No. 623,114. Patented Apr. 11, 1899.

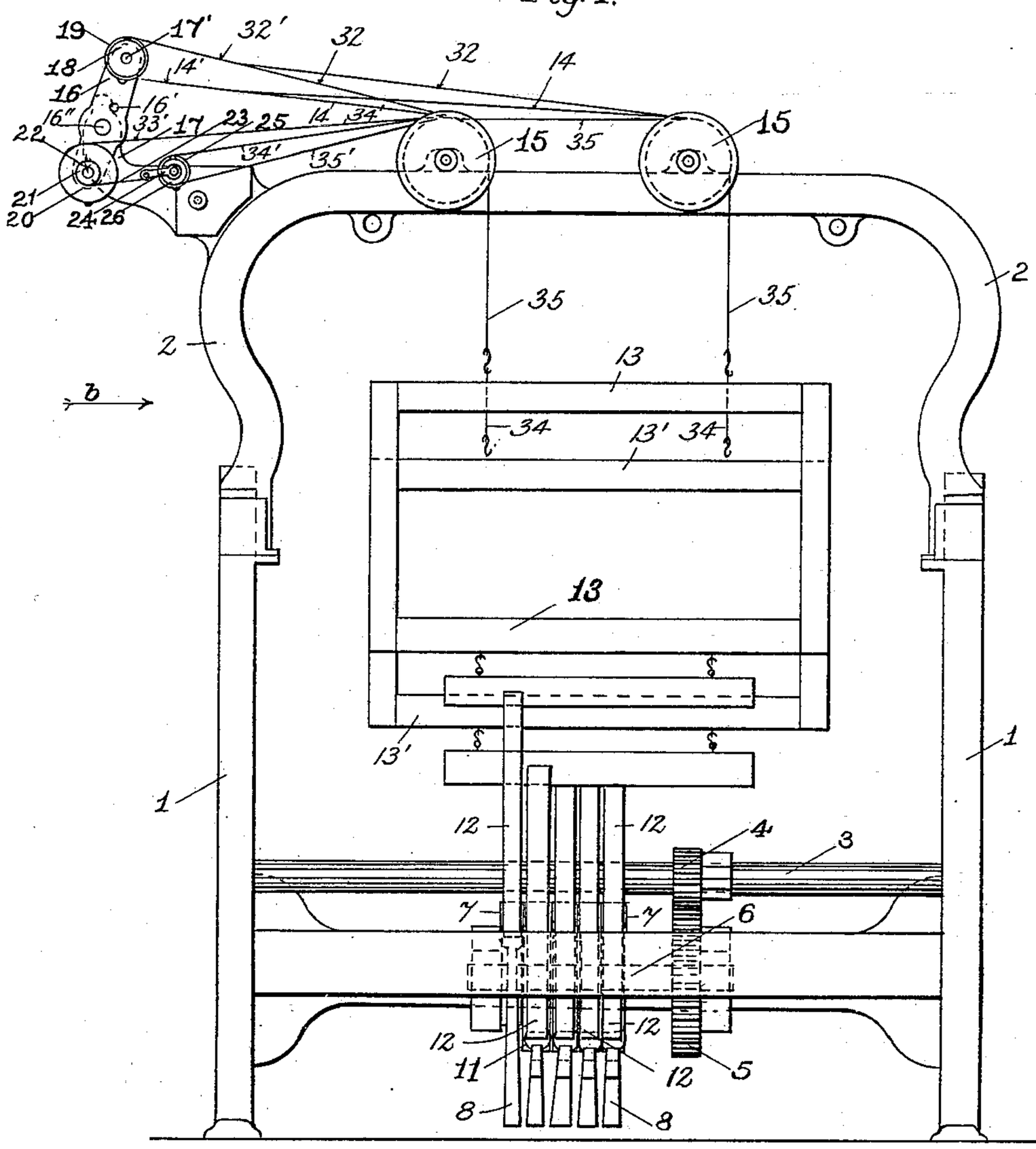
H. WYMAN.

LOOM.

(Application filed Feb. 5, 1898.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1.



Witnesses
Jos. T. Boyle
Edw. R. Parker

Inventor
Horace Wyman
by
John C. Dewey
Attorney

No. 623,114.

Patented Apr. 11. 1899.

H. WYMAN.

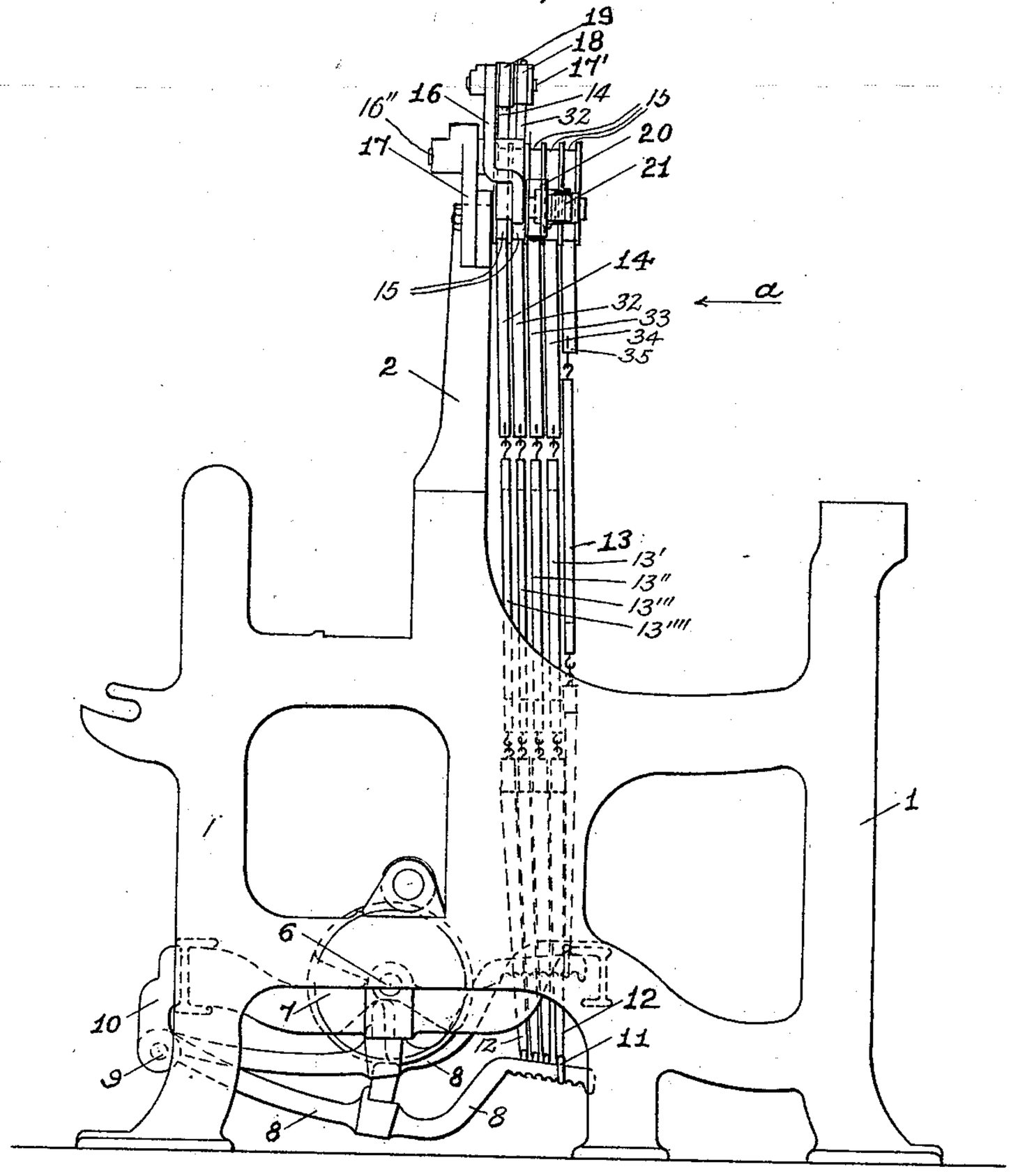
LOOM.

(Application filed Feb. 5, 1898.)

(No Model.)

5 Sheets—Sheet 2.

Fig. 2



Witnesses
Jos. T. Tyr
Edw. L. Parker

Inventor
Horace Wyman
by
John C. Dewey Attorney

No. 623,114. Patented Apr. 11, 1899.

H. WYMAN.

LOOM.

(Application filed Feb. 5, 1898.)

(No Model.) 5 Sheets—Sheet 3.

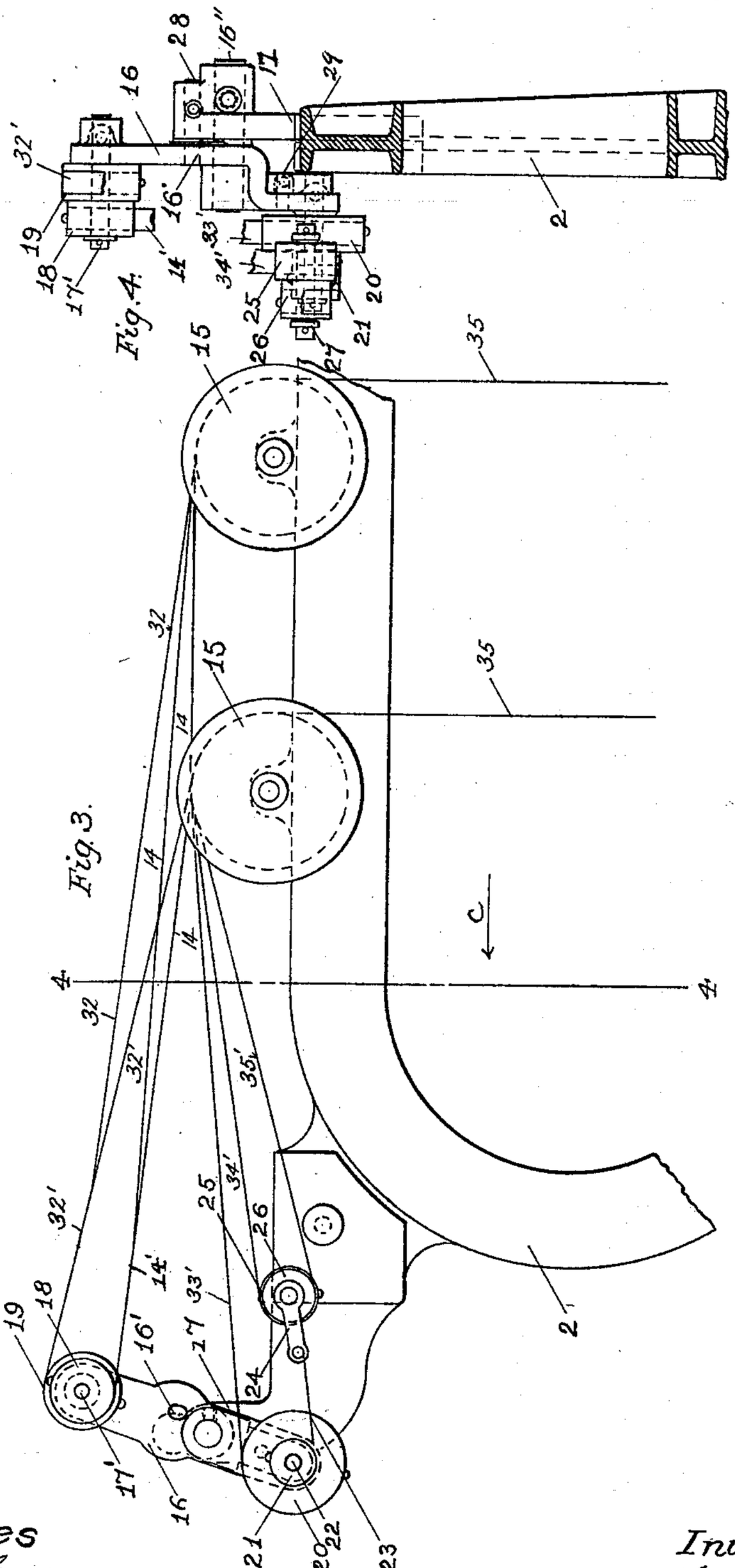


Fig. 4.

Fig. 3.

Witnesses
Jas. T. Cryer
Edw. R. Parker

Inventor
Horace Wyman
Attorney

No. 623,114. Patented Apr. 11, 1899.

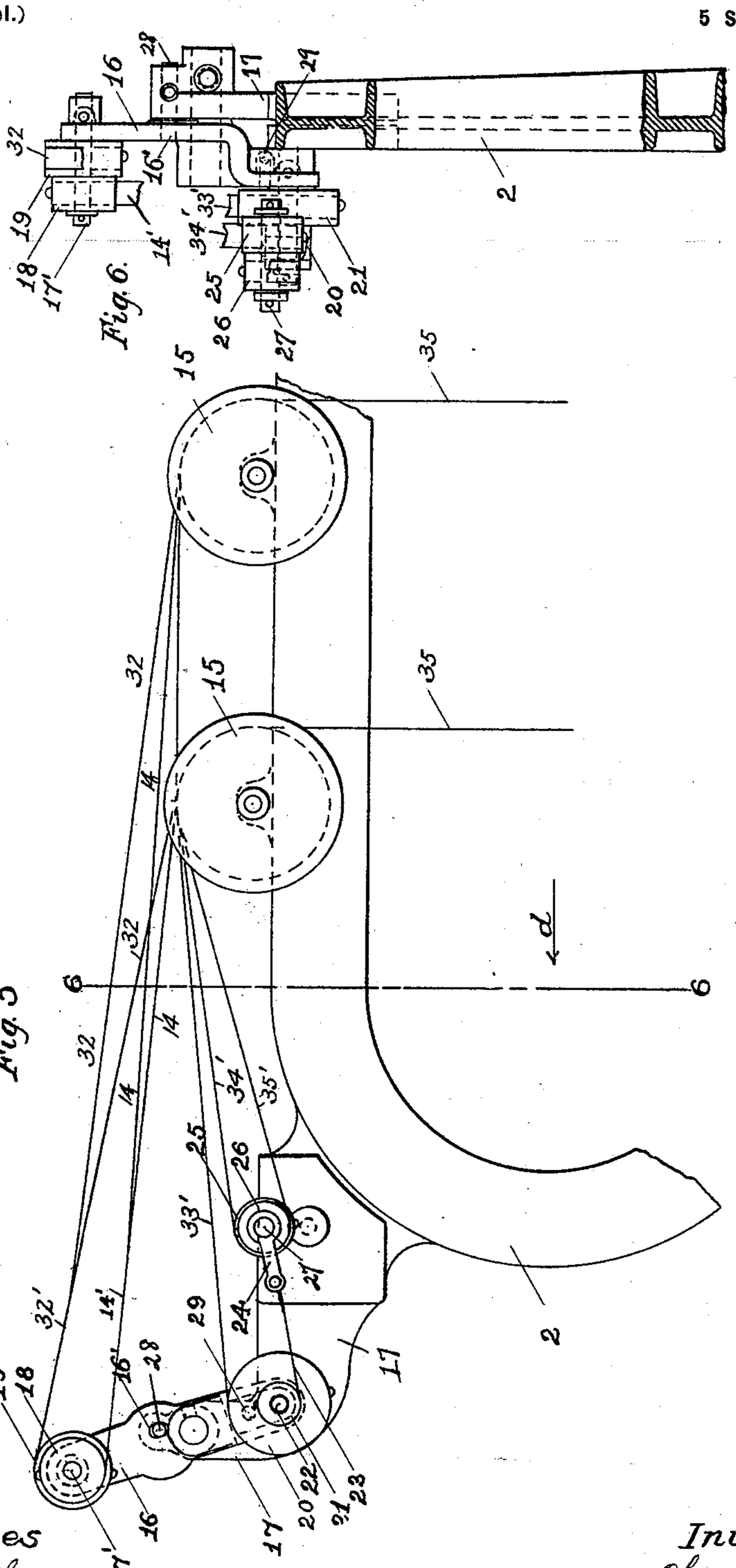
H. WYMAN.

LOOM.

(Application filed Feb. 5, 1898.)

(No Model.) 5 Sheets—Sheet 4.

Fig. 6.



Witnesses
Jos. T. Boyd
Edw. R. Parker

Inventor
Horace Wyman
by John C. Dewey Attorney

No. 623,114. Patented Apr. 11, 1899.

H. WYMAN.

LOOM.

(Application filed Feb. 5, 1898.)

(No Model.) 5 Sheets—Sheet 5.

Fig. 8.

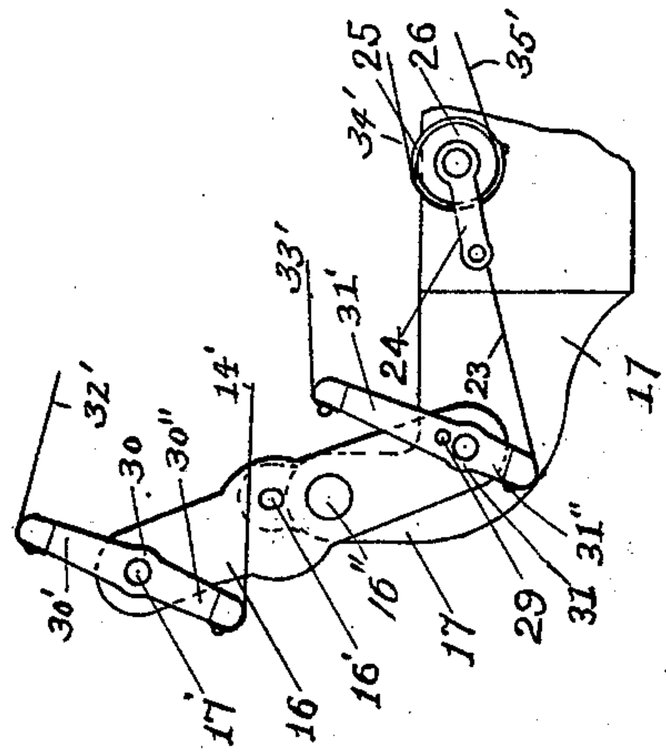
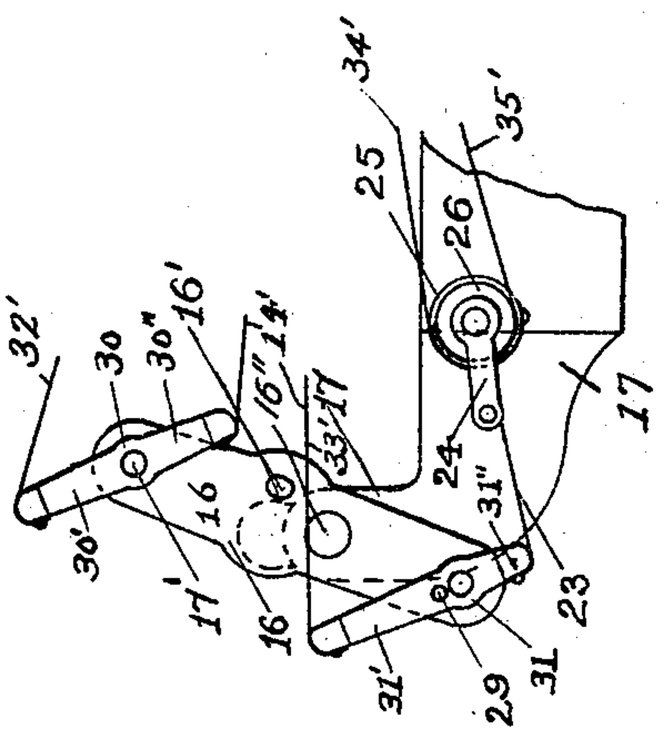


Fig. 7



Witnesses
Jos. T. Cryer
Edw. P. Parker

Inventor
Horace Wyman
by
John C. Dewey Attorney

UNITED STATES PATENT OFFICE.

HORACE WYMAN, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO THE CROMPTON & KNOWLES LOOM WORKS, OF SAME PLACE.

LOOM.

SPECIFICATION forming part of Letters Patent No. 623,114, dated April 11, 1899.

Application filed February 5, 1898. Serial No. 669,183. (No model.)

To all whom it may concern:

Be it known that I, HORACE WYMAN, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Looms, of which the following is a specification.

My invention relates to looms in which the movement of the harnesses is governed by a series of under-cams, and more particularly to what is called the "top-rigging" of the loom for moving the harnesses. The under-cams draw the harnesses down and through the top-rigging draw into the upper shed the harness which is to be raised.

The object of my invention is to improve upon and simplify the ordinary top-rigging mechanism and to place it at one side of the loom instead of directly over the harnesses, and thus remove any risk of oil falling from it upon the fabric; and my invention consists in certain novel features of construction of the top-rigging mechanism which sustains the harnesses in a loom and causes them to assume successive operative positions under the control of a series of cams. The top-rigging mechanism comprises in this instance a main lever or a lever of the first order mounted upon a stand or support on the top of the loom-frame, at one side thereof, and adapted to have a pivotal motion on a stud on said stand. This main lever carries a stud at each of its ends, upon which are mounted devices adapted to oscillate through the small arc of a circle, which devices may be designated as "strap-carriers," their office being to carry straps, which may be attached to each of them, one at each side of their fulcra. Said straps pass substantially in a horizontal direction to two series of pulleys or sheaves supported upon fixed pins on the loom-frame above the harnesses and from thence in a downward direction to the top or upper side of the harnesses. Each of the straps attached to a strap-carrier is connected to a separate harness, and each strap may be connected to its harness at two or more places to give it stability. From the under side of each of the harnesses there are connections to a series of levers operated by cams, one cam to each harness. Said cams determine by their rotation which of the harnesses shall move, the whole combination being such that when one harness is moved from one shed the connection through some part of the mechanism will make a corresponding movement of a harness in the opposite direction from the opposite shed, the movement of each harness being governed by its corresponding cam. For the purpose of some kinds of weaving the main lever is adapted to be held or locked in a fixed position, whereby the strap-carriers at the ends of the main lever may be used by their connections to their respective harnesses without any movement of the main lever. One of the strap-carriers at one end of the main lever is adapted to be held or locked in a fixed position, whereby a connection from one side only of such strap-carrier may be attached to its harness.

As the strap-carriers make only a partial oscillation when moving the harness to which they are connected from one shed to the opposite shed, either rolls or levers mounted upon the same stud may be used, to which the straps or cords which lead to the harnesses may be attached.

Any one of the strap-carriers may have attached to it instead of a strap connection direct to a harness the stud of an additional strap-carrier, from which additional strap-carrier connections may go to the harnesses in the same manner as those from the strap-carriers mounted directly upon the main lever.

The strap-carriers may have their surfaces to which the straps are attached so proportioned that the connections on some of the carriers, owing to their moving through different arcs, will move their connected harness through a greater distance than others, by which means the harnesses are moved into suitable planes for the formation of the shed for the passage of the shuttle, the back harness requiring a gradual increase of movement over the movement of the one next front of it.

Referring to the drawings, Figure 1 is a front view of a loom-frame, looking in the direction of arrow *a*, Fig. 2, and showing the harnesses, under-cams, and levers, and my improved top-rigging mechanism. Fig. 2 is a side view of the parts shown in Fig. 1, look-

ing in the direction of arrow *b*, same figure. Fig. 3 shows, on an enlarged scale, the top-rigging shown in Fig. 1. Fig. 4 is a section on line 4 4, Fig. 3, looking in the direction of arrow *c*, same figure. Fig. 5 corresponds to Fig. 3, but shows the top-rigging mechanism in its opposite position. Fig. 6 is a section on line 6 6, Fig. 5, looking in the direction of arrow *d*, same figure. Fig. 7 shows a modified construction of the top-rigging mechanism. Fig. 8 corresponds to Fig. 7, but shows the top-rigging mechanism in its opposite position.

In the accompanying drawings, 1 are the loom sides; 2, the top rail of the loom; 3, a driving-shaft having a pinion 4 thereon meshing with a gear 5 on a shaft 6, suitably journaled on the loom-frame and carrying in this instance five cams 7, each adapted to engage with a lever 8, pivotally supported at one end on a shaft or rod 9, secured in bearings 10 at the rear of the loom and connected at its other end through a link 11, adjustable in notches on the lever 8, (see Fig. 2,) with a strap 12, secured to the lower side of a harness-frame, as 13. The upper side of each harness-frame has two straps, each passing separately over a pulley 15 and then united into one, as shown in Fig. 1, and extending to one of the strap-carriers (shown in the form of rolls in said figure) on the top-rigging mechanism and secured to said strap-carrier. The top-rigging mechanism consists in this instance of a main lever or lever of the first order 16, which is centrally pivoted at 16″ upon a stand or bracket 17, secured to the loom-arch or the top rail—in this instance on the left side of the loom.

On a stud or pin 17′, secured in the upper end of the lever 16, are loosely mounted two strap-carriers in the form of rolls 18 and 19, attached together or made integral, to turn freely on said stud 17′. To one end of said rolls, as 19, is secured one end of a strap 14′. The other end of said strap is connected to the two straps 14, each of which passes over one of the sheaves 15 and is secured at its end to the top side of one of the harnesses. To the other of said rolls, as 19, is secured one end of a strap 32′. The other end of said strap is connected to the two straps 32, each of which passes over a sheave 15 and is secured at its end to the top side of one of the harnesses. The position of the straps or cords 14′ and 32′ on the rolls 18 and 19 is such—that is, on opposite sides of their fulcra—that the revolution of said rolls in one direction will lower one harness and raise the other, and vice versa.

At the lower end of the main lever 16 are two strap-carriers in the form of rolls 20 and 21, attached together or made integral, and loosely mounted on a pin 22, fast in the lower end of said lever, to turn freely on said pin. To one of said rolls, as 20, is secured one end of a strap 33′. The other end of said strap is connected to the two straps 33, each of which passes over one of the sheaves 15 and is secured at its end to the top side of one of the harnesses. To the other of said rolls, as 21, is secured one end of a strap 23, which has attached to its other end in this instance a loop 24, carrying two rolls 25 and 26, attached together or made integral to turn freely on a pin 27, supported in said loop 24. To one of said rolls, as 25, is secured the end of a strap 34′. The other end of said strap is connected to the two straps 34, each of which passes over one of the sheaves 15 and is secured at its end to the top side of one of the harnesses. To the other of said rolls, as 26, is secured one end of a strap 35′. The other end of said strap is connected to the two straps 35, each of which passes over a sheave 15 and is secured at its end to the top side of one of the harnesses.

The position of the straps 33′ and 23 on the rolls 20 and 21 is such—that is, on the opposite sides of their fulcra—that the revolution of said rolls in one direction will raise the harness connected with the roll 20 and lower the harnesses connected with the strap-carriers in the form of rolls 25 and 26 in the loop 24, and vice versa.

The several parts of the top-rigging mechanism are adapted to be used in different ways or combinations, according to the number of harnesses used.

The main lever 16 may oscillate from the position shown in Fig. 3 to the position shown in Fig. 5, or it may be held on or locked to the stand or support 17, on which it is mounted, by the pin 28 or equivalent device passing through the upper end of the stand and entering a hole 16′ in the lever, as shown in Fig. 5.

The strap-carriers in the form of rolls 20 and 21 may oscillate or turn on the stud 22 in the lever 16 or they may be prevented from oscillating or turning and held on or locked to the lever 16 by the pin 29 or equivalent device in the lever entering a hole in the side of the pulley 20. (See Figs. 5 and 6.)

I will now briefly describe the operation of the top-rigging mechanism. It will be understood that when less than five harnesses are used those which are not used and the strapping connected therewith may be removed. When five harnesses are to be used, the strapping or cording from the top-rigging mechanism to the harnesses will be connected as shown in the drawings, and the main lever 16 will be free to oscillate or move on its supporting-stud on the stand or support 17. The strap-carriers 20 and 21 will also be free to oscillate or turn on their supporting-pin 22. The front harness-frame, as 13, (see Figs. 1 and 2,) will be connected by straps 35, passing over sheaves 15, and strap 35′ to the strap-carrier 26. The second harness-frame, as 13′, will be connected by straps 34, passing over sheaves 15, and strap 34′ to the strap-carrier 25. The strap-carriers 25 and 26 are carried in the loop 24, which is con-

nected by the strap 23 with the strap-carrier 21. The third harness-frame, as 13″, is connected by straps 33, passing over sheaves 15, and straps 33′ to the strap-carrier 20. The fourth harness, as 13‴, is connected by straps 32, passing over sheaves 15, and strap 32′ to the strap-carrier 19. The fifth harness, as 13⁗, is connected by straps 14, passing over sheaves 15, and strap 14′ to the strap-carrier 18. The under side of each of the five harnesses 13, 13′, 13″, 13‴, and 13⁗ is connected by strap 12 to a lever 8, which is operated by a cam 7, as described above. When four harnesses are to be used, the strap-carriers 20 and 21 are locked or held on the main lever 16—in this instance by means of the pin 29, as described above. The strapping 33′ and 33 33 and the harness 13″ are removed. To operate the four harnesses, the strap-carriers 18 and 19 and 25 and 26 are used in connection with the cording or straps from the harnesses 13⁗, 13‴, 13′, and 13, respectively. When three harnesses are to be used, two of the harnesses and the cording or straps from said harnesses to their strap-carriers are removed, leaving three harnesses, with cording or straps extending to three strap-carriers. The strap-carriers for the three harnesses may be the rolls 18 and 19 and the roll 20, the strapping 34′ 34 and 35′ 35 and harnesses 13 and 13′ being removed, or the strap-carriers for the three harnesses may be the roll 20 and the rolls 25 and 26, the cording or straps 32′ 32 and 14′ 14 and the harnesses 13‴ and 13⁗ being removed. When only two harnesses are to be used, the main lever 16 will be fixed to the support or stand 17 by the pin 28 and the strapping or cords leading to three of the harnesses, and said three harnesses will be removed. To operate two harnesses, the strap-carriers 18 and 19 may be used, connected by strapping or cords 32′ 32 and cording 14′ 14 to the harnesses 13‴ and 13⁗, respectively, the other harnesses and the strapping or cords connected therewith being removed, or the strap-carriers 20 21 may be held on or locked to the main lever 16 by the pin 29, and the two strap-carriers 25 and 26, connected by strapping 34′ 34 35′ 35 to the harnesses 13′ and 13, respectively, may be used to operate two harnesses, and the other three harnesses and the strapping connected therewith will be removed.

In Figs. 7 and 8 is shown a modified construction of the compound lifting device shown in the other figures of the drawings.

It will be understood that the pulleys or rolls 18 and 19, 20 and 21, and 25 and 26 do not rotate or turn for a full rotation at any time during the operation of the loom, but merely oscillate or turn back and forth through a small portion of a circle. Consequently instead of having complete pulleys, as shown, to make a pair of strap-carriers the strap-carriers may be made in the form of levers, as shown in the case of pulleys 18 and 19 and 20 and 21 in Figs. 7 and 8, in which figures the lever 30, pivoted on the pin 17′, has one arm 30′ corresponding to the pulley 19 and the other arm 32′ corresponding to the pulley 18 in their relative diameters and which receive the harness-cording and to which is attached the strap 32′, leading to one harness, and a second strap 14′, leading to another harness, said lever 30 thus forming two strap-carriers or a pair of strap-carriers equivalent to the two pulleys 18 and 19. The lever 31, termed a "secondary" lever, pivoted at one side of its center on the lower end of the main lever 16, has the longer arm 31′ corresponding with the pulley 20 and the shorter arm 31″ corresponding with the small pulley 21 in their relative diameters and which receive the harness-cording and to which is attached the strap 33′, leading to one harness, and the strap 23, leading to the loop 24.

It will be understood that the details of construction of my mechanism may be varied some from what is shown and described, if desired.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a stand or bracket, of a main supporting-lever having a pair of strap-carriers mounted to turn on one arm of said lever, a secondary lever mounted on the other arm of said lever, a pair of strap-carriers pivotally mounted and connected with one arm of said secondary lever, and the other arm of said secondary lever adapted to receive harness-cording, substantially as described.

2. The combination with a stand or bracket, of a main supporting-lever mounted on said stand, a pair of strap-carriers mounted to turn on one arm of said lever, a secondary lever mounted on the other arm of said main lever, a pair of strap-carriers pivotally mounted and connected with one arm of the said secondary lever, and the other arm of said lever adapted to receive harness-cording, and means for holding the secondary lever from movement relatively to the main lever, substantially as described.

3. The combination with a support, of the main or supporting lever mounted pivotally on the said support, a pair of strap-carriers mounted to turn on one arm of said lever, a secondary lever mounted pivotally on the other arm of the said main lever, a pair of strap-carriers pivotally mounted and connected with one arm of the said secondary lever, the other arm of said secondary lever adapted to receive harness-cording, and means for holding respectively the main lever from movement relatively to the support, and the secondary lever from movement relatively to the main lever, substantially as described.

4. The combination with a stand or bracket, of a lever having a pair of strap-carriers mounted on one arm thereof, and a second pair of strap-carriers mounted on the other arm thereof, and means for holding one pair

of strap-carriers from movement, substantially as shown and described.

5. The combination with a stand or bracket, and a lever having a pair of strap-carriers mounted on one arm thereof, and means for holding said lever and said strap-carriers from movement, of a second pair of strap-carriers pivotally mounted and connected with one of the strap-carriers of the first-mentioned pair of strap-carriers, substantially as shown and described.

6. The combination with a stand or bracket, and a lever pivotally mounted thereon, and having a pair of strap-carriers pivotally mounted on one arm thereof, of means for locking said lever on its stand, comprising a movable pin or projection to extend in a hole in said stand and lever, substantially as shown and described.

7. The combination with a stand or bracket, of a swinging lever having two pairs of strap-carriers mounted thereon, upon opposite sides of its fulcrum, and means for preventing said lever from moving, substantially as shown and described.

8. The combination with a stand or bracket, of a swinging lever having two pairs of strap-carriers mounted thereon, upon opposite sides of its fulcrum, and means for preventing said lever from moving, comprising a movable pin or projection to extend in a hole or recess in said stand and lever, substantially as shown and described.

HORACE WYMAN.

Witnesses:
J. C. DEWEY,
M. J. GALVIN.