No. 686,970. Patented Nov. 19, 1901.

G. F. HUTCHINS.

PILE FABRIC LOOM.

(Application filed Mar. 29, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1

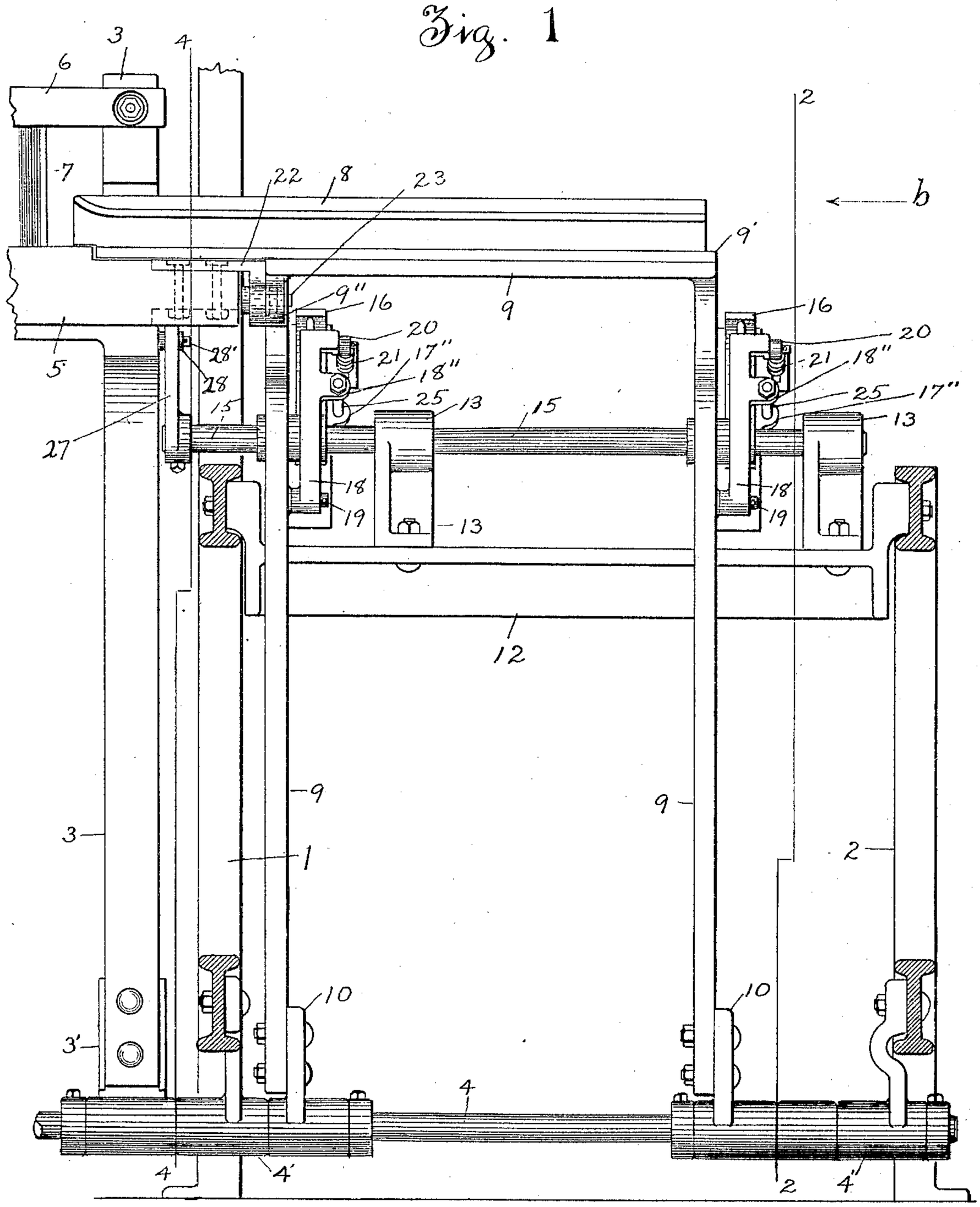

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Fig. 2

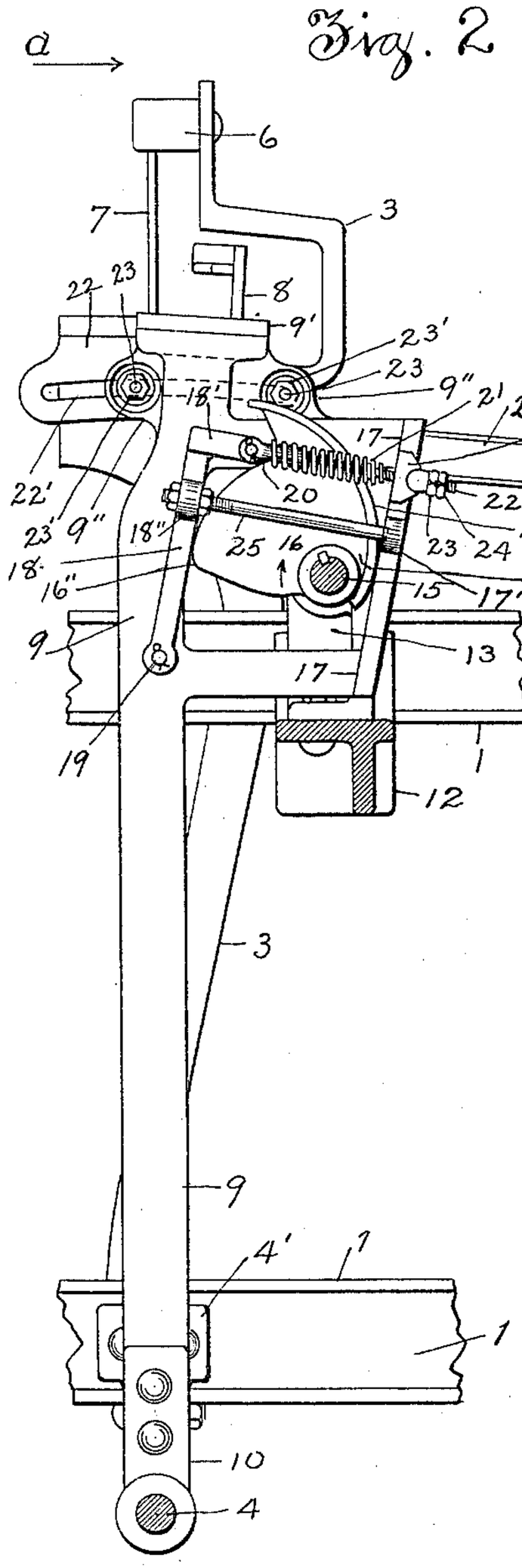

Fig. 3

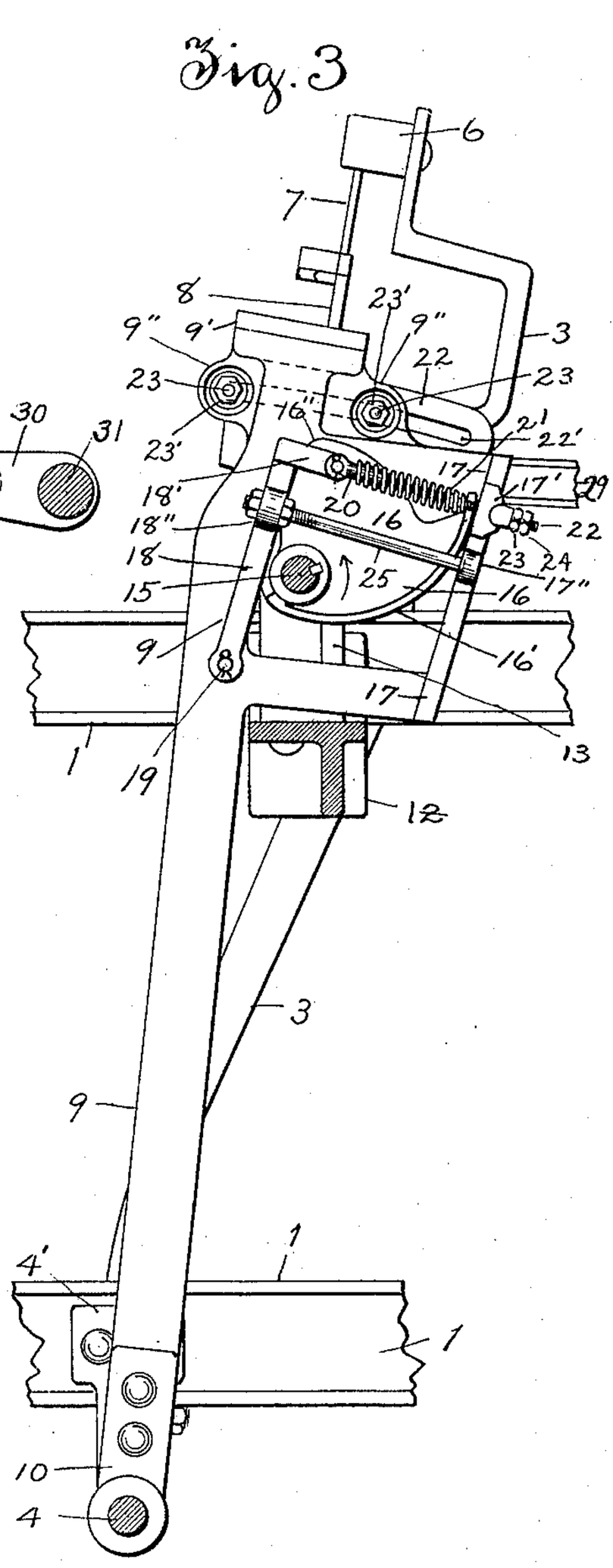

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Fig. 4

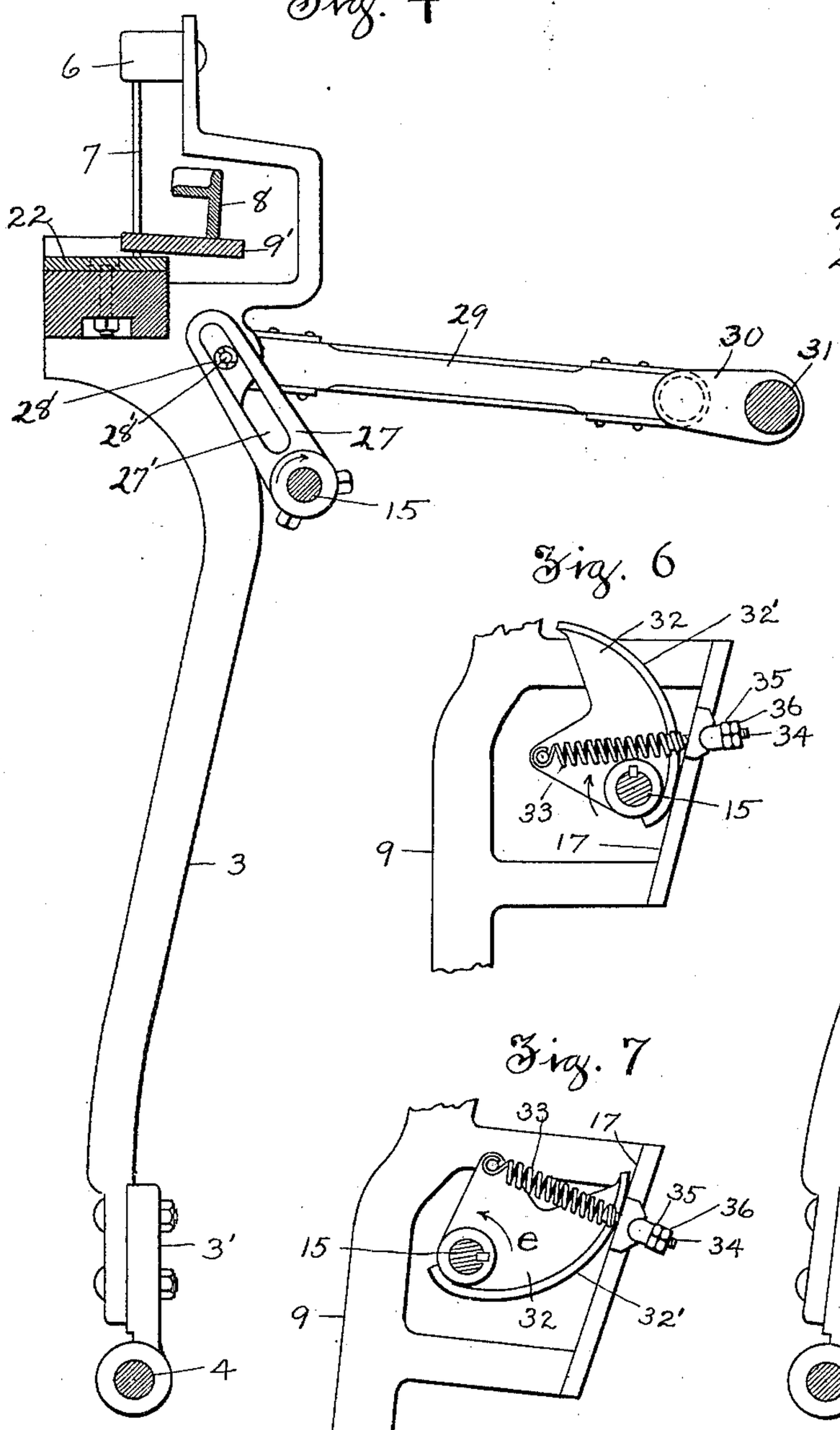

Fig 5.

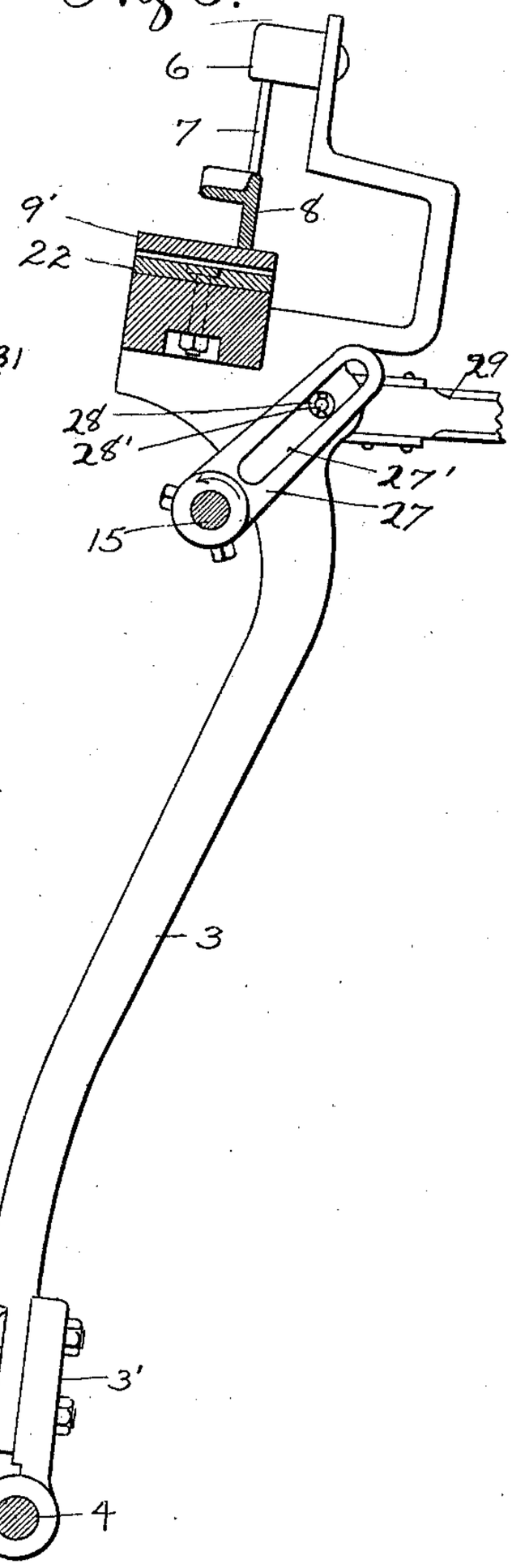

Fig. 6

Fig. 7

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UNITED STATES PATENT OFFICE.

GEORGE F. HUTCHINS, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO CROMPTON & KNOWLES LOOM WORKS, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

PILE-FABRIC LOOM.

SPECIFICATION forming part of Letters Patent No. 686,970, dated November 19, 1901.

Application filed March 29, 1901. Serial No. 53,412. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. HUTCHINS, 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 Pile-Fabric Looms, of which the following is a specification.

My invention relates to looms, and particularly to looms for weaving plush or other pile fabrics in which pile-wires are employed and one wire is inserted and another wire is withdrawn from one side of the loom at every pick. In this class of looms in order that there may be a clearance or room for the insertion and withdrawal of the pile-wires above referred to the shuttle-box on that end of the loom from which the wires are operated does not move with the lay to its extreme forward position, but only to about its middle position on the forward stroke of the lay, and upon the backward stroke of the lay the shuttle-box moves back with it to its extreme backward position. The shuttle-box referred to is made separate from the lay and is mounted on a swinging or rocking frame, which is connected with the lay and is operated by independent mechanism, which mechanism is operated to communicate to the shuttle-box the desired forward and backward movement at a fixed time relatively to the forward and backward movement of the lay.

The object of my invention is to improve upon the construction of looms of the class above referred to, and particularly to improve upon the mechanism ordinarily used to communicate a forward and backward movement to the shuttle-box, as above described. It will be understood that as the lay moves back and forth it has a continuous motion, the speed of which near the end of its backward stroke and the beginning of its forward stroke is somewhat less than during the rest of its stroke. It is necessary that the movement of the swinging frame and the shuttle-box thereon should conform substantially to the speed of the lay during the time that they move with the lay, so that the shuttle-box will be in proper position to receive and discharge the shuttle.

In my improvements the shape of the cams which move the swinging or rocking frame carrying the shuttle-box is such and the shaft on which they are secured is so operated through a connection to the lay by the movement of the lay that the movement of the shuttle-box is properly timed and the speed regulated relatively to the movement and speed of the lay.

In my improvements I preferably employ two cams fast on a shaft, which shaft is operated from the lay to have a rocking motion on the forward and backward movement of the lay. The two cams are located one near each end or side of the swinging or rocking frame carrying the shuttle-box and are preferably provided with two oppositely-arranged cam or wiping surfaces on their peripheries, which engage surfaces on the swinging frame and communicate thereto a forward and backward movement. The swinging frame and shuttle-box move forward with the lay until it reaches about its middle position or has completed about one-half of its forward stroke. The movement of the frame and shuttle-box is then arrested and the same remain stationary until the lay has moved to its extreme forward position and returned to about its middle position, when the frame and shuttle-box are moved back with the lay to its extreme backward position, the shuttle-box being in proper alinement to receive the shuttle.

By means of properly-shaped cam-surfaces on the cams which actuate the frame carrying the shuttle-box and the rocking of the shaft carrying said cams by a connection to the lay I am enabled to regulate the movement of said frame and box very exactly and cause them to move backward and forward with the lay at just the right time, as will be hereinafter described.

My invention consists in certain novel features of construction of my improvements above referred to, as will be hereinafter more fully described.

I have only shown in the drawings sufficient parts of a loom with my improvements applied thereto to enable those skilled in the art to which my invention belongs to understand the construction and operation thereof.

Referring to the drawings, Figure 1 is a front or face view of my improvements looking in the direction of arrow *a*, Fig. 2. Fig. 2 is a section on line 2 2, Fig. 1, looking in the direction of arrow *b*, same figure. Fig. 3 corresponds to Fig. 2, but shows the lay and shuttle-box in their rear position. Fig. 4 is a sectional view on line 4 4, Fig. 1, looking in the direction of arrow *b*, same figure. Fig. 5 corresponds to Fig. 4, but shows the parts in their opposite positions. Fig. 6 shows a modified construction of the cam shown in Figs. 2 and 3; and Fig. 7 corresponds to Fig. 6, but shows the opposite position of the cam.

In the accompanying drawings, 1 is a portion of the loom side or frame. 2 is an additional stand or frame, between which and the loom side 1 the box-motion mechanism to which my invention relates is supported.

3 is the lay-sword, bolted at its lower end to the rocker-iron 3′, loose on the shaft 4, which is mounted in bearings 4′ on the loom side 1 and the frame 2. (See Fig. 1.) At the upper part of the lay-sword 3 is secured one end of the lay 5, between which and the hand-rail 6 extends the reed 7 in the usual way.

The shuttle-box 8 is secured on the top plate 9′ of the rocking or swinging frame 9, which consists of two uprights secured at their lower ends to the bearings or rocker-irons 10, loose on the shaft 4.

Extending between the loom side 1 and the frame 2 is the girth 12, having thereon bearings 13, in which is mounted the rock-shaft 15. Fast on the rock-shaft 15 are the duplicate cams 16, to be hereinafter described, one near each end of said shaft. On one end of the shaft 15 is fast the arm 27, having a slot 27′ therein. A rocking motion is communicated to the shaft 15 on the forward and backward movement of the lay through a roll 28 on a pin 28′, fast on the outer side of the lay-sword 3, (see Figs. 4 and 5,) traveling in the slot 27′ in the arm 27.

It will be seen that in the backward and forward movement of the lay a faster movement will be communicated to the shaft 15 and the cams 16 thereon when the lay is near its middle position, the roll 28′ on the pin 28 being nearer the inner end of the slot 27′ in the arm 27. As the roll 28′ approaches the outer end of the slot 27 on the backward stroke of the lay a slower motion is communicated to the shaft 15 and cams 16, and consequently the shuttle-box 8.

The lay is operated in the ordinary way through connector 29, crank 30, and crank-shaft 31.

To the end of the lay 5 is bolted the angle-iron 22, which has a curved slot 22′ therein, (see Figs. 2 and 3,) through which loosely extend the bolts 23, their heads having a clearance between the end of the lay and the inner side of the angle-iron 22, as shown in Fig. 1. The other ends of the bolts 23 are secured in the side extensions 9″ on the frame 9, which have countersunk recesses therein to receive the nut 23′ on the bolts 23.

By means of the slotted angle-iron 22, fast on the end of the lay, and the bolts 23, fast in the frame 9, the frame 9 and the shuttle-box 8 thereon are connected with the lay and held in proper position relative thereto and prevented from getting out of position, and any end thrust of the shuttle-box by the incoming shuttle is prevented.

The two cams 16, fast on the rock-shaft 15, which communicate motion to the rocking frame 9 and the shuttle-box 8, are preferably of the shape shown in Figs. 2 and 3, with oppositely-arranged cam or wiping surfaces 16′ and 16″ on their peripheries.

The cam-surfaces 16′ engage the fixed inclined surfaces 17 on the upper end of the rocking frame 9 and act to move back said frame and the shuttle-box 8, carried thereon, by the rotation of the shaft 15 during the backward movement of the lay.

The cam-surface 16′ is a curve of constantly-increasing radius and is so made that as the cam 16 moves from the position shown in Fig. 2 to the position shown in Fig. 3 by the rotation of the shaft 15 the frame 9 and shuttle-box 8 will start to move back at their highest speed just at the time the lay reaches about its middle position on its backward stroke, and the speed of the frame 9 and also the lay will then gradually decrease until they reach their extreme rearmost position with the shuttle-box in alinement with the lay.

Each of the oppositely-arranged cam-surfaces 16″ engages an arm 18, pivoted at its lower end on a pin 19, fast in the side of the frame 9. The upper end of each arm 18 has a side extension 18′, to the end of which is pivoted a pin 20, which extends into and is connected with one end of a spiral spring 21. The other end of the spring 21 is secured to a threaded pin 22, which extends loosely through a hole in an ear 17′ on the inclined surface 17 and has a nut 23 thereon for adjusting the position of said pin 22 to regulate the tension of the spring 21 and a second nut 24 thereon to hold said nut 23. The spring 21 acts to hold the arm 18 in engagement with the cam-surface 16″.

In connection with the arm 18 I may use a rod 25, secured at one end in an ear 18″ on the arm 18 and bearing at its other end against an ear 17″ on the inclined surface 17. The rod 25 acts to overcome or neutralize the tension of the spring 21, so that as the cam 16 revolves to move back the frame 9 and shuttle-box 8 by the engagement of the cam-surface 16′ with the surface 17 on the frame 9 it does not have to work against the tension of the spring 21, said tension acting to hold the free end of the rod 25 against the surface 17.

The cam-surface 16″ is so shaped that it acts just the reverse of the cam-surface 16′—that is, as the cam 16 revolves to move forward the frame 9 and shuttle-box 8 by the engagement of the cam-surface 16″ with the

arm 18 from the position shown in Fig. 3 to the position shown in Fig. 2 it moves the frame 9 and box 8 with constantly-increasing speed until they reach their forward position, (shown in Fig. 2,) when they stop, and the lay continues its movement to its extreme forward position.

It will be understood by those skilled in the art that if the cams 16 could always be made of the exact shape to work between two mutually-fixed surfaces then two such mutually-fixed surfaces could be used, between which the cams could revolve to act as double or wiper cams and communicate a positive forward-and-backward motion to the swinging frame 9 and shuttle-box 8; but as it is almost impossible to make the cams of the exact shape and size to work between two fixed surfaces, owing to some inequality in the castings, &c., I employ one fixed surface for one of the cam-surfaces to work against and the other surface substantially fixed with respect to the first surface, but allowed to yield through the spring attachment 21.

In Figs. 6 and 7 is shown a modified construction of the cams 16. (Shown in Figs. 2 and 3.) In said Figs. 6 and 7 the cam 32 has only one cam-surface 32′, which is adapted to engage the fixed inclined surface 17 on the swinging frame 9 to move back said frame in the same manner as the cam-surface 16′ on the cams 16. A spiral spring 33 is attached at one end to the cam 32 and at its other end is adjustably connected with the surface 17 on the frame 9 in a similar manner, as above described in connection with the spring 21, by a threaded pin 34 and nuts 35 and 36. As the shaft 15 revolves, carrying the cam 32, Fig. 7, in the direction of the arrow *e*, the spring 33 acts to move the frame 9 forward as the cam-surface 32′ travels on the inclined surface 17 on the frame 9. It will be seen that with the cam 32, with one cam-face 32′, Figs. 6 and 7, the frame 9 will be moved back positively and will be moved forward by the spring 33, thus dispensing with a double-faced cam, and a second surface arranged opposite the surface 17 for the cam to engage.

It will be understood that the details of construction of my improvements may be varied, if desired.

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

1. In a loom of the class described, the combination with the lay, a rocking or swinging frame independent of the lay, a shuttle-box mounted on said frame and means operable from the lay for moving said frame and shuttle-box with the lay during part only of its movement.

2. In a loom of the class described, the combination with the lay, and a shuttle-box at one end of the lay, mounted on a rocking or swinging frame, and said frame, of means for moving said frame and shuttle-box, said means comprising a cam or cams, engaging surfaces on the rocking or swinging frame, and fast on a rock-shaft, and said rock-shaft, and means for operating the same, and a spring connected with the swinging frame, substantially as shown and described.

3. In a loom of the class described, the combination with the lay, and a shuttle-box at one end of the lay, mounted on a rocking or swinging frame, and said frame, of means for moving said frame and shuttle-box, said means comprising a cam or cams having oppositely-arranged cam-surfaces, engaging surfaces on the rocking or swinging frame, and fast on a rock-shaft, and said rock-shaft, and means for operating said shaft, substantially as shown and described.

4. In a loom of the class described, the combination with the lay, and a shuttle-box at one end of the lay, mounted on a rocking or swinging frame, and said frame, of means for moving said frame and shuttle-box, said means comprising a cam or cams having oppositely-arranged cam-surfaces, engaging surfaces on the rocking or swinging frame, one of said surfaces being fixed, and the other yielding, and said cams fast on a rock-shaft, and said rock-shaft, and means for operating said shaft, substantially as shown and described.

5. In a loom of the class described, the combination of the lay, a rocking or swinging frame mounted independently of the lay and carrying a shuttle-box, a shaft mounted in the loom-frame and independent of the lay for operating the said rocking or swinging frame, and connections between said shaft and lay for operating the former from the latter.

6. In a loom of the class described, the combination with the lay, a shuttle-box mounted independently of the lay, a shaft mounted in the loom-frame, operable connections between the said shaft and lay, and cams on said shaft to move the shuttle-box backward and forward with the lay during a portion of the movement of the lay.

7. In a loom-frame, the combination with the lay, a rocking or swing frame mounted independently of the lay and carrying a shuttle-box, a shaft, connections between the shaft and lay for operating the former from the latter, a double cam on said shaft having two cam-surfaces to move the rocking or swinging frame forward and backward with the lay during a portion of the movement of the lay.

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