Oct. 14, 1952 F. J. AHRENS 2,613,691

WEAVING LOOM

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FIG. 1

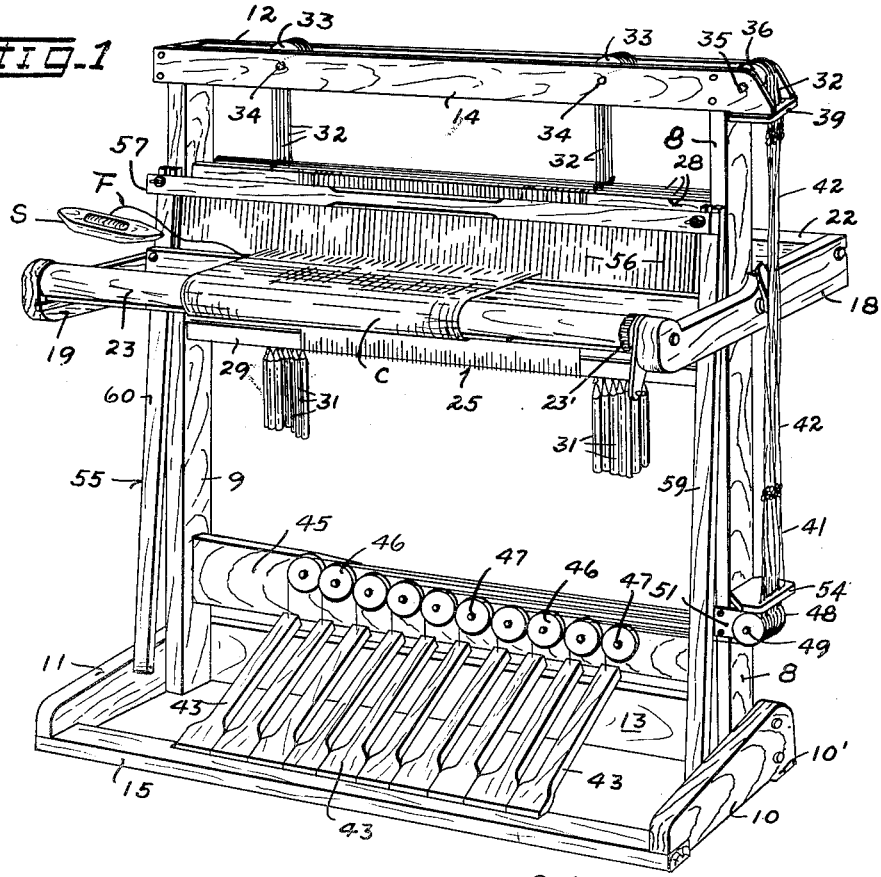

FIG. 2

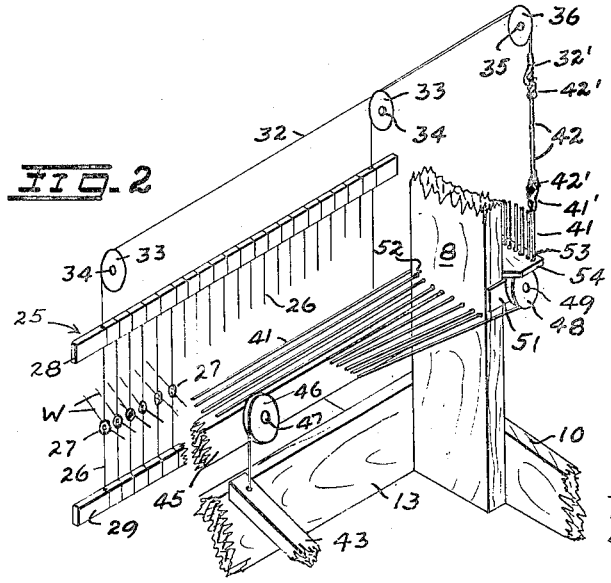

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FIG. 3

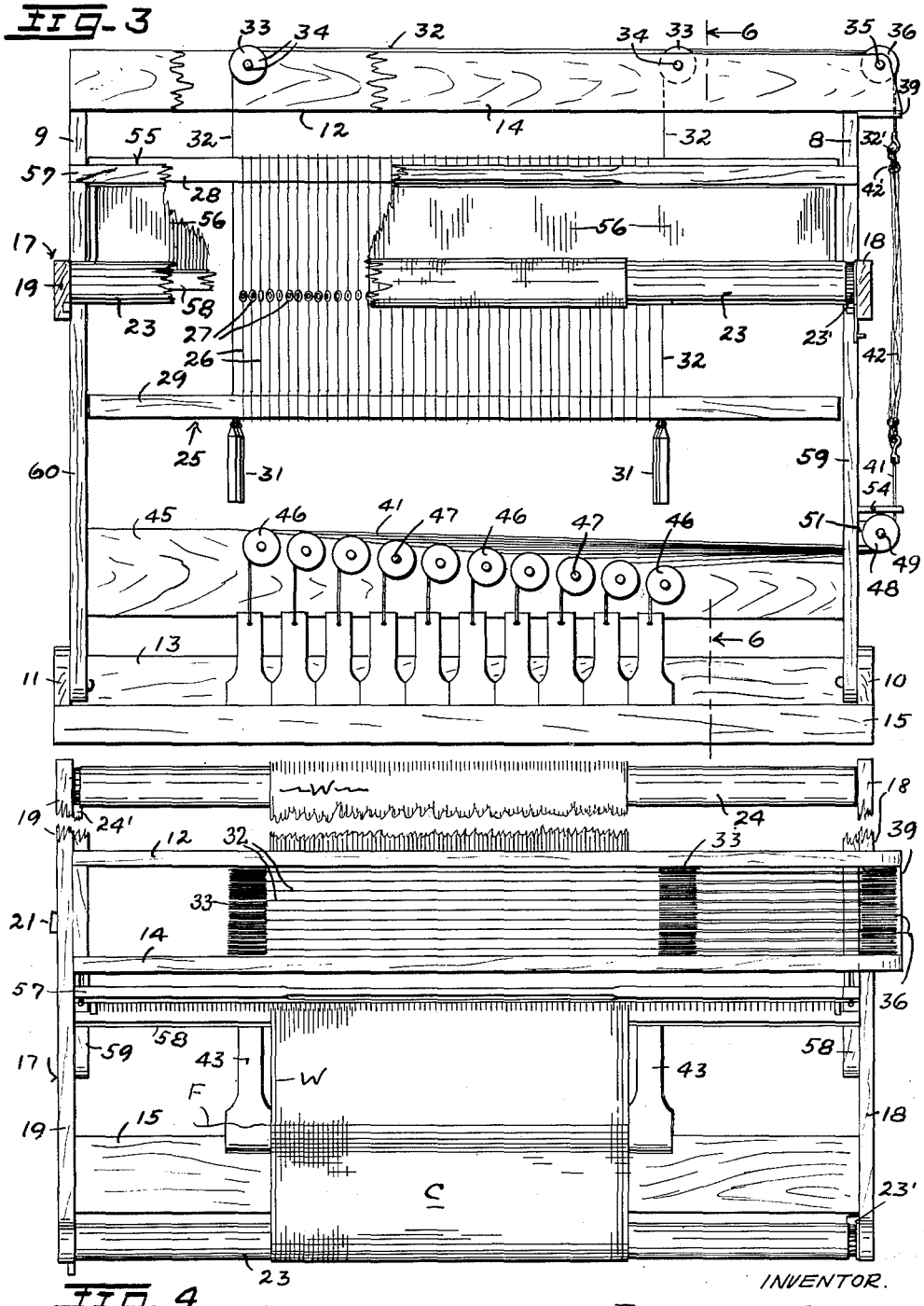

FIG. 4

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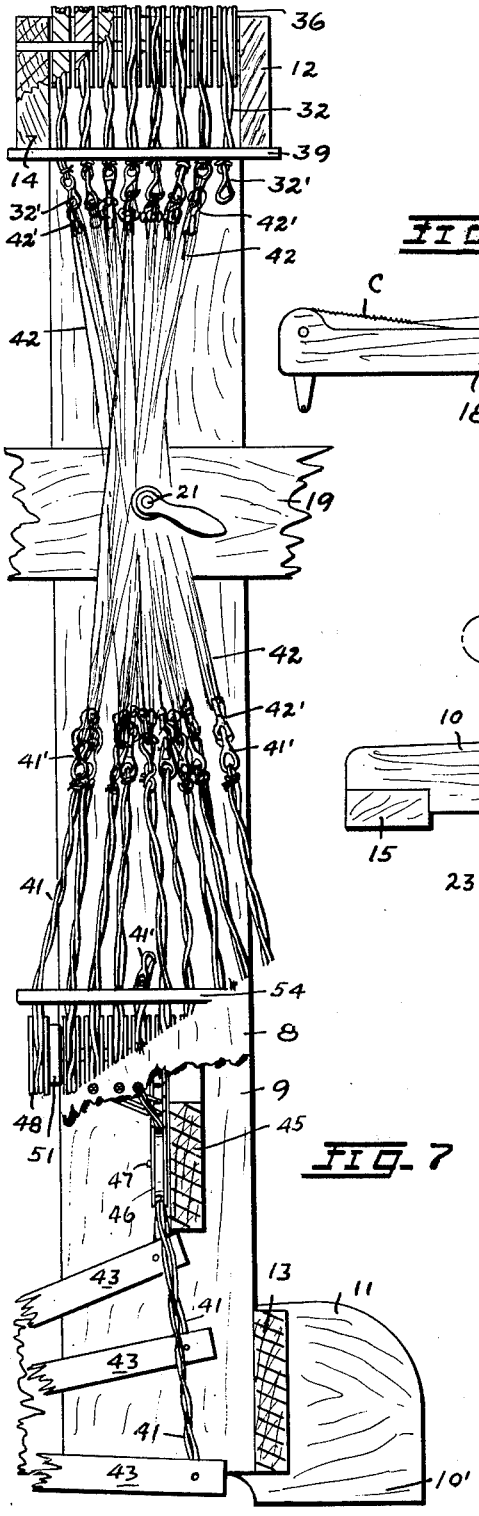

FIG. 7

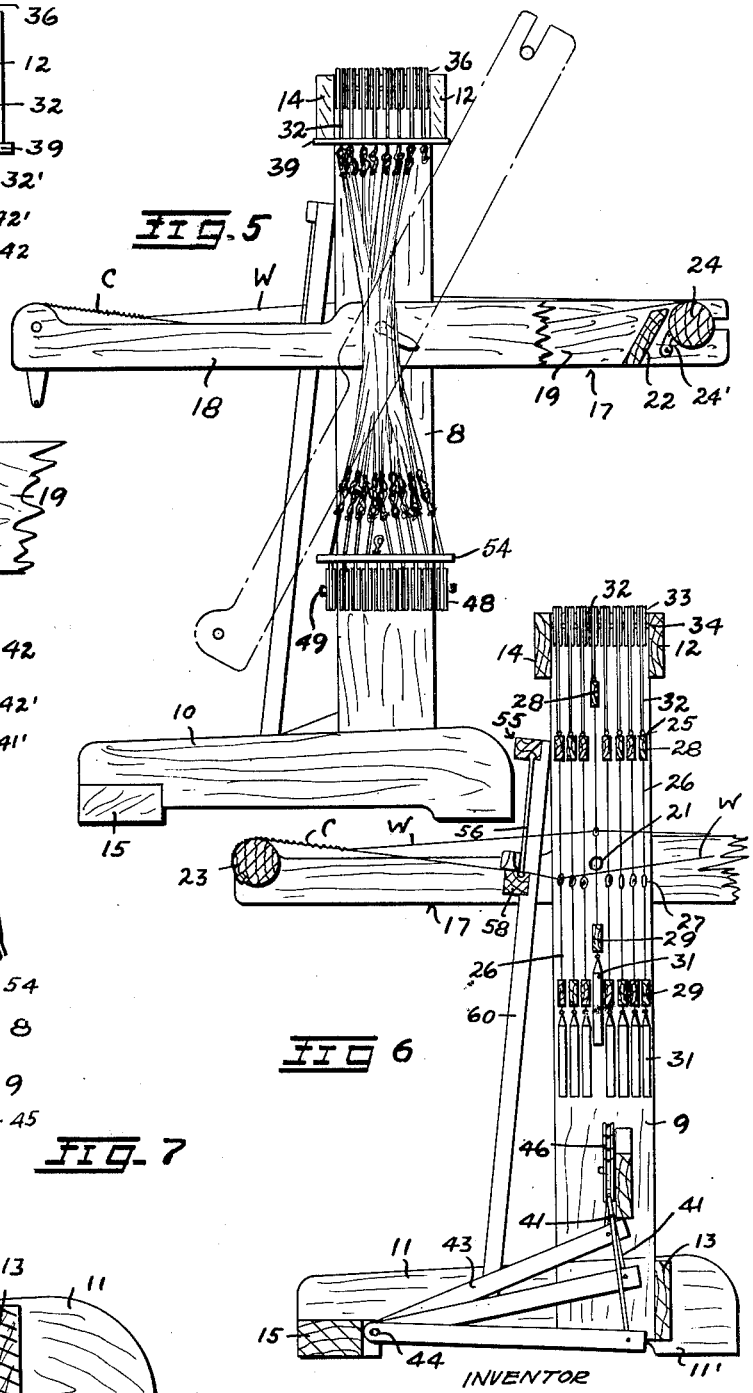

FIG. 5

FIG 6

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WEAVING LOOM

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7 Claims. (Cl. 139—33)

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The invention particularly relates to a weaving loom of the hand-operated domestic type.

A general object is to provide for a maximum possible variation of weave patterns in the woven product of a relatively simple hand loom structure.

A more specific object is to provide variable connections in the harness control lines at a particularly accessible point of the loom.

Another object is to provide an improved beater mounting and action for the loom.

A further object is to provide for such adjustments of the work-carrying weaving frame of the loom as to best accommodate a worker thereat or to dispose the frame in a folded position above the base area of the loom.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth or be apparent in the following description of a typical embodiment thereof, and in the accompanying drawings, in which,

Figure 1 is a perspective view of a loom embodying the features of my invention.

Figure 2 is a generally diagrammatic view of the positioning control for solely one heddle assembly of the loom.

Figure 3 is a front elevation of the loom having certain parts broken away.

Figure 4 is a plan view of the loom, a portion of the weaving frame thereof being broken out.

Figure 5 is a side elevation of the loom.

Figure 6 is a sectional view taken at the line 6—6 in Figure 3.

Figure 7 is an enlarged fragmentary showing of the control arrangement shown in Figures 5 and 6.

The various operative elements of the present loom are particularly shown as carried on a frame having upright side members 8 and 9 extending as standards from horizontal base members 10 and 11 respectively, said base members being arranged to engage a loom-supporting surface. The side members 8 and 9 are rigidly fixed to corresponding intermediate points of the base members 10 and 11 at their inner sides and near their rear ends, and have a fore-and-aft width which substantially equals the thickness of a harness assembly comprising a plurality of harnesses each providing sets of heddles having weft-receiving eyes. The standards 8 and 9 are connected at their rear edges by upper and lower cross bars 12 and 13 respectively, and a cross bar 14 connects the top of the standards 8 and 9 at their front edge and opposite the cross bar 12.

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At their forward ends, the base members 10 and 11 are notched out from below for connection to and by a cross bar 15, said bar providing a front foot for the frame, and the base members 10 and 11 are spaced from their plane of support between the foot bar 15 and rear foot portions 10' and 11' of the respective members. In the present structure, the standards and cross bars which cooperatively provide the loom frame are proportioned and disclosed as being of wood, and the various elements are assumed to be suitably fixed together, in the relation shown, as by the use of screws and/or glue, to provide the required rigid frame structure.

The weaving frame 17 of the present loom comprises mutually complementary side elements 18 and 19 supportedly engaged with the frame standards 8 and 9 at corresponding intermediate points thereof; in the present arrangement, the elements 18 and 19 are secured against the outer sides of the standards 8 and 9 by means of mutually coaxial single bolts 21 about which they may pivot except when the bolts are tightened up to clamp them to the standards. A tie bar 22 connects corresponding rear points of the elements 18 and 19 whereby it and the elements cooperatively provide a planar weaving frame.

At their forward ends, the elements 18 and 19 rotatably mount a take-up roller 23 for the cloth C which has been woven of warp threads W and strands of a filler or weft thread F by the use of the present loom. At their rearward ends, the side elements 18 and 19 of the weaving frame receive the trunnions of a roller 24 from which the warp threads W, which pass around the roller 23 as part of the cloth C, may be unrolled as the finished cloth is rolled upon the take-up roller 23; the rollers 23 and 24 are mutually parallel to each other and to the support axis of the clamp bolts 21. Suitable pawl and ratchet arrangements 23' and 24' at ends of the rollers 23 and 24 respectively provide for a desired fixedly adjusted condition of the warp thread portions between the rollers whereby the said thread portions tend to be and remain in a common plane.

The present loom is arranged to apply that process of weaving which requires a division of mounted warp threads W into angularly related groups extending rearwardly from the weaving edge of the formed cloth to provide between them a shed space through which a shuttle S carrying the thread F may be passed from one side of the warp assembly to the other for the placement of a filler or weft strand in the shed space; when the warp groups are restored to a

generally coplanar relation, the inserted filler thread is in predetermined woven relation to the warps.

In order to provide a woven relation of the warp threads to the filler threads, different sets of warp threads are successively lifted by the actuation of suitable harnesses 25 of a set thereof which engage warp threads of different groups for a selective raising of the groups to provide the sheds through which the shuttle S may be passed across the width of the warp assembly. Each present harness 25 comprises a series of parallel heddle cords 26 each having a loop or eye 27 interposed therein and connecting upper and lower bars 28 and 29 which are mutually parallel. The spacing of the cords 26 of a harness 25 is approximately that of the spacing of the warp threads in their mounted assembly, and different sets of the warp threads extend through the eyes 27 of different cords 26, all of said harnesses being normally held in lowered positions as by weights 31 suspended from the bottom bars 29 thereof. It will also be understood that a given warp thread may extend through heddle eyes 27 of more than one harness of the set for its raising when any harness engaging it is raised.

It will now be noted that the harnesses 25 are independently suspended on pairs of cords 32 extending from opposite end points of their top bars 28, said pairs of cords cooperating as parts of control lines which may support the different harnesses in their raised or lowered positions. As illustrated, the cords 32 of each pair extend around and similarly from mutually coplanar pulleys 33 mounted in fixed position above their points of attachment to a bar 28, said pulleys being shown as rotatably carried on shaft members 34 mounted on and between the top frame members 12 and 14 in horizontal disposition; each shaft member 34 mounts as many pulleys 33 as there are harnesses to be supported, and all of these pulleys are of like diameter.

At the right end thereof, the top frame members 12 and 14 extend beyond the standard 8, and their extending portions cooperatively carry a horizontal shaft member 35 which mounts a plurality of pulleys 36 for independent rotation, there being as many pulleys 36 as there are harnesses 25. The pairs of cords 32 from the harnesses extend over the different pulleys 36 to common terminal connections beneath the pulleys and from which they may be selectively pulled to raise their associated harnesses. Beneath the pulleys 36, the extending ends of the top frame members 12 and 14 preferably carry a horizontal plate member 39 providing a line of appropriately spaced guide perforations through which the depending portions of the cords 32 extend in mutually coplanar relation for connection with independently operable pull cords by which the harnesses may be raised singly or plurally to provide various patterns in the finished cloth.

In the present structure, the selective or collective pulling of the harness-support cords 32 is arranged to be effected through the operation of cords 41 which are selectively connected to the coterminous depending ends of the pairs of cords 32 by means of connecting tie cords 42 which permit variable and multiple connections between the cords 32 and 41. The cords 41 are arranged for selective pulling through the selective actuation of pedals 43 of a bank thereof which is provided at the base portion of the frame.

As particularly shown, the pedals 43 extend rearwardly from hinged connections to the frame base member 15 at its rearward edge at a common hinge pin 44, and normally slope upwardly for a contact of their rear ends with the bottom edge of a member 45 which is carried by and between the frame standards 8 and 9, said member thus comprising a stop to limit the upward swinging of the pedals. The cords 41 extend upwardly from the inner ends of the pedals 43 to their connections with the tie cords 42, the arrangement being such that the weighted harnesses 25 are operative through the described cord connections to the pedals to engage the pedals with the cross member 45 when the harnesses are in their limiting lowered position.

In the present structure, the cross-member 45 is of elongated plate form, is positioned with its plane upright, and mounts a series of pulleys 46 on stub shafts 47 extending from the front of the member, the arrangement being such that the pedal cords 41 extend vertically to the different pulleys, thence generally horizontally to pulleys 48 mounted on the standard 8 beneath the pulleys 36 for the cords 32, and thence upwardly. The shaft 49 for the pulleys 48 is carried on bracket arms 51 extending outwardly from the opposite sides of the standard 8 to mount the pulleys 48 in such spaced relation from the outer side face of the standard that the tie cords connecting the pedal cords 41 with the cords 32 are clear of the adjacent side 18 of the weaving frame.

The pulleys 48 for the front and rear panel cords 41 are shown as disposed beyond the corresponding edges of the standard 8 whereby the cords 41 engaging them are clear of the standard 8; the cord 41 which passes around the forward pulley 48 is that which is connected with the left-side pedal 43, while the cord 41 which passes around the rearward pulley 48 extends from the right-side pedal 43. The intermediate cords 41 pass through appropriately positioned transverse openings 52 through the standard 8. Preferably, and as shown, the portions of the cords 41 which are directed upwardly from the pulleys 48 extend through guide openings 53 provided in a plate member 54 which extends laterally from the standard 8 immediately above the bank of pulleys 48.

The connections between the tie cords 42 and the cords 32 at their tops and the cords 41 at their bottoms are preferably such that they may be readily established or broken; as indicated, the ends of the cords 32 and 41 to be connected by tie cords 42 are provided with snap hooks 32' and 41' respectively for interhooked engagement with snap hooks 42' (or loops) provided at the ends of the tie cords 42, this arrangement permitting and facilitating various connecting installations of the tie cords 42 between the ends of cords 32 and 41 to provide variable pull line connections between the pedals and harnesses. For providing different patterns in the woven cloth, different pedals 43 may be operatively connected with one or more harnesses, or a plurality of pedals may be connected to a given harness; the successive depression of pedals in a predetermined order to provide weft-receiving sheds may thus provide a predetermined woven pattern, the number of pattern variations permitted increasing with the total number of utilized harnesses in excess of two. It will be understood that the numbers of pedals and harnesses provided in the present loom need not be the same; the present loom provides ten pedals and eight harnesses.

It is to be noted that the present arrangement

by which the connecting cords 42 are operatively applied beyond and opposite an end of the frame provides for and facilitates a particularly ready variable interposition of said cords between the cords 41 and the cords 32 to cooperatively provide branched or unbranched pull lines 41—42—32 connecting the pedals and harnesses, it being understood that the cords 41 and 42 and 32 are collectively utilized to provide a control line, with each comprising a section of the line. Also to be noted is the fact that all of the tie cords 42 of the pull lines thus provided are arranged to have the same effective length; if length adjustments are needed in the pull line connections between the pedals and the harnesses, any such adjustments may be conveniently and accurately provided at the individual tied connections of the cords 32 with their hooks 32'. This provision for the installation of tie cords 42 of like length at a freely accessible loom location is understood to provide particularly valuable features in a domestic loom for producing successive woven articles which usually have different patterns.

If a particular harness is not to be used, no cord 42 is attached to its cords 32, and the hook 32' of that cord pair 32 engages the plate 39 as a stop to limit the descent of that harness; see Figures 5 to 7. If a pedal 43 is not to be used, no tie cord 42 is connected to its cord 41, and the hook 41' of its cord engages the top of the guide plate 54 as a stop to limit the lowering of that pedal. Figures 5 to 7 disclose one pedal 43 in such an inoperative position. It will thus be understood that, in view of the possible variations in the application of the tie cords 42 as intermediate control line sections, the present loom assembly provides for a particularly wide variation of weaving patterns in a structure which requires a minimum number of parts and is relatively simple with respect to its accomplishments.

Having a length of the weft or filler thread F inserted through a shed defined between separated sets of warp threads by reason of the raising of one or more harnesses which receive the raised threads through their eyes, a lowering of the raised harnesses to return the raised warp threads to the plane of the unraised threads, while resulting in a woven engagement of the inserted length of the filler thread with the warp threads, has not completed its incorporation in the woven cloth since it is not then snugly engaged against the previously inserted filler thread length. Accordingly, means are provided in the loom structure for positioning the last-inserted length of filler thread in its final position in the woven product, such a means comprising a beater assembly of a more or less known form. In connection with the present process of providing woven goods by a back and forth insertion of portions of a filler thread F supplied by a shuttle, it will be understood that the return bends provided in the filler thread at the sides of the cloth cooperate with the warp threads at the sides of the woven strip to provide selvedge edges thereat.

The disclosed beater assembly for use in positioning an inserted filler strand in the final woven product essentially comprises a reed frame 55 providing a set of upright reeds 56 receiving the warp threads W between them and disposed between the harness assembly and the woven goods for a forward movement thereof to engage and move forwardly a newly inserted filler strand, following a lowering of all harnesses for firmly positioning the strand in the product. The present reed frame 55 comprises mutually parallel upper and lower bars 57 and 58 connected by side frame members 59 and 60 at their right and left ends and having a set of reeds in the form of flat strips of metal or other suitable material carried between them. When a filler strand has been inserted through the warp assembly in the described manner, a forward movement of the reed frame 55 will engage the mutually coplanar front edges of the reeds 56 with said strand to move it forwardly until it reaches a limiting position against the previously inserted strand in the formed cloth. It will thus be understood that the beater action is essential to the production of a uniform woven product.

The reed frame 55 may be mounted for its forward and return movements in any suitable manner. In the present structure, the end members 59 and 60 of the frame are continued as legs to a hinged connection with the bottom frame members 10 and 11 for swinging about an axis forwardly of the frame standards whereby the frame is arranged for a limited oscillation thereof in its working and return strokes about the common axis of hinging of its supporting legs in the base of the frame. Noting that the different warp threads W constantly extend between adjacent reeds of the reed frame during weaving, the top of the lower frame bar 58 is preferably arranged to travel in an arc slightly below the top plane of the rollers 23 and 24, the relations being preferably such that the warp strands engaged by the lowered harnesses 25 are drawn downwardly against the top of the bar 58 when the latter is disposed in its limiting rearward position which, in the present instance, is determined by the engagement with the strands 8 and 9 of the upper ends of the beater frame sides 59 and 61; the warp threads are more or less tensed by reason of providing at least some support for the harnesses whose eyes they engage, the relation being brought out in Figure 6.

It will be understood that the forward swinging of the present beater assembly is arranged to maintain the warp threads in coplanar relation in front of the bar 58 whereby the action of the reeds 56 may be uniform along the filler thread engaged by them. Also, the engaged filler strand may be more or less tensed as desired by a pulling of the thread from a point thereof between the strands and the shuttle, whereby the woven product may be of uniform structure.

Recalling that the weaving frame 17 is swingably adjustable from the horizontal use position shown for it, it will be noted that said frame may be swung toward an upright plane while carrying the woven cloth and the warp threads; this device provides for a folding of the loom to minimize the floor space required beneath it and also permits the use disposal of the weaving frame in an out of horizontal position as may be desirable to facilitate the working thereat of weavers of different height, it being recalled that a weaver using the loom must reach over the finished cloth while moving a shuttle S through the shed spaced to apply a filler strand in position for its subsequent final positioning by the beater which must also be engaged by reaching over the front of the weaving frame. It will thus be understood that the angular adjustability of the weaving frame is a feature of importance in the present type of loom.

From the foregoing description taken in connection with the accompanying drawings, the

advantages of the present weaving loom features will be readily understood by those skilled in the art to which the invention appertains. While I have described the principle of operations, together with an arrangement which I now consider to be a preferred embodiment thereof, I desire to have it understood that the showings are primarily illustrative, and that such changes and developments may be made, when desired, as fall within the scope of the following claims.

I claim:

1. In a loom, a support frame defining a working space, a weaving frame disposed in said space and mounting warp threads and the woven product, harnesses cooperative with said weaving frame, harness-shifting pedals arranged for selective actuation, flexible pull lines connecting the harness-shifting pedals with the harnesses, said lines including intermediate tie sections arranged for variable interposed connection in the lines to selectively connect the pedals with the harnesses, and stop members on the frame cooperative with the connectors for the tie sections as a positioning means for a pedal or harness not in use.

2. In a loom, a support frame defining a working space, a weaving frame extending generally horizontally in an upper portion of said space and mounting warp threads and the woven product, upright harnesses disposed within said frame space and transversely through said weaving frame, harness-shifting pedals disposed in the frame space beneath the harnesses and arranged for selective actuation, and flexible control lines directly connecting the pedals with the harnesses and having portions thereof disposed to extend along a frame side, said line portions including tie sections removably inserted therein between spaced connectors therefor for variable applications to connect different pedals and harnesses selectively, and said frame side being provided with stops engageable by the tie section connectors as a positioning means for a pedal or a harness not in use.

3. In a loom, a support frame defining a working space, a weaving frame disposed in said space and mounting warp threads and the woven product, harnesses cooperative with said weaving frame, harness-shifting pedals arranged for selective actuation, and three-section flexible pull lines providing the sole connections between the pedals and the harnesses, the intermediate sections of said lines comprising tie sections arranged for selective interposed connection between the other sections of the lines to selectively connect the pedals and harnesses.

4. In a loom, a support frame defining a working space, a weaving frame disposed in said space and mounting warp threads and the woven product, harnesses cooperative with said weaving frame, harness-shifting pedals arranged for selective actuation, and three-section pull lines providing the sole connections between the pedals and the harnesses, the intermediate sections of said lines comprising tie sections connecting a line section from a pedal with line sections from a plurality of harnesses.

5. In a loom, a support frame defining a working space, a weaving frame disposed in said space and mounting warp threads and the woven product, harnesses cooperative with said weaving frame, harness-shifting pedals arranged for selective actuation, and three-section pull lines providing the sole connections between the pedals and harnesses, the intermediate sections of said lines connecting line sections from a plurality of pedals with a line section from the same harness.

6. In a loom, a support frame defining a working space, a weaving frame extending generally horizontally in said space and mounting warp threads, harness disposed within said frame space in cooperative relation to said weaving frame, harness-shifting pedals arranged for selective actuation, and flexible pull lines providing the sole connection of the pedals with the harnesses and having intermediate portions thereof extending in close adjacency, said intermediate line portions including tie sections of like length removable inserted therein between spaced connectors therefor for variable applications between the line parts from the pedals and harnesses to differently connect pedals and harnesses selectively.

7. A structure in accordance with claim 6 having said mutually adjacent portions of the pull lines located externally of the working space of the loom frame for ready access thereto.

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