May 8, 1962 A. R. HANNA 3,033,561

CLOTH-LAYING MACHINES

Filed July 21, 1960 2 Sheets-Sheet 1

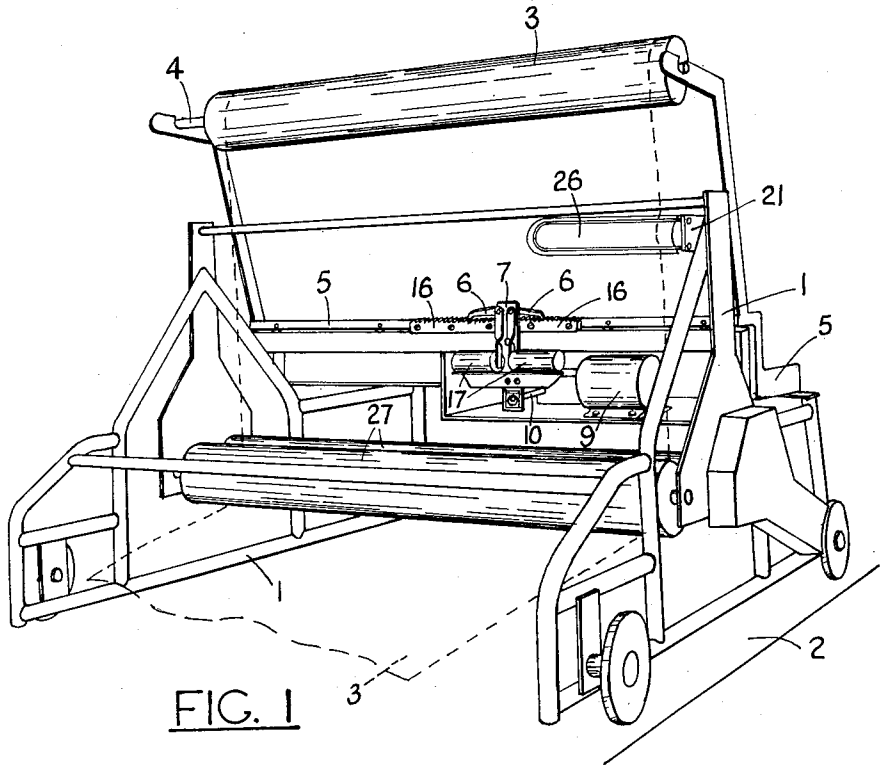


FIG. 1

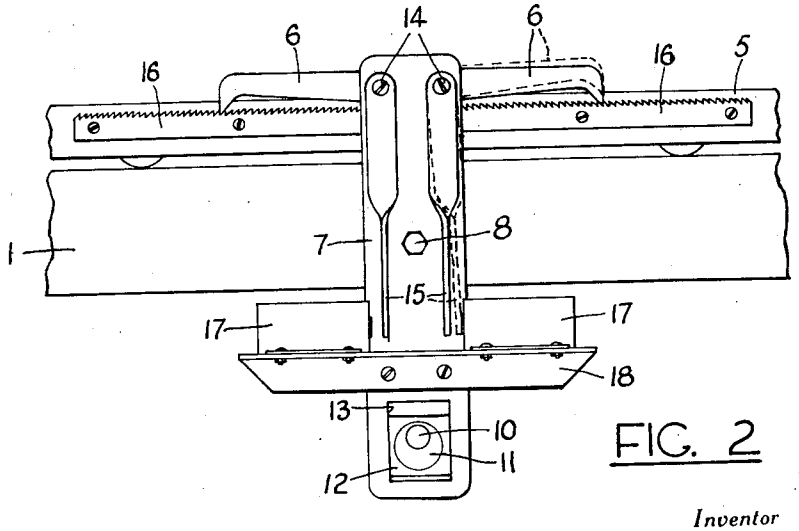


FIG. 2

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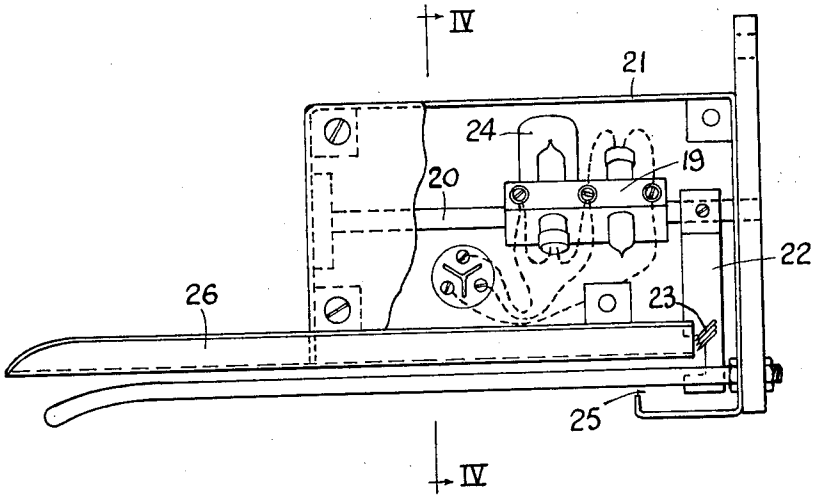


FIG. 3

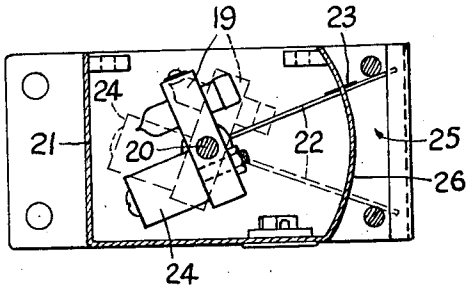


FIG. 4

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CLOTH-LAYING MACHINES

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The invention relates to cloth-laying machines such as are used in clothing factories for laying cloth from rolls onto cutting tables in a series of superimposed layers of cloth prior to cutting of the cloth by a cutting machine. Cloth-laying machines of this kind normally consist of a travelling frame reciprocable between the ends of a cutting table, means being provided on the frame for supporting a roll of cloth and for running the cloth out along the table as the machine travels from end to end of the table.

One of the difficulties met with in the use of such machines is that of laying cloth to a single lay-line at one edge of the cloth so that the lay edges of successive layers of cloth are in vertical alignment at the lay-line despite any normal variation in the width of the cloth, or any uneven winding of the cloth on the roll from which it is laid. This difficulty is particularly evident in the laying of relatively lightweight cloths, such as shirt fabrics, and in the laying of knitted fabrics.

The general object of the present invention is the provision of a cloth-laying machine of the above kind whereby cloth can be accurately laid to a single lay line at one edge of the cloth without the need for supervision and correction of the machine by an operator.

The cloth-laying machine of the invention consists of a frame adapted for mounting on a cutting table so as to be reciprocally movable between opposite ends of the table; a carriage mounted on the frame transversely thereof and adapted to support a roll of cloth to be laid by the machine, the carriage being slidably movable to either side of the frame during the laying operation; driving gear whereby the carriage is so moved; and switching means mounted on one side of the frame and connected to the driving gear so as to control the operation thereof, the switching means including a control member which is disposed adjacent to and is operable by one edge portion of a length of cloth passing from the roll when the machine is in operation; the arrangement being such that, when the machine is in operation and the control member is not so operated, the driving gear operates to move the carriage and the cloth towards the control member until the latter is so operated, whereupon the switching means are actuated to reverse the operation of the driving gear and the movement of the carriage until the cloth, in consequence of its movement away from the control member, ceases to operate the control member, this sequence of operation being repeated continually during the laying operation.

The intermittent short movement of the carriage first in one direction and then in the other as the lay edge of the cloth operates and then ceases to operate the control member results in that edge of the cloth being laid, within very close limits, along the line of travel of the control member with the machine as the machine travels to and fro over and along the cutting table.

The control member may be such that it is operated by physical engagement and movement of the control member by the cloth, the control member subsequently returning to its original position when the reverse movement of the carriage resulting from the operation of the control member causes the cloth to move away from and disengage the control member.

Alternatively, the control member may consist of a photo-electric cell or similar device which is operated by the temporary interruption of a beam in consequence

of the movement of the said edge of the cloth into the beam.

A cloth-laying machine constituting one embodiment of the invention will now be described in greater detail with reference to the accompanying drawings, in which:

FIGURE 1 is a general front perspective view of the machine;

FIGURE 2 is a front elevation, on a larger scale than FIGURE 1, of driving gear constituting a part of the machine;

FIGURE 3 is a plan, on a larger scale than FIGURE 1, of switching means constituting a part of the machine, showing a casing of the switching means partly broken away; and

FIGURE 4 is a cross-sectional elevation of the switching means, taken on the line IV—IV of FIGURE 3.

The machine shown in the drawings has a wheeled frame 1 adapted to travel along rails (not shown in the drawings) laid along the surface 2 of a cutting table on opposite sides thereof, in accordance with usual practice.

A roll of cloth 3 to be laid by the machine in the aforesaid manner is supported on a carrying spindle 4 of a carriage 5 which is mounted on the frame 1 transversely thereof, and is slidably movable to one side or the other of the frame 1 as required, through the action of driving gear (shown particularly in FIGURE 2) which is associated with the frame 1 and carriage 5.

The driving gear includes a pair of pawls 6 which are each pivoted at one end portion to the upper end portion of a generally upright rocker arm 7. The rocker arm 7 is in turn pivoted to the frame 1 by means of a pivot bolt 8, as shown in FIGURE 2, and is movable in a rocking motion about its pivot 8 by means of an eccentric drive from an electric motor 9 (see FIGURE 1) mounted on the frame 1. The drive from the motor 9 is transmitted to the rocker arm 7 through a drive shaft 10, a disk 11, and a squared block 12, the disk 11 being fixed eccentrically on the shaft 10 and being rotatably mounted within a circular central hole of the block 12, whilst the block 12 is slidably engaged within an oblong slot 13 formed in and extending longitudinally of the lower end portion of the rocker arm 7.

The pivotal attachment of the pawls 6 to the rocker arm 7 is effected by means of a pair of pivot pins 14 which are turnably engaged with the uper end portion of the arm 7 and project both forwardly and rearwardly of the arm 7. The pawls 6 are fixed one to each of the pins 14, at the projecting rear end portion of each pin 14, and a pair of downwardly extending lever arms 15 are fixed at their upper end portions one to each of the pivot pins 14, at the projecting forward end portion of each pin.

The pawls 6 extend in opposite directions from the rocker arm 7 and at approximately right angles to the lever arms 15, and are adapted at their outer ends, remote from the pins 14, to co-act with a horizontal rack 16 fixed to the carriage 5 and extending to right and left of the rocker arm 7. The teeth of the rack 16, on each side of the rocker arm 7, are inclined towards the rocker arm 7, so that the carriage 5 is moved to one side or the other of the frame 1 according to which one of the pawls 6 is engaged with the rack 16.

A pair of oppositely and inwardly facing electromagnets 17 are mounted on a bracket 18 which is secured to the rocker arm 7 to lie transversely thereof. The lower end portions of the lever arms 15 lie between the electromagnets 17, one adjacent to each electromagnet, and form armatures which are acted on by the electromagnets 17 when the electromagnets are energised. In the non-energized condition of the electromagnets 17, the outer ends of the pawls 6 rest in engagement with the teeth of the rack 16, and the arms 15 assume a vertical position

in which their lower ends are some distance away from the adjacent ends of the electromagnets 17, as is shown in FIGURE 2. When either one of the electromagnets 17 is energised, however, the lower end portion of the adjacent arm 15 is drawn towards that electromagnet and the corresponding pawl 6 is raised out of engagement with the rack 16, the said arm 15 and pawl 6 then assuming the position shown in broken lines in FIGURE 2. The other pawl 6 remains in engagement with the rack 16, so that the rocking of the rocker arm 7 around its pivot 8 then has the effect of moving the carriage 5 steadily to one side of the frame 1, the limit of such movement being determined by the length of the pawl 6 and rack 16.

The energising of the electromagnets 17 is controlled by switching means (shown in FIGURE 3) which are mounted at one side of the frame 1 adjacent to the lay edge of the cloth 3 issuing from the roll. The switching means consist of a double-acting mercury switch 19 fixed on a spindle 20 rotatably supported in a casing 21; a control member in the form of an arm 22 fixed at one end portion to the spindle 20 to project radially therefrom, and provided at its forward end portion, remote from the spindle 20, with a plurality of needle-like projections 23; and a balance weight 24 attached to the mercury switch 19 and arranged to normally maintain the switch 19 and arm 22 in their positions shown in full lines in FIGURE 4. The forward end portion of the arm 22 lies across a slotted opening 25 of the casing 21, and in the normal position of the arm 22 which is shown in full lines in FIGURE 4 the needle-like projections 23 are engageable by the lay edge portion of the cloth 3 when the lay edge of the cloth is moved into the slotted opening 25 by appropriate movement of the carriage 5.

In the position which is normally assumed by the mercury switch 19 and the arm 22 under the influence of the balance weight 24, one of the electromagnets 17 is energised to produce movement of the carriage 5 towards the switching means, the lay edge portion of the cloth 3 running over a convex surface of a guide tongue 26 which is attached to the casing 21 adjacent to the slotted opening 25, until eventually the lay edge of the cloth enters the opening 25 and engages the projections 23 of the arm 22. The arm 22 is then moved downwardly by the cloth 3, against the influence of the balance weight 24, to its position shown in broken lines in FIGURE 4. The movement of the arm 22 and spindle 20 actuates the mercury switch 19 so as to energise the other of the electromagnets 17 instead of the first-mentioned electromagnet, and to thus reverse the movement of the carriage 5 until the lay edge of the cloth 3 is moved out of engagement with the arm 22. The arm 22 and the switch 19 then return under the influence of the balance weight 24 to their original position, and the sequence of operations just described is repeated.

When the machine is in operation, the said sequence of operations is repeated continuously and rapidly, so that the lay edge of the cloth 3 is moved rapidly from side to side of a narrow path along the line of travel of the needle 24 with the machine as the machine travels along the cutting table. This movement is imparted to the cloth 3 at a stage when it has still to pass through one or more guides 27 of the machine before being laid on the surface 2 of the cutting table, the guides 27 serving to smooth out the said movement of the cloth 3, so that in practice the lay edge of the cloth is laid within very close tolerances along a straight lay-line corresponding to the mean of the distance across which the lay edge of the cloth is so moved.

In place of the electric motor 9 as the source of the rocking movement of the rocker arm 7, the rocking movement may be imparted from the movement of the frame 1 during the laying operation, through a suitable drive from one of the wheels of the frame.

In a modification of the machine described above and

shown in the drawings, the casing 21 and the parts contained therein are replaced by switching means consisting of a photo-electric cell arranged in conjunction with a source of light so as to scan the lay edge of the cloth 3, the cell being connected to the elctromagnets 17, or to one of them, through a photo-electric cell amplifier and a relay. The photo-electric cell, in this modification, corresponds to the control member 22 of the switching means shown in FIGURES 3 and 4 of the drawings, whilst the relay corresponds to the mercury switch 19 of that switching means.

I claim:

1. A cloth-laying machine comprising: a frame; means on said frame for mounting said frame on a cutting table to accommodate reciprocal movement of said frame between opposite ends of the table; a carriage mounted on the frame; means on said carriage supporting a roll of cloth to be passed from the roll and laid by the machine, the carriage being movable on the frame generally transversely of the direction of reciprocal movement of said frame on the table during the cloth-laying operation; driving gear coupled to the frame and carriage to move the carriage on the frame in one transverse direction and alternately in the opposite transverse direction, whereby at least one edge portion of a length of cloth passing from the roll during reciprocal movement of said frame between the opposite ends of the table, is movable with respect to the frame in one transverse direction and alternately in the opposite transverse direction; and switching means mounted on the frame and connected to the driving gear to control the direction of movement of the carriage thereby, said switching means being located on said frame to detect the presence and absence at a predetermined transverse location with respect to the frame of said one edge portion of a length of cloth passing from the roll during the cloth-laying operation, the connection of said switching means to said driving gear being effective to reverse the direction of transverse movement of the carriage by said driving gear upon detection of the edge portion of the cloth in said location during passage from the roll, and effective to again reverse direction of transverse movement of the carriage by said driving gear upon departure of the edge portion of the cloth from said location, whereby transverse movement of the carriage is repetitively reversed during the cloth-laying operation to reciprocate the said edge of the cloth with respect to said location of detection, during the cloth-laying operation.

2. The cloth-laying machine set forth in claim 1 wherein: said driving gear includes a generally upright rocker arm pivotally attached to the frame and movable in a rocking motion about said pivotal attachment; a motor on said frame; eccentric drive means coupling said motor to said rocker arm to provide said rocking motion; a gear rack fixed to said carriage and extending to both sides of said rocker arm, the teeth of said rack on both sides of said rocker arm being inclined towards said rocker arm; a pair of pawls pivotally mounted to the upper portion of said rocker arm and extending in opposite directions therefrom and engageable with said rack on opposite sides of said rocker arm; lever arms connected to said pawls; electromagnetic means operably associated with said lever arms and connected to said switching means, whereby said pawls are alternately engageable with said gear rack.

3. A cloth-laying machine as set forth in claim 1 wherein said one edge portion of the cloth is the lay edge of the cloth and wherein said switching means includes: a casing having an opening therein; a guide tongue on said casing disposed to guide the lay edge of the cloth into said opening as the cloth passes from said roll during the cloth-laying operation; a spindle rotatably supported in said casing; a control member including an arm fixed to said spindle and projecting radially therefrom, said arm including needle-like projecting means

engageable by the lay edge of the cloth, said projecting means being operable in a plane perpendicular to the axis of said spindle, said plane being at said location of detection, for movement of said control member by the lay edge of the cloth when said lay edge is at said location of detection; a double-acting mercury switch fixed on said spindle and coupled to said driving gear; and balancing means to establish a normal position of said control member and said switch.

4. A cloth-laying machine as set forth in claim 2 wherein said one edge portion of the cloth is the lay edge of the cloth and wherein said switching means includes: a casing having an opening therein; a guide tongue on said casing disposed to guide the lay edge of the cloth into said opening as the cloth passes from said roll during the cloth-laying operation, a spindle rotatably supported in said casing; a control member including an arm fixed to said spindle and projecting radially therefrom, said arm including needle-like projecting means engageable by the lay edge of the cloth, said projecting means being operable in a plane perpendicular to the axis of said spindle; said plane being at said location of detection, for movement of said control member by the lay edge of the cloth when said lay edge is at said location

of detection; a double-acting mercury switch fixed on said spindle and coupled to said electromagnetic means; and balancing means to establish a normal position of said control member and said switch.

5. A cloth-laying machine as set forth in claim 4 wherein said electromagnetic means consists of an electromagnet operably associated with each of said lever arms connected to said pawls, and wherein the connection of said mercury switch to said electro-magnetic means is effective to energize one of said electromagnets when the position of the mercury switch is determined by said balance means, and to energize the other of said electromagnets when the position of said mercury switch is determined by the operation of said control member by the engagement and movement thereof by the lay edge of the cloth during passage thereof from said rolls during the cloth-laying operation.

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