

June 27, 1939.

W. H. HALL, JR

2,164,241

FABRIC SPREADING MEANS

Original Filed Oct. 13, 1936

3 Sheets-Sheet 1

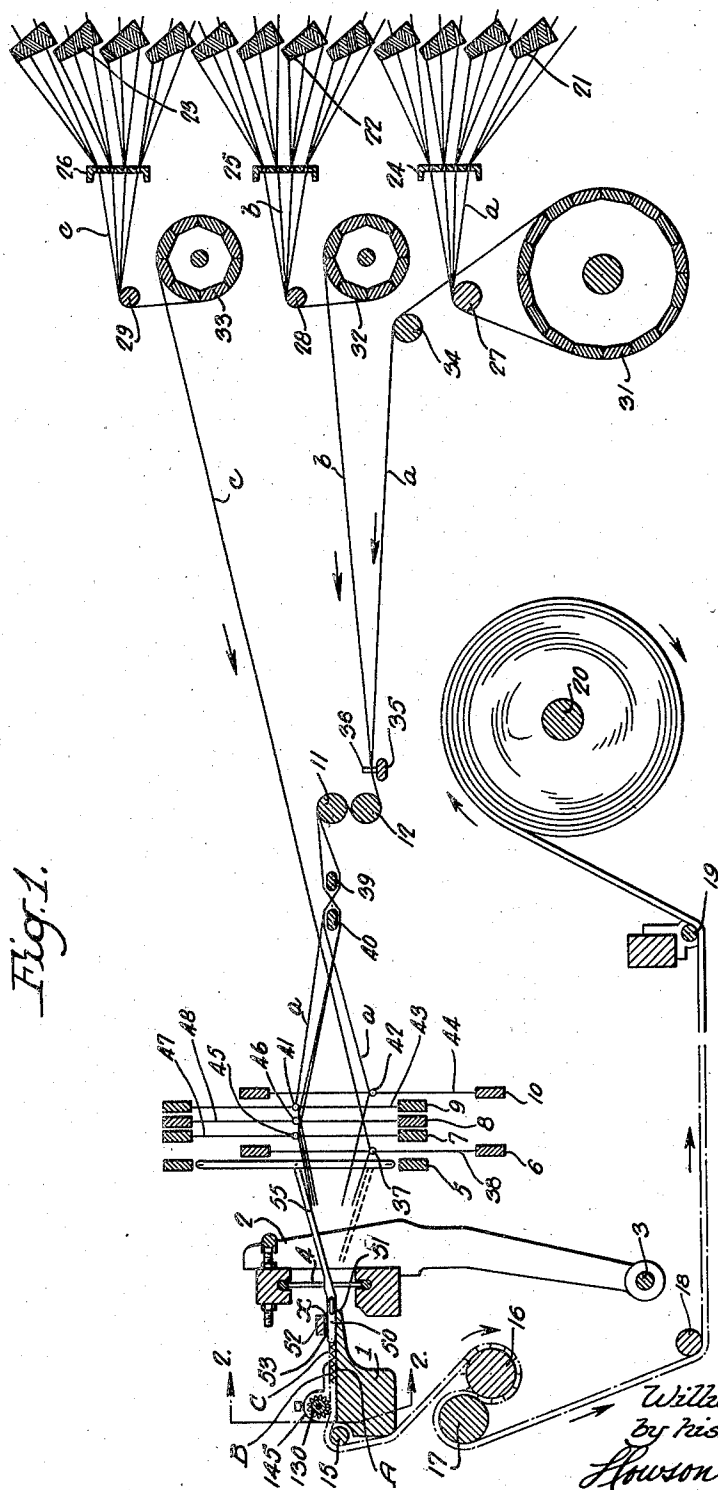


Fig. 1.

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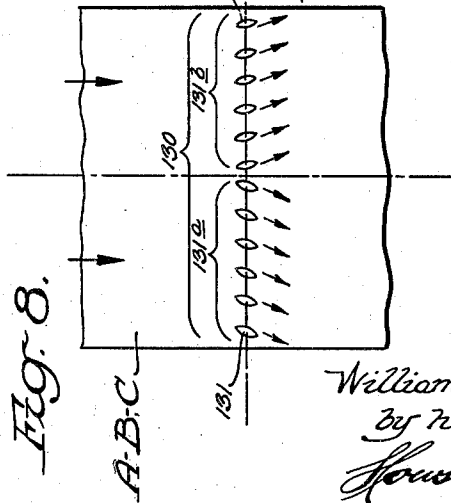
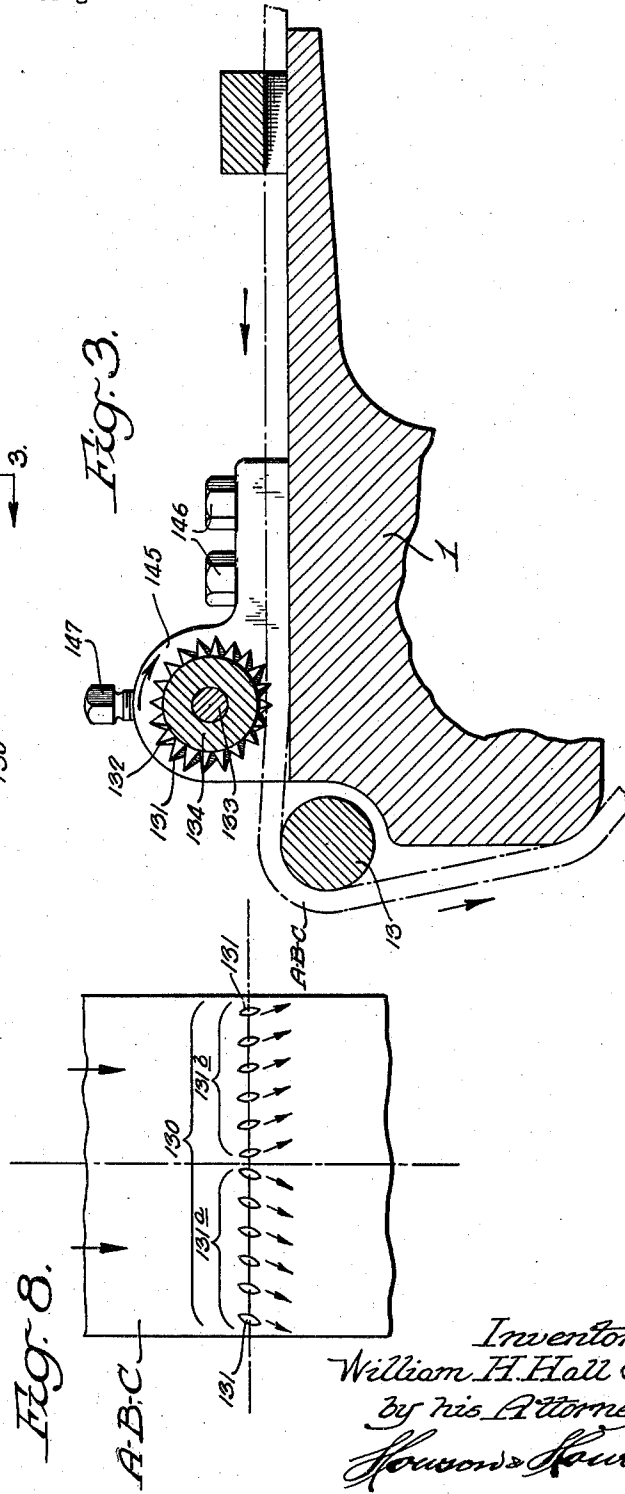
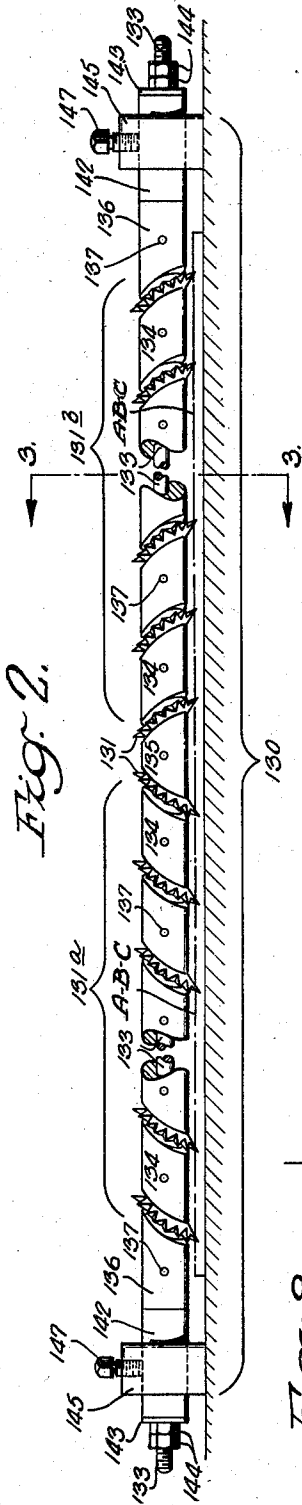
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Fig. 4.

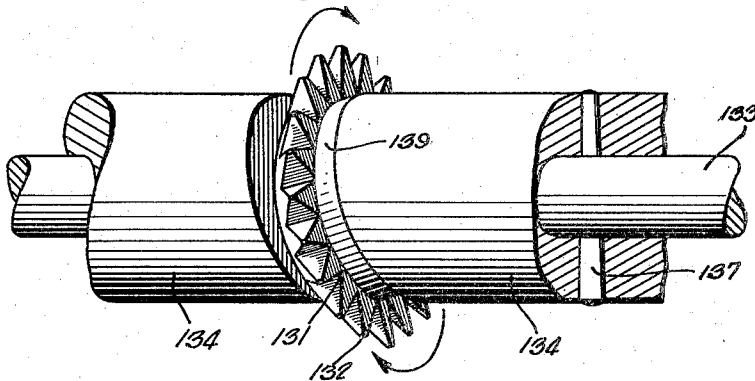


Fig. 5.

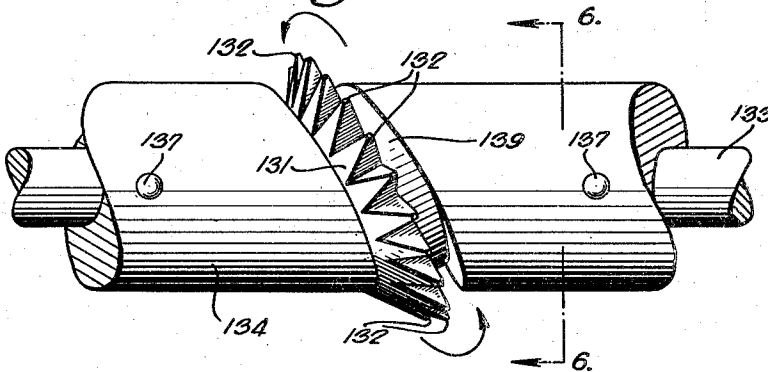


Fig. 7.

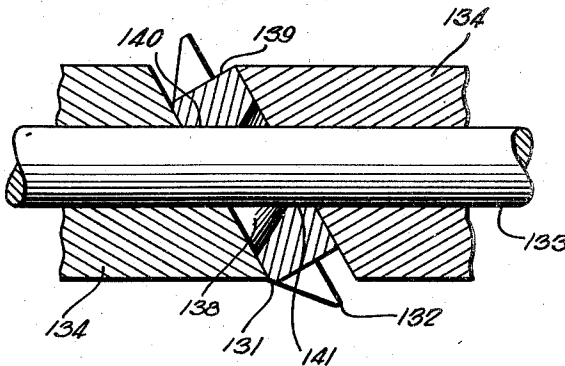
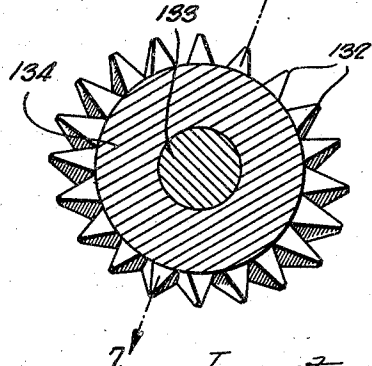


Fig. 6.



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UNITED STATES PATENT OFFICE

2,164,241

FABRIC SPREADING MEANS

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tion of Delaware

Original application October 13, 1936, Serial No.
105,428. Divided and this application Novem-
ber 29, 1937, Serial No. 177,133

4 Claims. (Cl. 139—291)

This invention relates to fabric spreading mechanism for use in looms, and more particularly looms capable of weaving pile carpet double, wherein base fabrics for two independent carpets are simultaneously woven in superposed relation to each other with separators therebetween and with pile-forming threads extending from one to the other of the base fabrics to be subsequently cut in a plane intermediate the two base fabrics for separating the two carpets and producing a cut pile formation on one face of each, as disclosed in my copending application Serial No. 105,428, filed October 13, 1936, of which the present application is a division.

The mechanism forming the subject matter of the present invention will be fully disclosed hereinafter, reference being had to the accompanying drawings, of which:

Fig. 1 is a longitudinal sectional elevation, in more or less diagrammatic form, illustrating the mechanism of the present invention as applied to a loom of the type noted;

Fig. 2 is a sectional elevation taken on the line 2—2, Fig. 1 and illustrating mechanism for spreading the fabric laterally

Fig. 3 is an enlarged sectional elevation taken on the line 3—3, Fig. 2;

Fig. 4 is a fragmentary plan view of the mechanism shown in Figs. 2 and 3;

Fig. 5 is a front elevation of the mechanism shown in Fig. 4;

Fig. 6 is a transverse sectional elevation taken on the line 6—6, Fig. 5;

Fig. 7 is a longitudinal sectional elevation taken on the line 7—7, Fig. 6; and

Fig. 8 is a diagrammatic plan view showing the spreading mechanism in relation to the fabric as the fabric is being woven.

A loom of the type above noted normally comprises a breast beam 1, and a pivoted lay 2 provided with the usual reed 4. The lay 2 is normally rocked about its pivot 3 by a crank shaft (not shown). The crank shaft is connected to the lay by the usual form of connecting rod.

The loom also normally includes a series of heddle frames illustrated at 5, 6, 7, 8, 9 and 10 respectively. These heddle frames are normally raised and lowered in predetermined relationship to each other while the lay is in the front-center position, in order to provide an open warp shed for the reception of the filling shuttle (not shown) which is shot transversely across the loom when the lay moves to the back-center position.

The raising and lowering of the heddle frames 5 to 10 inclusive, in predetermined relationship

to each other, is normally produced by a series of cams individual to the heddle frames and mounted on a common shaft which is driven at a predetermined speed with respect to the oscillations of the lay 2. This mechanism is common in the type of loom noted and is well known to those familiar with the weaving art and for that reason has not been illustrated in the present instance.

The loom also includes the usual whip roll 11 and warp guide roll 12 about which the warp threads pass in normally extending from a warp beam at the rear of the loom to and through the heddles of the frames 5 to 10 inclusive and through the dents in the lay reed 4, to the fell of the fabric at the front of the loom.

On the front upper corner of the breast beam 1 and extending transversely of the loom, and normally mounted for rotation in suitable bearings carried by the breast beam 1 or by the main frame of the loom, is a guide roll 15 over which the finished fabric passes.

The loom also includes the usual form of pin roll 16, and guide rolls 17 around which the fabric also passes. The fabric is taken up intermittently, i. e., for each beat-up motion of the lay or for each pick, by the pin roll 16, which maintains the fabric and the warp threads under tension. The rolls 16 and 17 are suitably mounted for rotation in the side frames of the loom.

The loom is also provided with fabric guide rolls 18 and 19 and a mandrel 20 on which the completed fabric is wound, said mandrel being driven in any suitable manner to wind the fabric step by step as it is advanced from the fell by the intermittent movements of the pin roll 16.

In the present instance, the usual warp beam is supplanted by a suitable rack of any well known type and upon which is mounted a series of cones, bobbins, spools or other yarn packages 21 containing warp threads *a*, which constitute the warp threads for the lowermost of the two base fabrics. The rack also supports a series of yarn packages 22 composed of threads *b* which constitute the warp threads for the uppermost base fabric. Also carried by the rack is a plurality of yarn packages 23 which supply the pile forming warps *c*.

The warps *a*, *b* and *c* respectively pass through guide or separating plates 24, 25 and 26 from the bobbins 21, 22 and 23 respectively to guide rolls 27, 28 and 29. The guide plates 24, 25 and 26 are provided with suitable relatively spaced openings or perforations through which the warp threads *a*, *b* and *c* pass and by which the threads

of each group thereof are retained in predetermined relation to each other for presentation to the guide rolls 27, 28 and 29. From the guide rolls 27, 28 and 29 the groups of warp threads *a*, *b* and *c* pass around tensioning rolls 31, 32 and 33 respectively.

From the tensioning roll 31 the warp threads *a* pass to and around a guide roll 34 and in so doing said warp threads pass through and between the threads *a*, where said group of threads lie in passing from the guide plate 24 to the guide roll 27.

The threads *a* pass from the guide roll 34 to and over a fixed supporting bar 35, which is disposed adjacent and parallel to the guide roll 12. The bar 35 is provided with a series of vertical pins 36 which are spaced apart longitudinally of the support 35 which latter extends transversely of the loom and is supported in any suitable manner by the main frames of the loom.

The warp threads *b* pass from the tensioning roll 32 through that portion of the group of threads *b* which extends between the guide roll 28 and the tensioning roll 32, said threads *b* then passing to the support 35 and between the guide pins 36 thereon, which maintains the threads *b* in predetermined relation to the thread *a* for delivery to the guide roll 12 and whip roll 11 of the loom.

The pile warp threads *c* pass from the tensioning roll 33 through the group *c* where said group extends from the guide roll 29 to the tensioning roll 33 and from this intersecting point directly to and through heddle eyes 37.

The heddle eyes 37 are carried by heddle wires 38 which in turn are carried by the heddle frame 6, in the present instance, said threads passing from the heddle eyes 37 to the fell *x* of the fabric.

From the whip roll 11 the warp threads *a* and *b* respectively pass under and over a separating bar 39, then over and under a second separating bar 40. The two groups of threads cross each other and pass through each other between the bars 39 and 40 as illustrated in Fig. 1.

From the bar 40 the warp threads *a* pass to and through heddle eyes 41 and 42 carried by heddle wires 43 and 44 respectively. The wires 43 and 44 are carried by the heddle frames 9 and 10 respectively. The warp threads *a* pass from said heddle eyes 41 and 42 through the dents in the reed 4 of the lay 2, to the lower base fabric A at the fell *x*.

The warp threads *b* pass from the separating bar 40 to heddle eyes 45 and 46 which are carried by heddle wires 47 and 48. These heddle wires are carried by the heddle frames 7 and 8 respectively. The warp threads *b* pass from the heddle eyes 45 and 46 through the dents in the lay reed 4 to the upper base fabric B at the fell *x*.

The fabrics A and B are maintained in vertically spaced relation to each other by separating blades 50, said blades being arranged in laterally spaced relation to each other, and disposed horizontally between a rearwardly projecting lip 51 of the breast beam 1 and a transversely extending bar 52 which is arranged above and in spaced relation to the upper surface of the breast beam to provide a guideway 53 for the separating blades 50.

The blades 50, 50 extend longitudinally of the loom and are arranged to move longitudinally through the guideway 53, with the double fabric A—B, during the beat-up movement of the lay to the front-center position and to be retracted slightly in the opposite direction during the move-

ment of the lay to the back-center position, as will be more fully disclosed hereinafter.

The separating blades are of a vertical depth corresponding to twice the height of the pile required on each of the fabrics A and B, said separating blades being arranged in vertical planes and spaced laterally to provide spaces therebetween through which the pile warps *c* pass in extending from the lower base fabric A to the upper base fabric B and vice versa to produce the interconnecting pile area C between said fabrics A and B.

Each of the spacing blades 50 is provided with a relatively movable section 55. The movable sections 55, 55 of the spacing blades 50, 50 are pivotally connected to the back ends of the spacing blade 50, 50 respectively and rise and fall with an inpredetermined relation to the warp threads *a*, *b* and *c*.

The two base fabrics A and B, after being woven at the fell *X* ride longitudinally along the lower and upper edges respectively of the blades 50 and are separated by the vertical width of the blades 50, which determines the length of the pile tufts to be formed by the pile threads *c* in each case as the threads *c*, *c* pass across the pile region C between the two fabrics. The double pile fabric composed of the two base fabrics and interconnecting pile threads rides off the rear ends of the spacing blades 50 as the pin roll 16 takes off the fabric, step by step, with the beat-up movements of the lay 2.

The rear end of the movable section 55 of each spacing blade 50 is pivotally connected to heddle blades which are mounted in the heddle frame 5, disposed immediately behind the lay 2 when said lay is in its back-center position above noted.

At times, during the weaving of double pile fabric or, and especially, during the weaving of a heading between the ends of two lengths or strips of the fabric, wherein the pile-forming warps are floated beneath the lowermost of the two superposed base fabrics which at that time are being woven more or less as separate fabrics connected together only at the selvage edges thereof by the weft or filling thread woven first into one and then into the other of the base fabrics at alternate picks respectively, the fabric tends to wrinkle in the direction of the warps, i. e., the selvage edges tend to move inwardly toward each other and cause the fabric to become wrinkled therebetween. These wrinkles extend longitudinally of the fabric through the heading and, in some cases, for some distance into the pile section which is woven subsequent to the heading.

In order to overcome the above noted longitudinal wrinkling of the fabric, the loom is provided, between the guide bar 52 for the base fabric spacers 50 and the guide roll 15 over which the composite fabric A—B—C passes after weaving, with a spreading device 130.

The spreading device 130 comprises a plurality of peripherally toothed wheels 131 which are spaced apart cross the breast beam and disposed in positions to contact with the fabric. The spreader wheels 131 are arranged in two series 131*a* and 131*b*. The wheels of each series are disposed in substantially parallel planes with the planes of the wheels of the one series arranged at acute angles to the plane of the fabric and breast plate 1 and pointing toward one edge of the fabric, while the planes of the wheels of the other series are arranged at reversely corre-

sponding acute angles to the fabric and breast plate and point toward the opposite selvages so that the two series are in opposed relation to each other with the planes of the two series of wheels in divergent relation to the longitudinal center line of the fabric and to a vertical plane coincident with the longitudinal center line of the fabric, i. e., a line substantially equidistant from the opposite disposed selvages of the fabric.

Each wheel 131 is provided around its periphery with a series of radially extending circumferentially spaced teeth 132 which are adapted to engage the fabric A—B—C, for example, inside relatively spaced chain warps of the upper base fabric B, between successive wefts thereof; and when the heading is being woven the teeth 132 may project through the top base fabric B into the lower base fabric A and engage the chain warps and wefts thereof in a similar manner. In either case the divergent relation of the wheels as the fabric is taken up step by step by the pin roll 16 keeps spreading the fabric laterally from the center line thereof toward the opposite selvege edges thereof.

A valuable advantage of the above resides in the fact that in addition to keeping the fabric from wrinkling it permits the use of a lesser number of warp ends across the fabric to maintain a predetermined width to the fabric than can normally be used to produce a fabric of equal width, with a resulting saving in the cost of material to the manufacturer.

The wheels 131 are each mounted for free rotation on and about the axis of a common supporting shaft or tie rod 133 and are held in definite spaced relation to each other along said shaft by spacing sleeves 134, 134, a center sleeve 135, and end sleeves 136, 136, all of which are suitably secured to the tie rod 133, as for example, by tapered dowel pins 137.

The opposite ends of the spacing sleeves 134 are cut at corresponding and parallel angles to the axis of the sleeve and the ends of the central sleeve 135 are cut at corresponding angles arranged in opposed relation to each other. The angular ends of adjacent spacer sleeves hold the spreader wheels definitely in the divergent planes desired and permits the wheels to turn freely.

In order to permit the wheels 131 to turn freely on the tie bar 133 while arranged at an angle to the axis of the tie bar the body portion of each wheel is provided with a frustoconical bore 138 having the larger diameter end or mouth of the conical opening disposed at one end of the wheel and the smaller diameter end or throat of the conical opening disposed at the opposite end of the wheel, or, in some instances, for example as shown in Fig. 7 where the wheel is provided with an axial extension or hub 139, at a plane intermediate the opposite ends of the wheel, with a similar frusto-conical opening extending inwardly from said opposite end of the wheel and having its smaller diameter end coinciding with the smaller end of the first said conical opening at said intermediate plane. In such case, each wheel 131 has a pair of bearing surfaces 140 and 141 respectively contacting the upper and lower sides of the tie rod 133 and permitting the wheel to turn about an axis common to both of the opposed conical ends of the bore at an angle to the axis of the tie rod 133.

At each of the opposite ends of the spreading device 130 there is a cylindrical sleeve 142 which encircles the tie rod 131 beyond the end sleeves

136, 136, respectively. The sleeves 142, 142 may or may not be doweled to the rod 133 as desired.

In the present instance, the cylindrical sleeves 142 are gripped between the end sleeves 136, 136 and washers 143, 143 on the tie rod 133 by nuts 144, 144 threaded onto the opposite ends respectively of the tie rod 131.

The cylindrical sleeves 142, 142 are mounted in bearings 145, 145 respectively which are secured to the breast beam 1 by screws 146, 146.

The sleeves 142, 142, and consequently the whole of the assemblage mounted on the tie rod 133 is adjustable axially and rotationally in the bearings 145 to vary the angle of divergency of the spreader wheels 131 with respect to the center line of the fabric.

The wheels 131 are maintained in their adjusted positions by set screws 147, 147 threaded into the bearings 145, 145 and engaging the cylindrical sleeves 142, 142 respectively.

I claim:

1. In a loom for weaving fabric comprising longitudinal warps and transverse wefts, means for advancing the woven fabric warpwise from the fell, a support extending across the fabric from side to side thereof, fabric engaging elements mounted on said support for free rotation about axes disposed at angles to the axis of said support and arranged in divergent angular relation to the center line of the fabric and in divergent relation to a plane perpendicular to the plane of the fabric and coinciding with said center line for spreading the fabric weftwise during said advancement thereof, and means affording rotary adjustability of said support about its own axis for varying said angle of divergency of said spreading elements.

2. In a loom for weaving fabric comprising longitudinal warps and transverse wefts, means for advancing the woven fabric warpwise from the fell, and means comprising two groups each comprising a plurality of separate relatively spaced toothed wheels independently rotatably mounted above and in contact with the fabric with the wheels of the two groups arranged oppositely in divergent angular relation to the center line of the fabric for spreading the fabric weftwise during said advancement thereof.

3. In a loom for weaving fabric comprising longitudinal warps and transverse wefts, means for advancing the woven fabric warpwise from the fell, means comprising two groups each comprising a plurality of separate relatively spaced toothed wheels independently rotatably mounted above and in contact with the fabric with the wheels of the two groups arranged oppositely in divergent angular relation to the center line of the fabric for spreading the fabric weftwise during said advancement thereof, a tie rod extending through relatively larger openings in said wheels with the axes of said wheels disposed at angles to the axis of said rod, spacer sleeves on said rod intermediate said wheels and provided with end surfaces disposed at an angle to the axis of the rod and maintaining said wheels in angular relation to said rod, and means for adjustably supporting said tie rod in predetermined relation to said fabric.

4. In a loom for weaving fabric comprising longitudinal warps and transverse wefts, means for advancing the woven fabric warpwise from the fell, means comprising two groups each comprising a plurality of separate relatively spaced toothed wheels independently rotatably mounted above and in contact with the fabric with the

wheels of the two groups arranged oppositely in divergent angular relation to the center line of the fabric for spreading the fabric weftwise during said advancement thereof, a tie rod extending through relatively larger openings in said wheels with the axes of said wheel disposed at angles to the axis of said rod, spacer sleeves on said rod intermediate said wheel and provided with end surfaces disposed at an angle to the

axis of the rod and maintaining said wheels in angular relation to said rod, and means for adjustably supporting said tie rod in predetermined relation to said fabric, said wheels having frusto-conical bores through which said tie rod passes and which afford bearing surfaces for said wheels on said rod. 5

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