-wheel with the shaft is effected by a movement of the treadle in both an upward and a downward direction instead of, as heretofore, being effected by the movement of the treadle in one direction. In the latter case the disengagement has hitherto been effected by the movement of the treadle in the opposite direction from that necessary to cause the engagement, whereas in my present improvement the disengagement is performed automatically by mechanism which I am about to describe, and independently of the treadle.

The treadle G is preferably bent into the angular form shown in Figs. 1 and 9, and is adjustably attached to a rock-shaft, *f*, Figs. 1, 2, 3, and 9, as shown at *g*, Fig. 3.

The rock-shaft *f* has its bearings *h*, Fig. 3, in the frame or bed A, one end of said shaft extending through and projecting outward from its bearing in said bed, as shown in Figs. 2 and 3. To such outwardly-projecting end of the rock-shaft *f* is adjustably attached a rock-lever, H, Figs. 1, 2, 3, and 9. To the upper extremity of the rock-lever H is pivoted a hook-bar, I, Figs. 1, 2, and 9, which has formed on its extremity remote from the rock-lever H a hook, *i*, Figs. 1 and 9. The hook *i* of the hook-bar I alternately engages and is disengaged from a pin, *k*, inserted into the side of another rock-lever, K, Figs. 1 and 9, which rock-lever is also pivoted at *l*, Figs. 1 and 9, to the bed-plate A. The rock-lever H oscillates on the pivot *l* when actuated, as hereinafter set forth. A coiled tension-spring, L, Figs. 1 and 9, connects the hook-bar I with the pivot *l* or to some point of attachment to the bed A of the machine, the spring L being attached to the hook-bar near the end of the same which is pivoted to the rock-lever H. The action of the spring L causes the hook *i* of the hook-bar I to engage the pin *k* of the rock-lever K in certain positions of the mechanism, as hereinafter set forth, and it also acts to raise the treadle G, after the same has been released from the pressure of the foot, up to and against a stop, M, Figs. 1, 3, and 9, which limits the upward movement of the treadle.

The upper end of the rock-bar K is furcated, as shown at *m*, Figs. 1, 2, and 9. Into the furcation *m* of the rock-bar K extends one extremity of a sliding bar, N, Figs. 1, 2, 9, 11, and 12. The bar N slides longitudinally in bearings O and O′, formed on or attached to the bed A. The bar N has cut on it a screw-thread, to which is fitted a nut, *p*, which serves as an abutment for one end of a spring, P, the other end of said spring abutting against the boss of the bearing O. The action of the spring P will therefore, when unopposed, thrust the sliding bar N toward the shaft E. To the end of the sliding bar N nearest the shaft E is attached a dog, *q*, Figs. 2, 9, 10, 11, and 12.

(Also indicated in dotted outline in Fig. 1.) In Fig. 10 it is shown both in side and front elevation, and its peculiarities of construction are more conveniently described by reference to the latter figure, in which it will be seen that its front face is curved to conform to the periphery of the smaller part of a shouldered collar, Q, Figs. 2, 9, 10, 11, and 12, which is firmly affixed to the shaft E by set-screws, keys, or otherwise between the fly-wheel F and the adjacent bearing D in the bed A. A horizontal cross-section of the body of the dog *q* would be rectangular, and on or in its front face is formed an incline, *q'*, as shown in Figs. 2, 9, and 10, and indicated also in other figures of the drawings, said incline extending laterally from a point near the right upper angle of the front face downward and across said face, as well shown in Fig. 10 in detail. Said incline has, preferably, a convex curvature, as shown; but this is not essential, as it might be either plane or concave and still effect the purpose hereinafter described.

The dog *q* has on its back side a curvature, *q''*, much greater at the top than at the bottom, and this part of the dog acts as a cam at proper periods, as will be subsequently explained. Moreover, the direction of the incline *q'* from the right downward to the left depends merely on its relation of position with the collar Q on the shaft E, as to whether the dog is placed on the front or rear of the shaft, and whether the clutch-gear, fly-wheel, and collar Q are on the right or left side of the machine. Therefore I do not limit myself to the precise details of construction I have described for the dog *q*. It will, however, in general, be more convenient to place the clutch-gear as shown and described, as that brings the treadle on the right side of the machine into proper relation with the right foot of the operator, without introducing any complication of cross-treadle, &c., which might otherwise be needed.

In the smaller part of the shouldered collar Q is formed a segmental recess, *r*, Figs. 2, 9, 10, 11, and 12; also, in the hub of the wheel F is formed a socket, R, Figs. 1 and 2, in which is placed a sliding bolt, *s*, Figs. 2, 9, 10, 11, and 12, actuated by a spring, *t*, in a direction toward the collar Q, and actuated in the opposite direction by mechanism about to be described. A part of the body of the bolt *s* is bored or hollowed out for the reception and guidance of the spring *t*, the spring thus working in a socket formed in the bolt itself and abutting against the end of the socket R in the wheel-hub.

On the side of that end of the sliding bolt which lies toward the shouldered collar Q is formed or attached an L-shaped projection, *u*, Figs. 2, 9, 10, 11, and 12, and on the inside of the hub of the wheel is a sliding dog, *v*, Figs. 2, 11, and 12, which slides radially in a way formed in the inside face of the hub. The dog *v* has also a lateral projection, *w*, and is pressed toward the central axis of the shaft E by a spring, 2, which is placed between the outer end of the dog *v* and an abutment, 3, formed on or attached to the inside of the hub or a spoke of the wheel F. When the bolt *s* is pressed into its socket R, as shown in Fig. 12, the spring 2 presses the dog *v* toward the axis of the shaft E and engages the L-shaped projection *u* on the bolt *s*, thus locking said bolt in the socket R until such time as the dog *v* is again forced out of engagement with said projection, which occurs whenever the dog *q* is forced in a radial direction away from the axis of the shaft E, when the dog *q* acts against the lateral projection *w* on the dog *v* to force the latter radially outward and free it from its engagement with the projection *u* on the bolt *s*. When this is done, the spring *t* forces the bolt *s* out of its socket R and causes it to enter the segmental recess *r* in the collar Q, thus establishing temporarily a rigid connection between the wheel F and shaft E, and causing the latter to turn with the wheel. When, however, the bolt *s* is thrust out of its socket R by the action of the spring *t* and the dog *q* is pressed flush against the periphery of the smaller part of the collar Q, as shown in Fig. 2 in full lines, in Fig. 9 in dotted outline, and in Fig. 12 in full lines, that end of the projection *u* which lies over the incline *q'*, Fig. 10, of the dog *q* is made, by the rotation of the wheel, to bear against the face of said incline and thrust the bolt *s* again back into the socket R, thus disengaging the wheel from its connection with the shaft. When the bolt *s* is thus thrust back into its socket, the L-shaped projection on said bolt is immediately engaged by the spring sliding dog *v*, as hereinbefore explained, and held there until the dog *v* is pulled out of its engagement with said projection. Then the bolt *s* is again thrust out of its socket and engages the collar Q in the segmental recess *r*, in the manner already described.

The disengagement of the dog *v* with the projection *u* on the bolt *s* is performed by the operator of the machine as follows: He presses his foot upon the step of the treadle G, the hook *i* of the hook-bar I being then in engagement with the pin *k* on the rock-lever K, at the proper time for effecting the engagement of the wheel with the shaft through the action of the bolt *s* and collar Q, as will shortly be more fully explained. The treadle, being thus depressed, acts through the rock-lever H and hook-bar I to draw the rock-lever K into the position shown in full lines in Fig. 9. The lever K in thus moving draws the sliding bar N in a direction away from the shaft E, and with it the dog *q* is brought into such a position relatively to the dog *v* that in its revolution the projection *w* is caused to pass over and bear against the curved part *q''* on the dog *q*, which forces the dog *v* also radially outward and releases the projection *u* on the bolt *s* from its engagement with the dog *v*. The bolt *s* is then immediately shot partly out of its socket by the action of the spring *t* and into the segmental recess *r* in the smaller part of the collar Q. The engagement

of the wheel with the shaft is thus effected at the will of the operator, and is not therefore automatic. On the contrary, the disengagement of the wheel from the shaft—that is to say, the withdrawal of the bolt from the segmental recess in the collar Q—is entirely automatic, being effected by the action of the incline q', Fig. 10, of the dog q; but as the incline q' cannot act to perform this function except when the dog q is in the position shown in Fig. 10—that is to say, flush with the periphery of the smaller part of the collar Q—and as, with the mechanism so far described and the treadle pressed downward, the dog q would be withdrawn from such position, mechanism is required which will bring the dog q into said position always before the shaft has made one complete revolution after its engagement with the wheel F through the engagement of the bolt s with the collar Q. This mechanism is as follows: S is an elbow-lever pivoted to the bed A at T, as shown in Figs. 1 and 9. One extremity, U, of this lever S is in such relation with a tappet, V, Figs. 1 and 9, formed on or attached to the hub of the wheel F, that the tappet slides over and presses downward the end U of the lever S once in every revolution of the wheel, provided the position of the lever S is at the time of the passage of the tappet V over the end U of said lever, as shown in full outline in Fig. 9, and, as will be subsequently seen, the lever S always has the position shown in Fig. 9 when the hook i of the lever I is engaged with the pin k on the lever K. It is the function of the elbow-lever S to release at the proper point in the revolution of the shaft E said hook i from the pin k on the lever K, leaving the latter lever under control of the spring P, which then reverses the motion of the lever K and all parts connected with it and brings the dog q into the position shown in dotted outline in Fig. 9 and in full lines in Figs. 2, 10, and 12. Such release of the hook i from the pin k is effected by the pressure of the end W of the elbow-lever S upward against the preferably-curved surface of the end of the hook-bar I, the end W of the elbow-lever having also a curved surface or sort of toe, which causes the ends of said levers S and K to perform their functions more smoothly.

Both the hooked end of the hook-bar I and the end W of the elbow-lever S work, preferably, in a mortise or chamber formed in and extending entirely through the lever K, as shown in dotted outline in Figs. 1 and 9, and the lever K is enlarged at the point where said mortise is formed, to secure the proper strength for the lever K without increasing its weight.

The general operation of the mechanism for engaging the shaft with the wheel and automatically disengaging the same in such manner that the shaft will make, and can never make more than, one revolution without stopping is as follows: When the mechanism is properly adjusted and the operator desires to have the shaft revolve in order to actuate the platen of the press through mechanism yet to be described, he presses with his foot upon the treadle to force the latter from the position shown in Fig. 1, in which the treadle rests against the stop M, into the position shown in Fig. 9. In thus moving, the treadle, through the action of the lever H, hook-bar I, and sliding bar N, moves the dog q radially away from the axis of the shaft E. By this movement the dog q is brought into position to force the dog v, when the latter has been brought into relation with the former, as hereinbefore described, in the same direction. This releases the L-shaped projection u on the bolt s from its engagement with the dog v, and the spring t then immediately shoots out the bolt s into the segmental recess r in the collar Q, which, as before explained, is rigidly attached to the shaft E. The shaft E then revolves with the wheel F. At the proper period in the revolution of the shaft E the tappet V is brought to bear upon the end U of the elbow-lever S, and, pressing the end U downward, raises the opposite end, W, of said elbow-lever upward, carrying upward with it the hooked end of the hook-bar I and releasing the pin k on the lever K from its engagement with the hook i on the hook-bar I. The spring P then immediately acts to thrust the sliding bar N back again toward the shaft E and bring the dog q into a position flush with the periphery of the smaller part of the collar Q, which position is shown in Figs. 2, 10, and 12 in full lines and in dotted outline in Fig. 9. This brings the incline q', Fig. 10, into relation with the L-shaped projection on the bolt s, so that the further revolution of the wheel F causes the extremity of said projection to pass over the face of said incline and force back the bolt s into its socket against the action of the spring t. In making this movement the dog v, which has previously rested against the toe of the L-shaped projection u, as shown in Fig. 11, is slipped, by the action of the spring 2, inwardly behind said toe, and engaging the same prevents the bolt s from again shooting out of its socket till the treadle is again raised to engage the hook i of the hook-bar I with the pin k of the lever K and again depressed by the foot of the operator to repeat the operation above described.

Thus it will be seen that, as before stated, the engagement of the wheel with the shaft is performed by an upward and successively downward movement of the treadle G and its correlated mechanism, the upward movement of the treadle being effected by the spring L, and the downward movement by pressure from the foot of the operator. The engagement of the wheel with the shaft is not, therefore, automatic. On the other hand, the required disengagement of the wheel from the shaft is at the proper period in the revolution effected by the purely automatic action of the clutch-gear. This automatic release is of the highest importance in the action of this machine, the material to be operated upon being fed to the dies by the action of gravity alone,

as will hereinafter appear, and, as gravity acts in strict relation to time, were the release of the shaft from its engagement with the wheel left dependent upon the attention or will of the operator, such release would be liable to occur either too late or too soon, and injury either to the work or to the machine, or both, would result, all danger of which is obviated by the automatic release of the shaft from its engagement with the wheel, as described.

The rotary motion of the shaft E is converted into a reciprocating motion, and in this form imparted to the platen of the press by mechanism as follows: The platen is shown at 4, Figs. 1, 2, 7, 8, and 14. From it project rearwardly extensions 4′, which terminate in bosses 4″, for the attachment of cross-heads 5, Figs. 2, 7, and 8, which are preferably attached to said cross-heads by bolts 6. The cross-head pins are shown at 7 in the same figures. To each cross-head is pivoted, by one of said cross-head pins, a short but strong eccentric-rod, which may be otherwise called a "connecting-rod" or "pitman," 8, Figs. 2, 7, and 8. Each of said rods is preferably formed integrally with its respective eccentric-strap, 9, which strap is split at the rear, as shown at 10, Figs. 7 and 8, and provided with bosses 11 and a clamping-bolt, 12, for setttng up said strap after the ordinary manner of tightening eccentric-straps. Such strap 9 bears upon the outer periphery of an eccentric, 13, Figs. 7, 8, and 8*. This eccentric may be turned at will upon a crank-pin, 14, and its center held in any position relatively with the center of said crank-pin which can be assumed by the rotation of the eccentric on said crank-pin by mechanism about to be described. The crank-pins for the two eccentrics 13 are preferably made by turning them down from the body of the main shaft E eccentric to the center of said shaft, but in such manner that the longitudinal axes of said crank-pins extended will coincide and form one and the same axis parallel to the axis of the main shaft. At one side of the peripheral surface of the eccentric 13 is formed a flange, 15, Fig. 8*, and Figs. 7 and 8, which extends entirely around the eccentric, and against which one side of the eccentric-strap 9 abuts. The outer margin of the flange 15 is toothed after the manner of an ordinary spur-gear, as shown at 16 in Figs. 7, 8, 8*, and in Fig. 2. The eccentrics 13 might therefore also be considered as spur-gears working eccentrically on their respective crank-pins, and having shouldered bearings for the eccentric-straps respectively belonging to them. To the inner side of each rod 8 is pivoted an intermediate pinion, 17, which meshes not only into the toothed eccentric 13, pivoted to said rod, but also into another pinion, 18, also pivoted to the rod on the same side, so that the pinions 18 face each other on the inner sides of the rods 8. The pinions 18 are, moreover, keyed to the ends of a short shaft, 19, Figs. 2, 7, and 8, which extends across between the rods 8 and which has in the middle a polygonal boss for the engagement of a spanner, by which means the shaft 19 can be turned. By this mechanism the eccentrics 13 can be simultaneously and symmetrically adjusted to any desired degree of eccentricity with the axis of the shaft E, and their throw relatively to said shaft can be thus adjusted to vary the stroke of the platen and adjust the latter with great nicety to suit the nature of the work to be done. In so adjusting the eccentrics 13, the clamping-bolts 12 of the eccentric-straps 9 are turned to unclamp said eccentrics, and after the adjustment of the latter are turned to clamp the eccentrics tightly in the straps, and said eccentrics not being keyed to the crank-pins 14, the latter turn freely in their bearings in said eccentrics to reciprocate the rods 8 and the platen 4, the latter being guided in its reciprocation by guides 20, Fig. 2, which are preferably cast integrally with the platen 4 and its rearward extensions 4′, and which work in suitable ways formed in or attached to the bed A.

The platen 4 carries a series of punches or male dies, 21, Figs. 1, 2, 7, 8, 14, 19, and 21, each of which is provided with a stripper, 22, Figs. 2, 7, 8, and 21. The construction of these punches or dies and strippers and mechanism for operating them is as follows: Each punch or male die 21 has its base abutted against a punch-plate, 4‴, Figs. 1, 2, 7, 8, and 19, which plate is held against and in proper relation with the platen 4 by strong bolts 25. Dowel-pins 23, Figs. 7, 8, 19, and 21, inserted both into the punch-plate 4‴ and the punches, are used to adjust the punches in proper relation with a die-plate, hereinafter described, and keep the punches from turning on their longitudinal axes when they are bolted to the punch-plate, which bolting is done by centrally-placed nick-headed bolts 24, Figs. 7, 8, and 19, the heads of said bolts being let down into recesses formed in the faces of the punches, as shown, said recesses being of size and shape corresponding to the size and shape of the stripper 22, which works therein, the nicked head of the bolt 24 passing centrally and entirely through the stripper and bearing upon the punch at the bottom of said recesses. The strippers 22 are annular in form and are caused to work in the recesses of the punches by special mechanism. During the advance of the punches in the act of cutting and stamping the metal, they abut firmly against the bottoms of the respective recesses in which they work, their front faces then being flush with the faces of the punches at the parts of said faces which bound the recesses. They therefore coact with the punches in the act of punching.

Into the rear faces of the strippers 22 are inserted nick-headed sliding bolts 26, Figs. 7, 8, 9, and 21, said bolts working in holes formed longitudinally in the punches and parallel to the longitudinal axis of said punches. The heads of the bolts 26 work in recesses 27, formed in the rear faces of the punches. Three

of these sliding bolts are preferred for each stripper, as shown, and their length is such between their heads and the rear faces of the strippers that a limited amount of motion is permitted to the strippers alternately outward and inward relatively to the recesses in the front faces of the punches, while the sliding bolts still retain the strippers in relation with the punches. It will now be seen that no special mechanism is needed to move the strippers 22 back into the recesses in which they work, as this will be done by the pressure of the front faces of the strippers upon the material to be punched. As soon as such pressure causes the strippers to firmly abut against the bottoms of the recesses, they (then having their front faces flush with the parts of the front faces of the punches which bound the recesses) will act as though they were integral parts of the punch-faces. The strippers, however, require special mechanism for forcing them partly out of the recesses in the front faces of the punches, which mechanism I will next describe.

From the rear faces of the strippers 22 extend rearwardly rods 28, Figs. 7, 8, 19, and 21, said rods passing freely through holes formed longitudinally in the punches and also through corresponding holes formed in the punch-plate 4‴. The rods 28 are preferably three in number for each stripper 22, and are attached to or inserted into the rear of said strippers, as shown, either by screw-threads or in any other suitable manner.

In the body of the platen 4 is formed a rectangular chamber, 29, Figs. 7 and 8. (Also shown in dotted outline in Fig. 2.) In said chamber is a plate, 30, Figs. 7 and 8, and the ends of the rods 28 opposite the ends of the same attached to the strippers are inserted by screw-threads into said plate 30, or are otherwise suitably attached to said plate. The strippers 22, rods 28, and the plate are thus rigidly attached to each other and move together when actuated, as about to be described. In the back part of the recess 29 is a supplemental recess, 31, which forms a part of the recess 29 and is continuous therewith. In the supplemental recess 31 works a rocking cam, 32, Figs. 7, 8, and 19. This cam does not revolve, but merely rocks on its journals 33. Shown in dotted outlines in Figs. 1, 7, and 8 and in full lines in Fig. 19.) This rocking motion is effected by means of rocker-arms 34, Figs. 1, 2, 7, and 8, keyed to the journals 33 of the cam 32, and actuated by links 35, pivoted to the outer extremities of the rocker-arms 34, and also to the plates 36, or some other motionless part of the machine, in such manner that when the platen 4 and its attachments are caused to advance toward the plate 36 the rocker-arms 34 are caused to move relatively to said platen into the position shown in Fig. 8, and when said platen is made to move away from said plate 36 the rocker-arms are moved into a position relatively to the platen shown in Fig. 7. In the former of these positions pressure of the material to be punched or stamped upon the front faces of the strippers 22 forces said strippers into the recesses of the front faces of the punches, and all the parts rigidly attached to said strippers then take positions shown in Fig. 8. In the latter of the positions of the strippers above described all their attached parts are forced into positions shown in Fig. 7 by the action of the cam 32 against the rear face of the plate 30. Thus the strippers are thrust out of their recesses in the punches every time the platen 4 retreats from the work after having made its stroke toward the same, and any of the punched or stamped pieces adhering to said punches are forced off, falling downward between the punches and die-plate into a box or receptacle, 37, placed as shown in Fig. 1.

The links 35 are made so that their lengths can be adjusted preferably by making each link in two parts, with right and left threads at the place of junction, and joining the two parts by right and left threaded nuts 38, as shown.

To the upwardly-projecting part of the bed A (shown at 39, Figs. 1, 2, 3, 4, 7, and 8) is bolted a strong plate, 36, by bolts 40, and to this plate is attached the die-plate, (shown at 41 in Figs. 1, 2, 3, 4, 7, 8, 14, 18, 19, and 20,) the attachment of the die-plate to the plate 36 being effected by bolts 42, as shown in Figs. 2 and 3. This die-plate is peculiarly constructed at the points where the holes for the reception of the punches lie nearest to each other. The points referred to are marked 43 in Fig. 18, for reference. The face of the die-plate 41, which faces the gang of punches 21, is cut away, as shown at 44 in Figs. 7, 8, 14, 18, and 19, to allow the cutting-edges 47 of said plate to project slightly above the general plane of said face, and extending to a distance on each side of each point 43 is a piece, 45, Figs. 18 and 20, which crosses the point 43, as shown in Fig. 18, and is let down into a recess, 46, in the body of the die-plate, as shown in Fig. 20, which is a section on the line *z z* in Fig. 18. The ends of the pieces 45 are preferably V-shaped, as shown, and the recesses to which said pieces are fitted are of corresponding shape. Said pieces 45 are of the same metal as that of which the die-plate is formed, and the purpose of this construction I will now explain.

It will be seen that, by reason of their thinness, the points 43 are the weakest in the die-plate, and as such more likely to sustain injury than any other parts. If, therefore, the face of the die-plate were made without the inserted pieces 45, the parts at 43 would be likely to spring in fitting the dies, and if any of them should ever break in use it would necessitate the supply of an entire new die-plate. By use of the inserted pieces 45 the die-plate can first be fitted nearly to accuracy, and, after the insertion of the pieces 45, can be exactly fitted without danger of springing, and also, when injured, any of said inserted pieces can be replaced by another without loss of the

die-plate. Concentrically with the cutting-edges 47, Figs. 7, 8, 14, 18, and 19, are arranged stamping punches or dies 48, Figs. 7, 8, 18, and 19. The punches or dies 48 pass entirely through the die-plate 41, and are attached by central nick-headed screw-bolts, 49, to the plate 36, to which said die-plate is also bolted, as already explained. Said punches 48 are also provided with dowel-pins (not shown) to keep them in proper relation with the cutting-edges of the die-plate in a manner strictly analogous to the method of holding the punches or dies 21, and which need not, therefore, be further described.

The acting faces of the punches 48 are made to conform to the design of the article to be punched or stamped and are the obverse of the faces of the punches or dies 21, hereinbefore described. It is also desirable to so construct them that when any general design or conformation of such articles is to be used for different customers, except some design of lettering to indicate any particular manufacturer of canned goods or other article of commerce, or label, or date of packing, or other desirable inscription, this can be done without necessarily making entire new sets of dies or punches 23 and 48 for each change of lettering, label, or inscription. This is accomplished as follows:

In the acting faces of the strippers 22 are formed annular recesses, to which are nicely fitted annular dies 50, Figs. 7 and 19, having the desired design of lettering, &c., formed on their outer faces; also, to similar recesses formed in the acting faces of the punches 48 are fitted annular dies, also marked 50 in Figs. 3 and 18 of the drawings, said dies having their acting faces accurately opposed to the acting faces of the annular dies in the punches 23, and having formed on their acting faces the obverse of the design on the punches 23. These annular dies are interchangeable with other annular dies having different designs of lettering, &c., and they may be removed from their recesses by tapping them upon their rear faces with a hammer and a set-punch through small holes formed in the punches 22 and 48, which are not shown in the drawings.

Fig. 23 illustrates the end piece or top of a fruit-can as finished, the face presented to the front being that formed by a face of one of the punches 48 and the annular die fitted thereto. Between the outer periphery of each of the punches 48 and the holes in the die-plate 41, bounded by the cutting-edges 47, is interposed and accurately fitted a stripper-ring, 51, Figs. 7, 8, 18, and 19, which at its rear margin is provided with a radially-extending flange, 52. Inserted into or otherwise attached to the flanges 52 on the stripper-rings are parallel rods 53, preferably three to each stripper-ring, which extend to and are attached by screw-threads or otherwise to a plate, 54, Figs. 1, 2, 7, and 18. Said plate 54 works in an opening in the bed behind the die-plate 36, as shown in Figs. 7 and 8. The rods 53 slide in holes bored parallel to each other through the plate 36, and they also support the plate 54. The reciprocation, therefore, of the plate 54 simultaneously imparts similar motion both to the rods 53 and the stripper-rings 51. The motion of the stripper-rings 51 and their connected parts, Figs. 2, 7, 8, 18, and 19, when said motion is in a direction away from the punches 22, is effected by the pressure of the material to be punched, when the punches 22, in advancing to punch said material, press the latter against the opposed faces of said stripper-rings. The motion of these stripper-rings, when the same are advanced to force any adherent punched pieces off from the faces of the punches or dies, is effected by the following mechanism:

From the rear of the plate 54 project brackets 55, Figs. 1, 2, 7, and 8, in or on which are formed bearings for a friction-roller, 56. Against the roller 56 are brought to bear the faces of rocking cams 57 at the proper period in the revolution of the shaft E. The cam 57 is keyed to a rock-shaft, 58, which has its bearings in brackets 59, bolted to the end of the bed A, as shown at 60. To the rock-shaft 58 is attached a rocker-arm, 61, projecting upwardly from said rock-shaft. To the extremity of the rock-lever 61 is pivoted a link-bar, 62, Figs. 1 and 2, which passes through an opening, 63, in the plate 36 and is pivoted to a stud, 64, that projects laterally from the platen 4. Said link is made adjustable as to length, preferably, by making it in two parts, right and left threaded at the meeting ends and joined by a right and left threaded nut, 65. It will now be seen that whenever the platen 4 commences to move backward after having made its forward or working stroke, it will, through the mechanism described, cause the stripper-rings 51 to simultaneously move slightly in the same direction as that of the platen, and thus force off from the faces of the dies 48 any stamped pieces that may adhere to said faces.

I come now to the automatic feeding mechanism, in describing which I will premise that the feeding to the punches of the standard-sized sheets to be punched and stamped is done entirely by the action of the attraction of gravitation upon said sheet after said sheet has been placed bodily in the feeding mechanism of the machine by the hands of the operator or attendant. The mechanism employed has for its functions the guiding of the sheet into proper relation with the punches and dies, the arrest of its motion at the proper positions for cutting and stamping the articles to be manufactured, the stripping off from the punches of the scrap or waste metal, the discharge of said scrap from the machine, and the guidance of the punched articles out of the machine into a receptacle, 37, Fig. 1, arranged to receive such articles as they are delivered. The sheets of metal of a standard size are one after another placed vertically in a vertical chute formed of two vertically-channeled bars,

66, Figs. 1, 2, 3, 5, 7, and 8. Said channeled bars may be formed by riveting sheet-metal plates to the sides of an intermediate flat bar which separates them, their edges overlapping said bar to form a channel, 67, as shown, or they may be made in any other suitable or preferred way. They are placed vertically relatively to the axes of the punches, parallel to each other, and at such a distance apart as will allow a sheet of metal of standard size to slide freely downward through the channels, yet to slide practically parallel to itself in all positions during such passage, so far as its vertical edges are concerned. An inclined guide, 67′, Figs. 2, 7, and 8, attached to the middle of the top of the die-plate 41, acts to keep the sheet straight at its lower margin when it first comes in front of the punches. Said sheet is shown in front elevation at 68 in Figs. 3 and 6* and in plan in Fig. 5. The sheet so placed in said channels is permitted to fall periodically edgewise a distance equal to the distance between two consecutive lines of centers of the holes punched in said sheet by the punches 21, such distance being indicated by parallel horizontal lines in Fig. 6*. This fall of the metal sheet occurs once for each revolution of the shaft E, and at the time when the punches 21 have been drawn away from the die-plate to or nearly to their greatest distance from said die-plate, and when the sheet has fallen its proper distance, as aforesaid, it is automatically arrested in its fall by mechanism about to be described until the punches 21 have again acted upon it. It is then automatically released to fall again the same distance and to be again automatically arrested, and so on till the entire sheet has been operated upon and the scrap discharged from the machine. The arrest of the fall of the sheet is effected by a projection, 69, attached to the body of a lever, 70. (Shown in plan view in Figs. 2, 5, and 14 and in elevation in Figs. 3 and 6*.) Said lever is pivoted to the bottom of the scrap-stripper plate 71, Figs. 2, 3, 5, 6, 7, 8, and 14. The stripper-plate 71 is attached to the sides of the channeled bars 66, preferably by machine-screws 72, as shown in Fig. 3, and its position on said bars is kept in fixed relation with the bars by dowel-pins 73, as shown in the same figure. This stripper-plate will be further described hereinafter. The pivot or fulcrum of the aforesaid lever 70 at the bottom of said stripper-plate 71 is shown in dotted outline in Fig. 2 and at 74 in Figs. 3, 5, and 14. The normal position of said lever when not moved, as hereinafter described, is shown in plan in Fig. 14 in full lines, it being held in this position by a small coiled spring, 75, also shown in Fig. 14.

To an adjustable bracket, 76, attached to the plate 36, is pivoted a ratchet-wheel, 77, Figs. 1, 2, 3, and 14. (Also shown in vertical section in Fig. 15.) To the pivot 78, which carries said ratchet-wheel, is also pivoted a rocker-arm, 79, and to the outer extremity of said rocker-arm is pivoted a pawl, 80, which engages the teeth of the ratchet-wheel, as shown. Said teeth are preferably hook-shaped in plan, as shown in Figs. 2 and 14, and they are preferably five in number. To the outer extremity of the rocker-arm 79 is also pivoted one end of a link, 81, the other end of said link being pivoted to a bracket, 82, attached to or formed upon the platen 4 and extending out laterally from said platen, as shown in Figs. 2 and 14. Said link is also made adjustable with reference to its length by making it of two parts joined by a right and left threaded nut, as hereinbefore described for other links. It will be seen that through this mechanism every complete revolution of the shaft and consequent reciprocation of the platen 4 will cause the ratchet-wheel 77 to turn on its pivot through an arc measured by the angle of two radii of said wheel drawn through the centers of any two adjacent ratchet-teeth when the parts of the mechanism are so adjusted that the pawl engages successively one tooth after another of said wheel, and in use the mechanism is so adjusted. The end of said pawl which engages the ratchet-teeth is constantly pressed toward the perimeter of the ratchet-wheel by a spring, 83, Figs. 14 and 15, said spring being riveted to the rocker-arm, as shown in Fig. 15, or otherwise suitably attached. Now, the bracket 76 is so adjusted that when a ratchet-wheel tooth engaged by the pawl 80 is advanced by the action of the pawl into the position shown in dotted outline in Fig. 14 the ratchet-tooth next in advance of the tooth engaged by the pawl is caused to bear against the extremity 84 of the lever 70, and forces said lever into the position shown in dotted outline, which is a position such that a further very slight motion of advance of the ratchet-tooth will entirely release said lever from its engagement with the tooth, leaving said lever under full control of the spring 75, which then immediately forces said lever back into the position shown in full lines in Fig. 14. The toe 69 of the lever 70 is so situated relatively to the punches that it lies just below the face of one (preferably the first one) of the lower range of punches, 48, and the sheet, when first slipped into the channels of the channeled bars 66, slides edgewise and parallel to itself downward till its lower edge rests upon said toe. When the platen 4 and its punches are advanced to make the first cut from said sheet, and then withdrawn again into the position shown in Fig. 14, which position is very near the termination of the rearward stroke of said platen, the completion of said backstroke, through the continued action of the ratchet mechanism above described, removes the toe 69 of the lever 70 from beneath the lower edge of the sheet. The latter, being at this instant unsupported, begins to fall to a lower position in the channels of the channeled bars 66; but before said sheet can fall a distance much greater than that measured by the narrow neck 85, Fig. 6*, between two con-

secutive punched holes the lever 70 is released from its engagement with the ratchet-tooth which has moved it, and the spring 75 throws the lever immediately into its former position, and the sheet in its further fall is arrested by the engagement of the toe 69 with the edge of the metal which bounds one of the holes just punched, as shown at 69 in Fig. 6*. This action is repeated once for every revolution of the shaft E until the punched sheet or scrap passes down out of the channels in the channeled bars 66 to a chute, 86, Fig. 1, which may conduct it to a compartment below the machine, if desired.

The stripper-plate 71, hereinbefore partly described, not only acts to strip off the scrap from the punches 21, but it also guides the punched and stamped articles in a direction away from the punches 48 to a chute, 87, Fig. 1, this stripper-plate having formed in it openings 88, Figs. 3, 4, and 6, which openings have their lower sides inclined toward said chute. There is one of these openings through said plate for each punch 48, and the stamped articles, when stripped off from the punches 48, drop into these openings and are directed by the application of the lower sides of the openings forward to the chute 87.

Pivoted to the end of the stripper-plate 71, as shown at 89 in Figs. 1, 3, and 4, is a lever, 90. A stop, 91, formed on or attached to one of the channeled bars 66, (preferably the one at the operator's right hand as he stands at the treadle,) limits the motion of the lever 90 on its pivot 89 in both directions, said stop being preferably a loop of metal extending entirely around the upper arm of said lever. The upper end of this lever is preferably bent thrice at right angles, as shown at 92, 92′, and 92″, the part at the bend 92″ being preferably off-set from the part which lies below it, as shown at 93. A spring, 94, riveted or otherwise suitably attached to the side of the channeled bar to which the lever 90 is pivoted, presses against the upper arm of the lever 90, above the pivot 89, and when its action is unopposed holds said lever in the position shown in Fig. 1. The lower end of the lever 90 is, by means of a pin, 95, Figs. 3 and 4, made to engage the lever 70. The operator, when it is desired for any cause to remove a sheet from the channeled bars 66, can, by pressing the upper end of the lever 90 away from him or toward the platen 4, cause the lever 70 to move in the same manner as it is moved by a tooth of the ratchet-wheel 77, thus removing the toe 69 of said lever from its position of support to the sheet, and permitting the latter to drop down through the channels of the channeled bars 66 onto the chute 86.

The operation of the machine is, in general, as follows, premising that the platen 4 is in the position shown in Figs. 1 and 7, and that the wheel F is revolving at its proper rate of speed: The operator slides into the upper parts of the channels in the channeled bars 66 a sheet of metal to be punched, and, releasing it, it falls at once downward till its lower edge rests upon the toe 69 of the lever 70. The operator next depresses the treadle, which, by its correlated mechanism, above described, draws the dog *q* away from the collar Q. The rotation of the wheel next brings the dog *v* into relation with the dog *q*, and the projection *w* of the dog *v* passes down over the curved surface *q″* of the dog *q*, which presses the dog *v* radially outward and releases it from its engagement with the L-shaped projection on the bolt *s*, which latter then shoots out into the segmental recess in the collar Q, thus engaging the shaft E with the wheel E′. The shaft now rotates with the wheel, and the platen 4 advances with its punches to act upon the sheet. Further rotation of the shaft then withdraws the punches, the strippers above described then coming into action for stripping the punched articles and the punched sheet from the punches, and, lastly, the tappet V acts upon the rock-lever S to disengage the hook *i* of the hook-bar I from its engagement with the pin *k* on the rock-lever K. This releases the sliding bar N to the full control of the spring P, which immediately thrusts the dog *q* back into its original position, whereupon the end of the L-shaped projection *n* on the bolt *s* is engaged by the incline *q′* on the dog *q*, which forces the bolt back again into its socket and releases the shaft from its engagement with the wheel. The shaft will then remain disengaged from the wheel until the operator allows the treadle to rise again, which it will do when pressure is removed from it, this movement being effected by the action of the spring L, which at the same time causes the hook *i* on the hook-bar I to again engage the pin *k* on the rock-bar K. The parts are all now restored to their initial positions, and the operation can be indefinitely repeated.

I desire here to state that I do not limit myself to the precise construction herein described for actuating the dog *q*. Other mechanism could be substituted for the hook-bar I, rock-lever K, and sliding bar N, or modified forms of either or all these parts could be used without materially affecting the action of the dogs *q* and *v*, the bolt *s*, and shouldered collar Q, for effecting the herein-described engagement and disengagement of the shaft and wheel; neither do I confine myself to the specific mechanism for actuating the strippers which force the punched articles off from the faces of the punches 21 and 48, as this mechanism might be varied also without affecting the action of said strippers in any material manner.

What I claim is—

1. A punching or stamping machine having a gang of reciprocating punches for acting upon sheets of metal of standard size, mechanism for reciprocating said punches, a die-plate arranged to coact with said punches, feed-channels arranged in vertical relation with the axes of said punches for guiding said sheets in parallel motion under the action of gravity, and

mechanism for arresting at regulated distances the fall of said sheets, substantially as and for the purposes specified.

2. The combination, with the wheel F and shaft E, provided with the shouldered collar Q, keyed to said shaft, and having the segmental recess *r*, of the spring-bolt *s*, socketed in the hub of said wheel and provided with the L-shaped projection *n*, the spring-dog *v*, having thereon the lateral projection *w*, the sliding dog *q*, constructed substantially as described, and mechanism for actuating the dog *q*, substantially as and for the purposes specified.

3. The specific mechanism herein described for actuating the dog *q*, consisting of the combination, with the treadle G, of the hook-bar I, having thereon the hook *i*, rock-lever K, having the pin *k*, for the engagement of said hook, sliding bar N, connected with the rock-lever K and with the dog *q*, spring P, arranged to oppose the action of the rock-lever K, rock-lever S, for releasing said hook from said pin, and tappet V, attached to the wheel, for actuating the lever S, substantially as and for the purposes described.

4. The specific mechanism herein described for actuating the dog *q*, consisting of the combination, with the treadle G, of the hook-bar I, having thereon the hook *i*, rock-lever K, having the pin *k*, for the engagement of said hook, sliding bar N, connected with the rock-lever K and with the dog *q*, spring P, arranged to oppose the action of the rock-lever K, rock-lever S, for releasing said hook from said pin, tappet V, attached to the wheel, for actuating the lever S, and stop M, for limiting the upward movement of the treadle and the correlated movements of the parts connected with said treadle, substantially as and for the purposes set forth.

5. The combination, with the shaft of a punching or stamping press and bearing or bearings for the journals of said shaft, said bearing or bearings each having formed therein a recess, *a*, of an adjustable curvilinear gib or gibs, *b*, fitted into said recess or recesses and also to a journal or journals of said shaft, and mechanism for moving said gib or gibs circumferentially in said recess or recesses, substantially as and for the purpose set forth.

6. The combination, with the shaft of a punching or stamping press and bearing or bearings for the journals of said shaft, said bearing or bearings each having formed therein a recess, *a*, of an adjustable curvilinear gib or gibs, *b*, fitted into said recess or recesses and also to a journal or journals of said shaft, and a set-screw or set-screws fitted to a thread or threads in the boss or bosses of said bearing or bearings and abutted against the base or bases of said gib or gibs for moving said gib or gibs circumferentially in said recess or recesses, substantially as and for the purposes described.

7. The combination, with the shaft of a punching or stamping press and bearing or bearings for the journals of said shaft, said bearing or bearings each having formed therein a recess, *a*, of an adjustable curvilinear gib or gibs, *b*, fitted into said recess or recesses and also to a journal or journals of said shaft, each having therein an oil cup or recess, *c''*, and mechanism for moving said gib or gibs circumferentially in said recess or recesses, substantially as and for the purpose set forth.

8. The combination, with the shaft of a punching or stamping press and bearing or bearings for the journals of said shaft, said bearing or bearings each having formed therein a recess, *a*, of an adjustable curvilinear gib or gibs, *b*, fitted into said recess or recesses and also to a journal or journals of said shaft, each having therein an oil cup or recess, *c''*, and a set-screw or set-screws fitted to a thread or threads in the boss or bosses of said bearing or bearings and abutted against the base or bases of said gib or gibs for moving said gib or gibs circumferentially in said recess or recesses, substantially as and for the purposes described.

9. The combination, with the crank-pins of the crank-shaft of a punching or stamping press, eccentrics fitted to said crank-pins and having toothed flanges, clamping eccentric-straps fitted to the perimeters of said eccentrics, eccentric-rods formed with or attached to said eccentric-straps and connected with the platen of the press, and pinions pivoted to said rods and meshed with said teeth on said eccentric-flanges, of mechanism for turning said pinions symmetrically for symmetrically adjusting said eccentrics on the crank-pins and adjusting the stroke of the platen, substantially as and for the purpose set forth.

10. The combination, with the crank-pins of the crank-shaft of a punching or stamping press, eccentrics fitted to said crank-pins and having toothed flanges, clamping eccentric-straps fitted to the perimeters of said eccentrics, eccentric-rods formed with or attached to said eccentric-straps and connected with the platen of the press, and pinions pivoted to said rods and meshed with said teeth on said eccentric-flanges, of a shaft, 19, keyed to said pinions for turning said pinions symmetrically for symmetrically adjusting said eccentrics on the crank-pins and adjusting the stroke of the platen, substantially as and for the purpose set forth.

11. The combination, with the reciprocating platen of a punching or stamping press, of punches 21, rigidly attached to said platen, a die-plate, 41, arranged to coact with said platen and punches, coacting annular strippers fitted to recesses in the faces of said punches, and mechanism for reciprocating said strippers longitudinally in said recesses of said punches, substantially as and for the purposes set forth.

12. The combination, with the reciprocating platen of a punching or stamping press, of punches 21, rigidly attached to said platen, a die-plate, 41, arranged to coact with said platen and punches, coacting annular strippers fitted to recesses in the faces of said punches, sliding bolts 26, fitted to work in bear-

ings in said platen and attached to said strippers, plate 30, arranged in a chamber formed in said platen, sliding rods 27, working also in bearings formed in said platen and attached both to the plate 30 and to said strippers, cam 32, fitted to and carried in bearings in said platen, rocker-arm 34, attached to the shaft of said cam, and link 35, attached to said rocker-arm at one end and at the other end to some fixed pivot on the bed or other non-moving part of the machine, substantially as and for the purposes described.

13. The combination, with the reciprocating platen of a punching or stamping press, of punches 21, rigidly attached to said platen, a die-plate, 41, arranged to coact with said platen and punches, coacting strippers fitted to recesses in the faces of said punches, mechanism for reciprocating said strippers longitudinally in said recesses, and a stripper-plate, 71, arranged in front of said die-plate, for stripping the scrap from the punches 21, substantially as and for the purposes specified.

14. The combination, with the platen of a punching or stamping press, of a punch or punches, 21, attached to said platen, coacting annular stripper or strippers fitted to the recess or recesses in the faces of said punch or punches, mechanism for reciprocating said stripper or strippers in said recess or recesses, die-plate 41, and stripper-plate 71, a fixed punch or punches, 48, arranged concentrically with a cutting-edge or the cutting-edges of the die-plate and centrally opposed to the punch or punches 21, annular stripper or strippers 51, fitted to the annular space or spaces between said punch or punches 48 and the cutting-edge or the cutting-edges of said die-plate, and mechanism for reciprocating said stripper or strippers 51 in said space or spaces, substantially as and for the purpose specified.

15. The specific mechanism herein described for actuating the strippers 51 in the annular spaces between the cutting-edges of the die-plate and the punches 48, which mechanism consists in the combination, with the platen 4, of the link 62, pivoted to said platen, rock-shaft 58, rock-lever keyed to the rock-shaft 58 and pivoted to the link 62, cam 57, attached to said rock-shaft, reciprocating plate 54, friction-roller 56, pivoted to the plate 54, and sliding rods 53, attached to the plate 54 and working in bearings in the plate 53, to which said punches are attached, substantially as and for the purposes set forth.

16. The combination, with the vertical channeled bars 66, arranged laterally one on each side of the die-plate for guiding a sheet of metal in relation with the punches and die-plate, and the stripper-plate 71, of a lever, 70, pivoted to the bottom of said stripper-plate, having the toe 69, formed on or attached to the inner end of the same for supporting the sheet and arranged in relation with the said die-plate, as herein described, and mechanism for actuating said lever on its pivot for automatically and alternately releasing said toe from its engagement with such sheet of metal and re-engaging said toe with the sheet, substantially as and for the purposes described.

17. The specific mechanism herein described for actuating the lever 70, as specified, which mechanism consists of the combination, with the platen 4, of a link, 81, pivoted to said platen or extension from said platen, ratchet-wheel 77, arranged in relation with said lever and pivoted to an adjustable bracket, 76, rock-lever 79, pivoted to said bracket at one end and to said link at the other end, spring-pawl 80, pivoted to the outer extremity of said rock-lever, and the spring 75, substantially as and for the purposes described.

18. The combination, with the platen 4 and its attached punches and strippers and the die-plate 41 and its punches and stripping mechanism, all constructed and operating substantially as herein described, of the stripper-plate 71, having openings with inclined bottoms arranged in front of the punches in said die-plate, and the chutes 86 and 87, whereby the stamped articles are separated from the scrap, substantially as and for the purposes set forth.

19. The combination, with the channeled bars 66, of the inclined guide 67, for guiding the middle of the lower margin of the sheet to be operated upon in putting said sheet into the machine, substantially as and for the purposes described.

20. The combination, with the lever 70, of the hand-lever 90, for operating the lever 70 independently of the ratchet-wheel, substantially as and for the purposes set forth.

21. The combination, with the punches of a punching or stamping press, of reciprocating strippers fitted to recesses in the acting faces of said punches, the outer faces of said strippers being arranged to alternately coact with said punches in the act of punching and as strippers for separating the punched or stamped articles from said punches, substantially as and for the purposes specified.

22. The combination, with a reciprocating die or dies, punch or punches, 21, and a reciprocating stripper or strippers coacting with said die or dies, punch or punches, of a fixed die or dies, punch or punches opposed in action to said reciprocating die or dies, punch or punches, and interchangeable dies 50, fitted, respectively, to recesses in the face or faces of said stripper or strippers and in the faces of said fixed die or dies, punch or punches, substantially as and for the purposes specified.

23. A die-plate of a punching or stamping press re-enforced by pieces 45, fitted into recesses formed in the face of said die-plate and in relation with the dies for strengthening said die-plate and for enabling the same to be fitted without springing, substantially as herein described, and for the purposes set forth.

NORMAN C. STILES.

Witnesses:
JNO. E. GAVIN,
JOHN BECKER.