No. 633,170. Patented Sept. 19, 1899.

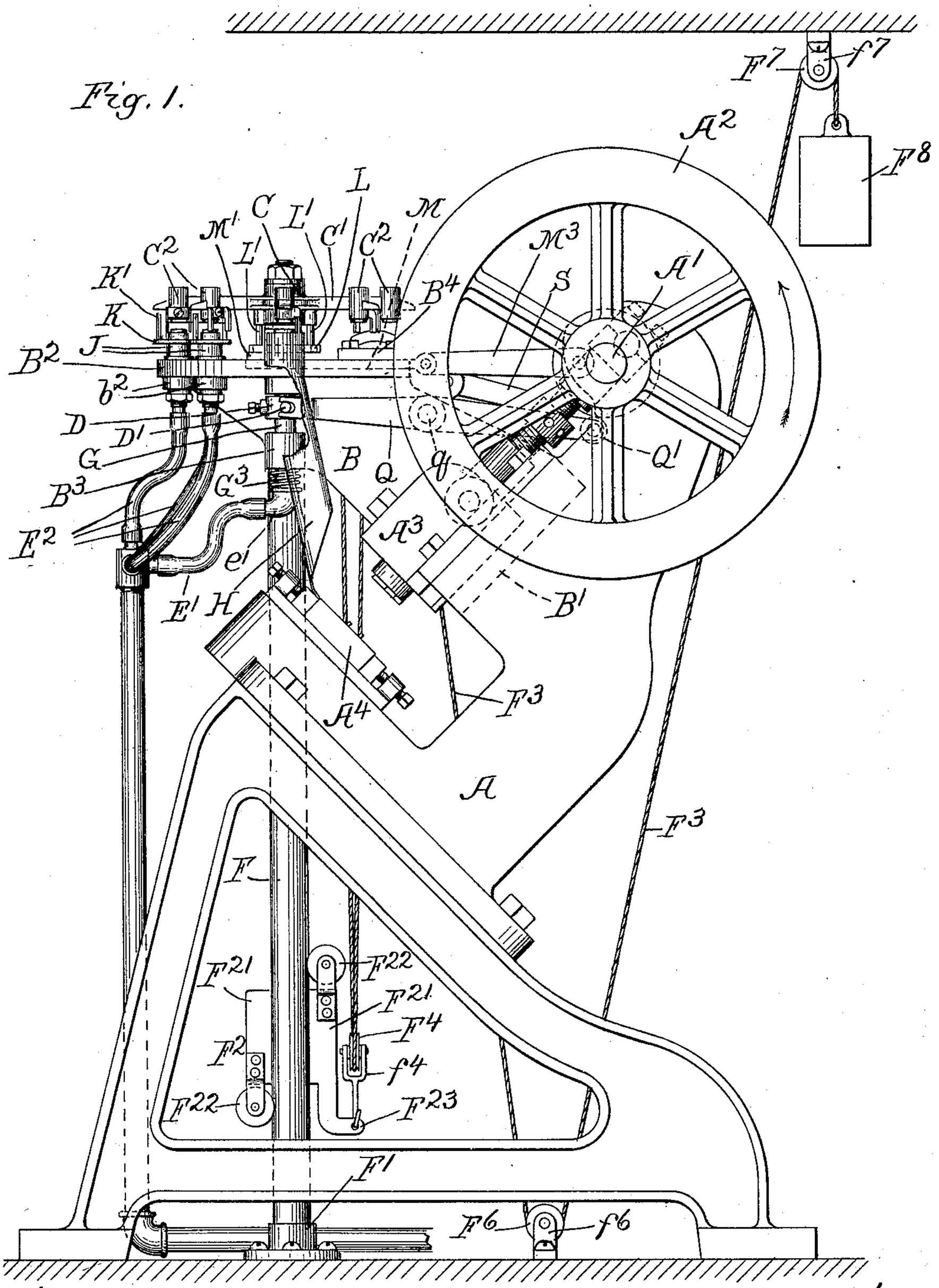
E. TYDEN.

FEEDING MECHANISM FOR DIE PRESSES.

(Application filed Sept. 10, 1898.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1.



Witnesses.
Edward T. Wray
Jean Elliott.

Inventor.
Emil Tyden
by Burton & Burton.
his attys

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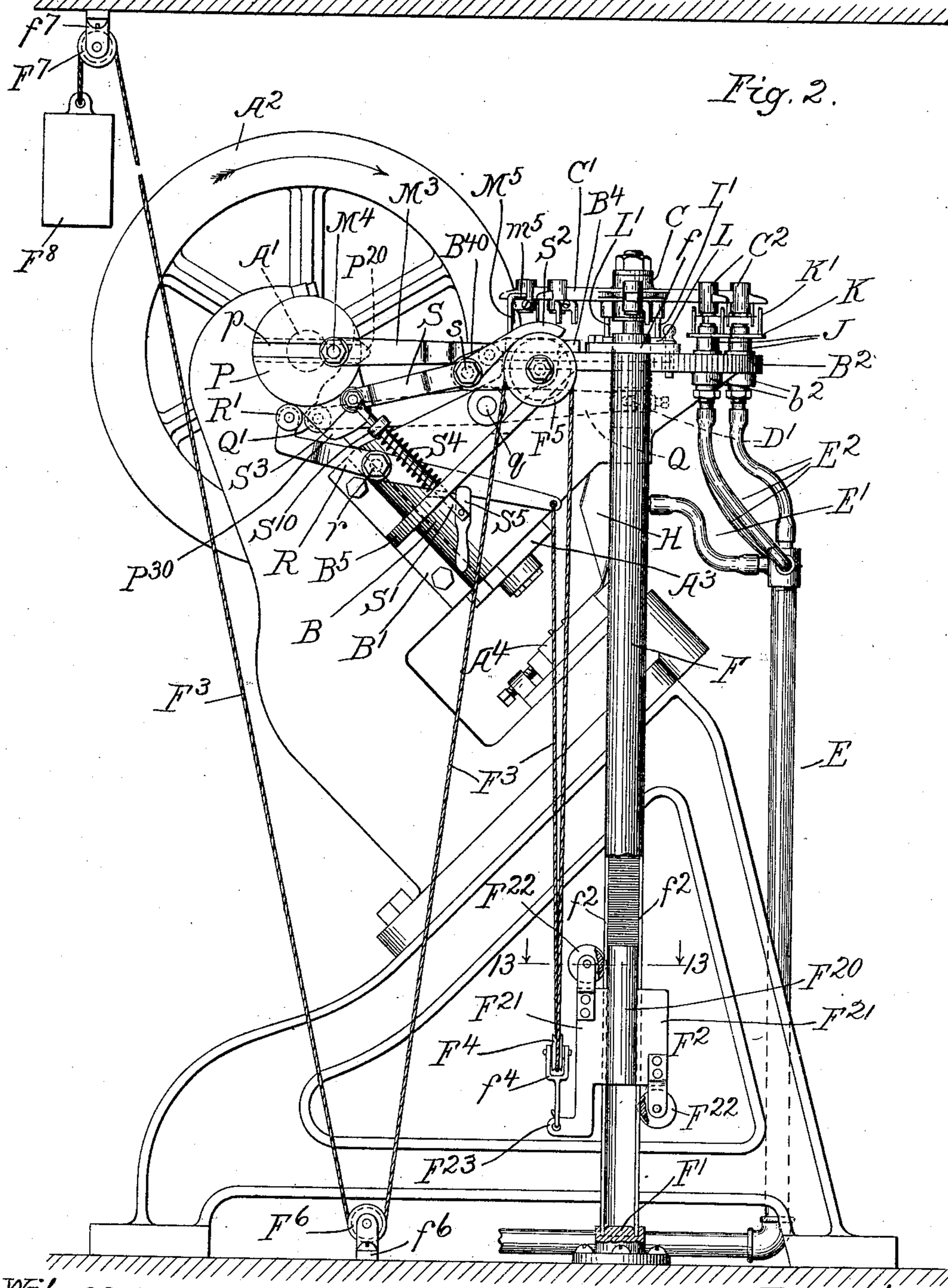
(No Model.) 5 Sheets—Sheet 2.

Fig. 2.



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(No Model.) 5 Sheets—Sheet 3.

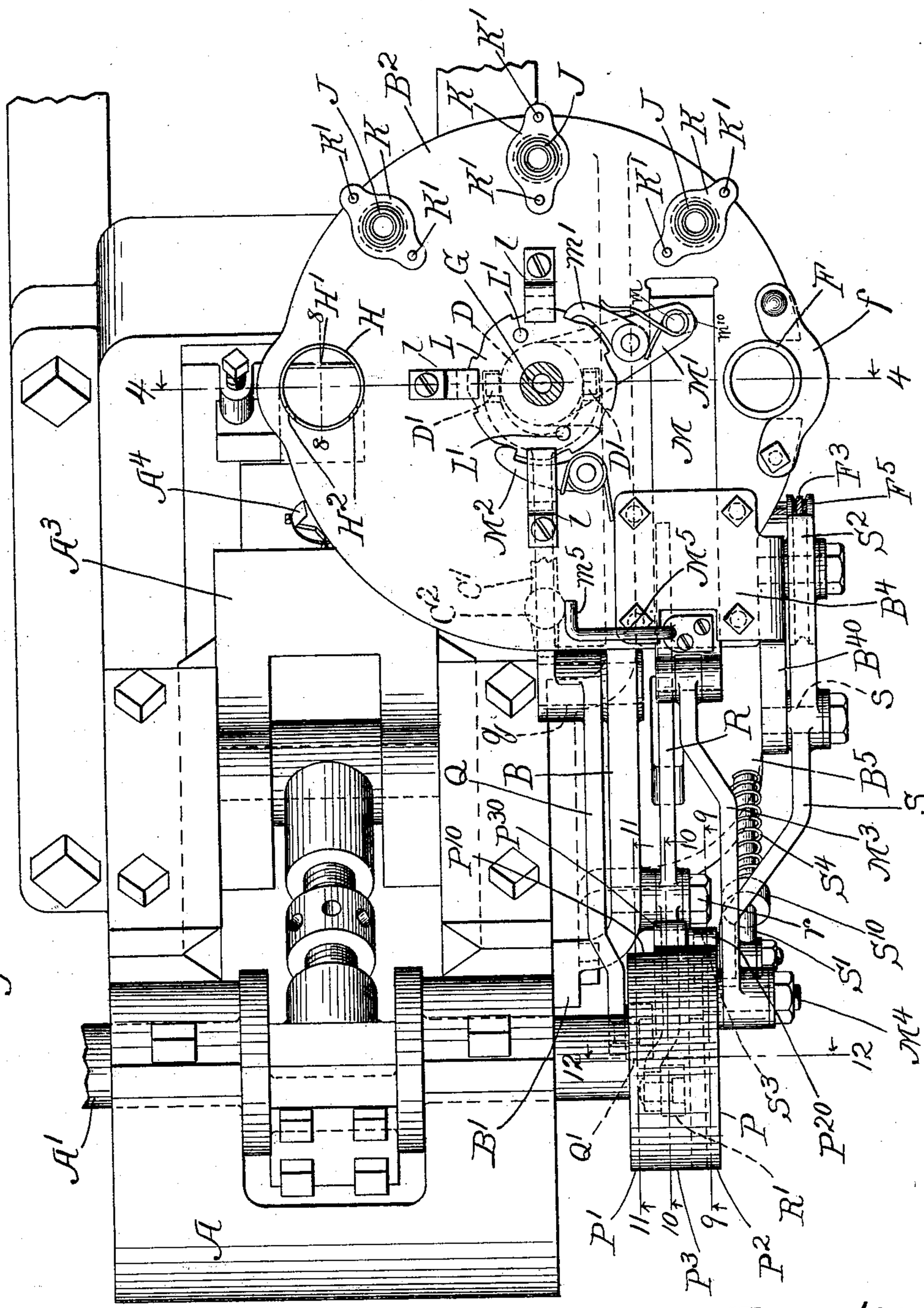

Fig. 3.

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Edward T. Wray.
Jean Elliott.

Inventor.
Emil Tyden
by Burton & Burton
his attys

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(No Model.) 5 Sheets—Sheet 4.

Fig. 5.

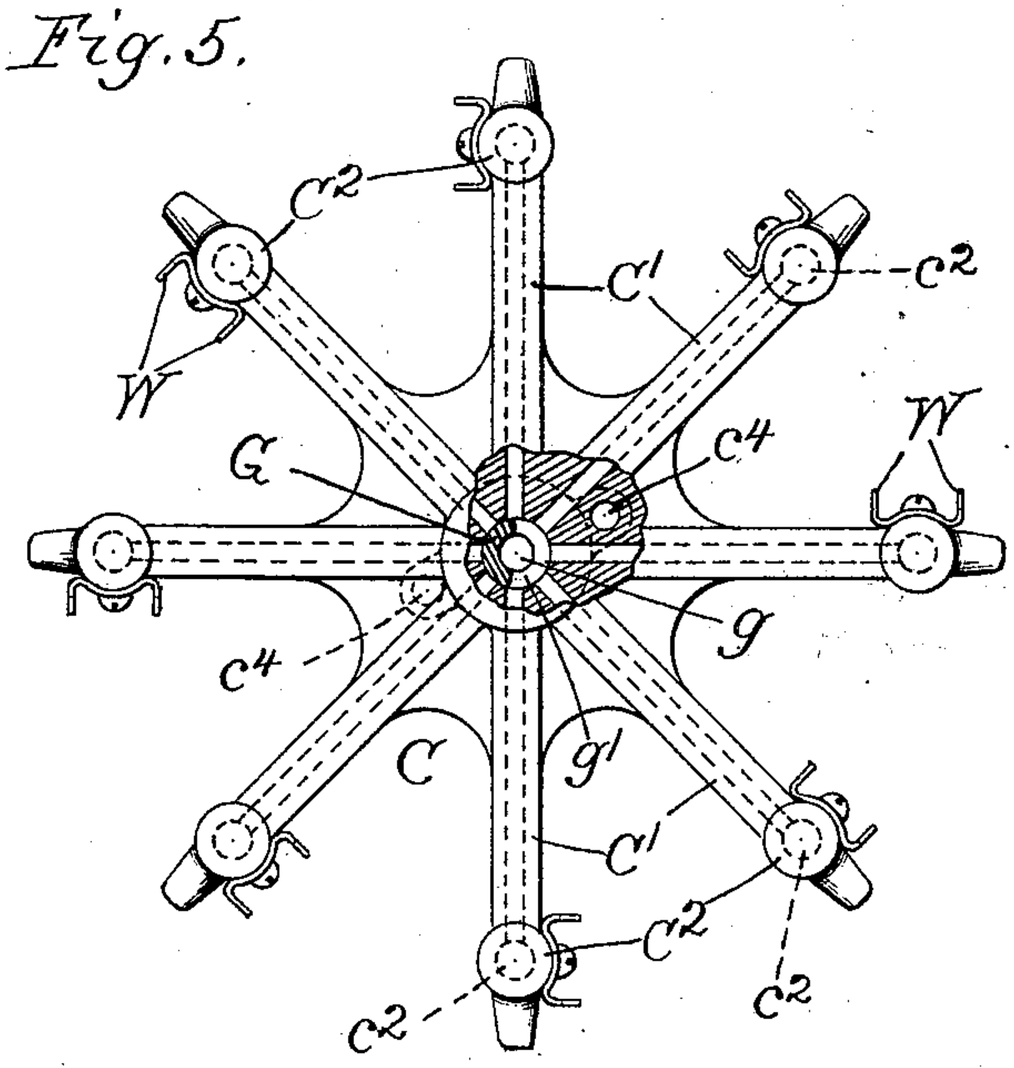

Fig. 6.

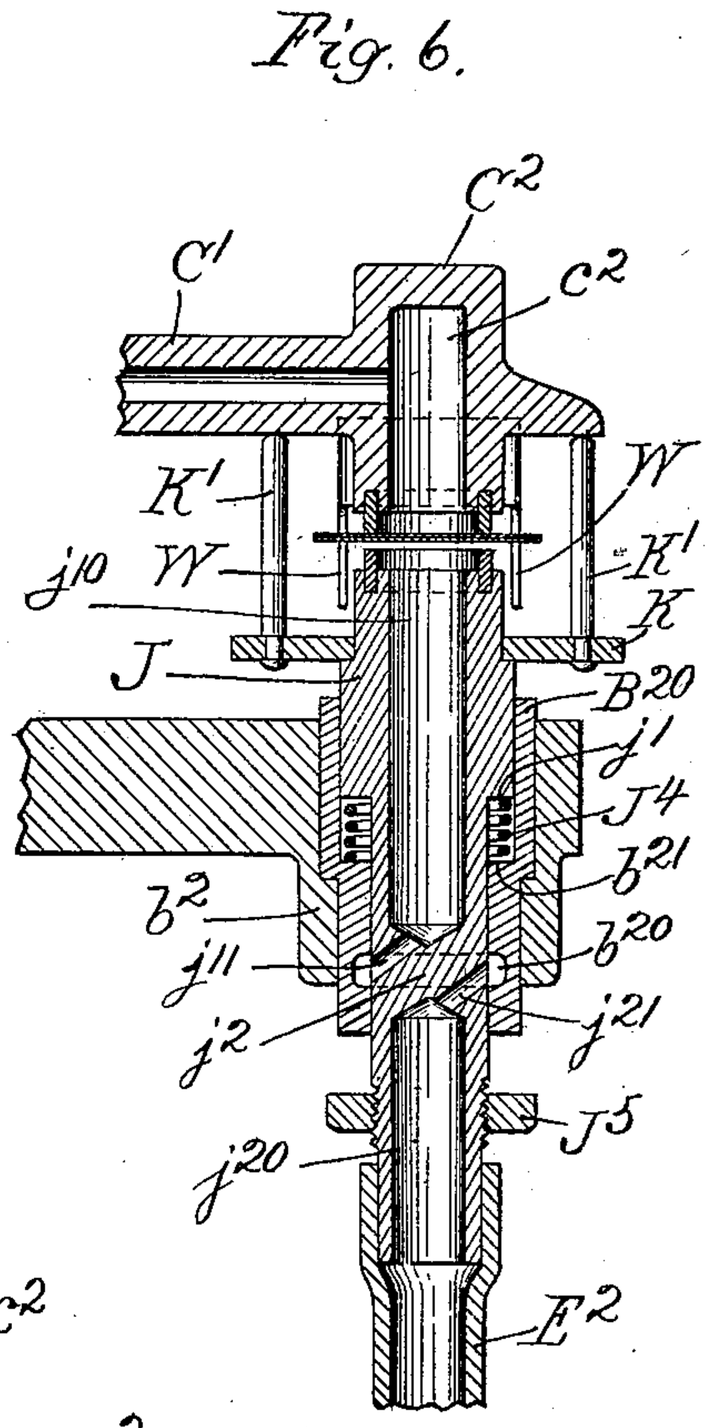

Fig. 4.

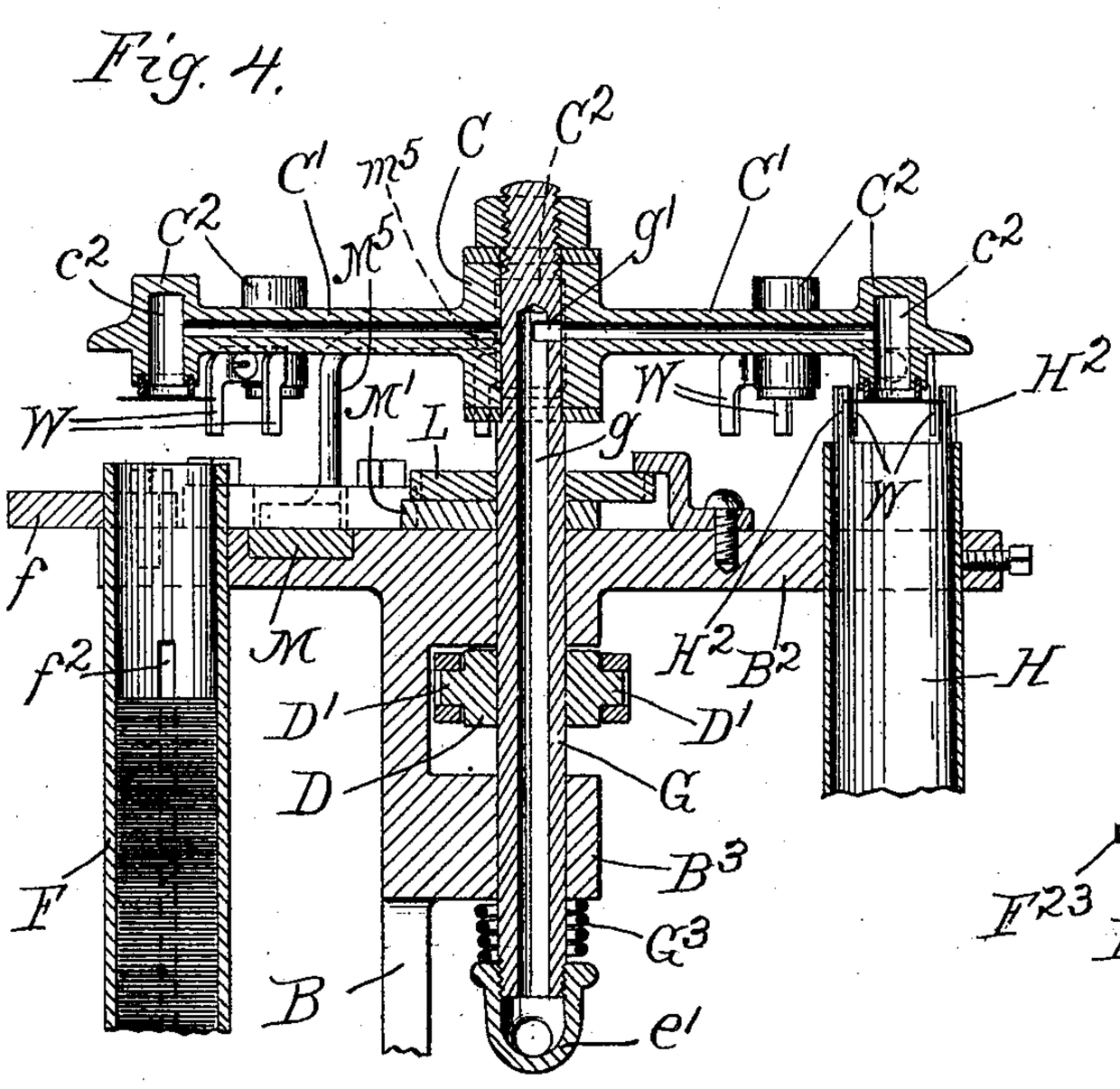

Fig. 13.

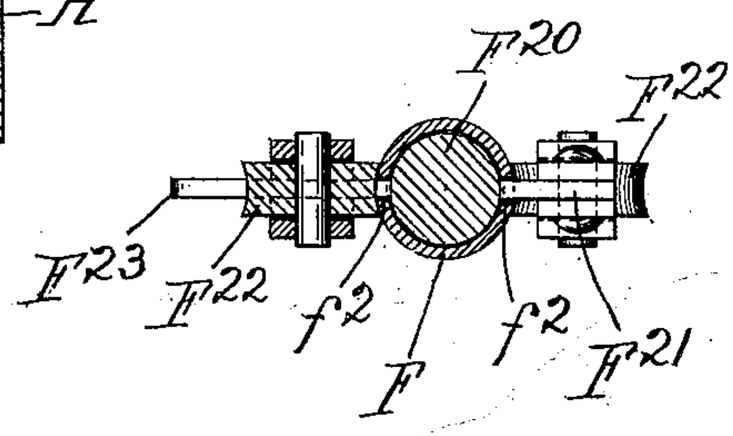

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Fig. 7.

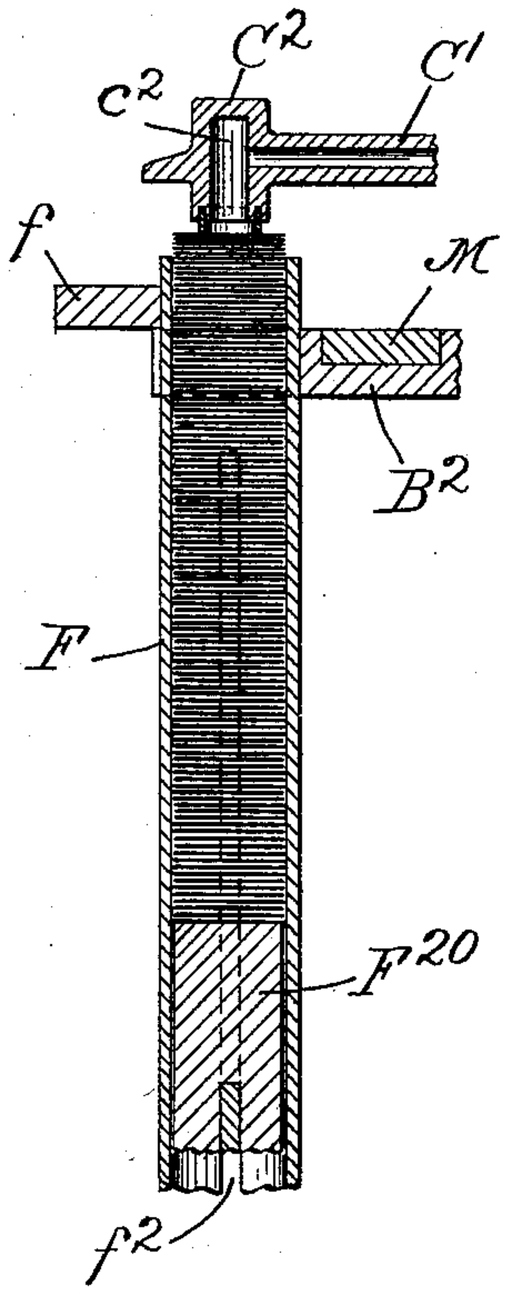


Fig. 9.

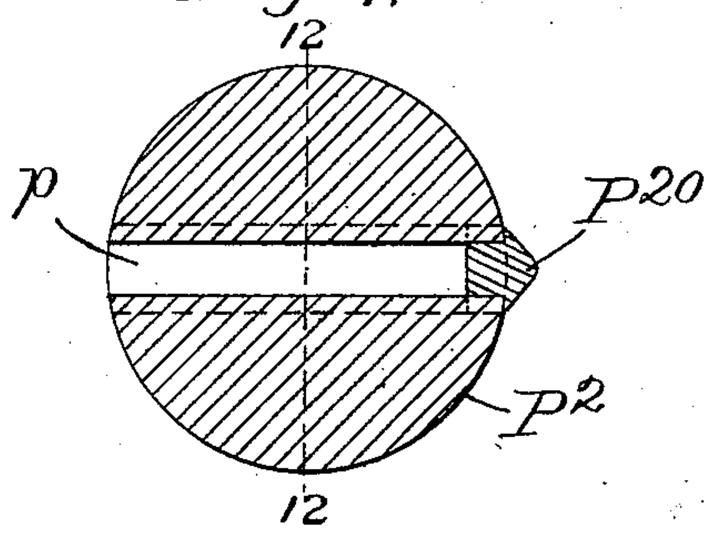


Fig. 10.

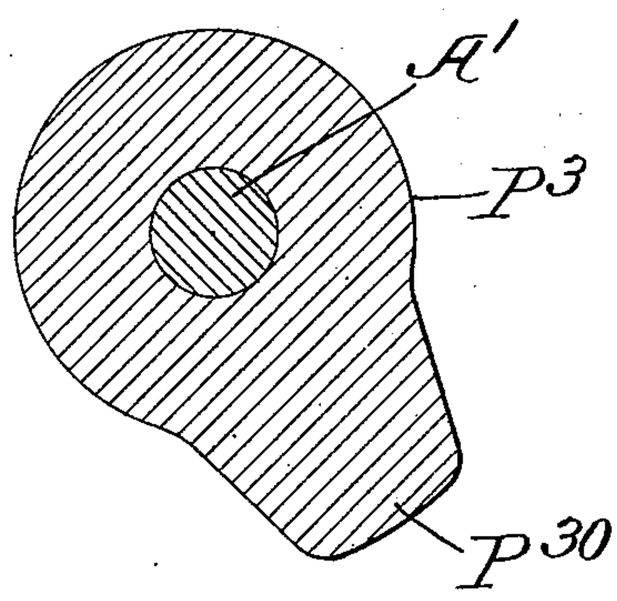


Fig. 8.

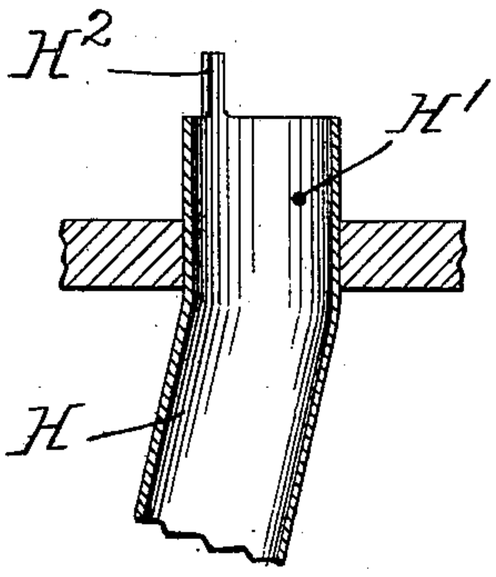


Fig. 11.

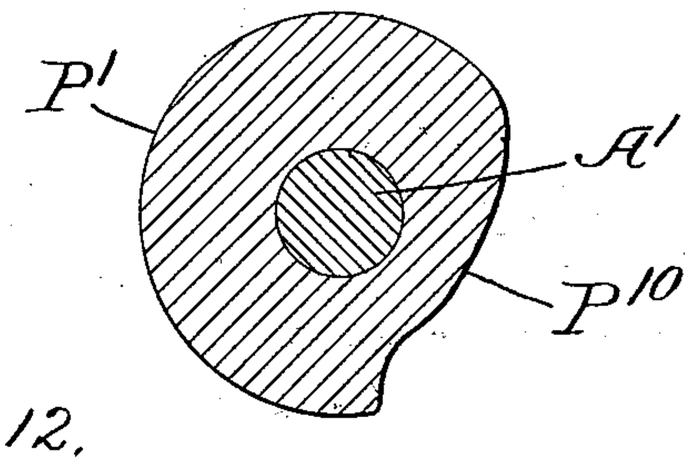
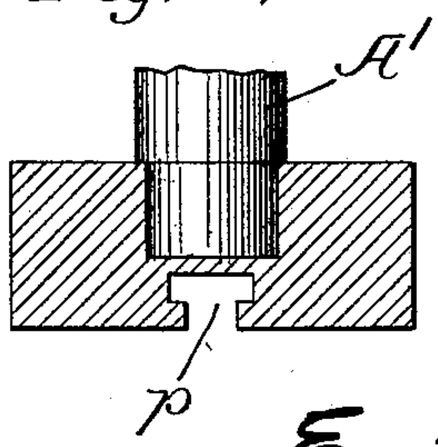


Fig. 12.



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UNITED STATES PATENT OFFICE.

EMIL TYDEN, OF HASTINGS, MICHIGAN, ASSIGNOR TO RICHARD B. MESSER, OF SAME PLACE.

FEEDING MECHANISM FOR DIE-PRESSES.

SPECIFICATION forming part of Letters Patent No. 633,170, dated September 19, 1899.

Application filed September 10, 1898. Serial No. 690,694. (No model.)

To all whom it may concern:

Be it known that I, EMIL TYDEN, a citizen of the United States, residing at Hastings, county of Barry, and State of Michigan, have invented certain new and useful Improvements in Feeding Mechanism for Die-Presses and other Machines, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide improved means primarily adapted for feeding blanks of sheet metal to die-presses and other mechanism by which such blanks are to be operated upon.

In the drawings, Figure 1 is a right-hand side elevation of a die-press and my improved mechanism associated therewith. Fig. 2 is a left-hand side elevation of the same. Fig. 3 is a plan of the same, portions of the press being broken away and details of the ordinary press mechanism being omitted. Fig. 4 is a section through the feeding mechanism at the line 4 4 on Fig. 3. Fig. 5 is a plan of the rotating spider or carrier, the same being broken away at the central portion and shown in section at a horizontal plane cutting through the suction-ducts. Fig. 6 is a detail section through one of the carrier-nozzles and one of the detaching-nozzles, showing the two nozzles in opposition at the position for detaching the surplus blank which has been picked up by the carrier-nozzle. Fig. 7 is a detail section of the carrier-nozzle and upper portion of the blank-reservoir or supply-tube at the relative position of those parts which is occupied at the instant of picking up the blank. Fig. 8 is a detail section of the delivery-tube at the line 8 8 on Fig. 3. Figs. 9, 10, and 11 are detail sections of the cam on the main shaft at the planes indicated by the lines 9 9, 10 10, and 11 11, respectively, on Fig. 3. Fig. 12 is a detail section, axial with respect to the shaft, at the plane 12 12 on Fig. 9. Fig. 13 is a section at the line 13 13 on Fig. 2.

A is the cast frame of a die-press of familiar form, having the bed in inclined position to facilitate the delivery of blanks thereto and therefrom. A' is the main shaft; A^2, the fly-wheel; A^3, the reciprocating head, and A^4 represents the die in position on the bed. This press is of familiar form and action.

B is a heavy cast bracket, which is constructed and arranged to support the principal portion of the mechanism of my improved carrier. This bracket is formed with a foot-piece B′, adapted to be bolted fast to the side of the frame A of the press, and from this foot-piece it is offset away from the fore-and-aft center of the press and extends up forwardly, terminating at the upper forward end in a horizontal substantially circular table B^2, which is about in the horizontal plane of the main shaft of the press. This arrangement leaves the press substantially clear and unobstructed at the front, so that access to the die is practically unimpeded and all adjustments and manipulations which it may from time to time be desirable to make in the punch and die can be made without displacing or disturbing any of the parts of the feeding mechanism.

At the center of the table B^2 there is journaled vertically the shaft or spindle G of the spider C, whose arms C′ C′, &c., extending horizontally, terminate in the pick-up nozzles C^2 C^2, &c., which overhang the marginal portion of the table. A lug B^3, projecting from the bracket B below the center of the table, furnishes a second bearing for the spindle G, which has one bearing in the table proper at the point where it penetrates said table, and between the two bearings there is made fast to the spindle a collar D, having gudgeons D′ D′, adapting it to be taken hold of by a forked lever, hereinafter described, for lifting and depressing the spindle longitudinally. The spindle is tubular, being bored from the lower end to a point near the upper end, said upper end being closed, and to its lower end there is connected by means of an elbow e' a flexible tube E′, which extends to the main suction-pipe, hereinafter described. Between the lug B^3 and the elbow e' a spring G^3 is coiled about the spindle, reacting against the end of the elbow and the lower side of the lug with a tendency to hold the spindle downward to the limit permitted by the play of the collar D above the lug B^3. Each arm C′ of the spider is tubular, the tubular aperture leading to the downwardly-opening cavity c^2

of the nozzle C^3. The tubular cavity g of the spindle G at the upper end opens to the surface throughout about half the circumference of the spindle, the opening g' being in the plane of the tubular apertures of the arms C', the inner ends of which therefore register with said opening throughout half the rotation of the spider, as hereinafter described.

F is the blank-reservoir or supply-tube. It is detachably connected to the table, protruding up through the same at a point under the path of the pick-up nozzles and preferably at the outer side of the table, as illustrated. H is the delivery-tube, which is similarly protruded through the table and secured thereto at a point diametrically opposite the supply and in front of and above the level of the die.

Between the supply-tube and the delivery-tube, under the path of the carrier-nozzles, over the forward part of the table B^2, there are mounted in said table a plurality of detaching-nozzles J J J, corresponding to the number of spider-arms C' and pick-up nozzles thereon, which are found on the spider between the two which are diametrically opposite, so that, as illustrated, three such detaching-nozzles are provided adapted to register with or to be overhung all at the same time by the pick-up nozzles of the spider. The detaching-nozzles are connected at their lower ends by flexible tubes E^2 E^2 E^2 with the main suction-tube E, which extends to a suitable exhaust-pump for the purpose of maintaining suction through the system. The detaching-nozzles are arranged to operate as slide-valves in the bosses b^2 b^2 on the table B^2, through which said nozzles are inserted. The construction which accomplishes this result is seen in Fig. 6. The nozzle is a cylindrical spindle, being larger at the upper part and reduced in diameter at the lower part, forming a shoulder j'. The table B^2 is bored at the boss b^2 to admit the nozzle from the upper side, the lower portion of the bore corresponding in diameter to the reduced lower portion of the nozzle-body, and the upper portion being counterbored to the diameter of the larger upper portion of the nozzle, and between the shoulder j' of the nozzle and the shoulder b^{21}, formed by the counterbore in the table, there is interposed a spring J^4, which is coiled about the nozzle and reacts between the shoulders with a tendency to hold the nozzle thrust upward to the limit permitted by a stop-nut J^5, which is screwed onto the lower portion of the nozzle below the boss b^2. The nozzle is bored from opposite ends, the bores j^{10} and j^{20} stopping short of each other, and from the surface at the plane of the intervening diaphragm j^2 oblique ducts j^{11} j^{21} are bored, the former to reach the upper end of the bore j^{10} and the other to reach the lower end of the bore j^{20}. An annular groove b^{20} is formed in the seat of the reduced portion of the nozzle at such position that the lower limit of the longitudinal movement of the nozzle in said seat, the ducts j^{11} and j^{21} register with said groove, which thereby constitutes a communicating passage between the upper and lower ends of the nozzle, while at the upper limit of said longitudinal movement the ends of the duct j^{21} are out of communication with the annular groove and are closed and communication between the two ends of the nozzle is thereby cut off. Preferably a brass thimble B^{20} is set into the table B^2 to constitute the seat for the spindle, and the shoulder and groove described are thus formed in such brass thimble, which, however, I have treated in the above description as a part of the table. The upper protruding end of each of the detaching-nozzles carries a cross-bar K, from whose opposite ends pins K' K' project upward in position to be encountered by the spider-arm as it descends, so that such descent of the spider-arm will depress the nozzle against the tension of the spring and at the limit of such depression admit the suction to the upper end of the nozzle, as described.

The general plan of operation of my improved feeding mechanism is that the spider C, carrying the pick-up nozzles on its several arms, rotates with a step-by-step movement, halting between the steps with one nozzle overhanging the receiving-tube, the opposite nozzle overhanging the delivery-tube, and with the intermediate nozzles at the forward side overhanging the detaching-nozzles, all of said nozzles being in communication with the central suction-duct in the spindle G and subject to the suction from the time they reach the supply-tube until they pass the delivery-tube, but being cut off from the suction while passing from the delivery to the supply tube. At each halt of the spider it is depressed, bringing the pick-up nozzles downward toward the receiving-tube, delivery-tube, and detaching-nozzle, respectively. The nozzle which overhangs the receiving-tube at this movement picks up the blank from the upper end of the pile in the receiving-tube, and the nozzles which overhang the detaching-nozzles advance toward the latter, affording opportunity for any surplus blanks to be detached. The descent of the spider occurs instantly upon the completion of the step movement, which brings the nozzles into the position described, and the mouth of each nozzle is thereby closed by the blank picked up from the receiving-tube almost instantly after the suction becomes operative through it, and the nozzle remains thus closed until the blank is finally taken off at the delivery-tube by devices hereinafter described, as the nozzle starts away from the latter just after each halt and the suction is cut off from the nozzle at this point, the cut-off being complete by the time the blank is detached, so that no appreciable waste of air occurs at either end of the path through which the blanks are thus carried. The detaching-nozzles are cut off, as described, from the suction, except when they are depressed, and such depression continues only long enough to per-

mit the suction to operate upon the lower surface of the lowest blank carried by any overhanging nozzle, so as to detach it if it be a surplus blank. The detaching nozzles are thus closed and waste no air during the rotary movement of the spider and during all the descending and rising movement of the spider before and after the spider-arm in the descending movement encounters the pins K′ K′.

I will now describe the mechanism for imparting to the spider the movements above indicated and also the mechanism for controlling the feed of the blanks.

About the shaft of the spindle G at the upper side of the table there is journaled a ratchet-wheel L, from whose upper surface two studs L′ L′ extend upward into apertures c^4 c^4 in the hub of the spider, so that the rotation of the ratchet-wheel will rotate the spider, the aperture c^4 being of sufficient depth to permit the vertical reciprocation of the spider without disengagement of the pins therefrom. The ratchet-wheel is retained on the table by guards *l l*, bolted to the table and overhanging the edge of the ratchet-wheel. On the top of the table retained between suitable guides there is a bar M, which engages an arm M′, a slot m^{10} in the former being entered by a pin *m* in the latter, which is pivoted about the spindle G and carries a spring feed-pawl *m′*, adapted to engage the ratchet-wheel to rotate it as the bar is reciprocated, and at any convenient position about the circumference of the ratchet-wheel there is mounted on the table a detent or locking pawl M^2 to prevent reverse rotation of the ratchet-wheel. The bar M extends rearward and projects beyond the rear edge of the table, and is pivotally connected to a pitman-link M^3, which is connected to a crank-pin M^4, secured to the cam-wheel P on the shaft A′. For convenience of adjustment to regulate the throw of the pitman and the feed-stroke of the pawl *m′*, the crank-pin M^4 is adjustable in a transverse slot *p* across the face of the cam-wheel P. The slide-bar M carries a rigid stop-arm M^5, which projects from the upper side and extends off sidewise and terminates in a forwardly-projecting finger m^5, which is in position to be encountered by each of the spider-arms in turn, and thereby to arrest the rotary motion of the spider at the exact limit of the forward, which is the feeding, stroke of the bar M, and thus prevent an overfeed.

The cam-wheel P comprises virtually three cams, which perform three important movements, about to be described. Each section of the transverse portion or belt of the cam-wheel, which in effect constitutes an independent cam, will be referred to as a cam and denoted by an independent letter. The cam P′, whose outline is seen in Fig. 11, operates upon the roll or other abutment Q′ at the rear end of the lever-arm Q, which is fulcrumed at *q* on the bracket B, and at the forward end is forked, its fork-arms engaging the gudgeons D′ on the collar D, whereby this lever causes the vertical movement of the spider. It will be noticed that the spider is normally, both by gravity and by the action of the spring G^3, at the lowest position, and the cam P therefore operates through the medium of the lever Q to lift the spider, permitting it to descend and remain at the lower position only during the lesser portion of the rotation of the cam, which corresponds to the depressed or cut-away portion P^{10}, the spider being therefore upheld during nearly three-quarters of the entire revolution of the shaft A′. The position of the crank-pin M^4 with respect to this depressed or cut-away portion of the cam is such as to cause the descending movement to occur at the halt of the spider in its step-by-step rotary movement produced by the pawl-and-ratchet mechanism, which is operated by the crank-pin.

The tube F is designed to be provided in duplicate, or in any number, interchangeable, in order to avoid loss of time in filling, one tube being filled while another is being exhausted, and the substitution being made as nearly instantaneous as possible. This tube is supported at the lower end in any suitable foot-piece, as F′, and the upper end is lodged in a notch or aperture of the table provided for it as described, being secured in position by the latch *f*, as seen in Figs. 2 and 3, the latch being pivoted at one end and secured by a pin *f* at the other end. The tube is slotted at opposite sides or split at f^2 f^2 from the lower end to a point near the upper end, and a follower F^2 is provided, having a cylindrical portion F^{20}, fitted to the interior of the tube, and feathers or wings F^{21} F^{21}, adapted to extend out through the slots f^2 f^2 of the tube. At the upper corner of one of the feathers F^{21}, and at the lower corner of the opposite feather, there are secured guide-pulleys F^{22} F^{22}, which bear oppositely against the outside of the tube for the purpose of preventing the clamping of the follower or of the cylindrical portion thereof in the tube, such clamping being liable to occur in the manner in which draft is applied thereto, which is by means of a cable F^3, passing over the pulley F^4, mounted in a pulley-block f^4, which is attached to the lug F^{23}, which extends from the lower end of one of the wings F^{21}. The cable F^3 is attached at one end to a lever R, which is fulcrumed at *r* on the bracket B. It extends from said lever down around the pulley F^4, as described, thence up around a grooved pulley or sheave F^5, down around a guide-pulley F^6, mounted in a pulley-block f^6, which is secured to the floor, and thence up around the guide-pulley F^7, journaled in a hanger f^7 at the ceiling, and at the end it carries a weight F^8, which thus operates with a tendency to pull upward the follower F^2. To prevent the action of this weight in forcing upward the follower and the pile of blanks except at a certain stage in the action, as hereinafter described, I provide a brake-lever S, fulcrumed at *s* on the lug B^{40}, which extends

from the plate B^4, said brake-lever being arranged with one end in the form of a shoe S^2, overhanging the sheave-pulley F^5 and bearing upon the cable as it runs over said pulley, the other end of the lever being provided with a link S′, which extends through the web B^5 of the bracket B and has a stop-collar S^{10} and a spring S^4 coiled about it reacting between the stop-collar and the web and holding the shoe down onto the cable with sufficient force to hold it at that point.

The cam-wheel P comprises a cam P^2, which is circular except as to an upraise or tooth P^{20}, which encounters an abutment-roll S^3 on the lever S once in each revolution of the shaft and for an instant during which it is passing said roll releases the cable from the brake-shoe. The lever R at the end opposite that at which the cable is attached has a roll or abutment R′ in the plane of the cam P^3, and this cam has the eccentric or operating portion P^{30}, adapted to encounter the roll R′ and force that end of the lever downward, lifting the opposite end of the lever and drawing upward on the end of the cable attached thereto. The cams which control the rising-and-falling movement of the spider and pick-up nozzles and the movement of the levers R and S for lifting the follower F^2 and for setting and releasing the brake-shoe S^2 are so arranged with respect to the abutments upon which they respectively operate in actuating the respective levers and with respect to the crank and pitman which causes the step-by-step rotary movement of the spider as to produce the several movements in the order and with the effect which will now be described.

In any pile of blanks, such as contained in the supply-tube, owing to slight irregularities which will always be present to some extent and owing to the burs or fins which are liable to be present on the edges, there will be found a considerable degree of elastic compressibility, a pile of four or five feet in height, such as is here illustrated, being easily compressed from two to four inches. Immediately upon the completion of a step in the rotary movement of the spider, and while, therefore, a pick-up nozzle is overhanging the upper mouth of the supply-tube the eccentric portion P^{30} of the cam P^3 collides with the abutment of the lever R and actuates that lever, causing it to pull upward on the end of the cable attached to it and lift the follower F^2, causing it to lift the pile of blanks in the tube upward a distance which is calculated to be equal to the maximum compressibility or elasticity of the pile. Immediately afterward the tooth P^{20} of the cam P^2 collides with the abutment of the lever S and releases the restraint of the brake-shoe on the cable F^3 for a single instant; but during that instant the weight F^8, operating through the cable, lifts the follower until the topmost blank of the pile is pressed against the mouth of the nozzle and the pile compressed to such a degree as the weight is adequate to accomplish. The brake-shoe having resumed its grip on the cable, the abutment of the lever R runs off the eccentric portion P^{30} on the cam P^3 and lets the follower and the pile of blanks thereon descend in the tube, the descent being a little more than the amount of compression caused by the weight and being sufficient, therefore, to withdraw the pile, leaving the blank or blanks which are held by suction on the nozzle free from contact with the withdrawn pile and free, therefore, to be carried away with the nozzle in its next rotary step movement. If more than one blank is picked up by the nozzle passing the supply-tube, as will frequently be the case, owing to the adhesion of the blanks to one another or engagement of their burs, it is the purpose of the detaching-nozzles to take off all the blanks below the first one, and for this purpose at each halt the spider is depressed or allowed to descend, so that the blanks carried by the pick-up nozzles may be brought into close proximity to the upwardly-open mouth of the detaching-nozzles and exposed to suction which operates through said nozzles when they are opened, and the opening of the nozzles is effected, in the manner already described, by the collision of the spider-arms with the pins projecting up from the cross-heads K on the detaching-nozzles. The lowest blank, if there is more than one, will be taken off by the detaching-nozzle, the adhesion between the two blanks being invariably overcome by the suction upon the lower surface of the lower blank.

I find it desirable not to cause the pick-up and detaching-nozzles to approach each other so closely as to positively press the lowest blank onto the detaching-nozzle, because when the adhesion between the blanks is caused by oil or other liquid which may be between them such positive pressure is liable to produce an almost perfect vacuum between the two blanks, and so to cause the adhesion or apparent adhesion of the blanks to each other to be very much greater than the suction which can be exerted through the nozzle upon the lower blank, and this would, of course, prevent the detaching of the lower blank. I therefore make the length of the pins K′ such as to cause the detaching-nozzle to be depressed and open to admit suction without bringing the blank carried by the pick-up nozzle into contact with the detaching-nozzle and without producing, therefore, any pressure between the blanks if more than one is carried by the pick-up nozzle.

Several surplus blanks may sometimes be picked up and the first detaching-nozzle encountered, and in that case the first detaching-nozzle might separate only the lowest of the surplus blanks, leaving still other of the surplus blanks adhering to the first one on the pick-up nozzle, and for this reason I provide the second and third detaching-nozzles, so that the remaining surplus blanks may be removed before the delivery-tube is reached.

In practice I have never found occasion for more than two of these detaching-nozzles, but any number might be provided, according to the supposed or actual exigencies of the case, as learned by experience in the use of any particular sort of blanks. In order to prevent positive pressure of the blanks when the spider descends, even if there should be several blanks adhering together on the pick-up nozzle, and at the same time to afford the second and subsequent detaching-nozzle, as well as the first, the best possible conditions for detaching the surplus blanks, I construct the pins K′ on the first detaching-nozzle a little longer than those on the second and those on the second a little longer than those on the third, so that the space allowed between the pick-up nozzle and the first detaching-nozzle shall be sufficient to accommodate the maximum number of blanks which in experience is found liable to be picked up—say, for example, four—without bringing the lowest one into contact with the detaching-nozzle and without, therefore, producing any pressure between the blanks. The second nozzle may have its pins arranged to allow for three blanks and the third for two blanks. This will usually, according to my experience, leave the first detaching-nozzle close enough to the overhanging blank, even if there is only one surplus blank, to enable it to exert pull enough on it to detach it.

It is of course necessary that any blank left on the detaching-nozzle shall be taken off therefrom immediately, so that the nozzle will open in order to operate upon the next blanks presented above it, and I therefore provide each of the pick-up nozzles with clearing-fingers W W, attached at the forward side in the direction of rotary movement, so as to reach and pass by each detaching-nozzle in advance of the pick-up nozzle to which they are attached. These fingers project down at both sides of the detaching-nozzle, being separated far enough to permit them to pass by the nozzle without colliding, but being near enough together to engage the overhanging edges of any blank which may be resting upon the nozzle, and thereby to push the blank off. The blank carried by the pick-up nozzle to the delivery-tube is stripped from the pick-up nozzle in a similar manner by means of stripping-fingers H^2 H^2, which project upward from the delivery-tube at the farther side in such position that they arrest the blank by engaging its edges, which project beyond the nozzle, holding it in position directly over the tube, while the nozzle moves onward in the next step movement of the spider. The suction is cut off, as nearly as may be calculated, at the same instant the mouth of the nozzle is uncovered by the detention of the blank, as described, so that no considerable waste of air occurs at this stage. The movement of the spider and the cut-off of the suction and the detaching and releasing of the blank at the delivery-tube are timed with respect to the movement of the press, so as to allow the blank time to fall and reach the die in advance of the operating movement of the punch toward the die. The release of the blank from the carrier may be timed, as found necessary by experiment, with any particular blank, taking into account the time required for the blank to pass through the delivery-tube and reach proper position in the die, so that this may occur before the punch descends so far as to prevent the blank from reaching this position. In order that the blanks may descend properly through the delivery-tube and slide edgewise over the die, I provide in the upper part of the tube near the receiving-mouth a trip-wire H′, extending across the tube near one side, which is encountered by one side of the blank as it falls, causing it to tilt from its horizontal position to vertical position, so that it will travel edgewise to the remainder of the tube.

When the supply-tube is to be removed and another one substituted, the most convenient method is to unlatch the tube at the upper end and then lift it clear of the follower F^2. The follower will then be introduced into the bottom of the tube to be substituted, which contains a new supply of blanks. Assuming that the change is made because of the exhaustion of the blanks in the tube which is to be removed, the follower will be nearly at the top of the tube to be removed, and in order to perform its work in a full tube it must be drawn down to the bottom, and for this purpose it is necessary to release the brake-shoe S^2. In order to do this conveniently, I provide a latch S^5, pivoted to the link S′ below the web B^5. This latch normally hangs, as shown in Fig. 2, in position such that it does not interfere with the action of the spring S^4, but upon being turned in position in line with the link, its end stopping squarely against the under face of the web, it retracts the shoe-lever and releases the cable and holds the shoe out of action.

I claim—

1. In a mechanism for feeding blanks, in combination with a receptacle for the blanks constructed and arranged to contain them in a pile or continuous rank, a carrier having a pick-up device adapted to face the discharge-mouth of the receptacle to check the pile and to receive blanks therefrom; mechanism which operates the carrier to cause the pick-up device to approach and depart from such position to receive and carry away the blanks; devices constructed and arranged to yieldingly advance the blanks by pressure at the rear or bottom of the pile; and mechanism for positively withdrawing said devices to permit the pile of blanks to recede, said mechanism being timed with respect to the movement of the carrier to cause both the advance and withdrawal to occur while the pick-up device stands facing the delivery-mouth.

2. In a mechanism for feeding blanks, in combination with a receptacle for the blanks

adapted to contain them in a pile or rank; a carrier having a pick-up device adapted to face the discharge-mouth of the receptacle to check the outward movement of the pile and to receive blanks therefrom; mechanism for operating the carrier to cause the pick-up device to approach and depart from blank-receiving position; devices constructed and arranged to advance the pile of blanks positively to a limited extent, and other devices constructed and arranged to advance the pile yieldingly until checked; and mechanism for withdrawing said devices to permit the pile to recede, said yielding and advance movements and said withdrawing movement being timed to occur while the pick-up device stands in position to check the advance movement.

3. In a mechanism for feeding blanks to die-presses and other machines, in combination with a supply-tube, the carrier having a blank-holding device constructed and arranged to face the end of the supply-tube to receive the blanks therefrom; mechanism for operating the carrier to cause the blank-holding device to approach and depart from such position to receive and carry away the blanks; a follower in the supply-tube, and devices constructed and arranged to advance the follower positively, and other devices adapted to advance it with yielding pressure in the tube to feed the blanks to the delivery end thereof; devices for restraining such yielding pressure of the follower on the blanks, constructed and arranged to both intermit such restraint after the positive advance is performed and reapply the same, within the time that the blank-holding device faces the delivery-mouth of the supply-tube; and mechanism constructed and arranged to afterward, and before the departure of the blank-holding device, release the follower from the positively-advancing devices to permit the blanks to recede in the tube.

4. In a mechanism for feeding blanks to die-presses or other machines, in combination with a supply-tube for the blanks, the carrier having a blank-holding device, and mechanism for operating it to cause it to move to a position facing the delivery-mouth of the tube, and to move away from such position; a follower F^2 in the supply-tube; a cable connected to the follower, and suitable means for applying stress to the cable to cause it to advance the follower in the tube; a brake constructed and arranged to restrain the draft of the cable on the follower; mechanism constructed and arranged to positively advance the follower, and cams which respectively operate such mechanism and the brake, timed with respect to the carrier's movement to cause the follower to be positively lifted, and immediately thereafter to cause the brake to be applied and then released and next to allow the follower to recede; all said movements being performed during the time that the blank-holding device faces the end of the tube.

5. In a mechanism for feeding blanks to die-presses and other machines, in combination with a supply-tube for the blanks and a carrier having blank-holding devices and mechanism for operating it to bring such blank-holding devices opposite the delivery-mouth of the tube and cause them to depart from such position; the follower F^2 in the supply-tube; the lever R and the cam which actuates it; a cable connected to said lever and looped about a guide on the follower; and suitable means for applying stress to the cable to cause it to exert draft on the follower to advance it in the tube; a brake constructed and arranged to restrain such draft upon the follower; and a cam which is adapted to actuate the brake to release such restraint; said cams being timed with respect to the movement of the carrier to cause the lever to be operated to positively advance the follower while the brake is operative on the cable, and immediately afterward release the brake, and then reapply the same, and then release the lever and allow the follower to recede; all said actions of the cams being performed while the blank-holding device faces the delivery-mouth of the tube.

6. In a press-feeding mechanism, in combination with a supply-tube and a carrier having a blank-holding device adapted to face the delivery-mouth of the tube to receive and carry away blanks therefrom; a follower F^2 in the supply-tube; a cable connected thereto and running over suitable guides; a weight supported by the cable to force the follower yieldingly along the tube to feed the blanks to the delivery end; brake mechanism adapted to operate upon the cable to restrain its draft upon the follower; a lever R suitably connected with the follower to advance the same in the tube; cams which operate upon said lever and upon the brake mechanism, timed with respect to the movement of the carrier to cause the lever to lift the follower and immediately after to release the brake while the blank-holding device faces the end of the tube, and afterward to apply the brake and permit the lever to be retracted and allow the follower to recede before the departure of said device from the tube.

7. In a press-feeding mechanism, a receptacle for the blanks to be fed consisting of a tube F, split or rifted at opposite sides; a follower adapted to move in said tube, and having wings protruding through the rifts; guides on the wings adapted to bear against the outer surface of the tube at opposite sides thereof and at points longitudinally separated thereon, and draft devices connected to the follower substantially in the plane of the rift at the side of the tube at which the foremost of said outer guides is located.

8. In a press-feeding mechanism, in combination with the tube F having the opposite rifts f^2 f^2; the follower F^{20} within the tube having the wings F^{21} F^{21} extending through the rifts, the rollers F^{22} F^{22} mounted on the

wings respectively at opposite ends, and adapted to bear upon the tube at opposite sides, and draft devices connected to the follower in the plane of the wings at the side at which the foremost of the rollers F^{22} is located.

9. In a feeding mechanism for a press or other machine a carrier having a pick-up device constructed and arranged to detachably hold the blanks by action upon one surface thereof; a source of blanks and means for moving the carrier from such source to delivering position, in combination with a detaching device adapted to act upon the blank at the opposite side thereof from the pick-up device and located adjacent to the path of the latter between the source and delivery; mechanism for causing the pick-up device and the detaching device to approach at the point in the path of travel of the former at which the said devices stand opposite each other, said pick-up and detaching devices and the mechanism for causing them to approach being constructed and arranged to terminate such approach before the blanks are positively pressed between the pick-up and detaching devices.

10. In a press-feeding mechanism, a carrier having a pick-up device adapted to detachably hold the blanks by action upon one surface thereof; a source of blanks and mechanism for moving the carrier from such source to delivering position, in combination with a suction-nozzle located adjacent to the path of the pick-up device between the source and delivery, and at the opposite side of the blank from the pick-up device; mechanism for causing the pick-up device and the suction-nozzle to approach at the point in the path of travel of the former at which said devices stand opposite to each other; devices associated with the suction-nozzle for cutting off and admitting the suction thereto, and mechanism for operating said suction-admitting and cut-off devices constructed and arranged to admit the suction while the pick-up is approaching the suction-nozzle, and before the blanks are positively grasped between the two, whereby the suction-nozzle is adapted to cause the suction to operate upon the blank to detach the same before contact of the blank with the suction-nozzle occurs.

11. In combination with a press, the chute in which the blanks descend to the die; mechanism for delivering the blanks facewise into the chute, and a trip in the chute at one side thereof in position to be encountered by one side of the blank as it falls and to trip it to cause it to advance thence edgewise to a position above the die.

12. In a press-feeding mechanism, in combination with a carrier having a pick-up device adapted to detachably hold the blanks by action upon one surface thereof; a source of blanks and means for moving the carrier from said source to delivering position; a suction-nozzle adapted to operate as a detaching device located adjacent to the path of the pick-up device between the source and the delivery and at the opposite side of the blanks from the pick-up device, such suction-nozzle comprising a spindle; a bearing in which such spindle has sliding movement; the spindle having a longitudinal passage leading from the nozzle-mouth toward the opposite end, and another longitudinal passage leading from said opposite direction toward the first passage, but stopping short thereof; and lateral ports from the proximate ends of said longitudinal passage to the bearing-surface, the spindle-bearing having a recess adapted at one position within the range of the longitudinal sliding movement of the spindle to register with both said ports, and at other position to be out of registration therewith, whereby they are closed; suitable means for holding the nozzle yieldingly at the latter position and devices for moving it longitudinally to the former position constructed and arranged to so move it when the pick-up device is opposite the suction-nozzle mouth.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Hastings, Michigan, this 7th day of September, 1898.

EMIL TYDEN.

Witnesses:
CHAS. S. BURTON,
JEAN ELLIOTT.