Oct. 29, 1929. J. E. PERRAULT ET AL 1,733,692

PNEUMATIC PRESSING MACHINE

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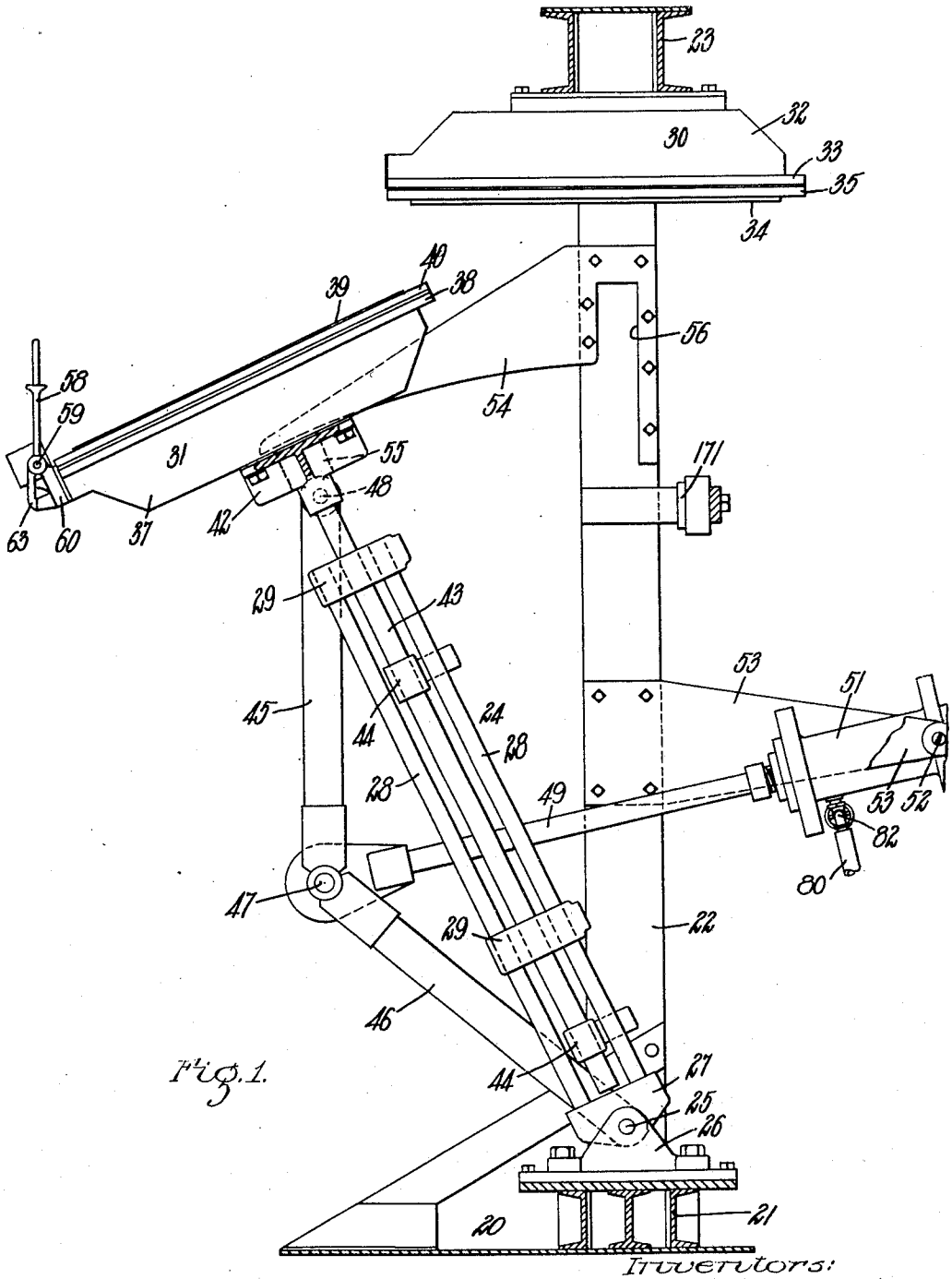


Fig. 1.

Inventors:
Joseph E. Perrault.
Louis J. Schroeder.
by Charles J. Gooding, Atty.

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PNEUMATIC PRESSING MACHINE

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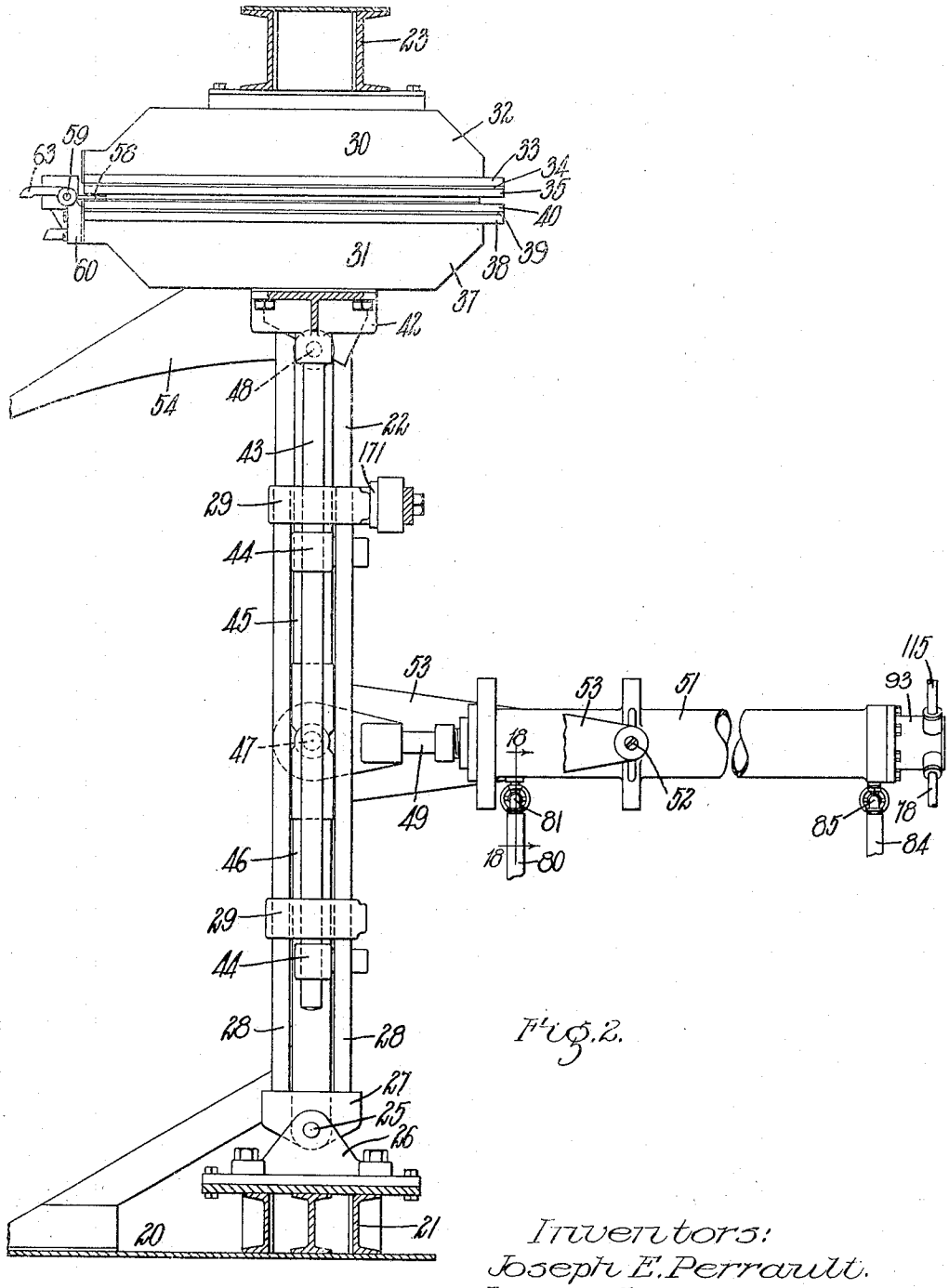


Fig. 2.

Inventors:
Joseph E. Perrault.
Louis J. Schroeder.
by Parker & Gooding Attys.

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PNEUMATIC PRESSING MACHINE

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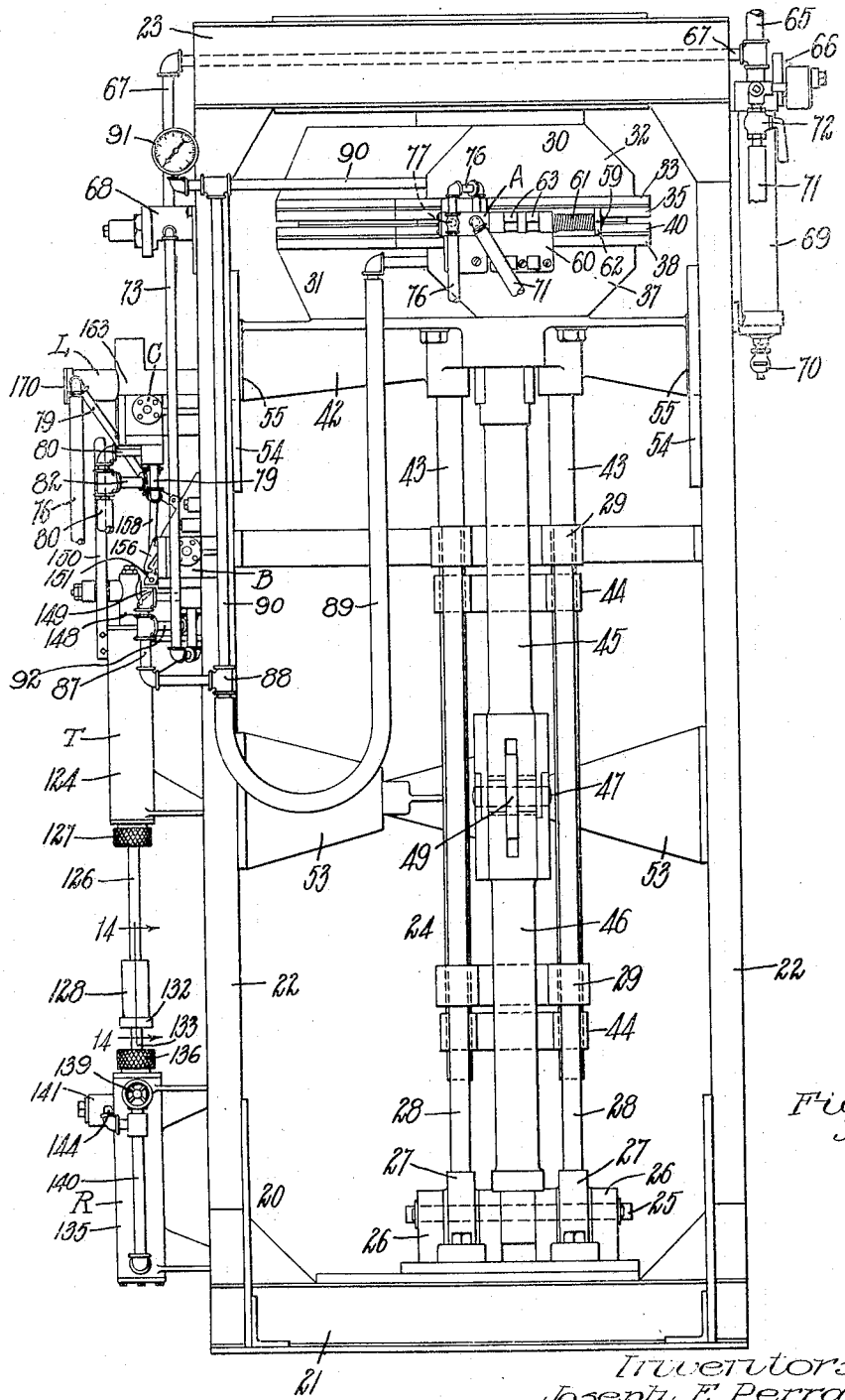


Fig. 3.

Inventors:
Joseph E. Perrault.
Louis J. Schroeder.
by Charles S. Gooding, Atty.

Oct. 29, 1929. J. E. PERRAULT ET AL 1,733,692

PNEUMATIC PRESSING MACHINE

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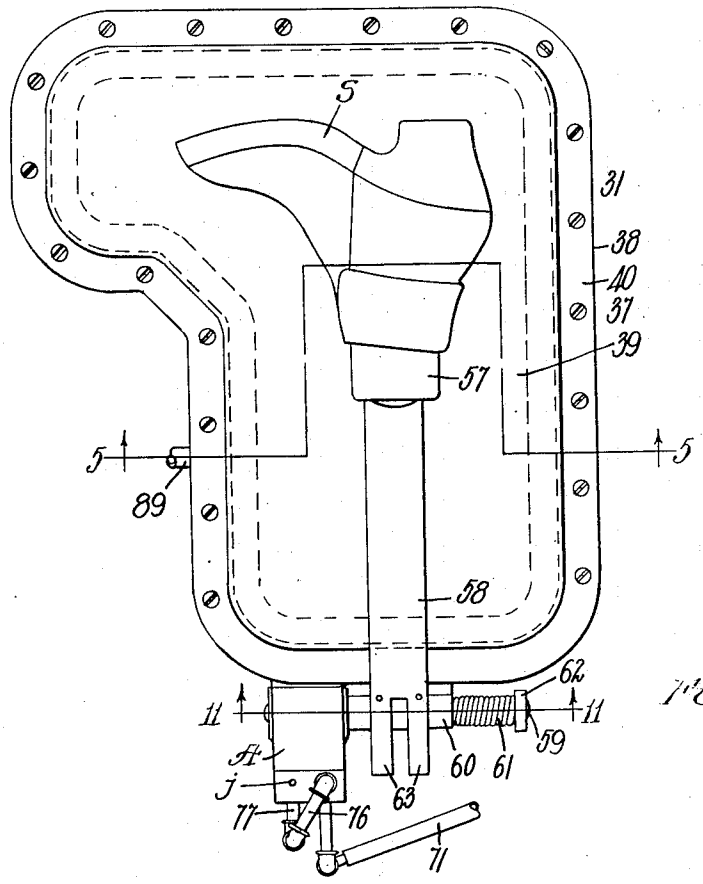


FIG. 4.

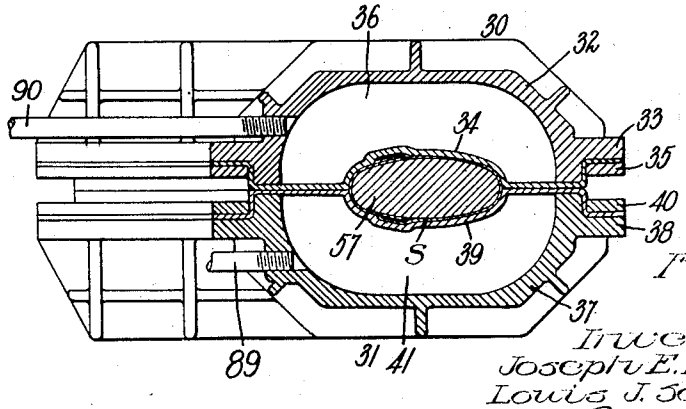


FIG. 5.

Inventors:
Joseph E. Perrault.
Louis J. Schroeder.
by Charles S. Gooding
Atty.

Oct. 29, 1929. J. E. PERRAULT ET AL 1,733,692

PNEUMATIC PRESSING MACHINE

Filed May 29, 1928 8 Sheets-Sheet 5

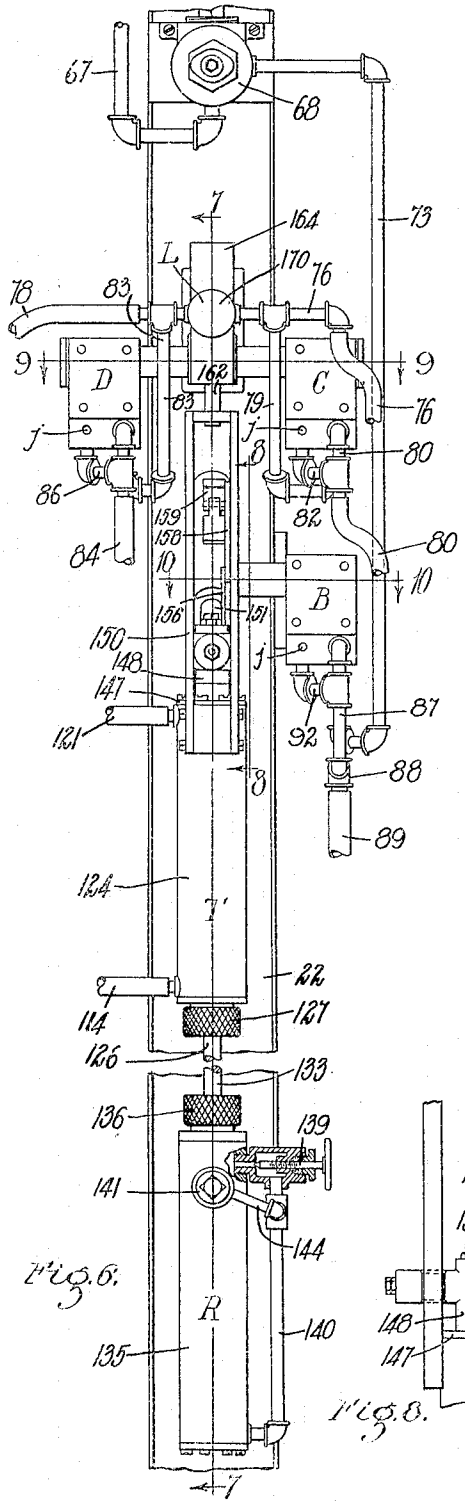


Fig. 6.

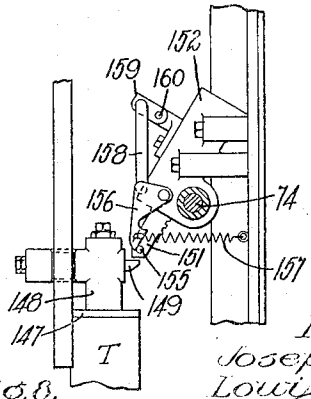


Fig. 8.

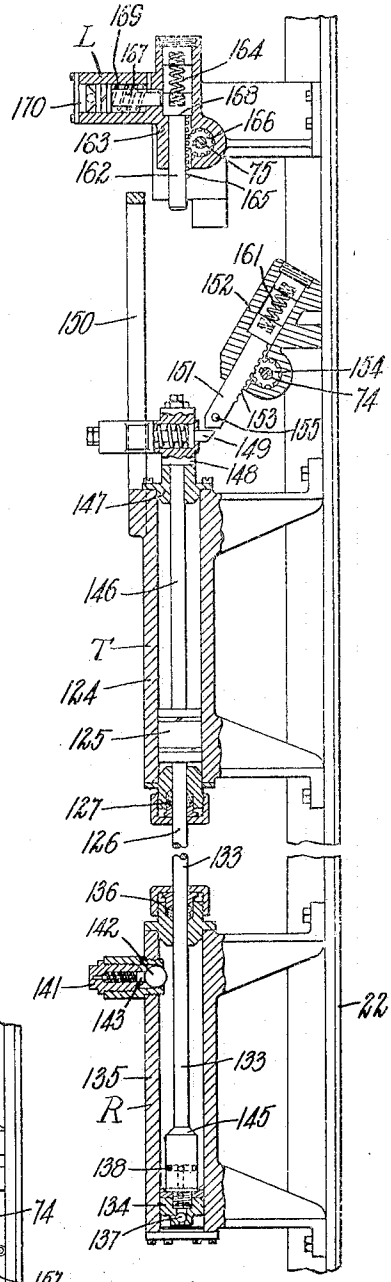


Fig. 7.

Inventors:
Joseph E. Perrault.
Louis J. Schroeder.
by Charles N. Gooding
Atty.

Oct. 29, 1929. J. E. PERRAULT ET AL 1,733,692

PNEUMATIC PRESSING MACHINE

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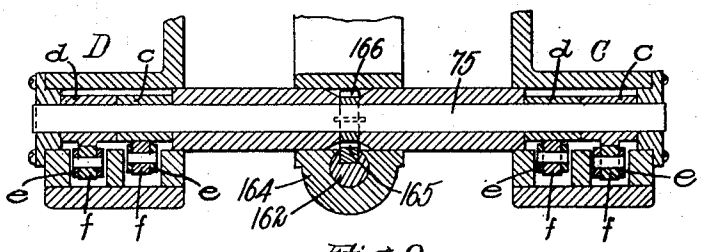


Fig. 9.

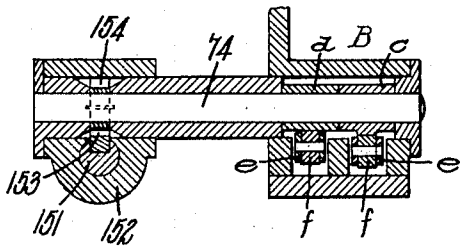


Fig. 10.

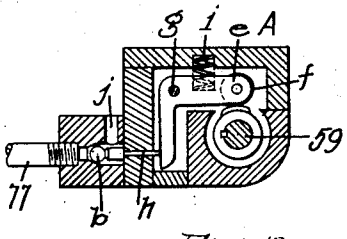


Fig. 12.

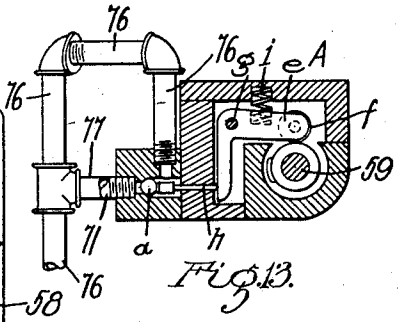


Fig. 13.

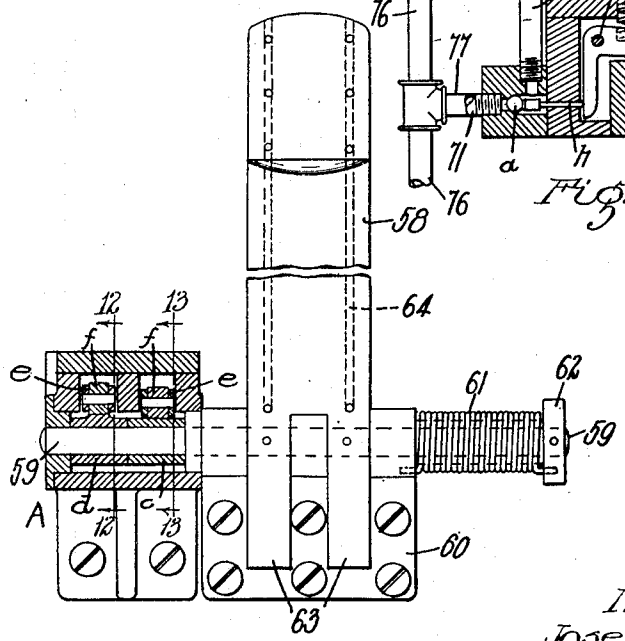


Fig. 11.

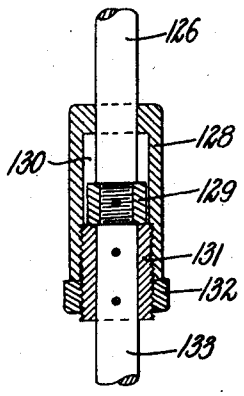


Fig. 14.

Inventors:
Joseph E. Perrault.
Louis J. Schroeder.
by Charles N. Goodin, Atty.

Oct. 29, 1929. J. E. PERRAULT ET AL 1,733,692

PNEUMATIC PRESSING MACHINE

Filed May 29, 1928 8 Sheets-Sheet 7

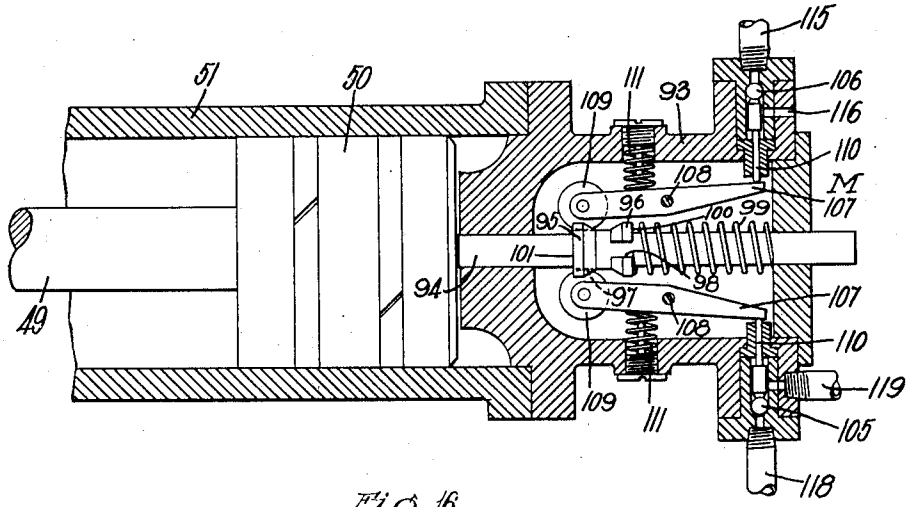


Fig. 16

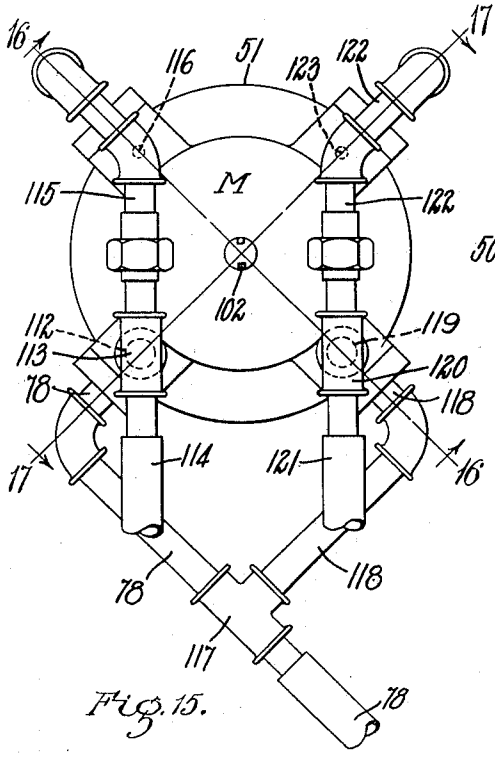


Fig. 15.

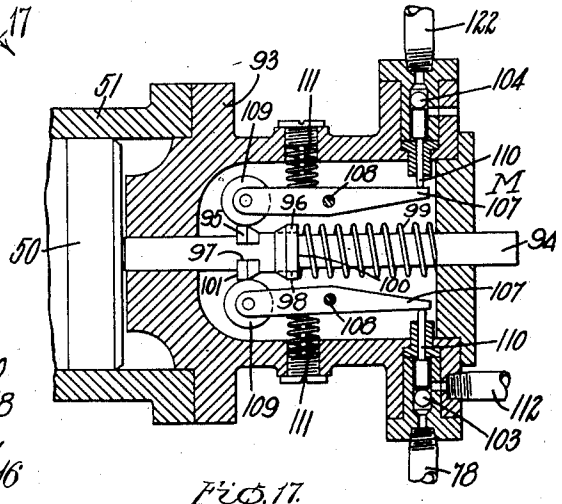


Fig. 17.

Inventors.
Joseph E. Perrault.
Louis J. Schroeder.
by Charles N. Gooding, Atty.

Oct. 29, 1929. J. E. PERRAULT ET AL 1,733,692

PNEUMATIC PRESSING MACHINE

Filed May 29, 1928 8 Sheets-Sheet 8

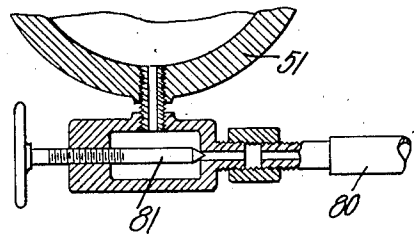


FIG. 18.

FIG. 19.

Inventors:
Joseph E. Perrault.
Louis J. Schroeder.
By Charles V. Gooding Attys.

Patented Oct. 29, 1929 1,733,692

UNITED STATES PATENT OFFICE

JOSEPH E. PERRAULT AND LOUIS J. SCHROEDER, OF WATERTOWN, MASSACHUSETTS, ASSIGNORS TO HOOD RUBBER COMPANY, OF WATERTOWN, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

PNEUMATIC PRESSING MACHINE

Application filed May 29, 1926. Serial No. 281,467.

This invention relates to a machine for pressing shoes, particularly those constructed of rubber compound, or rubber compound and fabric.

In constructing shoes such, for example, as rubbers, overshoes, gaiters and the like it has been customary in assembling the various parts of which the shoe is built for the operator to roll each part individually with a hand tool as the parts are attached to each other in order that all of the various layers of material entering into the construction of the shoe will adhere firmly together. As there are quite a number of parts employed in constructing shoes of this character, considerable time is consumed in rolling the parts together, and as considerable pressure is required, the work is very arduous especially when it is performed by women operatives.

An improved method of construction now contemplates assembling all of the various parts of the shoe with no more pressure than is required to hold each part in place temporarily and then pressing all of the parts together simultaneously by means of a mechanically operated pressing machine.

The object of this invention is to provide a machine in which the pressing operation hereinbefore mentioned may be performed in a rapid and efficient manner, the pressing instrumentalities being so constructed that shoes of different sizes and styles may be operated upon without it being necessary to make adjustments of any kind or change the form of the pressing members.

Another object of the invention is to provide a pressing machine which is operated and controlled entirely by a pressure fluid, preferably compressed air, the machine being started automatically when the last holder is moved to position the shoe within the lower pressing unit and when the latter is located in an open position, and finally being stopped automatically after the pressing operation when the lower pressing unit is again returned to its normal, or open position, at which time it is necessary to raise the last holder manually before the pressed shoe is removed and another shoe inserted.

The invention consists in a machine for pressing shoes or other articles of a similar character which are constructed of layers of sheet material which adhere together; as set forth in the following specification and particularly as pointed out in the claims thereof.

Referring to the drawings:

Figure 1 is a sectional side elevation of a shoe pressing machine embodying our invention, the machine being located in its normal or open position and portions thereof being broken away to save space in the drawings.

Fig. 2 is a view similar to Fig. 1 but illustrating the machine in its closed position.

Fig. 3 is a front elevation of the machine.

Fig. 4 is an enlarged plan view of the lower pressing unit together with a last holder and shoe, the latter being positioned ready for pressing.

Fig. 5 is a transverse section through the upper and lower pressing units, both of which are located in their closed positions with a shoe therebetween, the section being taken on the line 5—5 of Fig. 4.

Fig. 6 is an enlarged side elevation of a portion of the mechanism which is located upon the left hand side of the machine, said mechanism being viewed from the left hand side of Fig. 3.

Fig. 7 is a central vertical section taken on the line 7—7 of Fig. 6 looking in the direction of the arrows on said line.

Fig. 8 is a detail sectional elevation taken on the line 8—8 of Fig. 6 looking in the direction of the arrows on said line.

Fig. 9 is an enlarged horizontal section taken on the line 9—9 of Fig. 6.

Fig. 10 is an enlarged horizontal section taken on the line 10—10 of Fig. 6.

Fig. 11 is an enlarged sectional elevation taken on the line 11—11 of Fig. 4, the last holder being illustrated in its normal position ready to receive a last and shoe.

Fig. 12 is a detail section taken approximately on the line 12—12 of Fig. 11.

Fig. 13 is a detail section taken approximately on the line 13—13 of Fig. 11.

Fig. 14 is an enlarged central vertical section taken on the line 14—14 of Fig. 3.

Fig. 15 is an enlarged end elevation of the

control valves viewing the same from the right hand side of Fig. 2.

Fig. 16 is a detail sectional elevation taken on the line 16—16 of Fig. 15.

Fig. 17 is a detail sectional elevation taken on the line 17—17 of Fig. 15.

Fig. 18 is an enlarged detail section taken on the line 18—18 of Fig. 2.

Fig. 19 is a diagrammatic view illustrating the pipe connections to the various valves and fluid operated mechanisms.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 20 represents a main stationary frame embodying therein a base 21, side portions 22 and a top portion 23, all of which are constructed of structural iron and are bolted or otherwise secured firmly together in any suitable manner.

A rocker frame 24 is pivotally attached at 25 to a bracket 26 which, in turn, is mounted upon the base portion 21 of the frame 20. The rocker frame 24 embodies therein a pair of rocker members 27, in each of which is mounted a pair of cylindrical bars 28. Bearing members 29 are rigidly fastened to the bars 28, all of said bars extending through each bearing member and being rigidly secured thereto.

Rigidly secured to the under side of the top portion 23 of the main stationary frame 20 is an upper pressing unit 30, and slidably mounted upon the rocker frame 24 in a position to co-operate with the upper pressing unit 30 to form a pressure chamber is a lower pressing unit 31. The upper pressing unit 30 embodies therein a casing section 32 having an open under side around the edge of which extends a flange 33. A flexible pressing member 34 of expandible material extends loosely across the open side of the casing section 32 and is secured to the under surface of the flange 33 by a clamping member 35. The pressing member 34 entirely closes the under side of the casing section 32 and co-operates therewith to form a fluid compartment 36 within the casing section.

The lower pressing unit 31 embodies therein a casing section 37 having an open upper side around the edge of which extends a flange 38. A flexible pressing member 39 of expandible material extends loosely across the open side of the casing section 37 and is secured to the upper surface of the flange 38 by a clamping member 40. The pressing member 39 entirely closes the upper side of the casing section 37 and co-operates therewith to form a fluid compartment 41 within the casing section.

The casing section 37 is mounted upon a support 42 in which a pair of cylindrical guide members 43 are rigidly secured and said guide members project downwardly through both of the bearing members 29 and are slidably mounted therein. Tie members 44 are rigidly secured to both of the guide members 43 and act to hold the intermediate and lower portions of said guide members properly spaced. The actual weight of the lower pressing unit 31 is carried by toggle links 45 and 46, the adjacent ends of which are pivotally connected together at 47. The upper end of the link 45 is pivotally attached at 48 to the support 42 and the lower end of the link 46 is pivotally attached to the pivot member 25 of the rocker frame 24.

The lower pressing unit 31 is moved from its normal or open position illustrated in Fig. 1 to its closed position illustrated in Fig. 2 by fluid pressure means operating through a piston rod 49 and piston 50, the latter being located within a pressure cylinder 51. The piston rod 49 is attached to the pivot 47 for the toggle members 45 and 46. The cylinder 51 is pivoted at 52 between a pair of brackets 53 which are mounted upon the side members 22 of the main stationary frame 20. When the piston 50 is actuated within the cylinder 51 in a manner hereinafter to be more fully explained, the lower pressing unit 31 will be rocked from the position illustrated in Fig. 1 to the vertical position illustrated in Fig. 2 and during this rocking movement, the toggle members 45 and 46 will be prevented from functioning to lift said pressing unit on account of the weight of the latter and by means of a pair of guide plates 54 which are fastened to the inner sides of the side members 22 of the stationary frame 20, the upper edge of guide portions 55 of the support 42 engaging the under edges of the guide plates 54 and thereby preventing the toggle links from moving into alignment with each other. When, however, the guide portions 55 of the support 42 are moved into alignment with guideways 56 provided upon the guide plates 54, the toggle links 45 and 46 are permitted to function and the lower pressing unit 31 will then be lifted into engagement with the upper pressing unit 30 and will assume the position illustrated in Fig. 2. When the casing sections 32 and 37 are closed, a pressure chamber is formed upon their interior.

A shoe S formed of a plurality of sections of fabric and rubber compound adhering loosely together is located upon a last 57, in turn mounted upon a last holder 58, see Figs. 4, 5 and 11. The last holder 58 is rigidly secured to a shaft 59 mounted to rock in a bracket 60 fastened to the front of the lower casing section 37. The last holder is held in its normal or open position by means of a coil spring 61, one end of which engages the bracket 60 and the other end of which engages a sleeve 62 fastened to the shaft 59 in a manner to rock said shaft into a position where a pair of arms 63 formed integral with the last holder 58 will engage a stop provided upon the bracket 60. Although there is suf-

ficient pressure provided by the spring 61 to hold the last holder with the last and shoe thereon in their open positions, there is not, however, sufficient strength to said spring to cause the last holder to be moved automatically from its closed position to its open position when the lower pressing unit is moved to its open position, and it is necessary for the operator of the machine to manually raise the last holder from its closed to its open position. The tension of the spring 61, however, nearly counterbalances the combined weights of the last holder, last and shoe and practically no exertion is required to move said parts to their open position.

Vent passages 64 are provided in the last holder 58, thereby enabling air which may be trapped between the upper and lower pressing members 34 and 39 to escape when pressure is applied to the opposite sides of the pressing members during the pressing operation.

The pressure fluid, preferably compressed air, which is utilized to operate the various valves and mechanisms of this machine, is delivered thereto through a main supply pipe 65 which is connected with a pressure reducing valve 66, see Figs. 3 and 19. The pressure within the main supply pipe may be any amount above 75 pounds and the pressure reducing valve 66 is provided for the purpose of supplying the pressure fluid to certain of the mechanisms at approximately 75 pounds and is, therefore, set at this amount. From the pipe 65 a branch pipe 67 leads to another pressure reducing valve 68 which is set at approximately 45 pounds pressure. A condensation receptacle 69 having a drainage valve 70 is provided for the main pressure supply pipe 65. The pressure reducing valve 66 is connected by means of a flexible tube 71 with a valve mechanism A which is operated in a manner hereinafter to be described, by the rotation of the shaft 59, see Figs. 11, 12 and 13. A manually operated valve 72 controls the passage of pressure fluid through the tube 71. A pipe 73 leads from the reducing valve 68 to a valve mechanism B which is operated in a manner hereinafter to be described by the rotation of a shaft 74, see Fig. 10.

The valve mechanisms A and B together with other valve mechanisms C and D which are operated in unison by the rotation of a shaft 75, see Fig. 9, are all constructed in a similar manner and a description of the valve A will apply equally well to all of the others, the same reference characters being used in connection with corresponding parts of each of said valve mechanisms. Each valve mechanism embodies therein a ball check valve *a*, see Fig. 12 and a ball check valve *b*, see Fig. 13. The check valves *a* and *b* are controlled by means of cams *c* and *d* respectively which are rigidly fastened to the control shaft for said valve which, in the instance of the valve mechanism A, is the shaft 59. The cams *c* and *d* each operate a bell crank lever *e* by engaging a cam roll *f* which is rotatably mounted thereon and rocking said bell crank lever upon a pivot *g*. The bell crank lever *e* controls the movement of a pin *h*, either holding said pin against the ball and holding it closed, or releasing said ball and allowing the latter to open from the pressure therebeneath. A spring *i* engages the bell crank lever *e* in a manner to normally hold the check valves *a* and *b* closed as illustrated in Fig. 13, whereas when the cams *c* and *d* engage the rolls *f* the valves *a* and *b* will be open as illustrated in Fig. 12. Exhaust ports *j* are provided for each of the valve mechanisms A, B, C and D and communicate in each of said valves with the check valve *b* thereof.

A pipe 76 leads from the valve A where it communicates with the check valve *a* to a locking mechanism L hereinafter to be described, and a branch pipe 77 leads from the pipe 76 and communicates with the check valve *b* of the valve A. A portion of the pipe 76 is flexible to permit it to swing as the lower pressing unit 31 opens and closes. Another pipe 78 leads from the locking mechanism L to a control valve mechanism M hereinafter to be described, a portion of said pipe being constructed of flexible tubing. A branch pipe 79 leads from the pipe 76 to the valve C where it communicates with the check valve *a*. Another pipe 80 leads from the valve C where it communicates with the check valve *a* to the front end of the pressure cylinder 51 with which it communicates through a needle valve 81. A portion of the pipe 80 is preferably constructed of flexible tubing. A branch pipe 82 connects the pipe 80 with the valve C where it communicates with the check valve *b*. A branch pipe 83 leads from the pipe 78 to the valve D where it communicates with the check valve *a*. Another pipe 84 leads from the valve D where it communicates with the check valve *a* to the rear end of the pressure cylinder 51 with which it communicates through a needle valve 85. A branch pipe 86 leads from the pipe 84 to the valve D where it communicates with the check valve *b*.

A pipe 87 leads from the valve B where it communicates with the valve *a* to a T 88 from which a branch connection 89 preferably constructed of flexible tubing leads to the fluid compartment 41 of the lower pressing unit 31. Another branch pipe 90 leads from the T 88 to the fluid compartment 36 of the upper pressing unit 30. A pressure gauge 91 communicates with the pipe 90 and is provided for the purpose of registering the pressure within the fluid compartments 36 and 41. A branch pipe 92 leads from the pipe 87 to the valve B where it communicates with the check valve *b*.

The control mechanism M, see Figs. 15, 16 and 17, is located within a casing 93 which is

mounted at the end of the pressure cylinder 51 in a position where it will be operated by the piston 50. A rod 94 is slidably mounted within the casing 93 upon the median axial line thereof and also of the piston 50, and said rod has oppositely positioned cam portions 95 and 96 formed integral therewith. The cam portions 95 and 96 are slotted at 97 and 98 respectively, the slots of each cam portion being located opposite each other and the slots of the cam portion 95 being located 90° around the periphery thereof from the slots of the cam portion 96. A spring 99 surrounds the rod 94, one end of said spring engaging the back edge 100 of the cam portion 96 and the other end of said spring engaging an inner surface of the casing 93, and said spring normally acts to force the rod 94 toward the left in Figs. 16 and 17, and hold an edge 101 of the cam 95 against the interior of the casing 93 at such times as the rod 94 is not engaged by the extremity of the piston 50. Splines 102 are provided for the rod 94 to prevent the same from rotating within the casing 93.

Mounted within the casing 93 and positioned 90° apart therein are check valves 103, 104, 105 and 106, all of exactly the same construction. The operation of each check valve is controlled by a lever 107 pivoted at 108 within the casing 93. At one end of each of the levers 107 a roller 109 is rotatably mounted in a position to be engaged by both of the cams 95 and 96. The outer end of each of the levers 107 engages a pin 110 which in turn contacts with a spherical member of the check valve and holds the latter in its closed position. A spring 111 is provided for each of the levers 107 and acts to hold the roller 109 in engagement with the cams 95 and 96.

A pipe 112 leads from the casing 93 where it communicates with the check valve 103 to a T 113 from which a branch pipe 114 leads to the lower end of a timing valve cylinder T, see Fig. 6. Another branch pipe 115 leads from the T 113 to the casing 93 where it communicates with the check valve 106. An exhaust port 116 leads from the check valve 103 to the atmosphere. A T 117 is provided for the pipe 78 and a branch pipe 118 leads from the T 117 to the casing 93 where it communicates with the check valve 105. Another pipe 119 leads from the casing 93 where it communicates with the check valve 105 to a T 120 from which a pipe 121 leads to the upper end of the timing valve cylinder T, see Fig. 6. A branch pipe 122 leads from the T 120 to the casing 93 where it communicates with the check valve 104. An exhaust port 123 leads from the check valve 104 to the atmosphere.

The timing mechanism T embodies therein a cylinder 124 in which a double action piston 125 is slidably mounted, see Fig. 7. The cylinder 124 is fastened to one of the side members 22 of the frame 20. A piston rod 126 extends from the lower side of the piston 125 through a packing gland 127 to a lost motion member 128 illustrated in detail in Fig. 14. This member is illustrated in elevation in Fig. 3 but has been eliminated in Figs. 6 and 7 to save space in the drawings. A collar 129 is rigidly fastened to the lower extremity of the piston rod 126, said collar being located within a chamber 130 of the member 128. A sleeve 131 is adjustably secured within the member 128 and is locked thereto by means of a lock nut 132. A rod 133 is rigidly fastened to the sleeve 131 and connects with a piston 134 which is embodied in a retarding mechanism R, see Figs. 6 and 7.

The piston 134 is mounted within a cylinder 135 which is filled with a fluid, preferably oil, and a packing gland 136 is located at the top of the cylinder 135 where the piston rod 133 enters said cylinder. Located within the piston 134 is a check valve 137, and a plurality of oil ducts 138 connect the check valve 137 with the exterior of the piston rod above the piston. Mounted upon the cylinder 135 and communicating with the interior thereof adjacent to the top thereof is a needle valve 139, and a pipe 140 connects said needle valve with the lower extremity of the cylinder 135 at a point below the lowermost position of the piston 134.

A by-pass valve 141 is mounted upon the cylinder casing 135 adjacent to the upper end of said casing and a spherical valve member 142 of said by-pass valve projects a short distance through the inner extremity of said valve into the interior of the cylinder 135. A spring pin 143 engages the spherical valve member 142 and acts to normally hold said valve closed. A by-pass pipe 144 leads from the valve 141 to the pipe 140. Formed integral with the piston rod 133 at a point adjacent to the lower extremity thereof is a bevelled shouldered portion 145 and said shouldered portion is so positioned that during the upward movement of the piston 134 it will contact with the portion of the periphery of the spherical valve member 142 which projects into the interior of the cylinder 135 and will open the by-pass valve 141 a sufficient amount to allow a portion of the oil located within the cylinder 135 to pass through the valve 141 and pipe 144 into the pipe 140 without passing through the needle valve 139. This permits the piston 134 to move faster during the latter part of its upward stroke.

Projecting upwardly from the upper side of the piston 125 is a piston rod 146 and the latter projects from the interior of the cylinder 124 outwardly through an end plate 147 and has an actuating member 148 fastened thereto at its upper extremity. Located within the actuating member 148 is a

spring actuated push pin 149. A guide member 150 is provided for the purpose of holding the actuating member 148 in position and preventing the piston rod 146 and piston 125 from rotating within the cylinder 124.

Located just above the pin 149 and in the path of said pin as it moves upwardly is a plunger 151 which is mounted to slide in a bearing member 152 fastened to a side member 22 of the frame 20. The plunger 151 is located at such an angle to the axial line of the piston rod 146 that as the pin 149 moves upwardly, it will push the plunger 151 upwardly and then pass out of contact with said plunger. The plunger 151 has a plurality of rack teeth 153 formed thereon which mesh with a pinion 154 rigidly fastened to the shaft 74. A pin 155 projects laterally from the periphery of the plunger 151 and as the latter moves upwardly, said pin is engaged by a latch 156, see Fig. 8, which acts to hold the plunger in its uppermost position after the push pin 149 has moved out of engagement with the lower extremity of the plunger. A spring 157 acts to hold the latch 156 in engagement with the pin 155. A link 158 is connected at its lower end to the latch 156 and at its upper end said link is pivotally connected with a release member 159, in turn pivotally attached at 160 to the bearing member 152.

During the latter part of the upward movement of the piston 125 the pin 149 of the actuating member 148 will engage the under edge of the release member 159 and will lift the link 158 a sufficient amount to release the latch 156 from the pin 155, whereupon a spring 161 located within the casing 152 and contacting with the upper extremity of the plunger 151 will force the latter downwardly to its normal position. The upward movement of the plunger 151 will cause the valve mechanism B to admit the pressure fluid to the pressing units 30 and 31 simultaneously, and the downward movement of said plunger will shut off said pressure fluid from said pressing units and exhaust the fluid from the fluid compartments 36 and 41.

Located above the timing cylinder 124 and in alignment with the piston 125 and piston rod 146 is a plunger 162 which is slidably mounted within a casing 163 of the locking mechanism L. The plunger 162 is normally held in the position illustrated in Fig. 7 by means of a spring 164. Rack teeth 165 are provided upon the plunger 162 and said teeth mesh with a pinion 166 which is rigidly fastened to the shaft 75 for the valves C and D. A bolt 167 is slidably mounted within the casing 163 and said bolt is adapted to interlock with a shouldered portion 168 formed upon the plunger 162 when the latter is located in its raised position where it is driven by being engaged by the upper extremity of the actuating member 148. At this time the pressure fluid admitted to the front part of the casing 163 through the pipe 76 forces the bolt 167 toward the right in Fig. 7 and beneath the shouldered portion 168 of the plunger 162, and said bolt will hold said plunger in its raised position until the pressure fluid is exhausted from the casing 163, at which time the spring 167 surrounding said bolt will move the latter toward the left, Fig. 7, out of engagement with the shoulder 168 of the plunger 162, whereupon the spring 164 will again force the plunger 162 downwardly to its normal position. A cap 170 provided for the front portion of the casing 163 has a tapered portion projecting inwardly therefrom and providing a stop to limit the movement of the bolt 167 toward the left in Fig. 7 and prevent a head portion of said bolt from obstructing the passage of the pressure fluid into the casing 163.

The upward movement of the plunger 162 will operate the valves C and D to admit pressure fluid to the rear end of the cylinder 51 and at the same time exhaust the fluid from the front end of said cylinder, while the downward movement of the plunger 162 admits the pressure fluid to the front end of the cylinder 51, and at the same time exhausts the pressure fluid from the rear end of said cylinder.

A bumper 171 is provided upon the main stationary frame 20 for the purpose of preventing the rocker frame 24 from vibrating unnecessarily when the latter is brought to a vertical position.

The general operation of the machine hereinbefore specifically described is as follows:— Assuming that the upper and lower pressing units 30 and 31 respectively are located in their normal or open positions as illustrated in Fig. 1 and that the last holder 58 is located in its raised position also as illustrated in Fig. 1, the operator of the machine places a last 57 having the portions of a shoe S loosely assembled thereon upon the last holder which is then rocked downwardly into the lower casing section 37 as illustrated in Fig. 4. At this time the lower pressing member or diaphragm 39 is sagging loosely within the casing section 37 as is also the upper pressing member or diaphragm 34 in the upper casing section 32.

In rocking the last holder 58 downwardly, the shaft 59 of the valve mechanism A is rotated, causing the cam *c* to operate its lever *e* to open the check valve *a*, and causing the cam *d* to operate its lever *e* to close the check valve *b*. The pressure fluid is now permitted to pass from the tube 71, through the check valve *a* into the pipe 76 and from thence into the casing 163 of the locking mechanism L behind the sliding bolt 167 which, however, at this time is prevented from moving by reason of the fact that its forward end is contacting with the head of

the plunger 162. At this time the pressure fluid will pass through the casing 163 of the locking mechanism L, passing through the pipe 78 to the valve 103 of the control valve mechanism M. The check valve 103, however, at this time is closed so that the pressure fluid cannot pass through said valve. At this time, however, the pressure fluid can pass from the pipe 78 through the branch pipe 118 to the check valve 105 of the control valve mechanism M and as the check valve 105 is open, the fluid will pass through the pipes 119 and 121 to the cylinder 124 of the timing mechanism T above the piston 125 therein, causing the latter to be held in its lowermost position. At the same time also the pressure fluid will pass from the pipe 76 through the pipe 79 to the check valve *a* of the valve mechanism C, which, at this time, is permitted to open by reason of the fact that the cam *c* is in engagement with the cam roll *f* of the lever *e*. The check valve *a* of the valve mechanism C being open, the pressure fluid will pass through said check valve outwardly through the pipe 80 to the front end of the pressure cylinder 51 which it enters through the needle valve 81, and the piston 50 within the cylinder 51 will be moved to rock the frame 24 and lower pressing unit 31 from the inclined position illustrated in Fig. 1 to a vertical position. During this rocking movement of the rocker frame 24 upon which the lower pressing unit 31 is mounted, the toggle links 45 and 46 will be prevented from functioning to raise the lower pressing unit on account of the weight of the latter and by reason of the fact that the guide portions 55 of the support 42 are in engagement with the under surface of the guide plates 54 which prevent the toggle links from straightening out. When, however, the rocker frame 24 reaches a vertical position, the upper bearing member 29 engages the bumper 171 thereby bringing the rocker frame to a stop and the guide portions 55 of the support 42 will be located in alignment with the guideway 56 of the plate 54 and the toggle links are caused to straighten out and lift the lower pressing unit 31, closing the same and locking it tightly against the upper pressing unit 30.

When the check valve *a* of the valve mechanism C is open, the check valve *b* thereof is closed, and at the same time the check valve *a* of the valve mechanism D is closed and the check valve *b* of the valve mechanism D is open.

When the piston 50 reaches the forward end of its stroke, it will contact with the extremity of the rod 94 of the control valve mechanism M, moving said rod within the casing 93 against the tension of the spring 99 and moving all of the parts of the control valve mechanism into the positions illustrated in Figs. 16 and 17. The check valves 103 and 104 are now operated simultaneously, the former to permit the pressure fluid to pass therefrom through the pipes 112 and 114 to the cylinder 124 of the timing mechanism T beneath the piston 125 therein, causing the latter to rise and permitting the pressure fluid within the cylinder 124 above the piston 125 to exhaust through the pipes 121, 122 and exhaust port 123. At the time that the check valves 103 and 104 are open, the check valves 105 and 106 are closed.

As the piston 125 of the timing mechanism T starts upwardly, it carries with it the piston rod 126 having at its lower end the collar 129 which is located within the lost motion member 128, and the collar 129 being loose within the member 128, the piston 125 will rise quickly until the upper end of the collar 129 engages the inner under side of the member 128, whereupon both the piston 126 and member 128 will move upwardly in unison carrying the piston rod 133 and piston 134 of the retarding mechanism R therewith.

With the first part of the upward movement of the piston 125, the pin 149 of the actuating member 148 will engage the lower extremity of the plunger 151 pushing the latter upwardly against the tension of the spring 161 and rotating the shaft 74 of the valve mechanism B through the rack 153 and pinion 154. Up to this time the check valve *a* of the valve mechanism B had been closed, so that the pressure fluid provided for the fluid compartments 36 and 41 of the upper and lower pressing units 30 and 31 respectively has been prevented from reaching said compartments. The shaft 74 now being rotated, the check valve *a* of the valve mechanism B is opened and the pressure fluid will pass from the pipe 73 through the check valve *a* and from thence through the pipe 87, T 88 and pipes 89 and 90 to the fluid compartments of both pressing units, causing the pressing members or diaphragms 34 and 39 of the pressing units to expand and be forced tightly against the relatively loose parts comprising the shoe S, causing said parts to adhere tightly together.

As the spring pin 149 pushes the plunger 151 upwardly and finally passes out of contact with the lower extremity of said plunger, the latch 156 will engage the pin 155 which projects laterally from the plunger 151 and said latch will act to hold the plunger 151 in its uppermost position until the pin 149 reaches the under surface of the release member 159, whereupon the latter will be rocked upwardly, lifting the latch 156 from engagement with the pin 155, whereupon the spring 161 will function to again move the plunger 151 downwardly. During this downward movement of the plunger 151, the shaft 74 of the valve mechanism B will be rotated, causing the check valve *a* thereof to be closed, and at the same time causing the check valve *b* thereof to open, thereby permitting the

air within the upper and lower fluid compartments of the pressing units to exhaust through the exhaust port *j*.

As the piston 125 moves upwardly under the action of the pressure fluid within the cylinder 124, the upward action of the piston will be retarded by means of a fluid, preferably oil, which is located within the interior of the cylinder 135 of the retarding mechanism R, said oil being forced by the piston 134 from the interior of the cylinder 135 through the needle valve 139 and pipe 140 back into the cylinder 135 beneath the piston 134. The retarding action of the oil will take place until after the valve mechanism B is operated to shut off the passage of pressure fluid to the fluid compartments 36 and 41 of the pressing units and may be regulated by adjusting the needle valve 139. After the pressure fluid has been exhausted from the compartments 36 and 41, the shouldered portion 145 of the piston rod 133 will contact with the spherical member 142 of the by-pass valve 141, opening the latter and permitting a portion of the retarding fluid within the cylinder 135 to pass through the valve 141 into the pipe 140 where it will unite with the pressure fluid that has passed through the needle valve 139 and return to the cylinder 135 beneath the piston 134. This action of the by-pass valve 141 will accelerate the action of the piston 134 during the latter part of its upward stroke and will, therefore, speed up the remainder of the operation of the machine.

During the latter part of the upward movement of the piston 125, the upper extremity of the piston rod 146 will contact with the lower extremity of the plunger 162 moving the latter upwardly against the tension of the spring 164 until the shoulder 168 of said plunger passes above the forward extremity of the bolt 167 which, influenced by the pressure of the fluid at its other extremity, will be moved forwardly against the tension of the spring 169 and will hold the plunger 162 in its uppermost position. During the upward movement of the plunger 162, the shaft 65 of the valve mechanisms C and D will be rotated, closing the check valve *a* of the valve mechanism C and opening the check valve *b* thereof, and exhausting the pressure fluid from the front of the piston 50 through the exhaust port *j*. At the same time the check valve *a* of the valve mechanism D will be open, permitting the pressure fluid to pass therethrough and through the pipe 84 to the rear end of the cylinder 51 which it enters through the needle valve 85. At the same time the check valve *b* of the valve mechanism D will be closed.

As soon as the piston 51 starts moving away from the rod 94, the latter will be operated by means of the spring 99 to reverse the positions of all of the check valves comprising the control valve mechanism M from that illustrated in Figs. 16 and 17. At this time the pressure fluid will be admitted to the cylinder 124 above the piston 125 through the pipes 78, 118, 119 and 121, and at the same time the pressure fluid is exhausted beneath said piston through the pipes 114 and 115 and exhaust port 116.

After the piston 125 descends, the piston 134 will descend and the oil therebeneath will pass upwardly through the check valve 137 within the piston 134 and through the oil ducts 138 into the cylinder 135 above said piston. By this time the rocker frame 24 has been moved to its normal or open position as illustrated in Fig. 1 and the operator then grasps the last holder 58 and rocks the same from its closed to its open or normal position and when so doing rocks the shaft 59, thereby closing the check valve *a* of the valve mechanism A and opening the check valve *b* of said valve mechanism. When the check valve *a* closes, the main supply of pressure fluid is prevented from entering the valve mechanism A and the pressure fluid that has been located within the pipes 76, 78, 79 and 83 is exhausted through the exhaust port *j*.

As soon as the pressure fluid has been exhausted from the casing 163 of the locking mechanism L, the bolt 167 is moved out of engagement with the plunger 162 by means of the spring 169, and the spring 164 will move the plunger 162 downwardly rocking the shaft 75 and causing the various check valves of the valve mechanisms C and D back to their normal or starting position. The last with the completely pressed shoe thereon is then removed from the last holder 58 and the machine is then ready for operating upon another shoe.

We claim:

1. A pressing machine of the character described having, in combination, a pressure chamber, flexible pressing members located within said chamber, means to support an article to be pressed within the chamber between said pressing members, fluid pressure means to expand the pressing members against the article, and fluid means to time the interval during which the article is subjected to pressure by the pressing members.

2. A pressing machine of the character described having, in combination, a pressure chamber, flexible pressing members located within said chamber, means to support an article to be pressed within the chamber between said pressing members, means to force the pressing members against the article, fluid means to time the interval during which the article is subjected to pressure by the pressing members, and means to regulate the action of the timing means.

3. A pressing machine of the character described having, in combination, a pressure chamber, flexible pressing members located

within said chamber, means to support an article to be pressed within the chamber between said pressing members, fluid pressure means to expand the pressing members against the article, fluid means to time the interval during which the article is subjected to pressure by the pressing members, and valvular means to regulate the action of the fluid timing means.

4. A pressing machine of the character described having, in combination, a stationary pressing unit, a movable pressing unit, a holder for a last mounted upon one of said pressing units and adapted to position a shoe therein, and means actuated by the movement of the last holder in positioning the shoe within the pressing unit to automatically close the pressing units and supply a pressure fluid thereto.

5. A pressing machine of the character described having, in combination, a stationary pressing unit, a movable pressing unit, a holder for a last mounted upon said movable pressing unit and adapted to position a shoe therein, and means actuated by the movement of the last holder in positioning the shoe within the movable pressing unit to automatically close the latter against the stationary pressing unit and supply a pressure fluid to both of said pressing units.

6. A pressing machine of the character described having, in combination, a stationary pressing unit embodying therein an expandible diaphragm, a movable pressing unit embodying therein an expandible diaphragm, a holder for a last mounted upon said movable pressing unit and adapted to position a shoe relatively to the diaphragm thereof and means actuated by the movement of the last holder in positioning the shoe to automatically close the pressing units one upon the other and apply a pressure fluid thereto to expand the diaphragms thereof against the shoe.

7. A pressing machine of the character described having, in combination, a stationary pressing unit embodying therein an expandible diaphragm, a movable pressing unit embodying therein an expandible diaphragm, a holder for a last pivotally mounted upon one of the pressing units and adapted to position a shoe therein, means to close the movable pressing unit against the stationary pressing unit, means to regulate the speed of the closing means, and means to expand the diaphragms against the shoe.

8. A pressing machine of the character described having, in combination, a stationary pressing unit embodying therein an expandible diaphragm, a movable pressing unit embodying therein an expandible diaphragm, a holder for a last pivotally mounted upon one of the pressing units and adapted to position a shoe therein, means to close the movable pressing unit against the stationary pressing unit, means to regulate the speed of the closing means, means to expand the diaphragms against the shoe, and means to time the interval during which the shoe is subjected to pressure.

9. A pressing machine of the character described having, in combination, a stationary pressing unit embodying therein an expandible diaphragm, a movable pressing unit embodying therein an expandible diaphragm, a holder for a last pivotally mounted upon one of the pressing units and adapted to position a shoe therein, means to close the movable pressing unit against the stationary pressing unit, valvular means to regulate the action of the closing means, fluid means to expand the diaphragms against the shoe, means to time the interval during which the shoe is subjected to pressure, and valvular means to regulate the action of the timing means.

10. A pressing machine of the character described having, in combination, a stationary pressing unit embodying therein an expandible diaphragm, a movable pressing unit embodying therein an expandible diaphragm, a holder for a last pivotally mounted upon one of the pressing units and adapted to position a shoe therein, fluid pressure means to close the pressing units one against the other, fluid means to time the action of the closing means, and fluid means to expand the diaphragms against the shoe.

11. A pressing machine of the character described, having, in combination, a stationary pressing unit embodying therein an expandible diaphragm, a movable pressing unit embodying therein an expandible diaphragm, a holder for a last pivotally mounted upon one of the pressing units and adapted to position a shoe therein, fluid pressure means to close the pressing units one against the other, fluid means to time the action of the closing means, fluid means to expand the diaphragms against the shoe, and fluid means to time the interval during which the article is subjected to pressure by the diaphragms.

12. A pressing machine of the character described having, in combination, a stationary pressing unit embodying therein an expandible diaphragm, a movable pressing unit embodying therein an expandible diaphragm, a holder for a last pivotally mounted upon one of the pressing units and adapted to position a shoe therein, fluid pressure means to close the pressing units one against the other and also lock the pressing units in their closed position, means to time the action of the closing means, and fluid means to expand the diaphragms against the shoe.

13. A pressing machine of the character described having, in combination, a main frame, a stationary pressing unit upon said frame, a rocker frame, a toggle mechanism upon said rocker frame, a movable pressing unit supported upon said toggle mechanism and slid-

able upon the rocker frame, a holder for a last pivotally mounted upon one of the pressing units, and means operatively connected to the toggle mechanism and actuated by the movement of the last holder to position the shoe for the pressing operation, to automatically close the movable pressing unit against the stationary pressing unit and supply a pressure fluid to both of the pressing units.

14. A pressing machine of the character described having, in combination, a main frame, a stationary pressing unit upon said frame, a rocker frame, a toggle mechanism upon said rocker frame, a movable pressing unit supported upon said toggle mechanism and slidable upon the rocker frame, a holder for a last pivotally mounted upon the movable pressing unit, and means operatively connected to the toggle mechanism and actuated by the movement of the last holder in positioning the shoe within the movable pressing unit to automatically close the latter againts the stationary pressing unit and supply a pressure fluid to both of the pressing units.

15. A pressing machine of the character described having, in combination, a main frame, a stationary pressing unit upon said frame, a rocker frame, a toggle mechanism upon said rocker frame, a movable pressing unit supported upon said toggle mechanism and slidable upon the rocker frame, a holder for a last pivotally mounted upon the movable pressing unit, and fluid pressure operated means connected to the toggle mechanism and actuated automatically by the movement of the last holder in positioning the shoe within the movable pressing unit to close the latter and supply a pressure fluid to both of the pressure units.

16. A pressing machine of the character described having, in combination, a main frame, a stationary pressing unit upon said frame, a rocker frame, a toggle mechanism upon said rocker frame, a movable pressing unit supported upon said toggle mechanism and slidable upon the rocker frame, a holder for a last pivotally mounted upon the movable pressing unit, a cylinder, a piston within said cylinder operatively connected to the toggle mechanism, and means to admit a pressure fluid to the cylinder whereby the piston is actuated to close the pressing units one against the other and supply a pressure fluid thereto.

17. A pressing machine of the character described having, in combination, a main frame, a stationary pressing unit upon said frame, a rocker frame, a toggle mechanism upon said rocker frame, a movable pressing unit supported upon said toggle mechanism and slidable upon the rocker frame, a holder for a last pivotally mounted upon the movable pressing unit, a cylinder, a piston within said cylinder operatively connected to the toggle mechanism, means to admit a pressure fluid to the cylinder whereby the piston is actuated to close the pressing units one upon the other, to also lock the pressing units in their closed positions and finally supply a pressure fluid thereto.

18. A pressing machine of the character described having, in combination, a main frame, a stationary pressing unit upon said frame, a rocker frame, a toggle mechanism upon said rocker frame, a movable pressing unit supported upon said toggle mechanism and slidable upon the rocker frame, a holder for a last pivotally mounted upon the movable pressing unit, a cylinder, a piston within said cylinder operatively connected to the toggle mechanism, means to admit a pressure fluid to the cylinder whereby the piston is actuated to close the pressing units one upon the other, to also lock the pressing units in their closed positions and finally supply a pressure fluid thereto, and valvular means to regulate the speed of the piston.

19. A pressing machine of the character described having, in combination, a main frame, a stationary pressing unit upon said frame, a rocker frame, a toggle mechanism upon said rocker frame, a movable pressing unit supported upon said toggle mechanism and slidable upon the rocker frame, a holder for a last pivotally mounted upon the movable pressing unit, a cylinder, a piston within said cylinder operatively connected to the toggle mechanism, means to admit a pressure fluid to the cylinder whereby the piston is actuated to close the pressing units one upon the other and to also lock the pressing units in their closed positions, and means controlled by the movement of the piston to admit a pressure fluid to the pressing units.

20. A pressing machine of the character described having, in combination, a main frame, a stationary pressing unit upon said frame, a rocker frame, a toggle mechanism upon said rocker frame, a movable pressing unit supported upon said toggle mechanism and slidable upon the rocker frame, a holder for a last pivotally mounted upon the movable pressing unit, a cylinder, a piston within said cylinder operatively connected to the toggle mechanism, and valvular means actuated by the movement of the last holder to admit a pressure fluid to the cylinder whereby the piston therein is actuated to close the pressing units one against the other and supply a pressure fluid thereto.

21. A pressing machine of the character described having, in combination, a main frame, a stationary pressing unit upon said frame, a rocker frame, a toggle mechanism upon said rocker frame, a movable pressing unit supported upon said toggle mechanism and slidable upon the rocker frame, a holder for a last pivotally mounted upon the movable pressing unit, a cylinder, a piston within said cylinder operatively connected to the toggle mechanism, means to admit a pressure

fluid to the cylinder whereby the piston is actuated to close the pressing units one against the other and supply a pressure fluid thereto, and means to regulate the action of the closing means.

22. A pressing machine of the character described having, in combination, a main frame, a stationary pressing unit upon said frame, a rocker frame, a toggle mechanism upon said rocker frame, a movable pressing unit supported upon said toggle mechanism and slidable upon the rocker frame, a holder for a last pivotally mounted upon the movable pressing unit, a cylinder, a piston within said cylinder operatively connected to the toggle mechanism, means to admit a pressure fluid to the cylinder whereby the piston is actuated to close the pressing units one against the other and supply a pressure fluid thereto, and valvular means to regulate the flow of fluid to the cylinder whereby the speed of the closing means is varied.

23. A pressing machine of the character described having, in combination, a main frame, a stationary pressing unit upon said frame, a rocker frame, a toggle mechanism upon said rocker frame, a movable pressing unit supported upon said toggle mechanism and slidable upon the rocker frame, a holder for a last pivotally mounted upon the movable pressing unit, a cylinder, a piston within said cylinder operatively connected to the toggle mechanism, means to admit a pressure fluid to the cylinder whereby the piston is actuated to close the pressing units one against the other and supply a pressure fluid thereto, and means to time the interval during which the shoe is subjected to pressure.

24. A pressing machine of the character described having, in combination, a main frame, a stationary pressing unit upon said frame, a rocker frame, a toggle mechanism upon said rocker frame, a movable pressing unit supported upon said toggle mechanism and slidable upon the rocker frame, a holder for a last pivotally mounted upon the movable pressing unit, a cylinder, a piston within said cylinder operatively connected to the toggle mechanism, means to admit a pressure fluid to the cylinder whereby the piston is actuated to close the pressing units one against the other, and means actuated by the movement of the piston in closing the pressing units to admit a pressure fluid to the latter to press a shoe.

25. A pressing machine of the character described having, in combination, a main frame, a stationary pressing unit upon said frame, a rocker frame, a toggle mechanism upon said rocker frame, a movable pressing unit supported upon said toggle mechanism and slidable upon the rocker frame, a holder for a last pivotally mounted upon the movable pressing unit, a cylinder, a piston within said cylinder operatively connected to the toggle mechanism, means to admit a pressure fluid to the cylinder whereby the piston is actuated to close the pressing units one against the other and supply a pressure fluid thereto, fluid means to time the interval during which the shoe is subjected to pressure, and valvular means to regulate the action of the fluid timing means.

26. A pressing machine of the character described having, in combination, a main frame, a stationary pressing unit upon said frame, a rocker frame, a toggle mechanism upon said rocker frame, a movable pressing unit supported upon said toggle mechanism and slidable upon the rocker frame, a holder for a last pivotally mounted upon the movable pressing unit, a cylinder, a piston within said cylinder operatively connected to the toggle mechanism, means to admit a pressure fluid to the cylinder whereby the piston is actuated to close the pressing units one against the other and supply a pressure fluid thereto, a timing cylinder, a piston within said timing cylinder, means controlled by the movement of the first-mentioned piston to admit a pressure fluid to the timing cylinder to actuate the piston therein, and means to retard the movement of said last-named piston.

27. A pressing machine of the character described having, in combination, a main frame, a stationary pressing unit upon said frame, a rocker frame, a toggle mechanism upon said rocker frame, a movable pressing unit supported upon said toggle mechanism and slidable upon the rocker frame, a holder for a last pivotally mounted upon the movable pressing unit, a cylinder, a piston within said cylinder operatively connected to the toggle mechanism, means to admit a pressure fluid to the cylinder whereby the piston is actuated to close the pressing units one against the other and supply a pressure fluid thereto, a timing cylinder, a piston within said timing cylinder, means controlled by the movement of the first-mentioned piston to admit a pressure fluid to the timing cylinder to actuate the piston therein, fluid means to retard the movement of said last-named piston, and valvular means to control the flow of said last-named fluid means thereby timing the interval during which the shoe is subjected to pressure.

28. A pressing machine of the character described having, in combination, a main frame, a stationary pressing unit upon said frame, a rocker frame, a toggle mechanism upon said rocker frame, a movable pressing unit supported upon said toggle mechanism and slidable upon the rocker frame, a holder for a last pivotally mounted upon the movable pressing unit, a cylinder, a piston within said cylinder operatively connected to the toggle mechanism, means to admit a pressure fluid to the cylinder whereby the piston is actuated to close the pressing units one

against the other and supply a pressure fluid thereto, a timing cylinder, a piston within said timing cylinder, means controlled by the movement of the first-mentioned piston to admit a pressure fluid to the timing cylinder to actuate the piston therein, fluid means to retard the movement of said last-named piston, valvular means to control the flow of said last-named fluid means thereby timing the interval during which the shoe is subjected to pressure, and valvular means actuated by the movement of said last-mentioned piston to exhaust the pressure fluid from the pressing units.

In testimony whereof we have hereunto set our hands.

JOSEPH E. PERRAULT.
LOUIS J. SCHROEDER.