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CAPACITY CONTROLLED TEXTILE PRESS

## Filed Sept. 28, 1939

7 Sheets-Sheet 1





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G. C. DEVOL, JR., ET AL

CAPACITY CONTROLLED TEXTILE PRESS

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![](_page_2_Figure_8.jpeg)

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![](_page_3_Figure_3.jpeg)

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7 Sheets-Sheet 5

![](_page_4_Figure_6.jpeg)

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![](_page_5_Figure_1.jpeg)

BY Bohle better ATTORNEYS

CAPACITY CONTROLLED TEXTILE PRESS

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![](_page_6_Figure_6.jpeg)

# UNITED STATES PATENT OFFICE

#### 2.395.780

#### CAPACITY CONTROLLED TEXTILE PRESS

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#### Application September 28, 1939, Serial No. 296,926

13 Claims. (Cl. 38-40)

This invention relates to power-operated pressing machines, and more particularly to a capacity controlled textile press.

Conventional laundry-ironing presses used in commercial laundries and the like, also other types 5 of textile presses of a variety of uses, are ordinarily of the jaw-motion type having coacting pressing members usually called the "head" and "buck" which open and close on the work. These presses are usually power driven, that is, they are closed 10 and held closed by motor means which subjects the work to a high degree of ironing or finishing pressure under heat. One or both pressing jaws (head and buck) are heated, usually by dered work smoothly laid upon the buck.

The conditions and manner of use, with other special requirements and problems met in the textile ironing or smoothing art, comprising the laundry trade, the tailoring trade, and the cloth- 20 way from wide-open to fully-closed position by ing manufacturing industry, have come to widely distinguish the textile and apparel presses as a general class from other pressing fields.

The upper pressing head of a conventional launsurface to impart a smooth firm finish to the damp work being pressure-ironed and dried. On the other hand, the upper pressing head of a conventional garment press usually has a cloth covered surface to aid in distributing a spray of steam 30 position under heavy-ironing pressure. applied to the dry woolen garment to dampen it for finishing purposes. The lower buck of each type of press has a padded surface acting as a yielding bed on which to effectively iron the work, case of laundry work, and dry in the case of garment work. The ironing pad on each type of press permits the buttons, seams, and other irregularities to be depressed into the buck to equalize work, as the head seals down and is maintained under final heavy-ironing pressure until the work is ironed dry and finished.

At the present stage of the art, the operation of the motor means of conventional laundry and 45 ished work with less fatigue and attention to the other textile presses is usually governed by a twohand control comprising two safety manuals or buttons which are sufficiently spaced apart as to require an operator to simultaneously use both hands to energize the motor means and close the 50 pressing jaws. This manual two-hand control is largely in use because of the high degree of safety it affords to the operator; it compels her to give conscious attention to the manual control of the press because of the requirement of first with- 55 when the operator withdraws her hands from be-

drawing her hands from the press after laying and smoothing the work on the buck, and thereafter holding both of her hands on the control buttons or handles during and until the press is safely closed. Therefore, the operator must remain at the press until she fully closes it, which means a certain loss of time after she has completed the "lay" of the work in one press and before she can turn to the next press.

Also, according to present practice, either an electrically-operated or a fluid-pressure operated motor means is employed to drive laundry and other textile presses, the fluid-pressure or pneumatic type motor means being one of the more steam, for ironing and finishing the damp laun- 15 convenient forms of presses now largely in use. One of the more generally used laundry presses is sometimes referred to as the "full automatic" press by reason of its movable pressing jaw or jaws being fully powered to close the press all the

motor means. It is because of the dangers to an operator, inherent in a wide-opening full automatic press, that two-hand control is now the accepted and required control means for such dry-ironing press has a metallic plated or polished 25 presses, because this type of control compels the operator to withdraw both of her hands from the buck, after completing the "lay" (smoothing, etc.) of the work, before she can bring the heated ironing jaws or pressing members to finally closed

It is an object of this invention to produce a safe power-operated textile press, not requiring two-hand control, for use in laundry-ironing work in commercial laundries and otherwise in connecwhich is damp when it reaches the press, in the 35 tion with the pressure-ironing and finishing of all manner of textile materials; and more particularly it is an object to produce a new form of control instrumentality for such presses which does not require the operator to give his or her the pressure of the head around these parts of the 40 mental attention to the manual control means of the press, as a result of which the operator simply makes the lay of the work on the buck of one press and turns away therefrom to attend another press; thereby achieving increased output of fin-

> machines. A further object is to produce a safe poweroperated laundry press with a new form of control instrumentality embodying an electrical-field control means, taking the form herein of a capacity-responsive electrical circuit which is affected by the presence of the operator standing at the press, to automatically deenergize the motor means and open the press; and which responds

tween the pressing jaws, or when she bodily moves away from the press, to automatically energize the motor means to close the press and hold it closed for the duration of the pressure-ironing period. Thus, the approach and departure of an operator 5. to and from her station at the press, for removing the ironed work and making the next new lay thereof, serves to automatically control the opening and closing of the press without any mental or manual attention on her part to the control mech- 10 Figure 5 is a plan view thereof. anism of the machine.

Another object is to provide a capacity responsive control instrumentality for a press in which parts of the press act as the capacity responsive electrodes.

Also, it is an object to provide a press with a capacity control therefor having an electric field in the vicinity of the press (or between its pressing jaws) which is substantially uniform for any jaws of the press, except when the press is substantially closed, at which time the sensitivity of the control is automatically reduced.

Another object is to provide an electric control for a press which operatively responds to 25 the presence or absence of a body between the jaws of the press, the response for various positions of the movable jaw or jaws being adjustable so as to permit the use of the same type of control mechanism with presses of different designs 30 and shapes but having substantially the same control response and operating characteristics, so as to attain a standard uniformity of performance of each press making up a group of presses in a laundry or other place of use.

Still another object is to provide an electrical control instrumentality having its electrical field closely related to the press in order that its operation be not adversely affected by the presence of the operator, or by the presence of an- 40 shown as a matter of convenience with the press other operator, standing at or in the electrical control field of an adjacent press, so that several presses may be used or operated in close proximity to each other by one or more operators.

Another object is to provide a capacity control 45 instrumentality which may be applied to any existing press by the addition of small electrodes which are carried by the head or buck, or both thereof, and which are insulated therefrom.

Likewise, it is an object to provide a capacity 50responsive circuit for a control instrumentality, which is extremely sensitive and hence affords positive action in an accurately predetermined manner, operates with great speed so as to provide substantially instantaneous action, and is in- 55herently safe, failure of any of the parts always causing the press to open, and more particularly, preventing it from closing in the first instance.

Other objects and advantages of our improved capacity controlled textile press will become ap- 60 parent from, or be specifically referred to in, the following description thereof written in connection with the accompanying drawings showing examples of the invention, in which:

ing our improved electrical control, comprising what we sometimes refer to as our fixed bar type or form of electrode structure, in combination with a control circuit shown diagrammatically as one form of capacity responsive means which we 70 may refer to as our safety A. C. circuit. Figure 2 is a plan view of the movable ironing head of the press, showing the sensitive electrode carried thereby. Figure 3 is an enlarged sectional view of a portion of the electrode, showing the manner 75

of mounting it on the head or other parts of the press.

Figure 4 is a side elevational view of a variable condenser, characterized by a capacitance-curve adjustment means which adapts said condenser for use with various types or models of textile presses in combination with the electrical control field of this invention to render said field constant and reliable in its control characteristics.

Figures 6 and 7 are side views in open and closed positions, respectively, of a portion of a press having a modified form of electrode arrangement, known as the movable bar form.

Figure 8 is a sectional plan view of a second form of electrical condenser, shown on the press in Figures 6 and 7; and Figure 9 is a side view thereof.

Figure 10 is a diagrammatical plan of a pluposition of the movable ironing head or movable 20 rality of presses having capacity control and arranged in a group representative of a plurality of presses adapted to be used by one or more operators.

> Figure 11 is a side view of a laundry press with the head and buck insulated from the frame and ground, and with a portion of the capacity control mechanism shown diagrammatically and in section. This second form of electrode structure may be called the insulated jaw type. Figure 12 is a cross sectional view of the ironing head or movable pressing jaw of Figure 11 insulated from the press frame. Figure 13 is a longitudinal sectional view of an example of an electrically insulated steam connection or joint 35 for the movable ironing head.

Figure 14 is an enlarged sectional plan view of a third example of variable condenser which may be used to maintain the electrostatic field constant in its control function and which is of Figure 11, and this is the telescoped-tube form thereof. Figure 15 is a cross sectional end view of the condenser of Figure 14, as taken on the line -15 of Figure 14. 1 **5**-

Figure 16 is a diagram of a second form of safety capacity control which is sometimes referred to as our high speed circuit. It may be preferred as a press control over the safety A. C. circuit shown in Figure 1.

#### Construction of conventional press.

For the purpose of illustrating this invention, a simple or elementary form of power-operated laundry press is shown. Known types most generally employ the stationary lower buck and movable upper ironing head, although in some constructions both the head and buck are movable. In other instances, the buck moves in and out of registration with the stationary head. However, all textile presses are of one form or another having jaw motion, in that the work is pressed between two or more pressing jaw members, one or the other or both of which are power operated.

The press illustrated herein has a frame i with Figure 1 is a side view of a laundry press hav- 65 a work table 2 under the pressing jaws, that is, under the coacting head and buck. An ironing buck or bed I is mounted stationary on the frame, and has the usual form of padding 4 on its ironing surface. A movable ironing head 5 is carried on the forward end of a head arm or lever 8 pivoted at 7 on the frame. The heads and bucks of pressing machines are manufactured in a variety of shapes and sizes best suited to particular apparel and textile materials to be pressed.

The press lever \$ lifts the head \$ high above

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the buck to fully expose its padded surface to the operator while making her lay of the work, and consequently a wide opening is afforded for the convenience of the operator. This type of press, with its wide opening head, swingable up and down in relation to the buck around the rear horizontal axis 7, is sometimes called the "scis-sors-action" type of full-automatic press. It is one of the more convenient forms by which to disclose this invention.

A conventional form of power-actuating means is shown for closing and opening the press. The motor means may perform both functions, that is the opening and closing cycle, but more generally the motor means is employed to close the press 15 and simultaneously stretch or load a spring counterbalance, whereupon the latter performs the reverse function of opening the press and holding it open. As said before, electric or other motor means may be employed, but the example shown comprises a pneumatic motor means 9 usually operated by air pressure.

The cylinder **\$** is mounted to oscillate on a frame pivot 10 and its piston 11 with connecting rod 12 is pivotally connected at 13 to the head arm 6. Any suitable form of head counterbalancing means may be employed, and usually this takes the form of a long coil spring 14 having its inner end attached at 15 to the press frame. and its outer movable end operatively connected at is to the head arm. With the motor means \$ idle or de-energized, the tensioned spring means 14 maintains the head in wide open position.

An air inlet and exhaust tube 18 communicates with the inner or closed end of the cylinder, and this usually is an air hose which flexes with the up and down movement of the cylinder. A control member, such as valve means 19, is connected with the combination air inlet and exhaust tube 18. Operation of the valve 19, that is, the opening and closing thereof, serves to admit and exhaust air to and from the cylinder 9 for the purpose of closing and opening the pressing jaws \$ and 5.

#### The electrically controlled valve

In the event an electric motor is used to drive the press, an electrical power switch will of course be employed in place of the fluid-power valve 50 means 19. The electrically controlled type of valve shown, that is, a solenoid actuated valve 19, has a valve stem 20 which carries a solenoid core or armature 21 adapted to be actuated by a solenoid winding 22. A spring 23 tends to normally raise the valve stem when the solenoid is de-energized, and the energization of the solenoid returns it against the tension of the spring to its lowermost position. Thus the valve 19 is controlled by energizing and deenergizing the sole-noid 22. This is a poppet type valve and it is 60 found to be satisfactory for use in this new combination when a pneumatic motor means is used to operate the press. The valve 19 and its operating solenoid 22 may be mounted on the frame 65 I or on the cylinder 9, or otherwise conveniently mounted; the present illustration being purely diagrammatic.

An air-pressure supply conduit 24 connects with the valve housing is to feed air under pres-.70 sure to a flexible hose or tube is from a compressor and tank not shown. An inlet valve head 25 is carried on the inner end of the valve stem 28 and is held open by energizing the solenoid. that is, unseated from its inlet port, at one end (the lower end) of the valve chamber 26, for the

purpose of connecting the air conduit 24 with the motor flexible tube is to deliver air under pressure to the pneumatic motor \$ to close the press. The inlet valve head 25 is maintained open by the solenoid to keep the air supply line 24, 18 open to the cylinder for urging the piston II further on its power stroke to inch and seal the head 5 more firmly against the yielding buck pad 4 and to compensate or take up for any give or compression 10 in the pad. Thus when the press is closed the motor 9 is stalled against further movement by the contact of the head with the buck, the pressure of air continuing to urge the two together under ironing compression.

An exhaust valve head 27 acts to close the other end (the upper end) of the valve chamber 25, thus shutting off an exhaust port 28 when the inlet valve 25 is open. Thus the compressed air is conducted from the air-supply conduit 24 20 to the hose is and motor 8. The inlet valve 25 and exhaust valve 27 are fixed on the valve stem 20 and work in unison. Thus one valve head is always closed and the other is open, so that when the inlet valve 25 is open, the exhaust valve 27 25 is closed and the press is closing or closed. And conversely, when the inlet valve 25 is seated as in Figure 1, the exhaust valve 27 is open to exhaust the motor cylinder 8 through the exhaust port 28 to atmosphere, and the press is then open or in the act of opening. 20

The foregoing features of construction are presented as an exemplary form of power-actuated textile press for laundry or other work, for the purpose of now explaining the control instrumen-35 tality combined therewith and constituting our new combination. It will be noted that the fast closing heated ironing head of a laundry-ironing press presents a hazard to the safety of an operator because he or she is continually engaged with her hands and arms in the danger zone near or within the path of the head.

#### The capacity responsive circuit of Figure 1 and its use to control the press

For controlling the operation of the press and safeguarding the operator working near the danger zone, that is, within the path of the ironing head 5, we may use the capacity responsive circuit of Figure 1 showing one form of the invention.

This circuit comprises an oscillator tube \$2 and an amplifier or power tube 33 arranged to operate directly on alternating current from the power line or main \$4. A switch \$5 connects the capacity circuit to the power main 34, a wire 35 which forms a part of the circuit, being connected to one terminal of the switch 35 and a wire 37 being connected to the other terminal thereof. The tubes \$2 and \$3 are of the independently heated cathode type having heater filaments 40 and 41, respectively, which are connected in series. The filament 41 has one end connected to the wire 36, while the filament 48 has one end connected through a resistance 42 to the wire 37. A wire 43 connects the other ends of the filaments 40 and 41 in series.

The oscillating tube \$2 should preferably be a sharp cut-off tube and has a cathode 44, a control electrode or control grid 45, a screen grid 46, a suppressor grid 47, and a plate 48 usually called an anode. The control grid 45 is connected through a variable condenser 45 to one end of an oscillator coil \$\$, the other end of which is 75 connected to the wire \$8. The cathode 44 is con-

nected at a point 53 to the coil 50 and also through a grid leak resistance 54 to the control grid 45. The screen grid 45 is connected through a radio frequency choke 55 to the wire 37 to give it a suitable operating potential, while a condenser 56 connects this screen grid 46 to the cathode 44. The anode 48 is connected directly to the wire 37 from which it receives its operating potential.

The tube 33 has a cathode 74, a control grid 10 15, a screen grid 16, and an anode or plate 11. The cathode 14 is connected to the end of the filament 41 at the wire 43, so that it is separated from the wire 36 by the resistance of the filament. The control grid 75 is connected through a grid 15 leak resistance 78 to the wire 35. The control grid 75 is also connected through the condenser 79 to the cathode 44 of the tube 32. This condenser 79 has low impedance to the oscillating frequency of the capacity circuit. With the ar- 20 rangement shown, whenever the tube 32 is oscillating, an oscillating potential occurs across the resistance 78 and is therefore applied between the control grid 75 and the cathode 74 of the tube 33.

The anode 71 of the tube 33 is connected 25 through the coil of a relay 82 to the wire 37, a condenser 83 being shunted across this coil. The condenser \$3 stores and smooths the half cycle pulses which come through the tube when anode current is flowing to produce, in effect, direct cur-30 rent in the coil of the relay 82. This relay has an armature 84 attached to a spring contact 85 which is adapted to make electrical connection with a contact 86 attached to the wire 37, when the relay is energized. When the relay 82 is deenergized, the resiliency of the spring arm separates the contacts \$5 and \$6. The contact \$5 is connected by a wire \$7 to the solenoid 22, the other end of the solenoid being connected by a wire \$\$ to the wire \$\$.

The control grid 75 of the tube 33 is normally held negative with respect to the cathode 74 so that the current to the anode 77 of the tube 33 through the relay \$2 is insufficient to operate the 45 relay. When the tube 32 is oscillating, however, the positive half-cycles of the oscillating potential across the resistance 78 swing or cause the potential of the control grid 75 to become sufficiently positive to increase the anode current through the relay 82 and operate it, causing con- 50 tacts \$5 and \$6 to make electrical connection and thus energize the solenoid 22.

For dependable operation, one side of the oscillator coil 50 is connected through a condenser 51 to a chassis 52, in the form of a casing or 55 box, which encloses the tubes 32 and 33 with the associated circuit and other parts. The condenser 51 should be made large enough so that it will offer little impedance to the oscillating current, but its impedance to the 60 cycle alter- 60 nating current of the power main should be high. This condenser is used so that in the event or when one wire of the power main 34 is grounded, that grounded wire may be connected to either the wire 36 or the wire 37 of the capacity cir- 65 cuit without affecting the operation thereof, in a manner known to the art. •

The chassis or box 52, housing the capacity circuit parts, is mounted on the frame I of the press in some convenient location, as shown for 70 adjacent conductors having a potential differing example in Figures 6 and 7. It will be understood that the casing 52 is grounded by virtue of its attachment to the press frame 1 and thus that the lower end of coil 50 is effectively grounded for the oscillating frequency by condenser 51. 75 that the electrostatic lines of force will also ex-

Hereinafter, the chassis box or casing 52 (Figures 1, 6 and 7) will be used to designate the capacity responsive circuit as a unit or element in this new combination.

With the arrangement just described, the tube 32 may be made to oscillate by properly selecting the point 53 on the oscillator coil 50 and adjusting the variable condenser 49 to a suitable value. As long as the potential between the grid 45 and

the ground is greater by a certain amount than the potential between the cathode 44 and ground, sustained oscillations of the tube 32 will be produced at a frequency depending upon the inductance value of the coil 50 and the capacity of the condenser 49 together with certain other circuit capacities. If the capacity of the control grid 45 to ground is increased sufficiently to decrease the potential of the grid below a certain amount, the tube 32 will stop oscillating. Thus, the tube 32 and its associated parts represent, in effect, a circuit with two conditions of operation. In one condition, the tube 32 is oscillating; in the other condition it is not oscillating.

The components of the capacity responsive circuit, or control unit 52, may be subject to considerable variation. However, excellent results have been obtained by using a number 6J7 tube for the oscillating tube 32 with the oscillator coil 50 composed of 100 turns of #26 copper wire wound on a 1¼ inch mandrel for suitable inductance in this circuit. The remaining component values were as follows:

Condenser 49-25 to 200 micromicrofarads

35 Grid resistance 54—10 megohms

Radio frequency choke 55-6 millihenrys with 200 ohms resistance

Bypass condenser 56-mica, .001 microfarad

Coil of relay 82-1000 ohms resistance

40 Condenser 83-6 microfarads Grid resistor 78-2 megohms

Condenser 79-1 microfarad

This circuit oscillated at a frequency in the neighborhood of 300 kilocycles.

The change in the condition of the foregoing oscillating circuit is used to control the operation of the press, and such change is caused by the relative position of any part of an operator's body, or her arms, with respect to electrodes 62 and 63. These electrodes are carried respectively by the head 5 and the table 2 of the press 1, and are connected to the grid 45 of the tube 32 by means of a wire 60 through a condenser 61. This condenser 61 should have low impedance at the oscillating frequency, but high impedance to the 60 cycle current, and it serves to protect tube 32 in case the electrodes 62 or 63 are grounded and the wire 37 is connected to the grounded side of the power main 34.

The electrodes 62 and 63 are connected together by a wire 70, and they possess a capacity to ground symbolized by the condenser 64, shown in dotted lines. If a potential difference is caused to exist between the electrode means \$2, 53 and ground as, for example, by the application of an oscillating voltage, there is produced an electric field which is composed of electrostatic lines of force extending from said electrode means to all therefrom. The greatest concentration of these lines of force will be between the electrode means 62, 63 and the metallic mass of the press as a whole, including the head and buck. Note also

tend outwardly into space, as best we understand the electrical phenomenon at this time.

If a person moves into the vicinity of either of these electrodes 62 and 63, and thus into the electric field, the lines of force tend to concentrate 5 in the body of the person, and thus the capacity of the condenser 64 is increased by the capacitance of the electrodes to the body of the person. The condenser 49 is adjusted so that this increase in capacitance is sufficient to unbalance 10 the circuit and stop the oscillation of the tube 32.

If desired, a metal plate or screen 13 (Figure 1) may be provided, say by embedding it in the floor in front of the press in order to more effectively ground the operator. A metal mat may 15 be provided for this purpose, as shown at 73, and the operator stands on it when working at the press. This member 73 is grounded, as indicated.

The electrodes 62 and 63 are made of conduct- 20 ing material and are appropriately shaped to provide a clear working space adjacent the pressing jaws and to create an electrostatic field of maximum responsiveness. The electrodes are placed along the front and at least portions of the sides 25 of the head and buck. Mounted as shown (Figure 1), the lower electrode 63 affords sufficient room between itself and the buck 3 so the damp laundered work being ironed can be tucked in around the base of the buck and rest on the table with- 30 out coming into contact with the electrode. A metallic member, say bar material, or copper or brass tubing, about 3% inch in diameter or thereabouts, is satisfactory as electrode material.

sulated from any metal parts in their vicinity and also are spaced from such parts, so as to reduce to a minimum the capacity between the electrodes and the metal parts of the press frame. Any type of stand-off insulators may be used for 40 so spacing the electrodes, as, for instance, posts \$5, one of which is shown in detail in Figure 3. These posts may be made of "micarta," "bakelite," hard rubber, fibre, or any other substance having good insulating characteristics and suf- 45 the movable head 104. ficient strength to support the electrodes. The posts 65 may be supported by means of a threaded stud 66 screwed into a tapped hole 67 and has its outer end screwed into a tapped hole 68 in the post. The electrode is secured to the outer end 50 of each post 65 by a screw 69 through the tubular electrode and set in a tapped hole 72 in the outer end of the post.

### The compensating condenser of Figures 1, 4 and 5

When the head 5 and buck 3 are separated (press open), the combined capacity to ground of the electrodes 62, 63 is greater than when the press is closed. In order that the machine may be safe against closing on the hand of the oper- 60 ator when the press is open or in the act of closing, the capacitance of the combined electrodes \$2, \$3 to ground is increased or at least maintained until the head reaches a predetermined or "safety-first" position and then caused to de-crease, as the press closes from "safety-first" to final closed position. In short, the capacity to ground increases as the electrode \$2 approaches the electrode \$3 as the press closes, and decreases when the press moves into final closing position. 70 This is accomplished by a variable or compensating condenser 90 connected to the press so as to increase the capacity as the electrode \$2 starts with the press head from wide open position of the press and moves toward the electrode 63 dur- 75 52 and 63 in this position will be the actual ca-

ing the closing of the press, until the predetermined or "safety-first" position is reached, and then to decrease the capacity to ground. The condenser is shown in detail in Figures 4 and 5. The reason for the decrease is to confine the field between the electrodes 62, 63 to a minimum spread or area so that the press will not be sensitive to unintentional opening from closed position unless the operator is in the position she would occupy to handle work in the press. The condenser (Figures 1, 4 and 5) is made adjustable, so that the configuration of the capacitance curve may be changed to fit the requirements of different presses.

This condenser 90 may comprise a plate 91 of insulating material, such as "bakelite," mounted by screws 93 on a bracket 92 attached to the press frame i by any suitable means. At the wide end of the insulating plate 91 we provide a plurality of screws 99 having enlarged flat condenser heads or plates 100, these screws being arranged close together in an arc, the center of curvature of which is the axis of a shaft 94 at the narrow end of the plate 91. The screws 99 are threaded into tapped holes in the plate 91 and may be provided with lock nuts 101 to secure them in the insulating plate. The screws may also have slotted ends 102 to permit adjustment with a screw driver.

The shaft 94 may be rotatably mounted in a hub or tube \$5 forming a part of the insulating plate 91. An operating arm 108 is fixed by screw 97 to one end of the shaft 94, and a condenser arm 103 is fixed to the other end of the shaft 94 Both electrodes 62 and 63 are necessarily in- 35 by a screw 98. The condenser arm 103 extends a distance sufficient to terminate it adjacent the arc of the fiat condenser heads 100. This condenser is provided with an enlarged movable condenser plate or head 104 which may be about the same size as the stationary flat condenser heads 100. The arm 103 is spaced from the insulating plate \$1 by the hub \$6 sufficiently to permit adjustment of the screws 99 to position the series of flat heads 190 at different distances from

A metal strip 105 is provided on the opposite side of the insulating plate 91 from the condenser arm 103 and at the point where the screws 99 pass through it, the screws passing also through holes in the strip and the lock nuts it! being tightened against this strip. This connects all of the screws 99 electrically together and the wire 106 connects the strip 105 to the electrodes 62 and 63. The shaft 94 is grounded by a suitable 55 connection or wire 107.

The condenser arm 103 is operatively connected to the head arm 6 of the press (Figure 1) so as to move as the arm 6 moves. For this purpose the lever 108 is attached to the shaft 34 in any desirable manner and may extend radially from the shaft to be pivotally connected at 109 to the lower end of a link 110. The upper end of this link may be pivotally connected at iii to another lever 112 integral with the head arm 6 ad-65 . jacent the frame pivot 7. When the arm 6 swings to lower the head, the link 110 is raised, thus moving the lever 108 and rotating the shaft 94 to swing the arm 103. The entire condenser unit 96 may be enclosed in a suitable housing il3 shown in Figure 1.

As shown, the movable condenser plate or head 104 of arm 103 is at the left-hand side of the device when the press is in open position. The effective capacity to ground of the electrodes

pacity to ground, plus the capacity between the head 194 and the head 199 of the left-hand screw \$9 of the variable condenser \$9. As the press closes and the arm rotates in a clockwise direction, the heads 100 of the screws 33 become successive closer to the head 104, so that the capacity between these heads 100 and the head 184 increases the capacity to ground as the press head moves from wide open position toward closed position to a safety-first position.

In adjusting this type of condenser for a particular press, a curve may first be taken by a capacitance bridge of the change in capacity to ground of the electrodes \$2 and \$3 for movement of the ironing head 5 from open to closed 15 position and without the condenser connected in the circuit. Then the condenser \$6 may be in-dependently adjusted to provide a predetermined compensating capacity curve for the machine in which the condenser is to be installed. 20

The actual range of the compensating condenser 99 will depend largely on the particular type of press to which the invention is applied. but it will probably be in the neighborhood of 5 micromicrofarads. The minimum value of the 25 condenser should be as low as possible.

#### Sensitivity decreased when press closed

While using the press it is desirable to have the control extremely sensitive when the jaws of 30 the press are separated so that it will be absolutely impossible for the operator's hand to be caught by the head as it descends towards the buck. However, after the head has reached the buck there is no danger to the operator and 35 hence the head may be allowed to remain in position until the garment is completely pressed. It is desirable, therefore, that the sensitivity of the control be decreased when the press is closed so that the casual approach of the operator will '40 not open it.

The foregoing decrease in sensitivity is readily accomplished by turning the screw \$\$ at the righthand end of the line of screws of the condenser 99, so that its head iss will be as far as possible 45 away from the head 104 on the movable arm 103. The capacity when the arm is in this press-closed position will be a minimum. As this position of the arm corresponds to the closed position of the press, the capacity will be decreased suffi- 50 vicinity. ciently at such position as to cause the bridge or field between the electrodes to be confined or drawn in from a wide area and confined to a small area around the edge of the head or buck and thereby to render the control less sensitive. 55 she moves near enough to sufficiently affect the The adjustment of this last screw \$\$ of the condenser can be made such that the operator can move about in front of the press without the press opening, but as soon as she approaches beyond a predetermined distance (depending on 60 the adjustment of the right hand condenser screw), the press will open, and of course the press will open at any time that she touches either or both of the electrodes \$2 and \$3.

Great care should be taken in assembling the 65 parts of the oscillator circuit, especially those portions of the circuit which carry the high frequency current. When the parts are properly assembled, no substantial effect will be produced by changes in humidity or temperature of the 70 permitting the valve stem 20 to rise under the room in which the press is used. Where proper precautions are not taken to prevent the effect of humidity and temperature on the oscillating circuit and other parts of the circuit associated

continuously, or at least to turn it on for a suitable period of time before operation of the press, to insure that all the parts of the circuit will be uniformly heated and at their proper operating temperatures before the press is used. Note also that the leads or wires connecting the various electrodes to the circuit should be as short as possible, well insulated, and rigidly supported. Any unnecessary movement of the wiring may re-10 sult in changes in the sensitivity of the circuit.

#### **Operation of the press of Figure 1**

In the operation of the press, assuming that the operator has made the proper lay of a garment on the buck, she withdraws her hands or turns away from the press. As she moves a predetermined distance away from the press, the combined capacity to ground of the electrodes 62 and \$3 (sapacity of condenser 64) is reduced because she is moving out of the electrostatic field. This reduction of capacity to ground of the electrodes 62 and 63 raises the potential of the control grid 45 of the oscillating tube 32 with the result that this tube breaks into oscillation. Oscillation of the tube 32 produces an oscillating potential across the resistance 78 which swings the control grid 75 of the tube 33 in a positive direction with respect to the cathode 74 of that tube, thus increasing the anode or plate current through the tube and through the relay 82 sufficiently to operate the relay.

Energization of the relay 82 draws the armature 84 towards it, thus making or closing the contacts #5 and #8, thereby sending current from the wire 37 through said contacts, thence through wire \$7, through the solenoid 22 and wire \$8, and back to the wire 36 connected to the other side of the line 34. This energizes the solenoid 22 and draws the valve rod 20 downwardly against the tension of the spring 23, opening the inlet valve 25 and closing the exhaust valve 27, thus admitting air under pressure to the flexible conduit 18 which delivers it to the cylinder 9 and forces the piston il upwardly to swing the arm 6 and close the press.

At this point the operator is out of the electrostatic field and may be attending to other duties connected with her work, such as making a lay of a garment on another press in the nearby

After the press has been closed for a sufficient period of time to completely iron and dry the garment and the operator has completed her other duties, she again approaches the press. When electrostatic field, the combined capacity to ground of the electrodes 52 and 53 (capacity of condenser 64) will be thus increased, which will reduce the potential on the control grid 45 of the tube 32 to the point where this tube will stop oscillating. Removal of the oscillating potential from across the resistance 78 will lower the potential of the control grid 75 of the tube 33 with respect to the cathode 74 of that tube, which will reduce the anode or plate current of the tube 33 to such an extent that the relay 32 will release its armature 84 and break the contacts 85 and 86. This breaks the circuit through the solenoid 22, thus deenergizing the solenoid and influence of the spring 23. This closes the inlet valve 25, 26 and opens the outlet valve 27, 28, which allows the air to leave the cylinder \$, and allows the arm 8 of the press to swing in a countherewith, we may prefer to leave the circuit on 75 ter-clockwise direction under the tension of the

spring 14. The press is now open for the operator to remove the finished work and insert another article to be press-ironed.

If the operator should start to leave the press and then suddenly turn back to it as the head is descending, the change in capacity to ground of the combined electrodes 62 and 63 will cause the head to open again, and therefore under this arrangement it is absolutely impossible for the operator to catch her hand or any other part 10 of her body in the closing press, because it will always open whenever a part of her body comes in proximity to either the head or buck. However, by virtue of the adjustment in the variable or compensating condenser, the circuit is less 15 sensitive when the head is completely closed and so she may approach the press closer without having it open than would be true during the danger period when the head is closing. As explained, this operating sensitivity may be ad- 20 shaft 120, as these two pivot points may not be in justed as desired.

The positioning of the electrodes \$2 and \$3 in the manner described, electrically insulated from adjacent metal parts, provides certain desirable features relating to the operation of the 25 press. The large conductive mass of the head 5 acts as a shield for the electrode 62, absorbing or concentrating electrostatic lines of force in its direction with the result that the direction or area of the useful field is controlled and this  $_{30}$ portion of the field may be made extremely sensitive. We may prefer therefore, to mount the electrode \$2 adjacent the lower edge of the head 5, in which case the sensitive field will extend through a wide angle around the edge of the 35 118 may be electrically connected by means of head, making the control of the press responsive to any sufficiently large object, possessing suitable dielectric constant approaching this outer edge of the head within this area.

and the buck 3 act as shields for the electrode 63 to confine the sensitive electrostatic field to the space above and in front of the electrode 63. These two fields produced by the electrodes 62 and 63 thus cooperate to form substantially a 45 single field between them which must be intercepted by any object interposed between the head and buck, and which extends a sufficient distance at the front and sides of the press to effect the operation thereof in the manner described, 50 ed on the shaft 128, and a cooperating pair of as the operator moves towards and away from the press.

#### The movable electrode of Figures 6 and 7, with a condenser as in Figures 8 and 9

In some instances we may prefer to use the arrangement illustrated in Figures 6 to 9 inclusive, with any suitable condenser. In this arrangement a movable capacity responsive electrode [15 is positioned in the space between the head and  $_{60}$ buck when the head is in the raised position and is caused to swing out towards the front of the press when the head is brought down against the buck.

The swingable electrode 115 may be mounted 65 between two arms iis which may be pivotally supported on the head 5 by means of pivots 117. The arms iii may be preferably made of insulating material, such as "Bakelite," "micarta," or any other insulating material which will have 70 may be similarly supported by means of insulatsufficient strength to support the electrode and insulate it from the head. Two arms 118 may be used, positioned one at each end of the head, and it will be understood that the arm at the far end of the head in the views shown in Figures 75

6 and 7 will be a duplicate of the arm shown. The electrode [15 may be a bar, or preferably a tube, of brass or copper or other suitable conducting material, having a length sufficient to span the space between the two arms.

In order to swing the electrode 115 we provide a single link 118 which may have one end pivotally connected to one of the arms iis at 119 and the other end attached to a shaft 120 rotatably supported, in a manner to be hereinafter described, with respect to the frame 1 of the press, the shaft 120 being below the pivot 1 of the head arm 6. The distance of the pivot (26 below the pivot 7 is such that when the head is brought down, the movement about the two centers will swing the electrode 115 outwardly to the position shown in Figure 7. The link 118 may be bent horizontally so as to make the proper pivotal connection between the arm iii and the the same plane.

We may use the link **[18 as an electric conduc-**] tor for the electrode **115** and for this purpose may connect it by means of a wire 121 to the electrode. However, the other end of the link iis must be insulated from the frame I, and we may therefore separate the link [18 into two parts by means of an insulating member 122, the separation being at a point adjacent the shaft 120, so that the longer portion of the link [18 may also act as an electrode for the purpose of the invention.

The capacity control chassis 52 may be mounted in any convenient location, such as indicated in Figures 6 and 7, below the shaft 129, and the link a wire 123 to the capacity control unit. This wire 123 corresponds to the wire 60 of Figure 1.

The shaft 120 may be rotatably mounted in a bearing 124 carried by a box 125 secured to the In like manner the metal table 2 of the press 40 press frame. This box houses a condenser and is shown above the capacity control unit 52. The shaft 120 extends inside the box and has attached thereto a gear sector 125 which meshes with a gear 121 fixed on the shaft 128 of a variable condenser 129 (Figure 8) in the box 125. This condenser may be mounted on an insulating plate 130; and it may be similar to the condenser 80, shown in Figures 1, 4 and 5. But it is shown here as comprising a single movable plate (\$1, mountplates 132 fixed with respect to the insulating plate 130. The two or more stationary condenser plates 132 are electrically connected in any well known manner, and they are shown to be electri-55 cally connected by means of a wire iss to the wire 123 which in turn connects the electrode link 118 with the capacity responsive unit 52. The movable condenser plate (3) may be connected to ground on the metal box 125 by the wire 134.

In some instances, we may provide additional electrodes 131 and 138 mounted respectively at the front edge of the head 5 and at the front of the frame beneath the work table 2. The electrode 137 may be a conductive bar or tube and supported by means of insulating posts iss on the front of the head. This electrode 137 may be a little shorter than the head 5 and is electrically connected to the electrode link 118 by a wire 140. The electrode 138 below the table 2 ing posts 141 at the front of the press. This electrode 138 is electrically connected by means of a wire 142 to the wire 123 leading to the capacity control unit 52.

All of the electrodes 115, 137 and 138, and in-

cluding the link [18, which acts as an electrode, are connected to the capacity control unit, as is also the variable condenser 125, 129. When the operator approaches any of these electrodes, therefore, the capacity responsive circuit (housed 5 in chassis box 125) will respond and open the press in the manner described in connection with Figure 1. The electrode 115, swinging into the space between the head and buck, insures the sensitivity of the control to the presence of an 10 object of a predetermined nature in this space. The additional electrode 138 may be desired to prevent the tendency of the press to close before the operator has completely finished the lay of the work in case she has removed her hands mo- 15 mentarily from the buck.

The variable condenser 129 is used for the same purpose as the condenser 90 of Figure 1. We have found such a variable condenser particularly desirable where the swinging electrode is used, as 20 movement of the electrode out from the space between the head 5 and buck 4 alters its distance from the head and hence changes the capacity to ground. Accordingly, the condenser palte 131 should be specially shaped to provide the necessary changes in capacity as the press opens and closes.

In Figure 9, the condenser plate 131 is shown in its position of minimum capacity where it would be when the press is open. The ratio between the gear 127 and the gear sector 126 is such that the condenser plate will rotate through at least 180° when the head 5 moves through the necessary angle to open and close the press. As in the compensating condenser 30 of Figure 5, the capacity to ground of condenser 125, 129 (Figures 6-9) may be decreased when the press is closed by arranging the rotation of the condenser plate 131 so that it begins to pass out of the space between the fixed condenser plates 132 when the ironing head 5 has approached so close to the buck 4 that an operator could no longer get her hand therebetween.

#### Grouped operation of presses Figure 10

This invention lends itself particularly to a laundry plant layout where one or more operators attends to several presses. A three-press ironing unit, each press having capacity control, 50 is diagrammed in Figure 10 where presses 145, 146 and 147 are arranged in a group, say for one operator. The electrostatic fields of this group of presses are indicated respectively by the dotted lines 148, 149 and 158, and the operator may go 55 from press to press as indicated by the arrow. As soon as the lay on the first press 145 has been completed, she leaves that press without having to think about closing it or to make any extra control movements with her hands or feet, as in 60 conventional presses.

The operator can thus step to the next press 145 which will open at her approach. She then makes the lay on that press and moves on to next press 147. As she moves, press 146 will 65 close and press 147 will open. By that time the work on the first press 145 may be dried and pressure-ironed, and she will find this first press open by the time her hands have reached out to remove or change the position of the work. Sevreral presses may be thus operated at a minimum of time and effort, with the result that the operator can turn out more work with much less fatigue and without attention to manual controls as in conventional practice. 78

The field lines 149, etc., are entirely diagrammatic and in some forms of the invention actually may exist in a more concentrated and closely confined form around the pressing jaws, according to the third form of electrode means next described.

#### The head and buck as capacity sensitive electrodes, Figures 11 to 13

In some instances, it may be desirable to insulate both pressing members or jaws, the head and buck, from the press frame and use the head and the buck as the capacity sensitive electrodes. An example of this third form of electrode construction is shown in Figures 11, 12, and 13. This feature provides for an electrical control field more effectively concentrated at the danger zone, that is, at the front edges of the head and buck. This type of electrode means is well adapted for use in connection with a group of presses (Figure 10) attended by more than one operator, although the type of press construction may make it just as applicable and effective for single operator use.

In Figure 11, a typical laundry or textile press, sary changes in capacity as the press opens and closes. In Figure 9, the condenser plate 131 is shown in its position of minimum capacity where it would be when the press is open. The ratio between the gear 127 and the gear sector 126 is such that the condenser plate will rotate through at least 180° when the head 5 moves through the necessary

The head 153 may be insulated from the arm **35** 154 by means of the insulated ball and socket attachment shown in detail in Figure 12. The upper end of the arm 154 may be provided with a pair of enlarged portions 155 having openings 156 extending through them; at substantially

49 right angles to the arm. Inasmuch as both of these enlarged portions and their associated attachments are exactly the same, only one has been shown in the drawing. A rod 157 may be positioned in the opening 156 to extend through

(

45 this opening below the lower edge of the arm 154. The rod may be secured in this position by suitable nuts 158 and 159 at the top and bottom thereof, these nuts being threaded on the rod. Insulating washers 160 and 161 may be provided

0 at the top and bottom to space the rod in the opening (56 without touching the walls thereof, metallic washers (62 and (63 being provided under the nuts (58 and (59 respectively to insure greater strength.

The lower end of the rod 157 may extend downwardly a short distance from the arm 154 and may terminate in a ball 164. The head 153 of the press may be provided with a pair of raised portions 165 to cooperate with the balls 164 on

the lower ends of the two rods 157. Each of these raised portions may have a spherical recess 100, slightly larger in diameter than the ball 164, and the ball may fit into this recess with an insulating shell 167 between the two metal parts. This shell 167 may be made of "Bakelite," "Micarta," or the like, and may be molded around the ball 164.

A pair of clamping members 168 are provided to secure the head to the balls. To this end each 70 of the clamping members may be provided with a spherical recess 169, to fit on the upper side of the ball 164 and shell 167, and a hole i10 to accommodate the rod 157. Each clamping member 168 may be provided with a pair of openings 75 111, spaced from the central recess 169, to receive

stud bolts 172 which may be threaded into suitable tapped holes 173 provided in each of the enlarged portions 165 of the head 153. The holes 171 are made larger in diameter than the stud bolts 172, and insulating washers 174 may be used under the heads of the bolts in order to prevent the bolts from touching the clamping members 168. By tightening the bolts 172 the clamping members 168 may be held rigidly with the balls 164 between them and the head.

The insulating shells 167 and the washers 174 prevent metallic contact between the balls 164 and the head. In addition the rods 157 are insulated from the arm 154 by means of the washers 160 and 161 already described. This pro- 15 vides a rigid adjustable support for the head 153 permitting movement of the head about the balls 164 to align it with the contour of the buck. At the same time the head is completely insulated from the frame, the double insulation reducing 20 the capacity through the connecting means.

It is usually desired to heat the head 153 by means of steam, and when this is done the head may be made hollow and steam may be passed through it. In order to maintain the insulation 25 of the head in spite of the steam connections we may provide insulating fittings 175 which may be the same for both the inlet and outlet pipes. In Figure 11 the steam inlet connection is shown as comprising a pipe 176 which is threaded into 30 a suitable fitting 117 which may be rigidly supported on the frame 151 of the machine, as by means of a bracket 178. A flexible tube 179 may be attached to the fittings 177 and may connect with the head 153 through the insulating connec- 35 nects all three with the capacity responsive unit tion 175 which is shown in detail in Figure 13. This insulating connection may comprise a cylinder 180 of insulating material such as "Bakelite," provided with two metal discs 181, at either end, for making pipe connections thereto. Each 40 of these discs may have a threaded tubular extension 182 at the center thereof, for connection to pipe fittings, with a hole 183 extending through the disc and extension for the transmission of steam. Suitable holes 184 are provided around 45 the periphery of each of the discs 181 to receive stud bolts 185 which may be threaded into tapped holes 186 in the insulating cylinder to secure the discs 181 at either end of the cylinder.

The insulating cylinder 180 may have an open- 50 ing 187 through its center which may have an enlarged shallow portion 188 at one end and a deeper enlarged portion 189 at the other end. A glass tube 190 may be mounted in the opening 187 through the center of the cylinder and may 55 have a flange 191 at one end thereof, adapted to fit into the enlarged portion 188 of the opening through the cylinder. The other end of the glass tube may extend a short distance into the enlarged portion 189 of the opening, but the tube 60 is preferably shorter in length than the insulating cylinder so as not to contact with more than one of the metal discs.

The left end of the connection, as shown in Figure 13, is screwed into a suitable tapped opening 65 therefor in the hollow steam-heated ironing head 153, while the flexible steam inlet pipe 179 is connected to the other end of the insulator 175 by means of a fitting 192. Steam thus enters the movable head 153 through the flexible insulating 70 connection 175 in the direction of the arrows, and is prevented from directly striking the insulating material by the glass tube 190, which therefore protects it from the effect of the live steam.

flexible tube and insulating connection of the same type as just described and it is attached at the opposite end of the head, the two connections being arranged so that the steam circulates through the head for heating same.

The insulating means 167 and 175, etc., operatively mounts the steam heated ironing head 153 on the press frame 151, and thus the head may be used as a capacity sensitive electrode. Steam 10 may also be circulated through the stationary buck 152 for heating it, and the insulating connection 175 with an ordinary pipe connection may be used for that purpose; and thus the buck also may be used as a capacity sensitive electrode.

The buck 152 is insulated from the frame 151 by providing openings 193 in the top of the frame (Figure 11), through which bolts 194 extend without touching, the nuts 195 on the bolts being protected from the underside of the frame by insulating washers 196. The buck itself may rest upon the table 197 which is preferably metal and, in this case, separated from the frame by a heavy insulating sheet 197a. Thus, the buck and table 197 are connected together, but they are completely insulated from the frame 151.

The head 153 and buck 152 of the press, together with the metal table 197, function as the capacity responsive electrodes. The large metallic mass of the table top 197 is such that the damp laundered work hanging over the edge of the buck will not appreciably affect the response of the capacity circuit. The ironing head 153 is connected to the buck 152 and with the table top 197 by means of a wire 198, and a wire 199 con-52 mounted on the frame 15. The wire 199 takes the place of the wire 60 of Figure 1.

#### The compensating condenser of Figures 11, 14 and 15

In the use of the insulated head 153 and buck 152 with metal table 197, it is desirable also to provide a compensating condenser, the capacity of which will change as the head moves with respect to the buck, for the reason heretofore described in connection with previous forms of the invention. This condenser may take the form of either of the two heretofore described (Figures 4, 5 and 8, 9) or the third form now described and shown in Figures 11, 14 and 15.

In this third form of condenser, its movable element comprises a tube 200 of thin metal rotatably mounted inside of an insulating tube 201 which, in turn, is secured between spaced mounting brackets 202 attached to the press frame 151, as by screws 203. As shown, the two spaced brackets 202 are provided with holes in which the insulating tube 205 is tightly fitted and held stationary.

The metal tube 200 is oscillated within the insulating tube 201 by a lever 204 which is attached to one end of the tube 200, as by soldering or welding, noted at 205. A link 206 has one end pivotally connected with the outer end of the lever 204 and its other end pivotally connected with a lever 207 (Figure 11) on the head arm 154 adjacent the frame pivot 7. When the arm 154 rotates in a counter-clockwise direction to close the press, the lever 207 also rotates and raises the link 206 which oscillates the condenser tube 200 within the insulating tube 201.

The metal tube 200 may be cut out at its center at 208, such cut-out portion shown in this instance as extending substantially two-thirds Steam leaves the ironing head through another 75 around the circumference of the tube. A metal

plate 209 is positioned on the outside of the insulating tube 201 and may be bent to conform to the contour thereof and fastened thereto by means of a screw 210.

When the condenser is in the position shown in Figures 14 and 15, the cut-out portion of its metal tube 200 is adjacent the outer plate 209, but when the lever 204 is moved upwardly to turn the tube 200 in a clockwise direction, as viewed in Figure 15, the solid portion of the tube indicated at 211 (Figure 15) moves into the vicinity of the plate 209 thus increasing the capacity between the tube 200 and the plate 209. The tube 200 may be connected to ground or the press frame by a wire 212 held by a screw 213. 15 The plate 209 may be connected to the wire 199, leading from the head and buck, by means of a wire 214 secured by the screw 210.

As already explained, when the head of the press moves towards the buck the combined ca-20 pacity to ground may not change proportionally, and hence it may be desirable to cut the tube 209 or the plate 209, or both, in an uneven manner to compensate for this unequal change in the capacity as the head moves. Inasmuch as this 25 non-proportional capacity change would be different for different presses, especially those of different size and shape, we may prefer to use the type of condenser illustrated in Figures 1. 4 and 5 so that the condenser may be quickly 30 adjusted for the particular press with which it is used. The operation of the press of Figure 11 is generally similar to that already described in connection with Figure 1.

#### The circuit of Figure 16

First, it will be explained that the circuit shown in Figure 1 operates on raw alternating current. In other words, alternating voltages are applied to the plates of the tubes 32 and 33. The con- 40 trol relay \$2 operates on the positive half of the alternating current cycle, the bridging condenser 83 tending to hold the relay from one half wave to the next. The value of this condenser, necessary to eliminate relay chatter and insure ade- 45 quate relay current, may be large enough to keep the relay 82 energized for several cycles after the tube 33 has ceased to pass current. There may be, therefore, in using the circuit of Figure 1, a delay in the response of the relay \$2 corre- 50 sponding to several cycles of the alternating current which, for 60 cycle alternating current, may be as great as one-tenth (1/10) of a second.

Where the ironing head of a press is heavy 55 and closes at high speed, a perceptible movement, in some instances several inches, may occur during the delay aforesaid, that is between the time when the oscillator tube 32 stops, due to the presence of the operator's hand in the 60 path or danger zone of the press head, and the time when the relay 82 responds. In order to avoid this time delay and greatly speed up the response of the relay to the presence of an object between the jaws of the press, we 65 prefer to use a faster circuit. This preferred and faster control circuit, and a press controlled thereby, is shown diagrammatically in Figure 16. This second form of circuit can also be used in connection with forms of the invention previously 70 through a biasing resistor 264 which may be described.

This faster operating circuit comprises an oscillator tube 217, an output tube 218, and a buffer amplifier tube 219 connected between these two

type, and while the heaters of the tubes may be operated on alternating current, it is preferable to provide direct current for the other elements of the tubes.

To this end, we may use a transformer 220 having a primary winding 221 which may be connected directly to the alternating current power mains 222. The transformer 220 may also have a filament supply secondary winding 10 223 which may be directly connected across the filaments or heaters 224, 225, and 226 of the tubes 217, 218 and 219 respectively. The wiring for these filaments has been omitted for clarity. A high voltage secondary winding 227 on the transformer 220 may be connected between the anodes 228 and 229 of a full wave rectifier tube 230, the filament 231 of which may be independently energized by a separate secondary winding 232 on the transformer 220. The mid-point of the secondary winding 227 may be connected to a wire 233 and to ground at 234, while the filament 231 of the rectifier tube 230 may be connected to a suitable filter network, including the choke 235 and condensers 236 and 237 which are connected between opposite ends of the choke 235 and the grounded wire 233. A wire 238 may be connected to the opposite end of the choke 235 and forms the high voltage supply wire for the circuit.

The oscillator tube 217 may have a cathode 240 which is heated by the filament 224, a control grid or control electrode 241, a screen grid 242, a suppressor grid 243, and an anode 244. The suppressor grid 243, may be connected to the cathode 240 inside of the tube. The anode

35 244 may be given a positive potential by connecting it directly by means of a wire 245 to the positive supply wire 238, and the screen grid 242 may also be given a positive potential from the wire 245 through a radio frequency choke 246. The screen grid 242 may also be connected

through a condenser 247 to the cathode 240.

The control grid 241 of the tube 217 may be connected through a variable condenser 250 to one end of a coil 251, the other end of which may be grounded at 252. The cathode 240 may be connected to a point 253 on the coil 251, and a grid leak resistance 254 may be connected between the control grid 241 and the cathode 240.

With the circuit connected to the tube 217, as just described, the tube acts in the same manner as the tube 32 of Figure 1 with the exception that the plate supply is constant.

Also similarly to the tube 32 of Figure 1, it is the change in the circuit from the oscillating condition to the nonoscillating condition that is used to operate the control means. To this end we provide the buffer amplifier tube 219 which may have a cathode 258 heated by the filament 226, a control grid 259, a screen grid 260, a suppressor grid 261, and an anode 262 The suppressor grid 261 may be connected in. side the tube to the cathode 258, as shown, and the screen grid 260 may be given a positive potential from the wire 245 to which it is directly connected. The control grid 259 may be connected directly to a point 263 on the coil 251 which is near the grounded end of that coil. The cathode 258 may be connected to ground shunted by a condenser 265.

The anode circuit of the tube 218 may comprise a tuned tank circuit 266 including the coil 267 and the variable condenser 268, one side of this circuit tubes. All of these tubes may be of the heater 75 being connected to the anode 262 and the other

side to the wire 245, whereby the anode receives a positive potential. The tank circuit 266 is tuned to the oscillator frequency.

The anode 262 may also be connected through a condenser 269 to the control grid 270 of the tube 218. This tube 218 may have a cathode 271, which 5 may be heated by the filament 225, a screen grid 212, a suppressor grid 273, and an anode 214. The suppressor grid 273 may be connected to the cathode 271 inside the tube. 10

A bleeder resistance 275 may be connected between the positive wire 238 and the negative wire 233 and serves to provide various operating potentials for the elements of the tube 218. The screen grid 272 may be connected to a point 276 15 near the high voltage end of the bleeder to give it the proper operating potential, and the control grid 270 may be connected through a choke 277 to the negative end of the bleeder 275. In order to make the cathode 271 more positive than the 20 grid and thus maintain the grid negatively biased, we connect the cathode 271 to a point 278 on the bleeder 275 which has a suitable positive potential, and between this point and the grounded wire 233 we may connect the by-pass condenser 25

The anode 274 of the tube 218 may be connected through the coil of a relay 282 to the wire 238, a condenser 283 being connected across the coil of the relay. The relay 282 may have a movable 30 armature 284 provided with a contact 285 adapted to engage another contact 286 when the relay 282 is energized and the armature 284 pulled towards it. One of the contacts, as for instance contact 286, may be connected to one side of the power supply mains 222 by means of a wire 287, while 35 the other contact 286 may be connected by means of a wire 288 to the solenoid 22 used for controlling the operation of the motor means 9 which operates the press. The other side of the solenoid 22 may be connected by means of a wire 289 to the 40 opposite side of the power mains 222. A fuse 290 may be connected in series with the coil of the relay 282 to open the circuit in case of abnormal current through the tube 218. 45

In one instance where this circuit was used with good results, the oscillating tube 217 and the associated components of the oscillating circuit were the same as given in connection with the circuit of Figure 1. Some of the other more important values were as follows: 50

Bias resistance 264-between 3000 and 5000 ohms Bypass condenser 265—.1microfarad Coupling condenser 269-.1 microfarad

Radio frequency choke 217-between 6 and 8 mil-

Coil of relay 252-6500 ohms resistance

Relay condenser 283-.05 microfarad

## Operation of the circuit of Figure 16

In the operation of the circuit, adjustments are made so that for minimum capacity of the condenser 64 (the capacity to ground of the sensitive electrodes 62 and 63), the tube will be oscil- 65 lating. When this capacity is increased, however, by the approach of a person within the range of the sensitive electrodes 62 and 63, the potential on the control grid 241 will drop and the tube will stop oscillating. With the tube 217 oscillating, 70 an oscillating potential is delivered directly to the

control grid 259 of the tube 219 from the coil 251. The tube 219 amplifies this oscillating potential and produces an oscillation in the tank circuit

lator. The oscillating voltage in the tank circuit 266 is applied through the condenser 268 to the control grid 270 of the tube 218. This control grid 270 is given a negative biasing potential with respect to the cathode 271 by means of the particular connections used, such that the tube 218 will pass anode current only on the positive halves of the oscillating wave. This anode current is sufficient to operate the relay 282. The condenser 283 across the coil of the relay 282 is provided to store up and smooth out the current pulses flowing through the relay so as to make the operation of the relay more positive. When the relay 283 is energized, the contacts 285 and 286 close, which energizes the solenoid 22, thus operating the valve 19 and the motor 9 to close the press and maintain it closed.

When a body of a predetermined nature, as, for instance, the hand of the operator, approaches the electrode 62 and 63 on the press, the tube 217 stops oscillating. This removes the oscillating potential from the control grid 259 of the tube 219 and stops the oscillation in the tank circuit 266 which is in the plate circuit of that tube. This in turn removes the oscillating potential from the grid 270 of the output tube 218, and deenergizes the relay 282, thus separating the contacts 285 and 286, so that the current through the solenoid 22 is broken and the solenoid 22 deenergized. Deenergizing the solenoid 22 permits the spring 23 to return the valve 20 to its normal position, which shuts off the supply of fluid to the cylinder 9, opens the exhaust, and permits the spring 14 to open the press.

In the case where direct current is supplied to the anode 244 of the oscillating tube 217, the oscillating output will be greater, per unit change in capacitance of the condenser 64, than where raw alternating current is applied to this anode, be-

cause the oscillations occur continuously instead of during the periods corresponding to a half wave, as would be true in the case of raw alternating current. This increases the sensitivity of the capacity response over circuits using raw alternating current.

Also by the use of the buffer amplifier we can make the resonance curve of the oscillating circuit sharper so that it becomes more sensitive to changes in the capacitance of the condenser 64. This is done by connecting the load circuit across just a few turns of the coil 251 at the point 263 which prevents losses from the load from being reflected back into the oscillating circuit.

When the tube 217 starts or stops oscillating, 55 the relay 282 will be actuated within a time period corresponding to about two cycles of the oscillating frequency, which may be in the order of a million cycles per second, depending on the constants chosen, and the only delay between 60 the alteration of the field and the movement of the head 5 of the press will be caused by the inertia of the moving parts. The response of the electrical circuit is substantially instantaneous.

Because the tube 218 supplies half wave direct current impulses at the oscillator frequency to the relay 282, the condenser 283, the function of which is to store and smooth out these impulses, may be much smaller and therefore less expensive than would be the case if raw alternating current were used and 60 cycle impulses fed to

## General discussion of advantages

166 which is tuned to the frequency of the oscil- 75 ranged that when a failure occurs in substantially

any part thereof the relays 82 and 282 will be deenergized and will open the contacts 85 and 86 and 285 and 286. If the filaments of any of the tubes burn out, or any of the resistances, coils, or condensers in the circuit become shorted, or 5 open circuited, the relays will be deenergized. In Figure 16 the fuse 290 in the anode circuit of the tube 218 will open the circuit through the relay 282 if a short circuit in the tube 218 or in any other part of the circuit should cause the 10 vicinity of said electrode. anode current of the tube 218 to increase beyond the normal current value.

It is understood that various modifications in eration, assembly and manner of use, may and 15 circuit having two conditions of balance, means often do occur to those skilled in the art, especially after benefiting from the teachings of an invention. Hence, it will be understood that this disclosure is illustrative of preferred means of embodying the invention in useful form by ex- 20 plaining the construction, operation and advantages thereof.

What is claimed is:

1. A textile press comprising relatively movable pressing jaws having an open and a closed 25 position, power operated means to cause said jaws to assume either position, a balanced electric circuit to control said power operated means, said power operated means acting in one direction to close the press for a predetermined condition of 30 balance of said circuit and in the other direction to open the press for another predetermined condition of balance of said circuit, a conducting member connected in said circuit and positioned to establish an electric field around the path of 35the operating movement of said pressing jaws, said conducting member having a capacity to ground which is alterable by the presence of a body in the vicinity of said conducting member, and means to decrease the capacity to ground 40 during the final closing of the press.

2. A textile press comprising a pressing jaw a second jaw coacting therewith, the jaws havthe other, power means to effect such relative 45 mounted for relative movement towards and ing a relative movement, one toward and from movement, means for controlling the operation of the power means including means to create an electric field comprising an electrode member from which said field originates, and means to confine the electric field for the most part around 50 the path of movement of the movable jaw.

3. A press comprising a pair of cooperating pressing members having relative opening and closing movement, power operated means to effect such relative movement, a conductive mem- 55ber insulatedly mounted on one of said members, a second conductive member insulatedly mounted on the other of said members, and means to cause said power operated means to effect relative movement of said members when 80 a body of a predetermined nature passes into or out of the vicinity of said conductive members, the last means including a balanced electric control circuit operable from one condition of balance to another condition of balance by the pres- 65 ence of a body in the vicinity of the conducting members and being connected in circuit with said conducting members.

4. A press comprising a jaw member having a plurality of operating positions, power operated 70 means to move said jaw member from one of said positions to another, a balanced electrical circuit having two conditions of balance, means to jaw member towards one of its operating posi- 75 second rod in spaced relation to said buck and cause said power operated means to move said

tions when said circuit is in one of its conditions of balance, means to cause said power operated means to move said jaw member towards another of its operating positions when said circuit is in its other condition of balance, an electrode insulatedly mounted on said jaw member, and means to cause said circuit to change from one condition of balance to the other when a body of a predetermined nature passes into or out of the

5. A press comprising a pair of cooperating pressing jaw members, power operated means to move said members into and out of engagement with each other, a balanced electrical control controlled by the control circuit to cause said power operated means to move said jaw members when said circuit changes from one condition of balance to the other, an electrode insulatedly mounted on one of said jaw members, a second electrode insulatedly mounted on the other of said jaw members, said electrodes being connected in the control circuit, and means to cause said circuit to change from one condition of balance to the other when a body of a predetermined nature passes into or out of the vicinity of said electrodes.

6. A press comprising a pair of cooperating pressing jaw members, power operated means to move said members into and out of engagement with each other, a balanced electrical circuit having two conditions of balance, means to cause said power operated means to move said jaw members when said circuit changes from one condition of balance to the other, an electrode insulatedly mounted on one of said jaw members and in spaced relation thereto, a second electrode insulatedly mounted on the other of said jaw members and in spaced relation thereto, and means to cause said circuit to change from one condition of balance to the other when a body of a predetermined nature passes into or out of the vicinity of said electrodes.

7. A textile press comprising a head and a buck effect relative movement of said head and buck, a conductive rod shaped to conform to the contour of a portion of said head including the front and ends thereof, means to insulatedly mount said rod on said head in spaced relation thereto, and means to cause said power operated means to move said head and buck away from each other when a body of a predetermined nature passes into the vicinity of said rod and to move said head and buck towards each other when said body passes out of the vicinity of said rod, the last means including a balanced electrical control circuit electrically connected to said rod, and being in one condition of balance when the press is open, and in another condition of balance when the press is closed, and changing from ene condition of balance to the other by the presence of a body in the vicinity of said rod.

8. A textile press comprising a head and a buck mounted for relative movement towards and away from each other, power operated means to move said head and buck, a conductive roa bent to conform to the contour of the lower edge of the head, insulating means to support said rod adjacent the lower edge of said head and spaced outwardly therefrom, a second conductive rod having substantially the same configuration 25 said first rod, means to insulatedly support said below the top surface thereof, and means to cause said power operated means to effect the separation of said head and buck when a body of a predetermined nature moves into the vicinity of either or both of said rods and to move said head and buck towards each other when said body moves out of the vicinity of said rods, the last means including a balanced electrical circuit electrically connected to said rod, and being in one condition of balance when the press is 10 nature passes into and out of the vicinity of said open, and in another condition of balance when the press is closed, and changing from one condition of balance to the other by the presence of a body in the vicinity of said rod.

9. A textile press comprising a head and a 15 buck mounted for relative movement towards and away from each other, power operated means to move said head towards and away from said buck, a conductive rod shaped to conform to means to insulatedly position said rod in spaced relation to the lower edge of said head, a second conductive rod having a shape conforming to said first rod, means to insulatedly position said below the top surface thereof, means to electrically connect said rods together, a balanced electric circuit for controlling the operation of the power means, the control circuit being connected to said rods having two conditions of operation, the control circuit including means to cause said circuit to change from one of its operating conditions to another when a body of a predetermined nature passes into or out of the vicinity of said rods.

10. Apparatus of the class described comprising a pair of relatively movable cooperating jaw members, power operated means to move said jaw members into and out of engagement with each other, an electrode swingably mounted on 40 one of said jaw members so that it may be swung from a position at one side of said jaw member to a position between said jaw members, means to maintain said electrode in its position between said jaw members when said jaw members are separated and to swing said electrode to its position at the side of said jaw member when said jaw members are moved towards each other, means to create an electric field in the vicinity of said electrode, and means to cause said power 50 operated means to move said jaw members out of engagement with each other when a body of a predetermined nature passes into said electric field and to move said jaw members into engagement with each other when said body passes out of said electric field.

11. Apparatus of the class described comprising a movable jaw member having a plurality of operating positions, a second jaw member coacting therewith, power operated means to 60 move said movable jaw member from one of said

positions to another, an electrode, means to position said electrode in spaced relation to said movable jaw member, means to move said electrode from one side of said movable jaw member to another when said jaw member is moved, a balanced electrical control circuit having two conditions of balance including means to cause said circuit to change from one condition of balance to the other when a body of a predetermined

electrode, and electrically operated means controlled by the control circuit and operable to control the operation of said power operated means to move said jaw member in one direction when said circuit is in one condition of balance

and to move said jaw member in another direction when said circuit is in the other condition of balance.

12. A textile press comprising relatively cothe contour of the lower outer edge of said head, 20 operating jaw members having an open and a closed position, power operated means to relatively move said members from one position to another, an electrode mounted adjacent said jaw members, said electrode having an altersecond rod in spaced relation to said buck and 25 able capacity to ground, an oscillating circuit, means to cause said circuit to maintain sustained oscillations at a predetermined frequency when said alterable capacity to ground of said electrode is below a predetermined value and to stop the oscillations in said circuit when said capacity 30 to ground is above a predetermined value, means to amplify oscillations produced in said oscillating circuit, means to utilize said amplified oscillations to operate said power operated means. 35 and means to prevent losses from said amplifying means from being reflected into said oscillating circuit.

> 13. A textile press comprising relative cooperating jaw members having an open and a closed position, motor operated means to relatively move said jaw members from one position to another, an electrode positioned in the vicinity of said jaw members and having an alterable capacity to ground, an oscillating circuit, means to maintain sustained oscillations in said circuit when said capacity to ground of said electrode is below a predetermined value and to stop the oscillations in said circuit when said capacity to ground of said electrode is raised above a predetermined value, an amplifier tube having an input circuit and an output circuit, means to loosely couple said input circuit to said oscillating circuit, a tank circuit in said output circuit, a relay, means to cause oscillations in said tank cir-55 cuit to energize said relay, and means to cause energization of said relay to operate said power operating means.

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