

May 6, 1941.

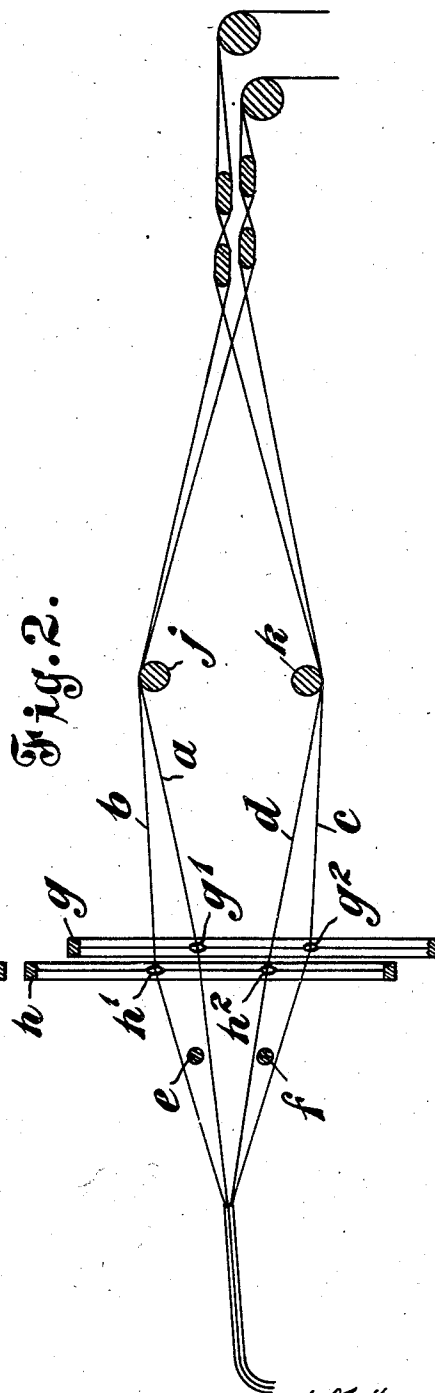
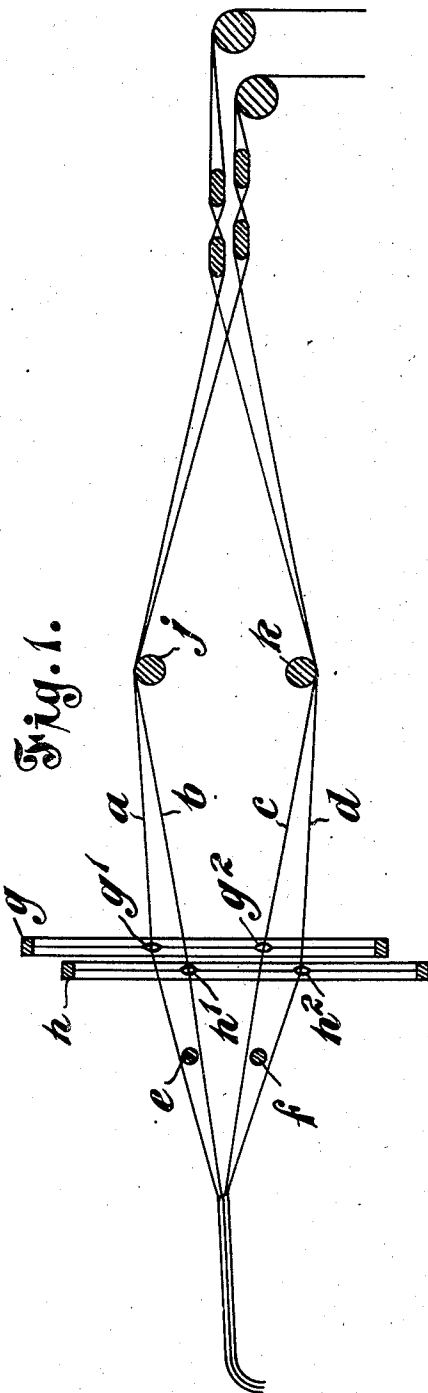
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2,241,202

AXMINSTER LOOM

Filed Oct. 19, 1940

2 Sheets-Sheet 1



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Fig. 3.

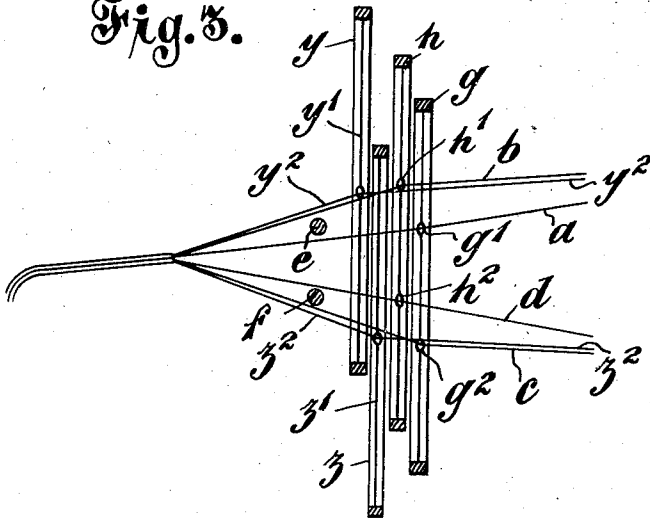


Fig. 4.

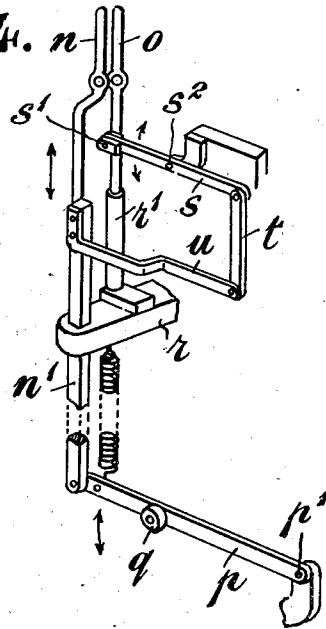


Fig. 5.

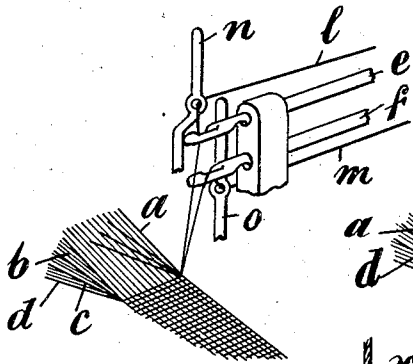


Fig. 6.

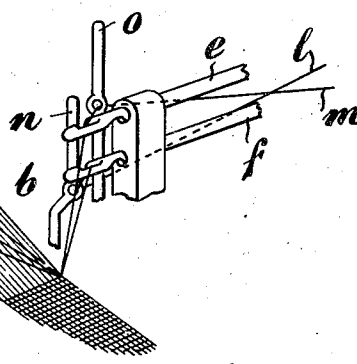
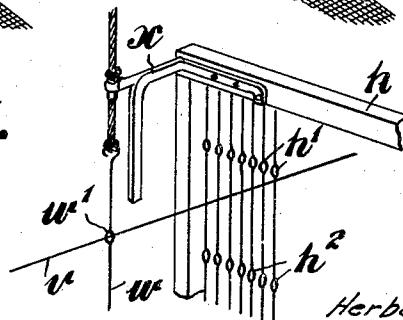


Fig. 7.



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UNITED STATES PATENT OFFICE

2,241,202

AXMINSTER LOOM

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Application October 19, 1940, Serial No. 361,839
In Great Britain September 26, 1939

4 Claims. (Cl. 139—123)

This invention has reference to improvements in or connected with Axminster looms, and has for one of its objects the alteration of the mechanism of existing Axminster looms of the type operating with two or more needles, whereby two or more weaves can be simultaneously produced by the one loom as superimposed layers of fabric, and further in the provision of means for binding together the said superimposed layers at a convenient line or lines between them according to the subsequent or ultimate use to be made of the woven fabric.

The main object of the invention may be stated to be the provision on an Axminster loom (providing for a normal say 36" weave) of facilities for weaving a plurality of plain weaves of the said width which could during the process of weaving be connected or bound together in such a manner as would admit of the final width of the woven fabric being say twice that of the normal width of the weave obtained by the loom.

A subordinate object of the invention is to provide means whereby the plurality of woven fabric layers may be so connected in the weaving process as to constitute a tubular or multi-tubular structure.

The present invention consists of an Axminster loom of the kind embodying two or more superimposed needles whereby a plurality of weaves of fabric are produced simultaneously in superimposed relationship, in combination with means for binding the superimposed weaves together along a line or lines during the process of the weaving, so as to produce (a) a fabric of greater width than the normal width of the loom, or (b) a plurality of woven fabric layers so connected in the weaving process as to constitute a tubular or multi-tubular structure. The invention further resides in means whereby the connection or juncture between the superimposed layers of woven fabric is made on the one side of the loom by inserting each of the weft threads alternately into the superimposed layers of woven fabric, so that the weft threads themselves form an edge connection or junction at the side of the fabric entered by the needles used to insert the weft threads into the upper and lower layers of fabric.

The invention will now be described in its application to an existing Axminster loom of the known type having two needles superimposed one above the other.

Reference will now be made to the accompanying sheets of diagrams which illustrate the features of the present invention.

Fig. 1 is a diagrammatic side elevation showing the run of the warp threads to form a double shedding for effecting two superimposed weaves.

Fig. 2 is a similar side elevation to that seen in Fig. 1 showing the alternative setting of the heddle frames and the change effected in the run of the warp threads at the alternate shot of the needles.

Fig. 3 diagrammatically illustrates the means for inserting binding threads in the superimposed layers by means of an additional pair of heddle frames for the purpose of producing a tubular or multi-tubular structure.

Fig. 4 illustrates a mechanism incorporated in an Axminster loom mechanism for effecting the alternating motion of the two weft threads, this mechanism being illustrated in this figure in the mid position of the two eyed rods through which the weft threads pass.

Fig. 5 illustrates part of the mechanism seen in Fig. 4 with the two eyed rods in one of the alternate positions, and also illustrates the run of the weft threads through the eyed rods to the respective superimposed needles.

Fig. 6 illustrates the alternative setting of the mechanism to that seen in Fig. 5, while Fig. 7 illustrates a simple means of incorporating a tacking thread in the selvedge or offside edge of the fabric.

Referring first more particularly to the diagrams Figs. 1 and 2 the warp threads $abcd$ are arranged in pairs, one pair ab to constitute the top shed (Fig. 1) and the other pair cd to constitute the bottom shed (Fig. 1) for a plain fabric weave produced in each shed, which weaves are simultaneously produced by the superimposed top and bottom needles e and f . The pair of warp threads ab constituting the top shed pass through a pair of wire eyes g^1h^1 respectively, the eye g^1 in the one wire being associated with the one heddle frame g and the other eye h^1 being associated with the second heddle frame h in the well recognised manner of Axminster loom construction, while the pair of warp threads cd constituting the bottom shed are likewise associated with wire eyes g^2h^2 each respectively carried by the said heddle frames g and h whereby the weft threads carried through by the shot of the top needle e pass through the upper shedding, while the weft threads carried by the lower needle f simultaneously pass through the lower shedding.

For the purpose of maintaining the requisite 55 degree of tension on the warp threads these

threads in their passage from the spools to the heddle frames are caused to straddle above and below a pair of spaced bars *jk* which constitute crossbars mounted on the frame of the loom and these bars are spaced apart a predetermined distance to ensure that the warp threads shall have imparted thereto a considerable degree of tension when the sheds are open, as it is found in practice that these threads must not be slack in the period when the needles are entering their respective sheddings.

Reference is now directed more particularly to Figs. 4, 5, and 6 of the diagrams, which illustrate the means of associating or binding the two simultaneously produced or superimposed weaves together so as to form a fabric of greater width than the normal width of the loom. In order to accomplish this purpose the connection, seam, or junction between the superimposed layers of woven fabric is made by means of weft threads *lm* which are inserted simultaneously in the superimposed layers of fabric produced as already described with particular reference to Figs. 1 and 2 of the diagrams, for which purpose the weft threads used in the two layers are inserted alternately in these layers in the successive sheddings of the warp threads of the upper and lower layers of woven fabric, that is to say, the weft thread inserted in the shed of the lower layer is in the next shedding inserted in the upper layer, and the weft thread which has been inserted in the upper layer in the preceding shed is next inserted in the other shedding in the lower layer of woven fabric, whereby the weft threads are continuously inserted into the two layers of woven fabric which have only to be unfolded to permit of the two layered fabric being opened to form a single layer of double width.

The means illustrated in Figs. 4, 5, and 6 of the diagrams for effecting this particular insertion of the two weft threads comprises the leading of the one weft thread *l* through the eye of the rod *n*, while the weft thread *m* is passed through the eye of the rod *o*, the respective threads being picked up in the well recognised manner by their respective needles *e* and *f*. The eyed rods *n* and *o* are vertically disposed and are adapted for an alternate setting as illustrated in Figs. 5 and 6, the rod *n* being rigidly secured to a slide *n*¹ which is pivotally connected at its lower end to a spring-controlled lever *p* which is rocked about the pivot *p*¹. A roller *q* is mounted on the lever *p* which roller co-operates with a cam (not shown) to effect a lifting and lowering motion of the lever *p* at the required periods. The eyed rod *o* is mounted within the tubular socket *r*¹ mounted on the bracket *r* secured to the frame of the loom. The rod *o* has pivotal connection at *s*¹ to an even-armed rocking lever *s* which fulcrums on the pivot *s*² on the frame of the loom, the other end of the lever *s* being pivotally connected by means of the link *t* to a horizontally disposed arm *u* which is rigidly secured to the slide *n*¹.

It will be appreciated by a comparison of Figs. 4, 5, and 6 of the diagrams that when the roller *q* co-operating with the rotating cam is at the mid position then the eyed rods *n* and *o* will occupy the position seen in Fig. 4, while when a lifting motion is imparted by the cam to the roller *q*, then the eyed rod *n* is lifted through the slide *n*¹ to the position seen in Fig. 5, and at the same time a corresponding depressing or lowering motion is imparted to the eyed rod *o* as seen in Fig. 5 through the linkage connection

s, *t* and *u*. When the roller *q* assumes, through the cam rotation, its lowest position then the eyed rods *n* and *o* will occupy the alternate position indicated in Fig. 6.

By means of this mechanism it will be appreciated that the weft thread *l* is first inserted in the upper shedding, while on the alternate shot of the needles the weft thread *l* is inserted in the lower shedding, and a corresponding alternation obtains of the weft thread *m*, whereby what may be termed an in and out or cross-over motion of the two weft threads is obtained to produce a binding together of the two superimposed weaves along a line adjacent the insertion point of the needles into the two sheddings.

It is to be appreciated that in the operation of an Axminster loom incorporating the mechanism described with reference to Figs. 4, 5, and 6 of the drawings, immediately prior to the one shot of the needles the eyed rods are in the position seen in Fig. 5, that during the course of this shot the rotation of the cam which operates the roller *q* brings the eyed rods to the mid position seen in Fig. 4, in which position there is a dwell, and that during the backward stroke of the needles a change is effected in the mechanism to the position seen in Fig. 6 which position is maintained prior to and immediately following the alternate shot of the needles, when the cycle of operation is repeated. It will therefore be appreciated that there is a dwell at each of the said shots in Figs. 4, 5, and 6 respectively, which period of dwell is determined by the operative cam which is timed in relation to the shots of the needles and the usual timed operations of the loom mechanism.

Referring now to the diagram Fig. 7, this illustrates a means of inserting a tacking thread adjacent the selvage or offside edge of the superimposed weaves. This is accomplished by means of a single thread *v* which extends from a carrier spool through an eye *w*¹ formed in the depending wire *w* located at the one end of a bracket *x* extending from the heddle frame *h* toward the fell of the fabric. The lower end of the wire *w* is provided with a weight (not shown) to maintain a tension and the position of the wire *w*, and this binding thread *v* is lifted and lowered in relation to the two superimposed layers or weaves of fabric on each operation of the heddle frame so as to effect the desired insertion of the thread *v* to constitute a tacking thread in the selvage of the fabrics, so that in the run of the fabric through the loom there is no tendency of the superimposed layers to move out of lay due to the traverse of the woven fabric through the loom.

The subordinate feature of forming the superimposed weaves into a tubular or multi-tubular structure may be effected by means of the mechanism illustrated in Fig. 3 of the drawings, where an additional pair of heddle frames *y* and *z* are provided which have single eyed wires *y*¹ and *z*¹ respectively mounted therein, through which binding threads *y*² *z*² pass in the line of the run of the warp threads. In order to effect the insertion of these binding threads into the superimposed weaves of fabric it is necessary to impart to the additional pair of heddle frames *y* and *z* a greater lifting and lowering motion than that which is imparted to the heddle frames *g* and *h*, so as to cause the binding threads *y*² and *z*² respectively to pass through both weaves of the fabric and to be held therein by the respective alternate shots of the needles *e* and *f*.

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It will be appreciated that any recognised form of lever lifting and lowering mechanism as ordinarily employed in connection with the heddle frames of Axminster looms can be utilised to impart the relatively greater motion to the additional heddle frames y and z , and that the binding threads y^2 and z^2 are so located and run in relation to the width of the fabric as may be necessary to effect the tubular formation.

For example if a single tubular formation is required then the binding threads y^2 and z^2 would be located on the opposite edge of the fabric, that is the selvage edge, to that of the insertion edge which is bound in the manner described with reference to Figs. 4, 5, and 6, but if it became necessary to form a multi-tubular formation in the one run or weave of the superimposed fabrics, then additional binding threads y^2 and z^2 and eyed wires y^1 and z^1 would be provided in connection with the heddle frames y and z respectively.

Where a tubular fabric is to be produced as previously indicated, this may be wholly effected by the use of the additional pair of heddle frames y and z and the corresponding binding threads without the introduction of the mechanism described with reference to Figs. 4, 5, and 6 of the diagrams, that is the whole of the binding or connecting operation which is desired between the two superimposed layers of fabric could be effected by the use of the additional pair of heddle frames y and z and the binding threads associated therewith only.

This tubular formation of the weave is useful in the production of sacks or other tubular fabric carriers.

It will be appreciated that when the loom has been converted to operate in accordance with the present invention the tuft-yarn spools and the mechanism associated therewith is dispensed with.

By the aforesaid conversion of an Axminster loom it is possible to weave say a blanket-like or plain fabric of a width two or more times as great as that of the normal width of the weave of the loom, and if instead of a weave of greater width it is desired to produce a fabric incorporating a plurality of binding threads at different positions, then a dual fabric of a tubular or pocketed character can be produced by the aforesaid alteration or conversion of an existing loom of the type referred to.

I claim:

1. In an Axminster loom, in combination, means for producing a plurality of superimposed sheds, an upper open-eye needle for carrying a weft thread through one shed, a lower open-eye needle for carrying a weft thread through the shed below the aforementioned shed, means for presenting a weft thread to one of said needles, a second means for simultaneously presenting a second weft thread to the other needle, and means for reversing the positions of said two presenting means prior to each shot of the needles, whereby each of said weft threads is alternately introduced into said two sheds.

2. In an Axminster loom, in combination, means

for producing a plurality of superimposed sheds, an upper open-eye needle for carrying a weft thread through one shed, a lower open-eye needle for carrying a weft thread through the shed below the aforementioned shed, means for presenting a weft thread to one of said needles, a second means for simultaneously presenting a second weft thread to the other needle, means for reversing the positions of said two presenting means prior to each shot of the needles, whereby each of said weft threads is alternately introduced into said two sheds, and means for moving a warp thread above said upper needle prior to every second shot of said needles, and below said lower needle prior to every alternate shot of said needles, said warp thread being located at the side of said sheds opposite the insertion point of said needles.

3. In an Axminster loom, in combination, heddle frames for producing a plurality of superimposed sheds, an upper open-eye needle for carrying a weft thread through one shed, a lower open-eye needle for carrying a weft thread through the shed below the aforementioned shed, means for presenting a weft thread to one of said needles, a second means for simultaneously presenting a second weft thread to the other needle, means for reversing the positions of said two presenting means prior to each shot of the needles, whereby each of said weft threads is alternately introduced into said two sheds, and auxiliary heddle frames having greater movement than the aforementioned heddle frames, for moving a warp thread above said upper needle and a second warp thread below said lower needle prior to every second shot of said needles, and reversing the positions of said warp threads prior to every alternate shot of said needles, said warp threads being located at the side of said sheds opposite the insertion point of said needles for binding the edges of the superimposed weaves together at said opposite side to form a tubular weave.

4. In an Axminster loom, in combination, heddle frames for producing a plurality of superimposed sheds, an upper open-eye needle for carrying a weft thread through one shed, a lower open-eye needle for carrying a weft thread through the shed below the aforementioned shed, means for presenting a weft thread to one of said needles, a second means for simultaneously presenting a second weft thread to the other needle, means for reversing the positions of said two presenting means prior to each shot of the needles, whereby each of said weft threads is alternately introduced into said two sheds, and auxiliary heddle frames having greater movement than the aforementioned heddle frames, for moving a set of warp threads above said upper needle and a second set of warp threads below said lower needle prior to every second shot of said needles, and reversing the positions of said two sets of warp threads prior to every alternate shot of said needles, said warp threads being located at intervals across said sheds to form a multi-tubular weave.

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