March 24, 1964 A. S. HUBIN 3,125,947

RECIPROCATING PRESS

Filed Jan. 3, 1962 3 Sheets-Sheet 1

Fig. 1

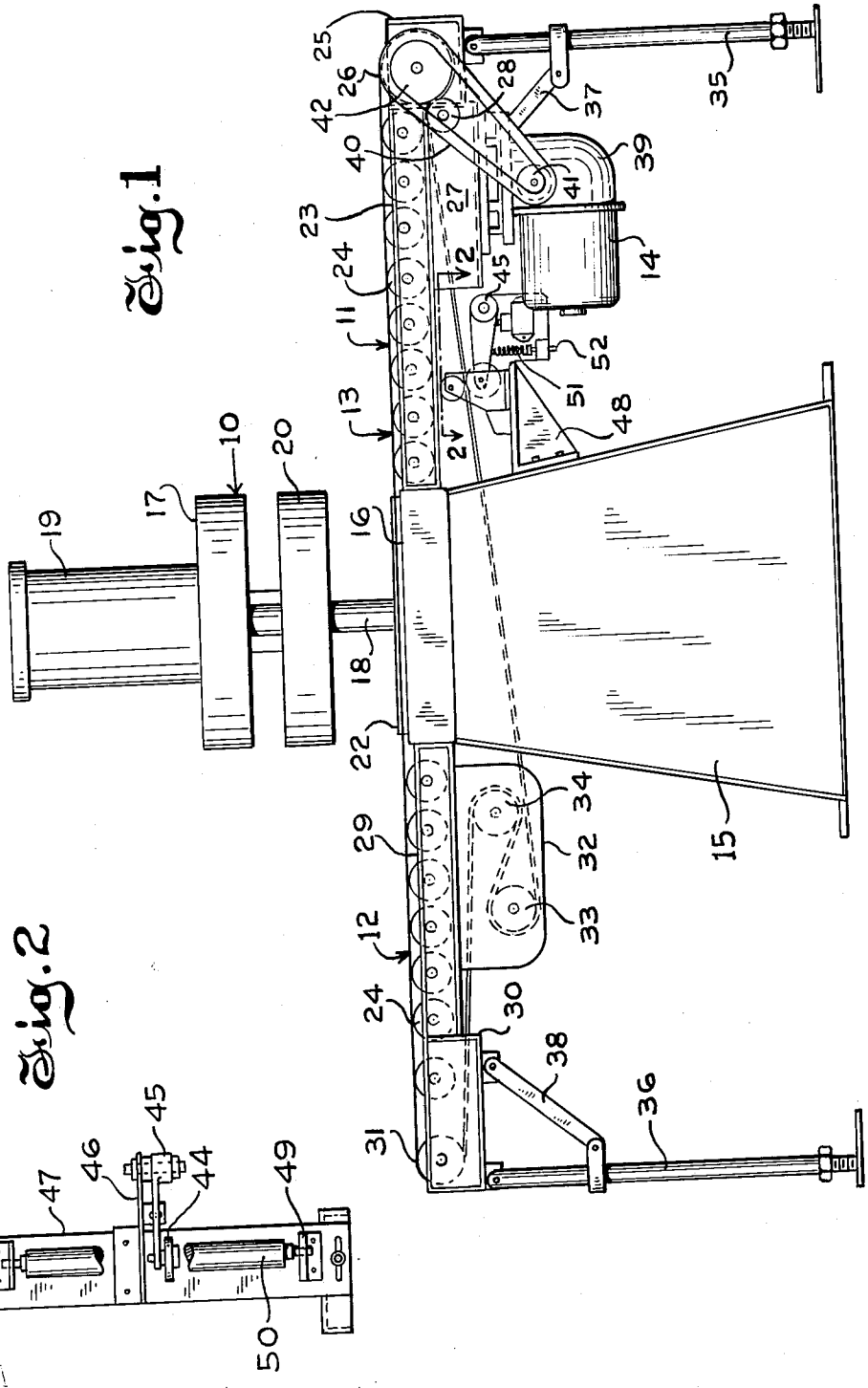


Fig. 2

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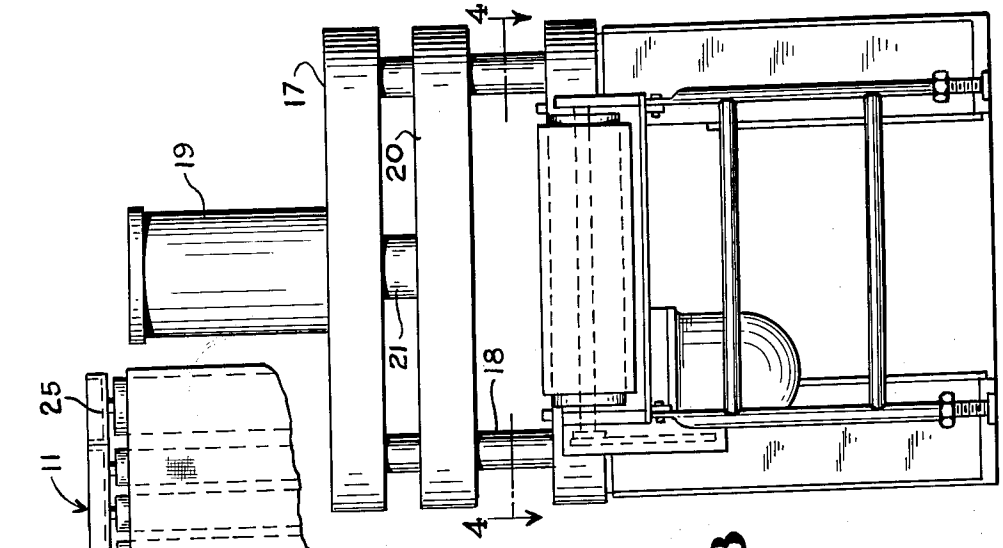


Fig. 3

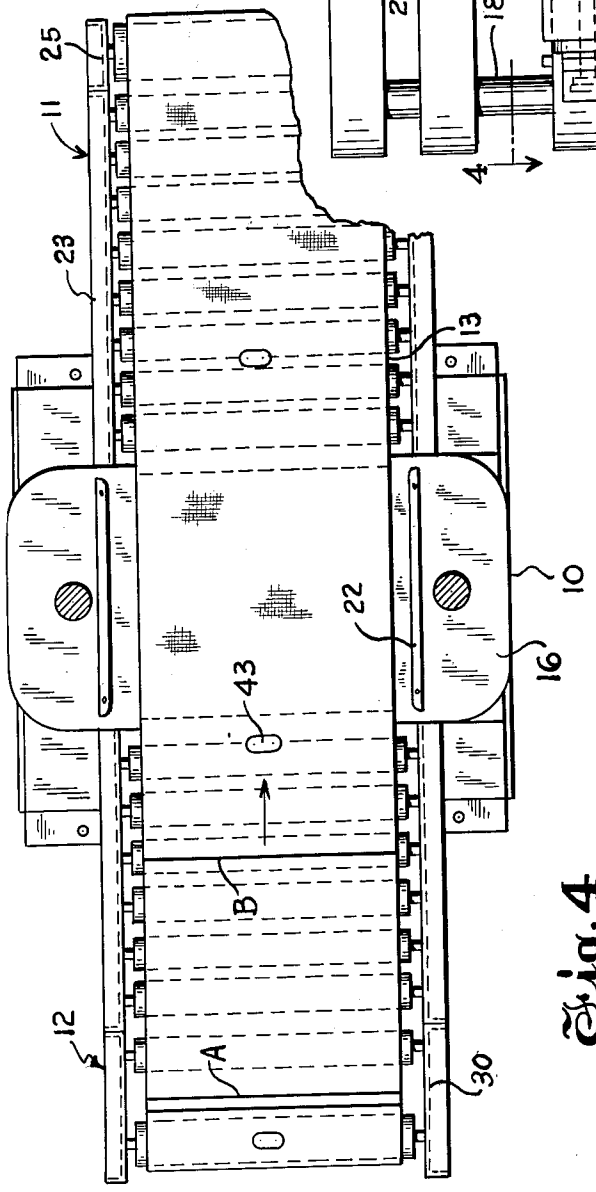


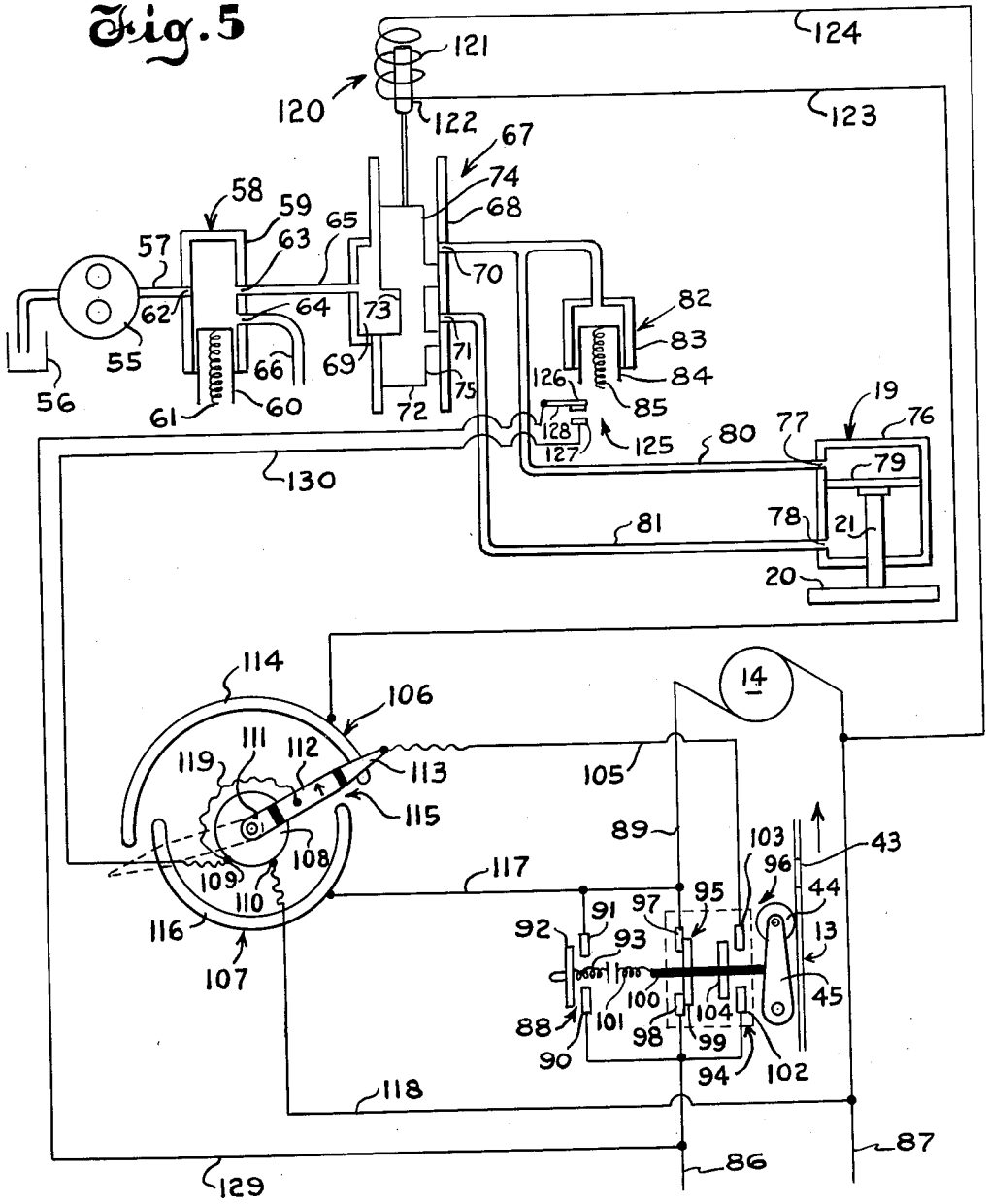
Fig. 4

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Fig. 5



United States Patent Office 3,125,947 Patented Mar. 24, 1964

3,125,947

RECIPROCATING PRESS

Anthony S. Hubin, Appleton, Wis., assignor to Kimberly-Clark Corporation, Neenah, Wis., a corporation of Delaware

Filed Jan. 3, 1962, Ser. No. 164,028
5 Claims. (Cl. 100—53)

My invention relates to reciprocating presses and, more particularly, to presses for compressing yieldable materials, such as stacks of folded paper facial tissues.

The package of facial tissue has in recent years become a product of universal acceptance with consequent great commercial importance. These tissues comprise creped paper sheets of a basis weight (uncreped) of about 6 to 10 pounds per ream (2880 square feet), the tissues usually being of two-ply construction. Ordinarily the tissues are folded and arranged in a stack which is packaged in a paperboard dispensing carton. The tissues may be either interfolded, so that dispensing from the carton is automatic, or the tissues may simply be individually C-folded, for example.

It has been found that these tissues may have the desirable qualities making them particularly useful for facial usage enhanced by compressing the tissues; and such compressing also advantageously causes stacks of the tissues to have less unrestrained height to allow the same number of tissues to be packed into smaller sized cartons, so that less space is required for storage in warehouses and on dealers' shelves.

Such compressing of stacks of tissues has in the past been done on machines of a type, for example, utilizing opposite passes of roller supporting platens. The rollers are in running contact with cam surfaces that approach each other, so that the platens likewise come together for compressing the tissue stacks between them. Such a machine is disclosed in Patent 2,960,023, issued to C. J. Greiner et al., on November 15, 1960.

Although such compressing machines have been successful with and are particularly adaptable for large scale operations, since these machines are operative to compress tissue stacks continuously, machines of this type are expensive to build, particularly due to the large forces on the platen supporting rollers and their journals.

It is an object of the present invention to provide an improved, relatively small size, simple, unit for compressing such facial tissues that has a resulting ease of operation and a minimum amount of required adjustment and maintenance. More particularly, it is an object of the invention, in this connection, to provide an improved compressor that is operative on batches of facial tissue stacks, compressing the batches individually.

It is also an object of the invention to provide automatic controls in connection with a machine of this type which will function to advance stacks of facial tissue between a pressure plate and an opposite platen, move the pressure plate toward the platen to perform the compressing operation, and automatically retract the pressure plate after a predetermined time of compression. It is also a more specific object to construct a machine of this type so that it may be easily adapted for stacks of different numbers of tissues, simply by changing the distance of least separation of the pressure plate with respect to the platen at which maximum compression occurs.

The invention consists of the novel constructions, arrangements and devices to be hereinafter described and claimed, for carrying out the above stated objects, and such other objects, as will be apparent from the following description of a preferred form of the invention, illustrated with reference to the accompanying drawings, wherein:

FIG. 1 is a side elevational view of a compressing machine embodying the principles of the invention;

FIG. 2 is a top view on an enlarged scale of a portion of the machine, taken from line 2—2 in FIG. 1 in the direction indicated;

FIG. 3 is an end view of the machine;

FIG. 4 is a plan view of the machine, partially in section, the view being taken on line 4—4 of FIG. 3; and

FIG. 5 is a schematic illustration of the hydraulic and electric controls that may be used with the machine.

Like characters of reference designate like parts in the several views.

Referring now to the drawings, the illustrated compressing machine may be seen to comprise, generally, a hydraulic press 10, a discharge table 11, a loading table 12, a belt 13 supported by the tables 11 and 12 and the press 10, and an electric motor 14 for driving the belt.

The hydraulic press 10 comprises a base 15 having a platen 16 as an upper surface over which the belt passes. A platform 17 is mounted on the platen 16 by means of a pair of cylindrical connecting rods 18, and a hydraulic motor 19 is mounted on the platform 17. A pressure plate 20 is mounted above the platen 16 with the connecting rods extending through the platen and having a sliding fit with it to allow the platen to move vertically, guided by the rods. The pressure plate 20 is connected to and is supported by the piston rod 21 of the motor 19. A pair of abutment strips 22 are fixed on the platen 16 adjacent the rods 18 for the purpose of limiting the downward movement of the pressure plate 20 toward the platen 16 for purposes hereinafter to be described.

The table 11 comprises side frame members 23 between which a series of rolls 24 for supporting the belt 13 are mounted, a pair of end frame members 25 for mounting a relatively large diameter belt driving roll 26, and side frame members 27 between which a belt idler roll 28 is mounted. The table 12 comprises a pair of side frame members 29 for mounting a plurality of belt supporting rolls 24, a pair of end frame members 30 for mounting one of the rolls 24 and also an end roll 31 and a pair of side frame members 32 for supporting belt idler rolls 33 and 34. The belt 13 is in endless form and, as shown, extends around the roll 26, the rolls 24 of the table 11, the platen 16, the rolls 24 of the table 12, the end roll 31, the rolls 33 and 34 beneath the table 12, and the roll 28 on the under side of the table 11 back to the driving roll 26. The tables 11 and 12 are suitably supported on their ends, such as by means of legs 35 and 36, respectively, which are braced with respect to the tables by means of struts 37 and 38, respectively.

The motor 14 has a suitable speed reducer 39 fastened to it and is thereby fixed beneath the table 11, particularly to the frame members 27. The speed reducer 39 is drivably connected with the driving roll 26 by means of a drive chain 40 extending around sprockets 41 and 42 respectively mounted on the speed reducer 39 and on the driving roll 26.

The belt 13 is provided with a plurality of openings 43 through it for purposes of controlling movement of the belt as will be hereinafter described. A roller 44 is so disposed that it may enter each of the openings 43 in the belt as the belt travels around its supporting rolls. The roller 44 is mounted on a lever 45 swingably disposed on a bracket 46. The bracket 46 is fixed on a plate 47 which extends transversely of the machine and which is fixed with respect to a pair of brackets 48 mounted on the base 15 of the press 10. A pair of brackets 49 are mounted on the plate 47 and support a roll 50 positioned on the inner side of the belt 13 opposite the roller 44. A compression spring 51 is provided between the lever 45 and a stud 52, which is fixed with respect to the bracket 46, for the purpose of yieldably holding the roller 44 in contact with the lower surface of the belt 13.

Referring to FIG. 5, the control system for the compressing machine may be seen to comprise a hydraulic pump 55, which is driven from a suitable prime mover, for supplying liquid under pressure from a suitable source 56 of liquid into an output conduit 57. A relief valve 58 is provided in the conduit 57 which comprises a casing 59 having a cylindrical piston 60 slidably disposed therein. A spring 61 acts against the piston 60, tending to move the piston upwardly within the casing 59. The casing 59 is provided with opposite ports 62 and 63 and with a bleed port 64 beneath the port 63. The port 62 is connected with the conduit 57, and the port 63 is connected with a conduit 65. The port 64 is connected to any suitable bleed conduit 66 adapted to return liquid to the liquid source 56.

A valve 67 is provided for connecting the conduit 65 with the hydraulic motor 19 for the platen 20. The valve 67 comprises a cylindrical casing 68 having an elongated port 69 on one side connected to the conduit 65 and having spaced ports 70 and 71 on the other side. A cylindrical valve piston 72 is disposed in the casing 68 and is formed with a peripheral groove 73 and also with longitudinally extending channels 74 and 75 in the side of the piston 72 adjacent the ports 70 and 71.

The hydraulic motor 19 comprises a cylindrical casing 76 having ports 77 and 78 therein adjacent opposite ends of the casing. A piston 79 is slidably disposed in the casing 76 and is fixed to the piston rod 21 which extends through the casing 76. A conduit 80 is provided to connect the ports 70 and 77, and a conduit 81 is provided to connect the ports 71 and 78.

A pressure responsive switch mechanism 82 is connected with the conduit 80. The switch mechanism comprises a casing 83 connected at one end with the conduit 80 and having a piston 84 slidably disposed therein. A spring 85 is provided for moving the piston 84 toward the end of the casing 83 to which the conduit 80 is connected.

The motor 14 is connected to a pair of electric leads 86 and 87 having an alternating electric potential between them. The connection of the motor to the lead 87 is of a permanent nature, and a manually operated switch 88 completes the connection of the motor 14 to the other lead 86 through a branch lead 89. The switch 88 comprises a pair of contacts 90 and 91 connected respectively with the leads 86 and 89 and a switch blade 92 for bridging the contacts 90 and 91. A spring 93 is provided for yieldably holding the blade 92 out of bridging relationship with the contacts 90 and 91.

A switch assembly 94 is operated by the roller 44 and lever 45. The switch assembly 94 comprises switches 95 and 96. The switch 95 comprises a pair of contacts 97 and 98 adapted to be bridged by a switch blade 99 carried by a plunger 100 of insulating material. The contact 98 is connected with the lead 86, and the contact 97 is connected with the lead 89, so that the switch 95 is in parallel with the switch 88. A spring 101 holds the plunger 100 in contact with the lever 45 and tends to move the plunger 100 and the blade 99 in a direction to open the switch 95. The switch 96 comprises a pair of contacts 102 and 103 adapted to be bridged by a switch blade 104 carried by the plunger 100. The contact 102 is connected with the lead 86.

The switch contact 96 is connected by means of a lead 105 with a switch 106 of an electrically actuated timer 107. The timer 107 comprises a synchronous motor 108 having energizing terminals 109 and 110 and having an arm 111 that rotates at a predetermined speed when the motor 108 is energized by means of an alternating potential applied to the terminals 109 and 110. The arm 111 carries contacts 112 and 113 which are insulated from each other and from the arm 111 as a whole. The contact 113 constitutes one of the contacts of the switch 106, the other contact 114 of the switch 106 being in the form of an arc. The contact 112 constitutes one contact of a switch 115, the other contact 116 of which is also in the form of an arc. The contact 113 is connected with the lead 105; the contact 116 is connected with the lead 89 through a branch lead 117; the terminal 110 is connected with the lead 87 through a branch lead 118; and the contact 112 is connected with the terminal 109 through a lead 119.

The valve 67 is operated by means of an electric solenoid 120 which comprises a winding 121 and an armature 122 within the winding 121. The two ends of the winding 121 are connected respectively through leads 123 and 124 with the contact 114 of the timer 107 and with the alternating current lead 87.

The switch mechanism 82 comprises a switch 125 having a pair of contacts 126 and 127. The contact 126 is mounted on a flexible strip 128 which is fixed at one end and which is adapted to be moved at its other end by the piston 84 to close the contacts 126 and 127. The arm 128 is connected by means of a lead 129 with the alternating current lead 86, and the contact 127 is connected with the timer terminal 109 by means of a lead 130.

In the operation of the compressing machine, a number of stacks of tissue, or whatever other material is to be compressed, are positioned on the portion of the belt 13 supported by the loading table 12, such as between lines A and B on the belt (see FIG. 4). The machine is particularly useful in connection with stacks of facial tissues which are interfolded or may be C-folded. Such tissues are made of creped paper which, for example, may have a basis weight of about 7½ pounds per 2880 square feet (uncreped); and the stacks, for example, may have a size after folding of the tissues of about 4¼ inches by 9¾ inches. Such stacks may be positioned on the belt 13 in two parallel rows, of four stacks each, extending transversely of the machine, for example. Obviously, tissue stacks of different sizes may be utilized, it only being necessary that the area of the belt 13 covered by the batch of stacks equal to or less than the area of the pressure plate 20. Tissue stacks of different heights may be used with the machine, such as, stacks of 400 individual tissues or 200 two-ply tissues, which, before being compressed, may have a height of approximately 3½ inches, or alternately stacks of 200 or 600 individual tissues having proportional uncompressed heights may be used, for example.

After the tissue stacks have been placed on the belt 13 between the lines A and B, the switch 88 is manually closed, and the machine then automatically operates to move the belt 13 a predetermined distance from its original station to a second station to bring the batch of tissue stacks on top of the platen 16 and beneath the pressure plate 20. The hydraulic motor 19 then is operative to move the pressure plate 20 downwardly until it contacts the abutment strips 22, and the pressure plate 20 remains in this position for a predetermined time, such as one or two seconds; and the motor 19 then is operative to raise the pressure plate 20. The pressure plate 20 in making contact with the abutment strips 22

compresses the tissue stacks to a predetermined reduced height and therefore to a predetermined pressure. A press 10, of suitable size, is able to develop 80 tons of force, for example, or 10 tons per stack, in a batch of eight stacks of the size before mentioned. This is sufficient force to compress stacks of 400 individual tissues from a height of about 3½ inches to a height of 7/10 inch. After the pressure plate 20 raises, the tissue stacks re-expand somewhat; and, on aging, they re-expand still further. However, the stack height after aging of the tissues may be expected to be substantially less than the original height such as about 2¼ inches, so that the tissue stacks may be packed in a 2½-inch high carton instead of a four-inch high carton which would be required for the stacks without the compression.

While the pressure plate 20 is descending on the batch of tissue stacks between it and the platen 16 and is compressing the batch of stacks, a machine operator may be positioning still another batch of tissue stacks on the portion of the belt 13 supported by the loading table 12. After the pressure plate 20 has raised and after the additional batch of tissue stacks is positioned on the table 12, the operator may then again close the manual switch 88 to again start the cycle of operation. The new batch of tissue stacks moves along with the belt 13 beneath the pressure plate 20, so that the pressure plate may again descend to compress this batch of stacks; and this same movement of the belt 13 moves the previously compressed batch of stacks out on to the discharge table 11 from which the compressed stacks may be moved for packaging by a second operator.

The roller 44, when it drops into one of the openings 43 in the belt 13, functions in conjunction with the switch mechanism 94 to stop movement of the belt as will be hereinafter more fully described, and the belt 13 may be assumed to be in a predetermined position with one of the openings 43 being opposite to and receiving the roller 44 before operation of the machine is initiated by actuation of the manual switch 88. Under these conditions, the arm 111 of the timer 107 may be assumed to have rotated from its illustrated position counterclockwise, so that the contact 113 has just separated from the contact 114 and the contact 112 is in contact with the contact 116 to close the switch 115, the arm 111 being in its position as shown in dotted lines in FIG. 5.

After the batch of tissue stacks to be compressed is loaded on the portion of the belt 13 supported by the loading table 12, one of the operators actuates the manual switch 88 so as to bridge the contacts 90 and 91 with the switch blade 92, thereby completing a circuit to the motor 14 through the lead 87 and through the leads 86 and 89 and the switch 88. The motor 14 is then operative through the speed reducer 39, the sprockets 41 and 42 and the chain 40 to drive the belt driving roll 26. The belt 13 then moves over the rolls 26, 24, 31, 33, 34 and 28, and also over the platen 16, so as to move the tissue stacks on the loading table 12 beneath the pressure plate 20. The roller 44 moves out of the belt opening 43 in which it rested prior to the actuation of the switch 88, and the roller 44 acting through the lever 45 is then operative to move the plunger 100 against the spring 101 to close the switch 95, bridging the contacts 97 and 98 by means of the switch blade 99. The motor 14 thus continues in operation to move the batch of tissue stacks previously positioned on the table 12 beneath the pressure plate 20 even though the manual switch 88 is released to be opened by its spring 93, since the switches 88 and 95 are in parallel.

The switches 88 and 95 and the switch 115 are effective to provide electric voltage to the timer motor 108 to cause it to operate. A circuit is completed from the supply lead 86, through either or both of the switches 88 and 95, the lead 117, the contact 116, the contact 112, the lead 119, the terminal 109, the motor 108, the terminal 110, and the lead 118 to the other supply lead 87. Thus, the timer motor 108 is operative, on closing of the switch 88, to move the arm 112 counterclockwise to its illustrated, full line, position in which the contact 112 is out of contact with the contact 116 and in which the contact 113 is in circuit making condition with the contact 114. It is clear that this movement of the switch arm 111 from its dotted line position to its full line position takes place simultaneously with the movement of the belt 13 to position a new batch of tissue stacks beneath the pressure plate 20.

The movement of the belt 13 continues until another opening 43 of the belt 13 moves into register with the roller 44, so that the roller 44 drops into the opening 43 under the action of the spring 51 acting on the lever 45 carrying the roller 44. The plunger 100 moves along with the lever 45; and, on such movement of the roller 44 into an opening 43, the switch 95 is opened and the switch 96 is closed. The manual switch 88 has previously been allowed to open; and the switch 95, on opening, breaks the circuit to the motor 14, so that the belt 13 stops. This movement of the belt has been sufficient to move the batch of tissue stacks which have been previously placed on the portion of the belt on the loading table 12, beneath the pressure plate 20, so that the stacks are in position to be compressed.

The switch 96 completes a circuit through the solenoid 120 so as to energize the solenoid, the circuit being from the lead 86, through the contact 102 the switch blade 104, the contact 103, the lead 105, the contacts 113 and 114, the lead 123, the winding 121, and the lead 124, to the supply lead 87.

The pump 55 is operative to pump liquid from the liquid source 56 to the conduit 57, and the relief valve 58 is operative to maintain the liquid at a certain predetermined pressure within the conduits 57 and 65 which are connected by means of the ports 62 and 63 in the valve 58. The piston 60 moves downwardly against the spring 61 to uncover as much as necessary of the port 64 to allow sufficient liquid to drain through the port 64 and bleed conduit 66 to maintain this predetermined liquid pressure in the conduits 57 and 65.

When the solenoid 120 is energized as above described, it is operative to draw the armature 122 and the valve piston 72 upwardly so as to bring the groove 73 into register with the port 70. The elongated port 69 connected to the conduit 65 is thus connected by means of the groove 73 with the port 70, and the liquid under pressure is thus supplied to the conduit 80. The liquid flows through the conduit 80 and the port 77 of the hydraulic motor 19 into the upper portion of the casing 76, and the liquid under pressure moves the piston 79 and the pressure plate 20, which is connected with the piston through the rod 21, downwardly so as to compress the tissue stacks on the belt 13 between the platen 16 and the pressure plate 20. It will be noted that the lower end of the casing 76 is drained, with the piston 72 being in its raised position, draining being through the port 78, the conduit 81, the port 71 and the longitudinal groove 75 in the piston 72. There is, incidentally, a reduction of liquid pressure in the conduits 57, 65 and 80 to less than the maximum which is maintained by the regulator valve 58 and at which the bleed port 64 is opened by the piston 60, as the casing 76 is filled with liquid through the port 77 and as the pressure plate 20 moves downwardly toward the platen 16, until the plate 20 contacts the abutment strips 22.

The switch mechanism 82 becomes operative to actuate the timer 107 when the pressure plate 20 comes to rest on the abutment strips 22. At this time, since liquid discontinues flow into the casing 76 through the conduit 80 and port 77, the pressure in the conduits 57, 65, and 80 builds up and reaches a value sufficient to move the piston 84 of the switch mechanism downwardly against the action of the spring 85 so as to close the switch 125. Shortly thereafter, the piston 60 of the relief valve 58 moves

downwardly against its spring 61 so that regulator 58 is operative as previously described. The switch 125, in closing, functions to actuate the timer 107, so that the pressure plate 20 is maintained in engagement with the abutment strips 22 for a predetermined length of time determined by the timer, to maintain the tissue stacks compressed to the maximum amount and under the maximum pressure for this length of time.

The switch 125 completes a circuit through the timer motor 108 from the supply lead 86, through the lead 129, the contacts 126 and 127, the lead 130, the terminal 109, the motor 108, the terminal 110, and the lead 118, to the supply lead 87. The timer motor 108 is thus energized, and the arm 112 moves in a counterclockwise direction from its illustrated full line position, remaining in contact with the contact arc 114 during this movement.

The pressure plate 20 remains in contact with the abutment strips 22 and the switch 125 remains closed under the action of the piston 84 as long as the contact 113 of the timer 107 remains in contact with the contact arc 114, with the arm 112 of the timer 107 travelling counterclockwise. Eventually, after a predetermined time of compression, such as from one to fifteen seconds, the arm 112 will have rotated through a sufficient arc so that the contact 113 runs off the end of the contact 114 and disengages therefrom. The switch 106 comprising the contacts 113 and 114 thus is opened to de-energize the electric solenoid 120 in series with the switch 106, and the armature 122 and valve piston 72 drop back into their illustrated positions. The upper end of the casing 76 of the hydraulic motor 19 is thus drained through the port 77, the conduit 80, the port 70 and the slot 74 in the piston 72; and at the same time, fluid pressure is applied to the lower surface of the piston 79 from the conduit 65 through the port 69, the groove 73, the port 71, the conduit 81, and the port 78 so as to raise the pressure plate 20.

The spring 85 is effective to move the piston 84 upwardly, so that the switch 125 opens as the pressure within the conduit 80 connected to the switch mechanism is drained through the valve 67 as just described. The switch 125 has been effective to complete a circuit through the timer motor 108, and the motor 108 is thus de-energized when the switch 125 opens; so that the timer arm stops at its dotted line position, closing switch 115 and opening switch 106.

When the pressure plate 20 is completely lifted from the tissue stacks beneath it, the stacks have unrestrained heights less than their original heights as above mentioned, and these compressed stacks move out onto the discharge table 11 along with movement of a batch of uncompressed tissue stacks from the table 12 to a position beneath the pressure plate 20 as the belt 13 moves, these movements and the subsequent series of operations above described being again initiated by closing the manual switch 88.

The belt 13 may be of any suitable material, such as cotton webbing or rubber, natural or synthetic; and the pressure plate 20 is contemplated to be preferably of steel. In order to prevent sticking of the tissue stacks to the lower surface of the platen 20, this platen surface is preferably sand blasted; and such surface finish has been found to be very effective in this respect.

Although the press 10 may have any suitable dimensions, it has been found that for tissues as folded of the sizes mentioned, the pressure plate 20 and the platen 16 may have surface areas of 20 inches x 20 inches, for example. The piston 79 in the hydraulic motor 19 may, for example, have a working stroke of about four inches so as to move from a height of about 4.7 inches to .7 inch above the platen 16, if the machine is used in connection with the stacks of 400 tissues above mentioned. The stroke of the piston, of course, may be varied within wide limits with changes in height of the stacks.

It will, of course, be understood that the sizes of component parts of the press 10, the pressure at which the pressure plate 20 is effective on the tissue stacks, the speed of the belt 13, the duration of time during which the pressure plate 20 remains in engagement with the abutment strips 22 and the speeds of the other parts of the compressing mechanism may be changed as desired. It is contemplated, however, that a complete cycle for this machine may be made in 20 seconds or less; so that, with skilled operators, the machine may have a capacity of 24 tissues stacks per minute. The belt 13 may advance from one station to the next, at both of which the roller 44 is disposed in an opening 43, in only a couple of seconds, if desired, after which the pressure plate 20 begins to move downwardly. The downward movement of the pressure plate 20, for example, may take place in about seven seconds; the tissue stacks may be held under compression for two seconds and the pressure plate 20 may be returned to its original upraised position in five seconds. The amount of movement that the belt may have between stations may also be changed; however, for the batches of tissue stacks above described, a satisfactory movement for the belt between stations is about 32 inches.

It will be understood that the amount of compression that the machine applies to the tissue stacks can well be changed simply by changing the thickness of the abutment strips 22, the thicknesses of the strips 22 being reduced for greater compressive pressure and vice versa. In the event that the number of sheets in the stacks are changed, the thicknesses of the abutment strips 22 may likewise be changed, as is apparent, for maintaining the same compressive pressure on the stacks.

The illustrated machine advantageously is a relatively small sized unit considering the high pressures that are applied and the resultant radical reductions in tissue stack height. The machine also is relatively simple and requires a small capital investment; and it is easily operated, maintained and kept in adjustment. The press 10 may be a commercial, readily available unit, rather than custom made; and this component thus is relatively inexpensive due to this reason. It will be noted that the actual forces of compression do not act against rollers or bearings due to the fact that the belt 13 is not moving while actual compression is taking place and the platen 16 and pressure plate applying the forces of compression are opposite each other; and, from this standpoint, maintenance may be expected to be a minimum. The machine may be easily adjusted to accommodate thicker or thinner tissue stacks simply by changing the thicknesses of the abutment strips 22.

I wish it to be understood that the invention is not to be limited to the specific constructions and arrangements shown and described, except only insofar as the claims may be so limited, as it will be apparent to those skilled in the art that changes may be made without departing from the principles of the invention.

I claim:

1. In mechanism for compressing articles of creped paper, a combination of a platen member, a pressure plate member, a source of supply of liquid under pressure, a hydraulic motor for moving said pressure plate toward said platen so as to compress the creped paper articles between said platen and pressure plate, a stop of non-yieldable material mounted on one of said members to limit the movement of said pressure plate toward said platen and thereby limit the height to which the creped paper articles are compressed, means for providing a connection from said pressure source to said motor so as to render the motor operative to so move said pressure plate toward said platen, timing mechanism operative a predetermined time after actuation of the timing mechanism to break said connection of said pressure source and said hydraulic motor, means for actuating said timing mechanism to render it operative as above mentioned when said stop on one of said members makes contact with said other member and including a fluid pressure respon-

sive control device operatively connected with said hydraulic motor and responsive to the fluid pressure applied to the hydraulic motor through said connection so as to so actuate the timing mechanism when the fluid pressure applied to the hydraulic motor increases above a predetermined value, and means under the control of said timing mechanism for moving said pressure plate away from said platen out of compressing relation with the latter when the timing mechanism is operative as above mentioned.

2. In mechanism for compressing articles of yieldable material, the combination of a platen, a pressure plate, a motor for moving said pressure plate toward said platen so as to compress the yieldable material articles between the pressure plate and platen, an endless belt having a plurality of spaced openings therethrough and passing over said platen and arranged to receive the yieldable material articles at a loading station and move them a predetermined distance to a station between said pressure plate and platen for compression, a motor for driving said belt, a manual control for said belt driving motor to initiate movement of said belt to bring the yieldable material articles loaded on the belt between said platen and pressure plate, first control mechanism to render said belt motor inoperative, second control mechanism to render said pressure plate motor operable to cause the pressure plate to move toward the platen, a control device connected to both of said control mechanisms and including a follower riding on said belt and movable into said belt openings to cause said first control mechanism to de-energize said belt motor to stop said belt and to cause the second control mechanism to energize said pressure plate motor to move said pressure plate toward said platen for compressing the yieldable material articles, and means for moving said pressure plate away from said platen after such compression.

3. In mechanism for compressing articles of yieldable material, the combination of a platen, a pressure plate, a motor operative for advancing said pressure plate toward said platen and for holding it in advanced position so as to compress the yieldable material articles therebetween, an endless belt passing over said platen on which the yieldable material articles may be positioned and having a plurality of spaced openings therethrough, a motor for driving said belt so as to move the articles a predetermined distance from a loading station to a compressing station between said pressure plate and platen, a manual control device effective on said belt motor to energize the motor for moving the belt, a control switch having a follower riding on said belt and movable into said openings to thereby actuate the switch, electric control mechanism connected with said belt motor, electric control mechanism connected with said pressure plate motor, both of said electric control mechanisms being connected with said switch so that when the switch is actuated by said follower moving into one of said openings the belt motor is de-energized to stop the belt and the pressure plate motor is energized to move the pressure plate toward said platen to compress the yieldable material articles, and timing mechanism having an effective connection with said pressure plate so that the timing mechanism is actuated when the pressure plate reaches its article compressing position and is operative a predetermined time after such actuation to render said pressure plate motor inoperative to hold the pressure plate in advanced position, and means under the control of said timing mechanism for moving said pressure plate away from said platen out of compressing position when the timing mechanism is operative as above mentioned.

4. In mechanism for compressing articles of creped paper, the combination of a platen, a pressure plate, a motor for moving said pressure plate toward said platen so as to compress the creped paper articles between the pressure plate and platen, a stop of non-yieldable material mounted on said platen to limit the movement of said pressure plate toward said platen and to thereby limit the compression given the creped paper articles to a predetermined thickness of the articles, an endless belt extending over said platen and having a series of openings therein, means for supporting said belt at a loading station which is spaced from said platen, a motor for driving said belt so that the belt may carry the creped paper articles previously loaded thereon at said loading station a predetermined distance between said pressure plate and platen for compression therebetween, a belt follower which is spring biased so as to be movable into said openings in the belt which are spaced said predetermined distances apart, a switch actuated by said follower as it moves into each of said openings, a manually operated control for said belt motor for actuating the motor to cause movement of said belt from one of said stations to the next station, control mechanism for said belt motor and connected with said switch and control mechanism for said pressure plate motor and connected with said switch for respectively causing the belt motor to stop operation and the pressure plate to move toward said platen as the switch is actuated by said follower moving into one of said belt openings, timing mechanism controlled by the position of said pressure plate and having an operative connection with said pressure plate motor for rendering the pressure plate motor inoperative to further press the pressure plate toward said platen a predetermined time after the pressure plate has reached its paper compressing position with respect to said plate, and means under the control of said timing mechanism for moving said pressure plate away from said platen out of compressing relation with the latter when the timing mechanism is operative as above mentioned.

5. In mechanism for compression articles of yieldable material, the combination of a platen, a pressure plate, a hydraulic motor for moving said pressure plate toward said platen so as to compress the yieldable material articles between the pressure plate and platen, a loading table and a discharge table, an endless belt extending over said platen and over said tables and having a series of openings therein, a motor for driving said belt so that the belt may carry the yieldable material articles a predetermined distance from a loading station on said loading table to a compressing station between said pressure plate and platen and may carry the articles a like distance from said compressing station to a discharge station on said discharge table, a manually controlled switch for said belt motor for actuating the motor, a belt follower spring biased so as to be movable into said openings in the belt corresponding to each of said stations, a switch actuated by said follower as it moves into said openings, a source of liquid under pressure, a two position valve for connecting said pressure source with said pressure plate motor to move the pressure plate toward said platen in a first position of the valve and to move said pressure plate away from said platen in a second position of the valve, an electric solenoid for moving said valve from its said second position to its said first position when the solenoid is energized and being connected to said belt actuated switch so that the solenoid is energized when the follower is positioned in said belt openings, a stop of nonyieldable material mounted on said platen so as to limit the movement of said pressure plate toward said platen and thereby limit the compression given to the yieldable material articles, a timing mechanism connected with said solenoid to be de-energize the solenoid a predetermined time after actuation of the timing mechanism, and pressure responsive switch mechanism connected with said pressure plate motor and said valve for actuating said timing mechanism as the fluid pressure impressed thereon increases to a predetermined value, said pressure responsive switch mechanism including a spring pressed plunger subject to the liquid pressure applied to said pressure plate motor and a switch operated by said plunger when the plunger moves against its spring on an

increase of the liquid pressure applied to said pressure plate motor when the pressure plate strikes said stop.

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