

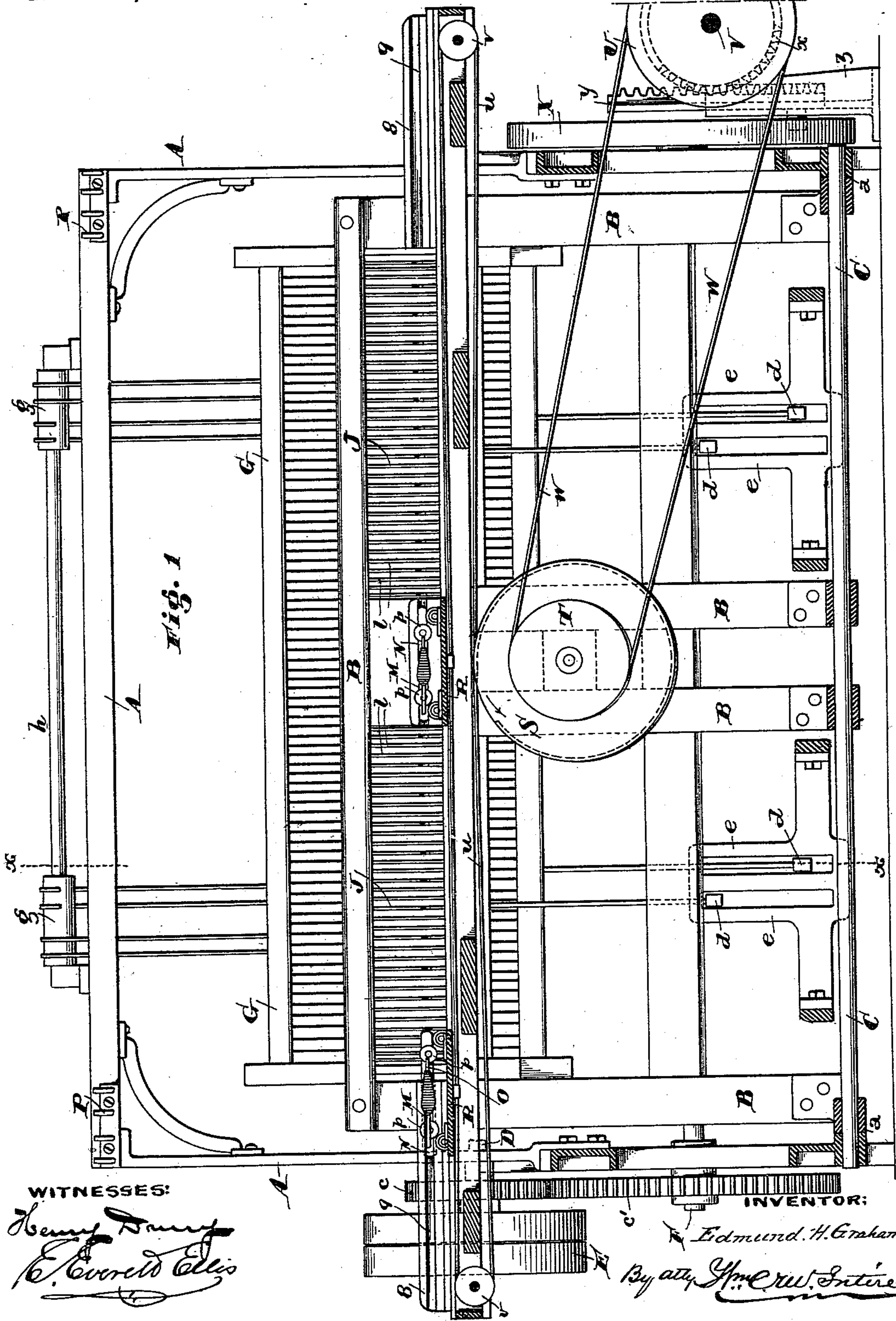
(No Model.)

3 Sheets—Sheet 1.

E. H. GRAHAM.  
LOOM.

No. 417,020

Patented Dec. 10, 1889.



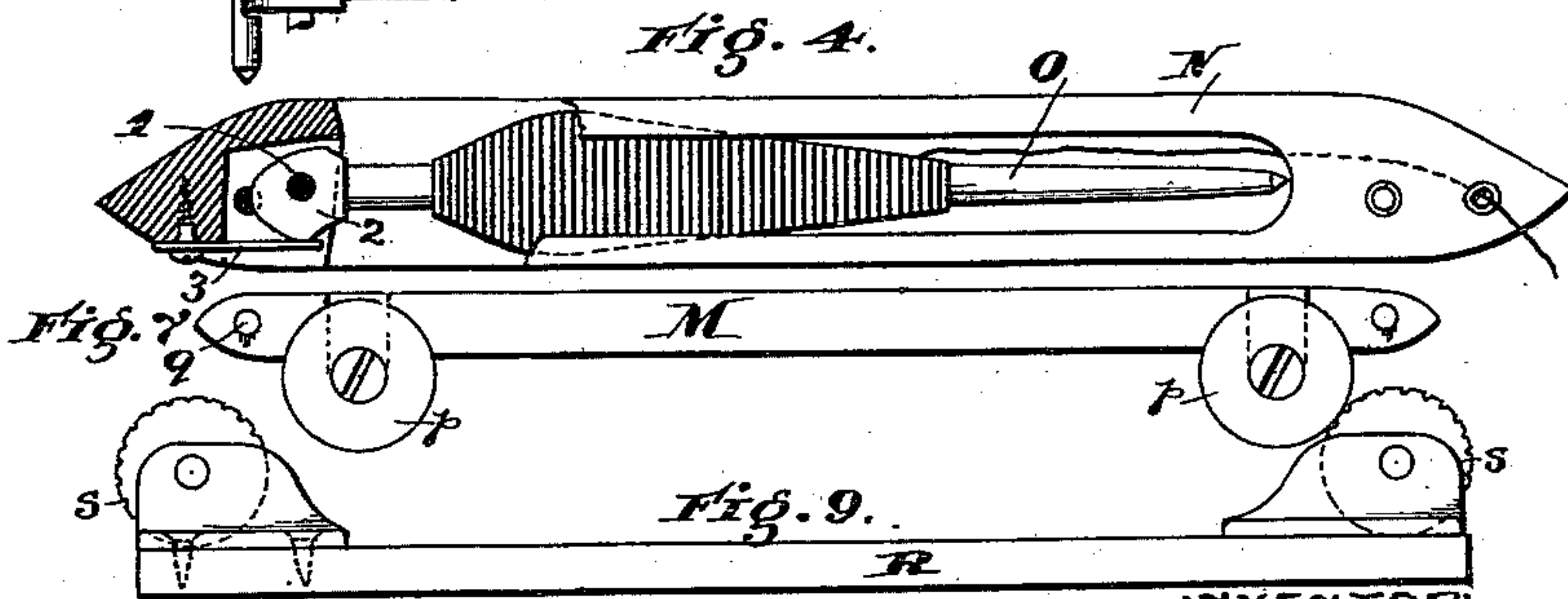
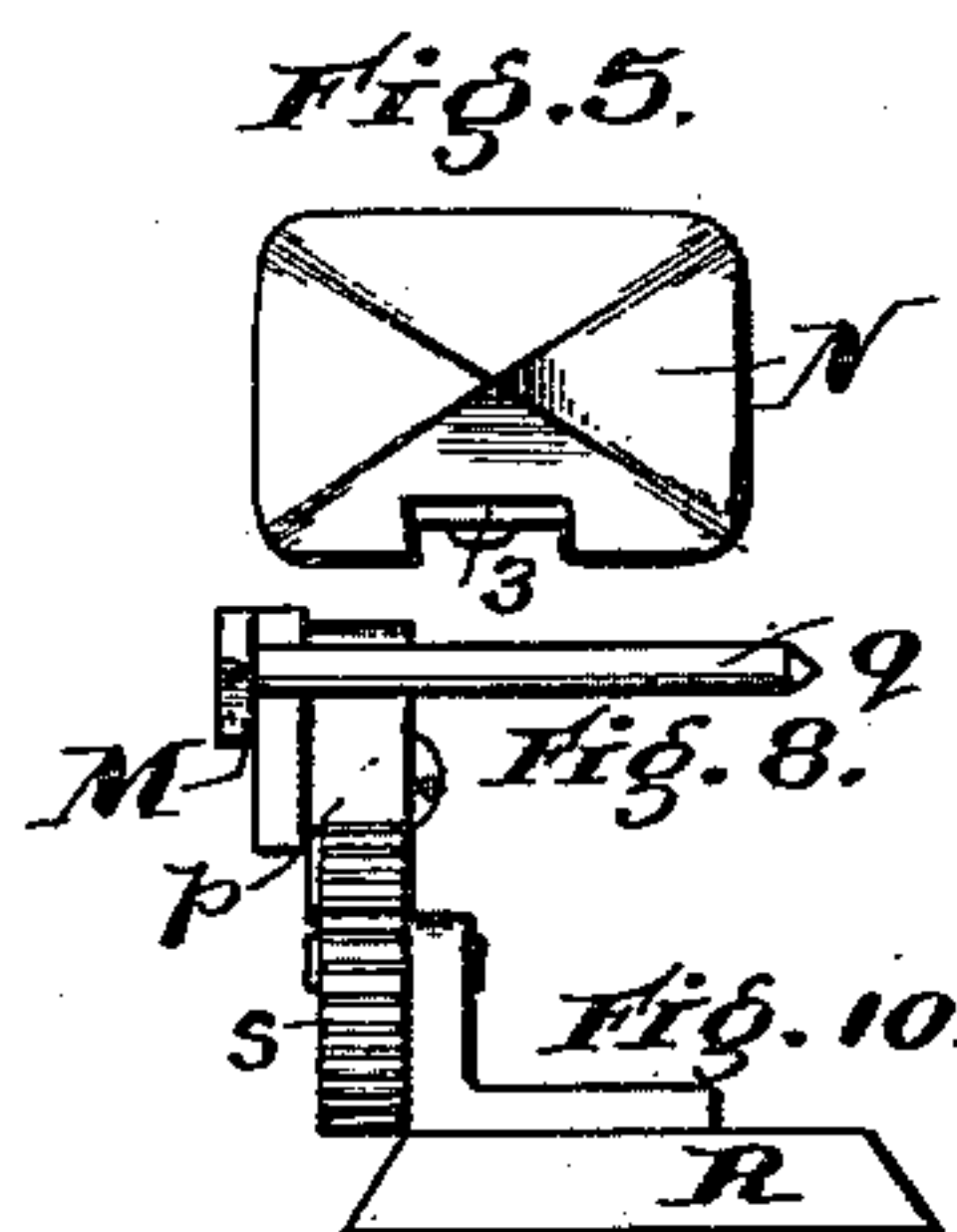
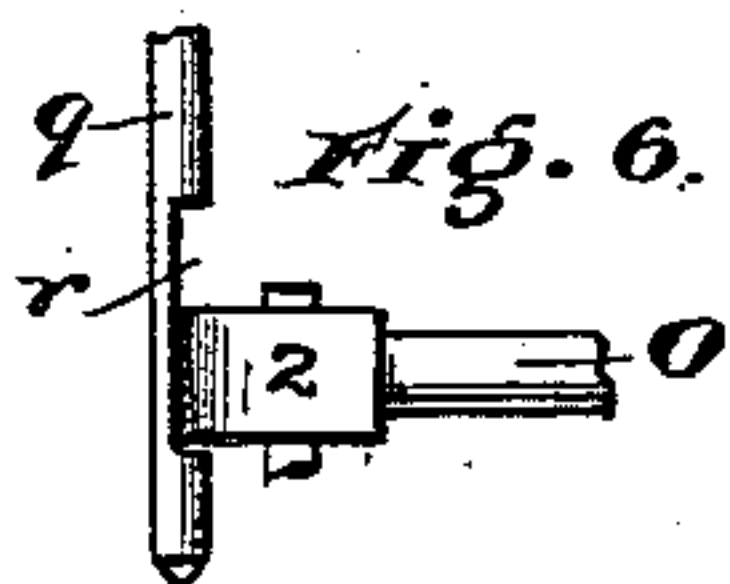
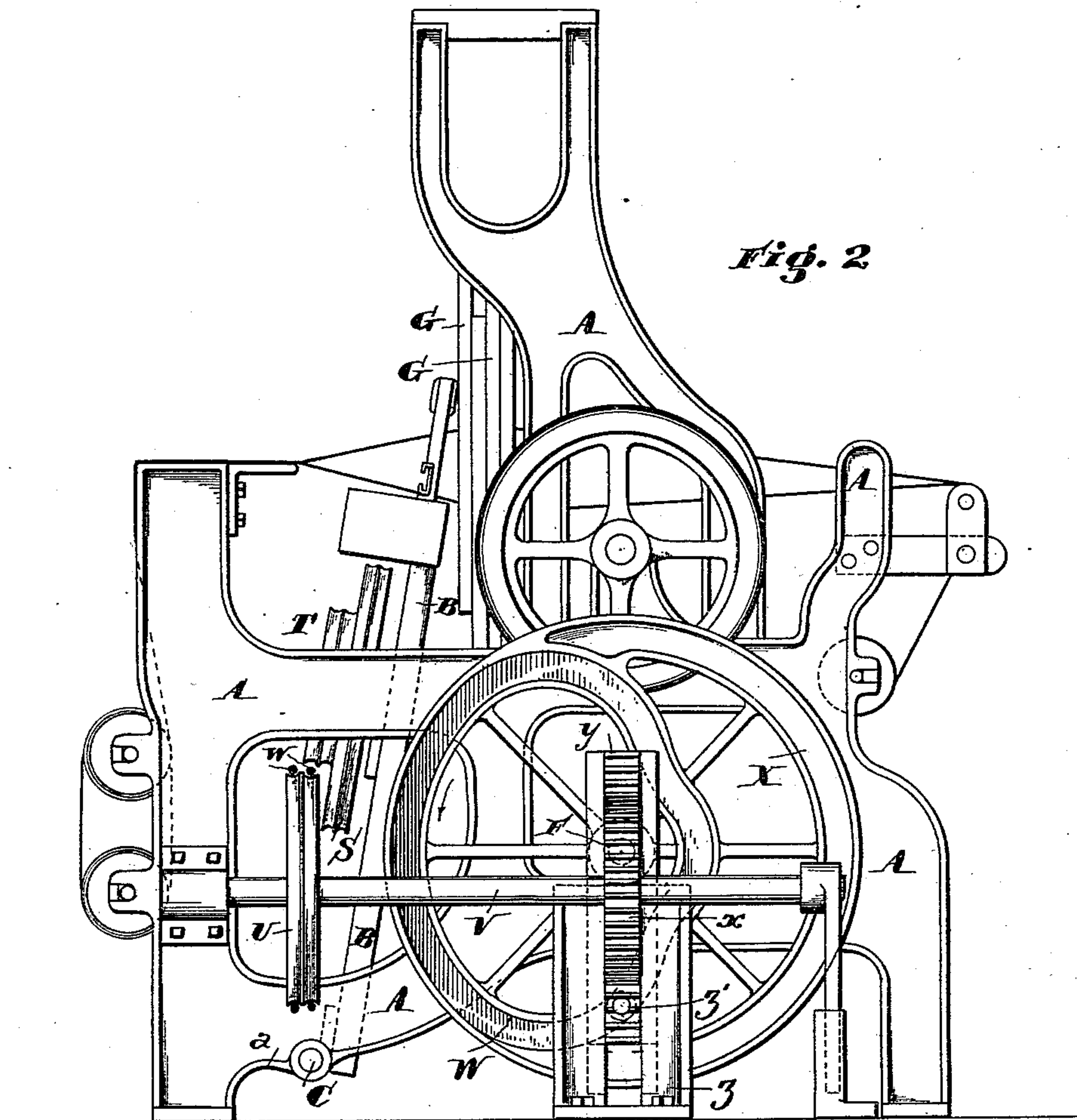
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3 Sheets—Sheet 2.

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Patented Dec. 10, 1889.



WITNESSES:  
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(No Model.)

3 Sheets—Sheet 3.

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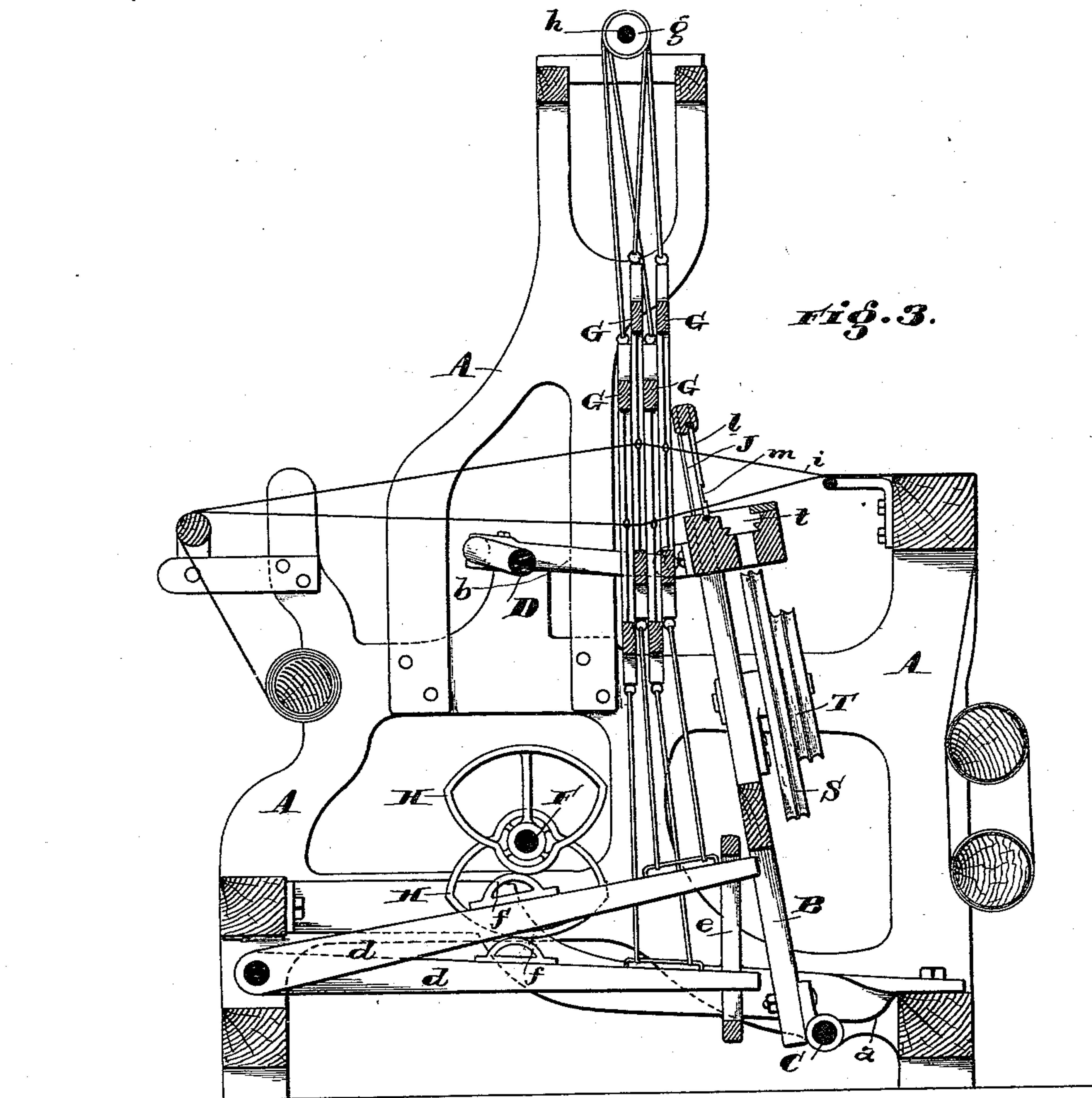


Fig. 11.



Fig. 12.

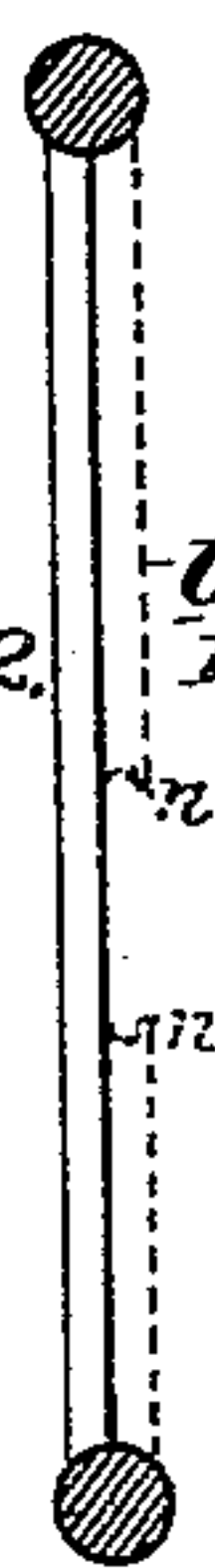


Fig. 13.

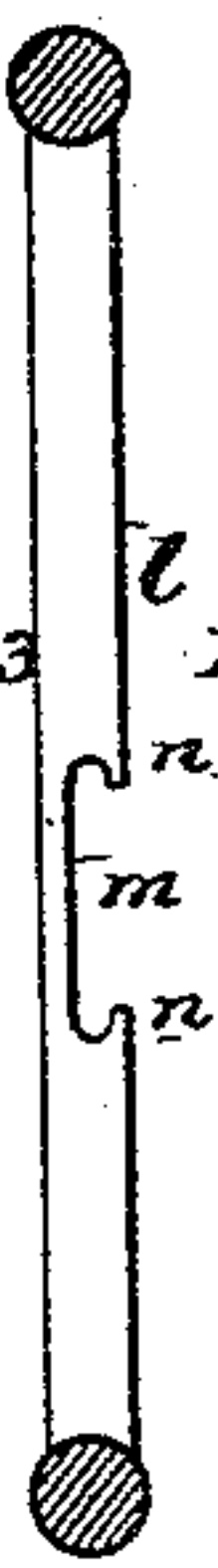
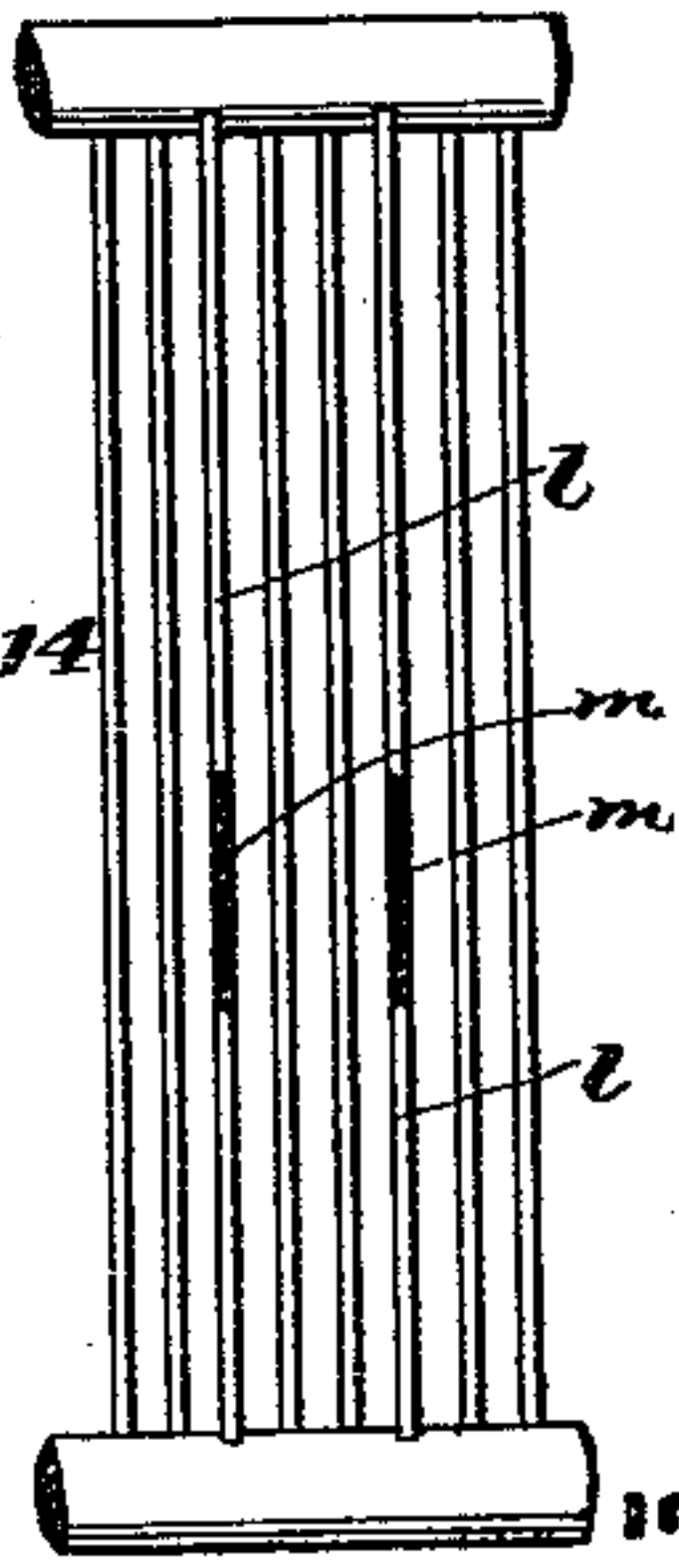


Fig. 14.



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# UNITED STATES PATENT OFFICE.

EDMUND H. GRAHAM, OF BIDDEFORD, MAINE, ASSIGNOR OF ONE-HALF TO  
LEVI WOODBURY, OF WASHINGTON, DISTRICT OF COLUMBIA.

## LOOM.

SPECIFICATION forming part of Letters Patent No. 417,020, dated December 10, 1889.

Application filed June 10, 1889. Serial No. 313,736. (No model.)

*To all whom it may concern:*

Be it known that I, EDMUND H. GRAHAM, a citizen of the United States, residing at Biddeford, in the county of York and State of Maine, have invented certain new and useful Improvements in Weaving-Looms; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain new and useful improvements in looms for weaving textile fabrics; and it consists, substantially, in such features of construction, arrangement, and combinations of parts as will hereinafter be more particularly described and claimed.

The invention has for its object, first, to provide a loom by which two fabrics may be woven at the same time.

The invention has for its object, second, to provide a loom by which two fabrics may be woven at the same time and a selvage produced on each edge of each of the finished fabrics.

The invention has for its object, third, to provide a loom by which two fabrics may be woven simultaneously or at the same time by the use of but one set of motive-power mechanism.

The invention has for its object, fourth, to provide a loom by which two fabrics may be woven at the same time with a much more even and regular introduction of the filling-threads, and also to obtain a greater number of "picks" in a given time, and, finally, to greatly simplify and cheapen the construction and arrangement of parts of which the machine is constituted, all as will more fully hereinafter appear when taken in connection with the accompanying drawings, wherein—

Figure 1 represents a vertical front elevation, partly in section, of a two-warp loom constructed in accordance with and embodying the features of my invention. Fig. 2 represents a vertical end elevation of the machine as viewed from the right-hand side thereof. Fig. 3 represents a vertical transverse sectional view of Fig. 1. Fig. 4 is an

enlarged side view, partly in section, of the shuttle and spindle, and Fig. 5 is an end view thereof. Fig. 6 is a view in detail to more clearly indicate the construction of parts whereby the spindle is maintained in its position within the shuttle. Fig. 7 is a side view of the reciprocating slide which carries the shuttle and its spindle, and Fig. 8 is an end view thereof. Fig. 9 is a longitudinal side elevation of the reciprocating block or truck which actuates the slide which holds the shuttle and its spindle, and Fig. 10 is an end view thereof. Figs. 11, 12, 13, and 14 represent enlarged views in detail to more clearly indicate the construction of reed employed.

In carrying my invention into effect I provide a suitable frame in which the several operative parts of the machine are mounted, and extending lengthwise of the same at the bottom, and preferably in front, is a shaft, which is mounted in suitable bearings. Upon this shaft the lathe of the loom is mounted, and to the upper side of the lathe, at the rear, suitable pitmen are connected, and which also are connected to the cranks of a shaft located to the rear of the lathe and working in suitable bearings in the main frame. The crank-shaft is operated to revolve, and when so operated the lathe is caused to vibrate on its shaft, thus effecting the "beating up" of the warps.

The lathe which I employ is constructed for the passage therethrough of two separate and entirely-independent warps, two reed-sections being provided for this purpose, each of which sections is of such peculiar construction as to form a guide or race way for the device which introduces the filling thread into the warps.

The devices for introducing the filling-threads into the warps are actuated by simultaneously-reciprocating blocks or trucks which are secured to a band or cord that is caused to move alternately back and forth lengthwise of the lathe, the said band being passed around pulleys mounted in the lathe frame at or near each end thereof and having its ends passed in opposite directions around a drum or pulley arranged about centrally of



the lathe beneath the warps, the said ends being threaded through openings in the drum and then properly secured, so that when the said drum or pulley is caused to partially rotate in a reciprocating manner the sliding blocks or trucks will be caused to move back and forth across the lathe, and thereby actuate the slides which hold the thread-carriers or spindles. To the side of the pulley or drum a smaller pulley is secured, and around this smaller pulley two separate ropes or bands are passed, the said ropes or bands also passing around a similar pulley that is carried by a shaft which extends transversely of the machine. On this shaft is mounted a pinion, which meshes or engages with a vertical rack that is operated to vertically reciprocate by the action of a grooved cam arranged or carried on the end of the shaft which operates the heddle-frame. The course of the groove in the cam is such as to cause the thread-introducing devices to be carried through in one direction and to then pause a length of time sufficient to permit of the beating up of the wefts by the action of the crank-shaft, and then said devices are carried back in like manner in the other direction and the same operation repeated, and so on.

Reference being had to the drawings by the letters marked thereon, A represents the main frame of the loom, and B the lathe, which is mounted upon a shaft C, that is supported in bearings *a a*, secured to and projecting inward from the said main frame. The lathe B is caused to vibrate on the shaft C in the manner usual in other looms, such vibration being effected through the medium of the crank-shaft D, located to the rear of the lathe at the top and connected to said lathe by suitable pitmen, as represented at *b*, Fig. 3. On one end of the crank-shaft are fast and loose band-pulleys E, and also a cog-wheel *c*, which meshes with a gear-wheel *c'*, carried on the corresponding end of the shaft F, which operates the pairs of levers *d d*, which alternately actuate the two sets of heddle-frames G G to open and close the shed. The levers *d d* are mounted upon small rockers which work in the main frame of the machine at the rear, and the forward ends of said levers move up and down in pairs of guides *e e*, arranged therefor in the frame of the machine at or near the front. The said levers *d d* are caused to alternately rise and fall in pairs by the action of cams H H, reversely arranged on the shaft F and working upon or against shoes or feet *f f*, secured to the upper edges of the levers.

Motion imparted to the crank-shaft will be communicated to the shaft F, and from the construction and arrangement shown the heddle-frames will be operated in an obvious manner. The said heddle-frames are supported by straps in the usual manner from spools *g g*, arranged on a shaft *h*, extending lengthwise of the machine and at the top of

the same, straps also being employed to connect the lower ends of the frames with the ends of the pairs of levers *d d*.

In the top of the lathe are constructed and arranged two separate or independent reeds J J, each having passed therethrough a separate set of warp-threads *i i*, and being constituted of reed-dents, across which the filling-threads are carried back and forth and introduced into the warps in such manner as to form on each edge of the two fabrics when finished a perfect selvage.

In order that the filling-threads may be carried into the warps as closely to the reeds as possible, and also to provide for the smooth and even introduction of said threads, I construct the reeds in such manner as that they shall serve as guides for the thread-carriers, and by which, also, I obtain a much smoother travel of the carriers, with little or no liability to breakage of the filling. I effect this by arranging intermediate of the reed dents or wires proper suitable thin flat strips *l*, having in their front edges the notches *m*, coincident with each other and of suitable length and depth and provided with lips *n n*, so as to retain the slides in their places upon the reeds. These strips *l* may be arranged in great number, or they may consist of only a few arranged suitable distances apart.

M M represent slides, which work in the guides formed for their reception in the reeds, which slides are constructed of straight well-dressed strips of metal having secured to one of their sides at or near the ends the small wheels or pulleys *p p*, preferably of rawhide or similar material, for the purpose of lightness and equal durability, each of said slides also having projecting outward therefrom at or near one of its ends a pin *q*, adapted to enter openings provided in the shuttles N N at or near one end thereof, the said pins being formed in their sides with notches *r*, (see detail, Fig. 6,) so as to receive a portion of the ends of the spindles or thread-carriers O O, and thus lock the shuttles and carriers to the slides. This is accomplished as follows: The spindles or thread-carriers O O are pivoted at one of their ends in the shuttles N N, (see 1, Fig. 4,) and at such ends are formed with small eccentrics such as are indicated by 2, Fig. 4, beneath each of which is a spring 3, for maintaining such spindles or carriers in positions longitudinal within the shuttles and free from the sides thereof, and when in their proper positions the eccentrics 2 are partly received into the notches *r*, and thus are the shuttle and its thread-carrier prevented from being slipped off. When the thread has all been paid out, by lifting or turning the carrier upwardly against the action of the spring the shuttle and carrier can then be easily slipped out and another substituted therefor very quickly. A number of shuttles and carriers are to be kept constantly in readiness and are to be hung upon



hooks P P, provided therefor on the frame of the loom. (See Fig. 1.)

R R represent sliding blocks or trucks for actuating the slides, and the construction of which will be best understood by reference to Figs. 9 and 10, wherein the same are shown to be constituted of flat blocks having small wheels s s, mounted in suitable bearings arranged at each end on top, the arrangement being such that said wheels s s are caused to alternately come in contact with the wheels of the slides, so as to actuate the same to move back and forth.

In the working of the slides and trucks the lower sets of warp-threads enter between the wheels of the slides and trucks, and for the purpose of increasing the friction, and thus accelerate the movement of the wheels in turning, I preferably form the peripheries of the wheels s s milled or corrugated, as shown in Figs. 9 and 10. By so doing the said lower sets of warp-threads take into the corrugations, and thus assist in rendering the movement of the wheels much easier.

The blocks or trucks R R are caused to move alternately back and forth across the lathe in a raceway t, provided therefor in the lathe-frame, by means of a strap, cord, or band u, which passes around pulleys v v, arranged on opposite sides of the lathe-frame, and which is afterward passed in opposite directions around a large pulley or drum S, located beneath and centrally of the two reeds, said pulley or drum being formed with suitable openings through which the ends of the cord or band are passed and properly secured in any suitable manner. Secured to the side of said drum or pulley S is a smaller pulley T, having two grooves for receiving two separate cords or bands w w, which extend over to one side of the machine and are passed in like manner around a similar but somewhat larger pulley U, carried by a shaft V, which is supported transversely of the machine in suitable bearings, as shown. This shaft V carries a pinion x, (see Fig. 2,) which meshes with a vertical rack y, working in a stationary guide-frame z, and the said rack y has a pin passing through the same at or near its lower end, which pin carries a small roll or wheel z', that works in the groove W of a cam X, carried on the end of the shaft which operates the heddle-levers.

For the purpose of counterbalance the cam X is constructed of a complete wheel or circle, as shown, and the groove therein is of such course as that when the parts thereof nearest the center of motion of the cam are reached by the roll of the rack a slight pause takes place, at which time the crank-shaft operates the lathe to vibrate to effect the beating up of the warps. As the crank revolves the rack will be caused to rise and fall in its guide-frame, and in so doing the shaft V will be caused to rock in its bearings, thereby partly rotating the pulleys or drums

S and T back and forth, and thus causing the sliding blocks or trucks to be reciprocated back and forth across the lathe in their raceway. A filling is introduced into each of the warps on the passage each way of the thread-devices, and a beating up takes place immediately after each passage.

In order that the filling-threads may be carried all the way through the warps in the alternate passage outwardly of the thread-devices, I construct or arrange at each side of the lathe-frame the extensions or wings 8 8, in which are formed the guides 9 9, which coincide with the guides formed in the reeds themselves, said wings being preferably detachable and secured in place by screws, as shown.

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

1. In a loom for weaving textile fabrics, the combination, with two separate reeds each formed with or having a guide across its face, of a reciprocating slide working in each of said guides and adapted to detachably receive and support a shuttle, substantially as described.

2. In a loom for weaving textile fabrics, the combination of two separate reeds each having a guide across its face, separate reciprocating slides working in said guides and each supporting a shuttle, and a spindle or thread-carrier pivoted in each of said shuttles and being in automatic locking engagement with the slides, whereby both the shuttles and slides are maintained in position, substantially as described.

3. In a loom for weaving textile fabrics, the combination, with the drum S, the belt u, and the blocks secured thereto, of the pulley T, secured to said drum and having separate grooves, the shaft V, located in suitable bearings at one end of the machine and carrying a similar pulley, the cords or bands w w, passing around said pulleys, and means for oscillating or rocking said shaft in its bearings, substantially as described.

4. In a loom for weaving textile fabrics, the combination, with the drum S, the belt u, and the blocks secured thereto, and the pulley T, secured to the drum, of the shaft V, carrying a similar pulley, as well as the pinion x, the cords w w, the rack-bar, and the circular cam X, having the groove W, substantially as described.

5. In a loom for weaving textile fabrics, the combination, with two separate reeds each having a guide formed across its face, of a separate filling-carrier for each of said reeds, slides which support said carriers and work in the guides, blocks or trucks for actuating the slides, and means for reciprocating the blocks, substantially as described.

6. In a loom for weaving textile fabrics, the combination, with the slide M, formed or provided with the pin q, in which is formed



the notch *r*, of the shuttle having an opening for receiving said pin, the carrier O, pivoted in the shuttle and formed with the eccentric 2 for entering the notch of the pin, and a spring bearing against the eccentric for retaining the carrier in place, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

EDMUND H. GRAHAM.

Witnesses:

C. D. HAMILTON,  
CHAS. A. MOODY.