March 14, 1939. A. H. RABA ET AL 2,150,187

HAND DRIVEN WEAVING LOOM FOR HOME WORK

Filed Feb. 3, 1937 2 Sheets-Sheet 1

Fig. 1

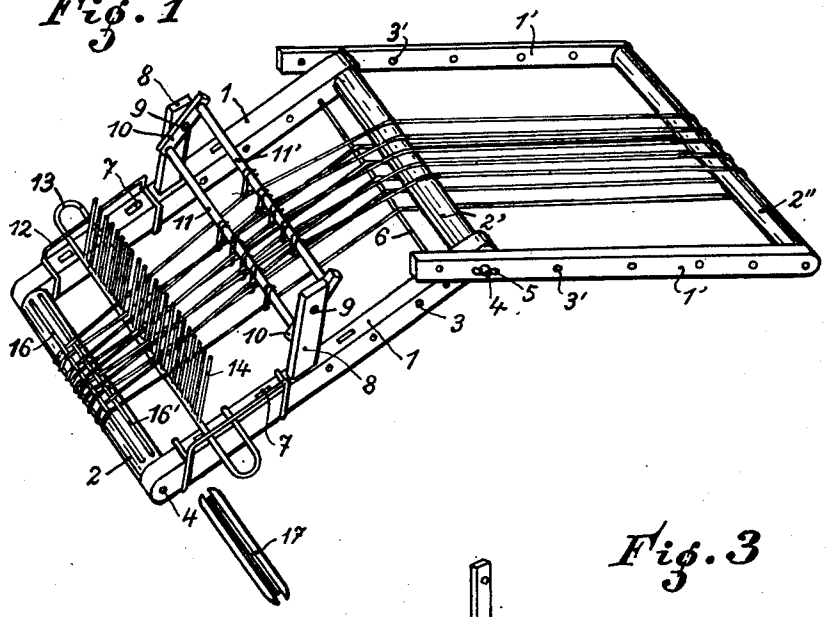
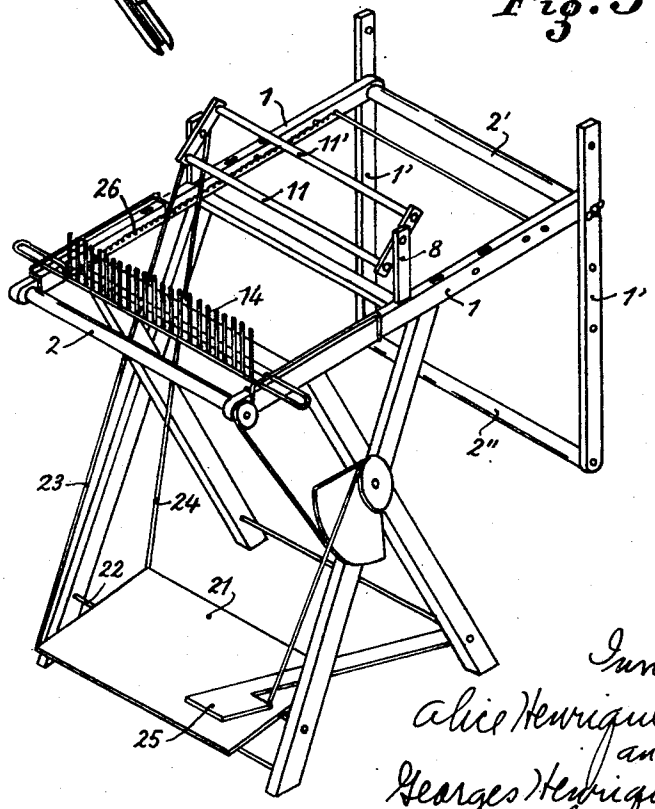



Fig. 3




Inventors
Alice Henriques Raba
and
Georges Henriques Raba
By B. Singer, Atty.

March 14, 1939. A. H. RABA ET AL 2,150,187

HAND DRIVEN WEAVING LOOM FOR HOME WORK

Filed Feb. 3, 1937 2 Sheets-Sheet 2

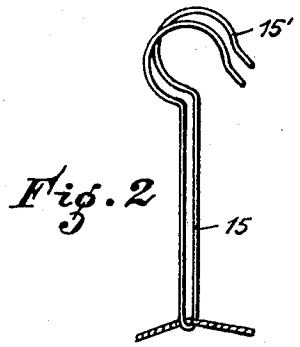



Fig. 2

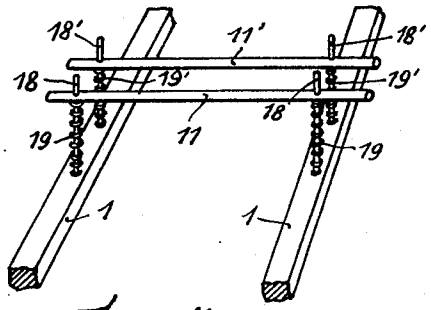



Fig. 5

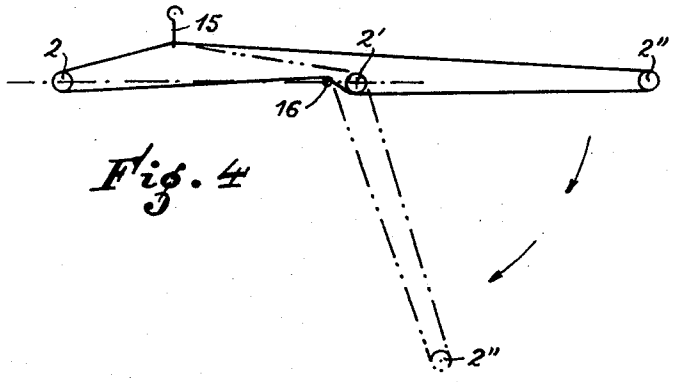



Fig. 4

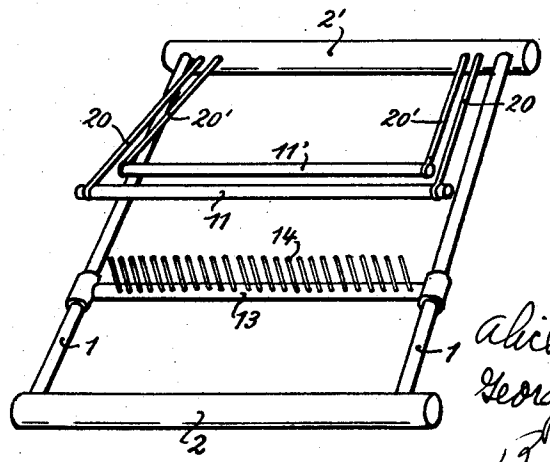



Fig. 6

Inventors.
Alice Henriques Raba and
Georges Henriques Raba
By Bisinger, Atty.

Patented Mar. 14, 1939 2,150,187

# UNITED STATES PATENT OFFICE

2,150,187

## HAND DRIVEN WEAVING LOOM FOR HOME WORK

Alice Henriques Raba and Georges Henriques Raba, Paris, France

Application February 3, 1937, Serial No. 123,938
In France February 5, 1936

5 Claims. (Cl. 139—33)

The present invention has for its object a hand-driven weaving-loom for home-work, comprising a frame of adjustable length and permitting of continuous winding up the warp-threads after arrangement of the guide-bar having upwardly open guide rods and sliding on the lateral beams of the frame; the vertical displacement of the warp-threads is effected by a removable device carrying supports for the threads and placed above the layer of the warp-threads, this device being constituted by one or several turnstiles, each one comprising two lateral rotary brackets inter-connected by rods or spindles on which are suspended the said supports in free articulation, these supports being constituted either by threads or by metallic hasps or clamps.

One feature of the invention consists in that these hasps or clamps are U-like, their branches forming hooks for suspension upon the rods or spindles of the turnstile.

The diameter of the curvature of these hooks is slightly superior to that of the turnstile-spindles so as to oscillate freely thereon and to permit said supports of maintaining themselves in a nearly vertical position during the movements of the turnstile.

Another feature consists in the guide-bar sliding on the lateral beams of the loom and preferably constituted by metal rods soldered to a rod forming handles at its extremities and sliding in appropriate guides fixed to said beams.

Several other particularities will be put forward in the course of the following description relating to the drawings appended. In these drawings is represented:

Fig. 1 a perspective view of an embodiment of a weaving-loom;

Fig. 2 a hasp forming a thread support;

Fig. 3 a loom with a support for it, in a perspective view;

Fig. 4 diagrammatically the foldability of the frame of the loom, and

Figs. 5 and 6 two different embodiments of the thread supports.

According to one embodiment of the invention, constituting merely an example, the loom comprises, first of all, a frame constituted by two lateral beams 1 (Fig. 1) and two cross-beams 2 and 2'. These cross-beams are preferably of round section and fitted on rotary pivots.

The lateral beams 1 are provided with several holes 3 so as to permit of fixing the cross-beams 2, 2', for example by screws 4, in different positions so as arrange them in different distance from each other, according to the length required for the work to be done.

In case of great length the frame can be continued by another frame element foldable below the first frame element and comprising two lateral beams 1' and one cross-beam 2'' similar to the cross-beams 2, 2'. The lateral beams 1' are provided with holes 3' permitting of adjustment of the length of the frame by the displacement of the second frame element with regard to the beams 1 of the first frame element.

The beams 1' are preferably fixed to the beams 1 by means of threaded bolts 4 passing through the extremities of the cross-beam 2' and receiving flynuts 5 so as to permit of an easy arrangement of beams 1' either below the beams 1 or in the continuation of these beams, the bolts 4 serving in this way as articulation pivots.

In case of utilization of the second frame element use is made of a rod 6 arranged in front of the cross-beam 2' between the beams 1. The main purpose of this rod 6 will be referred to later on; it acts equally as fastening means since it traverses two holes 3 in the beams 1 and enters partially corresponding holes 3' provided in the beams 1', these beams being maintained in this way in the prolongation of the beams 1. The rod 6 could be telescopic so as to act in the same way owing to its extensibility.

In the lateral beams 1 are provided mortices 7 destined to receive, either in the center of the loom or in intermediate points, according to the length of the work to be done, arms 8 provided with appropriate tenons so as to permit of their removal from any mortice.

To these arms 8 are articulated, by means of pivots 9, two brackets 10, the extremities of which are inter-connected by means of spindles 11 and 11' so as to form a turnstile.

Two guides 12 are fixed to the lateral beams 1, these guides guiding a rod, preferably a rigid metal bar 13, to which are soldered, preferably electrically, rods 14 of a small diameter and forming teeth. The extremities of the rod 13 are bent to form handles applying against the upper and lower side of the lateral beams and guided by them.

The loom is completed by a set of heddles, such for example as 15, constituted in any suitable way. First of all it is possible to utilize a glazed wire or thread wound on a shuttle and to work by lacing, for which purpose the spindles 11, 11' of the turnstile are covered with string with tight spirals; each one of the warp threads is taken successively by the shuttle and passed each time around the spindle while crossing the thread so that the lacing thread is seized between the spirals or turns of the string. By stretching the lacing thread the warp threads are raised for a first regular layer and then on proceeding in the same way the second layer is formed so that all even threads, for example, are connected to one spindle, and all odd threads to the other spindle. It is also possible to use metal hasps formed by a wire 15. These hasps (Fig. 2) are U-like and their ex-

tremities are bent to form hooks 15' destined to be hooked on to the spindles 11 and 11'. The diameter of the curvature of these hooks is greater than that of the spindles, to permit of their free oscillation around the latter and of their maintaining the vertical or nearly vertical position during all movements of the turnstile.

These hasps can all be of the same length or of different lengths. In the latter case by suitable and different displacements of the selvage holders, there may be obtained the lowering of certain warp threads before certain others, thereby accomplishing in this way varied weaving effects.

The mode of working of this loom is, as follows:

At the beginning the loom is adjusted in accordance with the length of the work to be done, by displacement of the cross-beam 2' or 2'', according as to whether, or not, use is to be made of the extension element 1', using the holes 3 or 3' respectively and taking into account that the length of the executed work will be double the distance separating the cross-beam 2 from the cross-beam 2' or 2'', according to the length of the work to be done.

After arrangement of the cross-beam at a suitable distance the guide-bar 13 is introduced and its extremities are passed below the guides 12 fixed to the beams 1. These guides could be arranged to perform a sliding movement to facilitate the introduction.

Now, the turnstile being still absent, the warp-thread (such as thread, wool, silk, cotton or another substance) is wound on continuously, passing the same over the outer cross-beams of the loom and between the teeth 14 of the guide-bar 13.

The strands of the thread are inserted between the teeth 14 successively at each turn or, according to the design, on jumping over some of the teeth or on inserting the thread several times between some teeth.

On attaining the required width of the work the thread is stopped and presents then itself in the shape of a skein wound on a reel and free with regard to the same, its spirals being more or less tight or apart according to the manner of their insertion between the teeth 14.

Finally the upper part of the layer constituted in this manner is connected to each one of the spindles 11, 11' of the turnstile by means of the heddles 15, so that the threads are supported alternately by the two spindles. For this purpose the threads are brought individually between the two shanks of the consecutive heddles suspended thereupon on the corresponding spindle, one heddle being suspended on one spindle, the next heddle on the other spindle, and so on, successively for all threads.

This operation finished, all even threads will be supported, for example, by one of the spindles, and all odd threads by the other spindle. The loom is now assembled and the weaving operation can be started.

By pivoting the turnstile by a half turn in one direction and then in the other direction all even and all odd threads will be raised alternately above the level of the loom.

The work is done in the habitual manner by the employment of a shuttle 17 garnished with an appropriate thread and passed between the warp layers alternately in one and in the other direction, the turnstile being acted upon previous to each passage of the shuttle. Each weft thread inserted in this way is tightened toward the preceding one by sliding the guide-bar toward the cross-beam 2 whereupon the guide-bar is moved toward the turnstile so as to permit the passage of the next weft thread.

The work can be effected according to different designs and with different kinds of material.

An advantage of the weaving loom built in this way consists in that it can be folded if equipped with a prolongation element, this folding being even possible during the weaving work and permitting of a reduced length. Such folding is possible owing to the rod 6 being inserted after winding up the warp threads on the loom, care being taken to pass all warp threads of the lower layer above this rod 6, by raising this rod with this layer, previous to inserting this rod into the holes 3 nearest to the cross-beam 2' always situated in the axis of pivoting of the beams 1' with regard to the beams 1.

This arrangement permits pivoting of the cross-beam 2'' (Fig. 4) around the cross-beam 2' without the warp threads getting loose, these threads describing an arc of a circle around two axes constituted by the cross-beam 2' and the rod 6.

For the execution of certain work, complementary thread heddles of equal length or of different length could be used, these supplementary heddles being suspended on spindles, such as 11, 11', independent of those provided on the turnstile. These secondary spindles could be fitted in a second turnstile supported by the beams 1 or by other supporting means.

According to the first embodiment shown in Fig. 5, these heddles are constituted by rods 18, 18' fixed to the beams 1 and surrounded by springs 19, 19'. The spindles 11, 11' slide on these rods and are alternately acted upon at suitable moments.

According to another embodiment shown in Fig. 6, the spindles 11, 11' are carried by flexible rods 20, 20' fixed to the cross-beam 2' of the loom.

In both these embodiments the warp threads are constantly pushed in the upward direction by the springs 19, 19' or by the rods 20, 20'. By traction upon one of the spindles 11, 11' in the downward direction certain threads are lowered and released in this way with regard to the other threads maintained by the other spindle raised either by springs or by its proper elasticity.

As shown in Fig. 6, the loom can be made of metal (metal tubes) or in any other suitable manner.

The loom can be also fitted on legs (Fig. 3) foldable as the loom itself and crossed to form an X, the arms of these legs or beams connecting these arms, being provided with tenons entering the mortices 7 of the beams 1, 1'. These mortices are at the same time destined, as aforesaid, for lodging the arms 8 supporting the turnstile.

In this stand pedals may be provided for the control of the movements of the turnstile and of the guide-bar or of one only of these two parts. The connection between the pedals and these parts is effected by a wire or any other known connection means containing elements for their quick attachment and permitting of separation and removal of the loom.

The traction exerted upon the loom by these means prevents all pivoting around the axis constituted by the fixation tenons and secures in this manner the stability during work.

According to one embodiment of the invention, a pedal 21 is fixed by means of an axle 22 between the uprights of the stand and is attached

by a wire 23 or another means fixed to one extremity of the pedal, to one of the spindles 11, 11' carrying the supports 15, the other of these spindles being attached by a wire 24 or the like to the other extremity of this pedal. Consequently, by acting upon the pedal, one of these spindles will be lowered whilst the other will be simultaneously raised and this movement will be reversed when the pressure exerted upon the pedal changes its point of application, the cadence, at which the work is going on, being determined by these movements. It is of course possible to utilise two or more pedals instead of single one, each of these pedals being connected to the corresponding spindle or spindle-set carrying the thread-supports.

Another pedal 25 is provided for the actuation of the guide-bar 13, for which purpose a wire or another means is fixed at one end to this pedal and at the other end to the handle portion of the guide-bar 13. The latter is constantly brought back into its rest position by a spring 26, or by an india rubber string or the like, the striking movement being obtained by the action upon the pedal 25. In order to favor the striking movement which, preferably, ought to be rapidly executed, the movement of the pedal 25 can be transmitted to the guide-bar either through the medium of one or several pulleys or by a lever or by means of two pulleys connected to each other and having different diameters, a cable led over one pulley, leading to the guide-bar, and a cable led over the second of these pulleys, leading to the pedal, or by other appropriate means.

The invention is of course not limited to the embodiments shown and described, numerous modifications, with regard to the general arrangement, to the execution of details and to the materials employed being possible within its scope.

What we claim is:

1. A loom to be operated by amateurs, comprising a frame whose outer cross pieces receive chain threads in order to make an endless chain layer, a comb and a rotary warp carrier device, carried by the frame, the frame being constituted of two sections, so as to permit its folding up in order to decrease the length of the loom when not in operation, one of the sections comprising two longitudinal bars connected at their ends by two round cross-pieces, and the other section comprising two longitudinal bars connected at one of their ends by a round cross-piece, the longitudinal bars of the two above mentioned sections having holes in order to permit fastening the bars of the second section on the bars of the first section, threaded rods and wing nuts about which the bars of the two sections may pivot, the said holes being in a sufficiently great number in the lateral bars in order to adjust the above mentioned sections with respect to each other so as to control the length of the work, the said longitudinal bars being fastened together by said threaded rods and wing nuts.

2. A loom to be operated by amateurs, comprising a frame, those outer cross-pieces receive chain threads for making an endless chain layer, a comb and a rotary warp carrying turnstile carried by the frame, the frame being constructed of two sections so as to be foldable for decreasing the length of the loom when not in operation, one of the sections comprising two longitudinal bars connected at their ends by two round cross-pieces, and the other section comprising two longitudinal bars connected at one of their ends by a round cross-piece, the longitudinal bars of the two above mentioned sections having holes, in order to permit fastening the bars of the second section to the bars of the first section, a rod carried by the first above mentioned section of the loom in such manner as to be able to pass through one of the longitudinal bars of this section and to enter a hole of the corresponding longitudinal bar of the second section, in order to fasten and maintain the two sections in alignment with each other and provide a pivot about which the longitudinal bars of the two sections may pivot.

3. A loom for operation by amateurs comprising a frame, the outermost cross pieces of which receive the chain threads to form an endless chain layer, a rake and a warp carrying turnstile carried by the frame, the frame being formed of two sections to permit its being folded for decreasing the length of the loom when not in operation, one of the sections comprising two longitudinal bars united at their ends by two round cross pieces and the other section comprising two longitudinal bars united at one of their ends by around cross piece, the longitudinal bars of the said two sections having holes to permit the bars of the second section to be fixed to the bars of the first section, screws and wing nuts about which the bars of the two sections may pivot, a rod carried by the first section of the loom so as to pass the two longitudinal bars of this section and to enter the holes of the longitudinal bars of the second section for locking the two sections and for maintaining them in alignment with each other.

4. A loom for operation by amateurs comprising a frame, the two outermost cross pieces of which receive the chain threads for forming an endless chain layer, a rake and a warp carrying reel mounted in the frame, the frame being formed of two sections to permit its being folded for decreasing its length when not in operation, one of the sections comprising two longitudinal bars connected at their ends by two round cross pieces, and the other section comprising two longitudinal bars connected at one of their ends by a round cross piece, the longitudinal bars of the said two sections having holes to permit the bars of the second section to be fixed on the bars of the first section, screws and wing nuts about which the bars of the two sections may pivot, a rod carried by the first section of the loom for locking the two sections and maintaining them in alignment with each other, the said rod receiving the lower layer portion of the endless layer of chain threads, for retaining this lower layer in position when the loom is folded by causing the second section of the loom to pivot on the first one, the layer being in this manner maintained in folded condition and in position upon the outer cross pieces of the first section, on the outer cross piece of the second section and on the rod which is then located beneath the outermost cross piece of the first section.

5. The loom of claim 4, wherein the folding of the frame, owing to the eccentricity of the pivotal supports induces a certain loosening of the lower layer section of the chain layer, which loosening permits the layer to move forwardly between the teeth of the rake without, however, inducing by the folding of the frame any appreciable shifting movement of the layer of threads.

ALICE HENRIQUES RABA.
GEORGES HENRIQUES RABA.