The present invention relates to a garment finishing machine for Ironing textile materials, or the like, and having at least one upper and one lower plate between which the material is pressed.

Such machines as presently used have a variety of driving mechanisms many of which are based on a pneumatic or hydraulic principle. The ironing or clothes pressing process itself comprises the two steps of moving the upper plate forward and into engagement with the textile material to be pressed and the actual pressing of the material between the plates. In performing the latter step, a relatively high force is necessary to produce the required pressure. The high pressure necessary for the pressing step is produced by using air or liquid at a high specific working pressure. In order to operate such machines with fluid from a storage tank conventionally used with such machines, it is necessary to provide a working cylinder of relatively large diameter.

The use of toggle mechanisms for moving the upper plate of ironing machines is also known in the art. However, such toggles are used only for actuating the moving plate toward the stationary plate during the closing step. An additional power cylinder is then required for performing the pressing step and is actuated by the pressure medium. With this arrangement, the linkage operates during the pressing step simply as a rigid, elongated movable member. A mode of construction of this kind is also relatively expensive.

The present invention is directed to a further improvement of an ironing machine of the last-mentioned type. The invention is characterized by a construction and arrangement of a toggle linkage which may be operated in successive stages, the first stage performing the step of closing the upper plate and the additional stage performing the ironing or pressing step. The power cylinder for actuating the toggle linkage also operates in successive stages. In accordance with the improved toggle linkage arrangement, considerable movement is produced at low pressure to move the upper plate to closing position while a relatively small movement of the upper plate is produced at a higher pressure during the pressing operation, due to the angular relation of the toggle links.

The practical use of the dynamic advantages of the toggle joint according to the invention is achieved by two rapid adjustment devices which adapt the machine to the ironing requirements of various textile and other materials. One of these adjustment devices permits operation of the upper plate to a stopping position for every useful spaced relationship relative to the lower plate that may be required so that, for example, pressure-sensitive textile materials such as velours, pillet and duffel cloths, certain types of knitted goods, and the like, can be treated by steaming and subsequent suction treatment while the upper plate hardly touches the material or exerts only a very slight pressure thereon. Also, by varying the spacing between the upper and lower plates of the machine, materials such as articles of clothing which swell or shrink during steaming without pressure may be processed as well as articles which would slip from the lower plate such as, for example, the edges or turn-overs of lounge jackets which require a separate ironing step.

A control cam on a moving portion of the linkage interrupts the action on the power cylinder by actuating a control valve to stop the movement of the upper plate at a predetermined fixed position with respect to the bottom plate before the actual pressing operation is started. The control valve can be moved manually toward or away from the control cam with the aid of an adjusting spindle, so that the switching impulse may take place at any desired time during the movement of the linkage.

The other rapid adjustment device makes it possible through suitable mechanism, to adjust the applied pressure for various ironing requirements. By varying the dynamic conditions of toggle linkages as, for example, by varying the length of articulated members of the linkage, or by changing the location of the pivoted connections between links, the movement of the parts of the linkage for performing a pressing and ironing operation can be limited to a part of the entire stroke of the toggle joint. Then the application of pressure diminishes in proportion as the toggle joint remains remote from its extended position during the pressing step.

One of the objects of the present invention, therefore, is to provide an improved ironing or pressing machine which varies the spacing between the movable and stationary plates of the machine during a pressing operation to adapt the machine for various kinds of textile fabrics.

Another object is to provide a machine of the type indicated which may be easily and quickly adjusted to vary the spacing of the pressing plates of an ironing or pressing machine and the pressure applied to the fabric by the pressing plates during a pressing operation. Still another object is to provide an improved operating mechanism for an ironing or pressing machine which is of a relatively simple and compact construction, economical to manufacture and one which is reliable in operation in performing its intended function.

These and other objects will become more apparent from the following description and drawings. It is to be expressly understood, however, that the drawing is for the purpose of illustration only and is not a definition of the limits of the invention, reference being had for this purpose to the appended claims.

In the drawing:

The single figure in the drawing is a diagrammatical view of a pressing and ironing machine incorporating one embodiment of the invention.

The preferred ironing or pressing machine illustrated in the drawing has a table 1 with a lower ironing plate 2 for cooperating with an upper ironing plate 3. The upper ironing plate 3 is mounted on a bifurcated lever arm 4 pivotally mounted intermediate its ends at 5 on a pedestal 6. The table 1 is supported at the upper end of a pedestal 7 and said pedestals 6 and 7, in turn, are mounted on a base plate 8.

The driving mechanism for moving the lever 4 and upper plate 3 mounted inethereon comprises a toggle linkage. The toggle linkage as illustrated has two linkage rods 9 and 10 with the adjacent ends of the rods pivotally connected to each other at 12 and a push rod 11 pivotally connected to the common pivot forming the knee of the toggle joint. The push rod 11 has a piston 11a at the end opposite pivot 12 which is enclosed and slides in a cylinder 13 pivotally mounted at 14 on the machine frame 7. A return spring 15 is connected between the linkage rod 10 and frame pedestal 7. Linkage rod 9 is pivotally connected at its outer end 16 to an adjustable lever 17 which, in turn, is pivotally connected intermediate its ends at 20 on the end of the lever arm 4 opposite the end mounting the upper plate 3. The opposite end of adjustable lever 17 is pivotally connected to a spindle rod 19 which, by means of an adjustment device 18, such as an adjustment nut, can be adjusted longitudinally along
the lever arm 4 to tilt lever 17 on lever arm 4 and thereby vary the position of pivot point 16, the angular relation of the linkage rods 9 and 10 and the amount of movement of the knee 12 necessary to fully extend the toggle. The adjustment device 18 may be actuated manually by a handwheel 18a.

The power cylinder 13 may be pneumatically or hydraulically operated by supplying the motive fluid thereto under pressure. The column arrangement is advantageous and with such a drive compressed air is fed from a source through a shut-off valve 21 in a pipe line 22, illustrated diagrammatically, to a manual controlled starting valve 23. A pipe line 24 extends from valve 23 to the switch-over valves 25 and 26. Each of the switch-over valves 25 and 26 may be considered, is a normally valve, but operable to a closed position when motive fluid is supplied to a connection separate from the inlet and outlet connections. Switch-over valve 26, in turn, is connected by a pipe line 27 to the power cylinder 13.

A branch pipe line 28a leads to a limit valve 27 of the toggle. Limit valve 28 is normally closed and when opened supplies motive fluid through pipe line 41 to switch-over valve 25 to operate the latter to closed position and stop the piston 11c in the power cylinder 13. The limit valve 26 is adjustable relative to its operating cam 30 and to this end it is mounted on one end of an arm 31 which, in turn, has its opposite end pivotally mounted on the anchor pin 32 on which rod 10 of the toggle mechanism rocks. Arm 31 is rocked on pin 32 relative to toggle rod 10 by a rapid-adjustment device 34 comprising, for example, an adjusting nut turned manually by a handwheel 34a to move a spindle rod 35 longitudinally and thereby rock the arm 31 pivotally connected to its end.

A branch pipe line 22c leads from the feed line 22 for the compressed air to a manually actuated valve 35 and from the valve through a pipe line 36 to the switch-over valve 37. A pipe line 38 connects the outlet from valve 37 to line 27 leading to the power cylinder 13 as previously described. A branch line 36a leads from line 36 to an exhaust valve 39 adapted to be actuated by a foot-actuated lever 40. One way valves 42 are arranged in the lines 36 and 38.

In accordance with the present invention, the first zone of movement of the toggle links 9 and 10 performs the step of moving the upper plate 3 to a closing position with respect to the lower plate 2. The subsequent pressing and ironing operation take place at a particular ironing pressure, depending upon the particular textile material being processed, in the more or less extended position of the first zone of movement of the toggle links 9 and 10, and the highest pressures being attained in the zone of the extended state. The desired pressure may be preselected for a particular fabric by varying the angular position to which the toggle links 9 and 10 are moved by the push rod 11 and power cylinder 13 as controlled by the limit valve 28 and its adjustment. By manually actuating the rapid adjusting device 33, 34, the instant of time at which the step of closing the upper plate 3 stops and the pressing and ironing steps begin can be varied. By manually actuating the rapid adjusting device 18, 19 the additional movement of the toggle links 9 and 10 and the pressure applied by the plate can be varied. Thus, it is possible to terminate the upper plate closure and pressing steps at any desired point. Advantageously, the normal spacing of the upper plate 3 from lower plate 2 is in the range of 15 to 20 mm.

The stopping of the movement of the upper plate 3 during the closure movement is initiated by the cam which actuates the feeler 29 of the impulse or limit valve 28 to close switch-over valve 25 connected thereto by line 41 to stop the flow of compressed air to the power cylinder 13. The stopping of the upper plate during a pressing operation is controlled by the angular relation of toggle links 9 and 10 at the end of the stroke of the push rod 11. By these means, the movement of the upper plate 3 is brought to a standstill by the pneumumatic system.

The entire pressing and ironing operation is performed as follows by first manually actuating valve 23. Compressed air then flows through the open switch-over valves 25 and 26 into the power cylinder 13 which, acting on piston 11c, moves the pin 12 and toggle links 9 and 10 through a forward stroke to move the upper plate 3 toward its closing position. Towards the end of the closure movement of the plate 3, the curved surface of cam 30 on the linkage rod 10 acts on the feeler 29 of the impulse or limit valve 28 to actuate the valve and supply air to the switch-over valve 25. This air closes valve 25 and thereby stops the flow of compressed air to the power cylinder 13. Thus, the movement of the upper plate 3 is stopped by the toggle mechanism and pneumumatic drive. The toggle linkage is then held in the angular relationship illustrated in the drawing.

The pressing or ironing steps are initiated by manual actuation of valve 35 to supply compressed air to the switch-over valve 37 and from the latter to the power cylinder 13, whereby the toggle linkage 9, 10 is again actuated to further move the upper plate 3 into pressing engagement with the fabric between it and lower plate 2. The ironing and pressing step takes place immediately by means of the upper plate 3 and the pressure applied is functional related to the angular position of the toggle links 9 and 10 at the end of the stroke of the push rod 11. The non-return valves 42 permit the flow of the compressed air in one direction only. By means of the foot-actuated lever 40, an exhaust of the entire air line 36 can be effected through the valve 39 and the pressing process terminated. It is the purpose of the tension spring 15 to restore the machine into the starting position, i.e. the opened position.

While a single embodiment only has been illustrated and described, it will be understood that changes may be made in the construction and arrangement of elements without departing from the spirit or scope of the invention. Therefore, without limitation in this respect the invention is defined by the following claims.

We claim:
1. In a machine for pressing textile materials of the type having upper and lower plates movable relative to each other by a toggle linkage and a single fluid motor connected to the latter for pressing textile material between the plates, the combination with said elements of the machine of a mechanism for moving the plates relative to each other comprising a source of fluid under pressure, a conduit for supplying fluid from said source to said fluid motor, said fluid motor means for controlling flow of fluid through said conduit to said motor including a limit valve, said motor being stopped when said motor when actuated, a cam on the toggle linkage movable in a path intersecting said limit valve to engage and operate the latter, a member mounting said limit valve for movement toward and away from said cam, and manually operable means for adjusting the member and position of the limit switch relative to the cam on the toggle linkage.
2. A machine for pressing textile materials in accordance with claim 1 in which the movable plate is mounted on one end of a lever arm, and adjustable bell crank lever mounted on the opposite end of said first mentioned lever arm, one end of the bell crank lever being connected to the toggle linkage, and manually operable means for rocking the bell crank lever on the first mentioned lever arm to adjust the angular relation of the links of the toggle linkage.
3. A machine for pressing textile materials in accordance with claim 1 in which the valve means comprises a manually operable valve for supplying fluid to the fluid motor, a normally open switch-over valve in the conduit, said switch-over valve closing when supplied with fluid, and said limit valve supplying fluid to said switch-over
valve when actuated by the cam on the toggle linkage to close the switch-over valve and stop the fluid motor.

4. A machine for pressing textile materials in accordance with claim 3 in which the valve means includes a second switch-over valve in the conduit means, a second manually operable valve, a branch circuit for delivering fluid from said source through said second manually operable valve and second switch-over valve to the fluid motor, said first and second switch-over valves being connected to said fluid motor and a third switch-over valve for closing the conduit between the first switch-over valve and motor, said third switch-over valve being normally open and closed when supplied with fluid, and means for delivering fluid from the second to the third switch-over valve when the second switch-over valve is open to supply fluid to the fluid motor.

5. A machine for pressing textile materials in accordance with claim 4 in which one way valves are provided in the conduit between the second mentioned manually operable valve and second mentioned switch-over valve and between the second mentioned switch-over valve and third mentioned switch-over valve.

6. A machine for pressing textile materials in accordance with claim 4 in which the valve means includes an exhaust valve connected to the branch conduit between the second manually operated valve and second switch-over valve, and a pedal actuated lever for actuating the exhaust valve.

References Cited by the Examiner

UNITED STATES PATENTS
1,673,517 6/28 Davis ------------------ 38-40
2,265,449 12/41 Reynolds ------------ 38-40
2,656,627 10/53 Clarke ---------------- 38-41
2,971,281 2/61 Neckel --------------- 38-41

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