

Oct. 24, 1944.

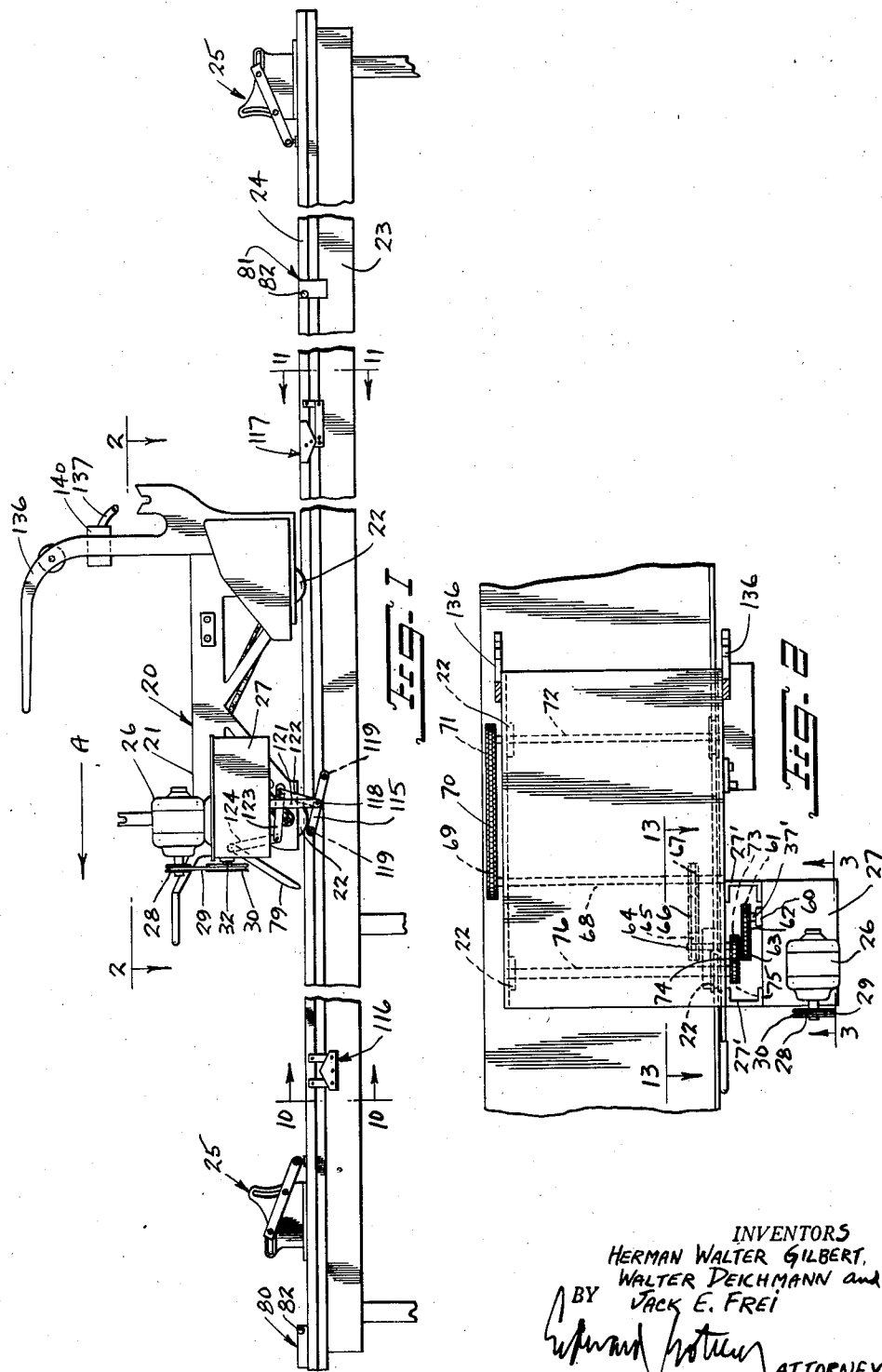
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2,360,869

AUTOMATIC CLOTH LAYING-UP MACHINE

Filed March 4, 1943

4 Sheets-Sheet 1



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AUTOMATIC CLOTH LAYING-UP MACHINE

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4 Sheets-Sheet 2

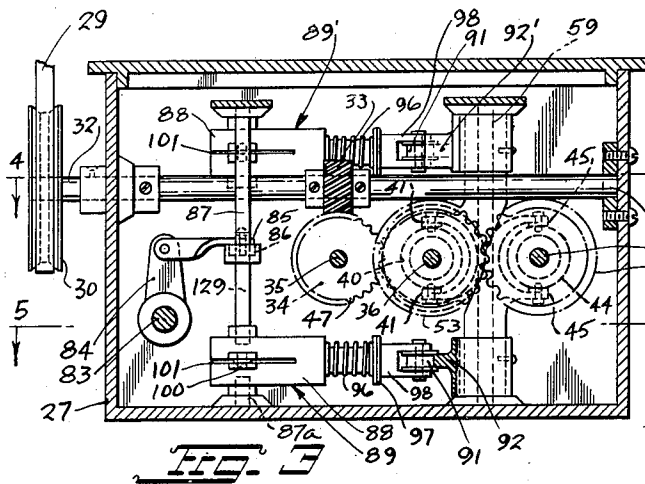


FIG. 3

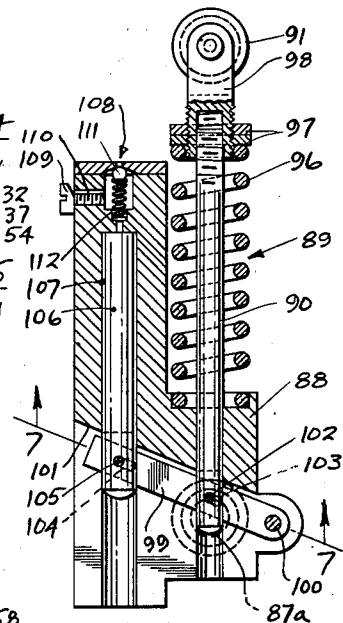


FIG. 6

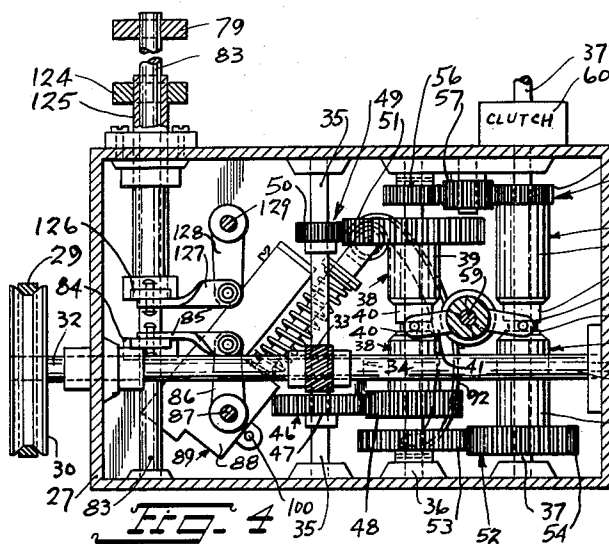


FIG. 4

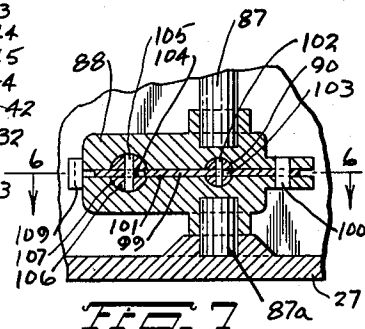


FIG. 7

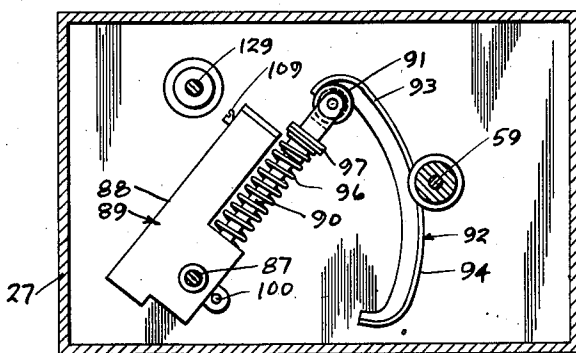


FIG. 5

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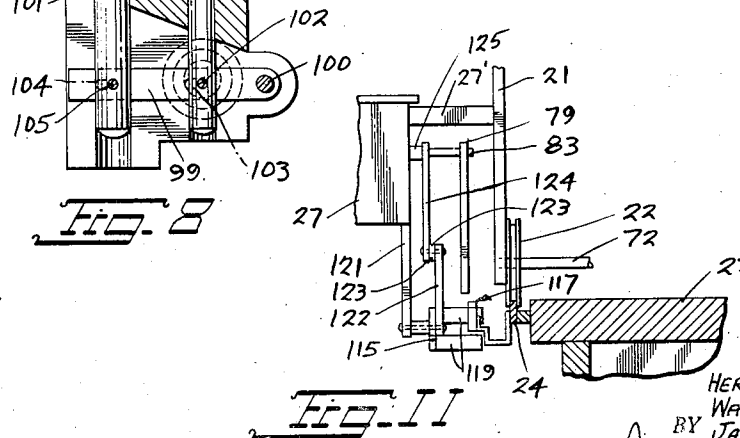
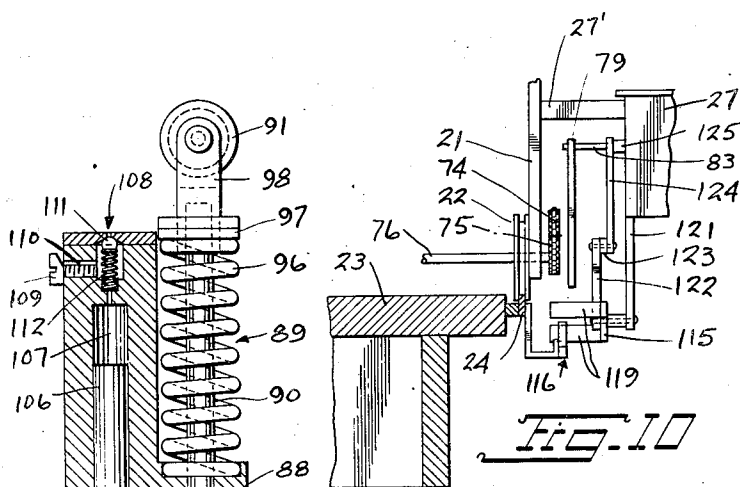
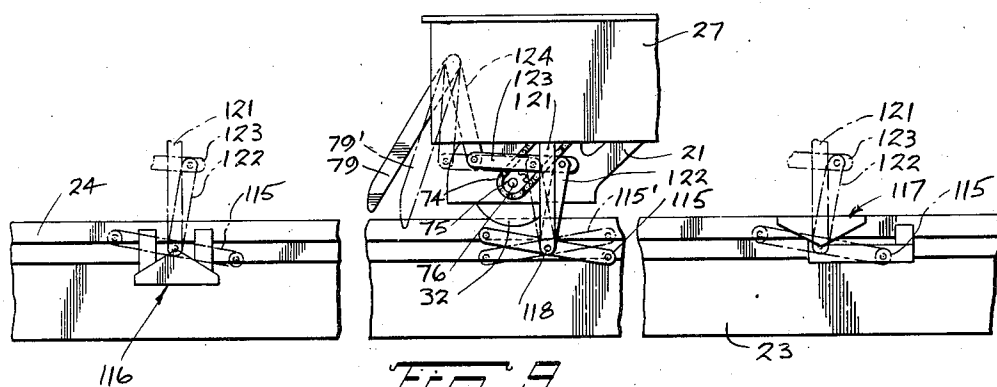
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4 Sheets-Sheet 3



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4 Sheets-Sheet 4

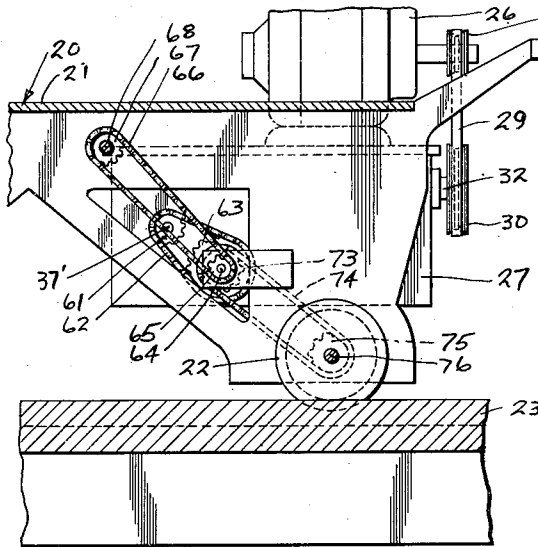


Fig. 13

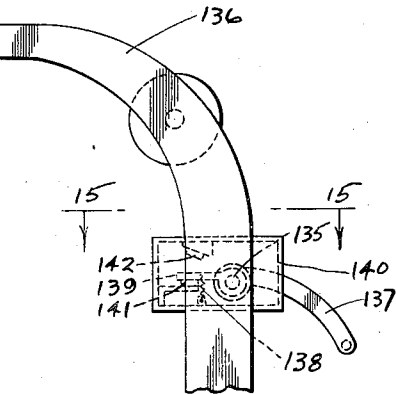


Fig. 14

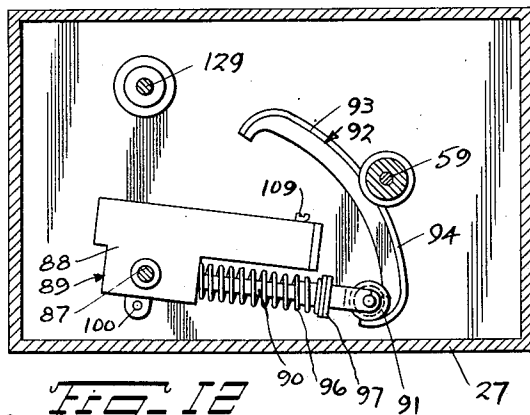


Fig. 12

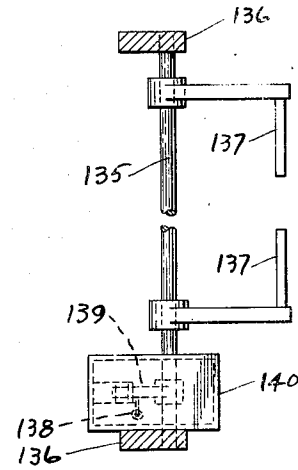


Fig. 15

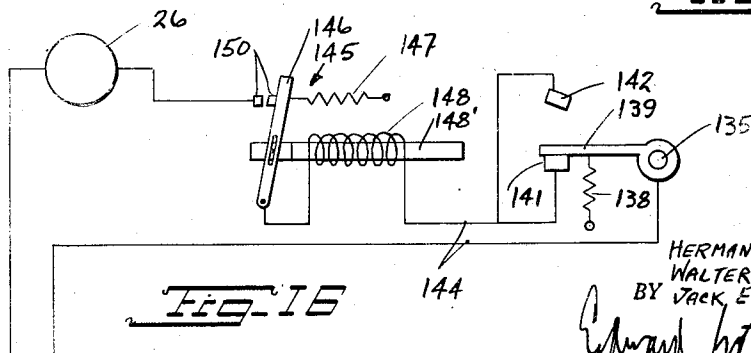


Fig. 16

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UNITED STATES PATENT OFFICE

2,360,869

AUTOMATIC CLOTH LAYING-UP MACHINE

Herman Walter Gilbert, Forest Hills, Walter Deichmann, Elmont, and Jack E. Frei, New York, N. Y.; said Deichmann and said Frei assignors to said Gilbert

Application March 4, 1943, Serial No. 477,934

18 Claims. (Cl. 270—31)

This invention relates to new and useful improvements in cloth laying-up machines, and has more particular reference to an automatic machine of this type.

Heretofore, the common cloth laying-up machine was manually operated in so far as it required that the carriage of the machine be manually moved back and forth on the table upon which the cloth was laid up. This invention contemplates the construction of an automatic cloth laying-up machine in which the carriage will automatically move to and fro on the table, eliminating the necessity that it be manually moved.

More specifically, it is proposed to so construct the new automatic cloth laying-up machine that its carriage travels rapidly to and fro on the table, except at the end portions of its path of travel. At said end portions, it automatically travels slowly so that it may reverse without an excessive jar. It is proposed to provide cams mounted on the table near the end portions of the path of travel, and it is proposed to provide a certain mechanism on the carriage of the cloth laying-up machine which is cooperative with these cams to control the speed of travel of the carriage of the machine. With the arrangement used, when the carriage of the cloth laying-up machine is outside of the cams it travels slowly, and when it is between the cams, it travels rapidly.

The invention also contemplates a simple and effective mechanism for reversing the carriage of the cloth laying-up machine when it reaches the ends of the path of travel.

An important feature of this invention resides in the construction of a certain transmission of the automatic cloth laying-up machine which connects a prime mover, such as an electric motor on the carriage of the machine, with the wheels of the carriage for driving the same. It is proposed that this transmission include change of speed clutches and change of direction clutches. An important feature resides in the way these clutches are arranged in relation with each other. Another important feature resides in the mechanism and means for operating these clutches.

It is important that the clutches function smoothly to prevent the carriage of the machine from jerking when its speed is changed or when its direction is changed. For this reason a certain mechanism has been provided which includes dash pots and certain cams ar-

ranged so as to gradually set the clutches into and out of operation.

The invention also proposes an arrangement for cutting out most of the mechanism of the transmission previously referred to, when desired, to convert the cloth laying-up machine to a machine in which the carriage may be hand operated, that is, manually moved to and fro.

The invention also proposes an automatic cut-out for stopping the automatic cloth laying-up machine when all of the cloth on it has been laid up. With this construction the necessity of an operator watching the machine has been eliminated.

The invention also proposes to construct the automatic cloth laying-up machine and the transmission mechanism thereof so sturdy that an operator may sit on the carriage of the machine while it is automatically moving to and fro and straighten out the layers of cloth as the machine lays them, and generally make certain that the cloth is being properly laid.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

Fig. 1 is a side elevational view of an automatic cloth laying-up machine constructed in accordance with this invention, and shown rested on a table.

Fig. 2 is a fragmentary horizontal sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary enlarged vertical sectional view taken on the line 3—3 of Fig. 2, this section being taken directly behind the front wall of the box shown in Figs. 1 and 2.

Fig. 4 is a fragmentary horizontal sectional view taken on the line 4—4 of Fig. 3.

Fig. 5 is a horizontal sectional view taken on the line 5—5 of Fig. 3.

Fig. 6 is a fragmentary horizontal sectional view taken through the center of one of the cylinders of the dash pots illustrated in Figs. 3-5, this view corresponding to a section on the line 6—6 of Fig. 7.

Fig. 7 is a fragmentary sectional view taken on the line 7—7 of Fig. 6.

Fig. 8 is a sectional view similar to Fig. 6 but illustrating the parts in a different position.

Fig. 9 is a fragmentary enlarged detailed view of a portion of Fig. 1 but schematically illustrating the parts in different positions.

Fig. 10 is a fragmentary enlarged sectional view taken on the line 10—10 of Fig. 1.

Fig. 11 is a fragmentary enlarged sectional view taken on the line 11—11 of Fig. 1.

Fig. 12 is a horizontal sectional view similar to Fig. 5 but illustrating the parts in a different position.

Fig. 13 is a fragmentary enlarged vertical sectional view taken on the line 13—13 of Fig. 2.

Fig. 14 is a fragmentary enlarged view of a portion of Fig. 1 showing particularly details of the automatic stop mechanism of the machine.

Fig. 15 is a fragmentary horizontal sectional view taken on the line 15—15 of Fig. 14.

Fig. 16 is a schematic wiring diagram of the electrical circuit of the device.

The automatic cloth laying-up machine, in accordance with this invention, includes a cloth laying-up machine 20 of any design and construction, having a carriage 21 supported on wheels 22. The goods to be laid up is placed on the carriage 21 and guided through the cloth laying-up machine 20 in the usual way. The details of the threading of the cloth and the machine itself will not be given in this specification as it forms no part of the invention, and machines of this type are well known. For example, this invention is applicable to a cloth laying-up machine such as illustrated in patent application Serial No. 370,784 invented by Messrs. Gilbert, Dexter and Deichmann.

The carriage 21 is rested on a table 23 which has a track 24 mounted along the front edge. The wheels 22 on the near side of the carriage 21 of the cloth laying machine engage this track. On the other side the carriage 21 of the cloth laying machine has rubber wheels which are merely rested on the top of the table 23. The carriage 21 is adapted to be moved to and fro on the table 23 from end to end along the length of the track 24. If we consider the right hand end of the table 23 as the front end of the table, then the carriage 21 may be moved to this position which we will refer to as the forward position, and next the carriage 21 may be moved to the left hand end of the table, which we will refer to as the rearward position of its path of travel, and next the carriage 21 may be moved back again to the right so as to lay up the goods. The carriage 21 works in conjunction with the usual cloth catching and holding devices 25 which are mounted on the forward and rearward ends of the table 23 for catching and holding the folded end portions of the layers of laid up cloth.

A prime mover 26, such as an electric motor, is indirectly mounted on the carriage 21. More specifically, the prime mover 26 is mounted on a box 27 which in turn is mounted on the side of the carriage 21 by the brackets 27'. The electric motor 26 may be supplied with electric current from an overhead flexible cable, or other system, not disclosed on the drawings, since it forms no part of the invention. A transmission connects the prime mover 26 with certain of the wheels 22 for driving the carriage 21, and this transmission includes change of speed clutches 38 and change of direction clutches 42, as hereinafter more fully explained. These clutches and most of the mechanism of the transmission are located within the box 27. The electric motor 26 is provided with a pulley 28 which is engaged by a belt 29 engaging a wheel 30 mounted on the

driver shaft 32 of the transmission. This driver shaft 32 is rotatively supported longitudinally of the box 27. The shaft 32 is provided with a spiral pinion 33 which meshes with a spiral gear 34 mounted on a transverse driven countershaft 35 rotatively supported across the inside of the box 27. This shaft 35 is parallel to a speed control shaft 36 also rotatively mounted transversely across the box 27. There is also a reverse clutch shaft 37 parallel to the shaft 36 and rotatively mounted across the box 27.

A pair of speed control clutches (said clutches 38) are mounted on the speed control shaft 36. These clutches 38 have drums 39 rotatively and non-slidably mounted on the shaft 36 and they also have adjacent cores 40 non-rotatively but slightly slidably mounted on the speed clutch shaft 36. The details of these clutches will not be given in this specification as they form no part of the invention. However, the operation of said clutches must be pointed out. The operation is such that a fork 41 working between the cores 40 is capable of throwing in or taking out selectively these clutches from operation. This may best be understood by examining Fig. 4 and noting that when the fork 41 is turned to the position illustrated, one of the cores 40 is pressed inwards while the other is free. The clutch 38 with the pressed in core 40 is the one that is now transmitting.

A pair of direction control clutches (said clutches 42) are mounted on the reverse clutch shaft 37. These clutches 42 have drums 43 rotatively and non-slidably mounted on the reverse clutch shaft 37. They also have cores 44 non-rotatively but slightly slidably mounted on the reverse clutch shaft 37. A fork 45 engages between the cores 44 and is adapted to operate said clutches 42. As illustrated in Fig. 4, the fork 45 is pressing inwards one of the cores 44 so that one of these clutches 42 is now transmitting. The other core 44 is free.

A high speed gear train 46 connects the countershaft 35 with the drum 39 of one of said speed control clutches 38. This high speed gear train 46 comprises a pair of identical sized meshing gears 47 and 48. The gear 47 is mounted on the shaft 35 while the gear 48 is mounted on the drum 39 of said clutch 38. A low speed gear train 49 connects the countershaft 35 with the drum 39 of the other of said speed control clutches 38. This low speed gear train comprises a small gear 50 mounted on the shaft 35 and meshing with a large gear 51 mounted on the drum 39 of said other speed control clutches 38. A forward gear train 52 connects the speed control shaft 36 with the drum of one of said direction control clutches 42. This forward gear train comprises a pair of meshing gears 53 and 54. The gear 53 is mounted on the shaft 36 and meshes with the gear 54 which is mounted on the drum 43 of one of the clutches 42. There is also a reverse gear train 55 connecting said speed control shaft 36 with the drum of the other of said direction control clutches 42. This reverse gear train comprises a gear 56 mounted on the speed control shaft 36 and meshing with an idler gear 57 which in turn meshes with a gear 58 mounted on the drum 43 of the said last mentioned clutch 42.

The controller fork 41 is freely mounted on the upper portion of a vertical shaft 59 turnably mounted within the box 27. The controller fork 45 is freely mounted on the lower portion of said shaft 59. At this point it may be best to trace the transmission through the box 27. Starting

with the shaft 32 the drive will continue to the gears 33 and 34 and thus to the driven countershaft 35. From the driven countershaft 35 rotations will continue to both of the drums 39 of the said speed clutches 38. However, it should be noted that the drums 39 will be driven at different speeds. One of these speeds will be transmitted to the speed control shaft 36 depending upon which way the fork 41 is thrown, since this fork 41 controls one or the other of the clutches 38. Rotations from the speed control shaft 36 will be transmitted simultaneously to the drums 43 of the direction clutches 42. However, these drums 43 will be rotating in opposite directions. One or the other of these clutches 42 will drive the reverse clutch shaft 37 depending upon the position of the fork 45. Thus the shaft 37 will be driven in one direction or the other at a high speed, or at a low speed, depending merely upon the engagement of the said clutches 38 and 42.

The shaft 37 projects from the back side of the box 27. The shaft 37 connects with a main clutch 60 which in turn connects with a rotatively supported stud shaft 37'. This rotatively supported stud shaft 37' is provided with a sprocket 61 engaged by a chain 62 which connects with a sprocket 63 on a countershaft 64. The countershaft 64 is provided with a sprocket 65 connected by a chain 66 with a sprocket 67 on a transverse shaft 68 mounted across the carriage 21. The back end of the shaft 68 is provided with a sprocket 69 engaged by a chain 70 connected with a sprocket 71 on a shaft 72 upon which the front one of the far wheels 22 of the carriage 21 is mounted. The shaft 64 is also provided with a sprocket 73 engaged by a chain 74 engaged over a sprocket 75 on a shaft 76 upon which the rear near wheel 22 of the carriage 21 is mounted. The construction is such that the shaft 37 indirectly drives two of the wheels 22 so as to drive the carriage 21. It is pointed out that the main clutch 60 may be opened so as to disconnect all the mechanism within the box 27 and then the carriage 21 of the cloth laying-up machine 20 may be manually pushed to and fro on the table 23.

A means is provided for throwing said change of direction clutches 42, which means includes a reverse control lever 79 movably mounted on said carriage 21, and more particularly, upon the side of the box 27. This reverse control lever 79 has a forward position, illustrated by the dot and dash lines 79', in which said carriage 21 is driven forwards, that is, towards the right, and it also has a rearward position, the position illustrated by the full lines in which said carriage 21 is driven rearwards.

Reversing members 80 and 81 are mounted on the said table 23 at said rearward and forward positions to form abutments for said reversing lever 79 to move said reversing lever towards its forward and rearward positions, respectively, when said carriage 21 reaches its rearward and forward positions, respectively. The reversing member 80 comprises a block mounted on the table 23 and supporting a roller 82 against which the end of the reverse control lever 79 strikes. The reversing member 81 also comprises a block provided with a roller 82 against which the reverse control lever 79 strikes.

The reverse control lever 79 is mounted on a turnable shaft 83 which extends into the box 27. A radial arm 84 is mounted on the shaft 83 and pivotally connects with a link 85 which in turn is pivotally connected with a radial arm 86 upon

a vertical shaft 87 turnably supported in the box 27. This vertical shaft 87 supports in conjunction with a stud 87a a horizontal radial housing 88 of a dash pot mechanism 89. A plunger 90 projects from the dash pot mechanism 89 and carries a follower roller 91 which engages an arcuate fork shifter cam 92 connected with said fork 45. This fork shifter cam 92 has end sections 93 and 94 extending to opposite sides of the pivot of said fork 45. This fork shifter cam 92 is for the purpose of depressing the plunger 90 when the housing 88 is turned so that the plunger 90 is moved from the extremity of one or the other of the end section 93 or 94 past the center of the fork shifter cam 92.

The plunger 90 is slidably mounted in and projects from the housing 88. Resilient means urges the plunger 90 outwards, and this resilient means includes a spring 95 coaxially mounted on the plunger 90 and acting between the housing 88 and nuts 97 adjustably mounted on a bracket 98 which supports the follower roller 91.

The construction of the dash pot means 89 may be recognized by noting that the plunger 90 has a slotted inner end through which a lever 99 passes. This lever 99 is pivotally mounted by a pintle 100 supported on the housing 88. The housing 88 has a slot 101 in which the lever 99 is capable of moving. The plunger 90 is provided with a pin 102 which engages a small slot 103 in the lever 99. The outer end of the lever 99 extends into a slot in the rear end of a piston 106, and said lever 99 is provided with another slot 104 engaged by a pin 105 mounted on said piston 106. This piston rod 106 works in a cylinder 107 formed in the housing 88. A one way valve 108 is mounted upon the front end of the cylinder 107. An adjustable bleed screw 109 indirectly connects with the front end of the cylinder 107. This bleed screw 109 has a slot 110 through which oil or other fluid for the dash pot may flow. The valve 108 includes a ball 111 and a spring 112 urging the ball 111 upon a valve seat. The construction is such that when the plunger 90 is pressed inwards the piston 106 will move correspondingly. This may be clearly understood by inspecting Figs. 6 and 8 which show the two positions of the piston of the dash pot. When the piston 106 moves inwards it draws oil through the valve 108. The spring 95 then tends to move the plunger 90 outwards, and this action at the same time forces the oil from the cylinder 107 through the bleed 110 of said bleed screw 109. This constitutes the dash pot action.

It is pointed out that in the position of the parts illustrated in Fig. 5, the spring 96 of the dash pot mechanism 89 tends to pivot the arcuate fork shifter cam 92 clockwise. This indirectly tends to pivot the fork 45 clockwise, see Fig. 4. Consequently, the bottom clutch core 44, as illustrated in Fig. 4, is engaged while the top clutch core 44 is free. When the reverse control lever 79 is moved to its other position, the housing 88 will be moved towards the position illustrated in Fig. 12. However, the reversing members (80 and 81) of the reverse control lever 79 must be so adjusted that when the housing 88 pivots, the roller 81 merely passes the center of the fork shifter cam 92. This new position of the follower roller 91 tends to turn the fork shifter cam 92 anticlockwise. The spring 96 then expands, as controlled by the dash pot action 89, and during this expansion the housing 88 continues to turn until finally it reaches the position illustrated in Fig. 12. In this position the fork shifter cam 92 is

now being urged at full pressure anti-clockwise, and the fork 45 is being correspondingly urged. It should be noted that the direction control clutches 42 are now reversed in their actions.

Means is also provided for operating said change of speed clutches 38, and this means includes a change of speed control lever 115 movably mounted indirectly on the carriage 21 and having a slow position, indicated by the dot and dash lines 115' in which said carriage 21 is driven at a slow speed. The speed control lever 115 also has a fast position, the position illustrated by the full lines on the drawings, in which the carriage 21 is driven at a high speed. Reversing cams 116 and 117 are mounted on the table 23 at points slightly inwards of said forward and rearward positions of said carriage 21 to move said speed control lever 115 towards its slow position when said carriage passes outwards of the cams, and to move said speed control lever 115 towards its fast position when said carriage 21 passes inwards of said cams. The speed control lever 115 is pivotally mounted at its center by a pintle 118. Rollers 119 are mounted upon the ends of the speed control lever 115. These rollers 119 are cooperative with the cams 116 and 117. The cam 116 has an apex directed upwards for pivoting the lever 115 as the carriage 21 passes in either direction. The cam 117 is of a similar construction except that it is pointed downwards. With this construction the speed control lever 115 will always assume its fast position when the carriage 21 is between the cams 116 and 117 and its slow position when the carriage 21 is outside of said cams.

The speed control lever 115 is pivotally mounted on a bracket 121 which is supported on the box 27. A radial arm 122 is connected with the pivot 118 of the lever 115 and pivotally connects with a link 123 which in turn is pivotally connected with radial arm 124 connected with a tubular shaft 125 engaged over the said shaft 83. This tubular shaft 125 extends into the box 27. The inner end of the shaft 125 is provided with a radial arm 126 which pivotally connects with a link 127 which in turn is pivotally connected with a radial arm 128 fixed on a vertical turnable shaft 129. This vertical shaft 129 supports a second dash pot mechanism 89', see Fig. 3. This second dash pot mechanism 89' includes a housing 88 which is supported by the shaft 129. The dash pot mechanism 89' is of identical construction to the dash pot mechanism 89. It has a follower roller 91 engaging an arcuate forked shifter cam 92' connected with the fork 41. Normally, the spring 96 of this dash pot mechanism 89' tends to turn the fork 41 in one direction. Then, when the change of speed lever 115 is moved by its operating cams 116 and 117, the dash pot mechanism 89' will be turned past the center of the fork shifter cam 92' and tend to turn the fork 41 in the other direction. In this way the clutches 38 are shifted, always one or the other transmitting.

The automatic cloth laying-up machine 20 is also provided with a cloth control automatic cut-over for the motor 26. This cutout includes a rod 135 mounted across the arms 136 of the carriage 21. The rod 135 is provided with fingers 137 over which the cloth is guided. The cloth tends to press these fingers 137 downwards, turning the rod 135 slightly against the action of a spring 138. This spring 138 acts between an arm 139 mounted on the rod 135 and a box 140 mounted on one of the arms 136. The arm 139 when free

and drawn by the spring 138 engages a contact 141. However, when cloth material depresses the fingers 137 the arm 139 disengages the contact 141 and engages a contact 142. The contacts 141 and 142 are connected in parallel, and then in series with a circuit 144 which includes a magnetic controller switch 145. This magnetic controller switch 145 has a lever 146 which is normally urged to an open position by a spring 147. It also has a coil 148 in series with the circuit 144 controlling a core 148' connected with the lever 146. A pair of contacts 150 are associated with said lever 146 and are in series with the circuit 144.

A feature of the automatic cutout resides in the fact that the automatic cloth laying-up machine 21 may be used without the cutout when desired. To do this it is merely necessary to so thread the cloth on the machine so that it does not depress the fingers 137. With this arrangement when the controller lever 146 is moved to close contacts 150 the automatic cloth laying-up machine will operate. On the other hand if it is desired to use the automatic cutout it is merely necessary to thread the goods so that the fingers 137 are depressed. In this condition the circuit 144 will be closed through the lever 139 and contact 142. When the controller lever 146 is now closed the machine will also be set into operation. However, when the end of the cloth is reached, the fingers 137 will be freed and the spring 138 will turn the rod 135 so that the circuit is broken between the arm 139 and contact 142. The coil 148 loses its magnetism and the spring 147 moves the lever 146 to break the circuit 144 at the contacts 150. The arm 139 now engages the contact 141 but the circuit remains broken at the contacts 150.

The operation of the automatic cloth laying-up machine is as follows:

The box 27 is filled with oil to a height above the dash pot mechanism 89'. As illustrated in Fig. 1 the carriage 21 of the machine is traveling at a fast rate towards the left, as indicated by the arrow A. When the carriage 21 reaches a position in which the speed control lever 115 will be moved by the cam 116 to its slow position, the speed of travel of the carriage 21 will be automatically slowed down. The shifting of the speed control lever 115 changes the speed of travel of the carriage 21 because as it rocks it will indirectly turn the shaft 129 to a position in which the housing 88 of the dash pot mechanism 89' moves to a position in which its follower roller 91 passes the center of the arcuate fork shifter cam 92'. This indirectly throws the fork 41 which in turn reverses the operation of the clutches 38. It is pointed out that even after the speed control lever 115 was moved by the cam 116, said lever 115 will continue to move under the action of the spring 96 of the dash pot mechanism 89'. It will continue to move until the dash pot mechanism 89' reaches the extremity of the fork shifter cam 92'.

The carriage 21 is now moved at a slow rate of speed and will continue to do so until changed. Next the reverse control lever 79 strikes the roller 82 of the reversing member 80. This pivots the reverse control lever 79 which indirectly turns the shaft 87 turning the dash pot mechanism 89 past the center of the arcuate fork shifter cam 92. This reverses the fork 45. However, the action will not be sudden. The parts are so designed that the housing 88 is turned to a position in which the follower roller

91 merely passes the pivot of the fork shifter cam 92. The carriage 21 now is traveling slowly towards the right. However, the lever 79 keeps moving because the spring 96 is expanding and the housing 88 keeps turning until the follower roller 91 reaches the extremity of the fork shifter cam 92. Soon the carriage 21 reaches a position in which the speed control lever 115 is moved back to its initial fast position by the cam 116. This will act indirectly upon the fork 41, which shifts the clutches 38, and now the carriage 21 will travel rapidly. It will continue its rapid motion until the speed control lever 115 is moved by the cam 117 to its slow position. This indirectly moves the fork 41 which operates the clutches 38, and now the carriage will travel slowly. It will continue its slow motion until the speed control lever 115 is again moved by the cam 117 to its fast position. It continues at the slow speed until the reversing lever 79 strikes the roller 82 of the reversing member 81. The carriage 21 now reverses its direction and still continues at a slow speed until the speed control lever 115 is again moved by the cam 117 to its fast position. Now the carriage 21 is traveling again towards the left at high speed.

While we have illustrated and described the preferred embodiment of our invention, it is to be understood that we do not limit ourselves to the precise construction herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

Having thus described our invention, what we claim as new and desire to secure by United States Letters Patent is:

1. In an automatic cloth laying-up machine having a carriage traveling on a table and a transmission for driving said carriage including a shaft with a pair of clutches having rotative drums on said shaft and adjacent cores non-rotative and slidably connected with said shaft, a pivotally mounted controller fork between said cores for actuating by sliding one core or the other, an arcuate fork shifter cam connected with said fork and having end sections extending to opposite sides of the pivot of said controller fork for depressing a plunger when moved from its ends to its center, a housing pivotally mounted to the front of said cam, a plunger for being depressed by said cam slidably mounted on said housing and having a follower engaging the free extremity of one end section of said cam, resilient means urging said plunger outwards for resiliently turning said cam and controller fork, dash pot means connected with said plunger for retarding its outward motion when depressed, and means for pivoting said housing to a position in which said follower is past the pivot of said fork.

2. In an automatic cloth laying-up machine having a carriage traveling on a table and a transmission for driving said carriage including a shaft with a pair of clutches having rotative drums on said shaft and adjacent cores non-rotative and slidably connected with said shaft, a pivotally mounted controller fork between said cores for actuating by sliding one core or the other, an arcuate fork shifter cam connected with said fork and having end sections extending to opposite sides of the pivot of said controller fork for depressing a plunger when moved from its ends to its center, a housing pivotally mounted to the front of said cam, a plunger for

being depressed by said cam slidably mounted on said housing and having a follower engaging the free extremity of one end section of said cam, resilient means urging said plunger outwards for resiliently turning said cam and controller fork, dash pot means connected with said plunger for retarding its outward motion when depressed, and means for pivoting said housing to a position in which said follower is past the pivot of said fork, and means for varying the resiliency of said resilient means.

3. In an automatic cloth laying-up machine having a carriage traveling on a table and a transmission for driving said carriage including a shaft with a pair of clutches having rotative drums on said shaft and adjacent cores non-rotative and slidably connected with said shaft, a pivotally mounted controller fork between said cores for actuating by sliding one core or the other, an arcuate fork shifter cam connected with said fork and having end sections extending to opposite sides of the pivot of said controller fork for depressing a plunger when moved from its ends to its center, a housing pivotally mounted to the front of said cam, a plunger for being depressed by said cam slidably mounted on said housing and having a follower engaging the free extremity of one end section of said cam, resilient means urging said plunger outwards for resiliently turning said cam and controller fork, dash pot means connected with said plunger for retarding its outward motion when depressed, and means for pivoting said housing to a position in which said follower is past the pivot of said fork, said resilient means comprising a spring coaxially on said plunger and acting between said housing and said plunger.

4. In an automatic cloth laying-up machine having a carriage traveling on a table and a transmission for driving said carriage including a shaft with a pair of clutches having rotative drums on said shaft and adjacent cores non-rotative and slidably connected with said shaft, a pivotally mounted controller fork between said cores for actuating by sliding one core or the other, an arcuate fork shifter cam connected with said fork and having end sections extending to opposite sides of the pivot of said controller fork for depressing a plunger when moved from its ends to its center, a housing pivotally mounted to the front of said cam, a plunger for being depressed by said cam slidably mounted on said housing and having a follower engaging the free extremity of one end section of said cam, resilient means urging said plunger outwards for resiliently turning said cam and controller fork, dash pot means connected with said plunger for retarding its outward motion when depressed, and means for pivoting said housing to a position in which said follower is past the pivot of said fork, said dash pot means including a pivotally mounted lever connected with said plunger to be moved by the plunger, a piston connected with the lever to be moved by the lever, and a cylinder in said housing for said piston.

5. In an automatic cloth laying-up machine having a carriage traveling on a table and a transmission for driving said carriage including a shaft with a pair of clutches having rotative drums on said shaft and adjacent cores non-rotative and slidably connected with said shaft, a pivotally mounted controller fork between said cores for actuating by sliding one core or the other, an arcuate fork shifter cam connected

with said fork and having end sections extending to opposite sides of the pivot of said controller fork for depressing a plunger when moved from its ends to its center, a housing pivotally mounted to the front of said cam, a plunger for being depressed by said cam slidably mounted on said housing and having a follower engaging the free extremity of one end section of said cam, resilient means urging said plunger outwards for resiliently turning said cam and controller fork, dash pot means connected with said plunger for retarding its outward motion when depressed, and means for pivoting said housing to a position in which said follower is past the pivot of said fork, said dash pot means including a pivotally mounted lever connected with said plunger to be moved by the plunger, a piston connected with the lever to be moved by the lever, a cylinder in said housing for said piston, and a one way valve mounted on the front end of said cylinder.

6. In an automatic cloth laying-up machine having a carriage traveling on a table and a transmission for driving said carriage including a shaft with a pair of clutches having rotative drums on said shaft and adjacent cores non-rotative and slidably connected with said shaft, a pivotally mounted controller fork between said cores for actuating by sliding one core or the other, an arcuate fork shifter cam connected with said fork and having end sections extending to opposite sides of the pivot of said controller fork for depressing a plunger when moved from its ends to its center, a housing pivotally mounted to the front of said cam, a plunger for being depressed by said cam slidably mounted on said housing and having a follower engaging the free extremity of one end section of said cam, resilient means urging said plunger outwards for resiliently turning said cam and controller fork, dash pot means connected with said plunger for retarding its outward motion when depressed, and means for pivoting said housing to a position in which said follower is past the pivot of said fork, said dash pot means including a pivotally mounted lever connected with said plunger to be moved by the plunger, a piston connected with the lever to be moved by the lever, a cylinder in said housing for said piston, a one way valve mounted on the front end of said cylinder, and an adjustable bleed connected with the front end of said cylinder.

7. In an automatic cloth laying-up machine having a carriage traveling on a table and a transmission for driving said carriage including a shaft with a pair of clutches having rotative drums on said shaft and adjacent cores non-rotative and slidably connected with said shaft, a pivotally mounted controller fork between said cores for actuating by sliding one core or the other, an arcuate fork shifter cam connected with said fork and having end sections extending to opposite sides of the pivot of said controller fork for depressing a plunger when moved from its ends to its center, a housing pivotally mounted to the front of said cam, a plunger for being depressed by said cam slidably mounted on said housing and having a follower engaging the free extremity of one end section of said cam, resilient means urging said plunger outwards for resiliently turning said cam and controller fork, dash pot means connected with said plunger for retarding its outward motion when depressed, and means for pivoting said housing to a position in which said follower is past the pivot of

said fork, comprising a lever movably mounted on said carriage, a linkage system connecting said lever and housing, and means mounted on said table for moving said lever during the traveling of said carriage.

8. In an automatic cloth laying-up machine having a carriage traveling on a table and a transmission for driving said carriage including a shaft with a pair of clutches having rotative drums on said shaft and adjacent cores non-rotative and slidably connected with said shaft, a pivotally mounted controller fork between said cores for actuating by sliding one core or the other, an arcuate fork shifter cam connected with said fork and having end sections extending to opposite sides of the pivot of said controller fork for depressing a plunger when moved from its ends to its center, a housing pivotally mounted to the front of said cam, a plunger for being depressed by said cam slidably mounted on said housing and having a follower engaging the free extremity of one end section of said cam, resilient means urging said plunger outwards for resiliently turning said cam and controller fork, dash pot means connected with said plunger for retarding its outward motion when depressed, and means for pivoting said housing to a position in which said follower is past the pivot of said fork, comprising a lever movably mounted on said carriage, a linkage system connecting said lever and housing, and means mounted on said table for moving said lever during the traveling of said carriage, said latter means comprising an abutment on the table and engageable with said lever.

9. In an automatic cloth laying-up machine having a carriage traveling on a table and a transmission for driving said carriage including a shaft with a pair of clutches having rotative drums on said shaft and adjacent cores non-rotative and slidably connected with said shaft, a pivotally mounted controller fork between said cores for actuating by sliding one core or the other, an arcuate fork shifter cam connected with said fork and having end sections extending to opposite sides of the pivot of said controller fork for depressing a plunger when moved from its ends to its center, a housing pivotally mounted to the front of said cam, a plunger for being depressed by said cam slidably mounted on said housing and having a follower engaging the free extremity of one end section of said cam, resilient means urging said plunger outwards for resiliently turning said cam and controller fork, dash pot means connected with said plunger for retarding its outward motion when depressed, and means for pivoting said housing to a position in which said follower is past the pivot of said fork, comprising a lever movably mounted on said carriage, a linkage system connecting said lever and housing, and means mounted on said table for moving said lever during the traveling of said carriage, said latter means comprising a cam mounted on said table and cooperative with said lever.

10. In an automatic cloth laying-up machine having a carriage traveling on a table and a transmission for driving said carriage including a shaft with a pair of clutches having rotative drums on said shaft and adjacent cores non-rotative and slidably connected with said shaft, a pivotally mounted controller fork between said cores for actuating by sliding one core or the other, an arcuate fork shifter cam connected with said fork and having end sections extending to

opposite sides of the pivot of said controller fork for depressing a plunger when moved from its ends to its center, a housing pivotally mounted to the front of said cam, a plunger for being depressed by said cam slidably mounted on said housing and having a follower engaging the free extremity of one end section of said cam, resilient means urging said plunger outwards for resiliently turning said cam and controller fork, dash pot means connected with said plunger for retarding its outward motion when depressed, and means for pivoting said housing to a position in which said follower is past the pivot of said fork, comprising a lever movably mounted on said carriage, a linkage system connecting said lever and housing, and means mounted on said table for moving said lever during the traveling of said carriage, said latter means comprising a cam mounted on said table and cooperative with said lever, said cam having an apex portion one side of which is adapted to throw said lever in one direction and the other side of which is adapted to throw said lever in the other direction.

11. In an automatic cloth laying-up machine having a carriage with wheels traveling on a table and a prime mover, a transmission connecting said prime mover and wheels, and including a driven countershaft, a speed clutch shaft, and a reverse clutch shaft, a pair of speed control clutches on said speed clutch shaft and having rotative drums and adjacent cores non-rotative and slidably connected with said speed clutch shaft, a pair of direction control clutches on said reverse clutch shaft and having rotative drums and adjacent cores non-rotative and slidably connected with said reverse clutch shaft, a high speed gear train connecting said countershaft with the drum of one of said speed control clutches, a low speed gear train connecting said countershaft with the drum of the other of said speed control clutches, a forward gear train connecting said speed clutch shaft with the drum of one of said direction control clutches, a reverse gear train connecting said speed clutch shaft with the drum of the other of said direction control clutches, a controller fork between the cores of said speed control clutches for actuating one core or the other core, and a controller fork between the cores of said direction control clutches for actuating one of said cores or the other.

12. In an automatic cloth laying-up machine having a carriage with wheels traveling on a table and a prime mover, a transmission connecting said prime mover and wheels, and including a driven countershaft, a speed clutch shaft, and a reverse clutch shaft, a pair of speed control clutches on said speed clutch shaft and having rotative drums and adjacent cores non-rotative and slidably connected with said speed clutch shaft, a pair of direction control clutches on said reverse clutch shaft and having rotative drums and adjacent cores non-rotative and slidably connected with said reverse clutch shaft, a high speed gear train connecting said countershaft with the drum of one of said speed control clutches, a low speed gear train connecting said countershaft with the drum of the other of said speed control clutches, a forward gear train connecting said speed clutch shaft with the drum of one of said direction control clutches, a reverse gear train connecting said speed clutch shaft with the drum of the other of said direction control clutches, a controller fork between the cores of said speed control clutches for actuating one core or the other core, and a controller fork be-

tween the cores of said direction control clutches for actuating one of said cores or the other, arcuate fork shifter cams connected with said forks and having end sections extending to opposite sides, housings pivotally mounted to the front of said cams, plungers slidably mounted on said housings and having followers engaging said cam, resilient means for urging said plungers outwards, and means for pivoting said housings to a position in which said followers are on one of the end sections or on the other of said end sections of said cams.

13. In an automatic cloth laying-up machine having a carriage with wheels traveling on a table and a prime mover, a transmission connecting said prime mover and wheels, and including a driven countershaft, a speed clutch shaft, and a reverse clutch shaft, a pair of speed control clutches on said speed clutch shaft and having rotative drums and adjacent cores non-rotative and slidably connected with said speed clutch shaft, a pair of direction control clutches on said reverse clutch shaft and having rotative drums and adjacent cores non-rotative and slidably connected with said reverse clutch shaft, a high speed gear train connecting said countershaft with the drum of one of said speed control clutches, a low speed gear train connecting said countershaft with the drum of the other of said speed control clutches, a forward gear train connecting said speed clutch shaft with the drum of one of said direction control clutches, a reverse gear train connecting said speed clutch shaft with the drum of the other of said direction control clutches, a controller fork between the cores of said speed control clutches for actuating one core or the other core, and a controller fork between the cores of said direction control clutches for actuating one of said cores or the other, arcuate fork shifter cams connected with said forks and having end sections extending to opposite sides, housings pivotally mounted to the front of said cams, plungers slidably mounted on said housings and having followers engaging said cam, resilient means urging said plungers outwards, and means for pivoting said housings to a position in which said followers are on one of the end sections or on the other of said end sections of said cams, and dash pot means connected with said plungers for retarding their outward motion.

14. In combination with a cloth laying-up machine having a carriage with wheels for the cloth and adapted to be moved to and fro from a forward to a rearward position and back again on a table, said cloth laying-up machine also having cloth holding means on said table at said forward and rearward positions for catching and holding the folded end portions of the layers of said laid-up cloth, drive means for said carriage comprising a prime mover on said carriage, a transmission connecting said prime mover with said wheels for driving said carriage and including change of speed clutches and change of direction clutches, means for throwing said change of direction clutches including a reverse control lever movably mounted on said carriage and having a forward position in which said carriage is driven forwards and a rearward position in which said carriage is driven rearwards, reversing members mounted on said table at said forward and rearward positions to form an abutment for said reversing lever to move said reversing lever towards its forward and rearward positions respectively when said carriage reaches its rearward

and forward positions respectively, means for throwing said change of speed clutches including a change of speed control lever movably mounted on said carriage and having a slow position in which said carriage is driven at a slow speed and a fast position in which said carriage is driven at a high speed, and reversing cams mounted on said table at points slightly inwards of said forward and rearward positions of said carriage to move said speed control lever towards its slow position when said carriage passes outwards of said cams and moving said speed control lever towards its fast position when said carriage passes inwards of said cams.

15. An automatic cloth laying-up machine, comprising a cloth laying-up machine having a carriage with wheels for the cloth and adapted to be moved to and fro from a forward to a rearward position and back again on a table and cooperative with cloth holding means on said table at said forward and rearward positions for catching and holding the folded end portions of the layers of said laid-up cloth, a prime mover on said carriage, a transmission connecting said prime mover with said wheels for driving said carriage and including change of speed clutches and change of direction clutches, means for throwing said change of direction clutches including a reverse control lever movably mounted on said carriage and having a forward position in which said carriage is driven forwards and a rearward position in which said carriage is driven rearwards, reversing members mounted on said table at said forward and rearward positions to form an abutment for said reversing lever to move said reversing lever towards its forward and rearward positions respectively when said carriage reaches its rearward and forward positions respectively, means for throwing said change of speed clutches including a change of speed control lever movably mounted on said carriage and having a slow position in which said carriage is driven at a slow speed and a fast position in which said carriage is driven at a high speed, and reversing cams mounted on said table at points slightly inwards of said forward and rearward positions of said carriage to move said speed control lever towards its slow position when said carriage passes outwards of said cams and moving said speed control lever towards its fast position when said carriage passes inwards of said cams, said transmission including a main clutch for connecting said wheels with said change of speed and change of direction clutches.

16. In an automatic cloth laying-up machine having a carriage traveling on a table and a transmission for driving said carriage, including a shaft with a pair of clutches having rotative drums on said shaft and adjacent cores non-rotative and slidably connected with said shaft,

a pivotally mounted controller fork between said cores for actuating by sliding one core or the other, an arcuate fork shifter cam connected with said fork and having end sections extending to opposite sides of the pivot of said controller fork for depressing a plunger when moved from its ends to its center, a housing pivotally mounted to the front of said cam, a plunger for being depressed by said cam slidably mounted on said housing and having a follower engaging the free extremity of one end section of said cam, resilient means urging said plunger outwards for resiliently turning said cam and controller fork, dash pot means connected with said plunger for retarding its outward motion when depressed, and means for pivoting said housing to a position in which said follower is past the pivot of said fork, said reversing members comprising abutments for the reverse control lever mounted on said table.

17. In an automatic cloth laying-up machine having a carriage traveling on a table and a transmission for driving said carriage, including a shaft with a pair of clutches having rotative drums on said shaft and adjacent cores non-rotative and slidably connected with said shaft, a pivotally mounted controller fork between said cores for actuating by sliding one core or the other, an arcuate fork shifter cam connected with said fork and having end sections extending to opposite sides of the pivot of said controller fork for depressing a plunger when moved from its ends to its center, a housing pivotally mounted to the front of said cam, a plunger for being depressed by said cam slidably mounted on said housing and having a follower engaging the free extremity of one end section of said cam, resilient means urging said plunger outwards for resiliently turning said cam and controller fork, dash pot means connected with said plunger for retarding its outward motion when depressed, and means for pivoting said housing to a position in which said follower is past the pivot of said fork, said reversing cams comprising apex shaped cams one of which is directed upwards and the other of which is directed downwards.

18. In an automatic cloth laying-up machine having a carriage traveling on a table and driven with an electric motor, a cloth control automatic cutout for said motor comprising movable fingers over which said cloth may engage, an arm connected with said fingers, a pair of spaced contacts between which said arm may move, a magnetic switch, and a circuit connecting said contacts in series with said magnetic switch and said motor.

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