March 22, 1949. P. SCHULTZE 2,465,174

POUNCING MACHINE

Filed April 12, 1944 7 Sheets-Sheet 1

Fig. 1.

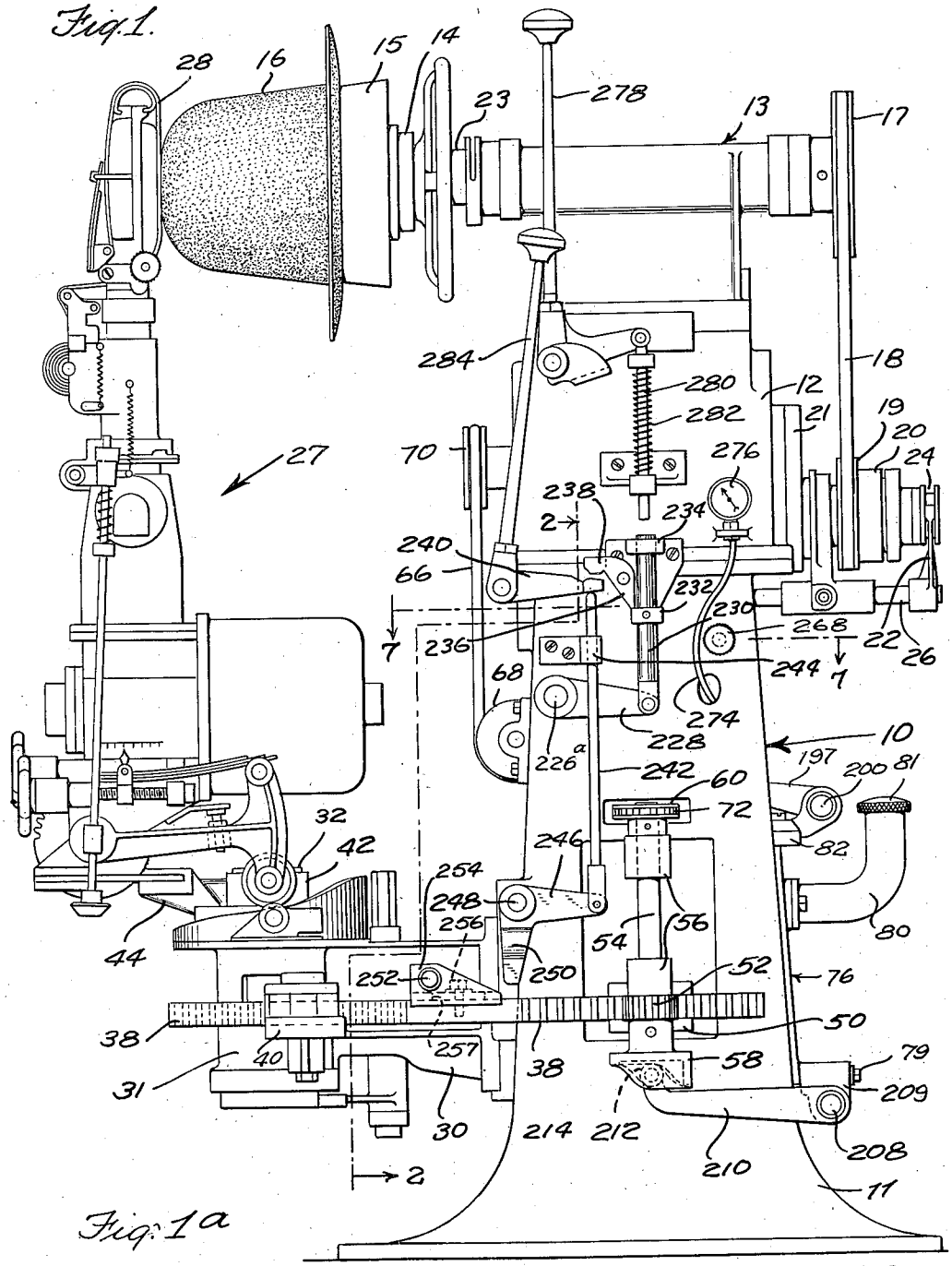
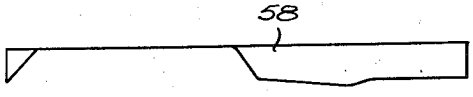


Fig. 1a



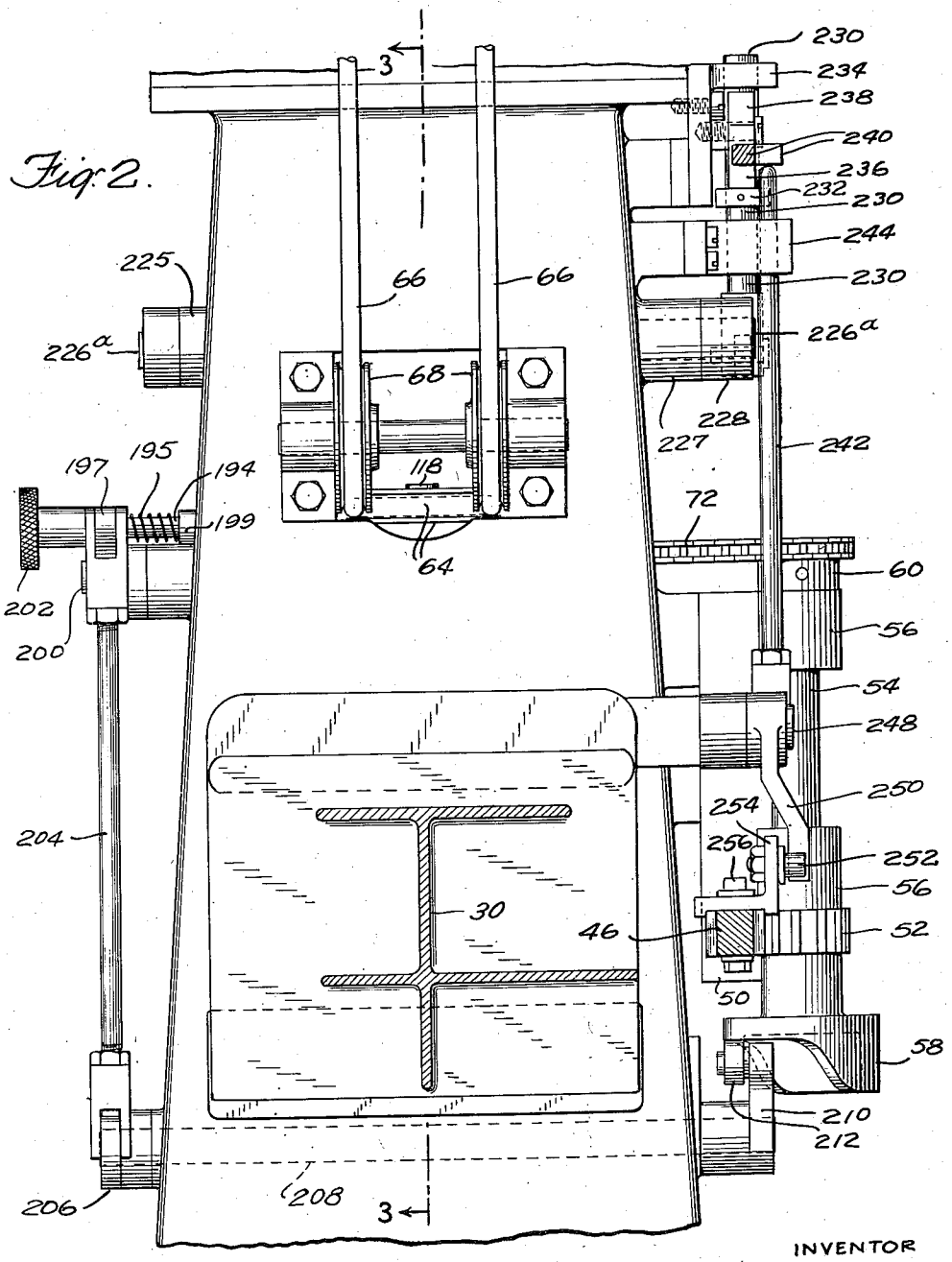
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Fig. 2.



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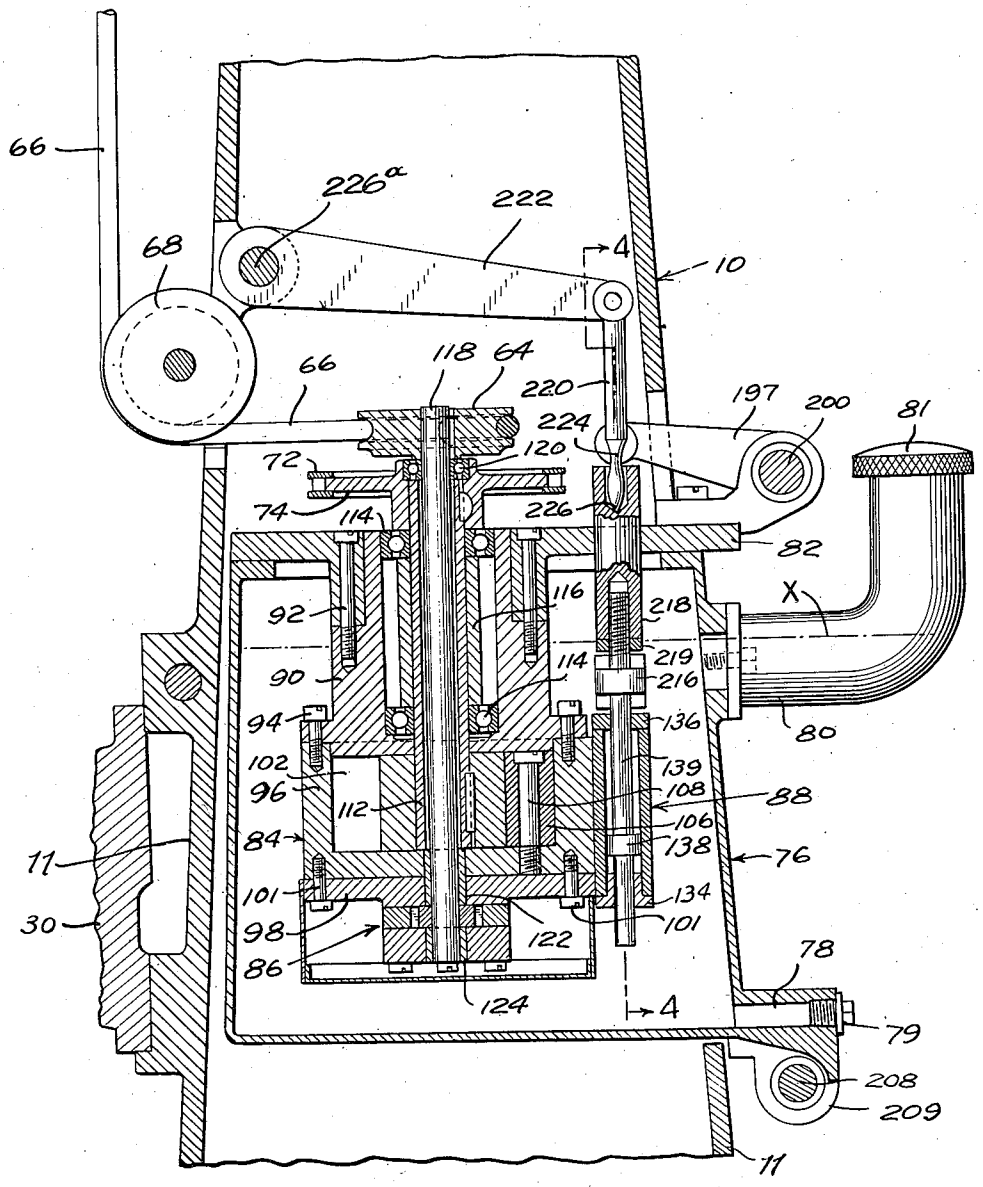


Fig. 3.

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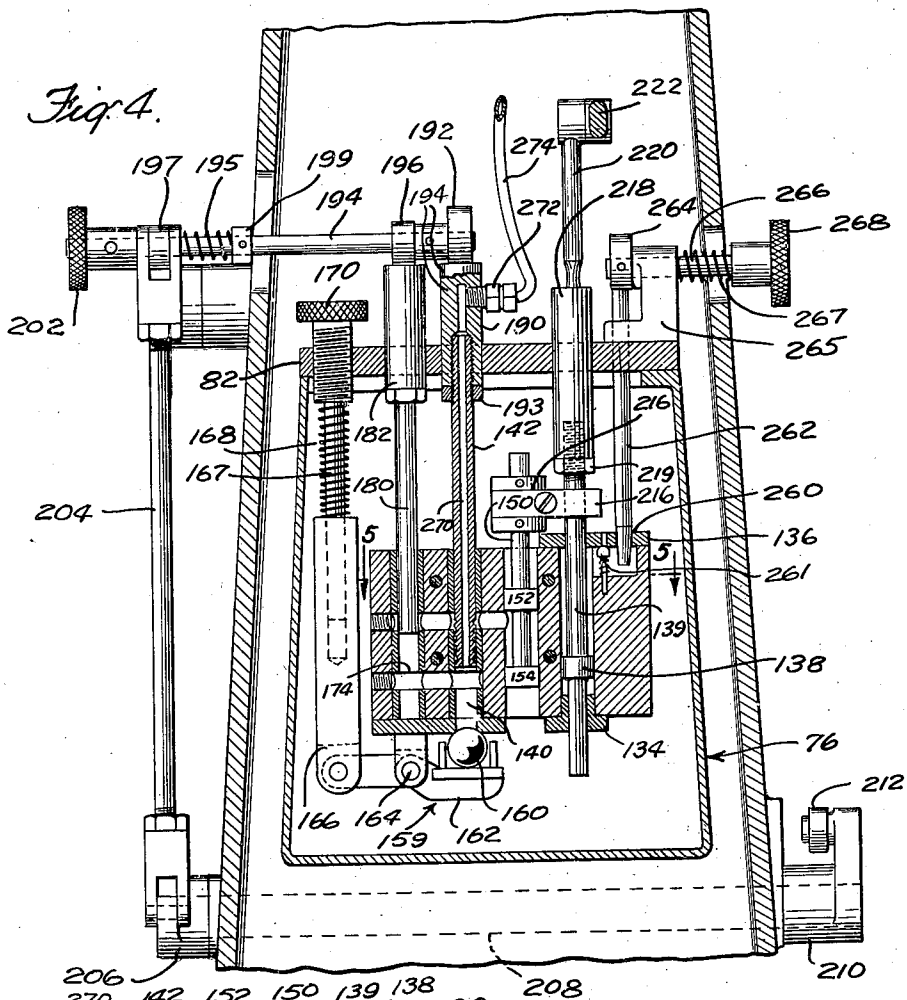
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POUNCING MACHINE

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Fig. 4.



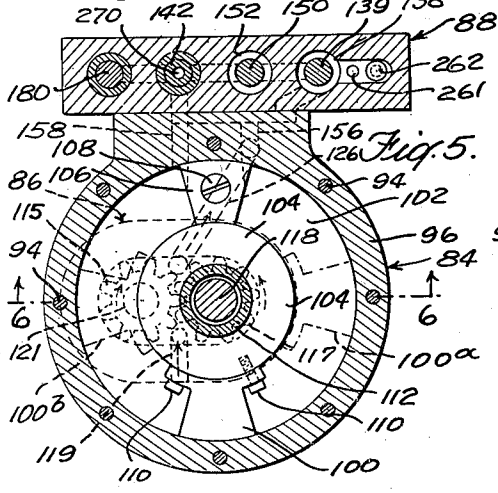


Fig. 5.

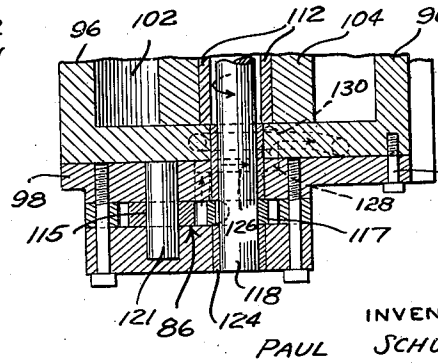


Fig. 6.

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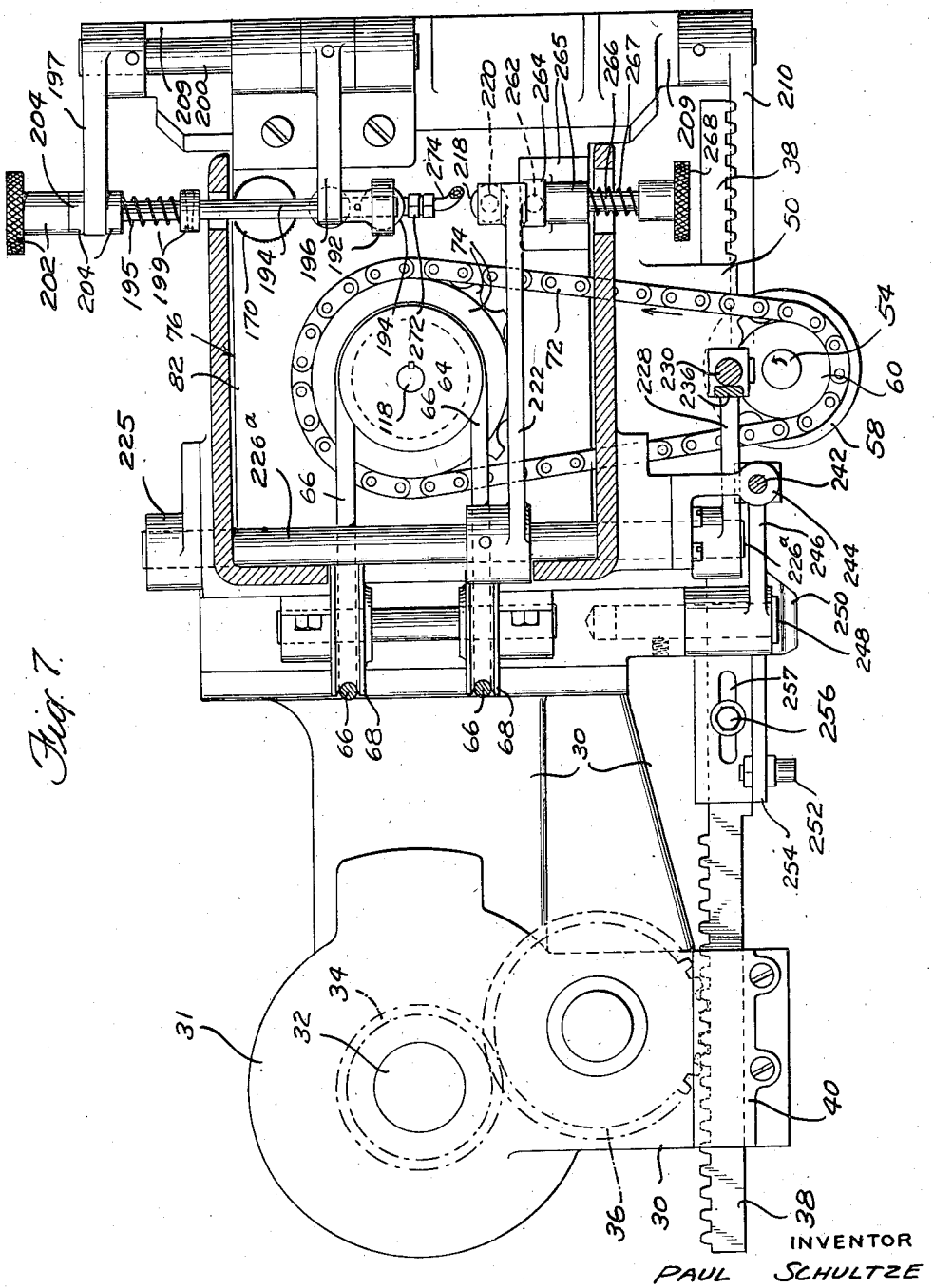


Fig. 7.

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Fig. 8.

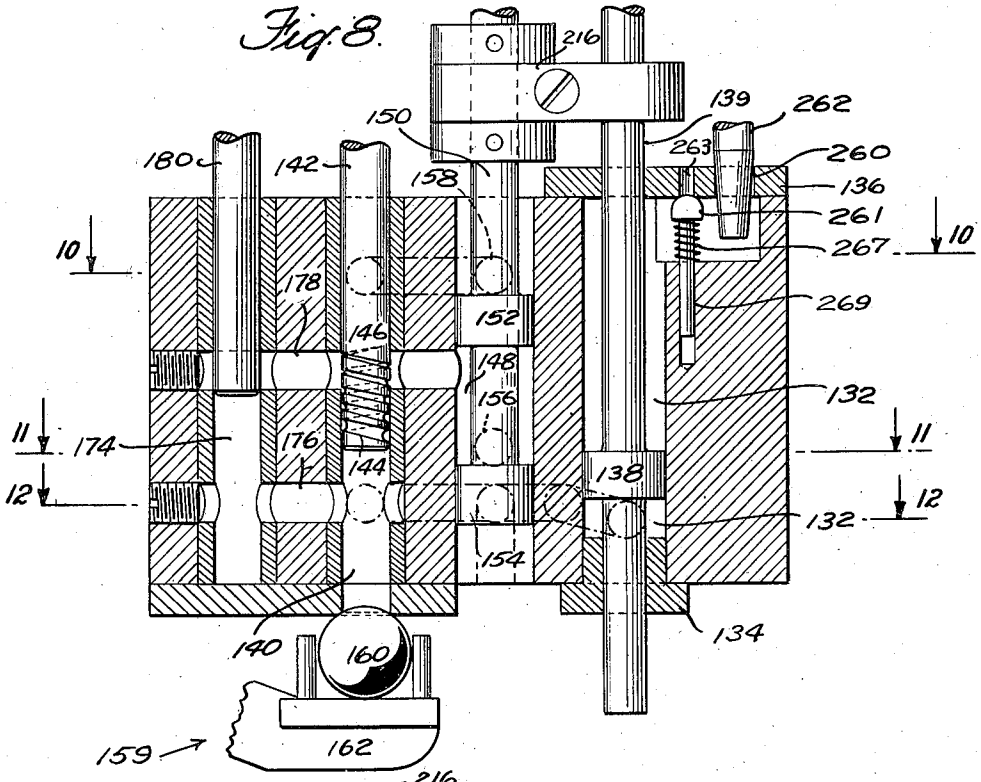
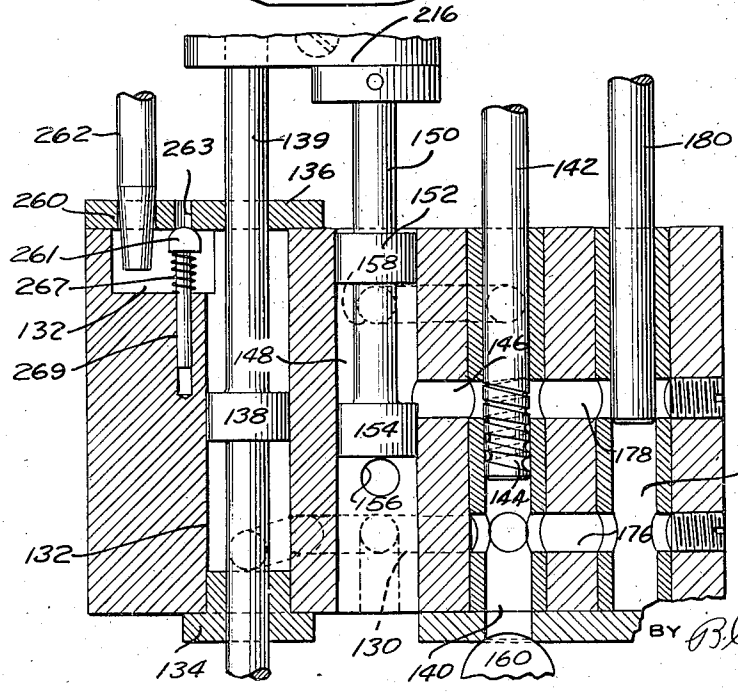


Fig. 9.



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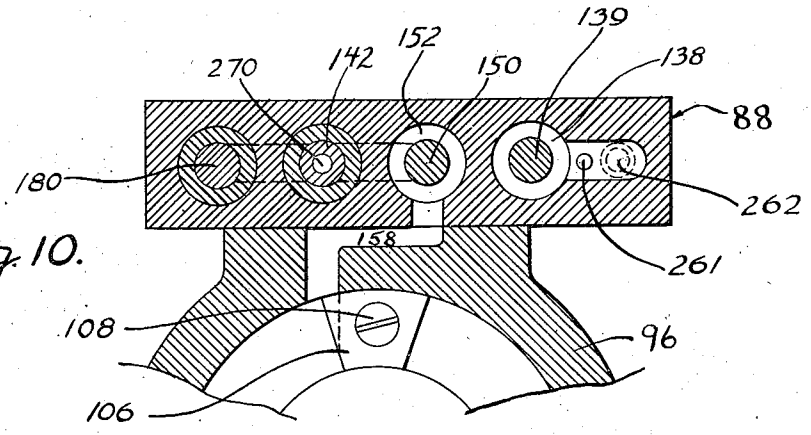


Fig. 10.

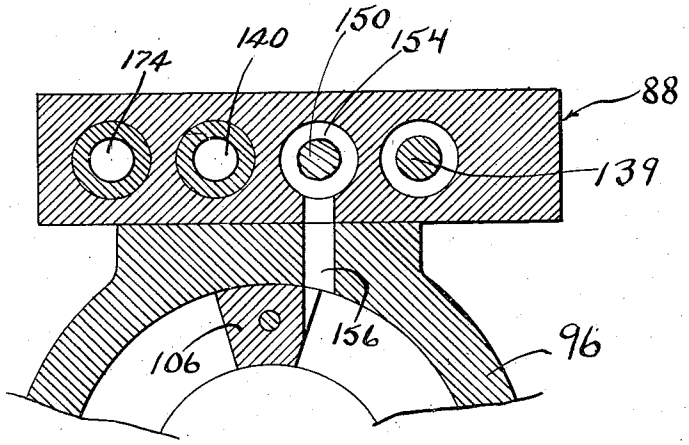


Fig. 11.

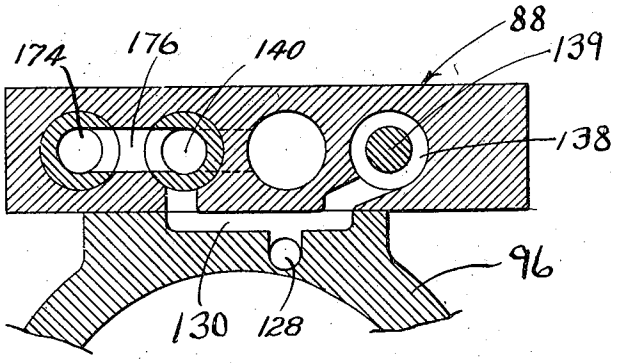


Fig. 12.

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Patented Mar. 22, 1949 2,465,174

UNITED STATES PATENT OFFICE

2,465,174

POUNCING MACHINE

Paul Schultze, Danbury, Conn., assignor to Doran Brothers Incorporated, Danbury, Conn.

Application April 12, 1944, Serial No. 530,597

14 Claims. (Cl. 223—20)

1

This invention relates to machines for pouncing or finishing hat bodies and more particularly to an improved hydraulic operating mechanism and its control.

An object of this invention is to provide a machine for use in finishing hat bodies which is efficient and dependable in operation and yet is simple, sturdy and durable in construction. Another object is to provide an operating mechanism and a control therefor which will meet the demands of commercial use. A still further object is to provide apparatus of the above character having a minimum of exposed parts, and having the advantages of a hydraulic system but not the disadvantages thereof. A still further object is to provide a hydraulic system which is adaptable to any one of a number of different types of machines and yet which gives optimum results under all conditions. These and other objects will be in part obvious and in part pointed out below.

The invention accordingly consists in the features of construction, combinations of elements, arrangements of parts and in the several steps and relation and order of each of the same to one or more of the others, all as will be illustratively described herein, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings in which is shown one of the various possible embodiments of my invention:

Figure 1 is a side elevation of a machine having my improved hydraulic mechanism installed therein;

Figure 1*a* is a contour diagram of a cam;

Figure 2 is an enlarged section on the line 2—2 of Figure 1;

Figure 3 is a section on the line 3—3 of Figure 2;

Figure 4 is a section on the line 4—4 of Figure 3;

Figure 5 is a horizontal section of the liquid motor with parts broken away taken on the line 5—5 of Figure 4;

Figure 6 is a section on the line 6—6 of Figure 5;

Figure 7 is an enlarged section on the line 7—7 of Figure 1;

Figure 8 is a section on an enlarged scale of the valve block shown in Figure 3;

Figure 9 is a section of the valve block with the valve in the reversing position;

Figure 10 is a horizontal section taken on the line 10—10 of Figure 8;

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Figure 11 is a horizontal section taken on the line 11—11 of Figure 8; and,

Figure 12 is a horizontal section taken on the line 12—12 of Figure 8.

The present invention will be described in connection with a pouncing machine of the type shown in my United States Patent No. 2,137,250, issued November 22, 1938, entitled "Pouncing machine." Reference may also be made to my prior United States Patent No. 2,105,130, issued January 11, 1938, entitled "Pouncing machine" wherein a similar pouncing machine is disclosed.

Referring particularly to Figure 1 of the drawings, a pouncing machine has a supporting column 10 formed by a base 11, a motor housing 12, and a head 13. Journaled in head 13 is a shaft 23 to the left end of which is fixed a chuck 14 which holds a hat block 15 on which a hat body 16 is mounted. At its right-hand end, shaft 23 has fixed thereto a pulley 17 by means of which the shaft is rotated through a belt 18 and a pulley 19 by a motor 21. Motor 21 is mounted in housing 12 and drives pulley 19 through suitable gears and a clutch 20; clutch 20 is operated by a fork 22 which fits in a groove 24 and which is carried by an operating shaft 26.

The hat body is rotated at a controlled speed and a pouncing tool show at the left in Figure 1 and indicated at 28 is moved into contact with the hat body. This pouncing tool is supported by a pouncing tool assembly and moved against and along the surface of the hat in the manner described in detail in my Patent No. 2,137,250. Accordingly, on the left-hand side of base 11 is mounted a bracket 30 which has a bearing casing 31 which provides a mounting for a pivot pin 32 (see Figure 7). Keyed to pivot pin 32 is a gear 34 which meshes with an idler gear or pinion 36 having teeth meshing with a rack 38. Rack 38 is slidably supported in a guide bracket 40 (see also Figure 1) which is rigidly clamped in turn to bracket 30. As will be explained more fully below, rack 38 slides back and forth in guide bracket 40 and this movement is transmitted through idler gear 36 and gear 34 to pin 32 with the result that pin 32 is turned in its casing 31. Clamped to the top of pin 32 is a collar 42 having an arm 44 which carries the tool assembly 27.

When in the position of rest, the tool assembly is so positioned that the pouncing tool does not contact the hat body on the block. When a block with a hat body thereon is properly positioned, the pouncing operation is initiated with the result that the tool assembly rotates or swings forward from the position of rest through a prede-

termined arc whereupon it stops and its movement is reversed, returning the tool to its position of rest. During the forward movement the pouncing tool is moved into contact with the "tip" or center of the crown of the hat body and thence around the square and down the side of the hat body to the brim. The reversal then takes place and the tool moves back up the side of the hat body, around the square and across the top and is moved away from the hat at the tip. After the forward movement has been completed, there is a slight delay, referred to as the "dwell," before the starting of the reverse movement. This dwell causes the tool to pounce the hat body adjacent the brim in a thorough manner. For purposes of better illustration, in Figures 1 and 7 the elements are shown at the time during the movement of the tool assembly when the tool is moving into contact with the tip of the hat.

The illustrative embodiment of the present invention is apparatus for moving the pouncing tool in the above manner. This movement is imparted to the tool assembly by oscillating the rack 38 (see Figures 1 and 7). Thus, in Figure 1, when rack 38 slides to the right, forward movement is imparted to the tool assembly carrying the tool from the position of rest to the dwell position. Rack 38 then slides to the left and this imparts the reversing movement to the tool assembly, returning the tool assembly to its position of rest.

At its right end rack 38 is supported by a rack guide 50 and has teeth on its outer side, that is on the side away from base 11, and these teeth engage a pinion 52. Pinion 52 is keyed to a vertical shaft 54 mounted in a pair of bearings 56 fixed to base 11. At its lower end shaft 54 carries a circular control cam 58 to be explained below. At its top end shaft 54 carries a driving sprocket wheel 60 through which oscillating movement is transmitted to the shaft and thence to the tool assembly.

The oscillating movement is produced by a motive unit positioned within base 11 and shown best in the sectional view of Figure 3. This motive unit is a hydraulic or liquid motor operated by oil from a pump. The pump is driven from the top through a pulley 64 and a belt 66 which extends around a pair of pulleys 68 (see also Figures 2 and 7) to a pulley 70 (Figure 1) on motor 21. The oscillating movement from the motive unit is transmitted to sprocket wheel 60 through a sprocket chain 72 which (see Figures 2 and 3) extends around a sprocket wheel 74 on the top of the motive unit.

The motive unit includes an oil tank or casing 76 which encloses the working parts of the unit and which also acts as an oil sump. Tank 76 is provided at the bottom with a drain opening 78 having a removable plug 79, and at the top with a filling spout 80 having a cap 81 on its top. Tank 76 has a top cover 82 from which the operating elements are suspended and emersed in the body of oil in the tank, the level of oil being as indicated at X. This operating mechanism comprises a hydraulic motor 84, an oil pump 86 and a valve assembly 88. At the top, a cylindrical block 90 is rigidly attached to cover 82 by a plurality of stud bolts 92 and attached to the lower end of block 90 by studs 94 is a motor block 96. The pump assembly includes a pump block 98 held in place by studs 101.

As shown best in Figure 5, the liquid motor is in the form of a vane 100 which is positioned in an annular space 102 between the inner surface of block 96 and the outer surface of a mounting sleeve 104; vane 100 spans space 102 radially and axially. Positioned within annular space 102 is a keystone-shaped block 106 which is held stationary by a stud bolt 108 threaded into the bottom of the motor block; block 106 closes off space 102 radially and axially. Vane 100 is rigidly attached by studs 110 to sleeve 104 and sleeve 104 in turn is keyed to a hollow shaft 112. As shown in Figure 3, shaft 112 is mounted in a pair of ball bearings 114 having a spacer sleeve 116 therebetween. At the top of shaft 112 is keyed sprocket wheel 74 referred to above. Pump 86 is driven from pulley 64 by shaft 118 which is supported at the top in a ball bearing 120 pressed into the top of sprocket wheel 74 and at the bottom in a pair of sleeve bearings 122 and 124.

The construction of pump 86 is shown best in Figures 5 and 6; this pump is of the conventional gear type with a driven gear 115 (Figure 6) mounted on a stud shaft 121 and a driving gear 117 keyed to shaft 118. The gears rotate as indicated by the arrows in Figure 5 carrying oil with them, oil being drawn into pump 86 from the oil sump through passage 119; the oil is discharged (Figure 6) under pressure through a passageway 126 in the upper surface of the pump block upwardly through a passageway 128 in the corner of the motor block to a horizontal passageway 130. Referring to Figure 9, at the left-hand end, passageway 130 opens into the bottom of a cylinder 132 formed in the valve block and closed at the bottom by a sealing ring 134 and at the top by a plate 136. Positioned within cylinder 132 is a piston 138 having a piston rod 139; piston 138 is the operating piston for the main valve which controls the movement of motor 84 and thus the returning of the tool from the dwell position to the position of rest.

The right-hand end of passageway 130 is open to a vertical bore 140 in which is positioned a speed adjusting rod 142 which has on its lower end a tapered spiral groove or thread 144. Groove 144 extends upwardly from the end of rod 142 and has slowly decreasing depth and width. The upper end of groove 144 opens to a horizontal passageway 146 which extends to the left to the main valve chamber 148. Positioned within chamber 148 is a main valve 150 which has two piston portions 152 and 154. In Figure 9, valves 139 and 150 are shown in the reversing position whereas in Figure 8 these valves are shown in the forward position; in Figure 8, the passageways which normally would not appear in this figure are indicated in dot-and-dash lines. Referring to Figure 8, immediately above the lower piston portion 154 is a passageway 156 shown in broken lines which leads to the lower portion of chamber 102; in Figure 5 this is at the right of block 106. Referring again to Figure 8, immediately above piston portion 152 is a passageway 158 shown in broken lines which leads to the top of chamber 102 (see Figure 5) at the left of block 106; thus, with valve 150 in the position shown in Figure 8, oil from the pump flows through passageway 140 along spiral groove 144 and through passageway 146 to chamber 148. It then flows through passageway 156 to chamber 102. This oil under pressure causes vane 100 to swing clockwise (Figure 5); the oil ahead of vane 100 is forced out through passageway 158 above piston portion 152 (Figure 8) and thus to the main body of oil. In Figure 5, vane 100 is shown in full lines in an intermediate position. During operation, vane 100 is moved between the

two broken line positions indicated at 100a and 100b, respectively; that is, when the tool assembly is in the rest position vane 100 is at 100a and when the tool reaches the dwell position at the brim of the hat vane 100 is at 100b.

The speed of movement of the vane depends upon the amount of oil which passes through groove 144 and this in turn depends upon the cross-section of the groove at the point where it opens into passageway 146 as well as upon the pressure in bore 140. As pointed out above, the cross-section of groove 144 is maximum at the bottom end of rod 142 and it decreases gradually so that the groove runs out. Thus, by moving rod 142 up and down the size of the groove at the point where it opens into passageway 146 is changed and the amount of oil which flows through the groove is thereby regulated. However, it is important to maintain a constant controlled oil pressure in bore 140 and this is done by a pressure regulating relief valve 159 closing the lower end of bore 140, shown best in Figure 4. Valve 159 has a ball 160 which is held in place by a ball retainer 162 pivoted at 164 upon the bottom of the valve block. Ball retainer 162 extends to the left of pivot 164 and is attached to a pressure bar 166, the upper end of which is bored and receives a guide rod 167 which is surrounded by a compression coil spring 168. The top of rod 167 is rigidly attached to the lower end of an adjusting cap 170 which is threaded in an opening in cover 82. The lower end of adjusting cap 170 bears against the top of spring 168 and holds the spring under compression against the top of bar 166; thus, by turning cap 170 the pressure of spring 168 holding ball 160 in place is changed. This valve acts as a pressure release valve and releases oil which is received from the pump in excess of that which is used. This valve also provides an accurate manner of obtaining a predetermined oil pressure in bore 140 and accurate control may thus be maintained upon the overall speed of movement of vane 100. As indicated above, the speed of movement of the tool assembly is changed as the tool moves around the hat and the change of speed is effected by moving rod 142 up and down thereby increasing and decreasing the effective depth or cross-section of groove 144.

When the tool is moving between its position of rest and the position in which it contacts the hat body, the speed of movement may be very rapid. Accordingly, special provision is made to obtain this effect and this is in the form of a bypass valve shown in Figure 9 at the right of the speed adjustment rod 142. This bypass valve is provided by a vertical passageway 174 which is connected through a passageway 176 to the lower end of bore 140 and which is connected through a passageway 178 to the upper end of passageway 140. Normally positioned over the end of passageway 178 is a plunger 180 which (see Figure 4) is slidably mounted in the cover 82 and is provided with a contact block 182. When unrestricted movement is desired, the pressure holding plunger 180 in the position shown is released and this plunger moves upwardly uncovering passageway 178. The oil then freely flows from passageway 176 through bore 174 and passageway 178 around rod 142 and through passageway 146 to chamber 148. It is thus seen that the lifting of plunger 180 causes the tool assembly to move at a rapid rate which is independent of the position of rod 142.

The pressure in bore 140 biases rod 142 upwardly and its upper end (see Figure 4) is threadably received in a block 190 which is held down by a cam 192, the position of which is changed in accordance with the speed adjustment desired. Initially rod 142 is adjusted with respect to block 190 and it is locked in position by a locknut 193. Thereafter cam 192 is moved up and down as desired and rod 142 follows the movement of the cam because of the pressure within bore 140. Cam 192 is mounted on a shaft 194 which is rotatably mounted in a pair of arms 196 and 197 (see Figure 7). Arms 196 and 197 are pivotally mounted on the machine by a shaft 200. At its outer end, shaft 194 carries an adjusting knob 202 by means of which rod 194 is turned to adjust the position of cam 192. The adjustment is held by friction caused by a spring 195 bearing against a collar 199 and the side of the forked upper of a vertical rod 204.

Arm 196 bears against the top of block 182 and in this way holds plunger 180 in the position shown in Figure 4. However, when it is desirable to provide for rapid movement of the tool assembly arm 196 is raised thereby permitting plunger 180 to move upwardly and open the bypass circuit in the manner outlined above. Accordingly, shaft 194 is connected at the left to a draw rod 204 which extends downwardly to an arm 206. This arm is similar to arm 197 and is mounted on a shaft 208 mounted in bearings 209 on tank 76 which extends to the right (Figure 4) and carries a cam arm 210 (see also Figure 1). Cam arm 210 has a roller 212 (see Figure 2) engaging the bottom cam surface of circular cam 58 the contour of which is indicated in broken lines at 214. The contour of this cam surface is shown schematically in Figure 1a and it is such that the speed of movement of the tool assembly is regulated in the manner outlined above; that is, when the tool approaches the hat body and again when it starts to move away from the hat body, cam arm 210 swings clockwise (Figure 1) and this (see Figure 4) lifts arm 196 so as to open the bypass around the control valve formed by rod 142 and groove 144. During the time that the tool is in contact with the hat body, the speed is controlled as desired by swinging cam arm 210 (Figure 1) through a short arc; this in turn moves rod 204 and levers 197 and 196 and this presses rod 142 downwardly or permits it to rise sufficiently to change the effective cross-section of groove 144 with the result that the rate of flow through the groove is controlled.

Referring to Figure 4, the main valve 150 is attached at its upper end to piston rod 139 by a clamp 216, and rod 139 is threaded into the lower end of a block 218 and is locked by a locknut 219. At its upper end (see Figure 3) block 218 is provided with a recess 226 which receives the lower rounded end 224 of a plunger arm 220. Plunger arm 220 is hingedly carried at its upper end by an operating lever 222 which is clamped to a shaft 226a carried in a pair of bearings 225 and 227 in base 11 (see Figure 7). Referring to Figure 1, shaft 226a carries exterior of base 11 an arm 228 to which is hingedly attached the lower end of an operating rod 230 having an adjustable collar 232 and extending through a guide block 234.

During the forward movement of the tool assembly, the elements are held in the position shown by a lock dog 236 pivoted to base 11 and having an extension 238. Directly beneath extension 238 is the end of a lever 240 and beneath lever 240 is a release rod 242 which extends

through a guide 244 and is carried at its lower end by an arm 246. Arm 246 is pivoted at 248 on base 11 and has an integral operating dog 250 which extends downwardly and (see Figure 2) in the path of a stud 252 carried by a bracket 254. Bracket 254 is held in position by a stud bolt 256 (see also Figure 7) which extends through a slot 257 in the bracket 254 and is threaded into the rack. Bracket 256 is so adjusted that when the tool reaches the position where the forward movement is to stop, stud 252 engages dog 250, swinging lever 246 counterclockwise (Figure 1). This lifts rod 242 raising lever 240 and swinging dog 236 away from collar 232. Piston 138 (Figures 4, 8 and 9) is therefore free to move upwardly and it tends to do this because of the pressure of the oil from passageway 130. This movement of piston 138 upwardly moves the main valve 150 to the position shown in Figure 9. In this position, oil from chamber 148 flows through passageway 158 into chamber 102 and (see Figure 5) to the left of block 106. At this time, vane 100 is in the position 100*b* and the incoming oil swings the vane counterclockwise toward the position 100*a*. This forces oil from the opposite end of the chamber through passageway 156 and the movement of the tool is reversed.

As indicated above, it is desirable to provide a dwell at the end of the forward movement of the tool and this result is obtained by merely delaying the movement of the main valve 150 to the reversing position; that is, the reverse movement is not started until valve 150 exposes the passageway 158 to the oil supply, and the dwell is the period of time which passes while the valve is moving to this position. This period of time is regulated by restricting the outlet from chamber 132 above piston 138. Accordingly, the outlet from this chamber is through an opening 260 into which is positioned the tapered end of a rod 262. The oil escapes from chamber 132 through the opening around the rod and by moving rod 262 up and down the size of this opening is regulated. As pointed out above, the oil pressure in bore 140, and therefore in chamber 132 beneath piston 138, is maintained constant by the pressure relief valve 159. Accordingly, by providing a fixed outlet around pin 262, piston 138 moves upwardly at an accurately timed rate and the length of the dwell is thereby controlled. Rod 262 is biased upwardly by the pressure within chamber 132 and (see Figure 4) it is held down at its upper end by a cam 264 fixed to a shaft 266 which in turn is rotatably mounted in a bracket 265 on cover 82. On the right-hand end of shaft 266 is an adjusting knob 268, and surrounding shaft 266 is a spring 267 which holds cam 264 against the side of bracket 265 with the result that friction holds the cam in adjusted position. Thus, when cam 264 is adjusted by knob 268 a predetermined dwell period is established. In order to facilitate the passage of oil into the top of chamber 132 when piston 138 is moved downwardly, a check valve 261 is provided which is normally held against an opening 263 by a spring 267. Valve 261 has a shank portion which is guided in a bore 269 in the valve block. When piston 138 is moved downwardly, the suction created by the piston moves valve 261 away from its seat and oil flows into chamber 132.

As shown in Figure 4, rod 142 has a central bore 270 to which a pressure gauge is attached through a nipple 272 and a flexible tube 274; such a gauge is shown in Figure 1 and indicated at 276.

The machine is started by swinging bar 278 at

the top of the machine in a clockwise direction and this operates suitable motor switches (not shown) as well as clutch 20, and it also swings operating bar 280 downwardly to move rod 230 to the position shown. A spring 282 normally holds bar 280 in its upper position as shown. When it is desirable to stop the machine before the tool reaches the dwell position, the bar 284 is swung counterclockwise and this raises lever 240 and releases dog 236 with the result that the tool is returned to the position of rest as outlined above.

As many possible embodiments may be made of the mechanical features of the above invention and as the art herein described might be varied in various parts, all without departing from the scope of the invention, it is to be understood that all matter hereinabove set forth, or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a hydraulic operating mechanism for a hat pouncing machine, said machine having a column, a rotatable hat support on said column, a pouncing tool rotatably mounted on said column to move from a position of rest remote from the hat body on said hat support into operative engagement with the hat body, that improvement which includes the combination of a pump mounted within said column, an electric motor mounted in said column, driving means including a shaft in said column connecting said motor and said pump, a hydraulic motor mounted in said column including a rotatable element, means to conduct fluid under pressure from said pump to said hydraulic motor, a second shaft in said column coaxial with said first shaft and connected to said motor element, and means forming a driving connection between said second shaft and said pouncing tool whereby said hydraulic motor drives said pouncing tool upon operation of said pump.

2. Apparatus according to claim 1 wherein said pump, both of said shafts and said hydraulic motor are disposed within a tank mounted within said column.

3. In a hydraulic operating mechanism for a hat pouncing machine, said machine having a column, a rotatable hat support on said column, a pouncing tool rotatably mounted on said column to move from a position of rest remote from the hat body on said hat support into operative engagement with the hat body, that improvement which includes the combination of a pump mounted within said column, an electric motor mounted in said column, driving means including a shaft in said column connecting said motor and said pump, a hydraulic motor mounted in said column including a rotatable element, means to conduct fluid under pressure from said pump to said hydraulic motor, a second shaft in said column coaxial with said first shaft and connected to said motor element, means forming a driving connection between said second shaft and said pouncing tool whereby said hydraulic motor drives said pouncing tool upon operation of said pump, a valve for controlling the flow of hydraulic fluid from said pump to said hydraulic motor, valve control means including a cam, and means connecting said cam to said driving connection whereby said cam is operated to control said valve during the driving operation of said driving connection.

4. Apparatus according to claim 3 wherein the valve includes a pair of ports connectable with

said hydraulic motor but which are closed when the machine is at rest, closures for said ports adapted to move between open and closed positions in relation thereto, and means connected to said valve control means for controlling the movement of said closures in response to the operation of said cam.

5. Apparatus according to claim 3 wherein said valve includes a pair of ports connectable with said hydraulic motor but which are closed when the machine is at rest, closures for said ports adapted respectively to partially open one port and completely open the other in timed relation, whereby said hydraulic motor is driven at slow and rapid rates in order to effect driving of said pouncing tool at slow and rapid rates, and means connected to said valve control means for controlling the movement of said closures in response to the operation of said cam.

6. In a hydraulic operating mechanism for a hat pouncing machine, said machine having a column, a rotatable hat support on said column, a pouncing tool rotatably mounted on said column to move from a position of rest remote from the hat body on said hat support into operative engagement with the hat body, that improvement which includes the combination of an oil pump mounted on said column, an electric motor mounted on said column, driving means connecting said motor and said pump, a hydraulic motor on said column, means to conduct fluid under pressure from said pump to said motor, means forming a driving connection between said hydraulic motor and said pouncing tool, whereby said hydraulic motor drives said pouncing tool upon operation of said pump, a valve for controlling the flow of hydraulic fluid from said pump to said hydraulic motor, valve control means including a cam, means connecting said cam to said driving connection whereby said cam is operated to control said valve during the driving operation of said driving connection, said valve including a pair of ports connectable with said hydraulic motor but which are closed when the machine is at rest, closures for said ports adapted to move between open and closed positions relative thereto, means constantly biasing said closures toward their open positions while said pump is operating, and means operatively associated with said cam and with said closures for moving said closures against the force of said biasing means when said cam is driven by said driving connection.

7. Apparatus according to claim 6 wherein said biasing means comprises the hydraulic fluid, the pressure of which is exerted directly against said closures, and a relief valve associated with one of said ports for bypassing the hydraulic fluid when said one port is closed.

8. In a machine of the character described, in combination, a rotatable hat support, a tool adapted to operate upon the surface of a hat mounted on said support, hydraulic driving mechanism including a hydraulic pump and a hydraulic motor, and means forming a driving connection between said motor and said tool, a valve for controlling the flow of hydraulic fluid from said pump to said hydraulic motor, a cam connected to and driven by said driving connection, a follower operatively associated with said cam so as to be driven thereby, said valve including a ported bore having a plunger movable therewithin to open and close the port in said bore, means communicating said bore with said pump and said motor, said plunger being so arranged as to be biased toward its open position relative to said port by the pressure of the hydraulic fluid in said bore, and means forming a driving connection between said cam follower and said plunger for moving said plunger toward its closed position against the pressure of said hydraulic fluid.

9. In a machine of the character described, in combination, a rotatable hat support, a tool adapted to operate upon the surface of a hat mounted on said support, hydraulic driving mechanism including a hydraulic pump and a hydraulic motor and means forming a driving connection between said motor and said tool, a valve for controlling the flow of hydraulic fluid from said pump to said hydraulic motor, a cam connected to and driven by said driving connection, a follower operatively associated with said cam so as to be driven thereby, said valve including a ported bore having a plunger movable therewithin to open and close the port in said bore, means communicating said bore with said pump and said motor, said plunger being so arranged as to be biased toward its open position relative to said port by the pressure of the hydraulic fluid in said bore, means forming a driving connection between said cam follower and said plunger for moving said plunger toward its closed position against the pressure of said hydraulic fluid, and means for relieving the pressure of the hydraulic fluid in said bore when said plunger is in its closed position relative to said port.

10. In a machine of the character described, in combination, a rotatable hat support, a tool adapted to operate upon the surface of a hat mounted on said support, hydraulic driving mechanism including a hydraulic pump and a hydraulic motor, and means forming a driving connection between said motor and said tool, a valve for controlling the flow of hydraulic fluid from said pump to said hydraulic motor, a cam connected to and driven by said driving connection, a follower operatively associated with said cam so as to be driven thereby, said valve including a ported bore having a plunger movable therewithin to open and close the port in said bore, means communicating said bore with said pump and said motor, said plunger being so arranged as to be biased toward its open position relative to said port by the pressure of the hydraulic fluid in said bore, means forming a driving connection between said cam follower and said plunger for moving said plunger toward its closed position against the pressure of said hydraulic fluid, said valve including a second bore having a port in communication with said pump, a second plunger in said second bore under the bias of the pressure of the hydraulic fluid, releasable means for holding said second plunger against movement by said hydraulic fluid, means operatively associated with said tool drive, means for releasing said releasable means when the tool driving means reaches the end of its forward movement, whereby said second plunger may be moved by the hydraulic fluid, and means operatively associated with said second plunger and with said valve for reversing the flow of fluid through said valve to said hydraulic motor when said second plunger is moved thereby to reverse the direction of movement of said tool driving means.

11. Apparatus according to claim 10 wherein the reversing means comprises a third plunger connected to said second plunger, said third plunger being slidably disposed in a third bore,

said third bore having a port which is opened and closed by said third plunger and which when open communicates said third bore with said pump and with that side of said hydraulic motor through which hydraulic fluid flows to effect reverse operation of said motor and accordingly of said tool driving means.

12. In a machine of the character described, in combination, a column, a hat support rotatably mounted on said column, a hat treating tool, means mounting said hat treating tool on said column for angular movement relative to said hat support, means including a rack for driving said tool, a pinion rotatably mounted on said column externally thereof and in mesh with said rack, a selectively reversible hydraulic motor mounted within said column, and chain and sprocket means forming a driving connection between said motor and said pinion whereby said pinion is driven by said motor.

13. In a machine of the character described, in combination, a column, a hat support rotatably mounted on said column, a hat treating tool, means mounting said hat treating tool on said column for angular movement relative to said hat support, means including a rack for driving

said tool, a pinion rotatably mounted on said column externally thereof and in mesh with said rack, a selectively reversible hydraulic motor mounted within said column, chain and sprocket means forming a driving connection between said motor and said pinion whereby said pinion is driven by said motor, means operable for controlling the direction of flow of hydraulic fluid to said motor, and means connected to said second-mentioned means for operating said last-mentioned means.

14. Apparatus according to claim 13 wherein said hydraulic motor and said controlling means are enclosed within a fluid-tight tank mounted within said column.

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The following references are of record in the file of this patent:

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