March 9, 1954 H. H. OLSON 2,671,493

APPARATUS FOR APPLYING COVERING MATERIAL TO THE TOPS OF DESKS, TABLES, AND THE LIKE

Filed Feb. 24, 1951 3 Sheets-Sheet 1

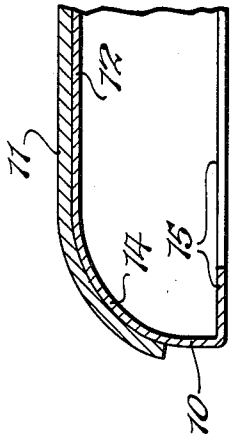


Fig. 2.

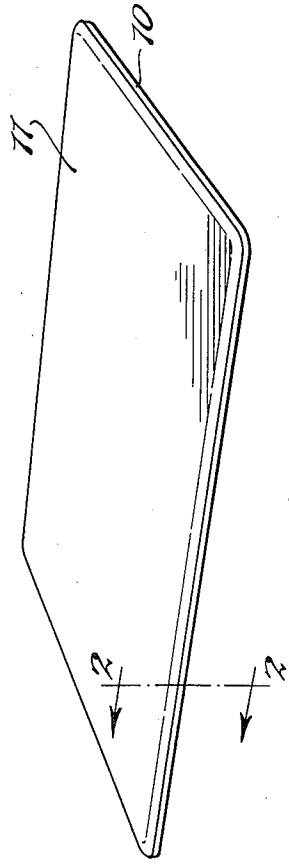


Fig. 1.

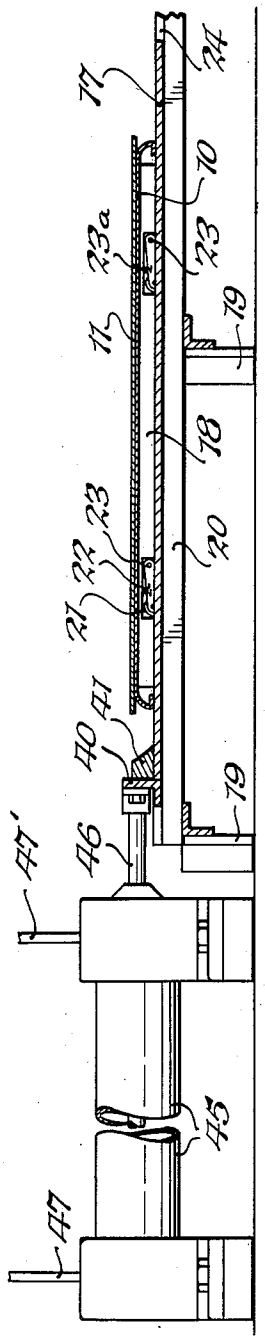


Fig. 3.

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Filed Feb. 24, 1951 3 Sheets-Sheet 2

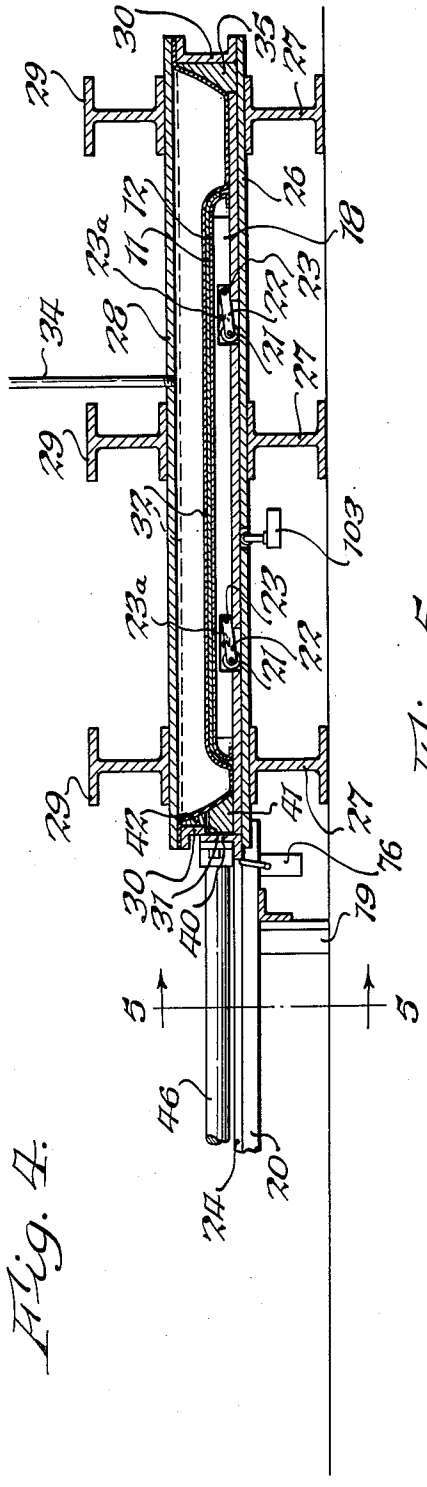


Fig. 4.

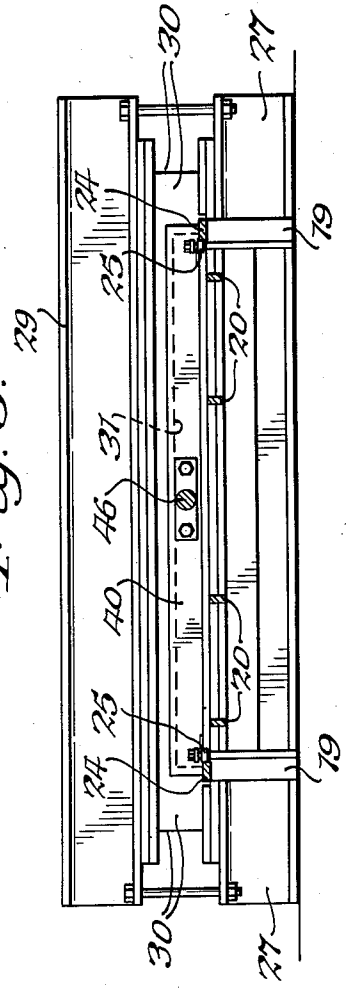


Fig. 5.

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Filed Feb. 24, 1951 3 Sheets-Sheet 3

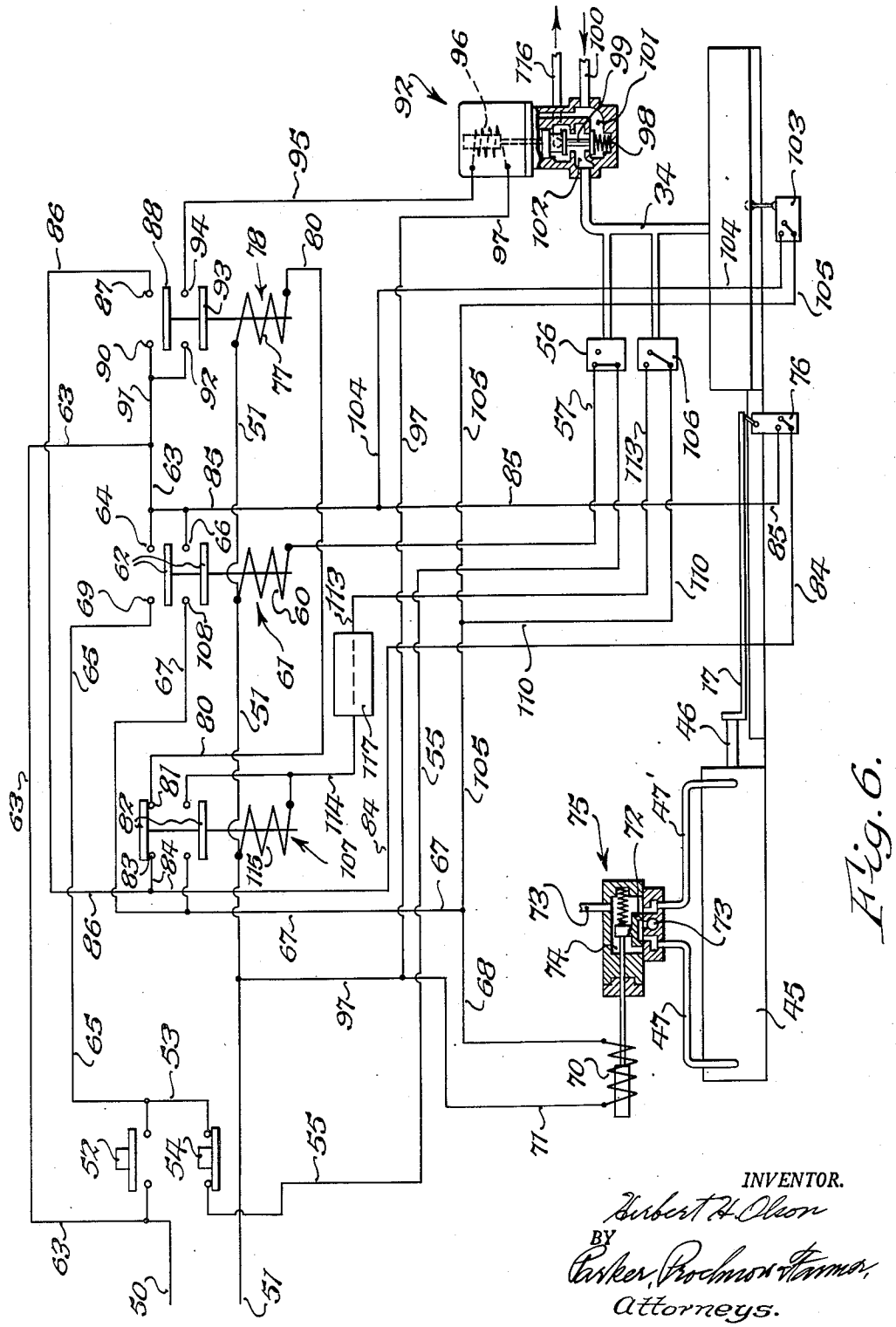


Fig. 6.

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UNITED STATES PATENT OFFICE

2,671,493

APPARATUS FOR APPLYING COVERING MATERIAL TO THE TOPS OF DESKS, TABLES, AND THE LIKE

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Application February 24, 1951, Serial No. 212,593

6 Claims. (Cl. 154—1)

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This invention relates to improvements in apparatus for applying covering material such, for example, as linoleum to the tops of desks, tables and the like.

One of the objects of this invention is to provide an apparatus for quickly and efficiently applying a covering material to the tops of desks or other articles of furniture in such a manner that the covering material will be smoothly applied to the tops and to rounded edges and corners thereof.

Another object is to provide apparatus of this type with a carrier movable into a position to receive a top and in which the covering material is initially laid on the top in correct relation thereto, and from which position it is movable into a pressure chamber in which pressure is applied to the covering material in such a manner as to press the covering material on the flat surface of the top and on the rounded edges of the corners thereof.

A further object is to provide apparatus of this type including a flexible diaphragm within the pressure chamber and in which the diaphragm is pressed by fluid pressure against the upper, flat surface, the rounded edges and the corners of the top.

Still another object is to provide automatic means for controlling the operation of the apparatus.

Other objects and advantages will be apparent from the following description of one embodiment of the invention and the novel features will be particularly pointed out hereinafter in connection with the appended claims.

In the accompanying drawings:

Fig. 1 is a perspective view of a top of a desk or the like having the linoleum or other covering material applied thereto.

Fig. 2 is a fragmentary, sectional view thereof, on an enlarged scale, the section being taken on line 2—2, Fig. 1.

Fig. 3 is an elevation, partly in section, of a part of an apparatus embodying the invention, on which the top and covering material are placed into correct relation to each other on a carrier.

Fig. 4 is a sectional elevation showing the remaining portion of the apparatus, including a pressure chamber.

Fig. 5 is an end elevation, partly in section, on line 5—5, Fig. 4.

Fig. 6 is a diagrammatic view of the electrical and fluid pressure connections between parts of the apparatus.

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Referring, in the first place, to Figs. 1 and 2, which show by way of example one type of top which may be produced by means of the apparatus shown, 10 represents the core or body of the top of a desk, table or other article on which covering material 11 of any suitable type, such for example, as linoleum, is secured by means of a suitable adhesive. The core 10 in the construction shown is formed of sheet metal having a substantially flat, upper portion 12 terminating at its edges in downwardly curved portions 14 which terminate at their lower edges in inwardly extending flanges 15. The corners of the core are also rounded, and the covering material 11 is cemented to the flat portion of the core and the edges thereof are flexed or bent around the curved sides and corners in such a manner as to produce wrinkle-free, curved edge and corner portions without cutting or slitting the corner portions of the covering material.

The apparatus on which the covering material is applied includes a carriage 17, Figs. 3 and 4, having a substantially flat, upper surface on which the core 10 may be positioned. The carriage may, for example, be provided with an upwardly extending plate or portion 18 which is of such proportions that the undersurface of the flat portion of the core 10 may rest upon the upper surface of this upwardly extending portion 18 of the carriage, the downwardly curved portions 14 of the top and the flange 15 extending beyond the supporting part 18, and preferably rest directly on the carriage 17. If a wooden core is used, the upwardly extending part 18 may be omitted and the core in that case may lie directly on the flat face of the carriage.

The carriage 17 is mounted for movement lengthwise of the apparatus on suitable guide members, such for example as rails or tracks 20 supported on legs or feet 19, and to facilitate movement of the carriage along the guide tracks, a plurality of rollers 21 are provided which are mounted on the ends of arms 22 pivoted at 23 on the carriage. These arms are normally pressed downwardly by any suitable resilient members, such as springs 23a, and these springs are of sufficient strength so that the carriage 17 with the desk top and covering material thereon is normally lifted thereby, slightly above the guide members or tracks 20, but when sufficient pressure is applied to the upper surface of the top, the rollers and arms are deflected upwardly into the position shown in Fig. 4, so that the carriage 17 will rest directly on the supporting surface. The guide means for the carriage prefer-

ably also includes guide bars 24 arranged at opposite sides of the tracks to engage the sides of the carriage and, if desired, guide rollers 25 may be provided for guiding the carriage into and out of the pressure chamber shown in Fig. 4.

The carriage is movable relatively to its guide means from a position shown in Fig. 3 into a pressure chamber shown in Fig. 4. This pressure chamber may be of any desired construction and, as shown, includes a bottom or support 26 for the carriage or for the articles to be treated and which in the construction shown, may be in the form of a plate resting on suitable supporting beams 27. This bottom wall may, if desired, support the wheels 21 of the carriage when the same enters the pressure chamber. The pressure chamber also includes an upper wall 28 which may also be in the form of a plate held by means of a plurality of beams 29 against upward deflection due to pressure within the chamber. The top and bottom walls of the pressure chamber are connected by means of side and end walls 30 suitably secured thereto.

Pressure is applied to the core and the linoleum or other covering material therefor when in the pressure chamber, by means of a flexible and elastic diaphragm 32 which may be made of rubber or similar material. In the construction shown by way of example, this diaphragm is suitably secured at its edges to the top wall 28 of the chamber. For example, in the construction shown, the edge portions of the diaphragm are pinched between the upper ends of the side and end walls 30 and the top wall 28, to form a fluid-tight connection between the top wall of the pressure chamber and the diaphragm. Consequently, when the diaphragm is deflated, it will be drawn into the position shown in broken lines in Fig. 4, either by its own resilience or by evacuating the fluid from the space between the diaphragm and the upper wall of the pressure chamber.

When the carriage is in the position shown in Fig. 3, a core 10 to be covered may be properly positioned on the upwardly extending core supporting portion 18 of the carriage. The covering material, in a substantially flat form, is correctly positioned on the core either before the same is positioned on the carriage or while the core is on the carriage, with the edge portions of the covering material extending outwardly beyond the flat surface of the core to the desired extent, as shown in Fig. 3. Any suitable adhesive may be used for securing the covering material to the core. Preferably, a pressure-sensitive adhesive is used with which the lower surface of the covering material and the upper surface and the downwardly curved edge and corner portions of the core are coated. When the core with the covering material properly positioned thereon is correctly placed on the carriage 17, this carriage is moved along the guideway or tracks 20 into the pressure chamber, whereupon fluid pressure is admitted into the pressure chamber above the diaphragm 32, for example, through a pipe or conduit 34. The diaphragm, which normally lies in close proximity to the upper wall 27 of the pressure chamber, approximately as shown in broken lines in Fig. 4, is then forced downwardly by fluid pressure into the position shown in Fig. 4, in which the covering material is securely pressed against the upper surface of the core. The diaphragm is sufficiently flexible so that it will be stretched by the fluid pressure around

the edges and corners of the furniture top, and thus press the covering material against the downwardly curved edge and corner portions of the core. At the edges of the core, the diaphragm turns the edges of the covering material over to lie against the sides of the core, and at the corners of the core the diaphragm moulds and shapes the corners of the covering material in such a manner that they will be secured to the corner portions of the top smoothly and without wrinkles. Portions of the diaphragm beyond the periphery of the top will be forced by the air pressure flatly upon the upper surface of the carriage, as shown in Fig. 4.

In order to prevent excessive distortion and stretching of the elastic diaphragm, the side walls of the pressure chamber are preferably provided with forms 35 which serve as filler members or corner pieces which fill in the lower corners and interior edges of the pressure chamber to support the edge portions of the diaphragm when inflated, and preferably the edges of the carriage fit into close proximity to these forms when the carriage is within the pressure chamber. These forms prevent the fluid pressure from forcing the diaphragm into the lower edges and corners of the pressure chamber and thus prevent excessive stretching of the diaphragm.

One of the upright walls 30 of the pressure chamber is constructed to provide an entrance for the carriage into this chamber, and this wall, therefore, has an opening 31 of sufficient size so that the carriage with the core and its covering material may move freely through this opening into and out of the pressure chamber. The carriage 17 is provided with an end wall 40 which extends across this opening 31 when the carriage is in its inner position in the pressure chamber and the carriage may also be provided with a form or corner piece 41 which may cooperate with a form 42 secured to the upper portion of the entrance wall 30, so that these two forms cooperate to prevent excessive distortion of the rubber diaphragm at the entrance end of the chamber.

The carriage, of course, may be moved manually into and out of its operative position in the pressure chamber and no force is necessary to hold it in its inner position, since the diaphragm exerts pressure mainly downwardly on the carriage. If desired, however, the carriage may be moved into the pressure chamber by any suitable mechanism and, in the construction shown for this purpose, a fluid pressure operated mechanism is employed including a cylinder 45 containing a piston (not shown) connected with a piston rod 46 which is suitably secured to the wall 40 of the carriage. When the carriage is in the position shown in Fig. 3, the piston within the cylinder 45 will be withdrawn toward the left end of the cylinder 45 in Fig. 3. However, when pressure is applied to the head of the piston, for example, through a pipe or conduit 47, and the conduit 47' is connected to exhaust 73, the piston and piston rod 46 will be moved outwardly with relation to the cylinder 45 to move the carriage into the pressure chamber, as shown in Fig. 4. The cylinder 45 may, of course, be located in any desired position. To simplify the illustration of this apparatus, it is herein shown as located at the end of the carriage, but it may, for example, be located below the pressure chamber and suitably connected with the carriage.

If desired, automatic controls may be em-

ployed to move the carriage, apply pressure to the diaphragm and discharge the pressure fluid from the diaphragm after an interval of time sufficient to cause the covering material to adhere firmly to the top. If desired, the controls may then actuate the mechanism to withdraw the carriage into the outer position to permit the removal of the finished top.

In Fig. 6 is shown diagrammatically and by way of example an automatic control system which may be employed in connection with the apparatus described. Electric current to operate the mechanism is supplied by power lines or conductors 50 and 51. To start the operation of the system, a starting switch or button 52 is depressed, thereby permitting current to flow from the current supply line 50 through the switch 52 through line 53 to the normally closed stop switch 54, through line 55 to the normally closed pressure controlled switch 56, line 57 to the coil 60 of relay 61 and thence back to the other power supply line 51.

Energization of the coil 60 raises the contact members 62 and thereby establishes a holding circuit, so that the starting button 52 can be released. Current now flows through the line 50, line 63 to terminal 64, contact member 62, terminal 69, line 65, back to line 53, line 55, pressure switch 56, line 57, and relay coil 60 to the line 51. Thus, energization of relay 60 establishes a circuit from terminal 66 which is connected to the line 63 and current supply line 50, contact member 62, terminal 108, line 67, line 68 to the solenoid coil 70 of a four-way valve 75, then through lines 71 and 97 and back to the other power line 51. This valve 75 may be of any suitable or desired construction. Such solenoid controlled valves are readily available on the market and, consequently, this valve is shown more or less diagrammatically. When the solenoid 70 is energized, the D-valve 72 is pushed against spring pressure to the right, as shown in Fig. 6. This permits fluid under pressure from the supply line 73 and chamber 74 to pass through the pipe 47 to the head of the cylinder 45, thus pushing the piston rod 46 and carriage 17 to the right in Fig. 6 into the pressure chamber. As the carriage 17 enters the pressure chamber, a momentary contact switch 76 is actuated. This momentary contact of switch 76 permits current to flow from the supply line 51 to the coil 77 of relay 78, line 80, terminal 81, contactor 82 and terminal 83 of a relay 107, line 84, switch 76, line 85 to the line 63 back to the other power line 50. This establishes a holding circuit in the relay 78 and current now flows through the power line 51, relay coil 77, line 89, to terminal 81, through contactor 82 to terminal 83 to line 86 to terminal 87, contactor 88, terminal 90, line 91 to the line 63 and back to power line 50, thus continuing energization of coil 77 of the relay 78.

This completes a circuit through a three-way valve 92 and current flows from power line 50, line 63, line 91, terminal 92, contactor 93, terminal 94, line 95, solenoid coil 96, line 97, back to power line 51. This three-way valve may also be of any desired or well known construction, and is merely illustrated diagrammatically in Fig. 6. Energization of the solenoid 96 of the three-way valve 92 pushes the valve stem and valves 99 downwardly against the tension of the spring 98, thereby permitting fluid pressure from supply pipe 100 to pass from the chamber 101 to chamber 102 and pipe 34 which is connected to the pressure chamber behind the diaphragm 32 in the pressure chamber. As pressure increases on the diaphragm, it causes the carriage 17 to deflect downwardly against the yielding members 22 and thus actuate a limit switch 103, see also Fig. 4, which closes another parallel circuit to the four-way valve 75. It will thus be seen that the springs 23a which act on the arms 22 serve the two-fold purpose of permitting the carriage to move into engagement with the bottom wall 26 of the pressure chamber, thus making it possible to employ relatively light arms 22 and rollers 21, and also enabling the downward movement of the carriage, caused by fluid pressure of the diaphragm, to actuate the limit switch 103. This current is supplied through the line 50, line 63, line 85 and line 104, limit switch 103, line 105, line 68, solenoid coil 70, line 71, line 97 to power line 51. Pressure now builds up in the chamber and the normally closed pressure switch 56 opens the circuit which it held to relay 61. This switch is set to be actuated at any desired pressure, for example, at some pressure below 25 pounds. This actuation thus breaks one circuit supplying electric power to the four-way valve solenoid 70 and current is now supplied to this solenoid 70 through the before mentioned circuit established by the limit switch 103.

When the pressure in the chamber reaches the desired maximum, for example, forty pounds per square inch, a normally open pressure switch 106 will be closed and will establish a circuit to the relay 107. Current then flows from the power line 50, line 63, terminal 66, contactor 62 and terminal 108 of the relay 61, line 67, line 105, line 110, switch 106, line 113, line 114, coil 115 of the relay 107 and back to the power line 51. This energization of the coil 115 of the relay 107 breaks the circuit to the coil 77 of relay 78 through the contacts 83, 82 and 81 being opened. De-energization of the coil 77 of relay 78 thereby also breaks the circuit to the coil 96 of the three-way valve 92 by the opening of the circuit between terminal 92, contactor 93 and terminal 94.

The spring 98 of the three-way valve returns the stem and valves 99 back to their normal position permitting the exhaust from the pressure chamber to pass through the pipe 34, valve chamber 102 to the exhaust pipe 116. This causes the carriage 17 to return to its normal position, thus releasing pressure on the limit switch 103, causing the circuit through the switch to be broken to the four-way valve solenoid 70. This permits the spring-loaded D-valve 72 to return to its normal position, which is to the left in Fig. 6, thus permitting fluid pressure from the pipe 73 to enter the pipe 47' connected to the right side of the cylinder 45, connect the pipe 47 to exhaust 73 and thereby return the piston rod 46 and carriage back to its retracted position out of the pressure chamber. All circuits are now open and none of the coils of the relay or valves is energized, and fluid pressure will continue to hold the carriage in its retracted position.

If at any time during the travel of the carriage into the pressure chamber it is desired to stop the operation, the stop switch 54 may be depressed, and this will return everything back to the normal or inoperative position.

If desired, a timing device 117 may be inserted between the lines 113 and 114 and thus maintain a pressure of continued duration on the

top, for example, when using glues or cements that require a continued pressure for a time interval.

When the carriage is returned to its initial position, the automatic cycle is completed. The core with the covering material cemented thereto can then be removed from the carriage 17 and another core and a sheet of covering material may be placed on the carriage, whereupon the apparatus is ready to repeat its cycle of operation.

When a pressure-sensitive adhesive is employed, no heating of the pressure chamber is necessary, but if it is desired to use this apparatus with an adhesive or cement that requires heating, it will be obvious that the fluid under pressure may be heated to the desired temperature or heating means, such as steam coils, may be provided to heat the core from underneath while pressure is applied to the covering material by means of a diaphragm.

It will be understood that various changes in the details, materials, and arrangements of parts which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention, as expressed in the appended claims.

I claim as my invention:

1. Apparatus for applying covering material to cores, which includes a carriage for receiving a core and covering material, a pressure chamber for receiving said carriage with said core and covering material in place thereon, guide members cooperating with said carriage for guiding said carriage in its movement into and out of said pressure chamber, said pressure chamber having an upper wall, an elastic diaphragm secured to said upper wall of said pressure chamber and which, when deflated, permits said carriage to move under the same, a valve for supplying fluid pressure to said diaphragm for expanding said diaphragm to exert pressure on said covering material and core, fluid pressure actuated mechanism for moving said carriage into and out of said pressure chamber including a valve, an electrical switch of the momentary contact type which is depressed by the operator to momentarily close a circuit including a pressure actuated switch for the purpose of opening said circuit when pressure in said pressure chamber reaches desired amount, an electrical relay for maintaining said circuit when said momentary contact switch is again opened, said relay closing a second circuit including a solenoid connected with said valve to move said valve into open position for admitting fluid under pressure to said pressure actuated mechanism to urge said carriage into said pressure chamber.

2. Apparatus according to claim 1, and including a second switch of the momentary contact type which is located in the path of movement of said carriage into its final position in said pressure chamber and which is actuated by said carriage to momentarily close a circuit including a second electrical relay, said second electrical relay completing a circuit to a second solenoid controlled valve for moving said second valve into a position to discharge fluid pressure into said space between said diaphragm and said upper wall of said pressure chamber for forcing said diaphragm downwardly against said covering material and core.

3. Apparatus for securing covering materials to cores, including a carriage for receiving the core and covering material, a pressure chamber including a resilient member arranged to be actuated by fluid pressure to bear against said covering material and core, guide means cooperating with said carriage for guiding the movement of said carriage into and out of said pressure chamber, fluid pressure controlled mechanism connected with said carriage for affecting movement of the same into and out of said pressure chamber, a solenoid operated valve controlling the flow of pressure fluid to said mechanism to move said carriage into and out of said pressure chamber, a second solenoid operated valve controlling the admission and discharge of pressure fluid to said pressure chamber, electrical circuits including a switch momentarily actuated by the operator, of said first solenoid operated valve actuating said mechanism to move said carriage into said pressure chamber, a second switch momentarily actuated by said carriage when approximately in said chamber, circuits controlled by said second switch for actuating said second valve for supplying fluid pressure to said resilient member, means for yieldingly supporting said carriage in an upper position and which yield to permit said carriage to be lowered when pressure is applied thereto by said resilient member in said pressure chamber, a limit switch which is closed during the initial lowering of said carriage against said resilient means, means for exhausting fluid under pressure from said resilient member when the desired pressure has been attained, and means operated by the opening of said limit switch due to raising of said carriage by the reduction of pressure acting thereon, to effect the return of movement of said carriage out of said pressure chamber to its initial position.

4. Apparatus according to claim 3, and including timing mechanism for delaying the exhausting of fluid under pressure from said resilient member.

5. Apparatus for securing covering material to cores, including a carriage for receiving the core and covering material, a pressure chamber including a resilient member arranged to be actuated by fluid pressure to bear against said covering material and core, guide means cooperating with said carriage for guiding the movement of said carriage into and out of said pressure chamber, fluid pressure controlled mechanism connected with said carriage for effecting movement of the same into and out of said pressure chamber, a solenoid operated valve controlling the flow of pressure fluid to said mechanism to move said carriage into and out of said pressure chamber, a second solenoid operated valve controlling the admission and discharge of pressure fluid to said pressure chamber, electrical circuits including a switch momentarily actuated by the operator, a circuit completed by said switch, a relay in said last mentioned circuit, said relay completing its circuit to said solenoid of said first valve to actuate said mechanism to move said carriage into said pressure chamber, a said second switch momentarily actuated by said carriage when approximately in said chamber, a circuit completed by said second switch to a second relay, said second relay completing said circuit to said solenoid of said second valve for admitting pressure fluid to said chamber, yielding means for supporting said carriage in an upper position and which yield to permit said carriage to be lowered when pressure is applied thereto by said resilient member in said pressure

chamber, a limit switch which is closed when said carriage is lowered, an independent circuit closed by said limit switch to said solenoid of said first valve controlling said pressure operated mechanism, for maintaining said first valve in same position as previously set by said switch momentarily actuated by the operator, means for opening said circuit including said first relay, said solenoid of said first valve and said pressure actuated switch which opens said circuit when pressure in said pressure chamber is sufficient to close said limit switch, leaving said first valve controlling said mechanism solely responsive to said limit switch, and also including a second pressure actuated switch in a circuit including a third relay, said third relay in said circuit to said second relay controlling said valve admitting pressure fluid to said pressure chamber, said second pressure switch when pressure in said pressure chamber reaches the desired amount of closing said circuit to said third relay causing said third relay to open said circuit to said second relay, thereby causing said second relay to open said circuit to said second valve, thereby causing said second valve to discharge pressure fluid from said pressure chamber, and said limit switch when open due to raising of said carriage by the exhaust of pressure fluid acting on said resilient member opening the circuit leading to said solenoid of said first valve, thereby reversing said valve to cause said fluid actuated member to move said carriage out of said pressure chamber to its initial position.

6. Apparatus for applying covering material to cores which includes a carriage for receiving a core and covering material, a pressure chamber for receiving said carriage with said core and covering material in place thereon, said pressure chamber having a bottom and a top wall, a diaphragm mounted on said top wall, said carriage having wheels on which said carriage is rolled into and out of said chamber and which are movable up and down relatively to said carriage, supporting means on which said wheels roll when said carriage is moved into and out of said pressure chamber, yielding means interposed between said carriage and said wheels and exerting sufficient force on said wheels to support said carriage above said supporting means during movement of said carriage into and out of said chamber, said wheels being movable toward said carriage against the action of said yielding means to permit said carriage to rest on the bottom of said pressure chamber when downward pressure is applied by said diaphragm to said covering material and said core on said carriage.

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