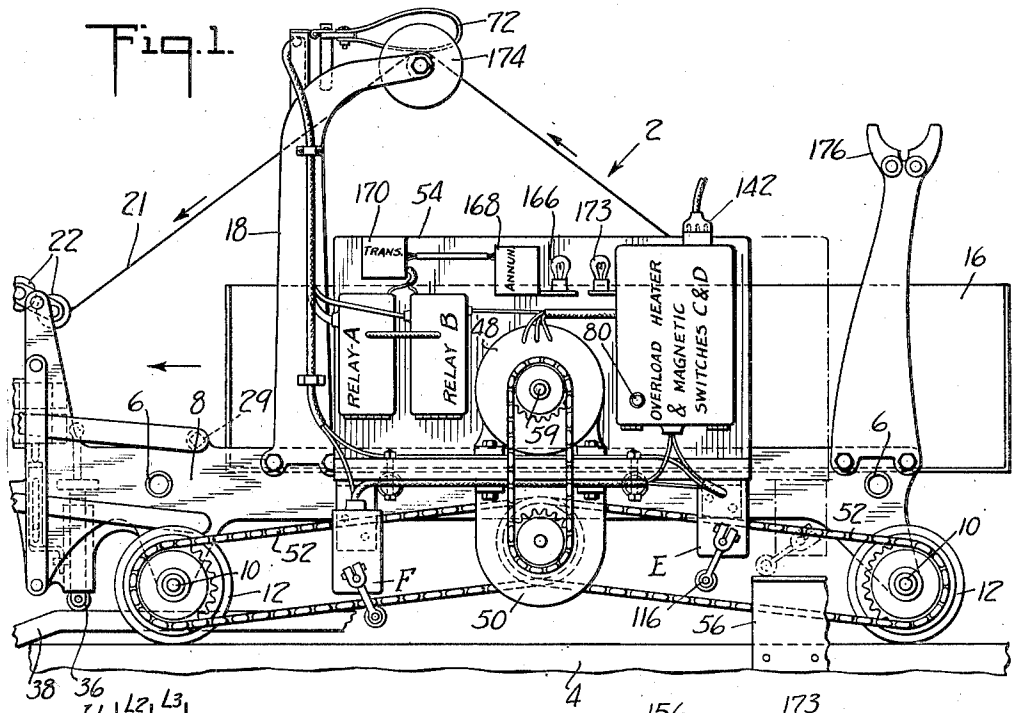
Feb. 21, 1939. I. KRASSNER 2,148,375

CLOTH LAYING MACHINE

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Fig. 1.



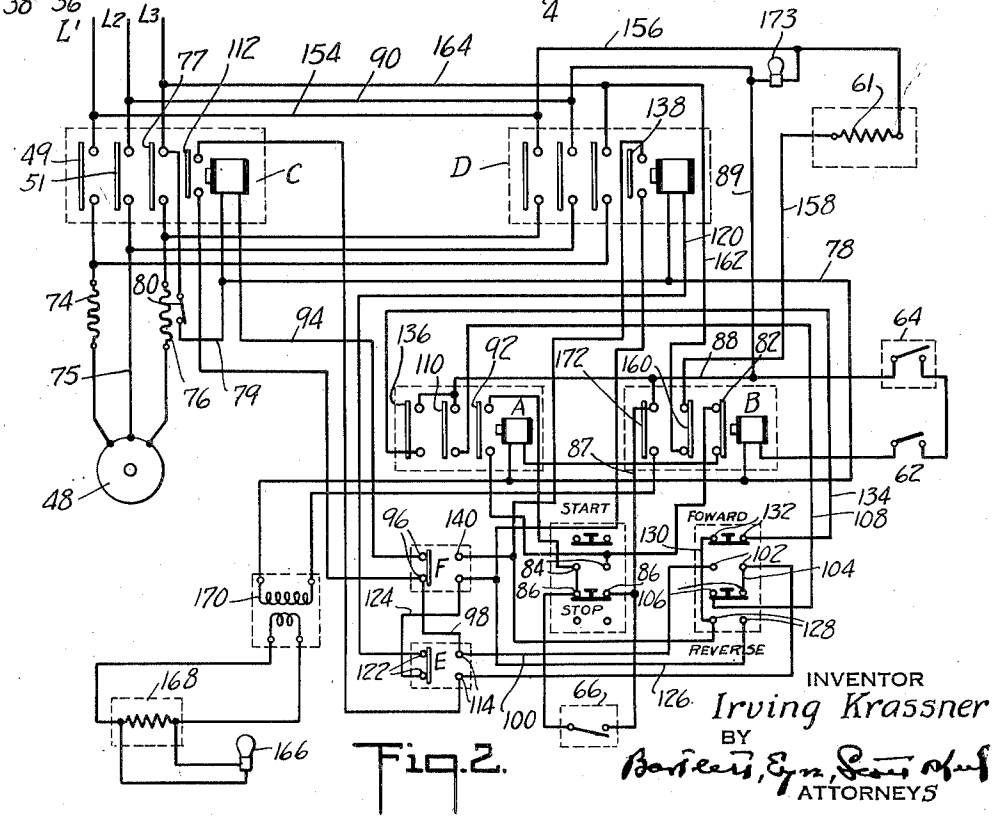


Fig. 2.

INVENTOR
Irving Krassner
BY
Barlow, Egan, Scott & Hurt
ATTORNEYS

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CLOTH LAYING MACHINE

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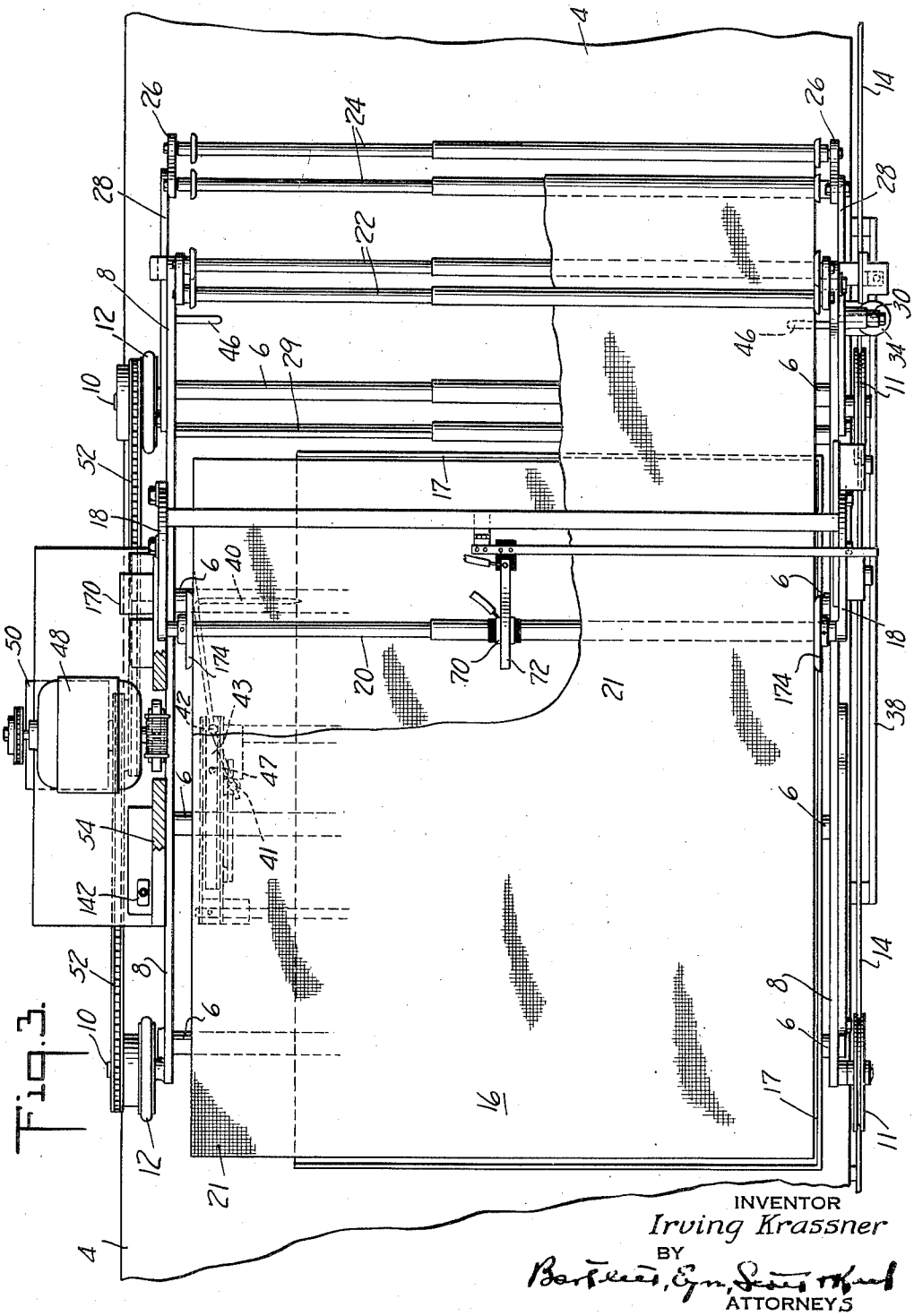


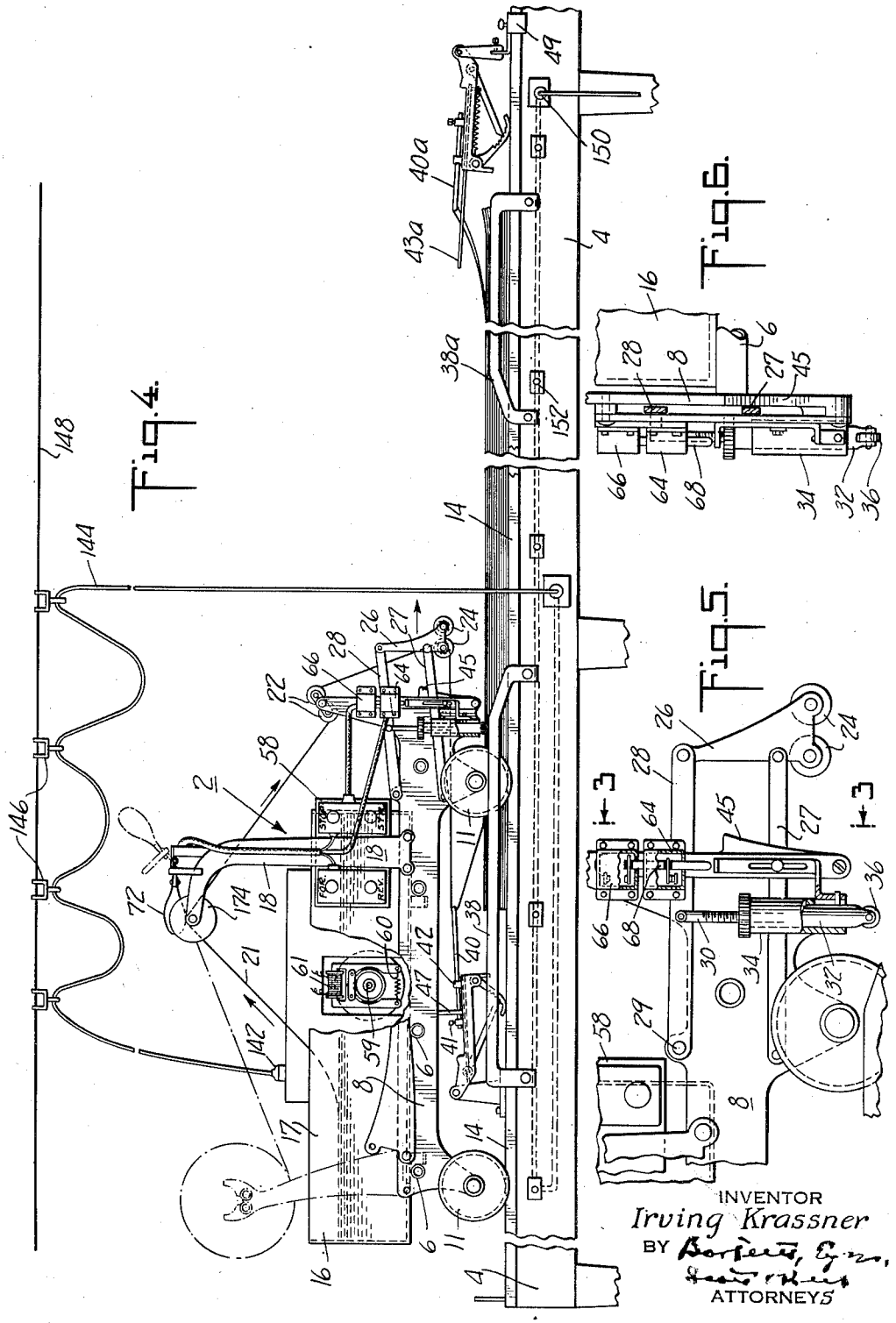
Fig. 3.

INVENTOR
Irving Krassner
BY
ATTORNEYS

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CLOTH LAYING MACHINE

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Fig. 7.

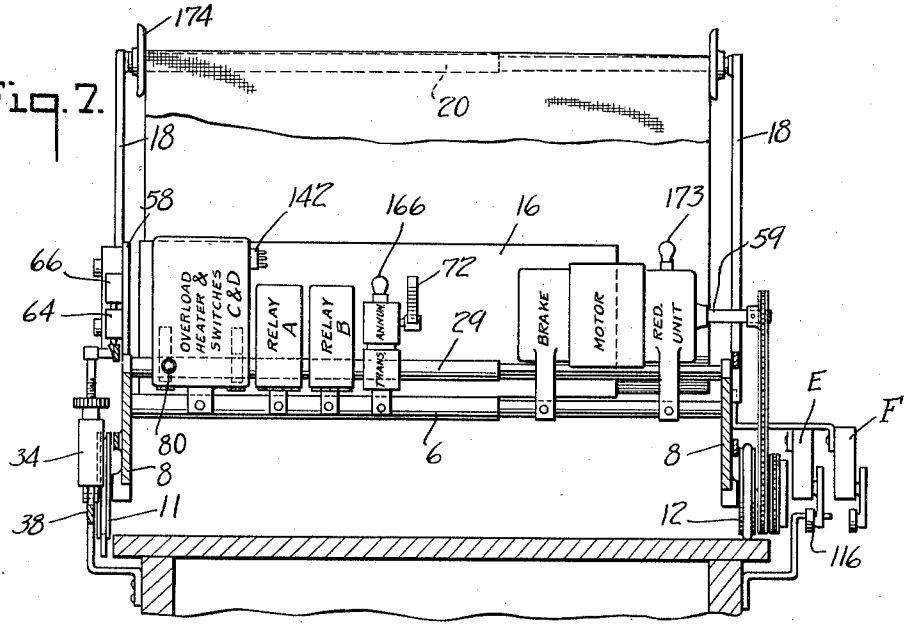
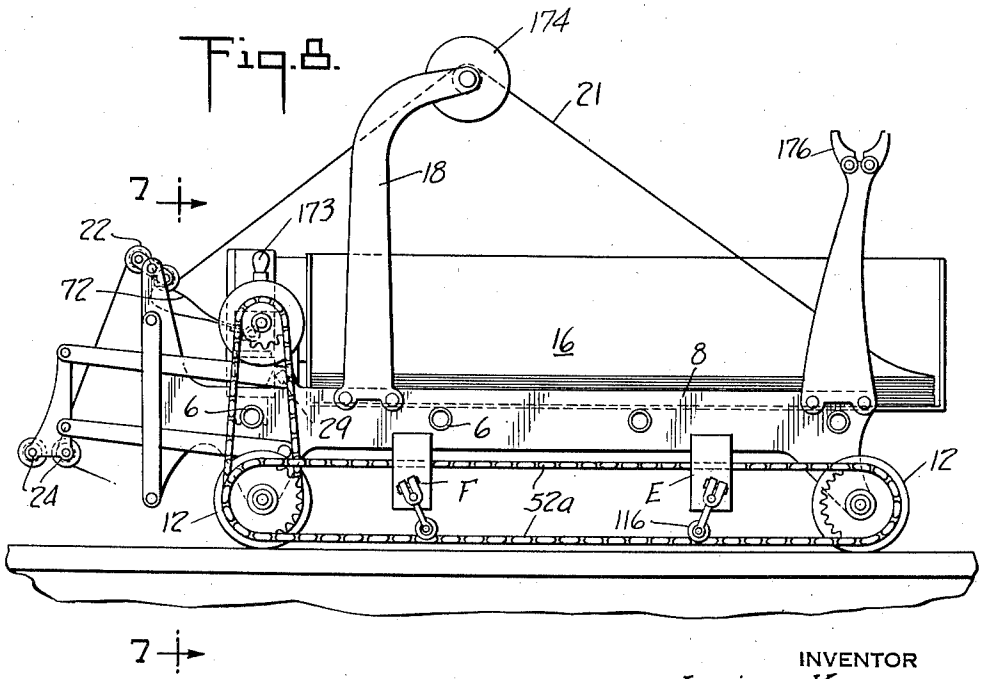


Fig. 8.



INVENTOR
Irving Krassner
BY
Bartlett, Egan & Scott
ATTORNEYS

Patented Feb. 21, 1939 2,148,375

UNITED STATES PATENT OFFICE

2,148,375

CLOTH LAYING MACHINE

Irving Krassner, Newark, N. J., assignor of one-third to Irving A. Winter, Woodmere, N. Y., and one-third to Julius Drittel, Elizabeth, N. J.

Application February 5, 1938, Serial No. 188,921

15 Claims. (Cl. 270—31)

The present invention relates to cloth laying machines and comprises an improved machine of that character which is fully automatic, efficient and safe in operation.

An important feature of the invention is the provision of a control circuit for the machine which permits the machine to be stopped at any point in its travel and to resume operation in either direction from that point.

Another feature of the invention is the provision of means for automatically stopping the machine and giving a signal when the cloth fed by the machine runs out.

A further feature of the invention comprises improved means for holding the material to be laid, which means insures better alignment of the edges of the cloth during laying and conserves time when the machine needs replenishing.

Other features of the invention include means for preventing jarring of the machine at either end of its travel under certain operating conditions. These and other novel features of the invention will become apparent as the description proceeds.

Of the drawings:

Fig. 1 is a side view of an automatic cloth laying machine embodying the invention;

Fig. 2 is a wiring diagram of the control circuit;

Fig. 3 is a plan view of the machine of Fig. 1;

Fig. 4 is a view of the machine of Fig. 1 taken from the other side thereof;

Fig. 5 is a fragmentary view on an enlarged scale illustrating the operating mechanism for certain cut-out switches;

Fig. 6 is a fragmentary view taken along the line 3—3 of Fig. 5;

Fig. 7 is a diagrammatic view illustrating an alternate arrangement of the control mechanism; and taken along the line 7—7 of Fig. 8;

Fig. 8 is a diagrammatic side view of the machine of Fig. 7 with certain parts omitted for simplicity.

The machine illustrated in Figs. 1 to 6 inclusive comprises a carriage 2 which moves back and forth upon an elongated table 4. The carriage 2 comprises a framework of four cross bars 6 secured at opposite ends to panels 8, a pair of stub axles 10 rotatably mounted in the panels 8 and carrying wheels 11 and 12. Wheels 11 are grooved and travel on a rail 14 extending the length of the table 4. Wheels 12 are rubber tired and travel directly upon the table. The cross bars 6, as well as all other cross members of the machine are telescopic to permit variation in the width of the carriage. An open topped box 16 for holding the material to be laid, rests upon the bars 6. The box 16 is open at one side to accommodate materials of different width and has a relatively high side wall 17 along which the edge of the material is laid when the box is filled. A pair of upright members 18 secured to the panels 8 carry a guide bar 20 over which the cloth 21 passes as it is drawn from the box 16. The material after passage over bar 20 passes between two pair of guide rollers 22 and 24. Each pair of rollers 22 and 24 are made adjustable as to the distance between individual rolls and relative position thereof to adjust the tension according to the thickness of material being laid. Guide bars 22 are mounted on the panels 8 while bars 24 are mounted on plates 26 which in turn are pivotally carried on the ends of lever arms 27 and 28. The other ends of levers 27 are pivotally mounted on panels 8 and the other ends of levers 28 are mounted on a cross bar 29 journaled in panels 8 (see Figs. 3 and 5). Cross bar 29 is made of two parts, one of which is square in cross section and fits telescopingly within a square recess of the other part to permit of joint rotation about their common axis. One lever 28, near its mid point, is pivoted to a rod 30 which is screw-threaded to a plunger 32 vertically movable in a sleeve 34 and carrying a roller 36 at its lower end. At opposite ends of the table 4 are cam members 38 and 38a comprising rails upon which roller 36 rides when the carriage is near either end of the table. The consequent raising of lever 28 by the rod 30 and plunger 32 when the roller 36 rides up on the cam 38, rotates bar 29 and lifts the rolls 24 so that they clear the material holding mechanism on the table and now to be described. This mechanism comprises a pair of right angle fingers 40 which are secured at one end by set screws 41 and pass through slots in upstanding members 42 mounted on sliding plates 43. When the carriage nears the end of its travel, inwardly extending fingers 46 (see Fig. 3) engage vertical pins 47 on the sliding plates 43 which cause the holding fingers 40 to swing outwardly to release the last fold of the material. When pins 46 and 47 are again out of engagement the fingers 40 swing back into position to engage and hold the newly made fold of material. At the other end of the table 4 operation of fingers 40a is effected by direct engagement of the sliding plates 43a with an abutting surface 45 on the carriage. To permit of different lengths of travel of the carriage, the material holding mechanism at one end of the table is mounted adjustably as by clamps 49

(see Fig. 4). The cam member 38a should be adjustably mounted on the rail 14 for the same reason.

Except for the box 16, the machine so far described, including the operating mechanism at the ends of the table is substantially of the type heretofore manually operated. The new control mechanism, which makes the machine completely automatic and increases its output, together with the new constructional features for cooperation therewith will now be described. As shown best in Figs. 1 and 2, the control mechanism includes a motor 48 which through suitable gear reduction 50, drives the wheels of the carriage by chains 52 passing around suitable sprockets secured to the wheels 12. A panel 54 mounted on one panel 8 carries, as a unit, substantially all of the various control relays and automatic switches. These devices include a relay A, which when the machine is operating, is normally energized, and which controls the circuits of the forward and reverse magnetic switches of the motor; a relay B, normally deenergized and which when energized, opens the circuit of relay A, causes an application of the brake and gives an audible or visual signal as desired; forward and reverse magnetic switches C and D, only one of which is energized at a time, for controlling the direction of operation of the motor and limit switches E and F which control the circuits of magnetic switches C and D and operate at the extremities of travel of the carriage upon engagement with upstanding cam members on the table 4. In Fig. 1 the cam member for operating limit switch E is shown at 56. It will be understood that a similar device, adjustably mounted at the other end of the table operates limit switch F. Four manual switches of the push button type and labeled Start, Stop, Forward, Reverse are mounted on a panel 58 on the other side of the carriage from panel 54 (see Fig. 4). Additional elements of the control circuit are an electric brake comprising a pair of pivoted members mounted on the drive shaft 59 of the motor (see Fig. 4) and biased by a spring 60 into braking position and a solenoid 61 normally energized through a back contact on relay B and holding the brake members out of braking position; a normally open feeler contact switch 62 in the circuit of relay B which closes when material ceases to pass over the guide roll 20; two cut-out switches 64 and 66 of which the former is in series with the feeler switch 62 and is opened only when the carriage is at one end or the other of the table and the latter of which is in parallel with normally closed contacts of the Stop switch and is closed only when the carriage is at one end or the other of the table. The movable members of switches 64 and 66 are mounted on a plunger 68 (see Fig. 5) which is raised when roller 36 rides on the cam rail 38. The purpose of switches 64 and 66 is to prevent deenergization of relay A while the carriage is at either end of the table, either automatically as by the closure of the feeler contact switch, or manually as by pressing of the Stop switch. Deenergization of relay A at such time might cause undesirable jarring of the carriage when it reaches the end of its run.

As shown best in Fig. 3, the feeler contact switch 62 comprises a strip 70 of conducting material insulatedly mounted on bar 20 and a flexible conducting member 72 which, when no material passes over the bar 20, makes contact with the strip 70.

The circuits of the various parts will now be given in detail with reference to Fig. 2. The circuit for motor 48 when operating in one direction is from power line L_1 through armature 49 and front contacts of magnetic switch C, overload heater 74 to one winding of motor 48 and back to power line L_2 through wire 75 and another armature 51 and front contacts of switch C; the other winding of the motor 48 being connected to power line L_3 through an armature 77 and front contacts of switch C and overload heater 76. When the winding of switch C is deenergized and that of switch D energized, the above circuits are broken at the front contacts of switch C and power line L_1 is connected through front contacts of switch D and heater 76 with the motor winding formerly connected with L_3, similarly L_3 is now connected through front contacts of switch D and heater 74 with the motor winding formerly connected with L_1 and the return circuit of the motor is connected to L_2 through wire 75 and a third pair of front contacts of switch D. As relay A controls the circuits of the windings of both magnetic switches C and D, its circuit will be described next. One side of relay A is connected directly to power line L_3 through wires 78, 79 and heater switch 80; the other side of the relay being connected through armature 82 and cooperating back contacts of the normally de-energized relay B, lower contacts 84 of the manual switch Start, and top contacts 86 of the manual Stop switch to power line L_2 by way of wires 87, 88, 89 and 90.

A stick circuit for relay A is provided by a shunt about contacts 84 of the Start button, which shunt includes armature 92 and front contacts of relay A.

Closure of the circuit of relay A by the Start button prepares the circuit of the forward and reverse magnetic switches C and D for manual closure by the respective Forward and Reverse button switches, the circuit of switch C being from power line L_3, heater switch 80, wire 79 to the winding of switch C, wire 94 through the normally closed contacts 96 of limit switch F, wires 98 and 100 to the lower contacts 102 of the Forward button switch, wire 104 and normally closed upper contacts 106 of the manual Reverse button switch, wire 108, armature 110 and front contacts of relay A, wires 88, 89 and 90 to power line L_2.

A stick circuit for the winding of switch C is provided by a shunt about contacts 102 of the Forward button switch, which shunt includes armature 112 of switch C. An alternative pick-up for the winding of switch C is provided by a second shunt about contacts 102 of the Forward button switch, which shunt includes the normally open contacts 114 of the limit switch E. Contacts 114 are bridged when a depending roller arm 116 (see Fig. 1) of the limit switch E rides up on the cam surface 56 adjacent an end of the table 4. The subsequent opening of these contacts 114 does not deenergize the coil C because of the stick circuit provided by armature 112.

The circuit for reverse magnetic switch D is similar to that above described for switch C, the circuit being from power line L_3, heater switch 80, wire 79 to the winding of switch D and from that to the normally closed contacts 122 of the limit switch E, wires 124 and 126 to the lower contacts 128 of the Reverse button switch, wire 130 and normally closed upper contacts 132 of the Forward button switch, wire 134, armature 136 and front contacts of relay A, wires 88, 89 and 90 to power line L_2. A stick circuit forming a shunt about contacts 128 of the Reverse button switch includes armature 138 of coil D and an alternative pick-up for the circuit is provided by a second

shunt about contacts 128 through the normally open contacts 140 of the limit switch F.

Power lines L_1, L_2 and L_3 are connected to the carriage by a plug 142 and flexible cable 144 (Fig. 4) supported by runners 146 from a wire 148 above the carriage. Near the center of the table 4 the cable 144 is brought down to the table and run along the side thereof to a power inlet 150. A plurality of button switches 152 are provided along the table for stopping the machine from different points irrespective of the location of the machine.

In operation, when the power is connected at inlet 150 and the plug 142 is inserted into its socket, the carriage stands idle with the brake applied until material is passed between strip 70 and cooperating feeler contact 72 of the feeler switch 62. When feeler switch 62 is closed, relay B is energized from power line L_3, heater switch 80, wires 79 and 78 to the winding of relay B, through feeler switch 62 and normally closed contacts of cut-out switch 64 (plunger 68 being in its lowermost position), wires 89 and 90 to power line L_2. With relay B energized, the circuit of relay A, and consequently of both magnetic switches C and D as well, is open as is that of coil 61 of the brake, which latter circuit is from power line L_1 through wires 154 and 156, coil 61, wire 158, armature 160 and back contacts of relay B, wires 162 and 164 to power line L_3. With the machine in this condition, a signal lamp 166 is lighted and any suitable audible signal given by an annunciator 168 in parallel therewith; the circuit of annunciator 168 and of lamp 166 being energized from a transformer 170 connected to power lines L_3 and L_2 through armature 172 and normally open front contacts of relay B. A pilot lamp 173 connected across the lines L_1 and L_2 is always lighted when power is supplied to the machine.

If now the feeler switch 62 is opened, either manually or by the passage of material between the contacts thereof, relay B and the transformer circuit connected through the front contacts thereof become de-energized and the brake is released by closure of the circuit of coil 61 through armature 160 and the back contacts of relay B. The operator thereupon draws the material over bar 20 and between the two pair of guide rolls 22 and 24 and weights the end thereof or otherwise secures it against movement along the table. The push button Start is then momentarily pressed to energize relay A and to close the stick circuit therefor and then either the Forward or Reverse button is pushed depending upon the direction of travel desired. Assume the Reverse button is pressed and that the direction of travel is to the right in Fig. 1 which corresponds to movement toward the left in Fig. 4. The carriage approaches the end of the table, roller 116 of the limit switch E rides up on cam surface 56 and roller 36 rides upon cam surface 38. The momentary throwing of limit switch E opens the circuit of the reverse magnetic switch D, which thereupon stays open because of the opening of its stick circuit, and closes the circuit of forward magnetic switch C which thereupon remains closed through its stick circuit. The direction of current through the coils of motor 48 being thus reversed, the carriage starts back along the table. The riding of roller 36 upon cam surface 38 raises plunger 68 which opens cut-out switch 64 and closes switch 66. The opening of switch 64 insures that relay B will remain de-energized irrespective of whether or not the material runs out and the closure of switch 66, which bridges the top contacts 86 of the Stop switch, prevents the stopping of the motor through deenergization of relay A. These safety switches 64 and 66 are provided to prevent undue jarring of the machine at the end of the travel and opening of the circuits of relay A during reversal of the motor. Should the cloth be exhausted while the machine is at one end or the other of the table, the feeler contact switch 62 will close and remain closed and switch 64 will close as soon as the roller descends from the cam surface 38. This energizes relay B, applies the brake and lights lamp 166. The operator thereupon replenishes the material and presses the Start and Forward push buttons. The carriage then continues to lay the material, traveling backward and forward along the table until again stopped by reason of the exhaustion of the material or because of the operator pressing the Stop button or any of the switches 152 along the table. When the Stop button is pressed the brake is not applied but relay A and the magnetic switches controlled thereby are de-energized. When any switch 152 is pushed, the brake is applied only so long as the switch is held open. This is a desirable feature as it permits the operator to move the carriage by hand to any point he desires after it has been stopped.

As will be apparent from the above description, the machine, once it is started, needs no attention from the operator until the particular bolt of material being laid is used up. The box 16 is large enough to hold a large number of bolts of material. Due to the provision of the relatively high side wall 17 of the box, it is only necessary when the box is being filled to place the side edge of the material against the wall 17. This insures proper alignment of the edges of the superposed layers of material when laid, as the box when placed in the carriage is positioned with its side wall aligned with the guide shoulder 174 on bar 20. Preferably two boxes 16 are provided so that the operator can be filling one box while the other is in use on the machine. A pair of arms 176, which are preferably so mounted as to be swung down out of position when not in use, are provided for holding material when it is in rolls. The box 16 is then advantageously used for carrying additional rolls for ready replenishing of the machine at any point along the table.

The invention has now been described with reference to the embodiment thereof illustrated in Figs. 1 through 6. It will be noted that practically all of the control mechanism, except the push button switches is mounted substantially as a unit on panel 54. Another and more compact arrangement of the control mechanism is illustrated in Figs. 7 and 8. In these figures the wiring connections and various unimportant structural details have been omitted for simplicity, and the various elements corresponding to elements already described in connection with Figs. 1 to 6 inclusive bear the same reference characters. As shown in Figs. 7 and 8, the control mechanism, including the magnetic switches C and D, the overload heaters with reset button 80, relays A and B, the transformer, annunciator, brake, motor and reducing unit, is supported by the front cross bar 6 of the carriage 2 and the cross bar 29 in advance of the box 16. The feeler contact switch cooperates with guide rolls 22 instead of with cross bar 20. The wheels 12 are driven from the drive shaft 59 by means of chains 52a and sprockets mounted on the wheels 12. The manually operable push

buttons for stopping and starting the mechanism are mounted on the panel 58 as in the earlier described embodiment of the invention and the limit switches E and F are secured to panel 8 on the other side of the machine. The cut-out switches 64 and 66 operate as in Figs. 1 to 6 and are shown at the left of the machine in Fig. 7. It will be understood that the electrical connections between the various elements is the same as that already described as is also the operation of the machine. This arrangement permits of ready application of the control unit to machines heretofore operated manually, and distributes the weight of the additional elements more uniformly across the carriage than is the case with the earlier described arrangement.

The improved cloth laying machine of the invention has now been described and two different arrangements of the control mechanism have been illustrated. It will be apparent from the description that the new machine will conserve time and labor, will lay cloth more efficiently because of the more accurate alignment of the edges of the superposed layers, and will be entirely safe in operation. Improved machines of the invention, automatically, accurately and rapidly lay hundreds of layers of material without requiring any attention from the operator except when the length of material being laid is exhausted, at which time a signal is given and the carriage stops at the point where the material ceased to be fed. This construction enables one worker to tend and operate two or more machines simultaneously.

The following is claimed:

1. A control mechanism for cloth laying machines of the type having a carriage carrying cloth to be laid and movable along a fixed runway, the carriage cooperating at either end of its travel with cloth holding means mounted on the runway, said mechanism including a reversible driving means on said carriage, an electric circuit controlling said driving means, manually operable switches in said circuit for starting said driving means for movement of the carriage and for stopping said driving means, said driving means, switches and circuit being arranged to permit starting of the carriage in either direction irrespective of the position of the carriage along the runway, automatic reversing means carried by said carriage and fixed means at opposite ends of said runway cooperating therewith for automatically reversing the direction of movement of said carriage when the carriage reaches either end of the runway.

2. Control mechanism according to claim 1 including cloth feeding means and means responsive to the passage of cloth through said feeding means for automatically stopping said driving means when the cloth ceases to pass therethrough, switch means carried on said carriage and cooperating means at either end of said runway for rendering said cloth responsive means inoperative while said carriage is within a predetermined distance from either end of the runway.

3. In a cloth laying machine of the type including a carriage movable back and forth along a runway, the combination including an open topped container having a flat bottom and open at one side, and a guide cross bar on said carriage having a guide shoulder thereon, said container being removably supported on said carriage and slidable transversely thereof to bring its side wall in alignment with said shoulder whereby when material is placed in said container with the side edge of the material along said side wall, the edges of the material when laid will be in alignment.

4. A control unit for cloth laying machines of the type having a carriage movable along a fixed runway, including in combination, a reversible electric motor for driving said carriage, a pair of magnetic switches for controlling the direction of operation of said motor and the supply of current thereto, a normally energized relay controlling the circuits of said magnetic switches and preparing the same for closure, a pair of manually operable stop and start switches for opening and closing the circuit of said relay, a second pair of manually operable switches for completing the circuits of one or the other of said magnetic switches after said relay has been energized, and automatic switch means operable when the carriage reaches either end of the runway to reverse the direction of operation of said motor by opening the circuit of one of said magnetic switches and closing the circuit of the other magnetic switch.

5. The control unit according to claim 4 including a normally deenergized relay, a feeler contact switch controlling said last mentioned relay and causing the energization thereof when the carriage ceases to lay cloth, the circuit of said normally energized relay including back contacts of said normally deenergized relay whereby the closing of the feeler contact switch causes opening of the circuits of the magnetic switches and consequent opening of the motor circuit.

6. The control unit according to claim 4 including a normally deenergized relay, a feeler contact switch controlling said last mentioned relay and causing the energization thereof when the carriage ceases to lay cloth, the circuit of said normally energized relay including back contacts of said normally deenergized relay whereby the closing of the feeler contact switch causes opening of the circuits of the magnetic switches and consequent opening of the motor circuit, said motor, magnetic switches, both of said relays and the movable member of said feeler switch being all removably mounted crosswise of the carriage and said manually operable switches being mounted on one side of said carriage for convenient access thereto.

7. The control unit according to claim 4 including a second relay controlling over back contacts the circuit of the first mentioned relay, a feeler contact switch for closing the circuit of said last mentioned relay when the carriage ceases to lay cloth, and means operable while the carriage is within a predetermined distance from either end of the runway for preventing closure of the circuit of said last mentioned relay whereby the machine continues to operate while within such distance from either end of the runway irrespective of whether or not cloth is being laid.

8. The control unit according to claim 4 including a normally open switch connected across the manual stop switch of the relay circuit, and means operable while the carriage is within a predetermined distance from either end of the runway for closing said normally open switch to maintain the relay energized independently of said manual stop switch.

9. A control unit for cloth laying machines of the type having a carriage movable back and forth over a runway, comprising in combination,

reversible electric driving mechanism for said carriage, an electric circuit controlling said mechanism, manually operable switches in said circuit and mounted on said carriage for energizing and deenergizing said mechanism for starting and stopping the carriage, said mechanism, switches and circuit being arranged to permit starting of the carriage in either direction irrespective of the position of the carriage along the runway, automatic switch means carried by said carriage and fixed means at opposite ends of said runway cooperating therewith for automatically reversing said mechanism to change the direction of movement of said carriage when the carriage reaches either end of the runway, remote manually operable switches along said runway for deenergizing said mechanism and an electric brake normally held in inoperative position independently of the manual switches on said carriage but operable to cause a brake application when the circuit of said mechanism is deenergized by any one of said remote switches.

10. In a cloth laying machine, the combination comprising a carriage, a runway for the carriage having cloth gripping means at opposite ends thereof, a flat bottomed container on said carriage for holding cloth to be laid and slidable transversely of the carriage for aligning the edge of the cloth, cloth feeding means on said carriage for delivering cloth from said container on to said runway, automatic means for driving said carriage in either direction, means carried on said carriage and cooperating means at opposite ends of said runway for automatically reversing the direction of travel of the carriage when it reaches the ends of the runway, manual means on said carriage for stopping said carriage and for starting the carriage in either direction irrespective of the position of the carriage along the runway, remote control means along said runway for stopping said carriage at any point along its path of travel and means associated with said cloth feeding means and responsive to the presence or absence of cloth therein for automatically stopping said carriage when cloth ceases to be laid.

11. A machine according to claim 10 including means carried by said carriage and operable when the carriage is within a predetermined distance from either end of the runway for rendering said cloth feeding responsive means inoperative when the carriage is within said predetermined distance.

12. A machine according to claim 10 including means operable when the carriage is within a predetermined distance from either end of said runway for rendering inoperative said manual stopping means on the carriage.

13. The machine according to claim 10 including braking means carried by said carriage normally held in inoperative position independently of the manual stopping means on the carriage and controlled by said remote control means on the runway and by said cloth feeding responsive means.

14. The combination with a cloth laying machine of the type having a carriage carrying cloth to be laid and movable along a fixed runway, of a control mechanism including carriage driving means, cloth feeding means, and means responsive to the passage of cloth through said feeding means for automatically stopping said driving means when the cloth ceases to pass therethrough, switch means carried on said carriage and cooperating means at either end of said runway for rendering said cloth responsive means inoperative while said carriage is within a predetermined distance from either end of the runway.

15. A control unit for machines of the type having a carriage movable along a fixed runway, including in combination, a reversible electric motor for driving said carriage, a pair of magnetic switches for controlling the direction of operation of said motor and the supply of current thereto, a normally energized relay controlling the circuits of said magnetic switches and preparing the same for closure, a pair of manually operable stop and start switches for opening and closing the circuit of said relay, a second pair of manually operable switches for completing the circuits of one or the other of said magnetic switches after said relay has been energized, and automatic switch means operable when the carriage reaches either end of the runway to reverse the direction of operation of said motor by opening the circuit of one of said magnetic switches and closing the circuit of the other magnetic switch, said motor, magnetic switches and both of said relays being all removably mounted crosswise of the carriage and said manually operable switches being mounted on one side of said carriage for convenient access thereto.

IRVING KRASSNER.