MULTINEEDLE SEWING MACHINE

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This invention relates to multi-needle sewing and quilting machines, and more particularly to that class in which a fabric supply roller and the feed rollers of the machine are so relatively supported and automatically moved as to stretch the fabric beneath the needles of the machine and move the same therewithin with the rollers as a shifting unit in order to produce accurate patterns and designs sewed by said needles.

The main object of this invention is to mount the fabric supply and feed rollers on either side of the needles in a sewing machine in such manner as to be simultaneously moved both transversely and longitudinally of the machine according to predetermined movements by supporting said rollers on a pair of simultaneously movable bars which in turn are mounted on a shifting sub-frame to provide any desired horizontal movements of the rollers and the fabric therebetween.

Another object is to provide the various shafts, rods and moving parts of the machine with ball bearings in many respects of novel construction in order to reduce friction and wear, and to eliminate the necessity for lubrication of such parts as are located adjacent or above the fabric which might easily be ruined by oil drippings.

Further objects and the various advantages and economies attained in my invention will appear more fully hereinafter as the specification proceeds.

In the accompanying drawings forming part hereof: Fig. 1 is a perspective view of a sewing machine constructed according to my invention and embodying the novel features thereof.

Fig. 2 is a front view of the same with a portion omitted by fracture of the view.

Fig. 3 is a top plan view of the same.

Fig. 4 is a cross section of Fig. 2 on line 4—4.

Fig. 5 is a detail of the novel ball bearings for certain sliding rods of the machine.

Throughout the views the same reference numerals indicate the same parts.

In the practice of my invention, a machine bed 1 is provided with a pair of rigid frames 2 and 3 which are held together by a pair of vertically spaced t-e-rods 5 and 6 which also have another purpose, as will presently appear. Upon the front and rear edges of the bed, at each end thereof, roller bearing blocks similar to 7—7 and 8—8 are secured, having rollers 9, 9 and 10, 10, respectively, two rollers beneath and one above upon each block. A pair of rails 11 and 12 are mounted adjacent the blocks and arranged between the upper and lower rollers, both rails having above and below, at both ends, guiding grooves similar to 13 and 14. The rails are secured together into a frame by a pair of transverse bars 15 and 18 which lie outside of the vertical frames 2 and 3 in spaced relation. Preferably a pair of angle blocks similar to 17, 18, 19 and 20 are interposed between the ends of the bars and the rails, a block 17 being secured upon rail 11 and a similar block 20 being mounted on rail 12, while a block 18 is secured to block 17 and a block 19 is secured to block 20. The crossbar 15 is screwed or otherwise fastened on to blocks 18 and 19.

The bar 16 is rigidly secured to the same rails in similar manner, the resulting rail and bar being movable in confined manner along the machine and may be termed a shift frame which is accurately guided by the various roller bearings engaging the rail grooves.

However, the blocks 17 and 20 and the corresponding rail blocks 11 and 22 support rigid posts 23, 24, 25 and 26, respectively, upon which in turn are mounted roller blocks indicated at 27, 28, 29 and 30, respectively. The blocks are vertically adjustable on their posts to a common accurate level, and each is provided with a pair of lower roller bearings similar to 31, 31 and an upper roller 32 between which is mounted a transverse rail 33 in the case of the blocks 27 and 28, and a parallel corresponding rail 34 is similarly borne upon blocks 29 and 30 of the posts 25 and 26. These transverse rails are grooved for receiving the rollers as at 35 and 36, and also below as in the case of the side rails of the shift frame. These upper transverse rails 33 and 34 are arranged to be moved in unison between their guiding rollers by means of a pair of arms 37 and 38 which are secured upon the ends of a shaft 39, which is supported by a pair of bearing blocks 40 and 41 secured upon posts 24 and 26, respectively. Each arm bears at its free end a stud similar to 42 disposed between a pair of cleats similar to 43 and 44 upon the adjacent rail member, so that when the shaft 39 is partially rotated in reciprocal manner, the arms will rock and propel the two transverse rails back and forth in perfect unison across the machine. At the other extremities of the same rails are secured a pair of brackets 45 and 46 upon which are adjustable mounted open bearing blocks 47 and 48 for supporting removably the shaft 49 of a fabric supply roller 50 having a fabric 51 thereon. Intermediate the ends of these rails, they are enlarged into upwardly projecting inclined
roller supports at 52 and 53 for receiving a pair of feed rollers 54 and 55 which are provided with end pinions at 56 and 57 in mesh for opposite rotation of the rolls.

The fabric 51 is passed from the supply roller 50 over a metal apron 58 which is secured to the transverse rails, and across the machine to the feed rollers 54 and 55 which are rotated by means which will be shortly described.

Now at this stage it is clear that the transverse rails, the supply roller and the feed rollers actually operate normally as a transversely movable frame, although having several very distinct advantages over such a frame. However, said cooperating parts move together as a unit and move the fabric between the rollers across with the same independently of any rotation of the rollers mentioned. In similar manner, not only does the transverse frame just described move as a unit across the machine, but by virtue of its supporting blocks and posts upon the previously mentioned shift frame, it will also move longitudinally of the machine with the shift frame when moved upon its rollers, the two relatively transverse movements providing any conceivable combination of movements for the rollers and fabric for any design whatsoever without the least displacement of the supply roller relative to the feed roller which would result in warping and inaccurate movement of the fabric, and improper sewing of the designs. Such designs are therefore directly controlled and determined by the relative transverse and longitudinal movements simultaneously imparted to said supply and feed rollers by the movement of either the shift frame or the transverse frame, or both. In order to control the reciprocal movements of the shift frame along the machine, a bar 59 is secured to cross bar 16 of said shift frame and provided with a pair of studs 60, 61 for engaging a cam 62 mounted on a shaft 63 which is rotatable in a supporting bracket 64, the shaft having an operating gear 65 upon its upper extremity. The particular outline and form of the cam 62 is necessarily special for each design and differs accordingly.

Upon the same end of the machine with the cam is mounted a gear casing 66 which serves also as a bearing for a main drive shaft 67 which has a worm 68 within the casing for driving a worm gear 69 secured on the lower end of a vertical shaft 70 also mounted in the casing and having above the same a gear 71. Between the gear 71 and the casing is located a gear change bracket 72 which supports an intermediate gear 73 in mesh with 71 and also with cam gear 65, the gears being changed according to the shape of the cam and the frequency of shift frame movement desired. The drive shaft is further supported in ball bearings 74 and 75 of the frames of the machine and end bearing 76, the left end having the pulley 77 and the other end the ‘handwheel’ 78. If the shaft is rotated it is seen that it will rotate the worm gear and the change gears, and thereby the cam which directly reciprocates the shaft frame upon its roller bearings.

On the other hand, in order to operate the transverse frame simultaneously though independently of the shift frame which supports it, the drive shaft has gear 79 fixed thereon between the machine frames in mesh with a longer gear 80 secured on a shaft 81 which is mounted in a bearing stand 82 and is provided upon its other end with a cam 83. The cam is disposed between a pair of studs 84 and 85 on a rack bar 86 in order to reciprocate the same upon a pair of spaced supports 87 and 88 which are fast on the bed 1. The free end of bar 86 is provided with a rack teeth at 89 meshing with a relatively long gear segment 90 fast on the shaft 89, and is easily seen that upon rotation of the drive shaft and its gear 79, the gear 80 and its cam 83 will be rotated thereby, and the cam will reciprocate the rack bar and rock the gear segment 90 and the shaft 39 with its axes 27 and 38 thus transversely reciprocating the transverse frame and its fabric and feed rollers. The gear segment is lengthened in order to maintain in operative relation with the rack 90 when the shift frame moves shaft 39 longitudinally during operation. The main shaft will then not only operate the shift frame by means of cam 62, but will simultaneously and independently operate the transverse frame though cam 83, despite the fact that the transverse frame is wholly borne by and shifts with the shift frame.

In addition to the frame shifting and design producing operations just described, the fabric is also fed onward from the supply roller by being drawn through the feed rollers 54 and 55. The main shaft has a miter gear 91 in mesh with a similar gear 92 secured on a shaft 93 which is mounted in a bearing post 94 and has a universal joint 95 upon its other end. This joint is secured to a hollow sleeve 100 in which is located a projecting bar 99 which rigidly turns with the sleeve and is also secured to a universal joint 98 which terminates in a worm 96. The worm is supported by the casing 103 on rail 33 and meshes with a worm gear which is rigidly coaxial with an outside gear 101, the same meshes with an intermediate gear 102 which in turn meshes with feed roller gear 56. Hence, rotation of the drive shaft miter gear will rotate sleeve 100, the worm 96 and the worm gear 97, the gears 101, 102, 56 and 97, whereby the rollers are rotated.

Leaving the fabric shifting and feeding devices for the present, the apparatus for performing the sewing operations demands attention. Upon the tie-rods 5 and 6 are mounted a series of guiding brackets 104, 105, 106, 107 and 108 for guiding a plurality of vertically arranged rods. Each of the brackets 104, 105, 107 and 108 has an upper horizontal arm similar to 119 and a lower arm similar to 120 on which are mounted a pair of ball bearing rollers of special novel construction as will appear forthwith, the rollers being in each case spaced apart similarly to 117, 117 and arranged on the right side of the arms on brackets 104 and 105, while being arranged on the left side of the arms on brackets 107 and 106. In the case of the middle bracket 106, the upper arm 121 is faced forward as is also the lower arm 122, there being a pair of similar roller bearings on each arm, an enlarged fragmentary view of the bracket and a part of the rod 127 being shown in Fig. 5. Each roller bearing consists of an inner race 123 secured to arm 121 by a screw 124, and surrounded by an outer race 117", while a plurality of bearing balls 155 lie between the races so that the outer race is free to revolve about the inner race by riding on the intervening balls. In each case the outer race has a toothed or serrated concave face 126 cut to mesh with a threaded section 118 of the rod 127, so that the latter rod will when vertically reciprocated ride smoothly in contact with the outer races of both spaced ball bearing rollers on the arm, said races being thus rotated. If the rod were smooth, the races could
also be smoothly concave to fit the rod, but they would sometimes not revolve in conformity with the reciprocation of the rod, and this would result in spots being worn on the races and grooves or streaks on the rod. But by means of the threads, the rod is substantially a round rack whose races are practically pinions meshing and positively moving in correspondence with movements of the rod, while the concave form of the races serves to definitely locate and retain the rod accurately between the roller bearings.

The rods 110 and 112, guided by the rollers on the brackets 104 and 108, and also rod 127 similarly guided by the rollers on the locating bracket 106 are secured at their lower ends to a presser foot 113, above which is supported a needle bar 114 carrying needle 115 which, and the apertures 116 in the presser foot and with which they co-operate and through which they are lowered during operation to the fabric 51 under the foot. The three rods have each a cam roller arm similar to 128 which is provided with a roller as at 129 engaging with a three-threaded shaft of a small shaft 131 supported by the frames 2 and 3 in ball bearings 132, 133. On the left end of shaft 131 is secured an arm 134 to which is connected a link 135 whose lower extremity is formed into a yoke 136 enveloping an eccentric 137 secured on the drive shaft 67. The lower end of shaft 131 is supported in ball bearings 74, 75 as the upper shaft 131 for smooth, easy rotation. If the drive shaft 67 is rotated by a belt on its pulley 77, or by a hand-wheel 78, the eccentric 137 will operate through yoke 136 and link 135 to raise and lower the arm 134, and thereby partly rotate operating shaft 131, whereby the cams 130 will raise and lower the presser foot through the rollers 129 of arms 128 of guide rods 109, 127 and 112 riding on and off the cams.

This will cause the presser foot to alternately clamp and release the fabric on a table 138 which is rigid with the end frames 2 and 3.

Then, again, the operating shaft 131 has a pair of short arms similar to 139 each of which is connected to a depending link 140, which in turn is connected at 141 to the needle bar 114 already mentioned. When this shaft is semi-rotated as stated, the arm 139 will raise and lower the needle bar by means of the links 140, and thereby pass a thread 157 with each needle down through both the presser foot, the fabric and through the table to a bobbin 142 having a thread 143. To the needle bar a pair of vertical rods 110 and 111 is secured and the rods are similarly guided as the rods 109 and 112 between roller bearings on the horizontal arms of the brackets 105 and 107 in order to accurately guide the needle bar in vertical movement with minor friction.

The mentioned bobbin rests in an operating slide 144 which in turn is supported by a strip 145, secured upon a pair of parallel bars 146 and 147 which are also rigid with the frames as in the case of the table 138. Upon each of the bars 146 and 147 are arranged corresponding pairs of guiding roller bearings as at 148 for guiding and supporting a series of horizontal rods 149 which have threaded rack sections as at 150 to co-operate with rollers in similar manner to that of the mentioned vertical rods and the roller bearing on the brackets 105 and 106 for securing the rod to a bar 151 which also carries and actuates the bobbin strips similar to 144, while deriving its movement from a rock-lever 152 engaging the pin 153 on bar 151, which lever is pivotally mounted at 154 on the bracket 88. On the main drive shaft 67 an intermediate eccentric 155 is mounted and engaged by an eccentric rod 156 which is connected at its rear end to the rocker lever 152 in order to move the bar 151 and the bobbin strips and thereby actuate the bobbins beneath fabric table 138.

It is thus seen that rotation of the main drive shaft will cause the needles to pass up and down with their threads through the presser foot, through the fabric and down through the teeth of the presser foot intermittently holds down the fabric during the sewing thereof, the needle and foot movements cooperating and being directly derived from operation of the eccentric 137 and the upper operating shaft on the machine frames. The bobbins are caused to co-operate with the sewing by the second eccentric 155 on the same drive shaft. Simultaneously the fabric will be gradually fed forward by the feed rolls due to rotation of the miter gear 91 on the drive shaft at the right end of the machine. Then again an intermediate spur gear 79 on the same main drive shaft drives one of the design cams 83 which causes the transverse movement of the upper transverse supply and feed roll frame, while the worm 68 near the left end of the drive shaft through the intermediary of the described gearing and design cam 62 will produce longitudinal movements of the lower rail frame along the machine, carrying along the supply and feed rolls, and therewith the fabric in predetermined manner, so that the desired designs are sewed on the fabric during the normal feeding thereof in conjunction with normal sewing operation continuously carried on by the machine.

In view of the fact that the main drive shaft and the upper operating shaft are both furnished with ball bearings, and the main operating parts which take the wear and tear of the machine are provided with roller bearings, as in the case of the lower and upper rails, the needle bar and presser foot rods as well as the horizontal bobbin guide rods, the machine needs little or no lubrication and has such a low co-efficient of friction as to tremendously enhance the operation and permits very greatly speeding up the same to produce a larger amount of perfect work than hitherto.

Variations may be resorted to within the scope of my invention and parts may be used without 125 others.

Haring now fully described my invention and indicated the novel features and advantages thereof, I claim:

1. In a sewing machine having a stationary 130 frame and a main drive shaft, the combination with sewing instrumentallities supported on said frame, of a movable frame mounted for horizontal reciprocal movement on said stationary frame, a pair of distinct independently movable cross 135 bars supported on said movable frame in superposed relation thereto, feed rolls supported on said movable cross bars and means for supporting a fabric supply roll thereon, 147 as to permit said fabric roll to be fed from said supply roll past said sewing instrumentallities to said feed rolls by being drawn by the latter rolls, means operable by said drive shaft for uniformly rotating said feed rolls, there being means also operable by said shaft to move said movable frame and means providing 146 for a compact driving mechanism for said independently movable cross bars, including a rocker arm shaft supported on said movable frame having a pair of arms engaging said movable cross bars in such manner as to provide synchronous movement. 150
ments thereof upon movement of said latter shaft, a reciprocating member operable by said drive shaft, means arranged within the general outline of said movable frame and associated with said drive shaft for actuating said reciprocating member, and means associated with said rocker arm shaft and engaged by said reciprocating member whereby to oscillate said latter shaft and said rocker arms and thereby move said cross bars.

2. In a sewing machine including a stationary frame having a main drive shaft, the combination with driven sewing instrumentalities including bobbin mechanism, of a horizontally movable frame mounted for longitudinal movement upon said stationary frame and including a pair of side bars, a pair of posts mounted rigidly upon each side bar, a pair of cross bars mounted on said posts for horizontal movement, and spaced by said posts above the movable frame to provide clearance for various appurtenances of the machine including said bobbin mechanism, means operable by said shaft for operatively moving said movable frame and independently moving said cross bars, a fabric supply roll and fabric feed rolls mounted on said crossbars to be movable therewith, and means for rotating said feed rolls from said main shaft so that designs may be sewn on a fabric while being fed through said feed rolls from said supply roll past said sewing instrumentalities.

3. In a sewing machine having a stationary frame provided with a main drive shaft, the combination with driven sewing instrumentalities, of a plurality of roller bearings mounted on the sides of said frame, a pair of guide rolls supported in association with said roller bearings to be longitudinally reciprocable thereon, crossbars secured to said rolls to unite the same into a sub frame and extending across said first frame, a plurality of upright posts rigidly mounted upon said sub frame, a block rigidly mounted upon each of said posts and having roller bearings secured thereon, a second movable frame supported in association with the latter roller bearings in such manner as to be transversely movable therein and also vertically adjustable above said first frame, upon vertical adjustment of said blocks, a fabric supply roll and feed rolls mounted on said transversely movable frame and bodily movable therewith, means operable by said main shaft to rotate said feed rolls, which feed rolls are adapted to draw a fabric from said supply roll past said sewing instrumentalities, and means driven by said shaft for moving said sub frame and independently moving said transversely movable frame in order to produce sewed designs upon said fabric.

4. In a sewing machine including a stationary frame and a drive shaft, the combination, with driven sewing instrumentalities including bobbin mechanism, of a horizontally movable frame mounted for longitudinal movement upon said stationary frame, and means providing for a compact and accessible structure for said machine including a plurality of upwardly extending members rigidly secured upon said movable frame, a pair of independently detachable cross bars movably supported upon said upwardly extending members rigidly secured upon said movable frame, a pair of independently detachable cross bars movably supported upon said movable frame and driven feed rolls mounted on said cross bars, and rigid support means for carrying said instrumentalities securely upon said stationary frame within the area bounded by said detachable crossbars and said feed and fabric supply rolls.

5. In a sewing machine having a stationary frame supporting a drive shaft, the combination with driven sewing instrumentalities including bobbin mechanism, of a horizontally movable frame mounted for longitudinal movement upon said stationary frame, and means providing for a compact and accessible structure for said machine, including a pair of separate and independently detachable cross bars movably supported upon said movable frame and provided with a fabric supply roll and with driven feed rolls, drive mechanism associated with said drive shaft for moving said movable frame, a second drive mechanism associated with said drive shaft in a position below the level of said sewing instrumentalities, and means for transmitting movement from said second drive mechanism to said cross bars whereby to synchronously move the frame and said rolls, including a rocker arm shaft borne upon said movable frame in a position substantially parallel with said feed rolls, a pendent member secured on said rocker arm shaft, a connecting member associated with said second drive mechanism and engaging said pendent member whereby to oscillate said roller arm shaft, and a pair of rocker arms secured upon said rocker arm shaft and individually engaging said cross bars, said sewing instrumentalities being disposed in a position intermediate said supply roll and said feed rolls as well as said cross bars.

6. In a sewing machine having a stationary main frame provided with a drive shaft, the combination with driven sewing instrumentalities including bobbin mechanism, of a horizontally movable frame mounted for longitudinal movement upon said main frame, a plurality of upwardly extending posts rigidly secured upon said movable frame, a second movable frame mounted for horizontal movement upon said posts transversely to the movement of said first movable frame and in elevated position to provide space for said bobbin mechanism, and drive mechanism associated with said drive shaft for individually moving said movable frames, there being a fabric supply roll and driven feed rolls mounted upon said second movable frame.

7. In a sewing machine having a stationary main frame and a drive shaft mounted thereon, the combination with driven sewing instrumentalities including bobbin mechanism, of a horizontally movable frame mounted for longitudinal movement on said main frame, a plurality of upright posts rigidly secured upon said movable frame, a second movable frame mounted at a relatively variable elevation upon said posts for transverse horizontal movement thereon, providing a variable space above said bobbin mechanism, and drive mechanism associated with said drive shaft for individually moving said movable frames, there being a fabric supply roll and driven feed rolls mounted upon said second movable frame.

8. A sewing machine including the combination, with a stationary frame provided with a main drive shaft and driven sewing instrumentalities, of a movable frame supported for horizontal movement thereon, a pair of guide rails having portions thereof formed with grooves and secured on said movable frame, a plurality of guide...
roller bearings mounted on said first stationary frame, which roller bearings extend into the grooved portions in the upper and lower edges of said rails in order to guide and retain said rails and movable frame in limited movement relative to the first frame, there being means operable by said main drive shaft to move said rails upon said roller bearings, a pair of feed rolls mounted upon said movable frame and rotatable by means associated with said main drive shaft, and means for supporting a fabric supply roll on said movable frame so that a length of fabric may extend from said supply roll past said sewing instrumentalities to said feed rolls.

9. A sewing machine including the combination, with a stationary frame provided with a main drive shaft and driven sewing instrumentalities, of a movable frame supported on said stationary frame, a plurality of upwardly extending posts secured on said movable frame, a pair of feed rolls arranged adjacent one pair of said posts upon one side of said sewing instrumentalities, a fabric supply roll arranged adjacent another pair of said posts upon the other side of said sewing instrumentalities so as to permit a length of fabric from said supply roll to extend past said sewing instrumentalities to said feed rolls, means associated with all of said posts to support said feed rolls and supply roll, said posts forming the fundamental supporting means for said rolls upon said movable frame, and means associated with said main drive shaft for driving said main drive shaft and driven sewing instrumentalities to both sides of said first frame, there being means operable by said main drive shaft to move said rails upon said roller bearings, a pair of guide rails secured on said movable frame, a plurality of guide roller bearings mounted on said first stationary frame so as to engage above and below said guide rails whereby to guide and retain said rails and movable frame in limited movement relative to the first frame, there being means operable by said main drive shaft to move said rails upon said rollers, a pair of feed rolls mounted upon said movable frame and rotatable by means associated with said main drive shaft, and means for supporting a fabric supply roll on said movable frame so that a length of fabric may extend from said fabric supply roll past said sewing instrumentalities to said feed rolls.

10. A sewing machine including the combination, with a stationary frame provided with a main drive shaft and driven sewing instrumentalities, of a movable frame supported for horizontal movement thereon, a pair of guide rails secured on said movable frame, a plurality of guide roller bearings mounted on said first stationary frame so as to engage above and below said guide rails whereby to guide and retain said rails and movable frame in limited movement relative to the first frame, there being means operable by said main drive shaft to move said rails upon said roller bearings, a pair of feed rolls mounted upon said movable frame and rotatable by means associated with said main drive shaft, and means for supporting a fabric supply roll on said movable frame so that a length of fabric may extend from said fabric supply roll past said sewing instrumentalities to said feed rolls.

11. A sewing machine including the combination, with a stationary frame provided with a main drive shaft and driven sewing instrumentalities located above said frame, of a movable frame mounted for horizontal movement on said first frame and including a pair of crossbars forming said first frame and extending across said stationary frame, a second distinct pair of separate crossbars movably supported upon said movable frame and also extending across said stationary frame at a different level than said first frame, a pair of crossbars for supporting a fabric supply roll so as to permit a length of fabric to extend from said supply roll past said sewing instrumentalities to said feed rolls, a pair of feed rolls mounted upon said second crossbars, means associated with said movable frame for moving said second pair of crossbars, a pair of feed rolls mounted upon said second crossbars, means also arranged upon said latter crossbars for supporting a fabric supply roll so as to permit a length of fabric to extend from said supply roll past said sewing instrumentalities to said feed rolls, a pair of rigid crossbars movably supported on said movable frame and extending across said stationary frame within the area bounded by said first crossbars, means for moving said second pair of crossbars, a pair of feed rolls mounted upon said second crossbars, means also arranged upon said latter crossbars for supporting a fabric supply roll so as to permit a length of fabric to extend from said supply roll past said sewing instrumentalities to said feed rolls, a pair of rigid crossbars movably supported on said movable frame and extending across said stationary frame within the area bounded by said first crossbars, means for moving said second pair of crossbars, a pair of feed rolls mounted upon said second crossbars, means also arranged upon said latter crossbars for supporting a fabric supply roll so as to permit a length of fabric to extend from said supply roll past said sewing 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supply roll so as to permit a length of fabric to extend from said supply roll past said sewing instrumentalities to said feed rolls.
actuated thereby, of a pair of superposed movable frames arranged for independent horizontal movements relative to said stationary frame and in transverse relation to each other, a pair of feed rolls supported upon one of said movable frames on one side of said sewing instrumentalities and a fabric supply roll supported on the same movable frame upon the other side of said instrumentalities in order to permit a length of fabric to extend from said supply roll past said sewing instrumentalities to said feed rolls, means associated with said drive shaft for moving said movable frames in predetermined manner, and means also associated with said drive shaft for uniformly and constantly driving said feed rolls in solely one direction independently of the movements of said movable frames.

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