

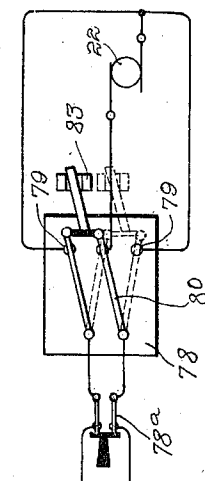
M. L. & C. M. SHAPERA.
FABRIC LAYING AND FOLDING MACHINE.
APPLICATION FILED NOV. 11, 1908.

964,124

Patented July 12, 1910.

48 SHEETS—SHEET 1.

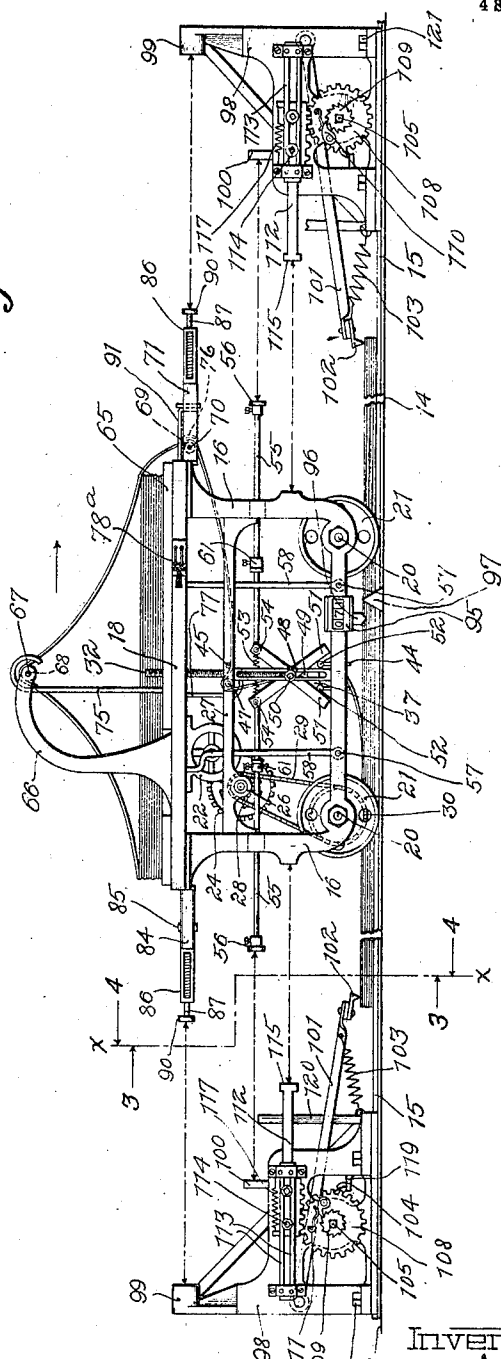
Fig. 12



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Fig. 1.



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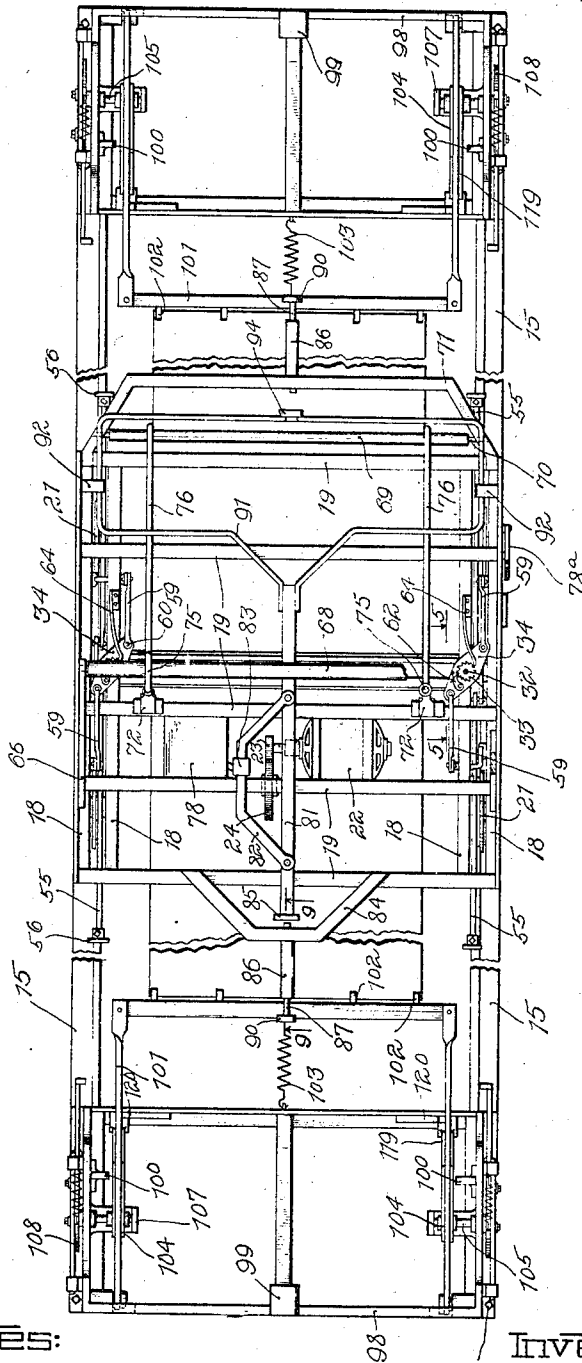
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4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 4.

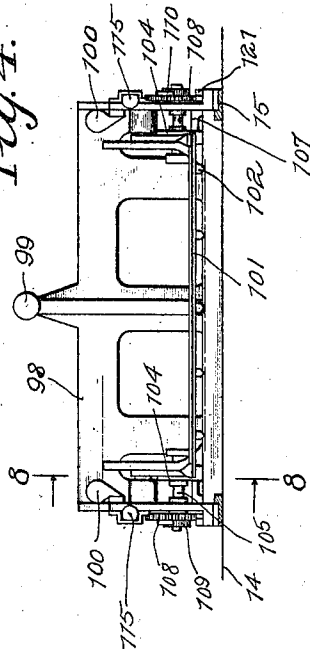


Fig. 13.

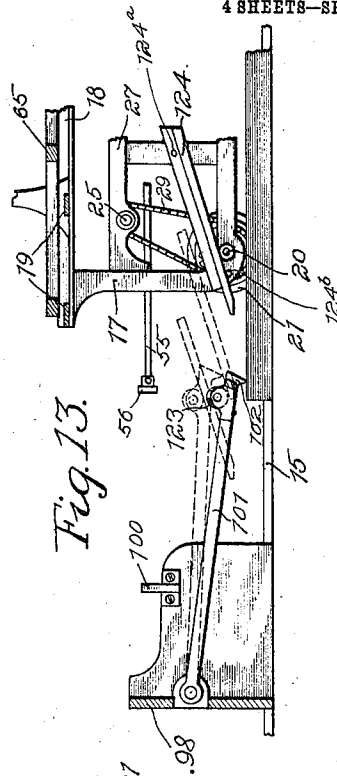
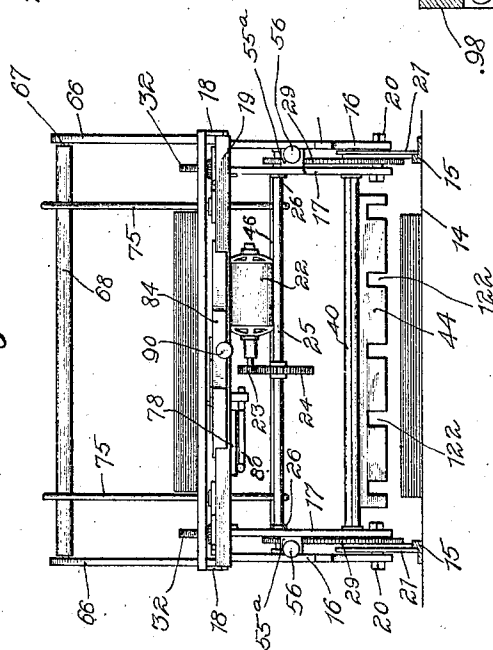


Fig. 3.

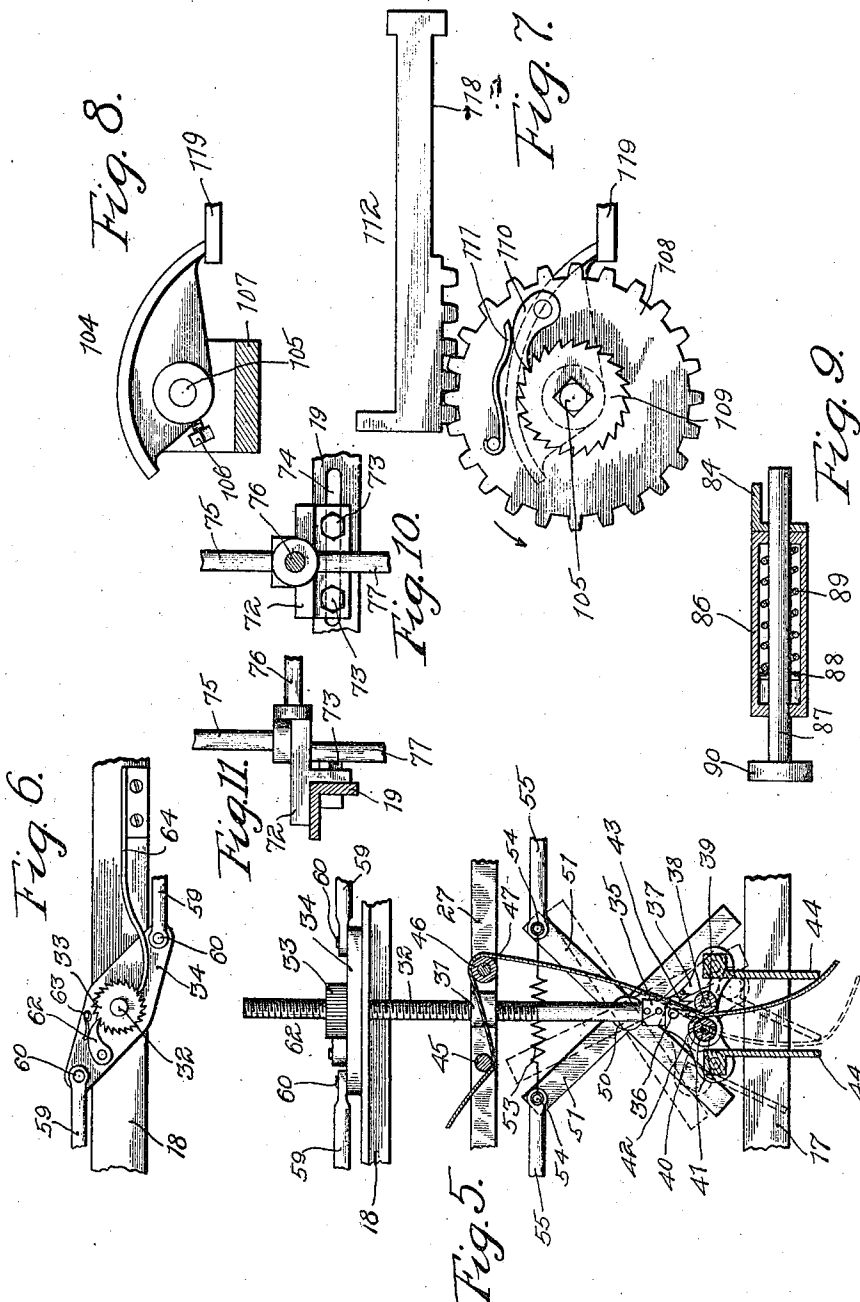


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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

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FABRIC LAYING AND FOLDING MACHINE.

964,124.

Specification of Letters Patent. Patented July 12, 1910.

Application filed November 11, 1908. Serial No. 462,139.

To all whom it may concern:

Be it known that we, MORRIS L. SHAPER and CHARLES M. SHAPER, citizens of the United States, and residing at Chicago, county of Cook, and State of Illinois, have invented new and useful Improvements in Fabric Laying and Folding Machines, of which the following is a specification.

This invention relates to fabric laying and folding machines, and particularly contemplates a device which operates entirely automatically.

Machines to the class to which our invention relates are adapted for use in garment making and similar industries where a large number of standard pieces are cut simultaneously.

In order to secure a multitude of pieces, for instance garment sections, which are precisely alike, it has become the custom to fold the fabric back and forth into layers of the proper length and to cut the pile thus formed in accordance with a predetermined pattern. It is evident that to so lay and relay the cloth manually would involve considerable labor in view particularly of the fact that the layers must frequently be of considerable length. In order to obviate this difficulty, machines have been designed to carry the primary bolt back and forth and to thus feed the fabric onto the pile. While these devices of the prior art relieved the operator of a great deal of labor, still constant attendance was absolutely essential. The device of our invention requires no attention after having been set into operation until the entire bolt has been properly laid out.

As in the prior structures, the device of our invention comprises essentially a reciprocating carriage and means at each end of the path for holding the ends of the pile. Our invention provides for the automatic propulsion of the carriage and for the operation of the end clamps by the impact of the carriage. It is this impact of the carriage at the end of the travel that reverses the direction of the carriage, operates the guiding mechanism for the end of the fold of the fabric, actuates the end clamping mechanisms to grasp the successive folds of the pile, and operates mechanism to gradually raise the guiding means as the pile increases.

Our invention is embodied in the structure

illustrated in the accompanying drawings, in which—

Figure 1 is a front elevational view thereof; Fig. 2 is a plan view thereof; Fig. 3 is an end elevational view of the carriage taken on the line $x-x$ of Fig. 1 and looking in the direction indicated by the arrows 3, 3; Fig. 4 is an end elevational view of one of the end clamps taken on the line $x-x$ of Fig. 1 and looking in the direction indicated by the arrows 4, 4; Fig. 5 is a sectional detail view on a larger scale taken on the line 5-5 of Fig. 2 and looking in the direction indicated by the arrows; Fig. 6 is a plan view of the portion shown in detail in Fig. 5; Fig. 7 is an end elevational detail view on an enlarged scale of part of the end clamp mechanism; Fig. 8 is a sectional detail view, on the same scale as that of Fig. 7, taken on the line 8-8 of Fig. 4 and looking in the direction indicated by the arrows; Fig. 9 is a detail view on a larger scale of part of the reversing mechanism to be described, being a sectional view taken on the line 9-9 of Fig. 2. Fig. 10 is a detail view on a larger scale of part of the fabric directing means to be described, being a front elevational view thereof. Fig. 11 is a side elevational view of the parts shown in Fig. 10. Fig. 12 is an underside view of the switching mechanism (enlarged), the circuit connections therefor being shown diagrammatically, and Fig. 13 is a vertical sectional view of part of the carriage and one of the end clamps illustrating a modified form which may be employed.

Like reference numerals are applied to the same parts throughout the various figures.

The entire arrangement to be described is mounted upon what is commonly known as a cutting table, indicated at 14 in Fig. 1, a pair of tracks 15, 15 being provided, upon which the carriage may reciprocate. The primary supporting element of the carriage comprises the outer upright side members 16, 16, the inner upright side members 17, 17 and the horizontal frame at the tops of the side members which consists of the longitudinal members 18, 18 and the transverse members 19, 19, these parts being rigidly secured together to form a resistant structure. Mounted upon shafts 20, 20 between the outer and inner side members are the pairs of roller wheels 21, 21 which rest upon the

tracks, as illustrated in the various figures. To secure the automatic propulsion of the carriage, we have provided a motive device, conveniently an electric motor 22, inverted and fastened to the under side of the transverse members 19, 19 of the horizontal frame portion of the supporting structure. The rotor of this device is provided with a pinion 23 which meshes with a gear wheel 24 rigidly secured upon a transverse shaft 25 journaled in bearings 26, 26 on the longitudinally extending cross pieces 27, 27 of the upright side members 16 and 17, respectively. Between the side members 16 and 17 at each side of the machine this transverse shaft 25 is provided with a sprocket wheel 28 which is operatively connected by means of a sprocket chain 29 with a sprocket wheel 30, preferably of larger diameter than the sprocket wheel 28, rigidly concentrically secured to the respective roller wheel 21. Thus the rotation of the motor is transmitted to the roller wheels to cause movement of the carriage.

On each side of the machine, mounted in an enlargement 31 on the cross piece 27 of the inner side member 17 and the corresponding longitudinal member 18 is a screw rod 32, this rod, however, not having threaded engagement with these parts. The screw rod 32 has in threaded engagement therewith above the member 18, a ratchet wheel 33 and it is by this engagement that the rod is supported. A walking lever 34 is loosely pivoted upon the rod 32 and is disposed between the ratchet wheel 33 and the member 18, as clearly shown in Fig. 5, the purpose of this lever being hereinafter clearly pointed out.

At the lower end of each of the screw rods 32 there is provided the supporting plate 35 and to this plate is pivoted at 36 the end plate 37 of a guiding system. Between the two end plates 37 a rod 38 is spanned and upon this rod is mounted the roller 39. Next this roller is mounted a second roller 40, the pivot rod 41 thereof being set in the end plates in an elongated slot (not shown) to permit of movement thereof toward and away from the roller 39. Loosely mounted on the pivot rod 41 at each end of the roller 40 are the washers 42 with which a coiled spring 43 is connected, this spring being fastened at its other end to the end plate. Thus the roller 40 is always maintained toward the roller 39.

Rigidly secured in symmetrically extending ears on the end plates, as shown in Fig. 5, are the guiding plates 44, 44. These plates are arranged to engage the fabric to tuck it beneath the end clamps as will be explained, the fabric passing downwardly between the rollers 39 and 40 as it passes from the bolt above, as will be explained, under the guide rod 45 secured between the

inner cross pieces 27, 27 and over the roller 46 mounted upon the pivot rod 47 mounted parallel and similarly to the rod 45.

In order to secure the swinging of the guiding mechanism about its pivots 36, 36 the following construction is provided: Secured between the cross member 27 and the lower cross member of one of the outer side members 16, 16 is a vertical bar 48 having a slot 49 in which an adjustable pivot stud 50 is set. Upon this stud 50 the oscillating levers 51, 51 are pivoted, preferably independently, in such a position that the lower ends of each may engage a pin 52 on the outside of the adjacent end plate of the guiding mechanism. These oscillating levers are preferably held in constant engagement with their respective pins 52 by the coiled tension spring 53. At the upper ends of the oscillating levers 51, 51 are pivotally connected at 54, 54, the reciprocating rods 55, 55 respectively, these rods loosely sliding in bearings 55^a, 55^a, between the inner and outer side plates 17 and 16, respectively. The rods 55, 55 are provided at their free ends with the heads 56, 56 the purpose of which will be hereinafter pointed out. It is, of course, apparent that this lever arrangement may be provided at either one or both sides of the machine, but we have, for the purposes of a disclosure, merely shown it upon one side.

It will become apparent as the description proceeds that the best operation of the machine requires a gradual rise in the oscillating mechanism during the working thereof. To secure this result the following construction is provided: Pivoted at 57, 57 in the lower cross bar of the outer side member 16 at each side of the screw rod 32, are the rocking levers 58, 58, having the inwardly turned portions 59, 59 so as to be pivoted at 60, 60 to the opposite ends of the horizontal walking levers 34. Mounted upon the reciprocating rods 55, 55 are the adjustable fingers 61, 61 disposed in path to engage the rocking levers 58, 58. It is apparent now that inward movement of one of the rods 55, 55 will cause the finger carried thereby to engage the corresponding rocking lever 58 to effect a considerable oscillation of the walking lever 34. The extent of this oscillation may be gaged by the adjustment of the fingers 61, 61. Upon the top of the walking lever 34 there is pivotally mounted a pawl 62 which engages the ratchet wheel and is held in such engagement by the spring 63, all as clearly shown in detail in Fig. 6. A lever spring 64 is secured to the member 18 and engages the ratchet to form a catch to prevent retraction and to insure positive and determined movement. It is evident that repeated reciprocation of the rods 55, 55 will effect the gradual rise of the guiding mechanism; rotation of the

screw bar 32 being prevented by the mechanism carried by the lower end thereof, it is clear that rotation of the ratchet 33, which has threaded engagement therewith and is vertically at rest since it rests upon the bar 18, which rotation is effected by the lever and pawl arrangement, will cause a rise of the screw bar. This mechanism being provided on each side of the machine, the guiding mechanism will rise uniformly on both sides. When it is desired to lower the guiding mechanism the pawl 62 and the spring catch 64 are withdrawn manually and the ratchet wheel rotated in the opposite direction. Since, in the device, as herein illustrated, the shifting mechanism comprising oscillating levers 51, 51 is provided at but one side of the machine, it is apparent that the reciprocating bars 55, 55 of the opposite side may be attached directly to the rocking bars 58, 58 and the heads 56, 56 thereof may be adjusted so as to get the proper movement. Upon the horizontal frame portion of the structural support an auxiliary frame 65 is provided, and it is upon this auxiliary frame that the bolt from which the fabric is fed rests. On each side of this frame upwardly extending arms 66, 66 are provided which carry at the upper ends a pivot rod 67 upon which a roller 68 is mounted. The fabric is passed over this roller and then over a roller 69 mounted upon a pivot rod 70 secured in the brace 71 of the horizontal frame, and from this roller the fabric passes under the cross rod 45 and so on as has heretofore been described. In order to direct the fabric we provide the following arrangement: One of the transverse members 19, preferably the one nearest directly below the roller 68, has mounted thereon a supporting block 72 which has a downwardly extending portion through which bolts 73, 73 may pass and through the slot 74 in the downwardly extending portion of the transverse bar. Thus adjustment of the block is made possible according, as will be noticed, to the widths of the fabrics, the slot being of sufficient length to meet the standard requirements. This block is formed to support the radiating arms 75, 76, and 77, the arm 75 extending toward, and having a hook extending over the roller 68, the arm 76 extending toward and having a hook extending over the roller 69, and the arm 77 extending downwardly and having a hook extending about the roller 46. Thus the guides may be drawn close to the fabric to direct the same, this arrangement being particularly advantageous in view of the fact that the guides at the several rollers are adjusted simultaneously.

As has been before stated, the carriage reciprocates and to secure this reciprocation we provide means for reversing the direction of the electric motor employed for pro-

pulsion. To secure this reversal the poles of the motor are changed by way of a pole changing switch 78 secured to the under side of the transverse bars 19, as shown in Fig. 2. In Fig. 12 we have shown an underside view of the same wherein the contacts 79, 79 and the movable element 80 is illustrated. The switch is there shown diagrammatically and may be of any ordinary pole changing type whereby, when in one position, the current passes through the motor connected therewith as shown on the figure in a certain direction while in the other position it passes therethrough in the opposite direction. A line switch 78^a is provided so that the carriage may be started and stopped as desired. To secure this reversal there is provided the shifting bar 81 which slides upon the transverse members 19 and carries a brace 82 which has downwardly extending therefrom a fork 83 with which the handle of the movable element 80 of the switch 78 engages. It is apparent that shifting the rod will cause movement of the switch. To secure this movement in one direction the following construction is provided: The bar 81 extends into the brace 84 on the end of the horizontal frame of the primary structure and is provided with a head 85. In alinement with this head and on the outside of the brace is secured a plunger case 86 in which a plunger rod 87 slides. This is clearly shown in Fig. 9. The rod 87 has a transverse pin 88 inside the case and a helical spring 89 is disposed about the rod between the pin and the inner end of the case. A head 90 is provided for the rod and the rod is of such length as to strike the head 85 of the shifting bar 81 when the head 90 is given a hammer blow. This blow is thus transmitted to the shifting bar to shift it quickly to throw the switch in the proper manner. The opposite end of the shifting bar 81 carries a substantially rectangular frame 91 to escape the fabric, this frame being slidably secured in the blocks 92, 92 and being provided with a plate 94 of more substantial dimensions and analogous to the head 85. A spring plunger arrangement similar to that just described is secured on the outside of the brace 71 in alinement with the plate 94 and for the same purpose, thus providing means for shifting the switch in the opposite direction.

In order to maintain count of the number of layers in the pile of fabric being formed, we provide a cyclometer 95 upon one of the side members 16, the operating element 96 thereof being arranged to strike a fellow member 97 disposed in its path. This operating element is effected when the carriage passes in either direction so an accurate record may be kept.

So that the pile may be kept taut and compact we have arranged opposite end

clamps which the carriage approaches, these structures not only securing this purpose but also forming means for creating the impact which secures the actuation of the operative parts of the carriage. These end clamps are alike and the same reference numerals have been applied relatively in each. This primary supporting structure is a U-shaped frame 98. Each frame carries an abutment 99 in alinement with the plunger mechanism for operating the switching mechanism as indicated in dot-and-dash lines in Fig. 1. Thus when the carriage passes in one direction the plunger strikes the approached abutment, the switch is thereby shifted as has been described and the motor operates oppositely to propel the carriage in the reverse direction. The carriage then approaches the opposite abutment and repeats as has been pointed out.

To secure operation of the mechanism for swinging the guiding arrangement and for giving the same the gradual rise, we provide lugs 100, 100 extending inwardly from the frame 98 into alinement with the respective heads 56, 56 of the reciprocating bars 55, 55. These lugs are, of course, placed in proper position relative to the abutment 99, and when struck by the heads 56, 56 upon the approach of the carriage cause the inward movement of the rods 55, 55. The effect of such movement of the rods has already been described.

Pivoted to the inner sides of the frame 98 is the U-shaped clamping frame 101 which has at its free end a series of teeth 102 in alinement and adapted to rest upon the pile of fabrics as shown in Fig. 1, a spring 103 being provided to increase the clamping action. To raise this frame a cam 104 is disposed under each of the side arms thereof, being secured upon a rotatable shaft 105 by a set screw 106. This shaft is mounted in the frame proper and an extension 107 thereon and extends beyond the frame proper to receive a cog wheel 108 loosely mounted thereon and a ratchet 109 secured thereto. A pawl 110 is pivoted upon the cog wheel 108 and is held in engagement with the ratchet by the spring 111. Thus movement of the cog wheel in the direction of the arrow (Fig. 7) would carry the ratchet by way of the pawl to effect movement of the cam to raise the clamp, while movement in the opposite direction would not affect the cam. To operate the cog wheel a cog bar 112, mounted in the ways 113 on the frame 98 by means of the bolts 114, is provided, this bar having cogs for mesh with the wheel and a blank portion which the wheel may escape. This cog bar 112 is provided with a toe 115 in alinement with a portion of the side member 16 of the carriage as indicated in dot-and-dash lines in Fig. 1. A spring 117 between the bar and

the frame tends to retain the bar and wheel in normal position and the approach of the carriage to the end structure causes the engagement of the member 16 with the toe 115 to move the cog bar against the tension of the spring 117 to rotate the cog wheel in the direction of the arrow. As has been explained such rotation would effect the movement of the cam to raise the clamping frame. This movement would continue until the blank portion 118 of the bar 112 reaches the cog wheel. The wheel would immediately be released regardless of the further movement of the carriage and the cams would drop back to allow the clamp to drop upon the pile. A stop 119 is provided as the limit of return movement of the cam. Upright guides 120 may be provided to prevent lateral displacement of the clamping frame.

The opposing end structures may be spaced any distance apart to suit the requirements, being preferably movable on the tracks 15 to keep the structures in alinement, and may be secured in the predetermined position by clamping bolts 121, 121.

The operation of the machine may be summarized as follows: The bolt of fabric is placed on the frame 65 and the fabric is then passed over the rollers 68 and 69, under the rod 45, over the roller 46, between the rollers 39 and 40 and the end then placed under one of the clamping frames 101. The carriage is then run away from that frame. When it collides with the opposite frame the guiding mechanism is swung and at that instant the cam 104 raises the clamping frame. While the effectual guiding plate 44 is in its swung position the cogs on the cog bar 112 pass the cog wheel 108 and the cam may drop back as has been explained, and the clamping frame will lower, the teeth thereof passing through the slots 122, provided in the guiding plates to grasp the fabric. Thus it is seen that the movement of the cam is very rapid and the lowering thereof is practically instantaneous, this lowering taking place while the cloth is being tucked under and while the carriage is practically inert at the end of its stroke. During this operation the motor has been reversed and the carriage proceeds in the opposite direction to repeat the cycle of operations.

In Fig. 13 we have illustrated a modified form of end clamp arrangement which may be employed. In this form the swinging clamping frame 101 is provided at each side with a roller 123 which is arranged to ride up a track 124 pivotally secured at 124^a to the inside of the inner side member 17 and resting on the pin 124^b as illustrated. When the roller reaches the end of the track the frame drops precisely in effect as in the other form heretofore described. This track is of such length that the frame drops when 13

the fabric fold is tucked under, precisely as in the case hereinbefore explained, and in the return of the carriage the roller passes under and incidentally raises the track 124.

5 By this arrangement the cog and bar arrangement is unnecessary. The rise of the clamping frame is secured at the proper time and the sudden drop of the clamp is secured at the proper instant.

10 Having thus described our invention, what we claim as new, and desire covered by Letters Patent, is:

1. In a fabric laying machine, in combination, a reciprocating carriage, a pair of guiding plates hung upon a common pivot on said carriage, means for guiding the fabric between said plates, a clamp at each end of the travel of said carriage, and means whereby said plates may be swung in one direction at one end of the travel of said carriage to guide the fabric into the corresponding clamp and whereby said plates may be swung in the other direction at the other end of the travel of said carriage to guide the fabric into the other clamp.

2. In a fabric laying machine, in combination, a reciprocating carriage, a pair of guiding plates hung upon a common pivot on said carriage, means for guiding the fabric between said plates, a clamp at each end of the travel of said carriage, an abutment at each end of the travel of said carriage, and mechanism carried by said carriage and operative upon collision with said abutment and mechanically connected with said plates to swing the same to guide the fabric into the clamp toward which the carriage is moving.

3. In a fabric laying machine, in combination, a reciprocating carriage, a pivoted supporting member mounted upon said carriage, guiding plates carried by said member, oscillating levers hung upon a common pivot on said carriage, means for maintaining said levers in effective relation to said supporting member, an actuating member slidably mounted in said carriage and connected with said oscillating levers, a stationary abutment member with which said actuating member may collide to operate said guiding plates, a clamp mounted on said abutment member, and means carried upon said abutment member for operating said clamp, said means being actuated by collision therewith of said carriage.

4. In a fabric laying machine, in combination, a reciprocating carriage, two clamps between which said carriage reciprocates, a pair of actuating guiding plates hung on a common pivot on said carriage, a stationary abutment at each end of the travel of said carriage, an actuating abutment member connected with said guiding plates and arranged to collide with one of said station-

ary abutments, and mechanism for raising said guiding plates operated by periodic mechanical connection with said actuating abutment member.

5. In a fabric laying machine, in combination, a reciprocating carriage, two clamps between which said carriage reciprocates, a pair of guiding plates hung upon a common pivot, screw threaded rods for supporting said guiding plates carried in said carriage, a ratchet wheel threaded on each of said rods and engaging the carriage proper to form a supporting member, means for actuating said guiding plates, and mechanism operated by said actuating means for rotating said ratchet wheels to raise said guiding plates.

6. In a fabric laying machine, in combination, a reciprocating carriage frame, two clamps between which said carriage frame operates, two vertical screw rods passing through openings in said frame, a ratchet wheel mounted on each of said rods and engaging said frame to form a supporting member, a pair of guiding plates pivotally mounted between the lower ends of said screw rods, actuating means for swinging said guiding plates at the end of the travel of said carriage, pawl mechanism associated with said ratchet wheel, and means connected with said actuating means for operating said pawl mechanism periodically to raise said guiding plates.

7. In a fabric laying machine, in combination, a reciprocating carriage frame, two clamps between which said carriage frame reciprocates, a supporting member pivotally mounted in said frame, a pair of guiding plates mounted on said supporting member, a pair of independently moving oscillating levers mounted on a common pivot and associated with said plates, and means for actuating said levers to swing said plates to guide the fabric into the approached clamp.

8. In a fabric laying machine, in combination, a reciprocating carriage frame, two clamps between which said carriage frame reciprocates, a supporting member pivotally mounted in said frame, means for raising said supporting member, a pair of guiding plates mounted on said supporting member, means for guiding the fabric between said plates, a pair of independently moving oscillating levers mounted on a common pivot and associated with said plates, and means for actuating said levers to swing said plates to guide the fabric into the approached clamp.

9. In a fabric laying machine, in combination, a reciprocating carriage frame, two clamps between which said carriage frame operates, a supporting member pivotally mounted in said frame, means for raising said supporting member, a pair of guiding

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plates rigidly mounted side by side on said supporting member, means for guiding the fabric between said plates, a pair of independently moving oscillating levers mounted on a common pivot and associated with said plates, spring means for yieldingly holding said levers in direct association with said plates, and means for actuating said levers, one in one direction and the other in the opposite direction, to swing said plates to guide the fabric into the approached clamp.

10. In a fabric laying machine, in combination, a reciprocating carriage frame, two clamps between which said carriage frame operates, a supporting member pivotally mounted on said carriage frame, a pair of guiding plates rigidly mounted parallel to each other in said supporting member, a roller disposed between said plates, a second roller, and spring means for maintaining said rollers in close relation to restrain fabric fed therebetween.

11. In a fabric laying machine, in combination, a reciprocating carriage frame, two clamps between which said carriage frame operates, a pair of supporting rods hanging symmetrically and laterally opposite in said frame, a supporting member pivotally hung at the lower end of each of said rods, a pair of guiding plates rigidly mounted parallel to each other between said supporting members, means for swinging said supporting members, and means for raising said supporting members together.

12. In a fabric laying machine, in combination, a reciprocating carriage for carrying a bolt of cloth, a pair of clamps between which said carriage operates, a pair of guiding plates carried upon a common pivot on said carriage and between which the fabric is adapted to pass, means for actuating said guiding plates to guide the fabric to the approached clamp, roller means for guiding the fabric between said plates and

for placing a tension thereon, and directing means on said carriage engaging the edges of the fabric at several places for preventing lateral displacement thereof.

13. In a fabric laying machine, in combination, a reciprocating carriage for carrying the bolt from which the fabric is to be fed, an abutment structure with which said carriage is arranged to collide, a motor for propelling said carriage, a pole changing switch for controlling said motor, and means operable by the impact for actuating said switch to reverse the action of the motor.

14. In a cloth laying machine, in combination, a reciprocating carriage, a motor for propelling said carriage, a pole changing switch for controlling the direction of said motor, a sliding frame mounted on said carriage and connected with said switch, spring plunger mechanism associated with said frame at each end thereof, and a stationary abutment member at each end of the travel of said carriage with which the respective plunger is arranged to collide whereby said frame is moved to reverse said switch.

15. The combination with a support, of a fabric supplying means, a carriage adapted to move along the support provided with fabric guiding means, means mounted on the carriage for positively driving the carriage in either direction, said means including a motor, and connections between the motor and the supporting wheels of the carriage to drive the latter, together with means for reversing the direction of movement of said carriage.

In witness whereof, we have signed our names to this specification in the presence of two subscribing witnesses.

MORRIS L. SHAPER.
CHAS. M. SHAPER.

Witnesses:

GEO. S. PINES,
WALTER S. BAER.