No. 686,765.. Patented Nov. 19, 1901.

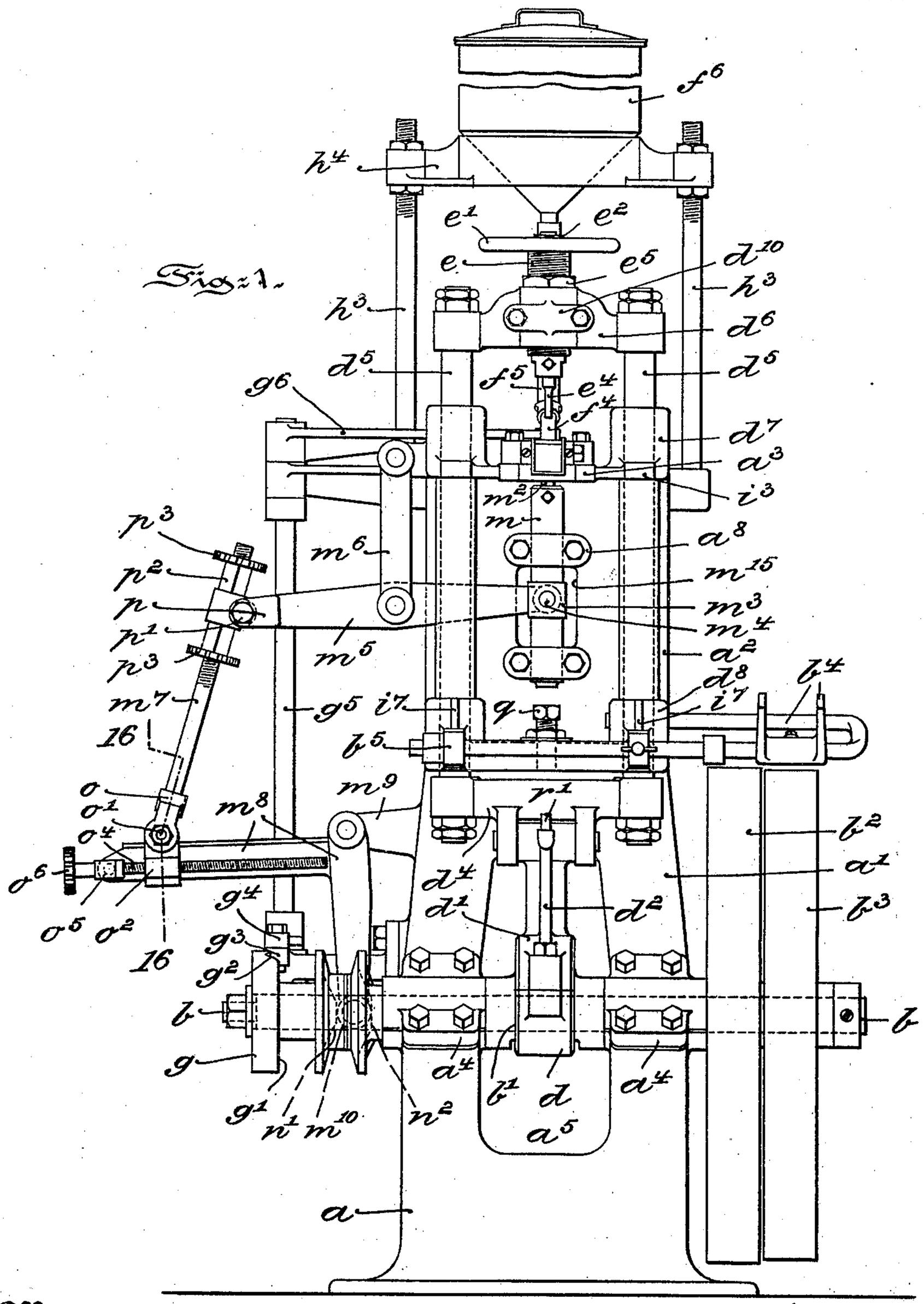
E. L. RICHARDS.

TABLET MACHINE.

(Application filed Sept. 4, 1901.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1.



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Thomas M. Smith

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(No Model.) 5 Sheets—Sheet 2.

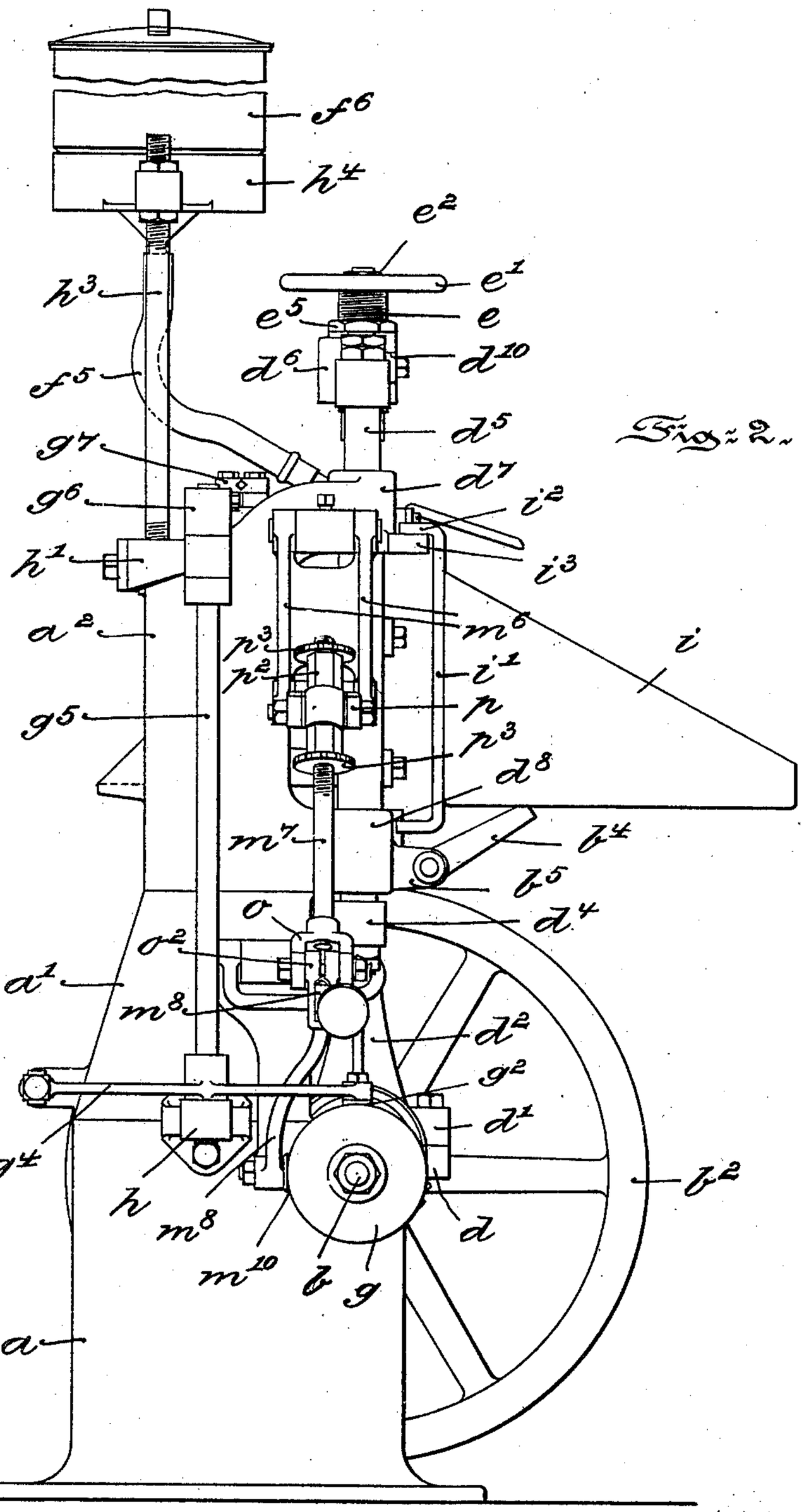

Fig. 2.

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(No Model.) 5 Sheets—Sheet 3.

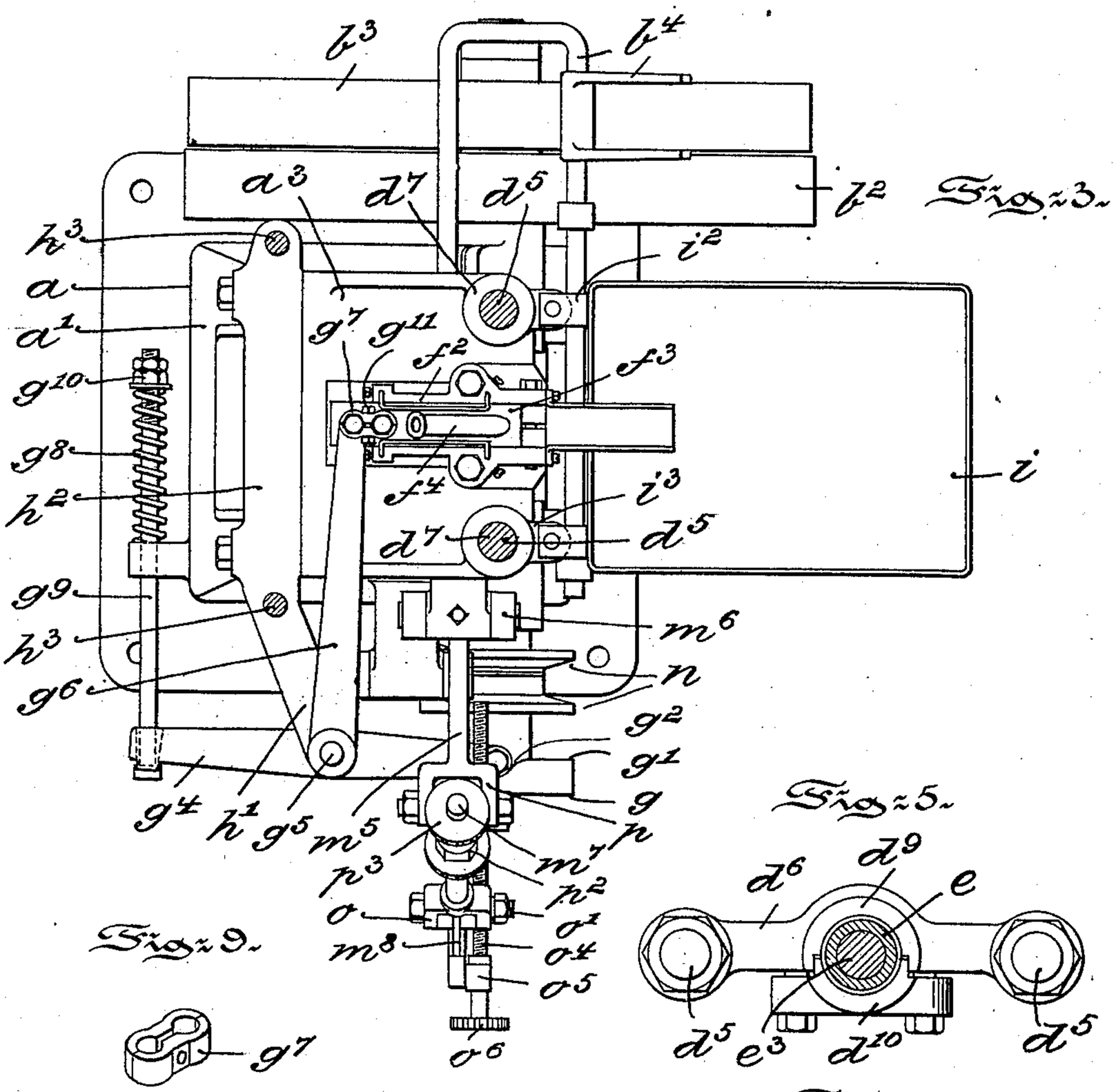


Fig. 3.

Fig. 9.

Fig. 5.

Fig. 6.

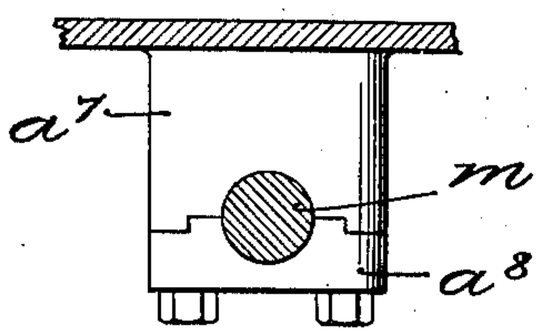


Fig. 8.

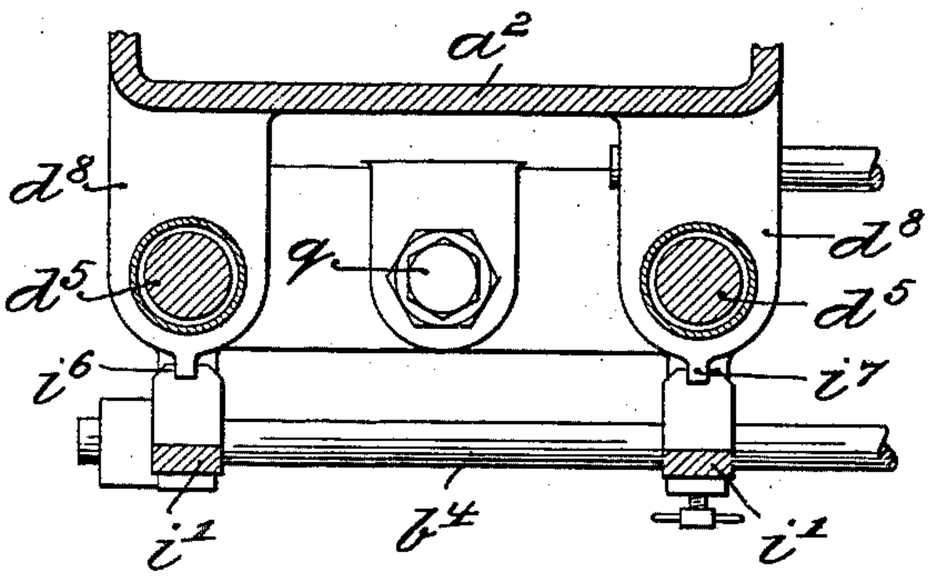
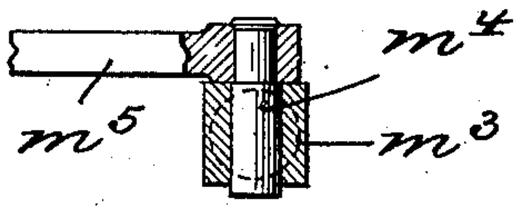


Fig. 7.



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5 Sheets—Sheet 4.

Fig. 4.

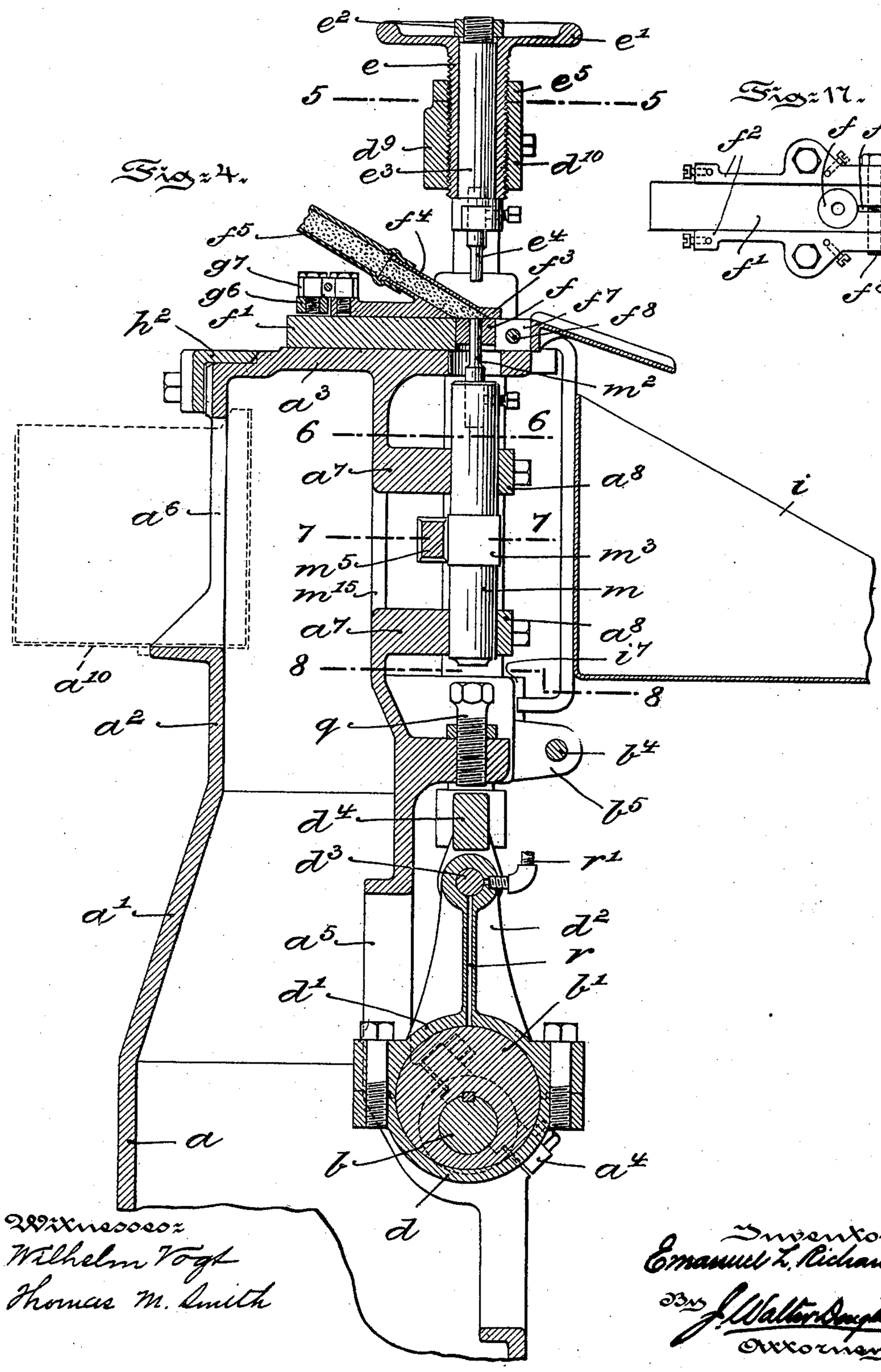

Fig. 17.

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(Application filed Sept. 4, 1901.)

(No Model.) 5 Sheets—Sheet 5.

Fig. 10.

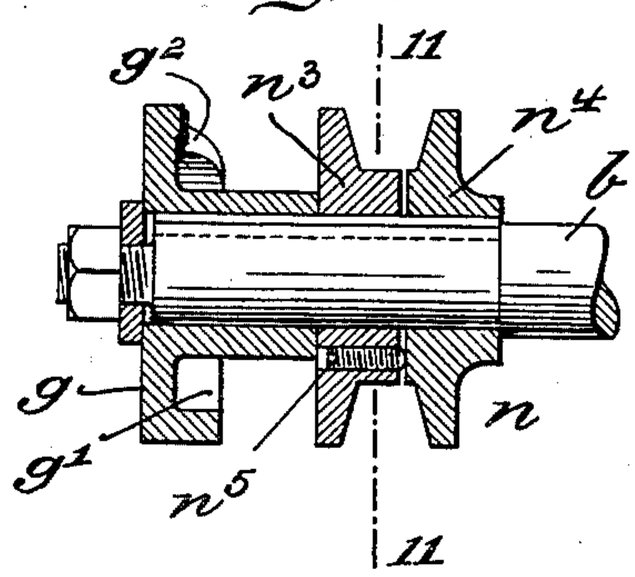


Fig. 11.

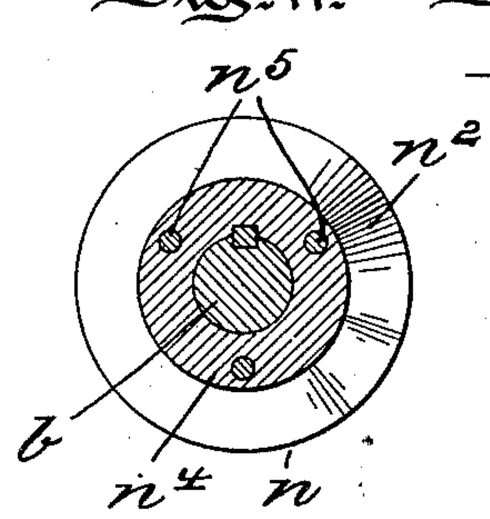


Fig. 12.

Fig. 13.

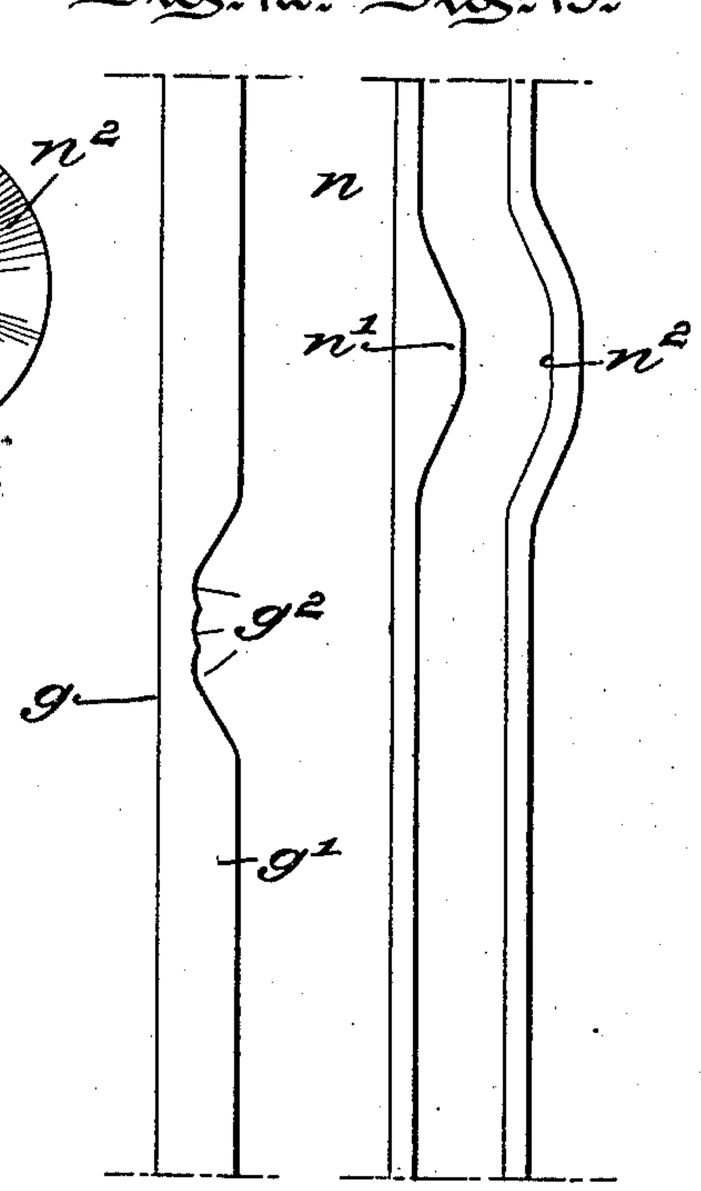


Fig. 14.

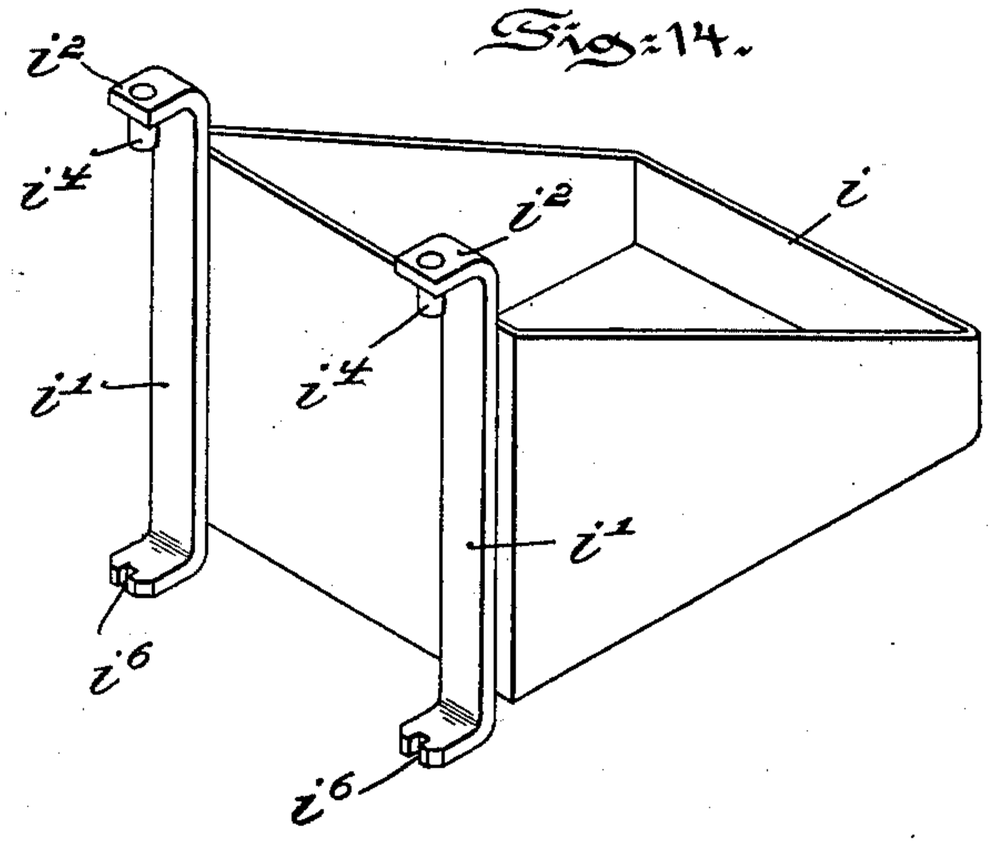


Fig. 15.

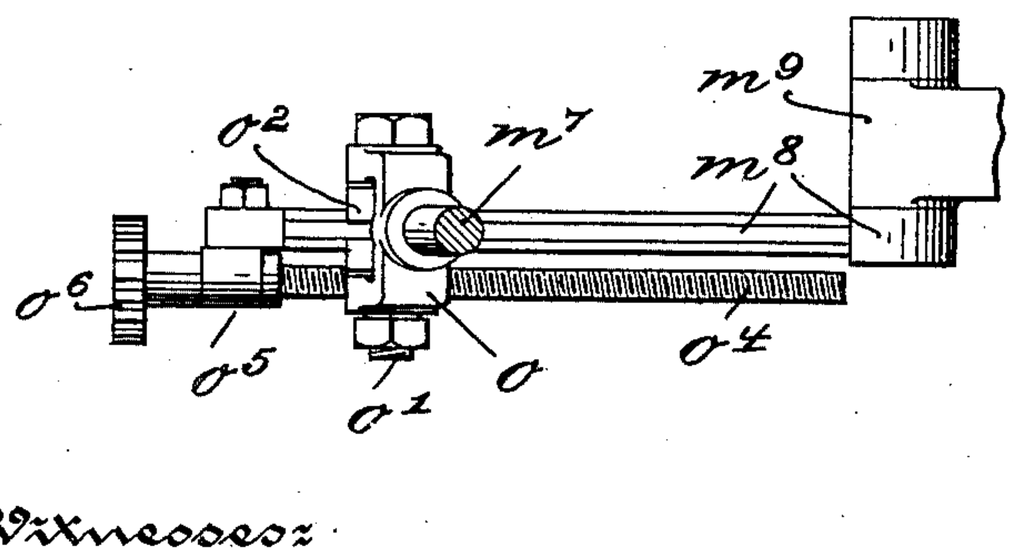
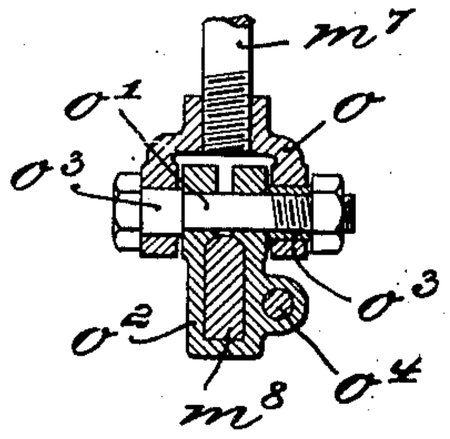


Fig. 16.



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UNITED STATES PATENT OFFICE.

EMANUEL L. RICHARDS, OF PHILADELPHIA, PENNSYLVANIA.

TABLET-MACHINE.

SPECIFICATION forming part of Letters Patent No. 686,765, dated November 19, 1901.

Application filed September 4, 1901. Serial No. 74,338. (No model.)

To all whom it may concern:

Be it known that I, EMANUEL L. RICHARDS, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Tablet-Machines, of which the following is a specification.

My invention has relation to a tablet-forming machine of a type wherein the tablet or lozenge is formed in a die and between two oppositely-arranged plungers, and in such connection it relates to the construction and arrangement of such a machine.

The principle object of my invention is to provide a tablet-forming machine of improved construction and arrangement whereby the parts are made readily accessible for changing punches or dies, cleaning, &c., and in which accurate and quick means of adjustment of the working parts of the machine can be effected.

The nature and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a front elevational view of a tablet-machine embodying main features of my invention. Fig. 2 is a side elevational view thereof. Fig. 3 is a top or plan view of the machine, taken below a horizontal plane passing beneath the upper punch. Fig. 4 is an enlarged vertical sectional view of Fig. 2. Figs. 5, 6, 7, and 8 are cross-sectional views taken, respectively, on lines 5 5, 6 6, 7 7, and 8 8 of Fig. 4. Fig. 9 is a perspective view of the link or toggle connecting the feed-shoe with its actuating-arm. Fig. 10 is a longitudinal sectional view, enlarged, of the cams on the main shaft for operating, respectively, the lower punch and the feed-shoe. Fig. 11 is a section taken on line 11 11 of Fig. 10. Figs. 12 and 13 are diagrammatic views illustrating the cam-surfaces of the cams of Fig. 10 projected upon a flat surface. Fig. 14 is a perspective view of the box for receiving the finished tablets. Fig. 15 is a top or plan view, enlarged, of a portion of the adjusting mechanism for the lower punch. Fig. 16 is an enlarged sectional view taken on the line 16 16 of Fig. 1; and Fig. 17 is a detail view, enlarged, of the block and die held therein.

Referring to the drawings, a represents the base or pedestal of the framework of the machine, substantially square in cross-section and hollow. This base a is capped by a pyramidal portion a', also hollow and square in cross-section, and this portion a' is in turn surmounted by a hollow portion a^2, having a roof a^3, forming the table upon which the feed-shoe and the die are supported, as hereinafter more particularly set forth.

The pedestal or base a is provided in front with bearings a^4, in which the driving-shaft b is supported and rotates. Between the bearings a^4 the front wall of the pedestal is cut out, as at a^5, to receive the eccentric b' and accessory parts and to render these parts readily accessible for the purposes of cleansing and repair. On the shaft b at one side of the machine are arranged the fast and loose pulleys b^2 and b^3, respectively, so that a suitable belt (not shown) may either surround the fast pulley b^2 to drive the machine or be shifted by a belt-shifter b^4 upon the loose pulley b^3 to stop the operation of the machine. The eccentric b' on the shaft b is surrounded by a two-part strap d d', on the upper portion d' of which is formed the extension or rod d^2, pivoted by a pin d^3 to the base of a cross-arm d^4. In the ends of this cross-arm d^4 are fastened the lower ends of two standards d^5, the upper ends of which are secured to a cross-head d^6. The standards d^5 slide up and down in two sets of bearings d^7 and d^8, located upon the front of the top portion a^2 of the framework, and form a means of transferring the motion of the eccentric b' and its rod d^2 to the cross-head d^6. Midway of its ends the cross-head d^6 is formed with a semicircular internally-screw-threaded portion d^9, and opposite this opening is bolted a strap d^{10}, forming with the portion d^9 of the cross-head d^6 a tubular screw-threaded opening for the reception of an externally-screw-threaded sleeve e. This sleeve e has its upper end formed into a hand-wheel e', and by means of a nut or strap e^2 it supports in its interior a plunger e^3, to the under face of which is removably secured the upper punch e^4 of the machine. By turning the hand-wheel e' the sleeve e may

be elevated or depressed in the cross-head d^6 to thereby adjust the plunger e^3 in a vertical plane toward or away from the table a^3 of the machine, which table supports the die f in which the tablet is to be formed. By unbolting the strap d^{10} the sleeve e, plunger e^3, and punch e^4 can be readily and quickly removed from the machine, and by unloosening the plunger e^3 from strap or bolt e^2 the plunger can quickly be separated from the sleeve e for repair or replacement. A collar e^5, screwed upon the exterior of the sleeve e at or near its upper end and fitting down upon the cross-head d^6 when the sleeve has been properly adjusted therein, serves as a gage or stop to insure the sleeve e again entering the cross-head d^6 the proper distance after it has been removed. The strap d^{10} forms a means of locking the sleeve to the cross-head d^6 to prevent accidental turning, since by tightening the bolts of the strap d^{10} the sleeve e will be tightly clamped to the cross-head.

The table a^3 supports a block f', forming with its sides f^2 a groove or channel in which the feed-shoe f^3 may slide horizontally, so as to periodically cover the upper face of the die f and discharge or feed the granulated or powdered material thereto. These sides f^2 are bolted to the table. The shoe f^3 is of the ordinary form, having the inclined chamber or receptacle f^4 fed by means of a flexible tubing f^5 from a hopper or receptacle f^6, containing the granulated material in bulk. The front end of the block f' has a recess or opening into which the die f fits, and that portion of the block f' projecting beyond the die f toward the front of the machine is split, as at f^7, and the split portions are clamped toward each other to secure the die in the block f' by means of the bolt f^8, as clearly illustrated in Fig. 17, said bolt passing through the sides f^2 as well as the split portions.

The reciprocatory movement of the shoe f^3 is controlled by the main shaft b, as follows: Upon the shaft b is secured a cam g, having its face g' formed, as illustrated in Figs. 3, 10, and 12, with a depression g^2. On the face g' and depression g^2 is adapted to travel a roller g^3, secured to one end of a rock-arm g^4. This rock-arm g^4 is connected intermediate of its ends to the lower end of a rock-shaft g^5, which projects upward and is secured to one end of an oscillating arm g^6. The oscillating arm g^6 is connected by a toggle g^7 to the rear of the shoe. When the roller g^3 sinks into the depression g^2 of the cam g, the rock-arm g^4, shaft g^5, and oscillating arm g^6 are actuated to force the shoe f^3 forward over the die f; but when the roller g^3 rises from the depression g^2 to the face g' of the cam g, then a reverse movement of the rock-arm g^4, shaft g^5, and arm g^6 retracts the shoe f^3 and uncovers the die f. The face g' acts as a dwell of the cam, and hence while the roller travels over the face g' no movement of the shoe f^3 can take place. The roller g^3 is held against the cam g by means of the spring g^8, surrounding a rod or pin g^9, connected to the free end of the rock-arm g^4, as clearly illustrated in Fig. 3. This spring g^8 normally acts upon a head or collar g^{10} of the rod or pin g^9 to retract the pin g^9 and the arm g^4, thus forcing the roller g^3 against the cam g. The toggle g^7, connecting the oscillating arm g^6 with the shoe f^3, is adjustable to take up the wear and tear upon the bolts or pivots on the rear of the shoe and the end of the arm g^6. For this purpose the toggle g^7 is split longitudinally into halves or sections, and intermediate of its tubular ends a bolt or tightening-screw g^{11} traverses the sections and serves as a means for drawing up the halves of the toggle to more closely fit upon the pivots of the parts it is to connect. This construction of toggle g^7 also provides an easy way or means for quickly disconnecting the shoe f^3 from the arm g^6. The rock-shaft g^5 is maintained in its vertical position by a lower bearing-block h, projecting from the side of the pedestal a, and by an upper bearing h', formed on or projecting from a bracket h^2. This bracket h^2 is set in flush with the table a^3 in the rear of the block f', so as to form no obstruction to the removal of waste material escaping from the rear of the shoe f^3. The bracket h^2 also forms a support for two standards h^3, which extend upward and support a frame h^4, in which the receptacle or hopper f^6 is supported. Below the bracket h^2 the rear wall of the portion a^2 of the framework is cut out to form an opening a^6 for the reception of a can or box a^{10} to receive the waste materials, as illustrated in Fig. 4. On the front of the portion a^2 is supported a receptacle or trough i for the reception of the tablets formed in the die f. The preferred manner of supporting the receptacle i upon the frame a^2 consists in securing to the vertical wall of the receptacle two straps i' of metal, each having the upper end i^2 bent over and resting upon a ledge i^3 upon the front of the frame a^2, to which it may be secured by the pin or bolt i^4 passing through a hole in the ledge i^3. The lower end i^5 of each strap is also bent inward and is notched, as at i^6, to fit into a projection i^7 on the front of the frame a^2. The arrangement and operation of the lower punch and its plunger or head are as follows: From the front wall of the top portion a^2 below the table a^3 project the two horizontal frame-plates a^7, forming when straps a^8 are bolted to the plates a^7 the bearings for the head or plunger m. This head or plunger m carries at its upper end a detachable punch m^2, adapted to traverse the die f and to form with the punch e^4 a tablet in said die. The punch m^2 also serves to eject the tablet from the die in a manner well known in the art.

The mechanism for reciprocating the plunger m in its bearings consists of a block m^3, formed or united to the plunger m intermediate of its ends, into which extends a bolt or

pin m^4 on one end of an oscillating arm m^5. The bolt m^4 may be removed by extending the hand through the rear opening a^6 and an opening m^{15} back of the plates a^7. Intermediate of its ends the arm m^5 is pivoted to a link m^6, swinging from the frame a^2, as clearly illustrated in Fig. 1. An adjustable link m^7, to be hereinafter described, connects the other end of the arm m^5 with one end of a bell-crank lever m^8, the connection being also adjustable, as will be hereinafter more fully described. The bell-crank lever m^8 is pivoted to an extension m^9 of the frame a' and has a roller m^{10} engaging a two-faced cam n of peculiar construction. This cam n is secured to the driving-shaft b, and has two cam-surfaces $n'n^2$, facing each other to form a double track in which the roller m^{10} runs. Upon these surfaces n' n^2 are formed the dwell and raising and lowering faces, as clearly illustrated in Fig. 13. Each surface n' n^2 is formed on a separate collar n^3 or n^4, and between the collars n^3 n^4 the cam-track is formed. The width of this track may be easily regulated, as illustrated in Fig. 10, by splining both collars n^3 and n^4 to the shaft b and adjusting one collar toward or away from the other by means of set-screws n^5 or equivalent means. There are two adjustments or take-ups for the connection between the bell-crank lever m^8 and the oscillating arm m^5. The first is illustrated in detail in Figs. 1, 15, and 16, and consists in screwing to the end of the link m^7 a yoke o, through which passes the bolt o', forming a pintle on which the link m^7 may swing. The bolt o' also serves to clamp a split sleeve o^2 tightly down upon the arm of the bell-crank lever m^8, which sleeve o^2 is inclosed within the yoke o. To so clamp the sleeve o^2, the bolt o' has two opposing collars or ears o^3, between which the wings of the split sleeve o^2 are clamped when the nut of the bolt o' is properly tightened. The sleeve o^2 is adapted to slide upon the lever-arm m^8 when the bolt o' is loosened, and to adjust the range of movement of the sleeve o^2 on the bell-crank lever m^8 a set-screw o^4 is passed through an eye o^5, formed on the extreme end of the bell-crank lever m^8 and traverses the sleeve o^2. By turning the nut or hand-wheel o^6 of the screw o^4 the sleeve o^2 may be advanced toward or away from the eye o^5, and consequently the point of pivotal connection between the lower end of link m^7 and bell-crank lever m^8 may be altered, as required. When this pivotal point is properly adjusted, the sleeve o^2 is quickly and easily locked to the lever m^8 by tightening the bolt o'. The pivotal connection between the upper end of link m^7 and the free end of the oscillating arm m^5 is also adjustable. For this purpose the free end of arm m^5 is forked, as at p, and carries a bolt p', forming a pintle or pivot upon which the arm m^5 may oscillate. This bolt p' also pivotally supports a block p^2, through which the link m^7 passes. Two opposing nuts p^3 serve to lock the block p^2 in proper position on the link m^7, and by loosening the nuts p^3 the block p^2 may be shifted up and down upon the link m^7 into required position, in which position it may be clamped by advancing the nuts p^3 toward each other. The plunger m in its lowermost position rests or is supported upon an adjustable screw-bolt q, so that the impact of the upper punch in the formation of the tablet is taken up by the bolt q, which is bolted in the frame a', and hence the operating mechanism for the lower punch is relieved of all direct jar or strain. The bearings for the plunger m in the frame-plates a^7 being each provided with a front strap a^8, bolted to the plates a^7, are so arranged that when the straps are removed from the frame-plates the plunger m and its punch may be removed from the machine through the front thereof for the purpose of cleaning or repairs.

The lubrication of the eccentric b' and the pin d^3, forming the pivot between the extension d^2 and cross-arm d^4, is accomplished by forming in said extension an oil-duct r, leading from the pin d^3 to the eccentric b', and in conveying oil from a suitable source by a pipe r' to said pin d^3, as clearly illustrated in Figs. 1 and 4. The belt-shifter b^4 slides or is guided in two projections b^5, formed on the front of the machine.

By arranging the framework and parts as hereinbefore described it will be seen that the driving-shaft b is located in the pedestal or base a of the machine, lending stability to the machine; and the axial line of said shaft is directly below the vertical axes of the two punches and of the standards d^5, operating the upper punch.

Having thus described the nature and object of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a tablet-forming machine, a framework consisting of three superposed hollow frame-sections, the upper section being smaller in cross-section than the lower section or pedestal and the upper and lower sections being connected by a pyramidal intermediate section, a main or driving shaft located in the pedestal, a die-holder and table supported by the roof of the upper frame-section, an upper plunger and punch, a frame carrying the upper plunger and punch and reciprocating in the front of the upper frame-section, a lower plunger and punch reciprocating in the front of the upper frame-section and means, controlled by the driving-shaft for reciprocating the two plungers and punches, all arranged so that the axial line of the driving-shaft is located below the table and below and in alinement with the vertical axis of the two plungers.

2. In a tablet-forming machine, a cross-head, means for raising and lowering said cross-head, a strap forming with said cross-head an internally-threaded bearing, said strap removably secured to said cross-head, a screw-threaded sleeve adapted to be ad-

vanced in the bearing so formed and a punch and its auxiliaries carried by said sleeve.

3. In a tablet-forming machine, a cross-head having a semicircular internally-screw-threaded portion intermediate of its ends, a strap adapted to be removably secured to said cross-head to form with said semicircular portion an internally-threaded bearing, a screw-threaded sleeve adapted to be advanced or retracted in said bearing, a nut or collar located on said sleeve and forming a gage to limit the movement of the sleeve in its bearing, means for clamping the strap tightly upon the cross-head to lock the sleeve in its bearing, and an upper punch and its accessories carried by said sleeve.

4. In a tablet-forming machine, a die, a feed-shoe adapted to traverse the die to convey material thereto, and means for reciprocating the feed-shoe, comprising a main or driving shaft, a side-motion cam located on said shaft, a rock-arm and shaft adapted to be operated by said cam, and an oscillating arm operated by said shaft and pivotally connected with the feed-shoe.

5. In a tablet-forming machine, a feed-shoe, a bolt projecting from the rear portion of said shoe, a split toggle pivotally connected at one end to the bolt of said feed-shoe, an oscillating arm, a bolt projecting from one end of said arm and pivotally connected to the other end of said toggle, a tightening-screw traversing the split toggle intermediate of its pivotal connections, and means for operating said oscillating arm.

6. In a tablet-forming machine, a feed-shoe, an oscillating arm adapted to reciprocate said shoe, a cam, a rock-arm engaging said cam and operated thereby, said rock-arm controlling the oscillating arm, and a spring normally tending to hold the rock-arm in engagement with said cam to prevent accidental movement of the feed-shoe.

7. In a tablet-forming machine, a block, a feed-shoe sliding in said block, a framework, a table supporting said block and forming the top of said framework, a bracket set flush in said table to the rear of said block, standards supported by said bracket, a feed hopper or receptacle supported by said standards and a flexible tube connecting said receptacle with said feed-shoe.

8. In a tablet-forming machine, a receptacle adapted to receive the finished tablet, a framework for the machine, upper ledges extending from the front of said framework, straps secured to the rear wall of said tablet-receptacle, each strap being bent at its upper and lower ends and provided with pins at the upper bent ends adapted to enter said lugs and two projections located on the front of the machine, and adapted to enter notches formed in the lower ends of said straps.

9. In a machine of the character described, a lower punch, a plunger carrying the same, a driving-shaft, a cam located thereon, a bell-crank lever operated by said cam, a link, means for adjustably and pivotally connecting one end of said link to the bell-crank lever, an oscillating arm adapted to reciprocate the plunger, and means for adjustably and pivotally connecting said oscillating arm with said link.

10. In a machine of the character described, a plunger and punch, a bell-crank lever and a link forming part of the mechanism for reciprocating the plunger and punch, a split sleeve surrounding one arm of said bell-crank lever, a yoke carried by the link and surrounding the split sleeve, and a bolt traversing the sleeve and yoke and adapted to clamp the sleeve upon the bell-crank-lever arm, said bolt forming a pivotal connection for the sleeve with said yoke.

11. In a machine of the character described, a plunger and punch, mechanism for reciprocating said plunger and punch, a bell-crank lever and a link forming part of said mechanism, a split sleeve surrounding one arm of the lever, a threaded adjusting-screw adapted to advance or retract the sleeve on said arm, a yoke secured to one end of the link and adapted to receive the split sleeve and a bolt traversing the yoke and sleeve and adapted when tightened to clamp the sleeve to the bell-crank-lever arm, said bolt forming a pivotal connection for the sleeve and yoke.

12. In a machine of the character described, a plunger and punch, mechanism for reciprocating said plunger and punch, an oscillating arm and a link forming part of said mechanism, a yoke formed on said arm, a block loosely traversed by said link, a bolt pivotally securing said block in said yoke, and two thumb-nuts adapted to be advanced or retracted on said link to bind the block to said link.

13. In a machine of the character described, a plunger and punch, an oscillating arm pivotally connected at one end to said plunger, a link pivoted at one end to the frame of the machine and pivotally supporting at its other end the oscillating arm at a point intermediate of the ends of said arm, a second link pivotally and adjustably secured to the free end of said arm and means for oscillating said second link.

14. In a machine of the character described, a main or driving shaft, an eccentric secured thereon, a two-part strap surrounding said eccentric, a rod carried by said strap, and a pin to which said rod is pivotally connected, in combination with means for lubricating the pin and eccentric, said means comprising a tube conducting oil to the pin and a duct formed in the rod and conducting oil from the pin to the eccentric.

In testimony whereof I have hereunto set my signature in the presence of two subscribing witnesses.

EMANUEL L. RICHARDS.

Witnesses:
J. WALTER DOUGLASS,
THOMAS M. SMITH.