April 26, 1960 W. C. WILSON ET AL 2,934,129

PRESSING MACHINE

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Fig. 1

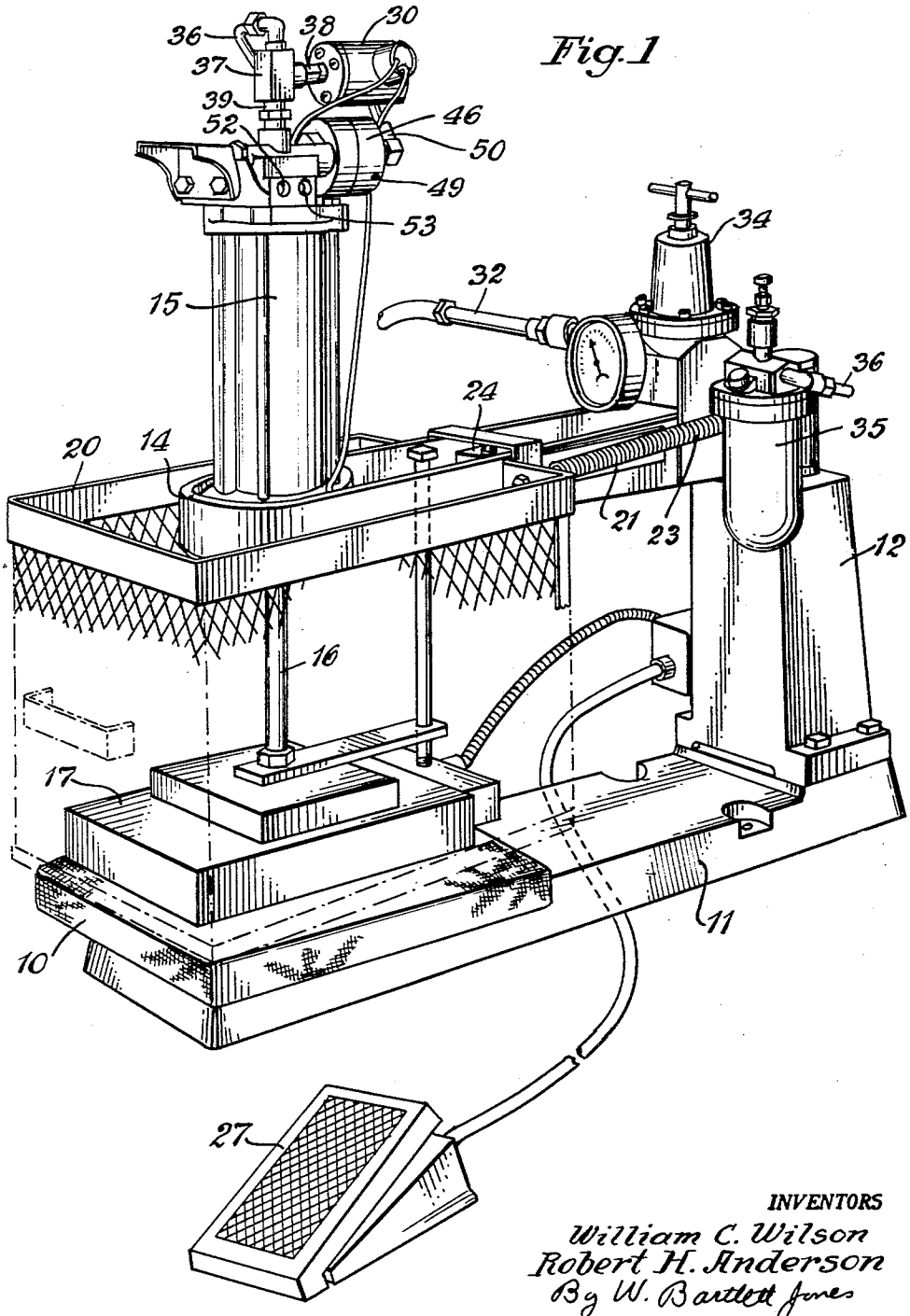

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Fig. 2

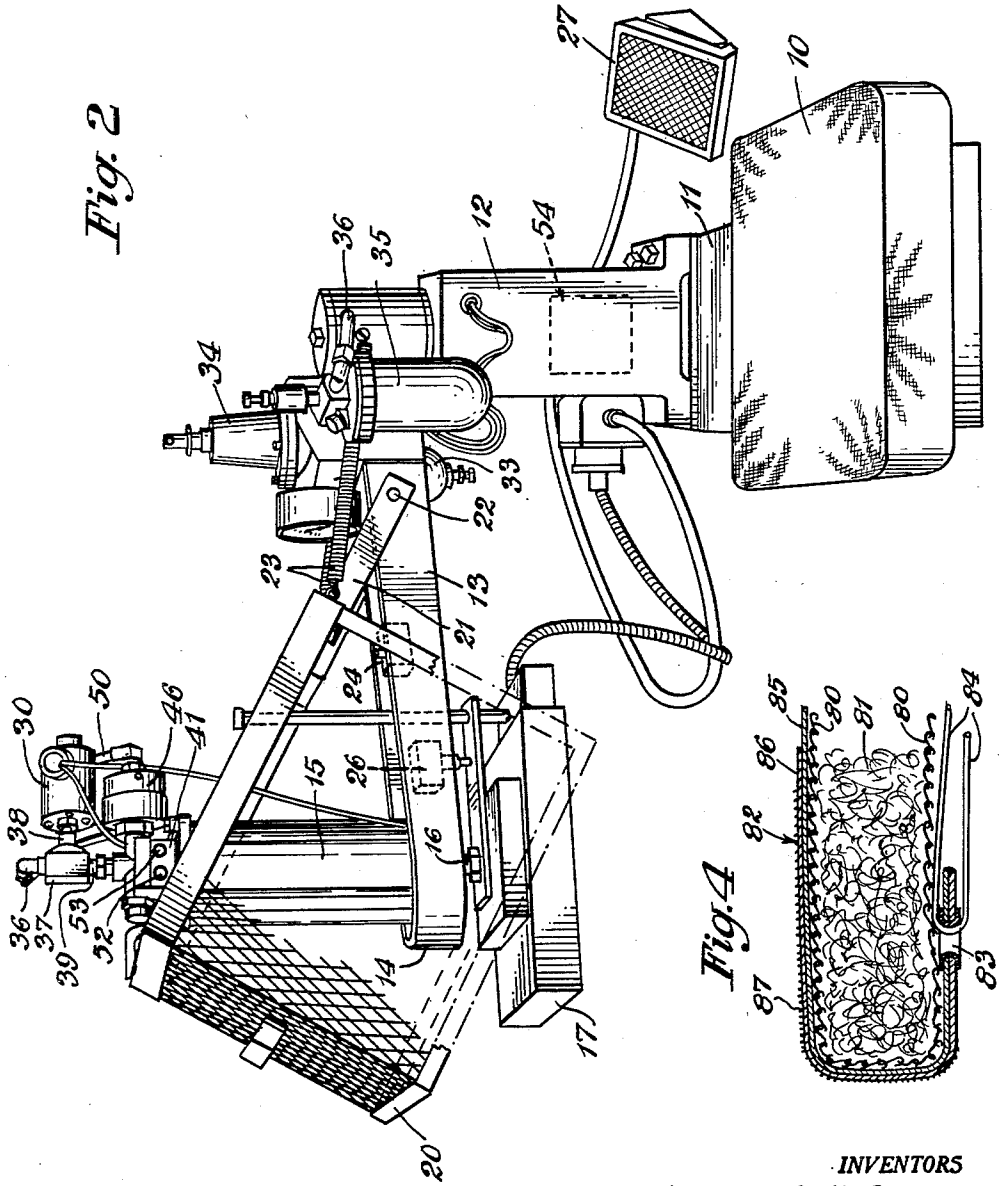

Fig. 4

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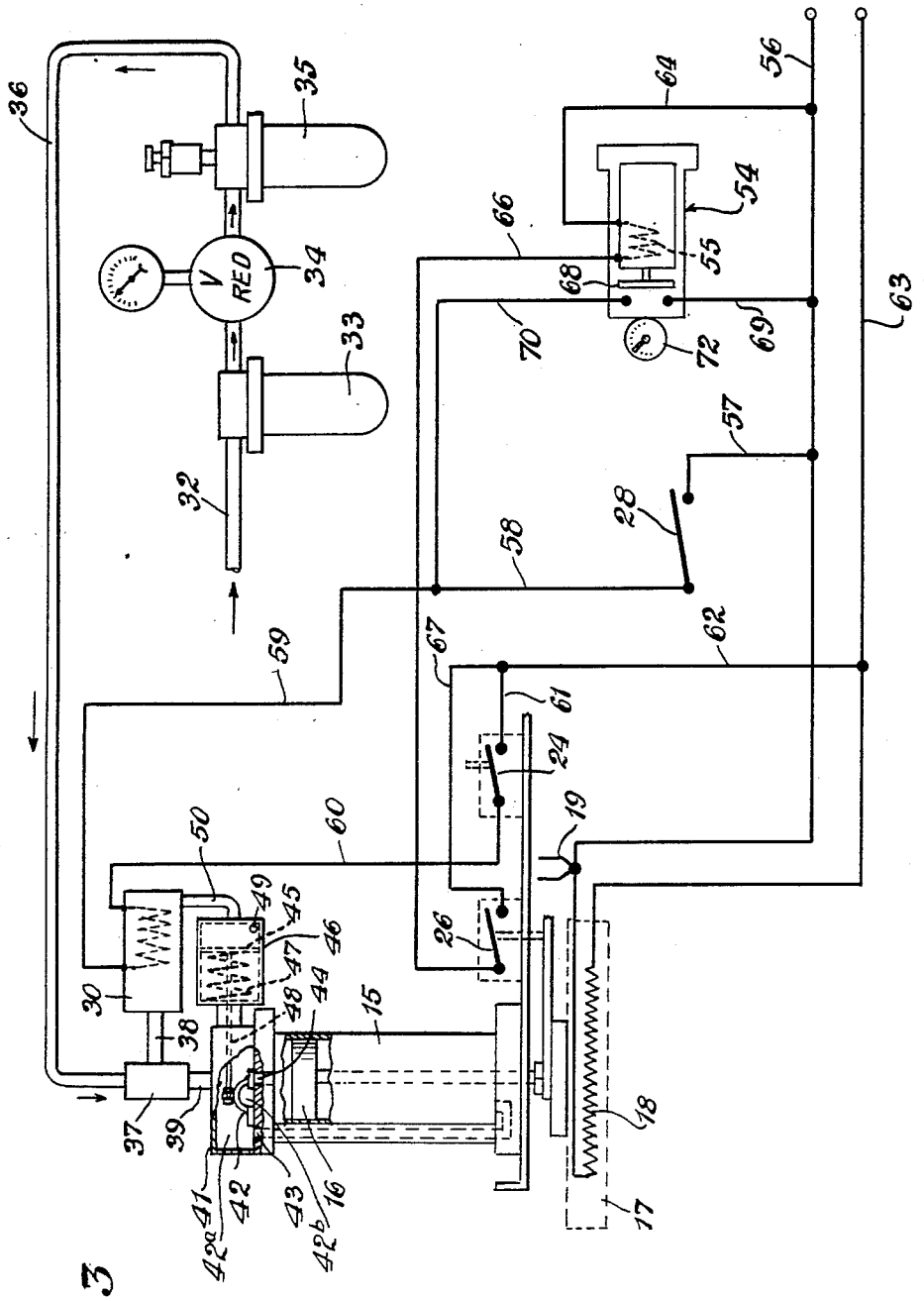

Fig. 3

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2,934,129

PRESSING MACHINE

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Application August 30, 1955, Serial No. 531,455

3 Claims. (Cl. 154—1)

The present invention relates generally to electrically controlled presses having a pressing element movable to and from a pressing location, and particularly to such a press incorporating numerous safety devices and designed for thermosealing patches on garments, as in a laundry or cleaning establishment.

Presses in general are frequently operated by persons who become incautious and who are, therefore, subject to injury by being caught between the pressing element, or in case of a heated platen, of being burned by inadvertent contact with the platen.

The present invention relates to such a press which is operated by compressed air and which is provided with a safety device to protect the operator, and which is electrically controlled.

Thermosealing of patches on garments is a well established practice, but it is commonly a hand operation resulting in many variations from uniform results. Not only the pressure applied by hand, but the temperature and time lead to non-uniformity. Additionally, the garment structure as to buttons, seams and the like, lead to lack of uniformity within a single patch. The present invention provides a machine which overcomes these numerous disadvantages and a machine which may be operated by unskilled help without danger of injury.

It is the general object of the invention to provide a pressing machine capable of repeated operation under predetermined conditions, such as time, pressure and temperature, when heating is involved.

It is a further object of the invention to permit operation of the press only when the safety device is in its protective position.

It is a further object of the invention to provide an automatic timer for the pressing action and further to have the timer take over control of the pressing from the operator after initiation thereof by the operator.

It is a particular object of the invention to provide a thermosealing patching press which applies substantially uniform pressure over obstructed areas of a garment, such as at seams and buttons, as well as at unobstructed areas.

Various other and ancillary objects and advantages of the invention will become apparent from the following description and explanation of a press embodying the features of the present invention.

Although the present invention may be embodied in presses of various kinds for various kinds of pressing operations, the invention is illustrated by a machine which is designed particularly for applying heat-sealed patches to garments. Such a machine has utility particularly in laundries and cleaning establishments where garments being cleaned are found to be torn and are, therefore, mended before delivery. Garments, such as workmen's clothing, are most commonly subject to such operations. Patches have long been known of various sizes and of various materials, provided with a thermosetting or thermoplastic adhesive so that a suitable patch may be placed over a garment to be mended and the patch sealed on by

heat and appropriate pressure. Such patches have heretofore been applied by a hand iron. This method has not been satisfactory for garments, such as shop uniforms, because the time of pressing, the pressure, and the temperature of the iron all vary, not only as to different operators, but from one patch to another with the same operator. As a result, some patches stay in place during laundering and some come off the garment. Such a machine is shown in the drawings, in which:

Fig. 1 is a perspective view of the press as positioned in operation.

Fig. 2 is a smaller perspective view with the pressing arm swung away in its non-operating condition with respect to the pad illustrated.

Fig. 3 is a diagrammatic representation of the parts coupled with the electrical connections therefor.

Fig. 4 is a partial cross-section of a pad.

It is to be understood that the invention is not limited to or by the illustrative embodiment shown in the drawings, and that numerous changes and modifications are contemplated as falling within the scope of the invention as expressed in the appended claims.

The apparatus comprises a stationary platform such as pad **10** upon which a work piece to be patched is placed and on which piece a thermosealing patch is positioned. The pad **10** is mounted on a horizontal base **11** of the apparatus which base has at one end a vertical column **12** on top of which is mounted a horizontally movable carrier in the form of a swinging arm **13**. The ability to swing the arm **13** allows the operator to utilize any portion of the platform or pad **10** lying in the arcuate area traversed by the pressing element, and also allows the operator to move the arm **13** and the pressing element away from the region above all of the pad or a desired working area thereof to facilitate placing a workpiece on the platform or pad without overhead obstruction. The free end **14** of the arm **13** carries an upwardly extending cylinder **15** in which is housed a vertically movable piston **16**. Air pressure is used to raise and lower the piston in a conventional manner, and thus air pressure serves to provide and maintain the pressing pressure. The lower end of the piston carries a working element, such as pressing platen **17**, within which is an electrical heating element **18** thermostatically controlled so as to maintain a predetermined temperature. In Fig. 3 the numeral **19** designates diagrammatically a thermostat control.

The apparatus is arranged for complete safety in operation. When the pressing element is in its uppermost position above a work piece on pad **10**, the pressing element **17** may not be lowered by action of the cylinder **15** until a safety device, preferably in the form of a cage **20**, is in its protective position. The safety cage **20** is mounted on a vertically swinging arm **21** pivoted at **22** adjacent the inner end of the horizontal arm **13**. The cage **20** is formed so that it completely surrounds the work piece, the heated pressing element and the pad **10** in a manner to prevent an operator inserting a hand or arm into the path of the pressing element **17**, or in contact with the heated platen. When the safety cage **20** is in its raised position, where it is held by spring **23** against its own weight, the apparatus is electrically inoperative, and when the cage **20** rests in its protective position by its own weight, it closes a switch **24**, thereby conditioning the apparatus to be electrically operative at the will of the operator.

When the pressing element is in its uppermost position, a limit switch **26** is open, preferably by direct action of the vertically movable piston and its pressing element. Thereby, the limit switch **26** is closed just after the pressing element starts downwardly, having moved only a short distance. This downward movement is initiated

electrically by the operator, as by his foot on a treadle 27 which closes a switch 28 therein. The resulting controlling impulse is the energization of a solenoid valve 30 which, when energized, causes air pressure to move the piston 16 down.

The air pressure is provided from a main supply 32 through a cleaner 33, through a reducing valve 34, and through an oiler 35 which introduces drops of oil into the passing air to lubricate the piston. The air then passes via conduit 36 to a T-fitting 37 which discharges via coupling 38 into solenoid valve 30 and via coupling 39 to a manifold 41 at the top of cylinder 15.

The manifold is associated with valve means which has two positions—one to introduce air to the top of the cylinder and vent air from the bottom of the cylinder and the other, to introduce air to the bottom of the cylinder and vent air from the top of the cylinder. Any conventional valve mechanism for this purpose may be employed. Such a valve structure includes a sliding valve member 42, shown more or less diagrammatically in Fig. 3. In the position shown, the valve member 42 permits air to enter the bottom of the piston via conduit 43, but, when moved to the left in Fig. 3, it uncovers port 44 and lets air move the piston 16 downwardly. The valve is so moved to the left by a diaphragm 45 in a casing 46 which diaphragm is normally urged to the right by a spring 47. The numeral 48 indicates a connecting link from the slide valve 42 to the diaphragm 45. Numeral 49 represents a small hole in the casing 46 on the pressure side to vent air at a rate slower than air is supplied via tube 50 connecting the solenoid casing 30 with the casing 46. Solenoid valve 30, when energized, lets air pass from tube 38 into tube 50 to move the diaphragm 45 to the left. When the solenoid is not energized, the spring 47 moves the diaphragm to the right and hence the slide valve 42, thus causing the piston to rise. Suitable exhaust holes 52 and 53 from the cylinder are indicated but the connections thereto are conventionally involved in the slide valve. The solenoid-controlled valve and piston and cylinder illustrated and described herein is a conventional commercial unit manufactured by The Bellows Co., Akron, Ohio. Its operation is as follows:

When the slide valve 42 admits air into port 43, as shown in Fig. 3, it also prevents admission of air into port 44 by its right-hand leg partitioning port 44 from the chamber 42^a containing the slide valve. The two legs of the slide valve 42 which partition the ports 43 and 44 from the chamber 42^a have channels providing communication of the ports with the chamber 42^b within the slide valve 42. In the extreme positions of the slide valve 42 the chamber 42^b respectively communicates with the exhaust ports 52 and 53. In the position shown in Fig. 3 port 44 is venting to the atmosphere via port 53, while port 43 receives air under pressure from chamber 42^a.

As described, the operator may hold the pressing element down, so long as the treadle switch 28 is closed. So that the operator need not hold the treadle switch 28 closed during the entire operation, and furthermore, to permit the pressing operation to be properly timed, there may be and preferably is provided a timing device which first operates to cut out the treadle switch and then automatically to de-energize the solenoid valve 30 after a period of time for which the timer may be set. Such a timer is indicated diagrammatically at 54. It has a solenoid 55 energized, not by but after closure of the treadle switch 28. The first action is via connections as follows: power line 56, connection 57, treadle switch 28, lines 58—59, solenoid valve 30, line 60, cage-closed safety switch 24, line 61, line 62, and power line 63. When the above circuit is established, the piston starts down, thus leading to early closure of switch 26. This energizes the timer as follows: power line 56, connection 64, solenoid 55, connection 66, limit switch 26, connection 67, connection 62 and power line 63. On energizing the timer, it moves a switch-closing bar 68 to close a by-pass

circuit around the treadle switch 28 as follows: power line 56, connection 69, bar 68, connection 70. Thus, the treadle switch 28 becomes ineffective and the operator's foot may be removed from the treadle, the timing device having taken over control of the operation to time it and to stop it.

Numeral 72 graphically represents a dial for setting the timer so that on expiration of a given time, the timer circuit is broken and bar 68 is retracted. This de-energizes the solenoid valve 30, causes the slide valve 42 to effect raising piston 16 to its limit with the result that limit switch 26 is opened, thus to render the timer inoperative until the treadle switch 28 is again closed. Then the cycle may be repeated. When a new work piece is to be placed on the pad 10, the cage 20 is raised and this opens switch 24 rendering the device electrically inoperative.

The heating element 18 is connected directly to the power lines 56 and 63 of which the terminals may be a plug to be inserted in an outlet when the machine is to be ready for operation.

In the machine described above, the pressure on a garment being patched results from the action on the garment between platen 17 and pad 10. The character of the pad 10 is important. Were it a flat hard platen, it is obvious that a patch extending over and beyond a seam would have great pressure on the seam and inadequate pressure, if any, beyond the seam. Therefore, not only the overall resiliency but the local resiliency of the pad is important for uniform patching. Additionally, the facial character of the pad is most important. When a hole is covered by a patch, the adhesive on the patch at the area of the hole may bond to the pad unless a protective liner intervenes. To obviate the need for such protection, the face of the pad presents material to which the adhesive will not bond in thermosealing.

Fig. 4 represents a pad specially suitable for such patching. The pad is made as a unit. In general, the pad has an envelope of flexible knitted wire fabric 80, within which is a pad 81 of metal wool, preferably of thin copper wire. Over this is a heat-resistant cloth 82 which passes around the edges to the underside of the pad. Eyelets 83 permit threading tie wire 84 through them to hold the cloth 82 in place. The cloth may be made of asbestos or glass fibers. As shown, the cloth 82 is composed of an inner layer 85 of asbestos, and an outer layer 86 of glass fiber cloth.

To prevent adhesion of patch adhesive to the pad, its surface layer is a suitable resistant material of which several are available. One is tetrafluoroethylene resin, sold as "Teflon" by E. I. du Pont de Nemours of Wilmington, Delaware. There are comparable functioning silicones. The Teflon and the silicones may be employed as sheet material lining the pad, but for economy, thinner coats are used as by applying a "Teflon" coating composition to the glass fabric, as indicated at 87.

From the foregoing, it will be obvious that the various features of the invention are not limited to a press of the kind described and may be variously employed within the scope of the invention as expressed in the appended claims.

Reference is made to applicants' Serial No. 736,075, filed May 19, 1958, as a continuation-in-part of the present application.

We claim:

1. In a pressing machine a pair of coacting relatively moving pressing members normally biased into non-pressing position, press-closing means including a fluid actuated motor and motion transmitting mechanism for moving a first one of said members vertically into pressing engagement with the other member, conduit means for the supply and exhaust of motive fluid to and from said motor and including a normally closed inlet valve and a normally opened outlet valve, a solenoid arranged when energized to move said valves to press-operating

position with said inlet valve open and said outlet valve closed, and when deenergized to reverse the positions of said valves and thereby effect movement of the pressing members to their normally biased position, an electrical circuit containing said solenoid, a vertically movable safety cage fixed with respect to said motor and having one lower position enclosing the movable pressing member in its pressing position and having an idle upper position freeing the space between said pressing members in their idle positions, said electrical circuit being open and inoperable when said cage is in said upper position and being operable when said cage is in said lower position, an operator's control switch in said circuit to be closed to energize said solenoid whereby the two pressing members move relatively to pressing position, an electrically operated timer energized as a result of closing said control switch, a timed switch closed during energized operation of the timer and opened by timed operation of the energized timer, said timed switch being in series with the energized solenoid and when closed serving to energize said solenoid, whereby timed opening of said timed switch deenergizes the solenoid and thereby effects relative movement of the pressing members from pressing position to non-pressing position and thereby effects deenergizing of the timer.

2. In a press in combination a vertical air-operated piston and cylinder, said piston having at one extreme a pressing position and at the other extreme a non-pressing position, a movable safety cage fixed relatively to said cylinder and having a lower position when said piston is in pressing position and an upper position when said piston is in non-pressing position, means providing a supply of air under pressure, valved connections from said supply to both ends of said cylinder, valve means in said connections, said valve means having two positions in each of which air is supplied to one connection and air is vented from the other connection, valve-moving means normally biased to move said valve means into its position effecting said non-pressing position of the piston, a solenoid arranged when energized to effect movement of said valve-moving means from its biased one position to another position whereby to move said valve means into its position to move the piston to pressing position, an electrical circuit containing said solenoid, said electrical circuit being open and inoperable when said cage is in said upper position and being operable when said cage is in said lower position, an operator's control switch in said circuit to energize said solenoid whereby the piston is moved to pressing position, an electrically operated timer energized as a result of closing said control switch, a timed switch closed during energized operation of the timer, and opened by timed operation of the energized timer, said timed switch being in series with the energized solenoid and when closed serving to energize the solenoid, whereby timed opening of said timed switch deenergizes the solenoid and thereby effects moving of the piston from pressing to non-pressing position and thereby effects deenergizing of the timer.

3. Apparatus according to claim 1 in which the fluid-actuated motor is fixed in position on an arm pivoted on a vertical axis to swing horizontally, and in which said second pressing member is fixed in position below the horizontal path of travel of said motor as said arm swings horizontally, said arm having a path of movement to move said safety cage out of the space above said second fixed pressing member.

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