Oct. 20, 1953 E. K. JOHANSEN 2,656,028

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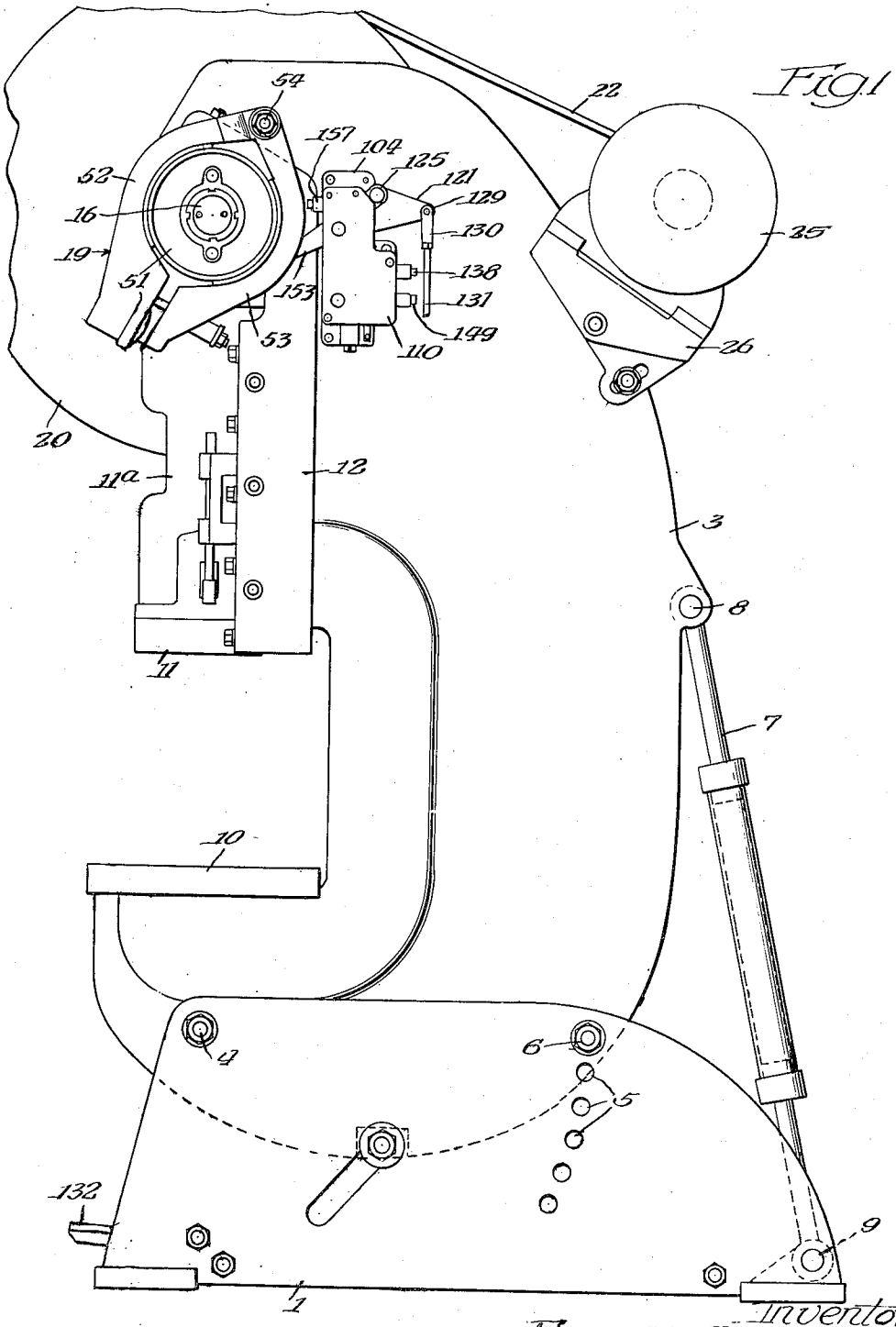
Fig. 1



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Attys

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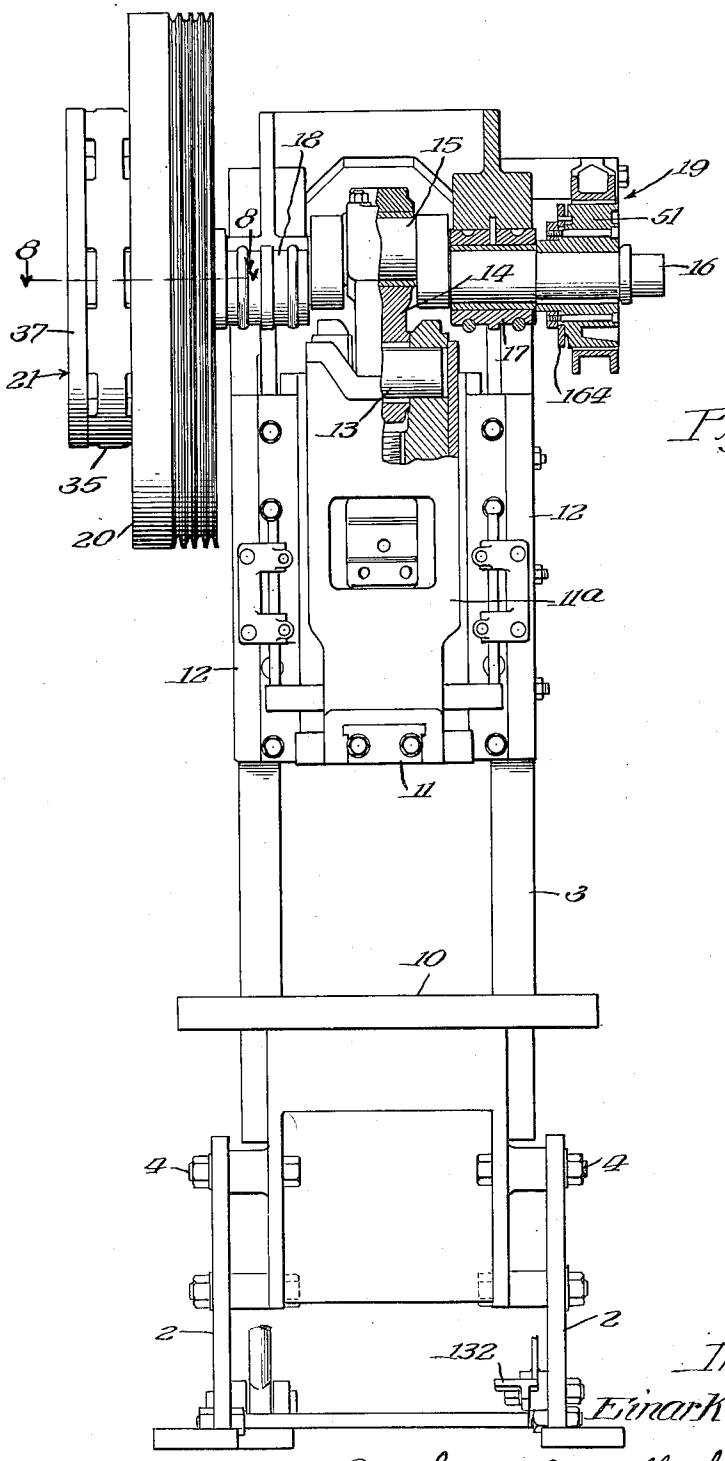

Fig. 2

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Fig. 3

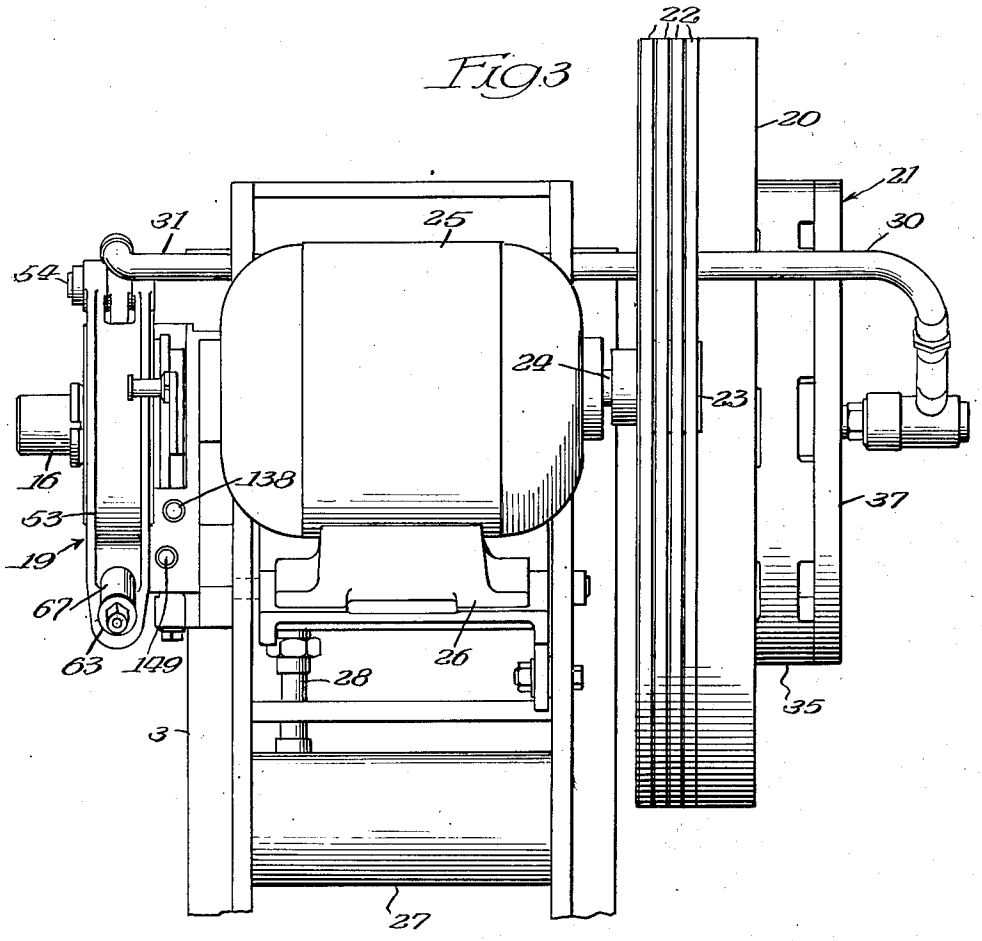

Fig. 4

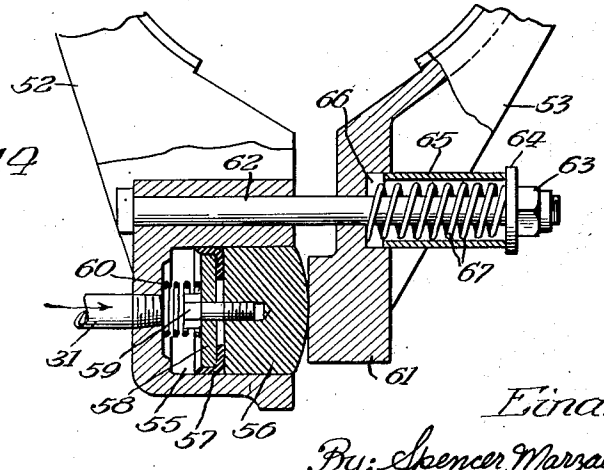

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Fig. 5

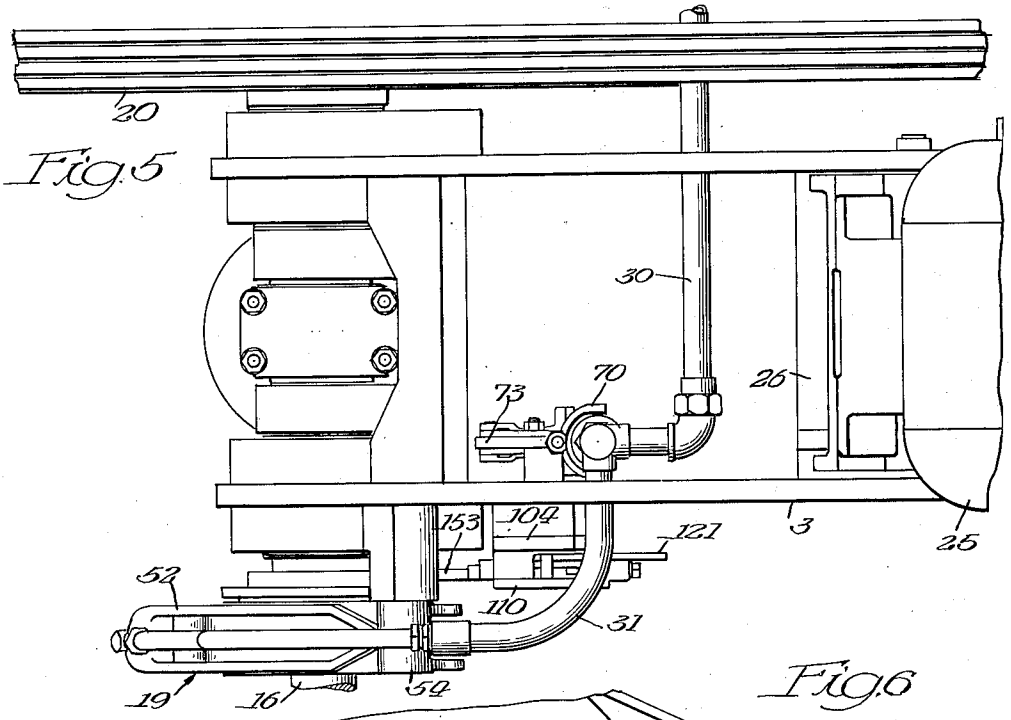

Fig. 6

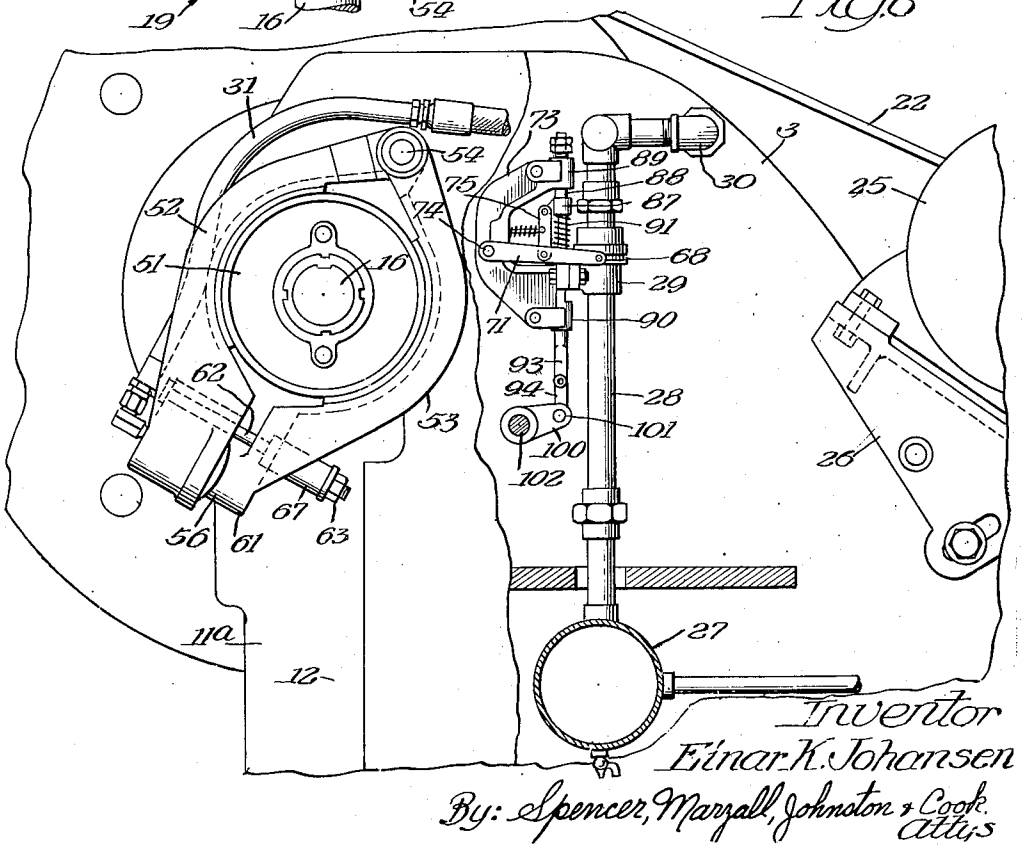

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Fig 8

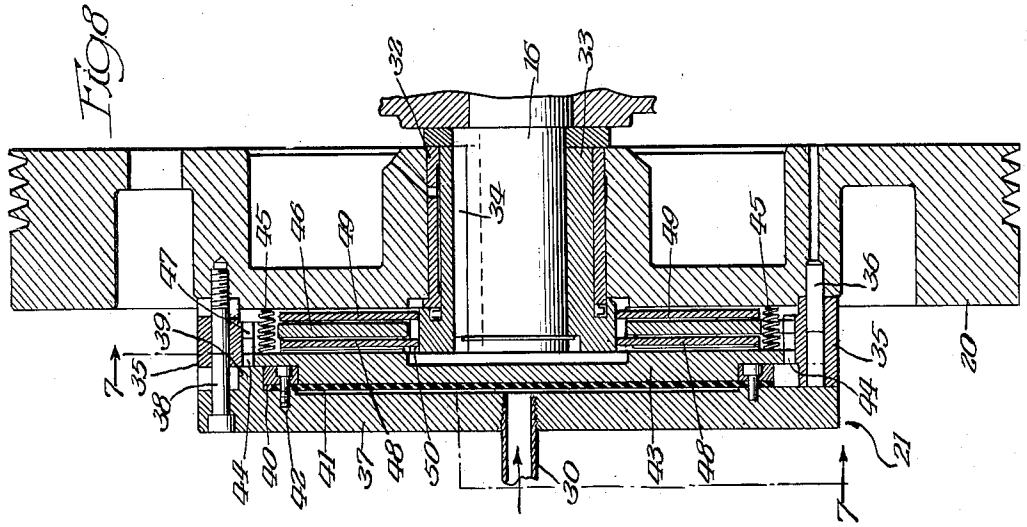

Fig 7

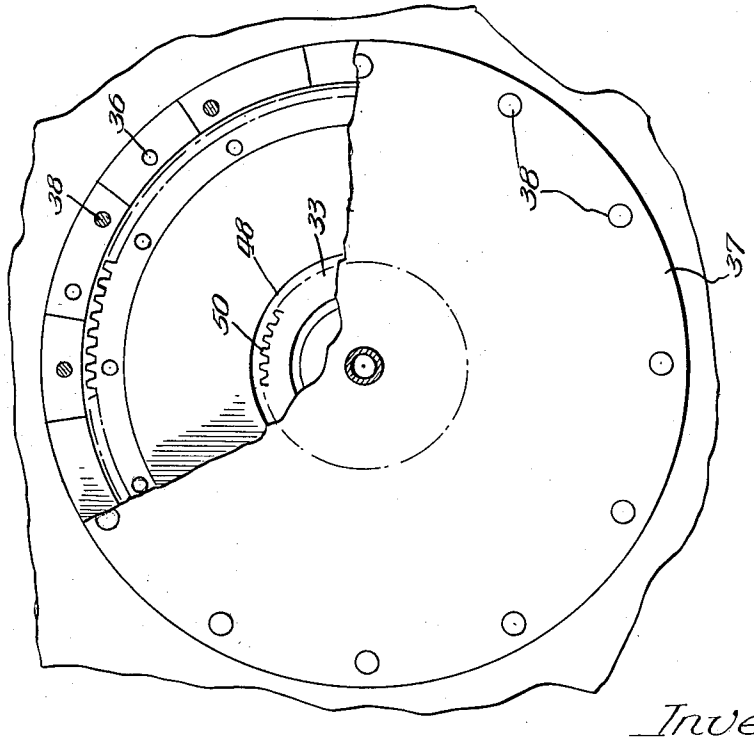

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Fig. 10

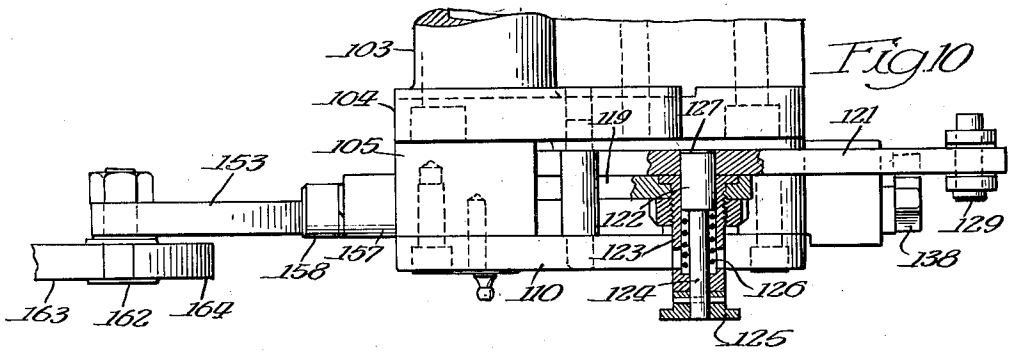

Fig. 9

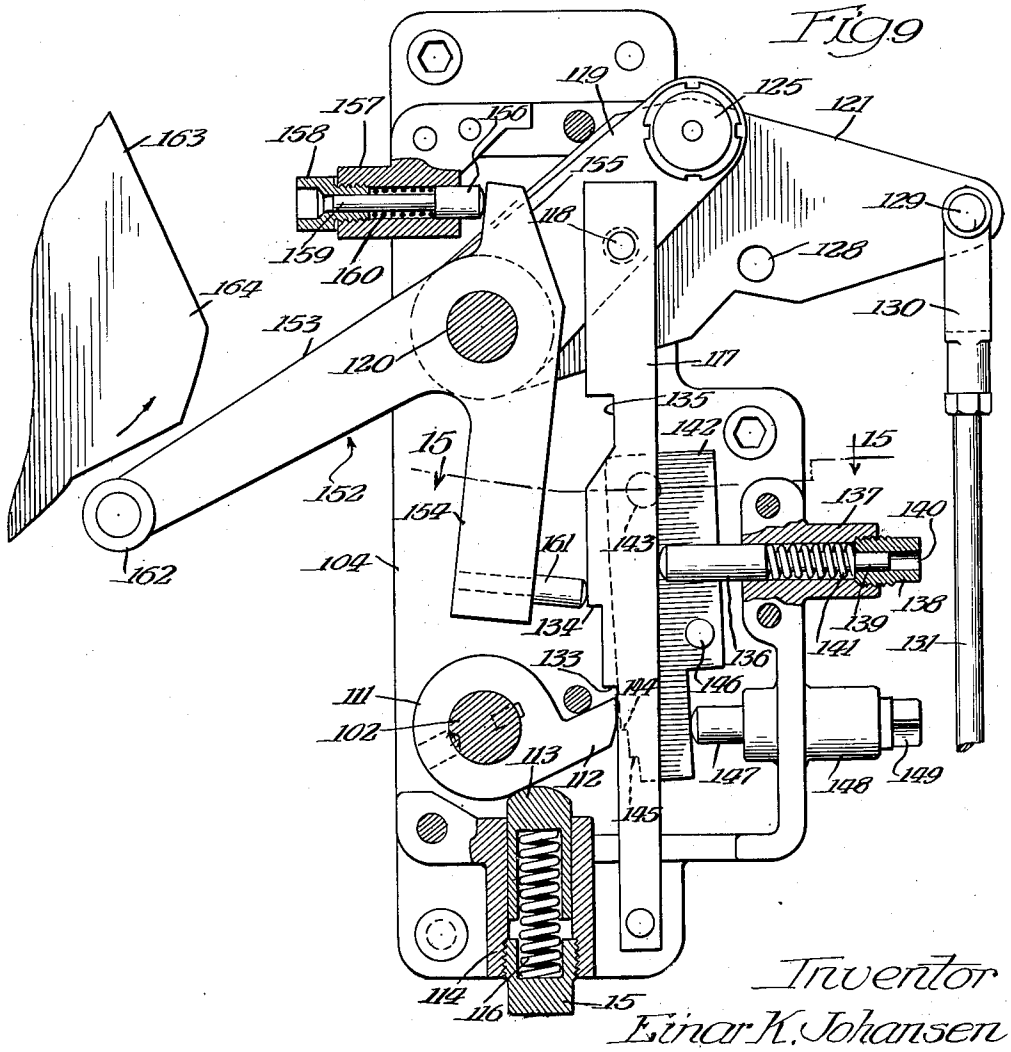

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Fig. 11

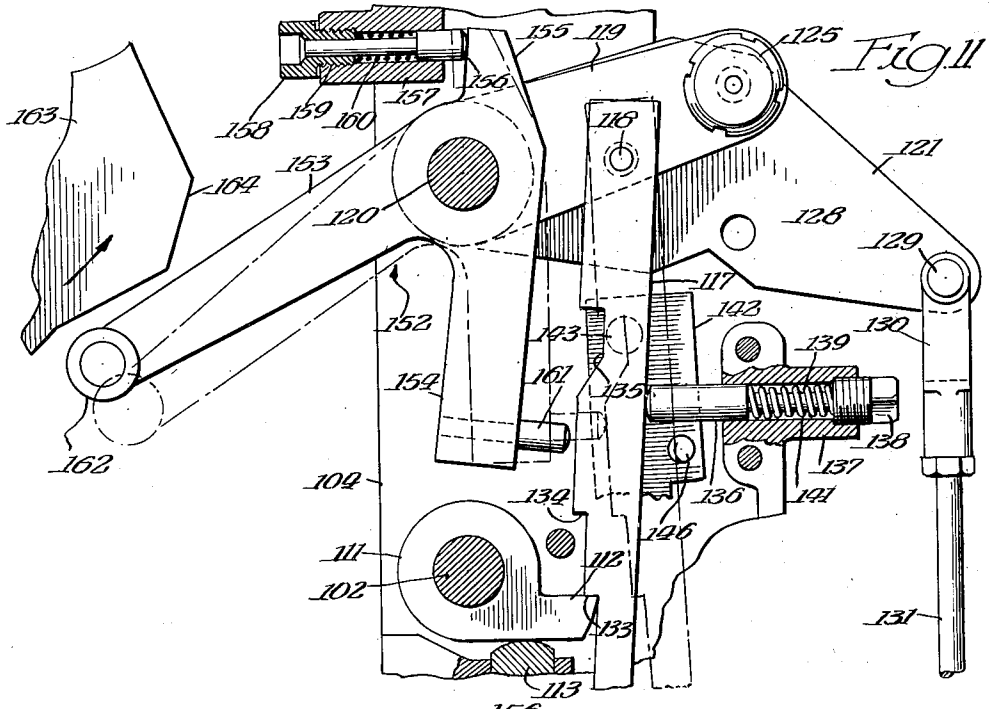
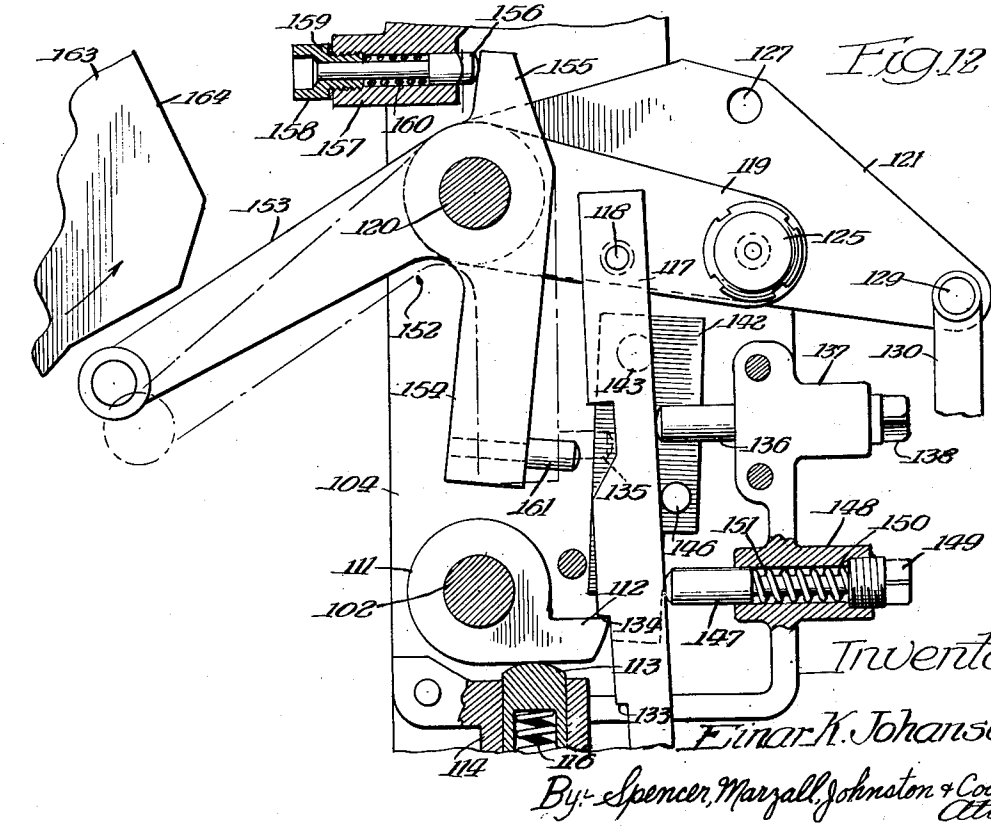


Fig. 12



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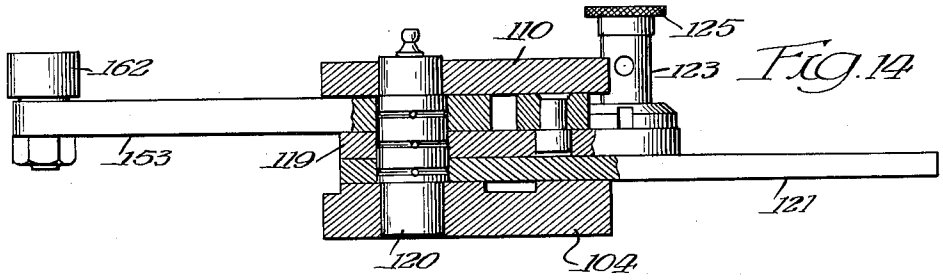

Fig. 14

Fig. 13

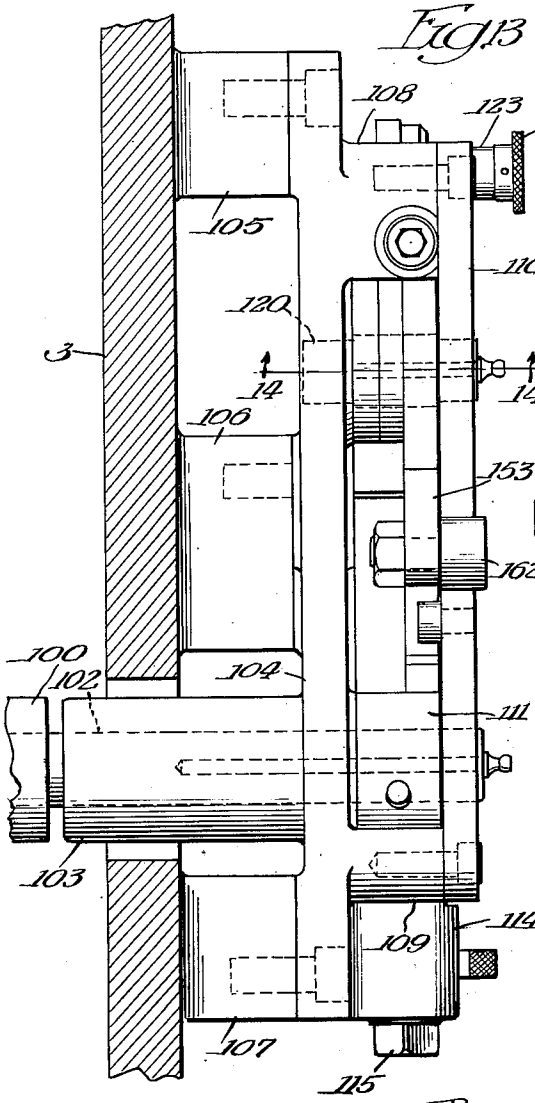

Fig. 15

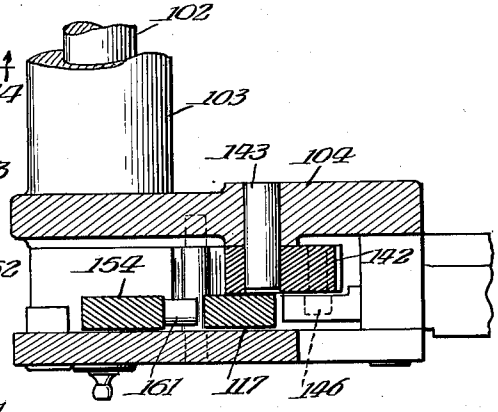

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Fig. 17

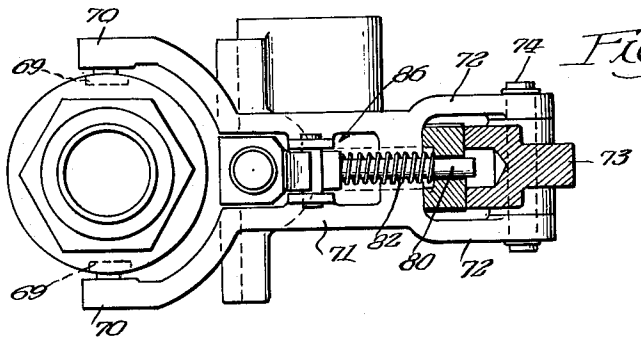


Fig. 16

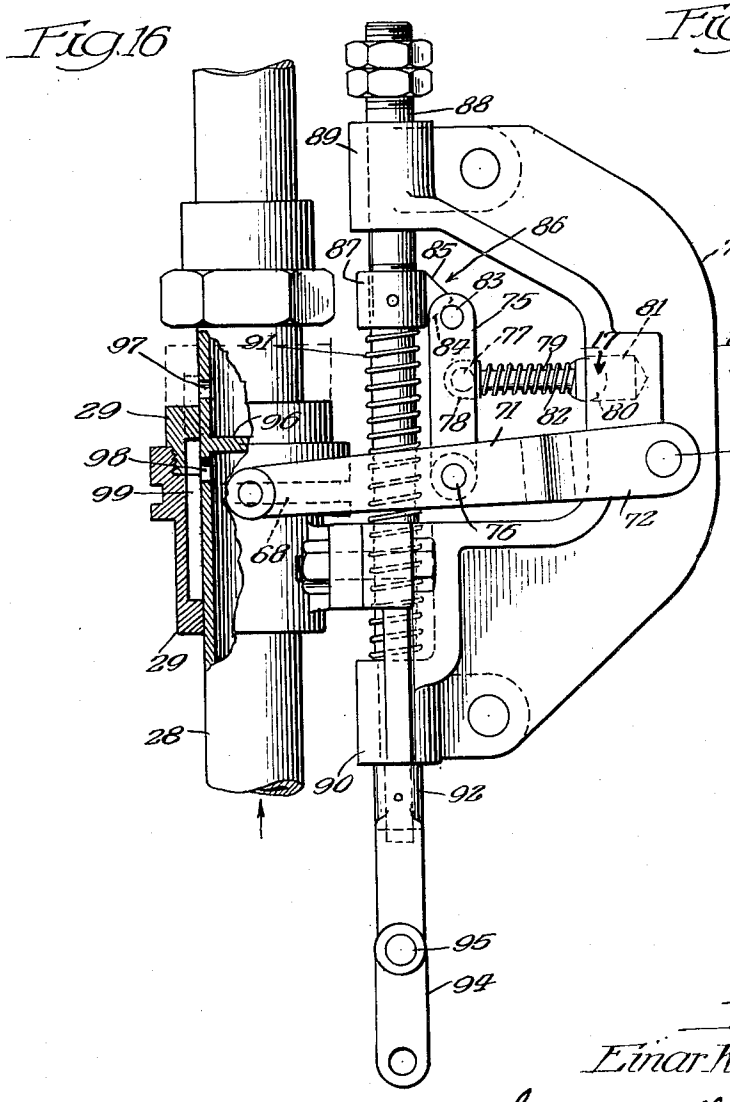
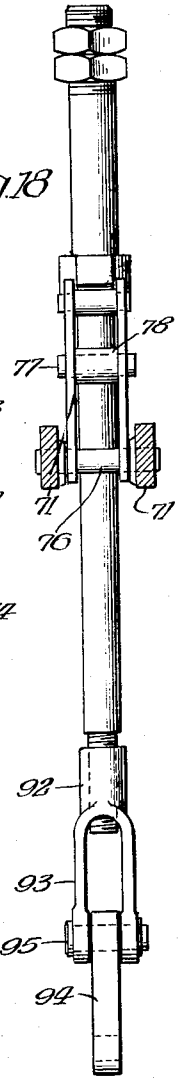


Fig. 18



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Patented Oct. 20, 1953 2,656,028

UNITED STATES PATENT OFFICE

2,656,028

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Einar K. Johansen, Oak Park, Ill., assignor to Clearing Machine Corporation, Chicago, Ill., a corporation of Illinois

Application June 3, 1949, Serial No. 97,057

1 Claim. (Cl. 192—144)

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This invention relates in general to a new and novel form of operating mechanism for metal working presses, and is illustrated herein particularly adapted for use in connection with the operation of a gap frame press.

The principal object of the present invention is to provide a novel form of actuating mechanim for the reciprocating slide of a metal working press which can be adjusted for either repeat operation or for single cycle operation.

Another object of the invention is to provide an actuating mechanism for a metal working press which is pneumatically controlled and wherein air is caused to cycle the machine either once or repeatedly as desired in accordance with an adjustment which may be made on a part of the mechanism.

A further object of the invention is to provide a pneumatically operated actuating mechanism for reciprocating the slide of a metal working press wherein air is caused to simultaneously engage a clutch mechanism and release a brake mechanism for cycling the press.

Still another object of the invention is to provide a novel form of mechanism for automatically stopping the reciprocation of the slide in the press at the end of a single cycle.

A still further object of the invention is to provide operating mechanism for a metal working press wherein a pneumatic system is caused to actuate the slide of the press, and wherein an adjusting device may be set to permit either a repeated cycling of the machine or to prevent the cycling of the machine more than once.

Other objects and advantages of the invention will become apparent from reading the following description taken in conjunction with the accompanying drawings in which:

Fig. 1 is a side elevational view of a gap frame press showing the present invention applied thereto;

Fig. 2 is a front elevational view of the press shown in Fig. 1 with certain parts broken away and shown in section for the sake of clarity;

Fig. 3 is a fragmentary rear elevational view of the press shown in Fig. 1 and showing only the upper part thereof;

Fig. 4 is an enlarged fragmentary elevational view of the brake mechanism with portions thereof shown in section for the sake of clarity;

Fig. 5 is a fragmentary top plan view of the machine shown in Fig. 1;

Fig. 6 is a fragmentary side elevational view of the upper part of the machine shown in Fig. 1 with a part of the frame broken away to show the air valve operating mechanism more clearly;

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Fig. 7 is a side elevational view of the clutch mechanism with parts broken away substantially along line 7—7 of Fig. 8;

Fig. 8 is a horizontal sectional view through the clutch mechanism and flywheel taken along line 8—8 of Fig. 2;

Fig. 9 is an enlarged side elevational view of the actuating mechanism for the pneumatic system shown in non-actuated position with the front plate removed therefrom and with certain parts shown in section for the sake of clarity;

Fig. 10 is a top plan view of the mechanism shown in Fig. 9 with a portion thereof in section to show certain details;

Fig. 11 is a view of the actuating mechanism similar to Fig. 9 with the parts shown in actuated position;

Fig. 12 is a view of the actuating mechanism similar to Fig. 11 but showing the parts adjusted for continuous and repeated cycling of the machine;

Fig. 13 is a front elevational view of the actuating mechanism shown in Figs. 9 to 12, inclusive;

Fig. 14 is a horizontal sectional view taken along the line 14—14 of Fig. 13;

Fig. 15 is a horizontal sectional view taken along line 15—15 of Fig. 9;

Fig. 16 is a side elevational view of the air valve and actuating mechanism therefor;

Fig. 17 is a top plan view of the mechanism shown in Fig. 16 with a portion thereof in horizontal section taken along line 17—17 of Fig. 16; and

Fig. 18 is a rear elevational view looking toward the left in Fig. 16 but with the supporting bracket removed therefrom to more clearly show certain details.

The operating mechanism for actuating the reciprocating slide of a metal working press may be adapted for use in any type of press where a reciprocating slide is caused to perform work upon a workpiece positioned on a die block. The illustration in the drawings of this mechanism as applied to a gap frame inclinable press is primarily for the purpose of showing the application of the invention and is not intended to be limiting.

The reciprocating slide of the press is adapted to be driven by a rotating shaft having a crank portion thereon. Continuously operating drive means is adapted to be connected to the rotatable shaft by means of a clutch mechanism when it is desired to have the machine cycle.

A brake device is also associated with the rotatable shaft and is normally applied to the shaft to prevent rotation thereof except when the clutch is engaged. A novel form of pneumatic system is embodied in the invention for simultaneously applying air to the clutch and the brake. When the air is thus applied, the brake releases the rotatable shaft and the clutch engages the drive means with the shaft to cause the shaft to rotate and cycle the machine by reciprocating the slide member.

The invention also embodies a novel form of actuating mechanism for the pneumatic system. This actuating mechanism is operable upon movement of a treadle. An adjustment is also provided on the operating mechanism for either continuous operation or non-repeat operation of the machine. When the adjusting mechanism is in the non-repeat position, the machine operator may press the threadle and immediately release the treadle, whereupon the machine will cycle once and then automatically stop. When the adjustment is in the position for continuous operation, the operator presses the treadle once and then releases the treadle, whereupon the machine will cycle continuously through the repeated reciprocation of the slide member.

Referring now more particularly to the drawings, and especially to Figs. 1, 2 and 3, there is illustrated a conventional gap frame inclinable press comprising a base member 1 having spaced sides 2 between which sides a main frame 3 is mounted for pivotal movement about a pivot rod 4. The sides 2 of the base are provided with a plurality of openings 5 spaced apart on a radius from the pivot point 4 and are adapted to receive a retaining bolt or rod 6. This rod 6 also is secured to the frame 3 and by inserting the retaining rod 6 in the different openings 5, the frame 3 may be tilted or inclined about the pivot point 4 for different operations.

A supporting rod 7 is secured at the rear of the frame by means of the pin 8 at one end thereof and the pin 9 at the bottom end to aid in supporting the frame when it is being inclined and for holding it in an inclined position.

The front of the frame 3 may be provided with a lower die block 10 and an upper die block 11. The upper die block is a part of a reciprocating slide member 11*a* adapted to reciprocate in the guideways 12 at each side of the frame. The upper end of the slide 11*a* is provided with a shaft or pin 13 which is received by the lower end of a crank arm 14. The upper end of the crank arm 14 receives a crank portion 15 intermediate the ends of a rotatable drive shaft 16. The drive shaft 16 is journaled in bearings 17 and 18 at opposite sides of the frame 3. A brake mechanism generally indicated at 19 is operably associated with the drive shaft 16 adjacent one end thereof and is normally applied to the shaft to prevent rotation thereof. A flywheel 20 is mounted at the opposite end of drive shaft 16 and has associated therewith a clutch mechanism 21.

One or more drive belts 22 pass around the flywheel 20 and a pulley 23, which pulley 23 is mounted on a shaft 24 connected to the motor 25 at the rear of the press. The motor 25 is suitably secured to a mounting bracket 26 mounted on the frame 3. Operation of the motor 25 will therefore result in continuous rotation of the flywheel 20 and its connected parts.

A main air conduit 27 (Figs. 5 and 6) supplies air to the pneumatic system for operating the clutch and brake devices. An air conduit 28 is connected to the main line 27 and has a valve associated therewith in the form of a slidable sleeve 29 surrounding the conduit 28. The details of this air valve will be described more fully hereinafter and is illustrated in Fig. 16. The branch conduits 30 and 31 are connected on the opposite side of the valve 29, the air conduit 30 being adapted to supply air to the clutch mechanism 21, and the air conduit branch 31 being adapted to supply air for operating the brake mechanism 19.

The clutch mechanism

The details of the clutch mechanism are more clearly shown in Figs. 7 and 8, to which reference will now be made. A bushing 32 surrounds the driving hub 33 keyed to the shaft 16 by means of the key 34. A ring member 35 is fastened to the outer side of the flywheel 20 by means of a plurality of axially extending pins 36 thereby keying the ring 35 to the flywheel 20. An outer plate 37 is secured to the flywheel 20 by means of a plurality of bolts 38 which also pass through the ring 35 and thereby secure the ring 35 in place as well as the operating mechanism for the clutch positioned between the plate 37 and the flywheel 20.

The outer plate 37 has an inwardly extending annular rib 39 within which a ring 40 is received. This ring 40 is utilized to clamp the peripheral edge of a diaphragm 41, the ring and diaphragm being held in place by bolts 42 passing through the ring and diaphragm and extending into the inner face of the plate 37.

A clutch piston 43 is mounted for axial movement within the housing formed by the ring 35 and is located immediately adjacent the diaphragm 41. The clutch piston 43 is provided with teeth 44 around the periphery thereof adapted to engage similar teeth on the inner surface of ring 35, whereby the clutch piston is splined to the ring 35 and may be moved in an axial direction.

A plurality of coiled compression springs 45 are located around the clutch piston 43 and extend in an axial direction. One end of each spring 45 bears against the inner face of the clutch piston 43 and the other end bears against the outer face of the flywheel 20, thereby normally urging the clutch piston out of engagement with the driving plate and driven plates as will be presently seen.

A driving plate 46 surrounds the outer end of the driving hub 33 and is also provided with teeth 47 around the peripheral edge thereof whereby it may be also splined to the ring 35. Driven plates 48 and 49 are splined to the outer end of the driving hub 33 by means of the interlocking teeth 50, and thereby form a driving connection between the driven plates and the driving hub.

In the operation of the clutch mechanism, the flywheel is being continuously rotated by the motor 25. The housing ring 35 and outer plate 37 being connected to the flywheel 20 will also be caused to rotate continuously. The clutch piston 43 and driving plate 46 are splined to the ring 35 and also continuously rotate with the flywheel 20. None of these elements, however, have any connection with the shaft 16 so that the shaft will not be caused to rotate until the clutch is engaged. When it is desired to cycle the machine, air is caused to enter through the conduit 30 and against the outer face of the dia-

phragm 41. It will be noted that a small space is provided between the inner side of the plate 37 and the outer face of the diaphragm 41 so that when air enters this space, the pressure against the diaphragm will be equalized and will cause the diaphragm to move inwardly or toward the right as viewed in Fig. 8. This movement of the diaphragm will cause a similar axial sliding movement of the clutch piston 43. This axial movement of the clutch piston 43 will cause the driven plate 48 to be clamped between the clutch piston and the driving plate 46. The driven plate 49 will also be clamped between the driving plate 46 and the outer face of the flywheel 20, thereby causing rotation of the driven plates 48 and 49. These driven plates have a driving connection with the driving hub 33 which is keyed to drive shaft 16 and will thereby cause rotation of the drive shaft and a reciprocation of the slide 11*a* through the medium of the crank mechanism 13, 14 and 15.

The brake mechanism

The brake mechanism is illustrated generally by the numeral 19 in Figs. 1 to 6, inclusive, but the details thereof are more clearly shown particularly in Figs. 4 to 6, to which reference will now be made.

The brake mechanism includes a brake drum 51 mounted adjacent one end of the drive shaft 16 and a pair of arms 52 and 53 secured to each other at one end by means of a pivot pin 54. Each arm 52 and 53 has a circular portion to which the brake lining may be applied so that when the two arms are urged toward each other, the brake lining on each arm will be forced against the brake drum 51 to prevent rotation of the drive shaft 16.

One arm 52 of the brake mechanism is provided at its outer end with a recess 55 in which a plunger member 56 is adapted to slide. A cup-shaped member 57 is caused to bear against the inner end of plunger 56 by means of a disc 58 mounted on a bolt 59. The end of bolt 59 is secured to the plunger 56 by threadedly engaging an opening in said plunger. A coiled compression spring 60 bears at one end against the disc 58 and at its other end against the bottom of the recess 55, so that the plunger 56 will be normally urged outwardly to bear against the end 61 of the other arm 53 of the brake mechanism.

An elongated rod 62 extends through both arms 52 and 53 and has a nut 63 threadedly engaging the outer end thereof. The closed end 64 of a tubular plunger 65 bears against the nut 63 and the plunger is mounted for bodily sliding movement axially thereof within a recess 66 in the arm 53. A coiled compression spring 67 surrounds the rod 62 and bears at one end against the bottom of recess 66 and at its other end against the bottom 64 of the tubular plunger 65. The action of spring 67, which is considerably heavier than spring 60, will urge the two arms 52 and 53 together so that the brakes will be normally applied to prevent rotation of the drive shaft 16.

When the air valve is open for operation of the machine, air will be caused to enter the recess 55 through the conduit 31 and apply pressure against the disc 58. When the pressure of the air within the recess 55 plus the pressure created by spring 60 is sufficiently great to overcome the resistance of spring 67, then the two brake arms 52 and 53 will be caused to separate, thereby releasing the brake and permitting rotation of drive shaft 16.

As will be seen later, the air in the pneumatic system is caused to flow simultaneously through conduit 30 to the clutch mechanism and through conduit 31 to the brake mechanism so that the clutch will be engaged to drive the shaft 16, as above explained, at the same time the brake is released to permit the shaft 16 to be driven.

Air valve actuating mechanism

Reference will now be made particularly to Figs. 16, 17 and 18 disclosing the details of the air valve and the actuating mechanism therefor.

It was previously stated that the air valve constituted a slidable sleeve member 29 around the air conduit 28. This sleeve member has an annular recess or groove 68 around the outer surface thereof adapted to receive the inwardly extending fingers 69 secured to the ends 70 of a bifurcated member or yoke 71. The opposite end of the yoke 71 is provided with spaced apart sides 72 extending on opposite sides of a bracket member 73 to which it is pivotally mounted by means of the pivot pin 74.

An actuating link 75 is pivotally secured as at 76 at its lower end between the sides of the yoke 71. The link 75 includes spaced apart side members between which a pivot pin 77 is adapted to be located and which passes through the end 78 of a rod 79. The opposite end of rod 79 terminates in a circular disc-like portion 80 received within a recess 81 in the bracket 73. The circular disc-like portion 80 will permit an up and down movement of the horizontal rod 79 about one end thereof as a pivot, and will cause the link 75 to raise and lower.

A coiled compression spring 82 bears at one end against the end 78 on the rod 79 and at its other end against the disc 80, to thereby normally force the sides of link 75 in a counterclockwise direction about the pivot pin 76.

Another pin 83 connects the two sides of the link 75 at its upper end and is adapted to bear against the two sides 84 and 85 of a cam member 86. The cam member 86 is an integral part of a collar 87 mounted on a vertically extending longitudinally reciprocating rod 88. The rod 88 is mounted for vertical sliding movement within the bearing portions 89 and 90 of the supporting bracket 73. The spring 82 urges the link 75 and the pin 83 toward the left as viewed in Fig. 16 so that the pin 83 will bear against either the surface 84 or the surface 85 of the cam member 86. When the rod 88 is caused to move downwardly, the cam member 86 and its collar 87 will also move downwardly and will force the link 75 together with pin 83 toward the right in a clockwise direction about the pivot pin 76. The rod 88 will move downwardly but a short distance so that after the point of the converging surfaces 84 and 85 of the cam member 86 has moved below the center of pin 83, the pin 83 will ride upwardly along surface 85 of the cam to elevate arm 79 about the disc 80 as a pivot point. This movement will elevate the yoke 71 and will cause a clockwise movement of the yoke about its pivot pin 74 to elevate the sleeve 29 of the air valve.

A coiled compression spring 91 surrounds the rod 88 and bears at one end against the bearing member 90 and at its other end upwardly against the collar 87. The spring 91 thus normally urges the rod 88 in an upward direction.

The lower end of rod 88 below the bearing 90 threadedly engages a link member 92 having

spaced apart sides 93. Another link 94 is connected between the sides of link 93 by means of the pivot pin 95. This linkage mechanism is connected to an operating device presently to be described which is adapted to raise and lower the rod 88 and yoke 71 together with the sleeve 29 for the purpose of actuating the air valve and causing air under pressure to flow to the clutch and brake mechanisms.

The air conduit 28 (Fig. 16) has a partition 96 therein at a suitable location and the wall thereof is provided with a port 97 above the partition 96, and with another port 98 below the partition 96. The sleeve 29 has an interior diameter larger than the conduit 28 so as to provide an annular air passage 99 between the sliding sleeve 29 of the valve and the conduit 28.

Air from the main line 27 is directed upwardly through the conduit 28 and outwardly through the port 98 into the annular passage 99. When the sleeve 29 of the air valve is in normal position, however, air will be confined within the valve until the sleeve 29 is moved upwardly to actuate the air valve. When the sleeve 29 is moved upwardly by a clockwise rotation of the yoke 71 due to downward movement of the rod 88, whereby the pin 83 will be caused to climb upwardly on the inclined surface 85 of the cam member 86, the sleeve 29 will assume the dotted line position shown in Fig. 16 where the upper port 97 will be in communication with the annular passage 99 within the sleeve. The air under pressure will then be free to pass outwardly through port 98 into the annular passage 99 and inwardly through the port 97 through the conduits 30 and 31 to the clutch mechanism 21 and the brake mechanism respectively. As long as the valve is in this actuated position, air will be forced into the conduits 30 and 31 to engage the clutch and release the brake, thereby causing rotation of the drive shaft 16 and a cycling of the machine.

At the end of any given cycle when rod 88 is caused to move upwardly, pin 83 will ride downwardly over the inclined surface 85 of cam 86 and will continue to ride downwardly along the lower inclined surface 84 of the cam member, thereby moving the yoke 71 downwardly together with the sleeve 29 of the air valve cutting off communication between the two ports 98 and 97. This will result in a disengagement of the clutch mechanism and an application of the brake mechanism to immediately stop any further rotation of the drive shaft 16 and will prevent any further operation or cycling of the machine.

The operating device for the air valve actuating mechanism

The operating device for the air valve actuating mechanism is connected directly with the treadle which the machine operator presses for cycling the machine. An understanding of the connection between the actuating mechanism for the valve and the present operating device may be had by reference to Fig. 6 wherein it will be seen that an arm 100 is pivotally secured at one end thereof by means of the pivot pin 101 to the lower end of link 94. The other end of arm 100 is secured to a shaft 102 which is mounted for a rotary movement in a bearing or hub portion 103 extending outwardly from one side of a plate 104 (Fig. 15).

This operating device is shown in more detail in Figs. 9 to 15, inclusive. The plate 104 from which the bearing 103 extends is separated from the main frame 3 by means of spacer members 105, 106 and 107 (Fig. 13). Suitable securing screws are applied to fasten the plate 104 to these spacer members on the main frame. The plate 104 is provided with a plurality of bosses such as 108 and 109 so that an outer cover plate 110 may be secured thereon and in spaced relation thereto.

The rockable shaft 102 has secured thereto an actuating member 111 with an arm 112 extending tangentially therefrom (Figs. 9, 10, 11 and 12). As viewed in Figs. 9, 11 and 12, the arm 112 is normally urged and maintained upwardly by means of a spring pressed plunger 113 adapted to move axially in the recess of a cylindrical boss 114 on the plate 104, at the bottom thereof. The bottom of the opening in boss 114 is closed by a plug 115. The plunger 113 is normally urged upwardly against the arm 112 of the actuating member 111 by means of a coiled compression spring 116 which bears at its bottom end against the plug 115 and upwardly at its upper end against a part of the plunger 113. This arrangement gives the actuating member 111 a normal position as shown in Fig. 9, but permits a clockwise rotation of the member 111 together with the shaft 102 on which it is mounted for a limited distance.

Immediately adjacent the outer end of arm 112 on the actuating member 111 there is a vertically extending thrust member or link 117 mounted by means of the pivot pin 118 to an arm 119. The arm 119 is mounted at one end thereof to a stub shaft 120. A plate or lever 121 having a substantially triangular configuration is also mounted at one corner thereof on the shaft 120 and is mounted for an oscillating movement throughout a limited distance about said shaft.

The arm 119 constitutes the settable mechanism for determining whether the machine is to be set for continuous operation or for non-repeat operation. Fig. 9 illustrates the various parts in the non-repeat position. The arm 119 is mounted for movement with the lever 121 through the medium of a connecting pin or plunger member 122 (Fig. 10). This plunger 122 is counted for limited axial movement within a bearing member 123 threadedly engaging an opening in the arm 119 and extending outwardly into the outer face plate 110. The plunger 122 has a stem 124 extending outwardly therefrom and is provided with a small circular handle portion 125 at its outer end. A coiled compression spring 126 is located around the stem 124 and within the bearing 123. One end of spring 126 bears inwardly against the plunger portion 122 and outwardly against a shoulder on the inner surface of bearing 123 so that the plunger 122 will be normally urged inwardly. There are two holes 127 and 128 in the lever 121. The upper hole 127 is adapted to receive the plunger 122 and connect arm 119 with the lever 121 so that when lever 121 is caused to oscillate about shaft 120, the arm 119 will be moved therewith. Movement of lever 121 and arm 119 will carry with it the link 117. When it is desired to have continuous uninterrupted operation of the machine, the handle portion 125 will be grasped by the operator and pulled outwardly to remove the plunger 122 from hole 127. Movement of the arm 119 may then be had to move the arm downwardly and connect arm 119 with lever 121 by movement of the plunger 122 into the hole 128.

As will be presently seen, this sets the machine for continuous operation.

The outer end of lever 121 is provided with a pin 129 to which is secured a link 130 and an operating rod 131. This operating rod 131 extends downwardly and is connected to a treadle 132 (Figs. 1 and 2) so that when the treadle is depressed there will be a movement downwardly of rod 131 and a similar movement of the lever 121 in a clockwise direction about the shaft 120 as an axis. This movement will force the thrust member 117 downwardly so that in the position shown in Fig. 9, the shoulder 133 on the link will come against the arm 112 on the actuating member 111 to rotate this member in a clockwise direction.

The thrust lever 117 is also provided with a similar shoulder 134 for use in actuating the air valve for continuous operation. There is also a recess 135 in the same side of link 117 for a purpose which will be presently described.

The thrust lever 117 is urged against the arm 112 of the actuating member 111 by means of a spring pressed plunger 136. This plunger 136 is mounted in a tubular bearing member or boss 137 formed in the bracket and is closed at one end by a plug 138 threadedly engaging the internal threads thereof. The plunger 136 has a stem 139 supported by an opening 140 in the plug 138. A coiled compression spring 141 bears at one end against the inner end of plug 138 and at its other end against the shoulder formed between the plunger 136 and the stem part 139 thereof. The plunger 136 is in alignment with the rear edge of the thrust lever 117 and bears thereagainst to normally urge the thrust lever 117 in a clockwise direction about its pivotal mounting 118 to force the forward edge thereof against the arm 112.

When the treadle 132 is depressed, a suitable linkage mechanism exerts a downward pull on rod 131 to urge the lever 121 downwardly about its pivotal mounting at 120. Arm 119 being connected to lever 121 will move downwardly therewith, thereby also moving the thrust member 117 downwardly. When the arm 119 is in the non-repeat position as shown in Figs. 9 and 11, downward movement of the thrust lever 117 will cause shoulder 133 to come against arm 112 and rotate the actuating member 111 in a clockwise direction to the position shown in Fig. 11. This will cause a clockwise rotation of shaft 102 as viewed in Fig. 6 and a downward movement of link 94 and rod 88. Referring to Fig. 16, it will be seen that downward movement of rod 88 will cause a like movement of the collar 87 and cam 86 connected thereto to thereby cause the pin 83 to ride upwardly along the inclined cam surface 85 to raise the yoke 71 about its pivot point 74 and a similar upward movement of the valve sleeve 29. The port 97 will thereupon be in communication with the annular passage 99 in the valve, whereupon air under pressure will be directed to the clutch and brake mechanisms heretofore described.

Immediately adjacent link 117 Figs. 9, 11 and 12 is a holding latch member 142 pivotally mounted to the bracket at 143. This latch member 142 is provided on its forward edge with a shoulder 145. The member also has a pin 146 on one side thereof in the path of movement of the thrust member 117.

A spring pressed plunger 147 is adapted to bear against the rear edge of the holding latch 142 to normally urge the holding latch toward the left and against the arm 112 of the actuating member 111. This plunger construction is similar to the one just described which holds the thrust member 117 against the actuating arm, and includes a tubular boss 148 on the bracket closed at one end by a plunger 149. The plunger 147 has a stem portion 150 adapted to ride in a suitable opening in the plunger 149. The coiled compression spring 151 which surrounds the stem portion 150 bears at one end against the inner end of plug 149 and at its other end against the shoulder formed between the plunger 147 and the stem 150. The spring 151 thereby normally urges the plunger 147 outwardly and holds the holding member 142 in contact with the actuating arm 112.

When the thrust member 117 is moved downwardly to rotate the actuating member 111 and to position the arm 112 in a substantially horizontal position as shown in Fig. 11, the holding latch 142 will move about its pivot point 143 in a clockwise direction under the influence of the plunger 147 so that one of the shoulders 144 or 145 will come against the upper edge of arm 112 and hold the actuating member 111 in the operating position. This will hold the rod 88 in a down position to maintain the air valve open for passage of air to the clutch and brake mechanisms. The operator of the machine may depress the treadle and immediately allow it to raise again, thereupon raising the thrust member 117. The actuating member 111 will, however, be held in its actuated position by means of the holding member 142 in the manner just described.

A trip member in substantially the form of a bell crank is generally indicated at 152 and is also mounted on the shaft 120 for slight rotation thereon. The trip member 152 has three arms thereon indicated at 153, 154 and 155. The entire member 152 is normally urged in a clockwise direction around shaft 120 by means of the spring pressed plunger 156 which bears against the forward edge of arm 155. This plunger arrangement is similar to those previously described and includes a tubular member 157 within which the forward end of the plunger is adapted to ride. The outer end of the tubular member 157 is closed by a plug 158 and has a passage therein to permit a sliding movement of the stem 159 on the plunger 156. A coiled compression spring 160 surrounds the stem 159 and bears at one end against the inner end of plug 158 and at its other end against the shoulder formed between the end of the plunger 156 and stem 159. Thus the plunger is normally urged outwardly against arm 155 to rotate the member 152 in a clockwise direction.

Arm 154 has a pin 161 protruding from the rear edge thereof and is adapted to come against the forward edge of thrust member 117 for the purpose of stopping operation of the machine. Arm 153 is provided with a cam roller 162 in the path of a cam member 163. This cam member 163 is mounted for rotation with the drive shaft 16 as may be seen in Fig. 2. The cam 163 has an enlarged portion 164 thereon and rotates in a counter-clockwise direction as viewed in Figs. 9, 11 and 12. The position of this enlargement 164 in these figures is the position thereof before the machine begins to cycle. When air is applied to engage the clutch and release the brake, the drive shaft 16 will rotate carrying with it the cam 163. One revolution of the cam will be substantially completed when the enlargement 164 comes

against the cam roller 162. Continued rotation of the cam will rotate the member 152 in a counterclockwise direction against the pressure of plunger 156 and will move arm 154 toward the right to the dot-dash line position shown in Fig. 11. This movement toward the right of the arm 154 will cause the pin 161 to come against the forward edge of the thrust member 117 and move this thrust member toward the right until it comes against the pin 146 in the holding latch 142. Continued movement of arm 154 toward the right will thereafter rotate the holding member 142 about its supporting pin 143 in a counterclockwise direction, thereby moving the shoulder 145 out of engagement with the upper edge of the actuating arm 112. The plunger 113 will thereupon operate to move the actuating member 111 back to its original position and will rotate the shaft 102 in a counter-clockwise direction to elevate rod 88 and cam member 86 therewith. These parts will then be in the position shown in Fig. 16 where the pin 83 has been caused to ride downwardly on the lower inclined surface 84 of the cam member 86 to lower the yoke 71 and move the valve sleeve 29 downwardly to cut off communication between the annular passage 99 and port 97. The clutch mechanism will thereupon become disengaged and the brake will be applied to immediately stop rotation of the drive shaft 16 and will cause the cam 163 to again stop substantially in the position shown in Figs. 9, 11 and 12.

It will thus be evident that with the arm 119 in the elevated position shown in Fig. 9 with respect to lever 121, the machine will be set to operate through a single cycle only, and hence may be termed the non-repeat position of the settable device. When the operator presses the treadle, the holding latch 142 will hold the air valve open to operate the drive shaft through one revolution thereby causing the reciprocating slide member to move downwardly and then upwardly. At the end of one revolution of the drive shaft, the enlargement 164 on the cam 163 will disengage the holding latch 142 from the actuating member 111 to automatically close the air valve and cause disengagement of the clutch and application of the brake.

When it is desired to have the machine operate continuously, the pin 122 which forms a connection between arm 119 and plate 121 may be withdrawn from opening 127 and moved downwardly to engage opening 128. This position of these parts is shown in Fig. 12. When this occurs, the thrust member 117 will also be lowered so that the shoulder 134 on the forward edge thereof will come against the actuating arm 112 to rotate the member 111 and shaft 102 in a clockwise direction to lower the rod 38 and open the valve. Again plunger 147 will urge the holding latch 142 in a clockwise direction so that the shoulder 145 will engage the arm 142 to hold the valve open. At this point the recess 135 in the edge of the thrust member 117 will be opposite the pin 141. Thus, when the enlargement 164 on the cam 163 engages the cam roller 162 and moves the trip member 152 in a counter-clockwise direction the pin 161 will assume the dotted line position of Fig. 12 and will move into the recess 135 without engaging the thrust member 117. The valve will thus remain open and the machine will continue to operate as long as the operator maintains the treadle depressed. Upon release of the treadle, however, the thrust member 117 will be elevated and the recess 135 moved out of register with the pin 161 so that when the trip member 152 is next engaged by the cam member 163 the pin 161 will engage the side of the thrust member 117 to trip the holding latch 142 in the manner previously described.

From the foregoing description it will be clear that the press may be set for either a single cycle operation or continuous operation. When the arm 119 is elevated so that the pin 122 thereon is in engagement with opening 127 on the lever 121, the machine is set for non-repeat operation. When the settable arm 119 is lowered so that the pin 122 is in engagement with opening 128 in lever 121, the machine is then set for continuous operation, all in the manner above described. It will also be evident that the invention embodies novel mechanism for presetting the machine for either non-repeat or continuous operation by a pneumatic system which causes simultaneous engagement of a clutch and release of a brake for cycling the machine. Automatic operation of an air valve at the completion of one cycle will apply the brake and disengage the clutch simultaneously to stop further rotation of the drive shaft.

Changes may be made in the form, construction and arrangement of parts from that disclosed herein without departing from the spirit of the invetnion or sacrificing any of the attendant advantages thereof, provided, however, that such changes fall within the scope of the claim appended hereto.

The invention is hereby claimed as follows:

In a cyclically operable machine of the character described, a driving shaft, a driven shaft, means operatively connecting said driven shaft and machine in driving relationship, a normally disengaged fluid pressure operated clutch operatively connecting said driving shaft and driven shaft in driving relationship, a normally engaged fluid pressure operated brake on said driving shaft, a source of fluid under pressure, a normally closed valve connected to said source and operable when open to supply fluid from said source to said clutch and brake to cause engagement of the former and disengagement of the latter, a valve operating member operatively connected to said valve and movable from a retracted position wherein the valve is closed to an advanced position wherein the valve is open, means normally maintaining said member in its retracted position, a depressible lever, a thrust member, means selectively pivoting said thrust member to said lever at spaced points thereon whereby upon depression of the lever the positional movements of the thrust member will be varied, a pair of shoulders on said thrust member selectively engageable with said valve operating member to move the latter to its advanced position upon depression of said lever, such selective engagement depending upon the selective pivoting of said thrust member, a holding latch engageable with said valve operating member to hold the same in its advanced position, a trip member engageable with said thrust member when the latter is in one of its selected pivoted positions for moving the latter into engagement with said holding latch to trip the latter and release said valve operating member, means on said thrust member for preventing engagement thereof by said trip member when the thrust member is in its other selected pivoted position, and cam means operable upon rotation of said driven

shaft throughout a predetermined degree for actuating said trip member.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,039,846	Howland-Shearman	May 5, 1936
2,052,752	Criley	Sept. 1, 1936
2,065,820	Mellon	Dec. 29, 1936
2,091,449	Littell et al.	Aug. 31, 1937
2,204,710	Stout	June 18, 1940
2,217,332	Criley	Oct. 8, 1940
2,250,629	Friedman	July 29, 1941
2,342,645	Criley	Feb. 29, 1944
2,348,891	Eason	May 16, 1944
2,483,203	Jonhe	Sept. 27, 1949
2,594,909	Georgeff	Apr. 29, 1952