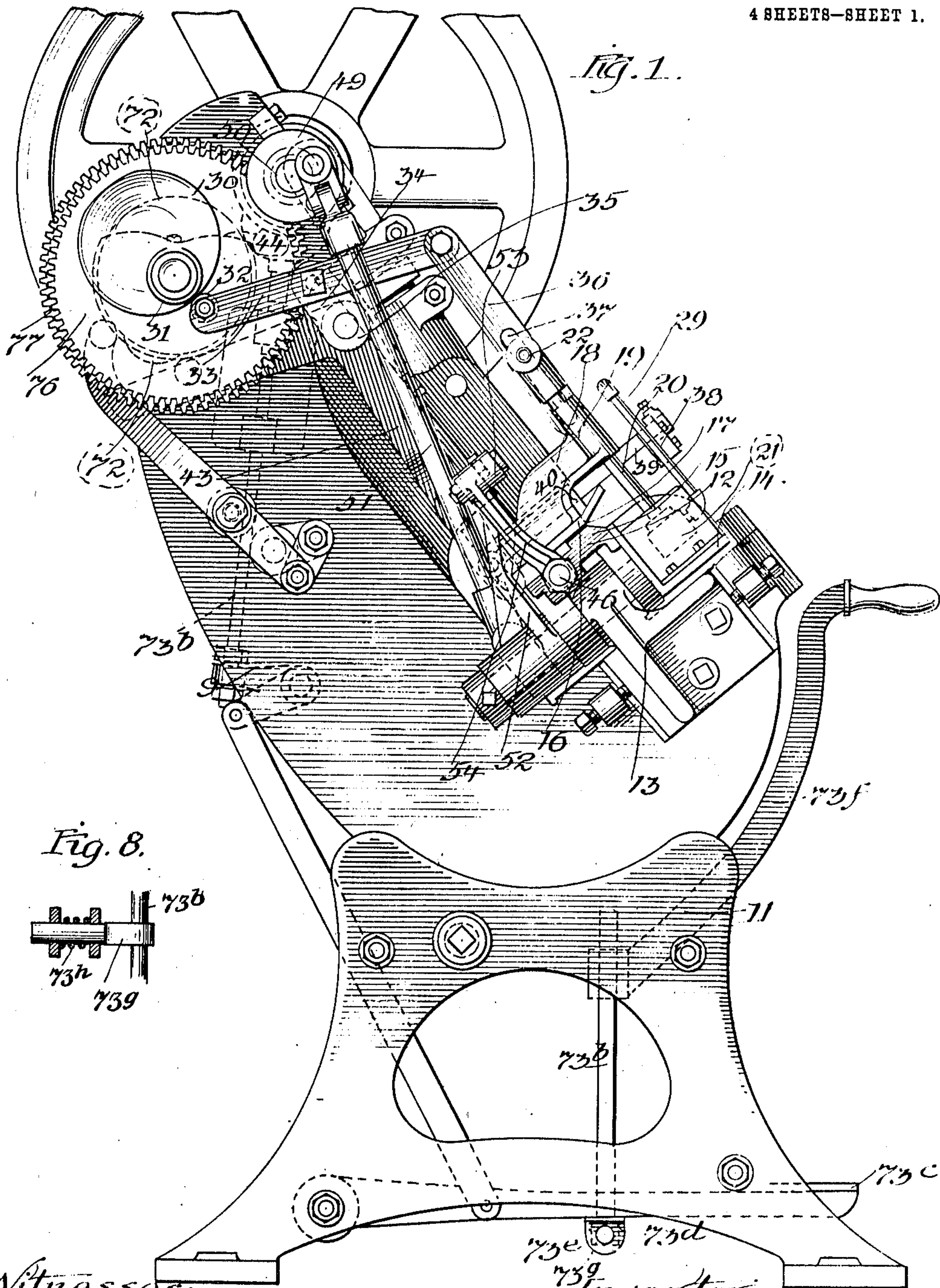


C. D. McDONALD.
AUTOMATIC DIE PRESS.
APPLICATION FILED DEC. 7, 1909.

970,092.

Patented Sept. 13, 1910.

4 SHEETS—SHEET 1.



Witnesses:
Frank Blanchard
Wm. V. Bond

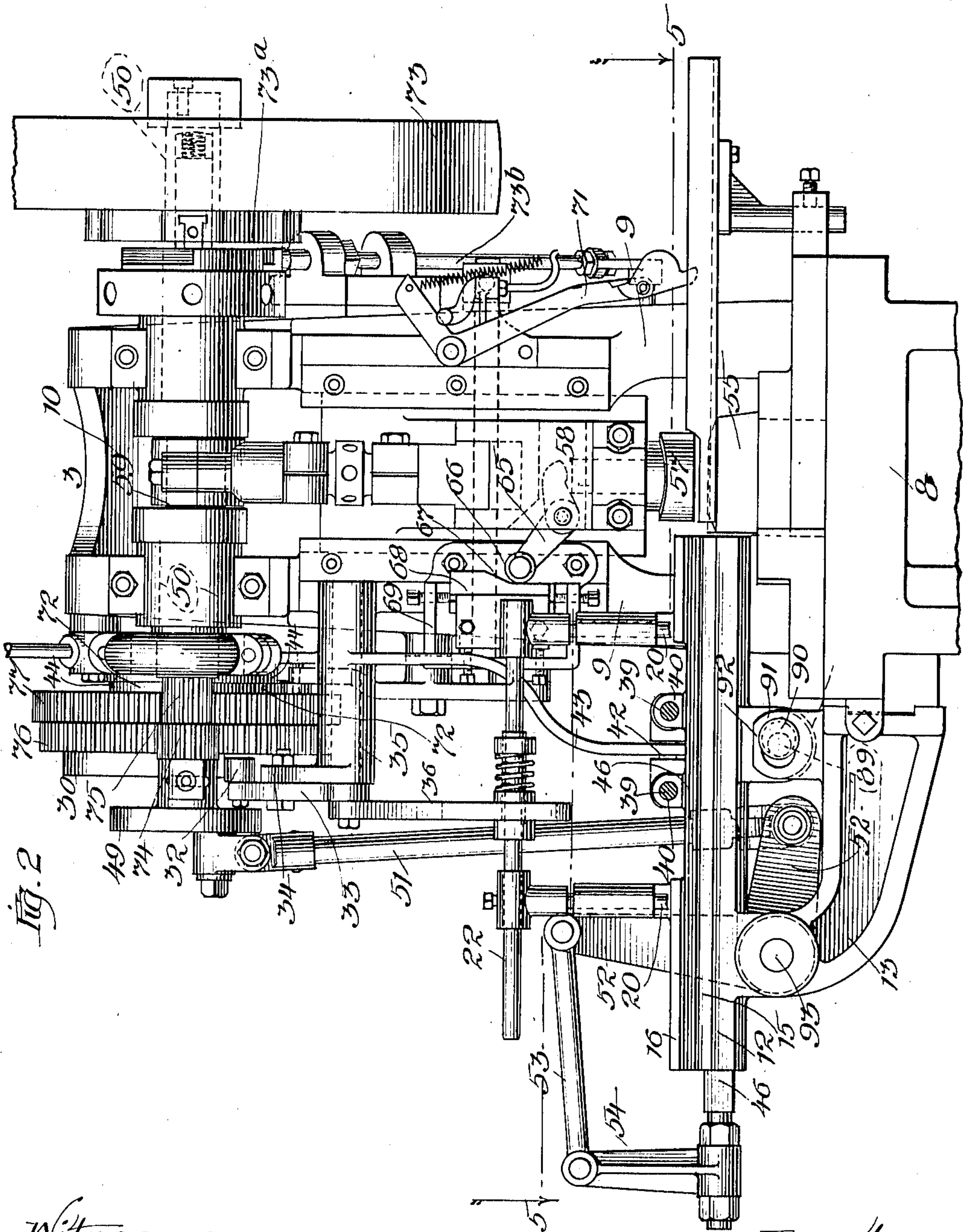
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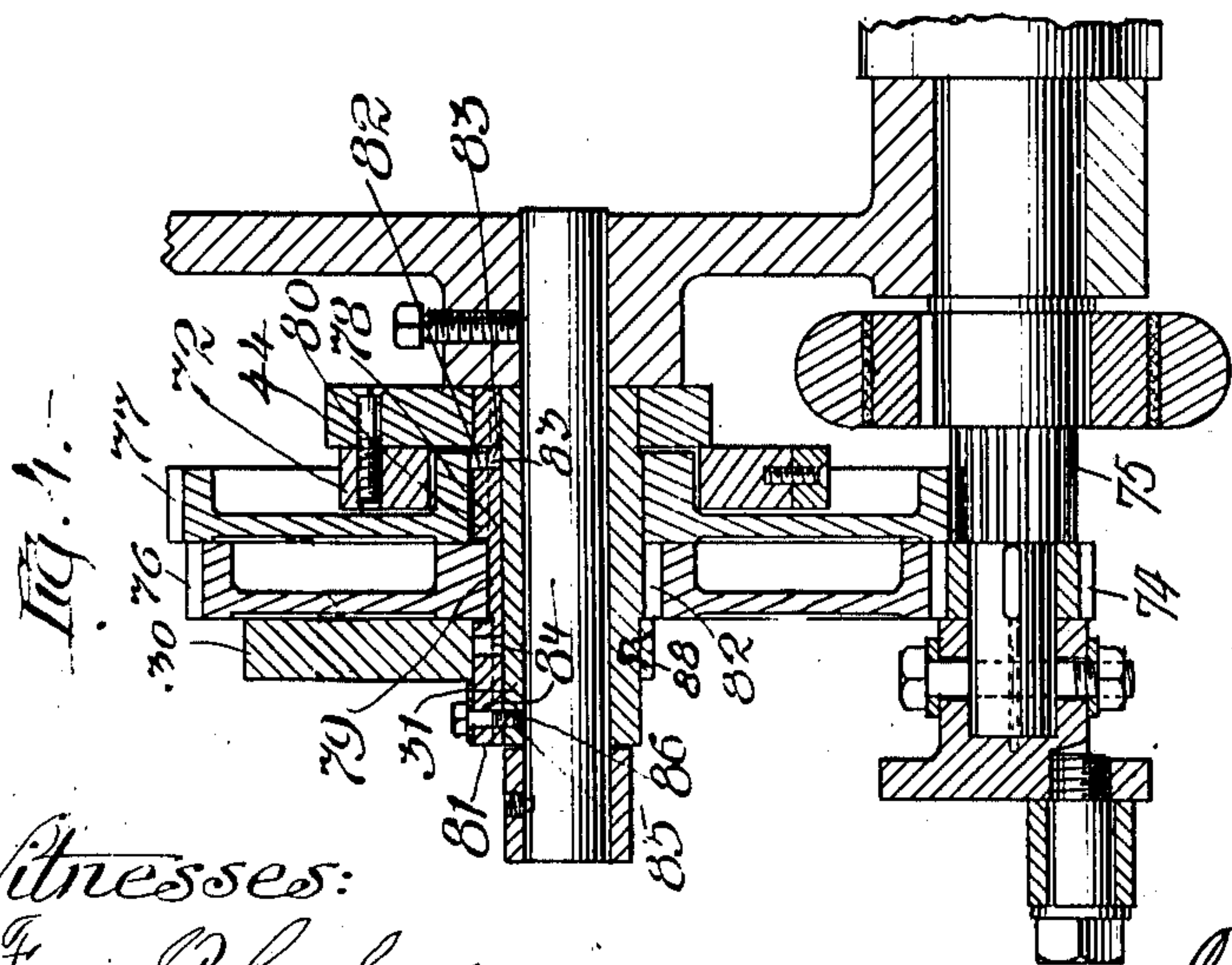
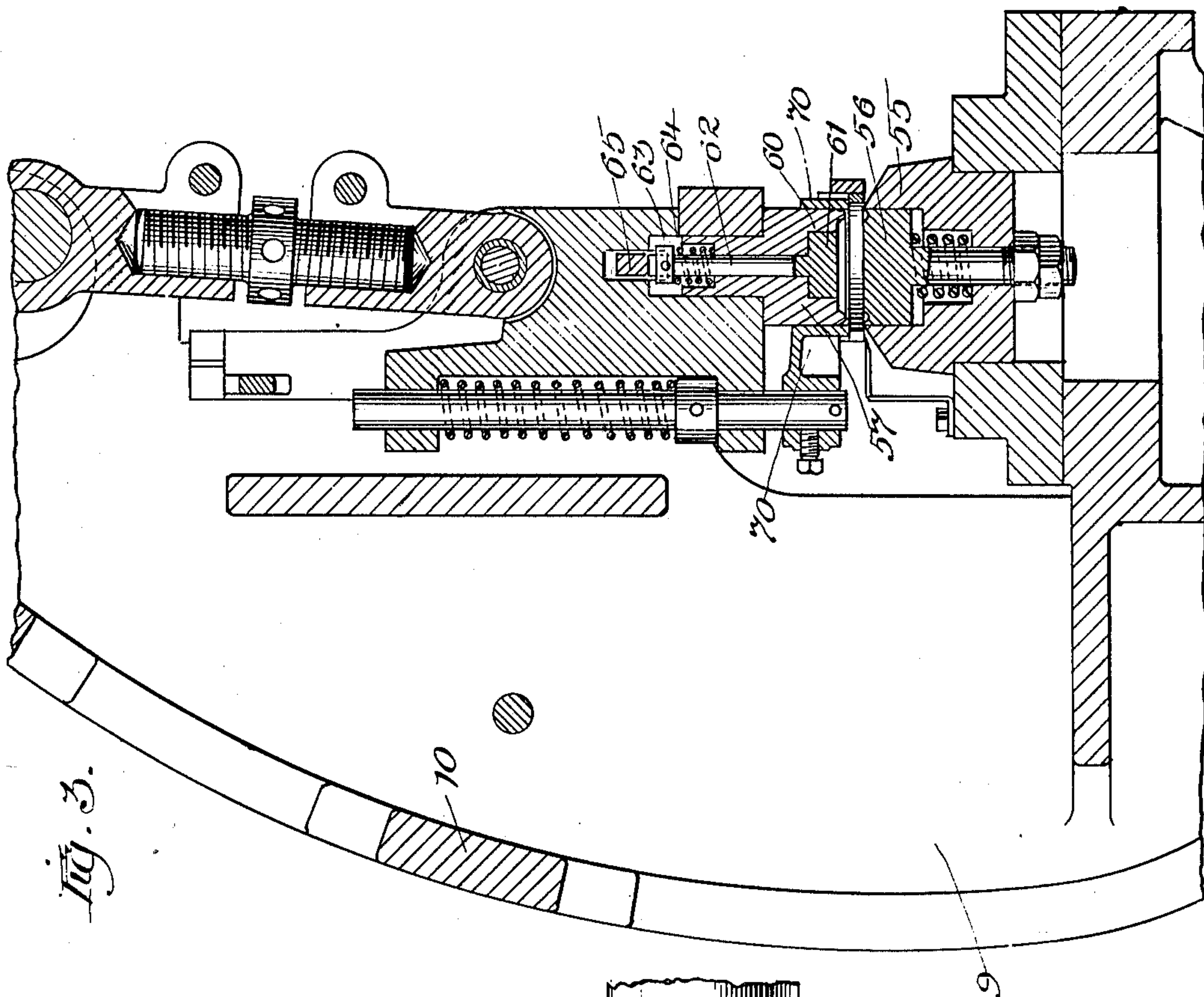
Inventor:
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4 SHEETS—SHEET 3.



Witnesses:
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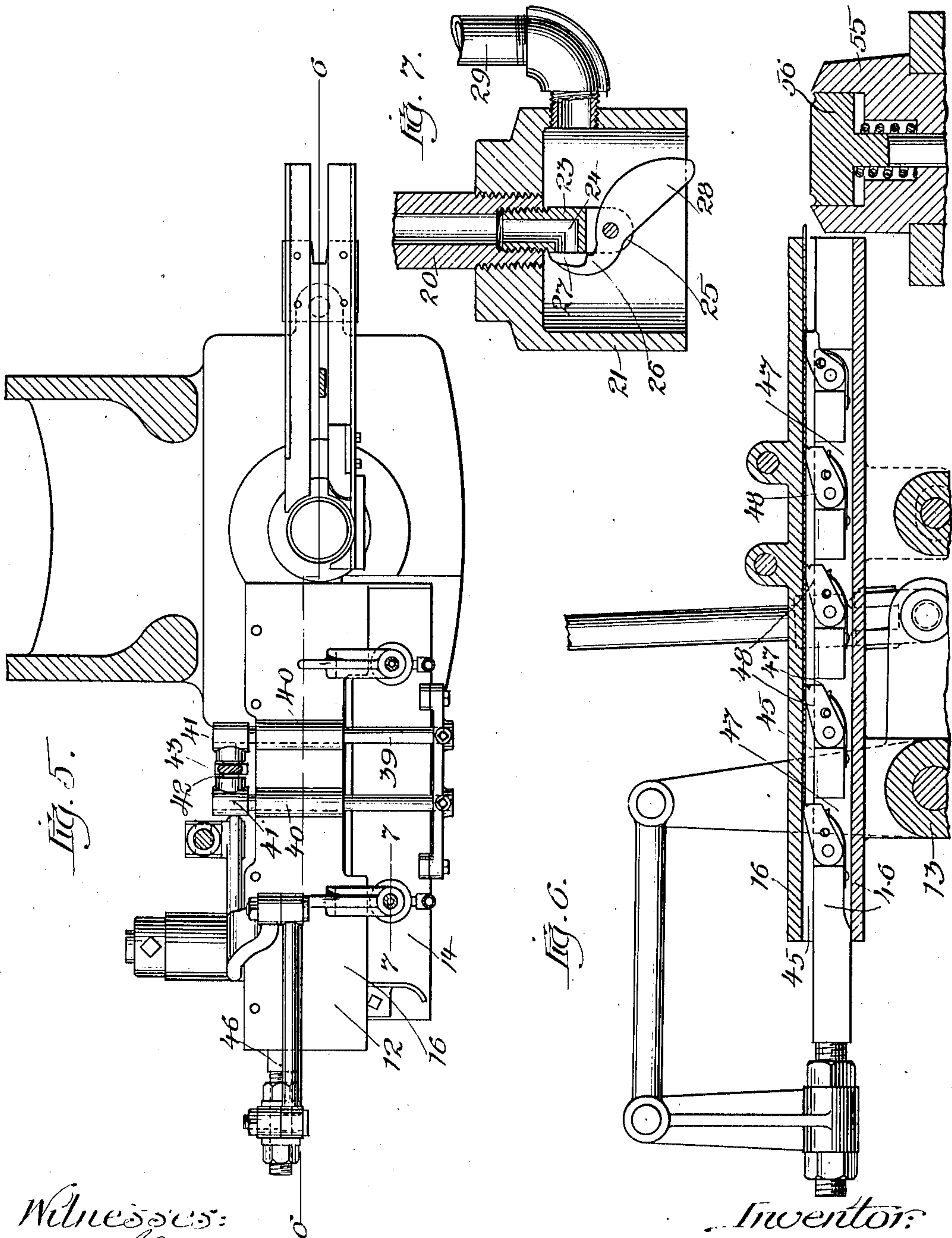
Inventor:
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4 SHEETS—SHEET 4.



Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES D. McDONALD, OF CHICAGO, ILLINOIS, ASSIGNOR TO McDONALD MACHINE COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

AUTOMATIC DIE-PRESS.

970,092.

Specification of Letters Patent. Patented Sept. 13, 1910.

Application filed December 7, 1909. Serial No. 531,800.

To all whom it may concern:

Be it known that I, CHARLES D. McDONALD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Die-Presses, of which the following is a specification.

This invention relates to improvements in automatic die presses of the type shown and described in Letters Patent of the United States, No. 784,415, granted to me March 7, 1905; and more particularly relates to means for automatically controlling the supply of vacuum used in lifting the work into position to be inserted into guideways, from whence it is fed to the die members; to means for returning the work to normal position in case the lifting means are not in proper contact with the work; to means for automatically ejecting the stamped article from the male die member; to means for adjusting the table on which the work is carried; to means for varying the movement of the mechanism used in feeding the work into position to be operated upon by the die members, and to varying the movement of the mechanism for ejecting the waste work from the machine; and to the construction of the feed bar which carries the members for moving the work into position to be operated upon by the dies.

The object of the present invention is to arrange and form the various mechanisms above referred to so as to improve generally the construction and operation of the machine as a whole.

The invention consists in the features of construction and combination of parts hereinafter described and claimed.

In the drawings, Figure 1 is a side view of the assembled machine; Fig. 2, a front view of the upper portion of the assembled machine, with the rest upon which the work is initially piled removed; Fig. 3, an enlarged section through the die member; Fig. 4, an enlarged section, showing the construction of the interchangeable gearing; Fig. 5, a section on line 5—5 of Fig. 2, showing the bell-crank lever and the members connecting the same to the feed bar, in elevation; Fig. 6, a detail, showing the feed bar and the levers for actuating the same, and showing its relation to the female die members; Fig.

7, a detail, showing the valve for controlling the supply of vacuum to the sucker head; and Fig. 8, a detail of the mechanism for detaching the foot lever.

The mechanism is supported and carried by a framework 8, preferably positioned so as to lie out of vertical alinement, and is composed of companion side walls 9 connected with a rear wall 10, and the framework is carried by a base or support 11 of any suitable construction. A table 12 is pivotally supported upon a bracket 13 extending out from the framework, attached to which table is a receptacle 14 upon which the work is initially piled. The table 12 is composed of two sections 15 and 16, the latter of which lies behind and has a forwardly extending portion lying across the top of the section 15, leaving an opening 17 at this point, into which the work is inserted and fed forward into the position to be acted upon by the die members. Each of the sections is beveled away at the forward end of the opening 17, so as to form a flaring mouth at this point.

Formed on the section 15 are bracket arms 18 carrying sleeves 19 which surround pipes 20, to the ends of which pipes are attached sucker heads 21. The pipes are connected by T couplings to a main supply pipe 22 connected to a suitable source of vacuum supply. Screw-threaded into the ends of the pipes 20, at the point where they enter the heads 21, are nipples 23, each of which is formed with a passageway 24 communicating with the interior of the head; and formed on said nipple are depending ears 25, between which is pivoted a valve member 26 having a portion 27 normally lying in position to close the passage-way 24, and a portion 28 which extends outwardly and terminates at a point a trifle below the lower edge of the sucker head, so that, when the sucker head is lowered and the portion 28 is brought into contact with the work, said portion will be thrown forward, moving the portion 27 away from the passageway 24 and allowing vacuum to enter the sucker head.

From various causes, it sometimes happens that all of the sucker heads are not brought into perfect contact with the surface of the work. This results in the work being carried upward by one corner and pre-

vents its being properly inserted into the opening 17. To prevent this, a pipe 29 extends across and is connected to the various sucker heads, so that when the work is lifted, if all of the sucker heads are not in firm contact therewith, outside air will be conducted through the pipe 29, destroying the vacuum in the sucker head and allowing the work to drop back to its original position.

The sucker heads are actuated by an eccentric 30 carried on a sleeve 31, driven in a manner which will be hereinafter explained, the surface of which eccentric is contacted by a roller 32 carried by an arm 33 pivoted to an arm 34 extending up from a fixture 35; and connected to the arm 33 is a link 36 formed with a slot 37, in which rests the pipe 22. The slot is provided for the purpose of giving a certain amount of lost motion to the link 36, which is necessary to compensate for the varying heights of the pile of work upon the receptacle 14.

When the work has been drawn up by the sucker heads to a position in alinement with the opening 17, it will be forced into said opening by fingers 38 carried by rods 39 passing through sleeves 40 formed on the table 12, and the rods 39 are fixedly secured in couplings 41 carried by a rod 42, to which is attached an arm 43 actuated by a cam 44. Located in a recess 45 formed in the member 16 is a feed bar 46 having portions of it cut away as at 47, and in the recesses thus formed are fingers 48 pivoted to the bar and held normally upward under spring tension, in a position to have a portion of their forward ends project above the top edge of the bar. The finger lying closest to the die member is cut away somewhat so as to allow it to clear the surface of the die when the bar is thrown forward. The work, when inserted into the slot 17, will lie in the position shown in Fig. 6, with the rear edge of it contacted by the finger farthest from the die member, so that when the feed bar is moved forward the work will be fed into position to be acted upon by the dies. The feed bar will then be drawn backward, the work being held against retraction there-with because the male die member will have descended by this time into operative position and the work will be clamped between the die members.

When the bar has been again returned to normal position, the finger next to the one farthest removed from the die member will be in contact with the rear edge of the work, and when the bar is again moved forward the work will be advanced by the finger in the manner previously described, and this operation will be continued until the entire surface of the work has been passed between the die members. The feed bar is actuated from a disk 49 mounted upon a main driving shaft 50; and pivoted off center on said

disk is a rod 51 connected to a bell crank arm 52 pivoted to the table 12; and to which is connected one end of a link 53, the other end of which is connected to an arm 54 extending up from the feed bar.

The die members consist of a female cutting die member 55 and a female forming die member 56, the latter of which is held upward under spring tension in the manner usual in such constructions. The male cutting and forming die member 57 is carried by a sliding head 58 actuated by an eccentric 59 mounted upon the main driving shaft 50.

While the machine is shown and described with a single set of die members, it will be understood that in forming certain kinds of articles more than one set may be used. I do not, therefore, desire to limit my invention in any way to a single set of die members. The male die member is formed with a recess 60, into which is entered a plunger head 61 formed with a stem 62 extending into a recess 63. The plunger is held normally upward by a spring 64, and the stem 62 is contacted by an arm 65 pivoted to the head 58, and upon one end of said arm is positioned a roller 66 contacting the cam surface 67 of a block 68 attached to the framework of the machine. Thus when the head 58 is drawn upward the cam will cause the arm 65 to swing downward, forcing the plunger 61 downward and the stamped article out of the die member. The block 66 is positioned with a frame 69 in a manner to permit of its adjustment in either vertical or horizontal direction, so that by arrangement of this block the stamped article will be discharged from the die head by the plunger at any time desired with respect to the movement of the die. Attached to the frame of the machine is a stripper 70 which performs the usual function given to such a member.

After the entire surface of the work has been fed between the dies, an ejector 71 will be actuated and the waste work ejected from the machine. The ejector is actuated by a cam 72 through a connection of rods, which is described and shown in the previously referred to patent granted to me March 7, 1905. The mechanism is driven from a main driving pulley 73 controlled by clutch mechanism 73^a actuated by a rod 73^b, connected to a foot lever 73^c, the depression of the foot lever withdrawing the clutch and allowing the mechanism to operate. The lever is held in depressed position by inserting it underneath a shoulder 73^b, and is adapted to be removed from such position by a pin 73^e actuated by a cam 73^d on the rock shaft 73^b, said rock shaft being actuated by a handle 73^f and the pin is retracted by a spring 73^h, as shown in Fig. 8. Adjacent to one end of the driving shaft 50 are

pinions 74 and 75 which mesh with gears 76 and 77, respectively, which gears are mounted upon the sleeve 31.

By referring to Fig. 4, it will be seen that the pinion 74 is larger in circumference than the pinion 75, and that the gear 76 is smaller than the gear 77, so that when the pinion 74 and the gear 76 are in mesh a faster rotation will be imparted to the various cams carried by the sleeve 31 than when the pinion 75 and gear 77 are in mesh. The gears 76 and 77 are connected to the sleeve 31 by a key 78 cut away at its center to form a recessed portion 79 and protruding end portions 80 and 81. Each of the gears 76 and 77 is formed with a keyway 82, and the sleeve 31 is formed with a keyway 83, so that when the end 80 of the key is in the position shown in Fig. 4, the sleeve is rotated in unison with the gear 77, and the various cams actuated in accordance with the speed of said gear, and at this time the gear 76 is revolving free upon the sleeve 31; but if the size of the work is changed so as to make it necessary to obtain a quicker movement of the parts actuated by the sleeve 31, this can be accomplished by pulling the key out until the protruding portion 80 is in register with the keyway 82 in the gear 76. The protruding portion 81 of the key is formed with a plurality of holes 84 adapted to register with a hole 85 formed in the sleeve 31, so that by the insertion of a pin 86 the key can be locked in its various positions. With the parts as shown in Fig. 4, the cam 30 is locked to the sleeve 31 by a flat-headed screw 88.

With the wearing away of the surface of the dies, it becomes necessary to adjust the table so as to have the work enter properly between the die members. This is accomplished by a pin 89 having an eccentric head 90 thereon, which acts against the walls of a recess 91 in an ear 92 extending from the bracket 13. The contacting of the head 90 against the side walls will swing the table 12 around a pivot 93 to any desired position of adjustment.

The operation is as follows: The work is drawn up by the sucker heads 21 until it is in alinement with the opening 17. The fingers 38 then act to force the work down into the opening, where it is engaged by the fingers on the feed bar 46 and moved into position to be acted upon by the dies; and when such action has been performed the plunger head 61 will act to eject the stamped article out from the die member. When the entire surface of the work has been fed past the die, the ejector 71 will be actuated to throw the waste work out of the machine, and the operation previously explained recommenced.

I claim:

1. In a device of the class described, the

combination of a framework, a receptacle for the work secured to said framework, die members mounted upon said framework, means for automatically feeding the work into position to be acted upon by the dies, means for automatically forcing the work into position to be acted upon by the feeding means, a hollow cup-shaped member for separating the work and lifting it into position to be brought into engagement with the feeding means, and a valve member actuated by the contacting of the cup-shaped member with the work, for creating a suction within the chamber of the cup-shaped member, to hold the work in engagement with the cup-shaped member during the lifting operation, substantially as described.

2. In a device of the class described, the combination of a framework, a receptacle for the work secured to said framework, die members mounted upon said framework, a feed bar for automatically feeding the work into position to be acted upon by the dies, fingers for automatically forcing the work into position to be acted upon by the feed bar, sucker heads for automatically separating the work and lifting it into position to be acted upon by said fingers, means for automatically raising and lowering the sucker heads, a valve operated by the contact of the heads with the work to permit of the creation of a suction within the heads, means for automatically ejecting the waste work from the machine, and means for automatically ejecting the stamped article from the male die member, substantially as described.

3. In a device of the class described, the combination of a framework, a receptacle for the work secured to said framework, die members mounted upon said framework, a feed bar for automatically feeding the work into position to be acted upon by the dies, fingers for automatically forcing the work into position to be acted upon by the feed bar, sucker heads for automatically separating the work and lifting it into position to be acted upon by said fingers, means for automatically raising and lowering the sucker heads, a valve operated by the contact of the heads with the work to permit of the creation of a suction within the heads, means for automatically ejecting the waste work from the machine, and means for changing the speed of the mechanism actuating the fingers which force the work into position to be fed forward by the feed bar, the mechanism that lifts the work into position to be acted upon by the fingers, and the mechanism for ejecting the waste work from the machine, substantially as described.

4. In a device of the class described, the combination of a framework, a receptacle for the work secured to said framework, die members mounted upon said framework, a

feed bar for automatically feeding the work into position to be acted upon by the dies, fingers for automatically forcing the work into position to be acted upon by the feed bar, sucker heads for automatically separating the work and lifting it into position to be acted upon by said fingers, means for automatically raising and lowering the sucker heads, a valve operated by the contact of the heads with the work to permit of the creation of a suction with the heads, means for automatically ejecting the waste work from the machine, means for automatically ejecting the stamped article from the male member, and means for changing the speed of the mechanism actuating the fingers which force into position to be performed by the feed bar, the mechanism that lifts the work into position to be acted upon by the fingers, and the mechanism for ejecting the waste work from the machine, substantially as described.

5. In a device of the class described, the combination of die members, a feed bar for feeding the work into position to be acted upon by said die members, sucker heads for automatically separating the work and lifting it into position to be brought into engagement with the feed bar, a pipe connected to said heads, leading from a suitable source of vacuum supply, and a valve operated by the contacting of the sucker heads with the work to permit of the creation of a suction within said heads, substantially as described.

6. In a device of the class described, the combination of die members, a feed bar for feeding the work into position to be acted upon by said die members, cup-shaped sucker heads for automatically separating the work and lifting it into position to be brought into engagement with the feed bar, a pipe leading from a suitable source of vacuum supply and entered into said heads, a nipple inserted into that end of the pipe entering the heads, said nipple having a passageway communicating with the pipe and also with the interior of the heads, and a valve member controlling the passageway in the nipple, said valve member being operated by the contacting of the heads with the work to permit of the creation of a suction within the sucker heads, substantially as described.

7. In a device of the class described, the combination of die members, a feed bar for feeding the work into position to be acted upon by said die members, cup-shaped sucker heads for automatically separating the work and lifting it into position to be brought into engagement with the feed bar, a pipe leading from a suitable source of vacuum supply and entered into said heads, a nipple inserted into the end of the pipe entering the heads, said nipple having a passageway communi-

cating with the pipe and also with the interior of the heads, a valve member controlling the passageway in the nipple, ears depending from said nipple, said valve member being pivotally mounted between said ears, and means for actuating said valve member when the heads are brought into contact with the work to permit of the creation of a suction within the sucker heads, substantially as described.

8. In a device of the class described, the combination of die members, a feed bar for feeding the work into position to be acted upon by said die members, cup-shaped sucker heads for automatically separating the work and lifting it into position to be brought into engagement with the feed bar, a pipe leading from a suitable source of vacuum supply and entered into said heads, a nipple inserted into that end of the pipe entering the head, said nipple having a passageway communicating with the pipe and also with the interior of the heads, a valve member controlling the passageway in the nipple, said valve member being pivotally mounted between ears depending from said nipple, said valve member consisting of a portion adapted to close communication between the passageway in the nipple and the interior of the heads, and a downwardly extending portion terminating a short distance below the lower edge of the heads, the contacting of the downwardly extending portion with the work actuating the valve member to open communication between the vacuum pipe and the interior of the head, substantially as described.

9. In a device of the class described, the combination of die members, a feed bar for feeding the work into position to be acted upon by said die members, sucker heads for automatically separating the work and lifting it into position to be brought into engagement with the feed bar, a pipe connected to said heads, leading from a suitable source of vacuum supply, a valve member controlling the admission of vacuum to each of said heads, said valve being actuated by the contacting of the sucker heads with the work to permit of the creation of a suction within the sucker heads, and a pipe extending across the sucker heads and communicating with the interior thereof and with the outside air, substantially as described.

10. In a device of the class described, the combination of die members, a feed bar for feeding the work into position to be acted upon by said die members, said bar having portions cut away to form a plurality of recesses, fingers pivotally mounted within said recesses and lying in a position to have a portion of their forward ends project above the top edge of the bar, springs adapted to bear against said fingers and exert

an upward spring tension thereon, cup-shaped sucker heads for separating the work, means for placing the work into position to be engaged by the fingers on the feed bar, a pipe connected to each of said sucker heads, leading from a suitable source of vacuum supply, and a valve member regulating the admission of vacuum to said heads to permit of the creation of a vacuum within the heads, said valve member being actuated by the contacting of the sucker heads with the work, substantially as described.

11. In a device of the class described, the combination of die members, a feed bar for feeding the work into position to be acted upon by the die members, said bar having portions cut away to form a plurality of recesses, fingers pivotally mounted within said recesses and lying in a position to have a portion of their forward ends project above the top edge of the bar, the fingers adjacent to the bar having a portion cut away to allow a clearance between the finger and the die when the bar is moved forward, springs adapted to bear against said fingers and exert an upward spring tension thereon, means for actuating said feed bar with a reciprocating movement, cup-shaped sucker heads for separating the work, means for placing the work into position to be engaged by the fingers on the feed bar, a pipe connected to each of said sucker heads, leading from a suitable source of vacuum supply, and a valve member regulating the admission of vacuum to said heads to permit of the creation of a vacuum within said head, said valve member being actuated by the contacting of the sucker heads with the work, substantially as described.

12. In a device of the class described, the combination of male and female die members, the male die member having a recess formed therein, a plunger head located in said recess, a stem on the plunger head, a coil spring adapted to hold the stem upward under spring tension, a cam, a block in which the cam is slidably mounted, means for adjusting the cam within the block, a frame in which the block is mounted, means for adjusting the block in the frame, whereby the cam may be adjusted vertically and horizontally, a pivoted arm carried by a sliding head, having one end bearing against the end of the stem, and having a roller on the other end bearing against the surface of the cam, and means for separating and feeding the work forward to be acted upon by said die members, substantially as described.

13. In a device of the class described, the combination of a main driving shaft, a plurality of various sized gears mounted thereon, a driven shaft in the form of a rotatable sleeve, a plurality of various sized gears

mounted upon said sleeve and meshing with the gears upon the main driving shaft, a plurality of cams fixedly mounted upon said sleeve, and means for locking to said sleeve any of the gears carried thereby, allowing the rest to revolve freely thereon, thereby rotating said cams at various degrees of speed, substantially as described.

14. In a device of the class described, the combination of a main driving shaft, a plurality of various sized gears mounted thereon, a driven shaft in the form of a rotatable sleeve, a plurality of various sized gears mounted upon said sleeve and meshing with the gears upon the main driving shaft, a plurality of cams fixedly mounted upon said sleeve, a keyway in said sleeve, a keyway in each of said gears carried by said sleeve, a key having a protruding acting portion and a cut-away non-acting portion, and means for moving the key to bring the acting portion into position for locking to the sleeve any one of the gears mounted upon the sleeve, thereby rotating the sleeve and the cams carried thereon at various speeds of rotation, substantially as described.

15. In a device of the class described, the combination of a framework, a table pivotally secured to said framework, die members mounted upon said framework, mechanism for feeding the work into position to be acted upon by said die members, said mechanism carried in said table, a pin rotatably mounted in said framework, an eccentric head upon said pin, the table having a recess formed therein against the walls of which the eccentric head contacts, the turning of the pin adjusting the table to keep it in proper alinement with the surface of the die members as the die members are worn away, substantially as described.

16. In a device of the class described, means for separating the work, consisting of companion hollow cup-shaped heads, a source of vacuum supply, a connection between the source of vacuum supply and the chambers of the heads, a valve carried by each of the heads and actuated by contact with the work to open communication between the source of vacuum supply and the chambers in the heads, to create a suction within the heads and serving to hold the work in contact with the heads during the lifting operation, and a connection between the heads whereby an imperfect contact of one of the heads with the work will automatically serve to break the suction in the other head and allow the work to return to normal position, substantially as described.

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Witnesses:

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THOS. A. BANNING, Jr.