

Mar. 3, 1925.

W. J. A. GRANT
LOOM HARNESS MECHANISM

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Filed July 23, 1924

2 Sheets-Sheet 1

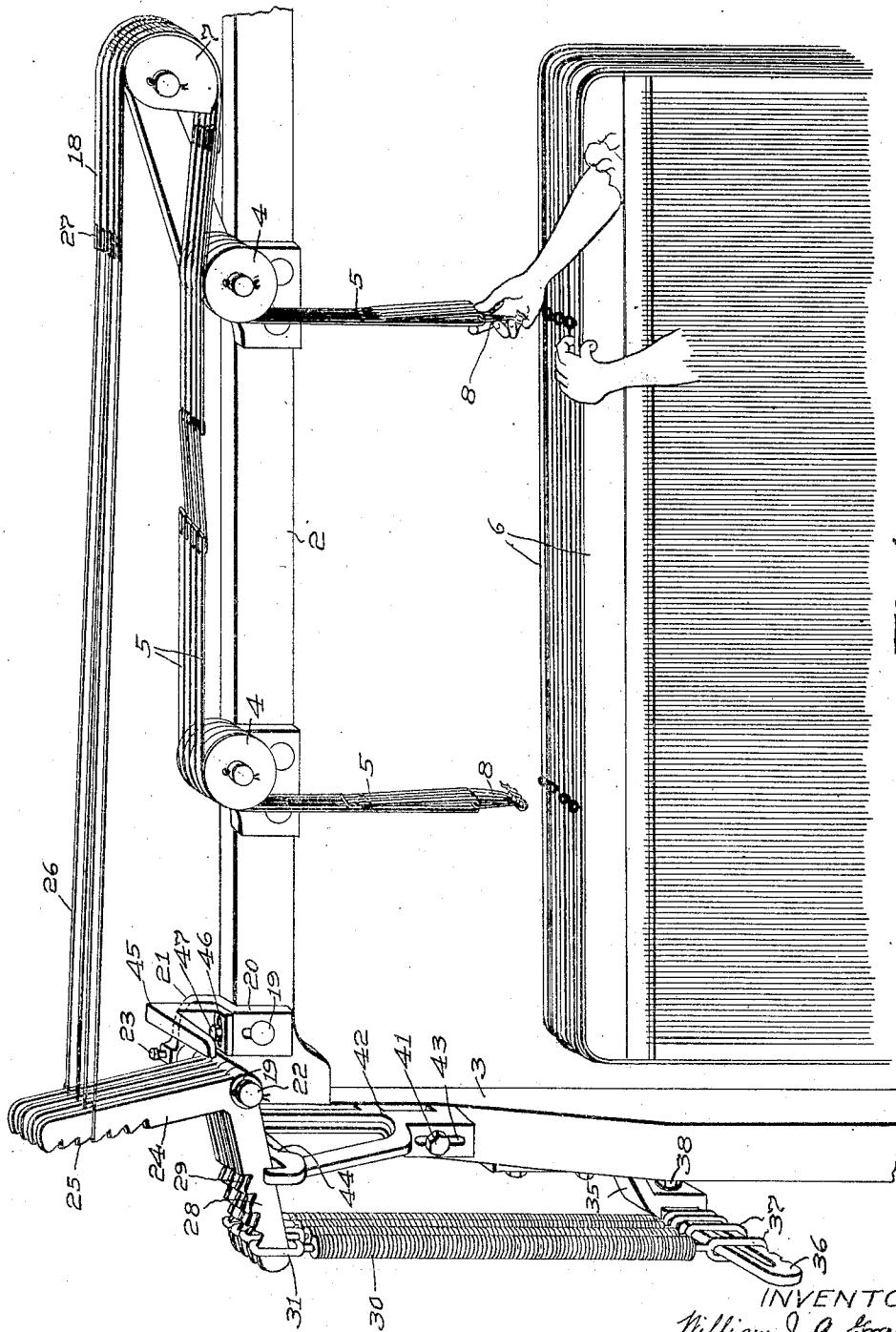


Fig. 1

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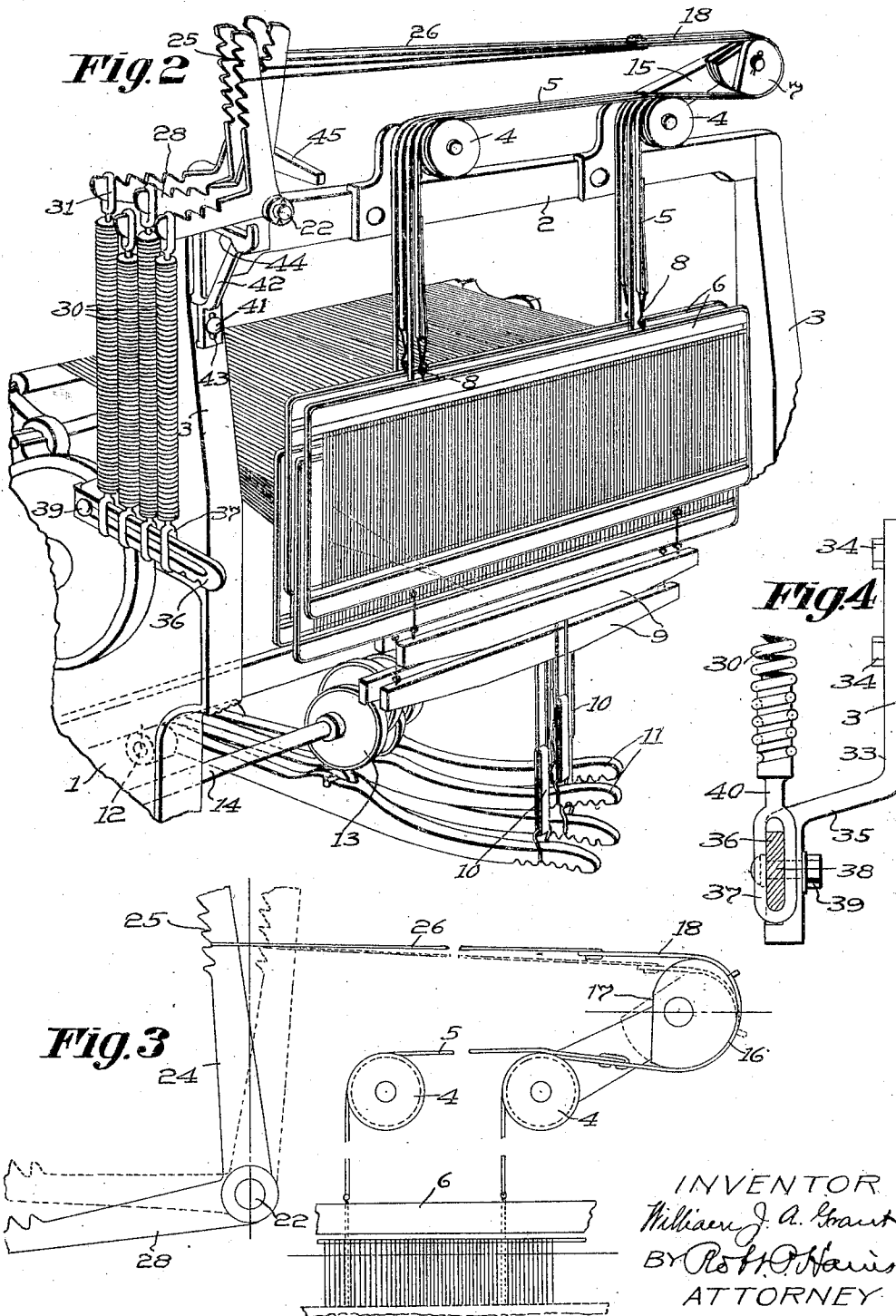
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UNITED STATES PATENT OFFICE.

WILLIAM J. A. GRANT, OF ALEXANDER CITY, ALABAMA, ASSIGNOR TO DRAPER CORPORATION, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

LOOM-HARNESS MECHANISM.

Application filed July 23, 1924. Serial No. 727,834.

To all whom it may concern:

Be it known that I, WILLIAM J. A. GRANT, a citizen of the United States, and a resident of Alexander City, in the county of Tallapoosa and State of Alabama, have invented an Improvement in Loom-Harness Mechanism, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to loom harness mechanism and more particularly to that type wherein the loom harness is moved positively in one direction and is spring actuated in the opposite direction. The present invention provides a loom harness mechanism of such type and so constructed and arranged that the alternate expansion and contraction of the actuating spring is materially reduced and the variations in tension more evenly distributed or equalized throughout the movement of the harness in either direction, and is a further development of the loom harness mechanism shown and described in the Louis S. Burbank Patent, No. 972,810, dated October 18, 1910.

In the Burbank patent, the spring for lifting the harness was located to extend horizontally over the top portion of the loom frame, and such spring was fixed at one end, while to the other end was attached a flexible connector which passed about or partially about a compensator at one side of the loom and the harness itself was connected to the compensator along a portion of the compensator of even radius. The mechanism of the Burbank patent has proven efficient and advantageous in practice, and the present invention while appropriating the compensating idea of the Burbank patent has so arranged and combined the parts in a novel manner such that the springs themselves act in a vertical direction and at one side of the loom where they are readily accessible to the loom attendant or loom fixer.

It is sometimes desirable in changing the warp in a loom to remove the heddles by detaching them from the flexible connectors by which they are operated, and the present invention provides means whereby the spring for lifting the harness may not draw unduly upon the connectors when the heddles or harness frames are detached there-

from. This feature of the invention is also of importance in case one of the harness connectors should break or accidentally become detached from its harness frame.

A still further feature of the present construction and arrangement of parts is to provide means for readily adjusting the tension of the springs which act through the connectors and compensators for lifting the harnesses.

In accordance with the present invention, the springs for lifting the harnesses are located at the side of the loom and act through bell crank levers supported from the loom arch at the side of the loom, while at the opposite side of the loom arch the compensators are located, and between the bell crank levers and compensators extend the flexible connectors which are themselves united to the harnesses by flexible connectors.

In accordance with the present invention, also, means are provided whereby should it be desirable to change the relation between one of the lifter springs and the bell crank lever, a relief of the spring tension upon the bell crank may not cause the bell crank and connected harness to unduly drop.

The various features of the present invention and novel combination of parts will best be made clear from the following description and the accompanying drawings of one good form of the invention.

In the drawings:

Fig. 1 is a front perspective view showing portions of a loom with the present invention associated therewith;

Fig. 2 is a perspective view of sufficient portions of the loom frame and operating parts with the associated invention showing more particularly the bell cranks and springs acting through the bell cranks, the flexible connectors and compensators upon the loom harnesses for lifting them;

Fig. 3 is a detailed front elevation showing the action of the bell cranks and compensators for lifting the harnesses; and

Fig. 4 is a detail showing one good form of means adjustably connecting the harness lifting springs to the loom frame.

The loom frame 1 may be of usual construction and provided with the loom arch 2 supported in usual manner from uprights 3 connected to the loom frame.

Mounted upon the loom arch 2 are the

guide pulleys or sheaves 4 which serve to guide the flexible connectors 5 which unite the harness frames 6 to the compensators 7. In the present instance of the invention four harness frames are shown, but it is to be understood, of course, that the number of harness frames may be varied to suit the weaving conditions.

The flexible connectors 5 which pass from the compensators 7 about the guide pulleys 4 to the harness frames 6 are each connected to the harness frame, in the present instance, by detachable means, one form of which is shown as a hook 8 whereby the harness frames may be readily detached from the flexible connectors.

Each of the harness frames 6 has connected to its lower end a cross-bar 9 to which is secured a connector 10 with the treadles 11, substantially as usual in treadle operated harnesses.

The treadles 11 are pivotally mounted upon a cross-shaft 12 and between its pivotal support and end portion each treadle is associated with an operating cam 13 mounted upon a cam shaft 14, the construction being such that upon rotation of the cam shaft 14 the treadles 11 will be operated to lower the respective harnesses in sequential order in accordance with the arrangement of the cams.

The compensators 7 are supported from the loom arch 2 by means of an arm 15 and each compensator comprises a portion 16 of uniform radius and a portion 17 of non-uniform radius, substantially as more fully described in the Burbank patent hereinbefore mentioned. Each of the harnesses 6 is connected to the uniform radius 16 of a compensator, while to the non-uniform radius portion of each compensator is secured a flexible connector 18 which extends laterally of the loom over the loom arch.

Mounted upon the loom arch 2 at the side of the loom opposite the compensators 7 are a series of bell crank levers to which the flexible connectors 18 are secured. In the present instance of the invention, the loom arch has secured to it adjustably by a pin or bolt 19 a bell crank lever support 20 having a flange 21 extending upwardly from the loom arch and provided with a pin or dead shaft 22 which may be secured to the upwardly extending flange 21 by means of a screw or bolt 23.

Mounted upon the pin or dead shaft 22 are a series of bell crank levers 24 each having a hub portion rotatively mounted upon the pin or dead shaft 22 for rocking movement thereon.

The upper toothed end portion 25 of each bell crank lever has adjustably connected therewith a flexible member or strap 26 which is itself connected at 27 to one of the flexible connectors 18. Each bell crank lever

has a laterally extending lower arm 28 preferably provided with teeth 29 to which is secured the upper end of the harness lifting springs, one being used for each bell crank lever. In the present instance, each of the harness lifting springs 30 is arranged in a vertical direction at the side of the loom frame, and its upper end is connected by a yoke 31 to the laterally extending arm 28 of its associated bell crank lever. At its lower end each of the harness lifting springs 30 is connected to an adjustable arm or bracket also secured to the side of the loom frame for convenient adjustment to vary the lifting tension of the spring as may desired.

From the construction thus far described it will be apparent that each harness lifting spring is located at the side of the loom adjacent the associated bell crank lever and acts through said bell crank lever and the flexible connector, the compensator, and flexible connector between the compensator and harness, for lifting the harnesses under the tension of the lifting spring. This disposition of parts, especially the location of the harness lifting springs at the side of the loom frame to act in a vertical direction upon the harnesses through the bell crank levers and compensators, presents a ready means for manipulation of the springs themselves without the necessity of reaching over the top of the loom frame.

The means for adjusting the springs at the side of the loom frame may be variously contrived, but in the present instance of the invention, the bracket 33 is secured by bolts 34 to one of the risers 3 extending upwardly from the loom frame and has the lower portion turned outwardly as at 35. Extending towards and from the front of the loom from the lower portion of the arm 35 is a spring engaging arm 36 having a toothed lower surface which may be engaged by the yokes 37, one of which is connected to each lifting spring 30. The arm 36 is adjustably connected to the lower end of the arm 35 by means of a bolt 38 which passes through a slot in the arm 35 whereby the securing nut 39 may be manipulated to permit the arm 36 to be adjusted vertically to thereby vary the tension of the harness lifting springs as a whole, and each spring itself may be additionally adjusted by means of the threaded stem 40 or its yoke 37, as more clearly shown in Fig. 4.

When the warp in a loom is to be changed, it is sometimes desirable to remove the harness frames from the loom along with the old warp, that the new warp may be drawn through the same harness frames by connecting the ends of the new warp with the ends of the old warp and pulling them through the harness frames. When the harness frames are thus to be removed from the loom, they are disconnected from their flexible connectors, and in the absence of means

to prevent, the harness lifting springs would withdraw the harness connectors to such an extent away from their operative position as to render it difficult to again connect the harness frames to the connectors when engaged with the new warp. It may sometimes happen, also, that the harness lifting springs themselves may break or become detached from the associated bell crank, and in such case, in the absence of means to prevent, the harness will fall. The present invention provides means for obviating both of these undesirable conditions as will now be explained.

Mounted upon the loom frame, as shown, are two stops, one at each side of the bell crank levers, for limiting the swinging movement of the levers either under the action of the springs when the harness frames are detached, or under the weight of the harness frames when the springs are broken or detached.

These stops are so constructed and arranged that they do not interfere with the free operative movement of the bell crank levers but come into play only when one of the contingencies above noted happens.

In the present instance of the invention, the riser 3 extending upwardly from the loom frame has adjustably connected to it by a bolt 41, Fig. 1, bracket 42 which is provided with a slot 43 through which the bolt 41 extends. The bracket 42 extends upwardly under the substantially horizontal arms of the bell crank levers and has a bridge member 44 extending the full width of all the bell crank levers, the construction being such that should the attendant disconnect the harness frames from their connectors, as shown in Fig. 1, the harness lifting springs will move the bell crank levers into a position such that the horizontally extending arms 28 of the bell crank levers will rest upon the stop or bridge 44. When the harness frames are returned to the loom, the detachable connections or hooks 8 are in close proximity to their operative position, so that the harness frames themselves may be readily connected to the harness connectors.

Adjustably mounted upon the loom arch is a stop 45, Fig. 1, which as shown may comprise a bracket having a slot 46 through which passes a bolt 47 for adjustably connecting the stop in position relative to the upwardly extending arms of the bell crank levers. The stop 45 is of sufficient extent to afford stopping means for any one of the bell cranks should the harness lifting springs connected thereto become detached or broken.

The location of the harness lifting springs at the side of the loom and acting in a vertical direction adjacent the bell crank levers facilitates adjustment of the springs as a whole and of the individual springs without

the necessity of reaching over the top of the loom and possibility of injuring the warp threads by parts dropping thereon. Similarly, the action of the harness lifting springs 30 to different positions along its associate bell crank lever may be readily accomplished to vary the action of any one spring through the connectors and compensators for lifting the harnesses. One of the purposes of the compensator 7 is, as stated in the Burbank patent mentioned hereinbefore, to minimize the expansive action of the springs in their lifting movements upon the harnesses, and in the present invention this is further accomplished and facilitated by the location of the springs at the side of the loom in ready position for manipulation and connecting the springs adjustably on the toothed horizontally extending arms of the bell crank lever.

What is claimed is:

1. In a loom, the combination of a vertically movable harness, means for depressing the harness, a bell crank lever mounted at one side of the loom arch, a compensator located at the opposite side of the loom arch, a flexible connector between the bell crank lever and compensator, a flexible connection between the compensator and harness, a spring located at the side of the loom adjacent the bell crank lever, and connections between the spring and bell crank lever for causing the latter to act through the flexible connector and compensator for lifting the harness.

2. In a loom, the combination of a vertically movable harness, means for depressing the harness, a bell crank lever pivotally mounted at one side of the loom arch, a compensator mounted at the opposite side of the loom arch, a spring located at the side of the loom and acting in a vertical direction upon the bell crank lever, a flexible connector between the bell crank lever and variable portion of the compensator, and a flexible connector between the non-variable portion of the compensator and harness whereby the expansive movement of the vertically disposed spring may be minimized for full harness movement.

3. In a loom, the combination of a vertically movable harness, means for depressing the harness, a bell crank lever mounted at one side of the loom arch, a compensator located at the opposite side of the loom arch, a flexible connector between the bell crank lever and compensator, a flexible connection between the compensator and harness, a spring located at the side of the loom adjacent the bell crank lever, connections between the spring and bell crank lever for causing the latter to act through the flexible connector and compensator for lifting the harness, and a stop for limiting the movement of the bell crank under the action of

the spring when the harness is disconnected from the flexible connector between it and the compensator.

4. In a loom, the combination of a vertically movable harness, means for depressing the harness, a bell crank lever mounted at one side of the loom arch, a compensator located at the opposite side of the loom arch, a flexible connector between the bell crank lever and compensator, a flexible connection between the compensator and harness, a spring located at the side of the loom adjacent the bell crank lever, connections between the spring and bell crank lever for causing the latter to act through the flexible connector and compensator for lifting the harness, and stops for restricting the movement of the bell crank lever in either direction under the impulse of the spring when the harness is detached from the connector and under the weight of the harness when the spring is detached from the bell crank.

5. In a loom, the combination of vertically movable harnesses, means for depressing the harnesses, bell crank levers mounted on the loom arch at one side of the harnesses, compensators mounted on the loom arch at the opposite side of the harnesses, flexible connectors between the bell cranks and compensators, flexible connectors between the harnesses and compensators, and vertically acting springs located at the side of the loom adjacent to the bell cranks and connected thereto for lifting the harness through the bell cranks and compensators.

6. In a loom, the combination of vertically movable harnesses, means for depressing the harnesses, bell crank levers mounted on the loom arch at one side of the harnesses, compensators mounted on the loom arch at the opposite side of the harnesses, flexible connectors between the bell cranks and compensators, flexible connectors between the

harnesses and compensators, vertically acting springs located at the side of the loom adjacent the bell cranks and connected thereto for lifting the harness through the bell cranks and compensators, and means for adjusting the length of the springs.

7. In a loom, in combination, a harness, a bell crank lever for each harness, flexible connections between the upwardly extending arms of the lever and the upper side of the harness, power actuated means connected to the lower side of the harnesses to depress them, vertically disposed springs connected to the laterally extending arms of said levers and operable through the levers and flexible connections to raise the harnesses, and a stop for limiting the rocking movement of the levers toward the springs and adapted to hold a lever when released from its harness in position to maintain its spring under tension.

8. In a loom, in combination, a bell crank lever pivotally mounted upon an elevated portion of the loom frame at one side of the loom, a flexible connection between an upwardly extending arm of said lever and the upper side of the harness, power actuated means connected to the lower side of the harness to depress it, a vertically disposed spring anchored at its lower end and connected at its upper end to a laterally extending arm of said lever and operable through the lever and flexible connection to raise the harness, and a cam-like compensator at the side of the loom opposite the bell crank lever engaged by the flexible connection and constructed to modify the movement imparted to the harness in conformity with the variation in force exerted by the spring as it is stretched.

In testimony whereof, I have signed my name to this specification.

WILLIAM J. A. GRANT.