Dec. 9, 1941. J. F. RAYNOLDS 2,265,449

PRESSING MACHINE

Filed Dec. 1, 1937 5 Sheets-Sheet 1

FIG. 1

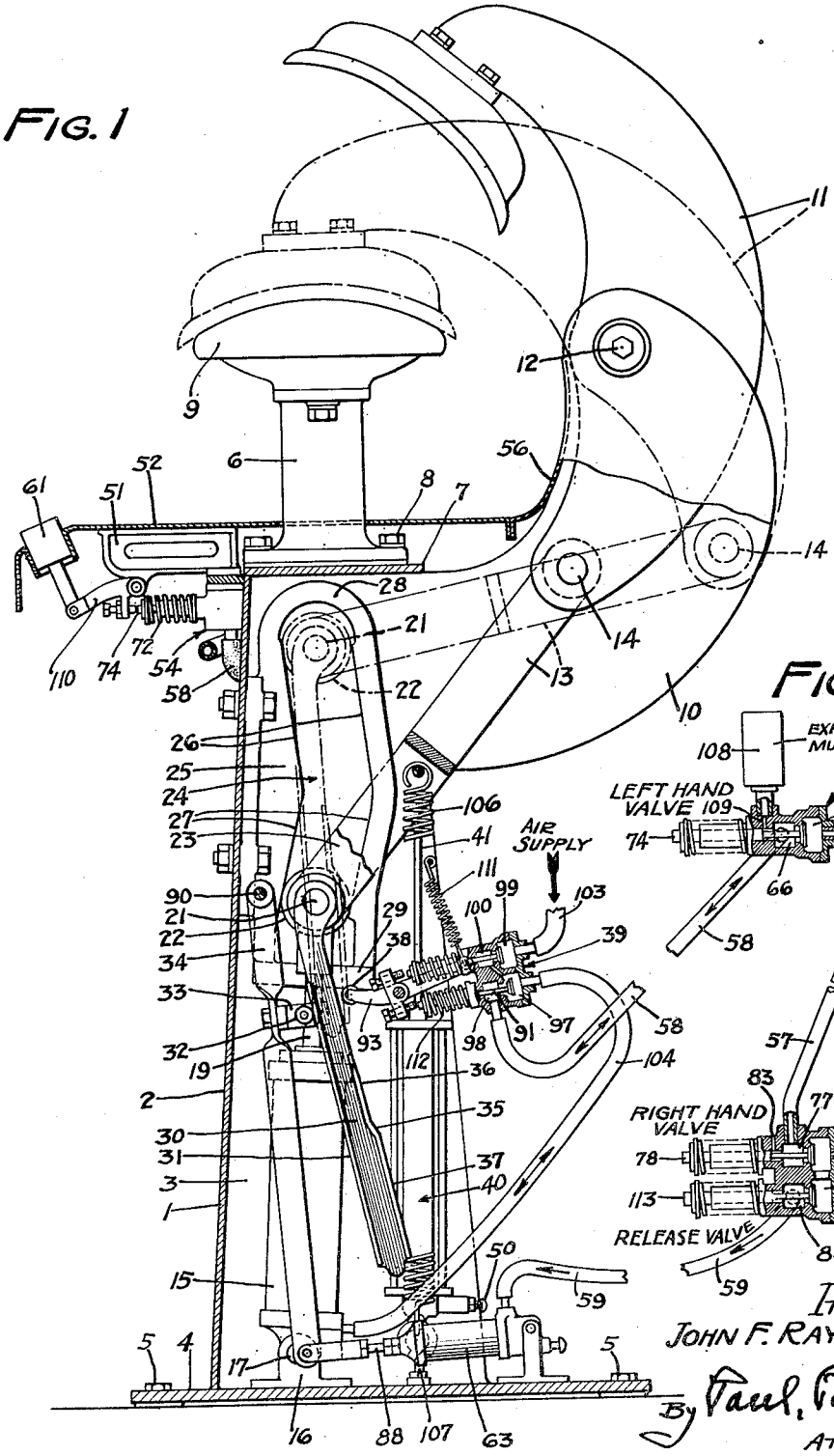



FIG. 5




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PRESSING MACHINE

Filed Dec. 1, 1937 5 Sheets-Sheet 2

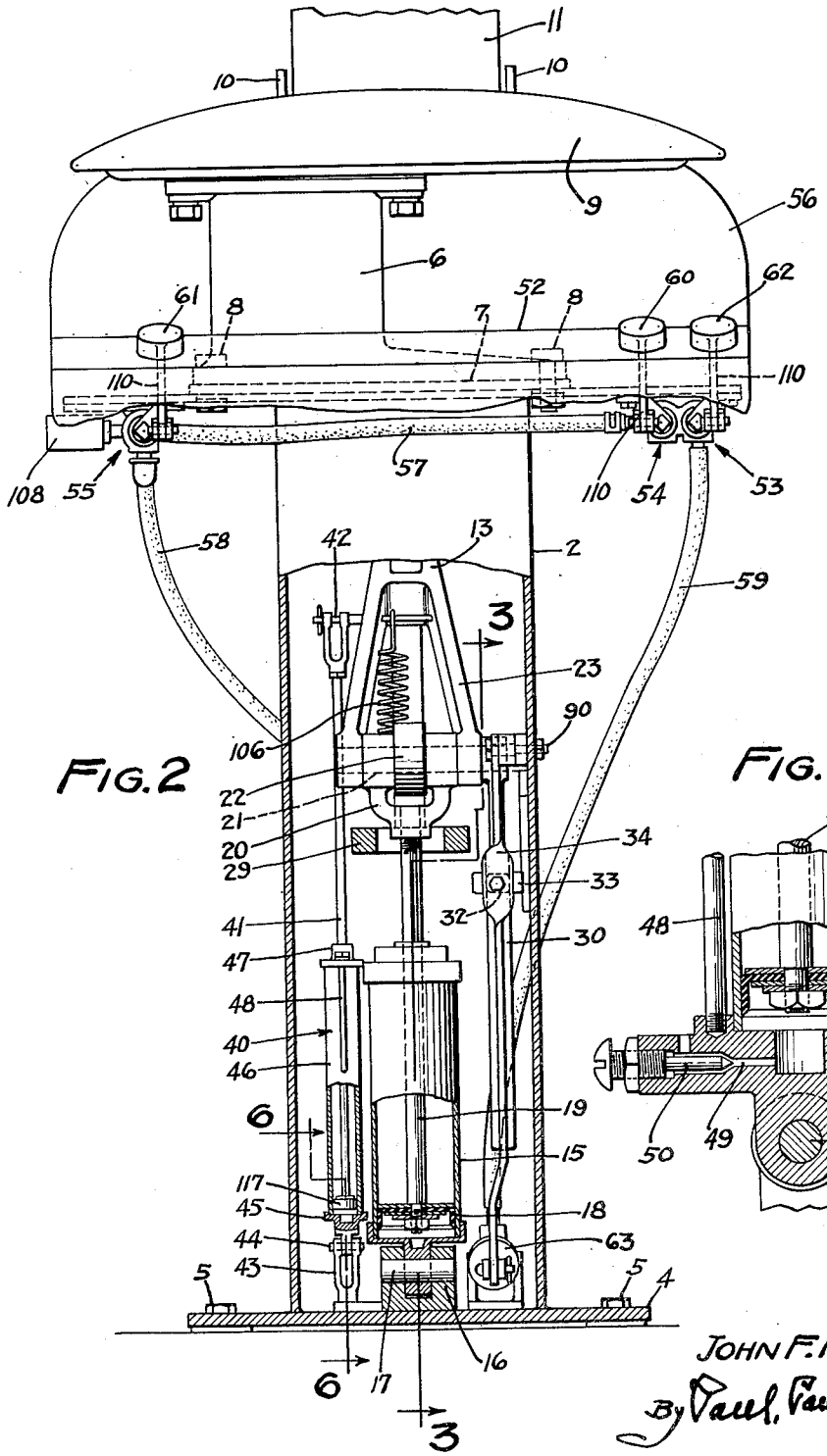



FIG. 2




FIG. 6

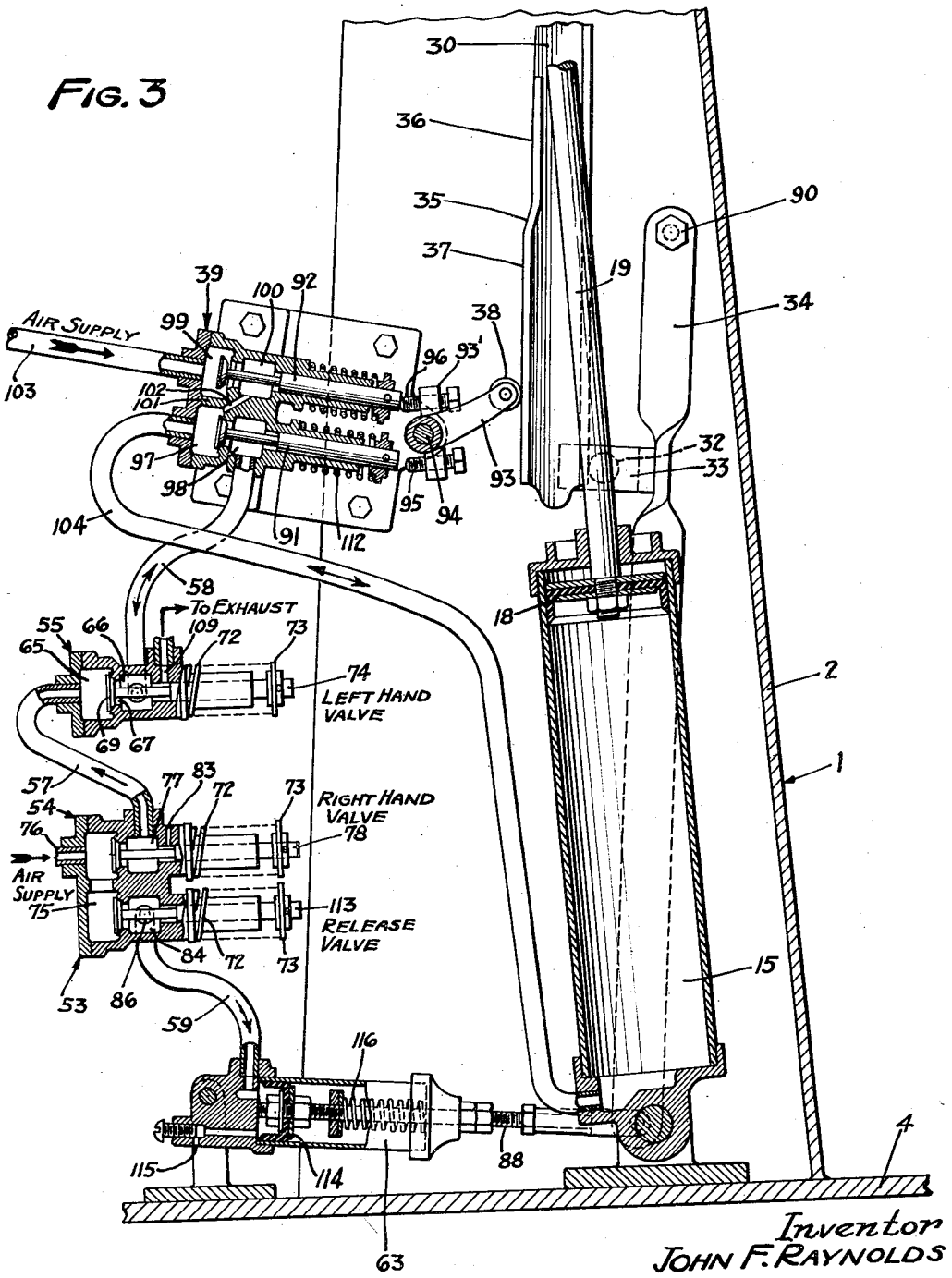
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PRESSING MACHINE

Filed Dec. 1, 1937 5 Sheets-Sheet 3

FIG. 3



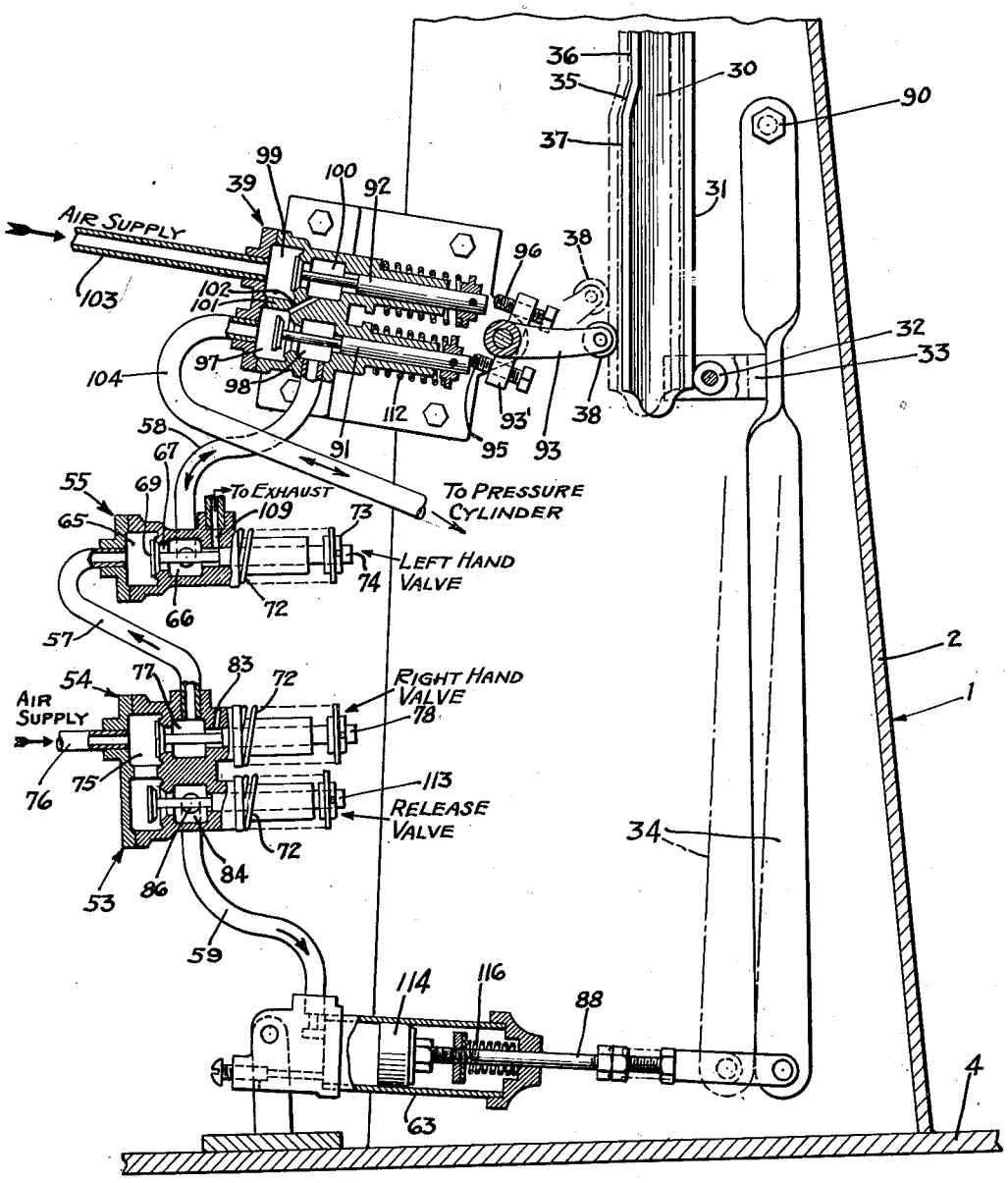

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PRESSING MACHINE

Filed Dec. 1, 1937 5 Sheets-Sheet 4

FIG. 4




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Dec. 9, 1941. J. F. RAYNOLDS 2,265,449

PRESSING MACHINE

Filed Dec. 1, 1937 5 Sheets-Sheet 5

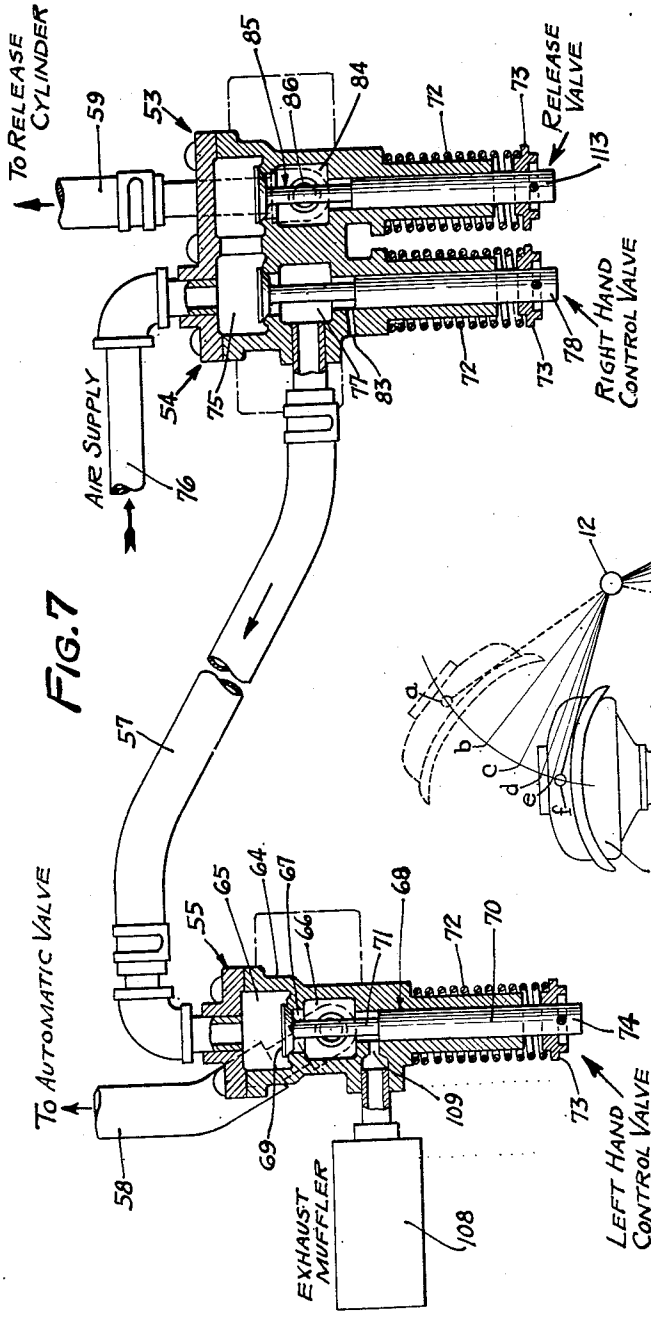



FIG. 7

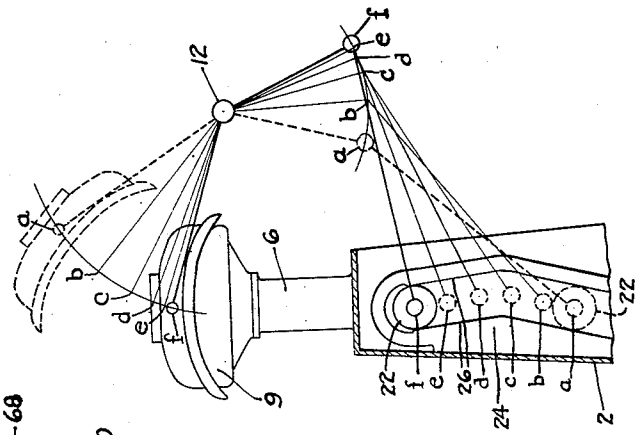



FIG. 8

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Patented Dec. 9, 1941 2,265,449

# UNITED STATES PATENT OFFICE

2,265,449

## PRESSING MACHINE

John F. Raynolds, Minneapolis, Minn., assignor to The Unipress Company, Inc., Minneapolis, Minn., a corporation of Minnesota

Application December 1, 1937, Serial No. 177,491

2 Claims. (Cl. 38—40)

This invention relates to pressing machines of the type used for the pressing of laundry, and has for an object the provision of a simple efficient power actuating mechanism for closing and opening the press, in which the initial movement of the press to a predetermined intermediate position is under the control of the operator, and the final closing movement is automatically carried out.

It is a further object of the invention to provide a mechanism for closing the press, in which the initial closing movement is carried out rapidly, and in which the press thereafter completes the closing automatically and develops a relatively high pressure so as effectively to remove irregularities from the garment being pressed, and to dry it as rapidly as possible.

It is also an object of the invention to provide an actuating mechanism in which both hands of the operator are required to be on the controls in order to close the press to a safe position.

A further object of the invention is the provision of a release means under control of the operator whereby the opening of the press may be accomplished at will, either at the press or from a point remote from the press.

It is also an object of the invention to provide a device to regulate the speed of final opening of the press and to smoothly slow it to a stop at its full open position, and one in which the rate of opening of the press will be constant at all room temperatures in which the press may be operated.

It is a further object of the invention to provide a mechanism whereby the movable element of the press will follow down upon the matted pad of the buck as it is gradually compressed during usage without, however, substantially varying the pressure at which the movement of the press ceases, when in closed position, and without change in the original adjustment.

It is also an object of the invention to provide a simple power-operated press wherein no energy will be required of the operator except the relatively small amount necessary to operate the controls.

Other objects of the invention will be apparent from the description hereinafter given of the novel features and combinations of parts which constitute the press mechanism.

In the description hereinafter given reference is had to the accompanying drawings in which like characters represent corresponding parts in all views.

Figure 1 is a side elevation partly in section of the press.

Figure 2 is a front elevation partly in section.

Figure 3 is an enlarged section of a portion of the base of the machine along the lines 3—3 of Figure 2 except that it shows the parts as they would appear when the press is in closed or operated condition.

Figure 4 is a sectional view similar to that shown in Figure 3 also along the lines 3—3 of Figure 2, except that the power cylinder mechanism has been eliminated for the purposes of simplification. This figure shows the press in its closed position, but with the release mechanism operated and parts as they would appear when the press is about to close.

Figure 5 is a schematic view partly in section of the manually controlled valve mechanism together with some of the connecting pipeways. It is to be noted that when Figures 1 and 5 are viewed together the complete air-flow movements of the press can be traced.

Figure 6 is a detail partly in section along the lines 6—6 of Figure 2 and shows the air regulator mechanism of the buffer cylinder.

Figure 7 is an enlarged detail partly in section of the manually controlled valve mechanism.

Figure 8 is a kinematic diagram showing the position of the presser arm and head for six equal increments of movement of the operating cylinder.

The invention comprises a main frame generally designated by the numeral 1, which is composed of an upright channel member 2 open at the rear side so as to form an easily accessible compartment 3 in which the various parts of the actuating mechanism are mounted. The frame 2 is mounted upon bed plate 4 which may be attached to the floor by means of screws 5, if desired. The upper part of the frame carries a pedestal 6 which is attached to top plate 7 by means of bolts 8. A shaped pressing buck 9 which is heavily padded by means of cotton or other material is fastened to the pedestal. If desired the buck may be of the construction as shown in my Patent 1,966,645, issued July 17, 1934.

The main frame also has an upwardly and rearwardly extending portion 10 upon which pressing arm 11 is pivoted at point 12. The upper end of pressing arm 11 carries a pressing head which may be heated in any desired manner, as for instance by means of steam under pressure or by an electric heating element. The

lower end of pressing arm 11 is pivotally attached to link 13 by means of through bolt 14.

The primary actuating mechanism of the press is power cylinder 15 which is pivotally mounted on the base by means of bracket 16. Pin 17 is preferably of hardened material so as to withstand the heavy pressures developed in the pressing operation.

As shown in Figure 2 piston rod 19 and plunger 18 are arranged in power cylinder 15. At the upper end of the rod 19 is mounted a fork-shaped member 20, which carries a through pin 21, upon which roller 22 is mounted. The outer ends of the pin 21 serve to pivotally connect the piston rod to the forked lower end 23 of link 13, the upper end of which is pivoted at 14 to the lower end of the pressing arm 11.

On the inside of the frame is mounted an irregular shaped slot 24 in which roller 22 operates. The slot is formed integrally with plate 25 by which it is fastened to the inside front portion of frame 2. The slot is formed in two straight sections 26—26 and 27—27 which are formed integrally with plate 25. The portions 26—26 which form the upper sections of the slot are connected by curved portion 28 and the sections 27—27 of the lower section are connected by a circumferential frame portion 29. This portion is shown in section in Figure 2. The circumferential frame 29 has a central opening of size sufficient to allow the piston rod 19 to move freely, while the roller 22 follows the irregular path defined by slot surfaces 26 and 27.

At the right end of pin 21 as shown in Figure 2 there is mounted a depending cam surfaced rod 30 which is freely pivoted. The left-hand surface 31 of this rod (as shown in Figure 1) is perfectly straight and rides against roller 32 which is mounted upon a bracket 33 on pivoted arm 34. The purpose of this roller and pivoted arm will be explained subsequently. The right-hand surface of rod 30 (as shown in Figure 1) contains cam portion 35 and two displaced but parallel surfaces 36 and 37. These surfaces cooperate with roller 38 and serve to operate the automatic valve shown generally at 39. In one operating position as shown in Figure 1 of the drawings, rod 30 is lowered so that surface 36 is opposite roller 38. When this occurs spring 111 moves lever 93 in a counterclockwise direction and moves the valves into the position shown in Figures 1 and 4. In Figure 3 the rod 30 is in its upper position as it would be with the press closed. In this position roller 38 has ridden up upon surface 37, and has moved valve 39 in its second operating position.

To the left of operating cylinder 15 as shown in Figure 2 there is mounted a buffer cylinder 40 the piston rod 41 of which is connected at its upper end to pin 42 on link 13. The lower end of buffer cylinder 40 is pivotally mounted on bracket 43 and pin 44 so as to permit the cylinder to oscillate during the operation of the press.

As shown in Figure 6 the buffer comprises a cylinder head 45 which is assembled to the barrel 46 of the cylinder and its cap 47 (shown in Figure 2) by means of through bolts 48. The cylinder head has an air release orifice 49 through which the flow of air may be regulated by screw 50. In this way the opening of the press may be timed and the cushion effect of the buffer regulated.

At the top of the press there are mounted several brackets 51 which serve the double purpose of carrying work table 52 and the operating valves designated generally as 53, 54 and 55. The work table has a rear flange 56 which rests against bracket 10. The various operating controls are connected to each other and to the operating cylinders by means of tubular connections 57, 58 and 59, as shown in Figures 1, 2, 3 and 4.

The operating controls which are under the manual control of the operator and consist of a right-hand control button 60 which actuates right-hand control valve 54, left-hand control button 61 which actuates left-hand control valve 55 and release button 62 which actuates release valve 53. The control valves 53, 54 and 55, and the various tubular connections from these valves to the air supply line, automatic pressure maintaining valve 39, actuating cylinder 15 and release cylinder 63 are shown in Figures 1 and 5, considered together.

The right-hand control valve, left-hand control valve and release valves are shown enlarged in Figure 7. The left-hand control valve which is generally designated 55, comprises a casing 64 having an upper chamber 65 and an antrum chamber 66 which is connected to the upper chamber 65 by valve port 67 which is normally closed by valve 68. The valve itself comprises an enlarged head 69 and a lower bulky stem portion 70 which is connected to the valve head by means of a stem portion 71 of reduced diameter. Valve spring 72 which rests against casing 64 maintains pressure on the valve through collar 73 and its pin.

When the valve is in the position shown in Figures 3, 5 and 7, the lower bulky stem portion 70 uncovers port 109 which communicates with exhaust muffler 108, which may be of any type desired.

The upper valve chamber 65 of left-hand control valve 55 communicates with chambers 77 of right-hand valve 54 by way of tubular connection 57. The antrum chamber 66 communicates with automatic pressure maintaining valve 39 by way of tubular connection 58.

The right-hand control valve and the release valve which are generally designated as 54 and 53 respectively are, for convenience, built as one unitary structure. Each is similar to the left-hand control valve and the detailed structure therefore need not be described. The right-hand control valve 54 and the release valve have a common air supply chamber 75 which is fed by main air supply line 76. The valve stem 78 of the right-hand valve is similar to valve stem 70 of valve 55, and serves as a valve to open and close exhaust port 83, for a purpose to be described presently.

The release valve is similar to the right-hand control valve and contains antrum chamber 84 to which air under pressure is admitted when valve 85 is lifted. When this occurs, air passes from upper chamber 75 through the valve port and into port 86 which communicates with the release cylinder by means of tubular connection 59.

The release mechanism of the press is illustrated in Figures 1, 2, 3 and 4 and comprises a cylinder 63 having a piston rod 88 which is forced to the left (as shown in Figure 1) when air is applied to it by way of release valve 53 and tubular connection 59. The release cylinder piston rod 88 is pivotally connected to depending arm 34 which in turn is pivoted to the frame at point 90. Roller 32 which is carried by bracket

33 on arm 34, serves as a back stop upon which cam arm 30 rides when the press is operated.

The casing of automatic valve 39 is similar to the double valve casing which serves for the right-hand control valve 54 and release valve 53, and contains two valve stems 91 and 92 which are similar to those previously described with reference to the left and right-hand control chambers and the release valve. The valve stems are operated by an arm 93 which is pivoted about point 94 and biased to the position shown in Figure 1 by the spring 111 which is sufficiently strong to overcome spring 112 and thus depress valve 91. Arm 93 carries a roller 38 at its outward end which bears upon the parallel surfaces 36 and 37 of the cam arm 30. Arm 93 has an integrally formed cross-piece 93' upon which are mounted adjusting screws 95 and 96 which serve respectively to operate valve stems 91 and 92 against their tension springs. These screws are preferably adjusted so as to allow both valves to be closed for a short interval as arm 93 is moved from one position to the other. The purpose of this adjustment will be explained later.

It will be noted that the casing of valve 39 has four separate chambers 97, 98, 99 and 100. Chambers 97 and 99 are separated from each other by wall 101, whereas chambers 97 and 100 communicate with each other by means of passageway 102. Chamber 99 connects with the air supply line 103 and contains air which is constantly under pressure.

Valve 39 has two operating positions, shown in Figures 3 and 4, respectively. As shown in Figure 3, valve 92 is raised from its valve seat so as to permit air under pressure to pass from chamber 99 through the valve port to chamber 100 and thence through passageway 102 to chamber 97. When in the position shown in Figure 4, valve 92 is seated and valve 91 is raised, in which case chamber 97 communicates with chamber 98. Chamber 98 in turn communicates with the antrum chamber 66 of the left-hand control valve by way of tubular connection 58, and chamber 97 communicates with pressure cylinder 15 by way of tubular connection 104, see Figures 1, 3, and 4.

As shown in Figures 1 and 2 the press is provided with a spring 106 which at its upper end is connected with link 13 and its lower end is connected to eye bolt 107 mounted in the base of the machine. This spring serves to open the press when the application of air pressure to cylinder 15 is released.

Figure 8 is a kinematic diagram which shows the manner in which the presser head responds for equal increments of movement of the piston cross-head roller 22 along slot 24. It will be seen that the increments of movement of the presser head corresponding with increments *a*—*b*, *b*—*c* and *c*—*d* are relatively large, but that after roller 22 passes the hump in slot 24 and enters upon the 26—26 section, the increments of movement of the presser head are much reduced.

Stated another way, during the early part of its travel, the movement of plunger 19 of pressure cylinder 15 produces a relatively direct effect upon pivoted arm 11 with the result that the pressing head approaches the buck 9 at a relatively high rate of speed. As the press approaches the closed position shown by dotted lines in Figure 1, roller 22 will enter the upper part 26—26 of the slot 24 and in this position the component of motion of pin 14 to the right (as shown in Figure 1) to close the press, will be relatively small. While the movement at this time is comparatively slow, the pressure developed is exceedingly heavy, so that a garment being pressed will be effectively free from wrinkles and rapidly dried.

The pads on buck 9 are usually made of cotton and steel wool and the cotton is replaced weekly. When fresh the pad is thick and relatively compressible, but as the press is used, the pad takes a permanent set and is reduced in thickness. No adjustment of the presser head is necessary in order to compensate for the varying limiting position of the buck pad during use, or for variations in thickness of the garment being pressed because the relatively long upper portion 26—26 of slot 24 permits a range of stopping positions for roller 22 which compensates for these variations. The press merely closes down until the pressure developed on the buck balances the net effective force exerted by the piston, as counteracted by the press opening springs.

It is to be noted that while spring 106 offers increasing resistance to the upward travel of roller 22 when ironing, in the upper part 26 of slot 24, at the same time the angle of the surface of slot 26 with reference to link 13 affords increasing mechanical advantage for successive increments of upward movement of the roller, thus tending to maintain approximately uniform ironing pressure between presser head and the stationary buck 9.

In Figure 5 there is shown an exhaust muffler 108 which communicates with port 109 of left-hand control valve 55. This muffler may be of any approved type such as a casing filled with steel wool. Its purpose is to reduce the hissing sound of the exhaust air from cylinder 15 during the operation of the machine. A second muffler may be provided at port 83 of right-hand valve 54, if desired, but this muffler would be used only occasionally, as hereinafter explained.

*Operation*

In the open position of the press, shown in Figure 1, the pressing arm and pressing head 11 are shown in the full line positions, and piston 18 is at its lowermost position in cylinder 15. In order to initiate closing the press, the operator actuates buttons 60 and 61 simultaneously (as shown in Figure 2). When this occurs valve stems 78 and 74 of right and left-hand valves 54 and 55, respectively, are moved to their "open" position. This is accomplished by means of levers 110 on each valve which communicate the movement of the operating buttons to their corresponding valve stems. When the valve stems 74 and 78 are moved to their open positions air under pressure is admitted from the air supply line 76 (see Figures 1 and 5) to chamber 75 of right-hand control valve 54 and thence through the opening provided by actuated valve 78 to antrum 77. It will be noted that the movement of valve 78 to the "open" position closes port 83, thus blocking the escape of air at this point. Air under pressure is thereby delivered to tubular connection 57 and thence to chamber 65 of left-hand control valve 55. Since valve stem 74 has also been moved to the "open" position air under pressure will accordingly be delivered to antrum chamber 66 and thence by way of tubular connection 58 to chamber 98 of automatic pressure maintaining valve 39. This valve is in the position shown in Figure 1, that is to say, roller 38 is opposite cam surface 36. In this po-

sition spring 111 overcomes valve spring 112 and opens the valve between chambers 98 and 97 with the result that air under pressure is delivered to tubular connection 104 which communicates directly with cylinder 15. Piston 18 is accordingly driven upwardly and the press is closed. As the press nears the closed position cam surface 35 on cam arm 30 will come adjacent roller 38 and force the roller into the position shown in Figure 3. When this occurs valve 92 will be moved to the open position and valve 91 closed. Air under pressure will accordingly be delivered directly from supply line 103 through chamber 99 to chamber 100 and thence by way of communicating passage 102 to chamber 97 from which it travels directly to power cylinder 15 by way of tubular connection 104. The press accordingly continues to close of its own accord.

Since the movement of arm 93 in raising valve 92 from its valve seat simultaneously lowers valve 91 into engagement with its valve seat, the passageway between chambers 98 and 97 is broken off. This closure serves to interrupt the flow of air by way of operator control valves 54 and 55, and the operator may accordingly remove pressure from buttons 60 and 61. Set screws 95 and 96 are preferably adjusted so that there will be a very short period during which both valves 91 and 92 are closed. This interrupts the air supply from the operated push-buttons, as well as the direct supply by way of valve 92. However, this occurs while the press is closing and since the press coasts during this very short interruption in air supply, the effect is merely to check the motion slightly. This is desirable since the motion must be slowed down during the final closing operation.

As the roller 22 reaches the bend in slot 24, a relatively long increment of movement of the piston and roller 22 will be required for a given movement of pressing arm 11 with the result that a relatively heavy pressure is developed as the press closes. When the pad on buck 9 is fresh and thick as it is when just replaced, the press will be closed and the pressure developed soon after roller 22 has passed the bend in slot 24. The limiting position of roller 22, for a given thickness of pad and work, is determined by the pressure developed on the pad, the air pressure applied to the cylinder, and the force of tension spring 106. As the pad on buck 9 is compressed during usage the limiting position of the presser head will gradually become lower and lower, with the result that roller 22 will come to rest at gradually higher positions along section 26—26 of slot 24. Since increments of upward movement of roller 22 throughout the upper portion 26—26 of slot 24 are relatively small and substantially constant for equal increment movements of the pressing head, a substantially uniform pressure will be developed on the buck, whether it is fresh and thick or matted down, as after continued use.

The press will remain in closed position with air applied to cylinder 15 by way of automatic control valve 39 (see Figure 3) until the automatic supply is interrupted. This is accomplished by the use of a release mechanism which comprises release cylinder 63 and piston 88, which serve to move lever arm 34 about pivot point 90. As previously explained, lever 34 carries roller 32 on bracket 33 and in the position shown in Figure 3, serves to hold cam arm 30 in such a position that cam surface 37 will be effective to operate upon roller 38 and valve operating arm 93. When the operator wishes to release the press, pressure is applied to button 62 which serves to operate the valve stem 113 of release valve 53. This serves to open the passageway between chamber 75 and antrum 84 which communicates with release cylinder 63 by way of tubular connection 59. Air under pressure is accordingly admitted to the release cylinder and piston 114 is moved to the right as shown in Figure 4. The lever arm 34 is accordingly moved from the dotted line position (see Figure 4) to the full line position and in so doing permits cam arm 30 also to move out of contact with the roller 38 on valve operating arm 93. The spring 111 (Figure 1) then moves the lever arm 93 to the full line position shown in Figures 1 and 4, thereby closing valve 92 and opening valve 91. This serves to interrupt the supply of air under pressure which had previously been applied through the automatic valve to pressure cylinder 15 and opens a communicating passage from the pressure cylinder by way of tubular connection 104 to chamber 97, chamber 98 by way of tubular connection 58 to antrum 66 of left-hand control valve 55. Assuming this valve to be closed, valve stem 74 is in a position to uncover port 109 which communicates with the exhaust muffler 108 (shown in Figures 5 and 7). The action of springs 106 upon link 13 of the press tends to open the press and to drive piston 18 downwardly in cylinder 15. This forces the air from the cylinder by way of the circuit just traced through the exhaust muffler 108 to atmosphere, and the press accordingly opens.

During the time release button 62 is depressed, air under pressure is delivered to cylinder 63, and a small amount bleeds through vent 115. When the air supply is interrupted by the release of button 62, spring 116 within cylinder 63 returns piston 114, piston rod 88, arm 34 and roller 32 to the position shown in Figure 3.

As the press moves to open position, piston 117 of the buffer cylinder is driven downwardly in buffer cylinder 46. This serves slightly to compress the air which is in the cylinder and to drive it through the metering orifice 49 in the cylinder head. The needle valve 50 of this orifice is adjusted so as to check the escape of air and thereby check the descent of piston 117 in cylinder 46. This serves to time the opening of the press and to cushion the movement of the press as it reaches its final open position. Since the viscosity of the air in buffer cylinder 46 is constant through the range of operating temperatures of the press, the cushioning effect and the "timing" of the press will remain substantially constant.

If it is assumed that the operator depresses the left-hand control button and releases only the right-hand control button, the press will nevertheless open because the exhaust air from cylinder 15 will accordingly be directed through antrum chamber 66 of valve 55 to chamber 65 and thence by way of tubular connection 57 to antrum 77 of valve 54. Since it is assumed that valve stem 78 of the right-hand valve is in the "closed" position, air will be exhausted to atmosphere by way of exhaust port 83, which is opened under these conditions. If desired, an exhaust muffler may also be provided for port 83.

I claim as my invention:

1. In a pressing machine, cooperating stationary pressing element means and movable pressing element means movable toward and away from each other, fluid pressure motor means for

moving said movable element means when power is applied thereto, resilient means for normally holding the movable element means away from said stationary element means, manual means for controlling the application of fluid pressure to said fluid pressure motor means, and automatic means for applying fluid pressure to said motor means regardless of the operation of said manual means, including a valve having a movable operating element, a cam-shaped pendulum mounted on said movable pressing element means, positioning means for holding said cam-shaped pendulum against the movable operating element of said valve for operation of said valve by the cam as the pressing machine is closed, and means for withdrawing said positioning means to a position such that the cam does not operate said valve.

2. A pressing machine having a central supporting column consisting of a front plate connected to side plates to form a vertical hollow space therein, a stationary pressing head mounted thereon, backwardly and upwardly extending arms on said side plates, a presser arm pivotally mounted between the extending arms, a presser head mounted on said arm for cooperative movement into and out of engagement with said stationary pressing head, and means for moving said arm comprising a cam plate mounted within the vertical hollow space of said supporting column, a link pivotally connected to said presser arm, a roller pivotally mounted on the other end of said link and mounted for movement in said cam slot, and piston means for moving the roller to and fro in said slot, said piston means being pivoted to the base of the machine and extendible vertically in said hollow space.

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