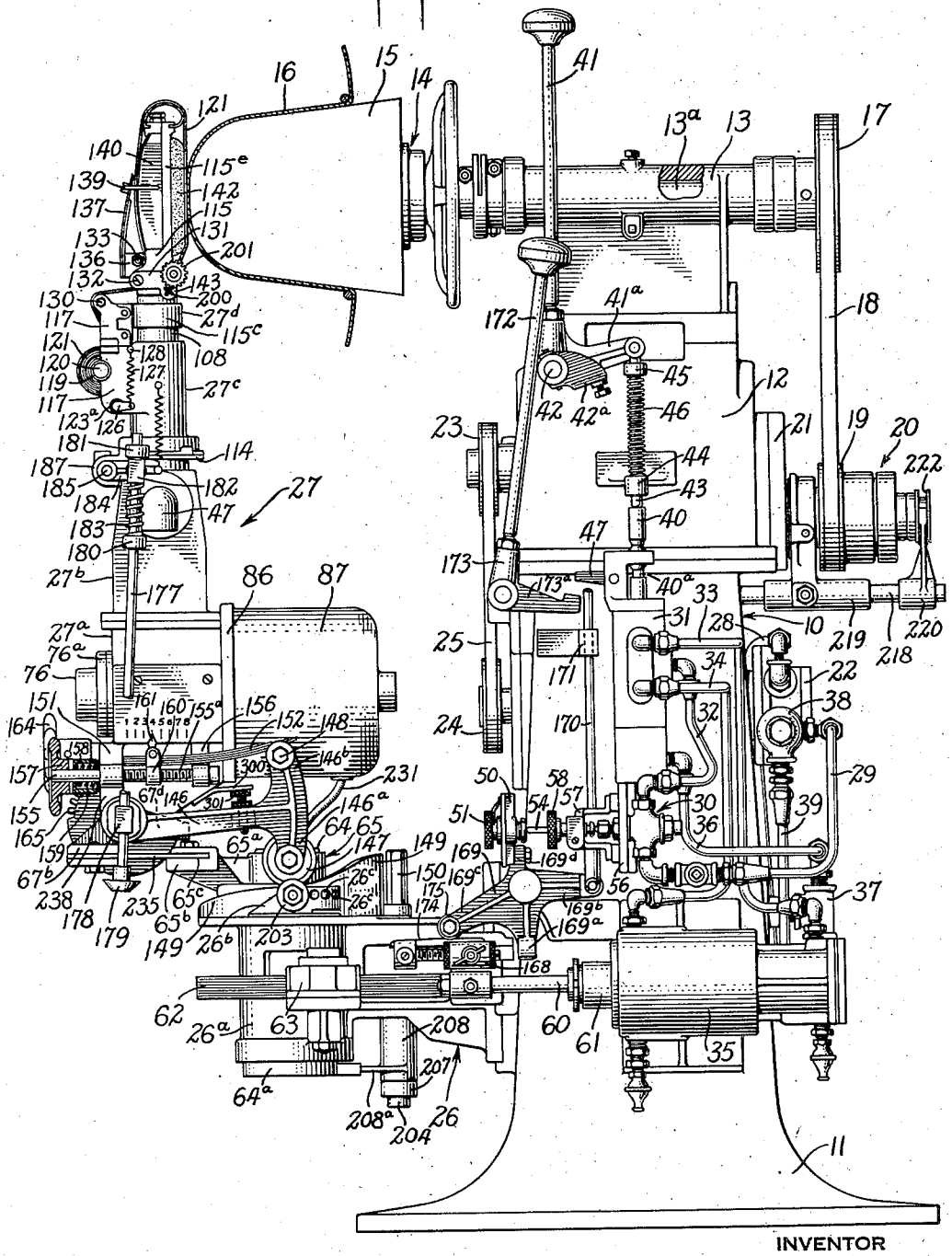
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POUNCING MACHINE

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Fig. 1.



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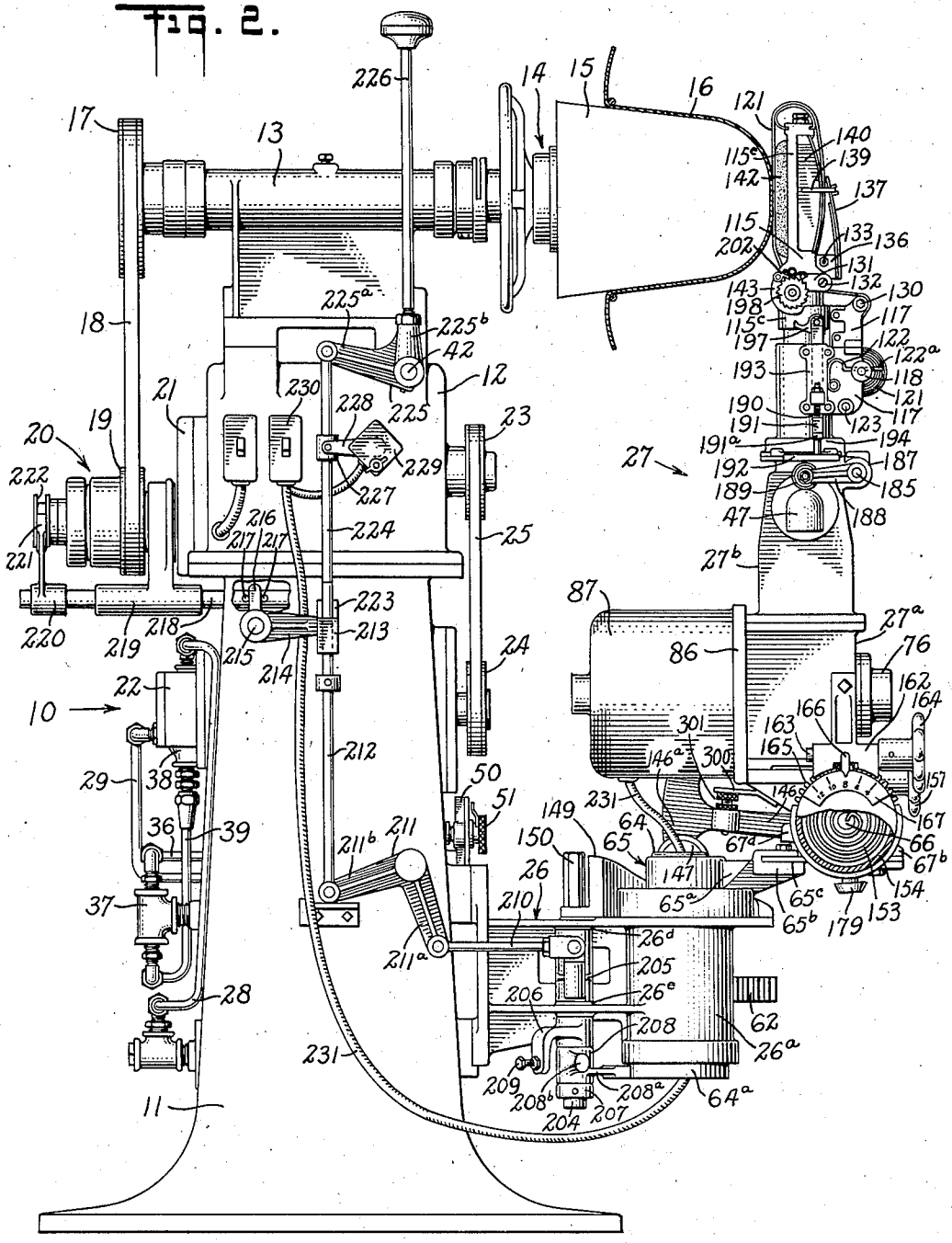
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POUNCING MACHINE

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Fig. 2.



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POUNCING MACHINE

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Fig. 3.

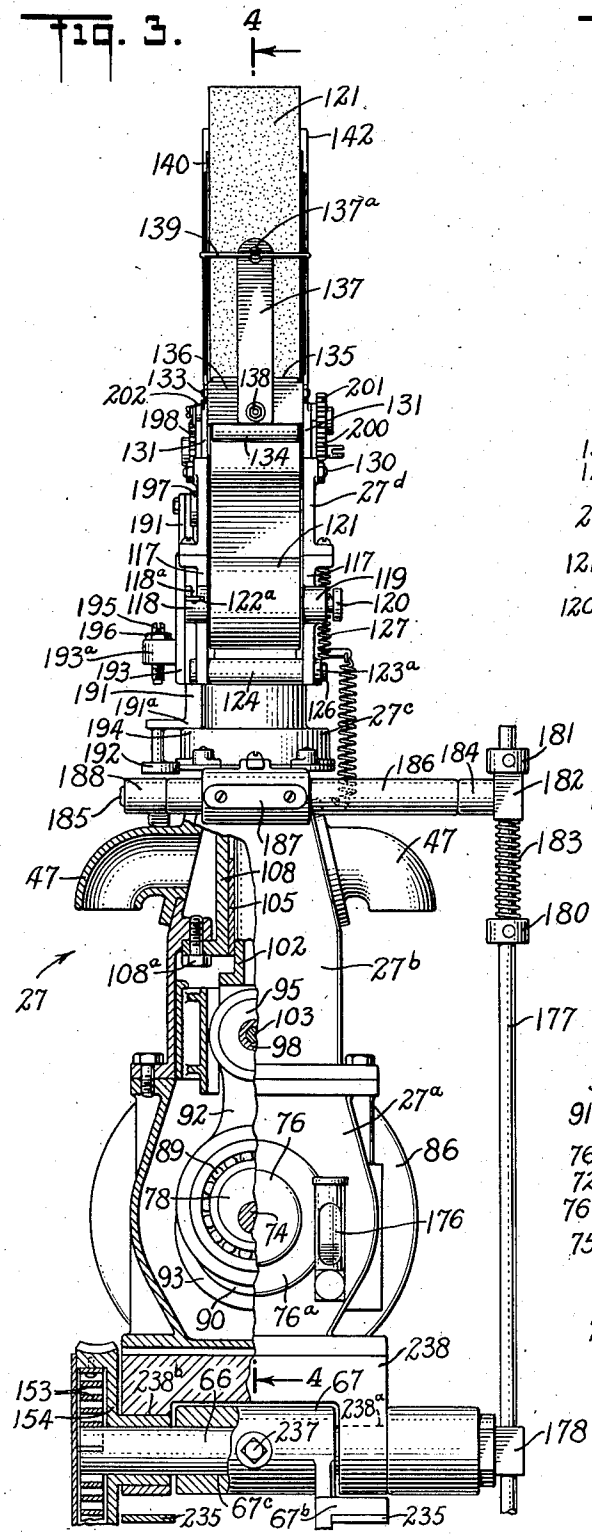
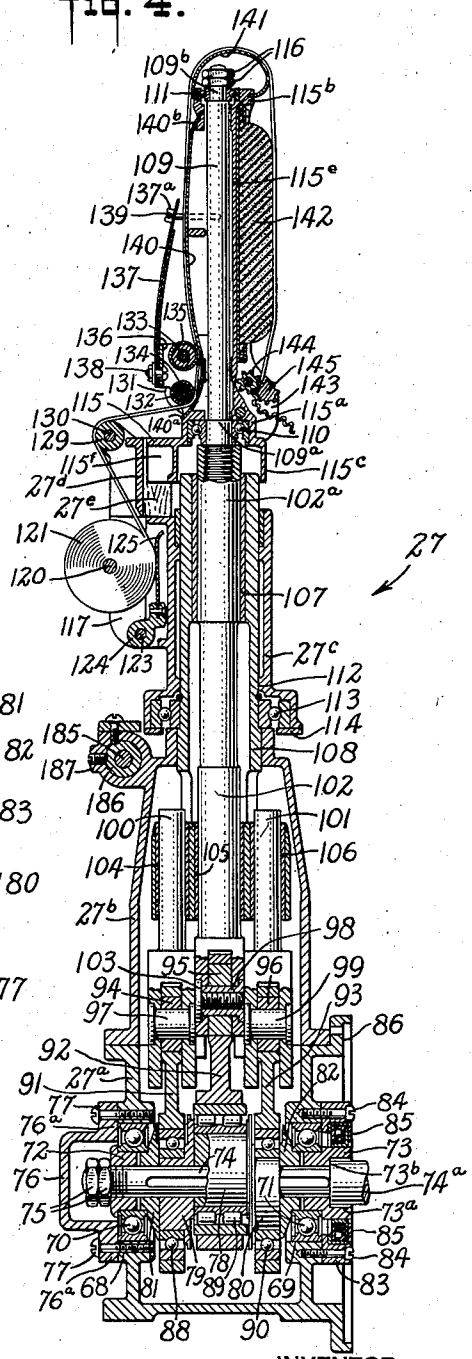


Fig. 4.



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POUNCING MACHINE

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Fig. 6.

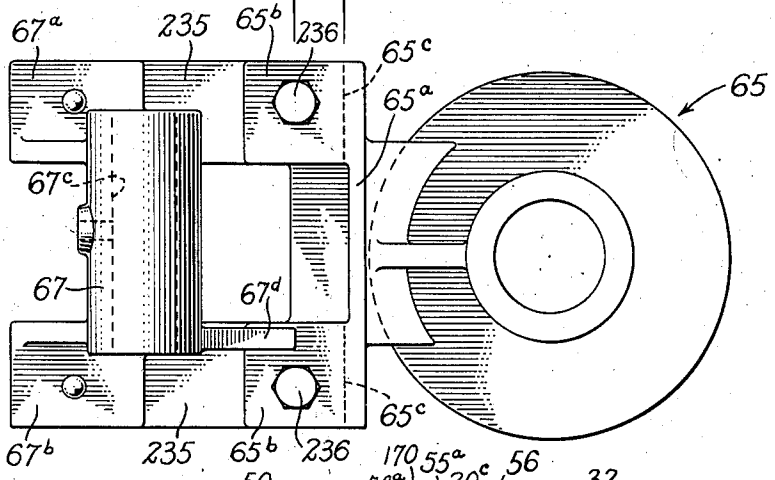


Fig. 7.

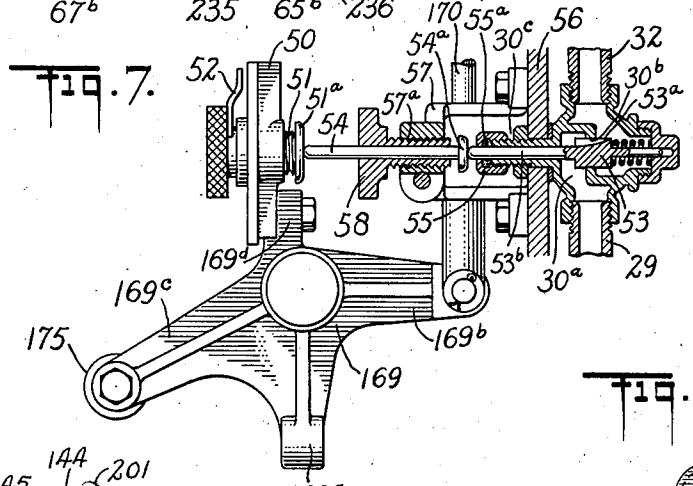


Fig. 8.

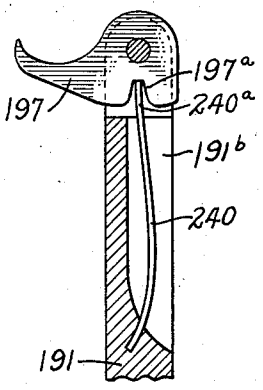
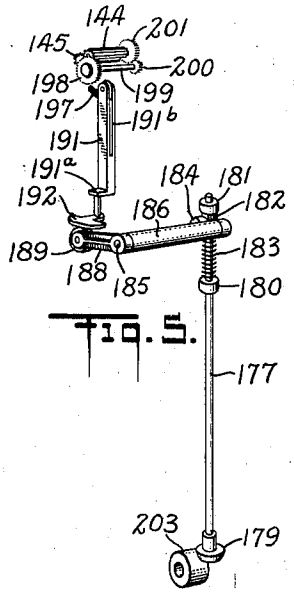


Fig. 5.



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Patented Nov. 22, 1938

2,137,250

UNITED STATES PATENT OFFICE

2,137,250

POUNCING MACHINE

Paul Schultze, Rose Hill, Danbury, Conn., assignor to John C. Doran, doing business as Doran Brothers, Incorporated, Danbury, Conn.

Application June 22, 1936, Serial No. 86,484

14 Claims. (Cl. 223—20)

This invention relates to a machine for pouncing or finishing hat bodies.

One of the objects of this invention is to provide a machine for finishing hat bodies which is simple in construction, efficient in operation and sturdy and durable under conditions of rigorous use. Another object is to provide a machine of the above nature which may be efficiently operated by unskilled labor. Another object is to provide a machine of the above nature wherein several of the operating parts are actuated hydraulically. Other objects will be in part apparent and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts as will be exemplified in the structure to be hereinafter described 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 embodiments of my invention,

Figure 1 is an elevation of one side of my machine;

Figure 2 is an elevation of the other side of my machine;

Figure 3 is an enlarged front elevation of the pouncing tool assembly of the machine a portion thereof being shown in section;

Figure 4 is a sectional elevation taken along the line 4—4 of Figure 3;

Figure 5 is an enlarged perspective view of the feeding mechanism for the pouncing paper;

Figure 6 is an enlarged plan view of the mounting for the pouncing tool assembly;

Figure 7 is an enlarged elevation of a portion of the hydraulic system, certain parts thereof being shown in section; and

Figure 8 is an enlarged fragmentary elevation of part of the paper feeding mechanism, portions thereof being shown in section.

Similar reference characters refer to similar parts throughout the several views of the drawings.

In general and with reference to Figure 1, the pouncing machine comprises a column generally indicated at 10 formed by a base section 11, a motor housing 12 and a head 13. A shaft 13a is journaled in head 13 and has secured on one end thereof a chuck generally indicated at 14 which receives a hat block 15 on which a hat body 16 may be mounted. Preferably shaft 13a is adjustable axially by any suitable mechanical instrumentality (not shown) such as is described in my copending application Serial Number 5,757, filed February 9, 1935, in order to change the position of chuck 14 to accommodate hat blocks of different depths. On the other end of shaft 13a is a driven pulley 17 connected by means of a belt 18 to a driving pulley 19 associated with a clutch generally indicated at 20. Clutch 20 is driven by a motor 21 mounted in housing 12 and thus shaft 13 may be driven to rotate hat block 15. Motor 21 also drives an oil pump 22 by means of pulleys 23 and 24 and belt 25, oil pump 22 preferably being mounted in the upper part of section 11 of column 10.

Rotatably mounted on a bracket generally indicated at 26 (Figure 1) secured to and extending from section 11 is a pouncing tool assembly generally indicated at 27 which is movable about and toward and away from hat block 15 through instrumentalities to be described hereinafter. Pouncing tool assembly 27 includes a pouncing tool and a driving mechanism therefor as will also be described in detail hereinbelow.

Oil pump 22 (Figure 1) supplies oil under pressure to a hydraulic piston reciprocably disposed in a cylinder 35 secured to the lower part of section 11 of the machine column. A piston rod 60 extends through a gland 61 on cylinder 35 and has connected thereto a rack 62 supported by a guide 63 secured to bracket 26. Pouncing tool assembly 27 is mounted on a heavy pin or stud 64 which is rotatably journaled in a suitable housing 26a or the like which may be an integral part of bracket 26 or connected thereto in any suitable manner. Preferably stud 64 has gear teeth (not shown) cut thereon which mesh with an idler gear (not shown) which in turn meshes with the teeth of rack 62. Thus reciprocation of rack 62 causes rotation of stud 64 and accordingly rotation of pouncing tool assembly 27. For a more detailed disclosure and description of these parts, reference is made to my above-noted copending application.

As is more clearly shown in Figures 2 and 6, a collar generally indicated at 65 is secured to the top of stud 64 (Figure 2) so as to be rotatable therewith and from this collar extends a bracket portion 65a. As is more clearly shown in Figure 6, bracket portion 65a is provided with arms 65b, each of which has a cut out portion 65c (Figures 1 and 2). A resilient strip 235 (Figure 6) is secured to each of arms 65b in cut out portions 65c thereof (see Figure 2), screws 236 (Figure 6) holding the strips in place. The free ends of strips 235 have secured respectively thereto the legs 67a and 67b of bifurcated part 67 which is provided with a bore 67c receiving a pin 66. A set

screw 237 extends through part 67 and bears against pin 66 to hold the pin and the part in non-pivotal relationship. The lowermost part of pouncing tool assembly 27 (Figure 3) comprises a supporting member 238 including bored portions 238a and 238b which are pivotally mounted about pin 66. It may now be seen that pouncing tool assembly 27 is resiliently mounted with respect to assembly stud 64 (Figure 1) and this for a purpose pointed out hereinafter.

Preferably the bored portion of bifurcated part 67 (Figure 6) has extending therefrom an arm 67d which forms an abutting member engageable with the top of one of arms 65b of bifurcated part 65a to limit the movement of the pouncing tool assembly 27 resulting from the resiliency of strips 235.

Referring to Figure 3, pouncing tool assembly 27 is preferably built up of several cast housings or the like and accordingly comprises a crank case 27a, a cross head guide housing 27b, a paper roll support 27c (see also Figure 1) and a pad guide bracket 27d, all of which will be described in greater detail hereinafter. Crank case 27a is secured to supporting member 238 and accordingly pivotal movement about pin 66 causes swinging of the entire pouncing tool assembly toward or away from the hat block.

Crank case 27a is provided with bores 68 and 69 in which are disposed roller bearings 70 and 71. Disposed respectively within bearings 70 and 71 are outer spacer 72 and inner spacer 73, these spacers each being provided with a bore which journals a motor shaft extension 74. Inner spacer 73 has a large bore 73a which forms a shoulder 73b against which an enlarged portion 74a of shaft 74 abuts when shaft 74 is properly positioned in the spacers. The other end of shaft 74 is preferably threaded to receive lock nuts 75 which, when taken up against outer spacer 72, securely hold shaft 74 in its operative position in the spacers. Preferably I provide a cap 76 which is secured to the outer side of crank case 27a by means of screws 77, this cap preferably including portions 76a which rest against the outer race of bearing 70 to hold the bearing in its proper operative position. Bearing 71 is held in its proper operative position by a suitable shoulder former on inner spacer 73.

Mounted on shaft 74 and rotatable therewith is a main crank disc 78 on the opposite sides of which are smaller crank discs 79 and 80 which are also secured to shaft 74. These three crank discs are centered on shaft 74 between spacers 72 and 73 by a part 81 disposed between the inner race of bearing 70 and the crank disc 79 and by another part 82 similar to part 81 disposed between the inner race of bearing 71 and crank disc 80. Parts 81 and 82 also conveniently provide means for throwing oil about the interior of crank case 27 and thus lubricate the parts rotating therewithin while at the same time preventing excessive oil from entering bearings 70 and 71 which require only a film of lubricant. Bearing 71 and accordingly part 82, crank discs 78, 79, 80 and part 81 are conveniently held in position in the crank case by means of an annular part 83 which bears against the outer race of bearing 70 and is secured to the crank case by means of screws 84. Preferably I provide an oil seal 85 between inner spacer 73 and annular part 83 to seal lubricant within the crank case.

Crank case 27a is also provided with a motor housing 86 on which, as is more clearly shown in Figure 1, a motor 87 is mounted, the armature (not shown) of this motor being connected to shaft 74 (Figure 4). Referring again to Figure 4, I provide a ball bearing 88 on crank disc 79, a ball bearing 89 on crank disc 78 and a ball bearing 90 on crank disc 80. Mounted on these bearings respectively are connecting rods 91, 92 and 93 in the upper portions of which are respectively disposed wrist pin bushings 94, 95 and 96 through which wrist pins 97, 98 and 99 respectively extend. A pair of balancing rods 100 and 101 having bifurcated lower ends are connected to connecting rods 91 and 93. Thus the bifurcations of balance rod 100, for example, lie on opposite sides of the upper end of connecting rod 91 and wrist pin bushing 94 and are suitably bored to receive wrist pin 97. Balance rod 101 is similarly related to crank shaft 93. Preferably the bifurcations of these balance rods closely fit the opposite sides of their respective connecting rods and wrist pin bushings so as to allow a minimum amount of play therebetween.

Balance rods 100 and 101 are preferably of bronze and are provided for a purpose to be described more fully hereinafter.

A reciprocating rod 102 extends upwardly through cross head guide housing 27b and has its lower end bifurcated and secured to the upper end of connecting rod 92, the bifurcations of this rod preferably closely fitting the sides of the upper end of connecting rod 92 and the sides of wrist pin bushing 95. Wrist pin 98 extends through the bifurcations of rod 102 and is secured thereon by means of a suitable screw 103 or the like threaded into the wrist pin. Preferably the lower end of rod 102 is dimensioned to have a substantially close sliding fit between the lower ends of balance rods 100 and 101 thus, in effect, the lower ends of the balance rods constitute a guide for the lower end of the reciprocating rod.

In the upper portion of cross head guide housing 27b I provide a rod guide 108 in which are mounted suitable bushings 104, 105 and 106 which slidably receive balance rod 100, reciprocating rod 102 and balance rod 101 respectively. Preferably reciprocating rod 102 is a hollow tube fabricated from a light but strong material such as, for example, Dow metal, an alloy comprising about 97½ per cent magnesium and about 2½ per cent aluminum, thus providing a rod which is light in weight though extremely rigid. In order to avoid excessive and rapid wear of rod 102, the portion thereof which reciprocates within bushing 105 is preferably smaller in diameter than the diameter of the bushing and is coated with hard steel which is ground to the size of the bushing, thus providing a bearing surface that will stand long and rigorous use. The upper end 102a of rod 102 is similarly treated and is received in a bushing 107 disposed in the upper portion of rod guide 108 which extends through paper roll support 27c and is secured to cross head guide 27b by a bolt 108a (Figure 3). Upper end 102a of hollow rod 102 is preferably threaded to receive a pad supporting rod 109 (Figure 4), the lower end of which has a shoulder 109a on which is mounted a ball bearing 110. The upper end 109b of rod 109 is preferably reduced and has mounted thereon a ball bearing 111, which facilitates the swiveling of a feeding pad frame 115 as will be more fully explained hereinafter.

Paper roll support 27c (Figure 4) is provided with an upper annular bearing 112 which bears against the outer surface of rod guide 108. The lower end of support 27c receives a ball bearing

113 which is held in the support by a washer 114. The inner race of bearing 113 rests upon the top of cross head guide housing 27b and thus paper roll support 27c and pad frame 115 are free to pivot about rod guide 108.

Feeding pad frame 115 is provided with portions 115a and 115b which fit about ball bearings 110 and 111 respectively to provide a pivotal relation between frame 115 and pad supporting rod 109. Frame 115 is held in its operative position by a pair of lock nuts 116 threaded onto the upper end of pad supporting rod 109, and these nuts when taken up hold frame 115 against the top of ball bearing 110 which in turn is held against the top of reciprocating rod 102. It will also be noted that frame 115 has a cup shaped portion 115c which fits over the upper end of rod guide 108 so that upon reciprocation of rod 102 guide 108 extends into cup portion 115c of frame 115. Extending from portion 115c I preferably provide a guide portion 115f which slides against an impregnated wood guide block 27e during operation of the pouncing tool. Guide block 27e is secured in frame guide 27d in any suitable manner. As may be seen from the above, paper roll support 27c and pad frame 115 are pivotally related to rod 108 by bearings 110, 112 and 113 so as to facilitate swiveling of the pouncing pad as it passes over the "square" of the hat body for example.

As is more clearly shown in Figures 1 and 3, paper support 27c has extending therefrom a pair of brackets 117 on each of which are formed bosses 118 and 119, having coaxial bores extending therethrough. Disposed within these bores is a paper roll supporting pin 120 (Figure 4) which rotatably carries a roll of sandpaper 121. Preferably boss 118 is provided with a slot 118a (Figure 3) which receives an extending arm 122a of a spring 122 (see Figure 2) secured to one of brackets 117. Arm 122a when positioned in slot 118a (Figure 3) fits into a depression (not shown) formed in the end of pin 120 to prevent casual displacement of the pin. When the roll of sandpaper 121 becomes exhausted, arm 122a may be lifted out of place to permit withdrawal of pin 120 so that a new roll of sandpaper may be installed.

Bridging the space between the lower portions of brackets 117 is a pin 123 (Figures 3 and 4) having secured thereto a friction blade hub 124. Hub 124 carries a friction blade 125. To one end 123a (Figure 1) of pin 123 is secured an arm 126, the other end of which is secured to one end of a spring 127. The upper end of spring 127 is secured to a pin 128 (Figure 1) extending from paper support 27d thus biasing arm 126 upwardly to force friction blade 125 (Figure 4) against sandpaper roll 121 to prevent free rotation of sandpaper therefrom.

Sandpaper from roll 121 (Figure 4) rides over a roller 129 revolubly mounted on a pin 130 which bridges the space between the upper portions of brackets 117. Associated with pad frame 115 are a pair of brackets 131 (Figures 1 and 2) in which is mounted a pin 132 (Figure 4). A guide roller 134 is rotatably mounted on pin 132 and a U shaped cross piece 136, the lower end portion of which is also mounted pivotally on pin 132, is provided to bridge the space between brackets 131. The upper portion of cross piece 136 is provided with a bearing pin 133 on which a friction roller 135 is rotatably mounted. A flat leaf spring 137 is secured to the back portion of cross piece 136 by a screw 138. The upper end of spring 137 is provided with a small slotted button 137a. A yoke like latch 139 is movably mounted in the rear part of pad frame 115 and adapted to engage the slotted button 137a. Associated with the rear portion of pad frame 115 is a paper guide strip 140, fastened to the pad frame at the lower end at 140a and the upper end at 140b (Figure 4). It may thus be seen that the action of spring 137, when engaged with latch 139 forces the roller 135 against paper guide strip 140, clamping the sandpaper yieldingly therebetween.

Secured to the top portion 115b of pad frame 115 is a top paper guide 141 and to a front portion 115e of frame 115 is secured a pouncing pad 142, preferably of sponge rubber or the like. Extending from frame 115 and below pouncing pad 142 are a pair of projections 143 (Figures 1, 2 and 4) and in and between these projections are rotatably mounted toothed feed drums 144 and 145 (Figure 4) these feed drums being driven by a mechanism to be described hereinafter.

It may now be seen from the above and with reference to Figure 4 that after the sandpaper leaves roll 121 and is fed over guide roller 129 it extends between guide roll 134 and guide strip 140a, between friction roll 135 and guide strip 140, up and over the surface of guide strip 140 over top guide strip 141, down over pouncing pad 142 and between the toothed feed drums 144 and 145 upon actuation of which the paper is automatically fed from roll 121.

As has been pointed out above, pouncing tool assembly 27 (Figure 1) is pivotable toward and away from hat body 16 and is also movable about the hat body so as to contact it over a path extending substantially from the apex of the hat to the brim portion thereof. Because of the frusto-conical shape of the hat body it is important that the pressure of the pouncing tool thereagainst be varied during the travel of the pouncing tool. To this end, as is most clearly shown in Figures 1 and 2, I provide an arm 146 which is revolubly mounted on pin 66 (Figure 3) which carries tool assembly 27. Arm 146 (Figure 1) is preferably T-shaped and on the lower portion 146a thereof is rotatably mounted a roller 147 while the upper portion 146b thereof is preferably provided with a pin 148 or the like for a purpose described below. A cam 149 is adjustably secured to the top of housing 26a by a bolt 150, the surface of this cam being designed in accordance with the shape of the hat block 15 being used, and it is upon the upper surface of this cam that roller 147 of arm 146 rides.

A bracket 151 (Figure 1) extends from crank case 27a to provide a mounting for a leaf spring 152, the end of which is borne by stud or pin 148 located in end portion 146b of arm 146. Thus it will be seen that the extremities of T-arm 146 lie between and contact the top surface of cam 149 and the end of leaf spring 152. Thus when tool assembly 27 is rotated by the action of rack 62, which is impelled by the piston in cylinder 35, in the direction of the downward slope of cam 149, arm 146 pivots about pin 66 (Figure 3) so that the tension in leaf spring 152 (Figure 1) is relieved thus permitting tool assembly 27 to pivot toward hat body 16 to bring the pouncing tool into contact with the surface of the hat body. It may also be seen that when roller 147 rides up cam 149, arm 146 is pivoted counterclockwise thus tensioning spring 152 which causes tool assembly 27 to pivot away from the hat body. Preferably

the surface of cam 149 is so designed that immediately after the pouncing tool passes over the surface of the hat body at the apex thereof, upon its return stroke, arm 146 is pivoted upwardly at a faster rate so as to remove the pouncing tool from the surface of the hat body.

Preferably I provide an arm 300 (Figure 1) secured to the bottom of tool assembly 27 which abuts against an adjustable stop 301 mounted on T-arm 146 to limit the swinging movement of assembly 27 toward the hat block.

While tool assembly 27 (Figure 1) tends of its own weight to swing toward hat body 16, its weight is not sufficient to overcome the tension of leaf spring 152 to bring the sandpaper covered pouncing pad 142 into contact with the surface of the hat body. Accordingly to urge the pouncing pad and sandpaper into contact with the hat body, I have provided a coiled spring 153 (Figure 2). Spring 153 is preferably disposed in a drum 154 and is anchored to the drum and supporting pin 66, as is more clearly shown in Figure 3, to constantly impel tool assembly 27 (Figure 1) toward the hat body, drum 154 being revolubly associated with pin 66 in any suitable manner for a purpose to be described hereinafter. Thus coil spring 153 may be termed a tension spring whereas leaf spring 152 (Figure 1) may be termed a tension relief spring and by adjusting the effective tensions of each of these springs the pressure of pouncing pad 142 against hat body 16 may be given any one of a wide range of values.

To effect the adjustment of the pouncing pad pressure against the hat body I provide a rod 155 (Figure 1) having a threaded portion 155*a*. The end of threaded portion 155*a* of rod 155 is revolubly mounted in a bracket 156 while another portion of this rod is borne in spring supporting bracket 151. The unthreaded end of rod 155 has secured thereto a hand wheel 157 or the like and preferably disposed between the hub of this wheel and bracket 151 is a cup shaped housing part 158 which houses a coiled spring 159 disposed about rod 155. Spring 159 is preferably an expansion spring and forces the closed end of cup 158 against the hub of hand wheel 157 thus constituting a friction brake to prevent casual turning of the hand wheel and rod 155. Threadably received on the threaded end of rod 155 is a nut 160 having secured thereto a pointer 161. Pointer 161 registers on a graduated scale mounted on the surface of crank case 27*a* so as to indicate the value of effective tension in spring 152. Nut 160 also includes a portion (not shown) on which the under surface of leaf spring 152 rests. Thus by manipulating hand wheel 157, nut 160 may be moved in one direction or another to vary the effective pressure of tension relief spring 152.

As is more clearly shown in the lower right section of Figure 2, another bracket 162 is secured to crank case 27*a* and has revolubly disposed therein a shaft 163 on one end of which is mounted a hand wheel 164. A worm (not shown) is preferably cut on shaft 163 in bracket 162 and meshes with gear teeth 165 which are cut along a portion of the periphery of drum 154. A pointer 166 is mounted on bracket 162 and the end of this pointer overlies a graduated scale 167 mounted on the exterior surface of drum 154. Upon manipulation of hand wheel 164, drum 154 is revolved in one direction or another to attain the desired tension of coil spring 153, the value of the tension being indicated on scale 167 by pointer 166. It may now be seen that by setting hand wheels 157 and 164 at desired points as indicated by pointers 161 and 166, an accurate adjustment of the pressure exerted by pouncing pad 142 against hat body 16 is readily obtained.

As mentioned hereinabove, tool assembly 27 is given its rotary motion through a hydraulic instrumentality, namely cylinder 35 and accordingly the hydraulic system will now be described.

With reference to Figure 1, oil pump 22 is provided with an intake pipe 28 (see also Figure 2) which supplies the pump with oil from a reservoir or sump (not shown) located in the lower part of section 11 of column 10. Leading from oil pump 22 is an oil outlet pipe 29 (Figure 1) connected to a metering valve generally indicated at 30. A direction control valve 31 is connected to metering valve 30 by means of a pipe 32 and connected to direction control valve 31 are pipes 33 and 34 which are connected to the opposite ends of cylinder 35. An exhaust pipe 36 is connected to the lower part of direction control valve 31 and is also connected by way of T-joint 37 (Figure 2) to the oil reservoir in section 11 of the machine column.

Referring again to Figure 1, a relief valve 38 is also connected to oil pump 22 and this relief valve is connected by way of a pipe 39 (Figure 2) to T-joint 37 and accordingly to the oil reservoir in section 11 of the column.

Direction control valve 31 (Figure 1) has disposed therein a plunger (not shown) which is moved vertically upon movement of a plunger rod 40 which is in turn actuated by a hand lever 41 pivotally mounted on housing 12 of the column by a pin 42. Lever 41 conveniently is a bell crank lever the lower end 41*a* of which is connected to a rod 43 slidably extending through a pair of brackets 44 and 45 secured to housing 12. Disposed between brackets 44 and 45 and about rod 43 is a return spring 46, this spring being effective to return lever 41 to its original position after the lever is operated to force plunger rod 40 downwardly. When plunger rod 40 is forced downwardly, it is held in this position by a lever 47 having on its lower end a detent (not shown) which catches on a shoulder 40*a* formed on plunger rod 40. Thus oil under pressure is directed through pipe 34 to the left-hand end of cylinder 35, as viewed in Figure 1, causing left to right movement of rack 62.

An adjustable abutment 168 (Figure 1) is mounted on piston rod 60 for travel therewith and during the left to right travel of rack 62, and accordingly piston rod 60, abutment 168 engages one end 169*a* of a bell crank lever 169 which is pivotally mounted on section 11 of machine column 10. Further movement of abutment 168 pivots lever 169 causing upward movement of another arm 169*b* thereof to which is attached a reversing rod 170, the upper end of which is borne in a guide 171 secured to column 10. As the end of the stroke of piston rod 60 is approached (at which time pouncing pad 142 is adjacent the brim portion of hat body 16) reversing rod 170 is raised (through the coaction of abutment 168 and bell crank 169) sufficiently to engage lever 47 so as to disengage the detent (not shown) on the end thereof from shoulder 40*a* of plunger rod 40. It is apparent that the reversing of piston rod 60 may be advanced or retarded according to the position of abutment 168.

A spring (not shown) in reversing valve 31 forces the valve plunger (not shown) upwardly so as to change the direction of flow of oil from pipe 34 to pipe 33 thus introducing the oil under pressure into the other end of cylinder 35 causing right to left movement of cylinder rod 60 and ac-

cordingly rack 62. Thus tool assembly 27 is rotated in its return direction of travel passing substantially through an angle of 180 degrees measured from the brim portion of the hat so that the tool ultimately assumes a stationary position spaced from the hat body. When this position is reached, further movement of the piston in cylinder 35 is impossible and oil from pump 22 bypasses through relief valve 38.

Under certain circumstances, it may be desirable to reverse the direction of travel of tool assembly before it reaches the end of its forward stroke adjacent the brim portion of the hat body. To effect such premature return, I provide a hand lever 172 secured to a bell crank lever 173 pivotally mounted on the upper portion of section 11 of the machine column. Counter-clockwise movement of lever 172, as viewed in Figure 1, causes end 173a of the bell crank lever to rise and engage lever 47 thus disengaging the detent (not shown) mounted thereon from shoulder 40a of valve plunger rod 40 causing the valve to effect a reversal of fluid flow.

Under certain conditions, it is desirable that the feed rate of the pouncing tool over the surface of a hat body vary during its forward travel and during its reverse travel so that the pouncing paper contacts certain portions of the hat body a less amount than other portions thereof. In the interests of economy of time it is also desirable to effect a quick return of the pouncing tool from the apex of the hat body to its inoperative position where it is spaced from the hat body.

To effect automatically this varying feed rate I have provided a cam 174 (Figure 1) which is secured to the top of and travels with rack 62. Cam 174 travels under a roller 175 mounted on another arm 169c of lever 169 thus causing pivoting of lever 169 in one direction or another according to the contour of cam 174. Lever 169 is provided with still another arm 169d which has secured thereto a speed adjusting dial 50 (see Figure 7).

Dial 50 (Figure 7) is provided with a threaded bore which threadably receives a speed adjusting screw 51 which is provided with a head 51a. Secured to one end of screw 51 is a pointer 52 which indicates the position of head 51a by pointing to indicia (not shown) on the face of dial 50. Screw 51 and the bore in dial 50 are so threaded that relatively small rotation of the screw effects substantial axial movement thereof in one direction or the other, this adjustment being provided for a purpose to be described hereinafter.

With reference to Figure 7, fluid under pressure flows through pipe 29 into a chamber 30a of metering valve 30. Chamber 30a is provided with an outlet port 30b in which a spring actuated piston 53 (partly shown in section) is slidably received. Piston 53 is provided with a longitudinal tapered groove 53a on its circumference and an outwardly extending stem 53b which abuts a push rod 54. Stem 53b is sealed in a portion 30c of valve 30 by a cap 55 and a suitable oil seal 55a.

Valve 30 is suitably mounted on a bracket 56 (seee Figures 1 and 7) secured to section 11 of the machine column. Secured to bracket 56 and extending therefrom, I provide a preferably U-shaped bracket 57 (Figure 7) which has a threaded bore 57a extending therethrough. Suitably threaded into bore 57a is an adjusting screw 58 suitably bored to receive push rod 54. Push rod 54 preferably has a head 54a thereon adapted to abut against the adjacent end of screw 58. It may now be seen that screw 58 may be so positioned that the closing of port 30b can be positively limited, in that push rod 54 and accordingly collar 54a thereon can slide through screw 58 until collar 54a abuts thereagainst thus limiting the closing movement of valve piston 53 and stem 53b.

The outer end of push rod 54 (Figure 7) is adjacent head 51a of screw 51 and according to the position of head 51a with relation to dial 50, head 51a abuts the end of push rod 54 sooner or later during the pivoting of bell crank 169. Thus it is possible to provide a dwell at the end of the forward feeding motion of the pouncing tool because screw 58 can be set so that, when head 54a abuts the end of the screw, port 30b of the valve 30 is substantially closed to permit only a small amount of fluid to pass therethrough to direction control valve 31 (Figure 1) and cylinder 35. This dwell is made possible by the adjustability of screw 51 in dial 50, that is, the screw may be manipulated to retract head 51a thereof so that when head 54a of push rod 54 abuts the end of screw 58 continued movement of lever 169 separates the engagement of head 51a and the adjacent end of push rod 54. It will also be seen that the dwell can be avoided by manipulation of screw 51 to push head 51a thereof away from the adjacent side of dial 50 thus preventing the substantially complete closing of the valve 30 as bell crank 169 reaches the end of its pivotal movement. It is advantageous to provide this dwell so that the pouncing tool 142 (Figure 1) may operate on the band portion of hat body 16 longer than upon other surfaces thereof, the band portion of the hat often being the most difficult part thereof to pounce.

It may also be seen that depending upon the position of pouncing pad 142 in relation to the surface of hat body 16 and consequently the position of cam 174 and lever 169, the orifice in metering valve 30 is greater or smaller to effect the desired rate of flow of the oil and accordingly effect the feed rate of the pouncing tool. For a more detailed description of certain features of the hydraulic system employed in my pouncing machine, reference is made to my above-noted copending application, Serial No. 5,757, filed February 9, 1935.

As noted above, the mechanism encased in tool assembly 27 includes crank discs 78, 79 and 80 (Figure 4) and rods 102, 100 and 101 (Figure 1) which are connected respectively thereto, these crank discs being rotated by motor 87. Preferably reciprocating rod 102 is reciprocated at a high rate of speed which may be as high as, or higher than 3600 reciprocations per minute. In order to dampen the vibration naturally ensuing from such rapid reciprocation, and prevent rapid deterioration of the mechanism, balance rods 100 and 101 and their respective crank shafts and crank discs and wrist pins are so proportioned as to exactly equal in weight the weight of reciprocating rod 102, its crank shaft, wrist pin and crank disc, pad frame 115 and all of the various parts secured thereto about rod 109.

In order to maintain this perfect balance I have found it desirable to mount the roll of sandpaper 121 stationary relative to pad frame 115 and accordingly a feed mechanism for the sandpaper is provided which will be described in detail hereinafter. As pointed out above, tool assembly 27 is resiliently borne by spring strips 235, and these strips absorb what little vibration remains undampened by balance rods 100 and 101.

Lubrication is preferably provided by the so-

called splash system. Thus the bottom of crank case 27a (Figures 3 and 4) conveniently forms a reservoir into which a suitable lubricant may be introduced in any convenient manner. Preferably an oil gauge 176 (Figure 3) is secured to crank case 27a in a position to indicate the oil level within the crank case. As pointed out hereinabove, parts 81 and 82 (Figure 4) are so formed as to supplement the splashing action of crank discs 78, 79 and 80 and accordingly act as lubricant throwers to throw oil or other suitable lubricant up into cross head guide 27b to lubricate the several wrist pins and bearings of balance rods 100 and 101 and reciprocating rod 102. These lubricant throwers 81 and 82 also prevent excess lubricant from reaching ball bearings 70 and 71. Preferably I provide a pair of elbow breathers 47 which are secured to the upper portion of cross head guide 27, these breathers providing ventilation for the interior of the cross head guide and crank case 27a.

In order to effect a regular feed of sandpaper from roll 121 over pouncing pad 142 (Figure 1), I provide a feed mechanism comprising a feed operating rod 177 which is slidably received in a guide bracket 178 (Figure 3) secured to one end of stud 66. The lower end of feed rod 177 is provided with a cam piece 179 (Figure 1) for a purpose to be described hereinafter. The upper end of rod 177 has a pair of collars 180 and 181 (Figure 3) secured thereto and between these collars a guide sleeve 182 is slidably disposed on the rod, a spring 183 constantly urging guide sleeve 182 upwardly against collar 181. Guide sleeve 182 is pivotally connected to a lever 184 (Figure 1) which is, in turn, secured to a shaft 185 rotatably mounted in a bearing 186 (Figure 3) secured to the upper portion of cross head guide 27b by a bracket or clamp 187. On the left hand end of shaft 185, as viewed in Figure 3, there is secured a pawl lifting arm 188, which as is more clearly shown in Figure 5 has a roller 189 rotatably mounted thereon.

With reference to Figure 2, a slot 190 is preferably formed in paper roll support 27c and in this slot is slidably disposed a sliding arm 191 having a shoe 192 formed on the bottom thereof. A cover plate 193 is bolted to the side of paper roll support 27c over slot 190 to hold sliding arm 191 in its assembled position.

As is more clearly shown in Figure 5, sliding arm 191 is provided with a shoulder 191a which rests on a flanged portion 194 (Figure 3) of support 27c when arm 191 is in its lowermost position. I preferably provide a boss 193a (Figure 3) on cover plate 193 which has a threaded bore extending therethrough to adjustably receive a stop screw 195 which is conveniently held in its set position by a lock nut 196. The bottom of stop screw 195 thus limits the upward throw of sliding arm 191.

The upper end of arm 191 (Figure 5) is preferably bifurcated and is provided with a pivotally mounted pawl 197 which, when arm 191 is forced upwardly, engages ratchet wheel 198 to impart clockwise rotation thereto to the extent of one notch per engagement. The bifurcation in the upper end of arm 191 is preferably relatively shallow as is more clearly shown in Figure 8, and extending downwardly from the bottom of the bifurcation is a tapered groove 191a. A leaf spring 240 has its lower end secured in the body of arm 191, this spring extending upwardly through groove 191a and having its free end 240a lying in a notch 197a formed in pawl 197, the bias of the spring thus tending to keep pawl 197 centered. Ratchet wheel 198 (Figure 5) is mounted on one end of a shaft 199 which bears on its other end a pinion 200, pinion 200 being in constant mesh with a gear 201 secured to one end of toothed feed drum 141.

It may now be seen that when feed rod 177 (Figure 5) is forced upwardly, lever 184, shaft 185 and arm 188 are given a clockwise movement, as viewed in Figure 5, causing roller 189 to rise against sliding arm shoe 192 which in turn causes arm 191 to ride upwardly forcing pawl 197 into engagement with ratchet wheel 198. Through the medium of gears 200 and 201, feed drums 144 and 145 are rotated respectively in counterclockwise and clockwise directions upon reciprocation of the pouncing pad, and a piece of sandpaper lying between the feed drums, as shown in Figure 4, is pulled therethrough to the extent of one notch on ratchet wheel 198 for each reciprocation of the pouncing pad. To prevent backward feed of the sandpaper I have provided a spring urged pawl 202 (Figure 2) which prevents reverse rotation of ratchet 198.

Every time rod 177 (Figure 1) is pushed upwardly, sandpaper is fed from roll 121. This feeding action takes place during the reciprocation of pouncing pad 142 which causes ratchet 198 (Figure 5) to engage pawl 197 for each stroke of the pouncing pad when arm 191 is in its raised position. Rod 177 and accordingly arm 191 are raised every time cam part 179 rides over a roller 203 which is secured to a bracket 26b mounted on the top of housing 26a and the cam part rides over this roller twice during each cycle of operation of the pouncing tool. Preferably bracket 26b (Figure 1) is provided with a plurality of holes 26c in any one of which roller 203 may be secured to advance or retard the feeding of the sandpaper. However, due to the extremely rapid reciprocation of the pouncing pad, more sandpaper would be fed than is necessary to replace worn paper were the feeding mechanism to operate twice during each operating cycle of the pouncing tool assembly.

Under certain circumstances it might be desirable to effect a complete change of sandpaper upon pouncing pad 142; such a change being readily effected by manually raising arm 191 (Figure 2) during the operation of pouncing pad motor 87 until the rapid reciprocation of pouncing pad and its connected parts have caused the feeding of as much sandpaper as desired.

To automatically stop the rotation of the hat block 15 and the reciprocation of the pouncing pad after completion of the pouncing operation on each hat, I provide a shut-off mechanism which is most clearly shown in Figure 2. Extending through suitable bosses 26d and 26e formed in bracket 26 I provide a shaft 204 which has mounted on the upper portion thereof a lever 205. On the lower portion of shaft 204 is secured a dog 206 and a collar 207, between which is a bell crank lever 208, one projection 208a thereof lying in the path of a projection 64a (Figure 1) on tool assembly stud 64. The other arm 208b (Figure 2) of bell crank lever 208 preferably extends from the shank of the lever to abut an adjustable screw 209 extending through the end of dog 206 when bell crank lever 208 is pivoted by abutment 64a (Figure 1) on stud 64 to contact bell crank lever arm 208a.

Lever 205 (Figure 2) has pivotally secured to the end thereof, one end of a rod 210, the other end if which is pivotally secured to an arm 211a

of a bell crank lever 211 pivotally mounted on section 11 of the machine column. The other arm 211b of bell crank lever 211 is pivotally connected to an operating rod 212 which extends upwardly to a pivot block 213, pivot block 213 being connected to a lever arm 214 which is, in turn, connected to the outer end of a shaft or stud 215 pivoted to the machine column. The inner end of stud 215 has secured thereto a crank arm 216 which lies between two pins 217 extending from a clutch operating rod 218. Clutch operating rod 218 extends through and is borne by a bracket housing 219 mounted on motor housing 12, clutch rod 218 having secured thereto a fork 220 having bifurcated arms 221, the ends of which lie in a grooved clutch shifting part 222 extending into clutch 20.

Returning to pivot block 213, there is also pivoted thereto a block 223 to which is secured a rod 224. Rod 224 is pivotally connected at its upper end to one arm 225a of a bell crank lever 225, the other arm 225b of which receives an operating lever 226. Bell crank lever 225 is secured to one end of shaft 42 which is pivotally mounted in the upper part of motor housing 12 and which has secured to its other end a dog 42a, the lower portion of which extends inwardly and under the arm 41a of the bell crank lever 41b. It may thus be seen that movement of operating lever 41 to the right (Figure 1) will cause arm 41a to engage the inward extension of dog 42a and thus through shaft 42 the lever 225 (Figure 2) will move in unison with lever 41b. However, since the bell crank lever 41b is free to pivot about shaft 42, the lever 226 can be operated independently when it is desired to only rotate the the hat without the pouncing pad moving into engagement as, for example, for the purpose of brushing off the dust after pouncing. Secured between the ends of rod 224 (Figure 2) is a collar 227 to which is pivoted a switch arm 228 for operating a mercoid switch 229 or the like. Mercoid switch 229 is preferably hooked up in series with main switch 230 which supplies electricity by way of conductor 231 to motor 87. Thus although the circuit is made through main switch 230, it may be broken by moving switch arm 228 of mercoid switch 229 and this for a purpose pointed out hereinafter.

As pointed out hereinabove, it is desirable to cause feeding of the pouncing paper only once during one cycle of operation. Accordingly, projection 64a (Figure 1) which extends from and consequently rotates with tool assembly mounting stud 64, is preferably so positioned that it contacts bell crank lever arm 208a (Figure 2) shortly after pouncing pad 142 has completed its operations on the apex of the hat body during the return movement of the pouncing tool. When projection 64a abuts bell crank lever arm 208a bell crank lever 208 (Figure 2) is swung so that its arm 208b abuts screw 209 in dog 206 and accordingly further movement of bell crank lever 208 causes rotation of shaft 204. Rotation of shaft 204 is translated into horizontal linear movement of rod 210 through the medium of lever 205, and linear movement of shaft 210 is, in turn, converted into vertical linear movement of operating rod 212 by means of bell crank lever 211. As operating rod 212 moves upwardly, clutch operating lever 214 also swings upwardly to cause clutch pin 216 to move to the left as viewed in Figure 2, thus causing movement to the left of shaft 218 and forked part 220. This movement of part 220 causes outward movement of grooved clutch operating part 220 which, in turn, causes disengagement of the clutch and consequently a cessation of rotation of spindle 13 which bears the hat block 15.

Upward movement of operating rod 212 also causes upward movement of rod 224, this in turn causing switch arm 228 to swing upwardly and break the circuit in mercoid switch 229 and so shut off pouncing pad motor 87. As these several movements occur quite rapidly, motor 87 has sufficient time in which to stop its rotation before cam part 179 (Figure 1) engages roller 203 which would position the various parts of the pouncing paper feed mechanism for feeding of paper.

When the machine is put into operation again to pounce a new hat body lever 41 (Figure 1) is swung, thus directing fluid into the hydraulic piston 35 to cause left to right motion of rack 62 as viewed in Figure 1 to start the pouncing tool assembly in its forward feed motion. Through the agency of metering valve 30 and cam 174, the first part of the forward motion of the pouncing tool during which it is not in contact with the hat body is quite rapid, and accordingly cam part 179 is in contact with roller 203 for a very short space of time. However, the reciprocation of pouncing pad frame 115 and the feed mechanism parts mounted thereon is so rapid that, even in the short period of contact between cam 179 and roller 203, ratchet wheel 198 (Figure 5) has been forced against pawl 197 a sufficient number of times to cause a sufficient amount of sandpaper to be fed over pouncing pad 142. Immediately after cam part 179 (Figure 1) has left roller 203, sliding arm 191 (Figure 5) falls removing pawl 197 from the range of the stroke of ratchet 198; hence no subsequent feeding of the sandpaper is effected.

In operation the operator of the machine, after securing hat block 15 (Figure 1) in place on chuck 14 and after securing hat body 16 in place on the hat block, manipulates hand wheels 155 and 157 to adjust springs 152 and 153 (Figure 2) so that pouncing pad 142 will bear against hat body 16 with the desired pressure. The operator also adjusts screw 51 of the metering valve to set the forward and return feed rates of the pouncing tool. Also sandpaper feed roller 203 is set in the desired hole 26c, particular hole being chosen in accordance with the amount of sandpaper to be fed per operation of the pouncing tool. The operator also adjusts abutment 168 to time the reversing of the pounching tool in accordance with the depth of hat body 16.

After the above-noted adjustments have been made the operator swings lever 41, as viewed in Figure 1, thus depressing valve plunger rod 40 to direct the flow of oil under pressure into the left-hand end (as viewed in Figure 1) of hydraulic cylinder 35. The piston rod accordingly moves to the right and rack 62, being attached to the piston rod, pivots pouncing tool assembly 27 in a clockwise movement, as viewed in Figure 1. During the first part of this pivotal movement which, up to the apex of the hat body, is relatively rapid, roller 147 on arm 146 follows the downward slope of cam 149 permitting the pouncing tool assembly to swing toward the hat body. When the pouncing tool reaches the apex of hat body 16 it goes into contact therewith and as the pouncing pad 142 is reciprocating it begins to remove material from the surface of the hat body. Roller 147 continues down cam 149 as the pouncing tool moves about the hat body and material continues to be removed as pouncing pad 142 reaches the brim

portion of the hat body. At this brim portion a short pause or dwell of the pouncing tool is effected through the operation of metering valve 30 as pointed out hereinabove. Also when the end of the forward feed stroke of the pouncing tool is completed, abutment 168, which moves with piston rod 60, has pivoted bell crank 169 to force reversing arm 170 upwardly thus disengaging the detent (not shown) on lever 47 to permit the plunger in valve 31 to rise. The rise of this plunger effects a reverse flow of oil, the oil flowing to the right hand side of cylinder 35 as viewed in Figure 1.

Upon reverse flow of oil, piston rod 60 moves to the left-hand side as viewed in Figure 1 thus pivoting it in counterclockwise direction at varying feed rates which are determined by metering valve 30 as pointed out above. When the pouncing tool has returned to the apex of the hat body, roller 147 has reached a point on cam 149 where adjusting screw 301 in arm 146 abuts against an extension 300 on supporting member 238. Further upward movement of roller 147 on cam 149 will thus cause the pouncing tool to swing away from the hat body. Also at this time, roller 175 on bell crank lever 169 has reached a portion of cam 174 where further movement of cam 174, which moves with piston rod 60, causes a substantial opening of metering valve 30 to effect the rapid return of pouncing tool assembly 27 to its original position spaced from the hat body.

During the return movement of pouncing tool 27 from the apex of the hat body, projections 64*a* on the bottom of supporting stud 64 engages projections 208*a* (Figure 2) of bell crank 208 to the left as viewed in Figure 2. Continued pivoting of bell crank 208 causes projections 208*b* thereof to contact dog 206 and pivot the dog to raise arm 212 upwardly through linkage provided by rod 210 and bell crank lever 211. Upward movement of arm or rod 212 causes disengagement of clutch 220 through linkage comprising bell crank 214, rod 216, pins 217, rod 218 and fork 221. Also upward movement of rod 212 causes rod 224 to break the circuit in mercoid switch 229, the breaking of this circuit shutting off pouncing tool motor 87. Hence (referring again to Figure 1) when cam piece 179 reaches roller 203, reciprocation of the pouncing pad has so substantially subsided that contact between cam piece 179 and roller 203 effects little, if any, feeding action of pouncing paper as pointed out above, the feeding of the pouncing paper being effected during the clockwise pivoting, as viewed in Figure 1, of the pouncing tool assembly.

It may now be seen that I have provided a pouncing machine which is well able to finish a hat body of substantially any size, depth and quality. By providing a varying feed rate of the pouncing tool and by providing adjustments for the effective pressure of the pouncing tool against the hat body, I am able to impart a uniform finish to a number of hat bodies in a thoroughly efficient and practical manner. Accordingly my finishing machine is well able to fulfill the above-noted objects in addition to many others in a thoroughly efficient and practical manner.

As many possible embodiments may be made of the above invention and as many changes might be made in the embodiment above set forth, it is to be understood that all matter hereinbefore 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 machine of the character described, in combination, a base, a hat support rotatably mounted on said base, a tool support resiliently mounted on said base and pivotable about said hat support, and a tool reciprocably mounted on said tool support.

2. In a machine of the character described, in combination, a base, a hat support rotatably mounted on said base, a bracket pivotally mounted on said base, a resilient member secured to said bracket, a tool support secured to said resilient member, means for pivoting said bracket whereby said tool support pivots about said hat support, a pouncing tool reciprocably mounted on said tool support, and means for reciprocating said pouncing tool.

3. In a machine of the character described, in combination, a base, a hat support rotatably mounted on said base, a bracket pivotally mounted on said base, a resilient member secured to said bracket, a tool support secured to said resilient member, means for pivoting said bracket whereby said tool support pivots about said hat support, a pouncing tool reciprocably mounted on said tool support, and means for reciprocating said pouncing tool, said means including a plurality of balance rods for dampening vibration resulting from reciprocation of said tool.

4. In a machine of the character described, in combination, a base, a hat support mounted on said base, a pouncing tool reciprocably mounted on said tool support, said tool having an abrasive surface, means for intermittently automatically renewing said abrasive surface, and means inactive during operative engagement between said tool and said hat support for controlling said last-mentioned means.

5. In a machine of the character described, in combination, a base, a hat support mounted on said base, a tool support mounted on said base, means for effecting relative movement between said tool support and said hat support, a pouncing tool reciprocably mounted on said tool support, said tool support being stationary with respect to the reciprocation of said tool, said tool having an abrasive surface, and means for automatically renewing said abrasive surface, said last mentioned means including parts which are set for operation by said relative movement.

6. In a machine of the character described, in combination, a base, a hat support rotatably mounted on said base, a tool support pivotally mounted on said base, means for pivoting said tool support about said hat support, said tool support being swingable toward and away from said hat support, resilient means biasing said tool support toward said hat support, a spring member associated with said tool support for acting against said resilient means, and a pouncing tool reciprocably mounted on said tool support.

7. A pouncing machine having a tool support, a tool mounted on said tool support, means for feeding abrasive material over a surface of said tool, means intermittently operative for actuating said feeding means, and means inactive during pouncing activity of said tool for controlling said intermittently operative means.

8. In a machine of the character described, in combination, a rotatable hat support, a tool support operatively associated with said hat support, a reciprocable pouncing tool mounted on said tool support, means for reciprocating said pouncing tool, means for feeding abrasive material over a surface of said tool, means intermittently opera-

tive for actuating said feeding means, and means inactive during pouncing activity of said tool for controlling said intermittently operative means.

9. In a machine of the character described, in combination, a base, a hat support operatively associated with said base, a tool support operatively associated with said base, means for effecting relative movement between said supports, a tool mounted for reciprocation on said tool support, means for reciprocating said tool substantially rectilinearly, and means for dampening vibration resulting from reciprocation of said tool.

10. In a machine of the character described, in combination, a base, a hat support operatively mounted on said base, a bracket pivotally supported by said base, a pair of spring members secured to said bracket, a second bracket secured to said spring members, a tool support secured to said second bracket, and a tool operatively mounted on said tool support.

11. In a machine of the character described, in combination, a base, a hat support rotatably mounted on said base, a tool support pivotally mounted on said base, means for pivoting said tool support about said hat support, said tool support being swingable toward and away from said hat support, resilient means biasing said tool support toward said hat support, a flat spring member associated with said tool support to variably resist the bias of said resilient means, means for varying at will the effective length of said flat spring member, and a pouncing tool reciprocably mounted on said tool support.

12. In a machine of the character described, in combination, a rotatable hat support, a traversing tool having means for actuating it to operate on the surface of a hat mounted on said support, means for effecting a continuous pressure of the tool against the hat, means for varying the amount of said pressure at will, means for automatically and variably relieving the pressure of said last-mentioned means as said tool traverses predetermined portions of the hat, and means for varying at will the effective relieving action of said relieving means.

13. In a machine of the character described, in combination, a rotatable hat support, means for rotating said hat support, a reciprocable tool operatively associated with said hat support, means for reciprocating said tool, means for traversing said tool about said hat, means for feeding abrasive material over a surface of said tool, means for rendering ineffective said hat support rotating means and said tool operating means substantially at the end of the traversing movement of said tool, and means operable subsequent to operation of said last-mentioned means to actuate said abrasive feeding means.

14. A pouncing machine having a tool support, a tool mounted on said support, means for reciprocating said tool, a supply of abrasive material for said tool associated with said support, means for feeding said abrasive material over said tool, said supply of abrasive material being stationary with respect to the reciprocation of said tool, and means for dampening vibration resulting from reciprocation of said tool.

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