(No Model.) 6 Sheets—Sheet 1.

R. C. GREENHALGH & J. WADSWORTH.

LOOM FOR WEAVING HAIR CLOTH.

No. 308,489. Patented Nov. 25, 1884.

FIG. 1.

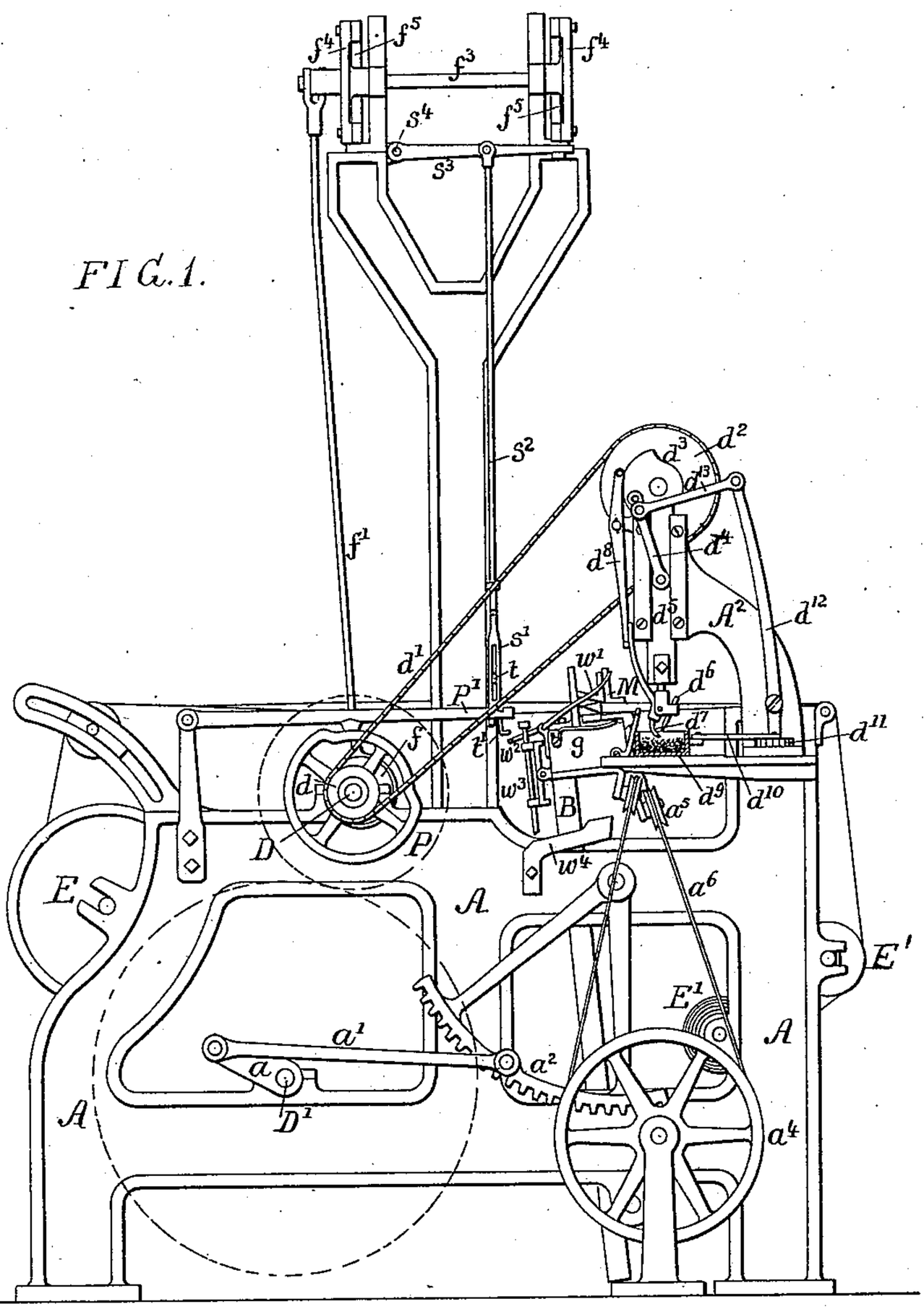

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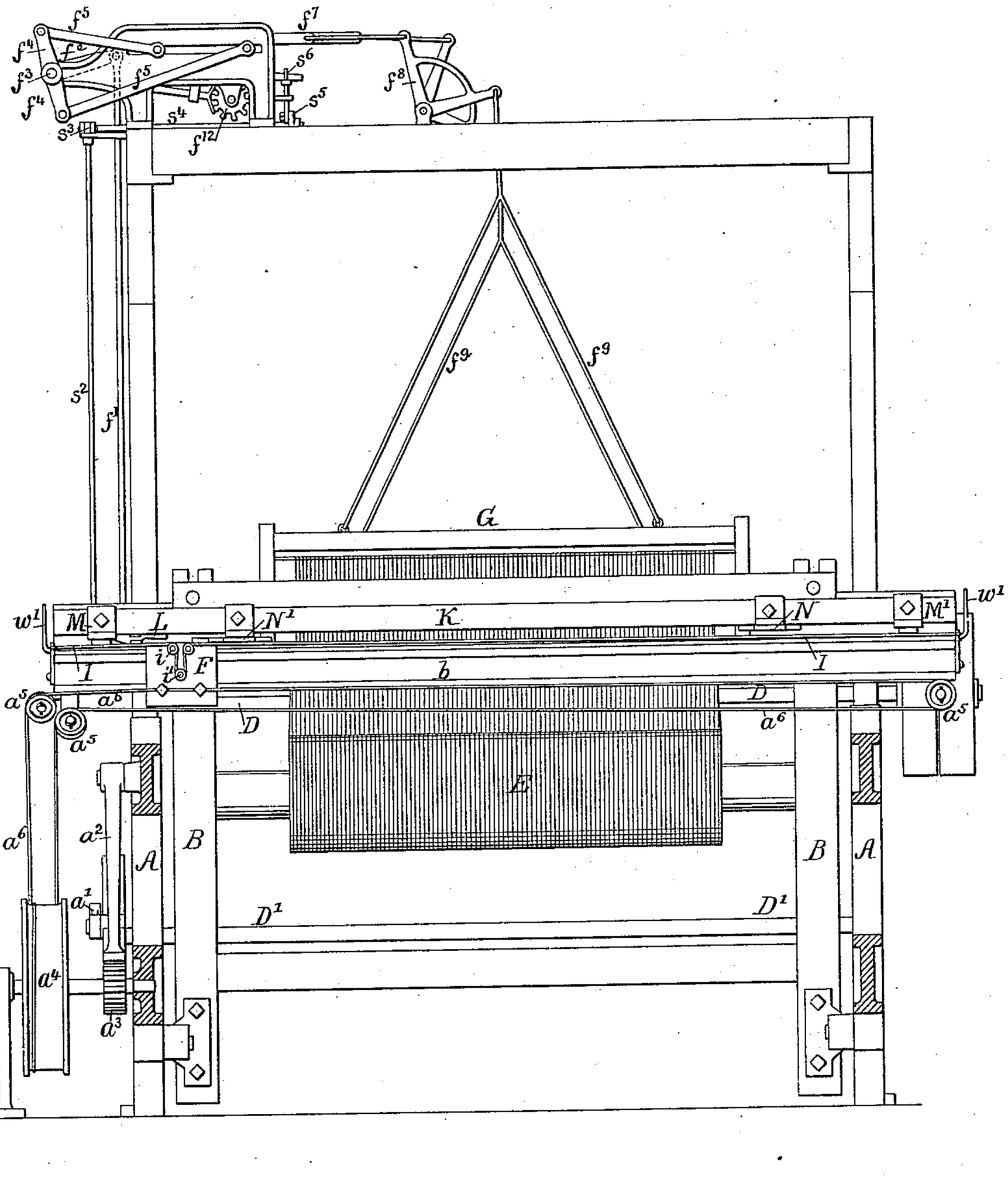
FIG. 2.



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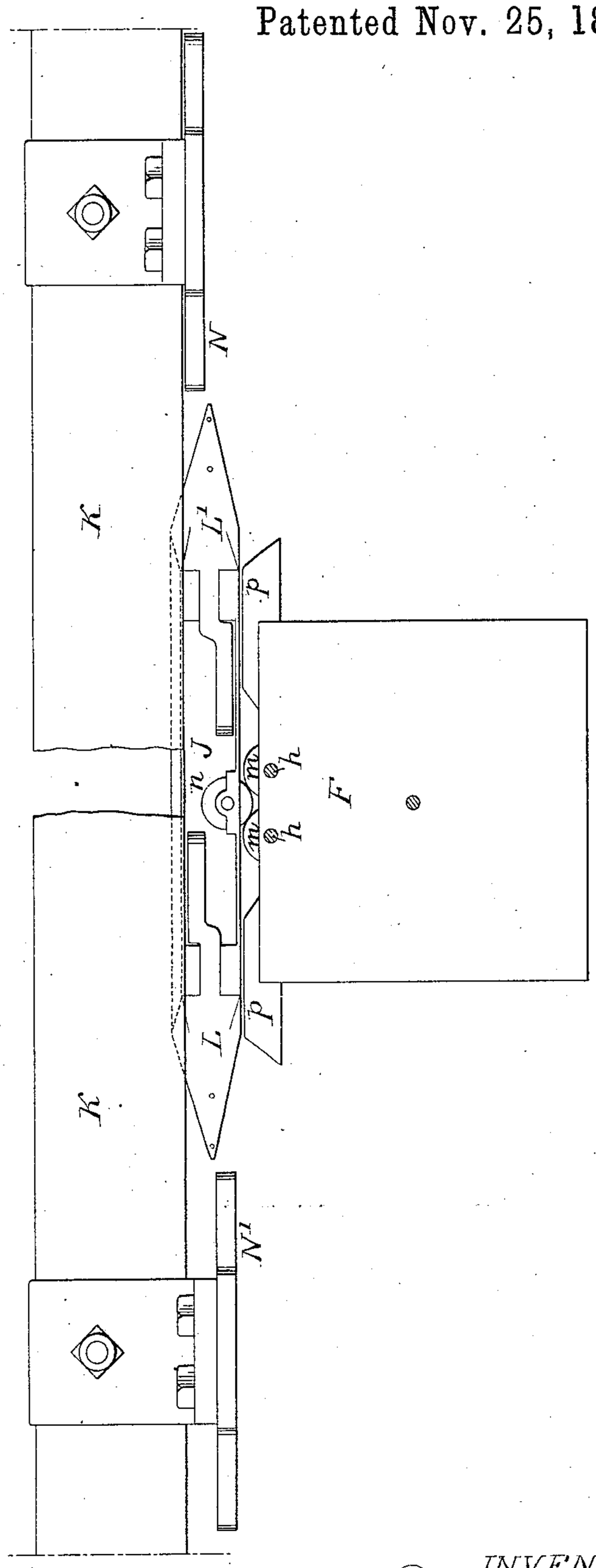

FIG. 3.

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FIG. 4.

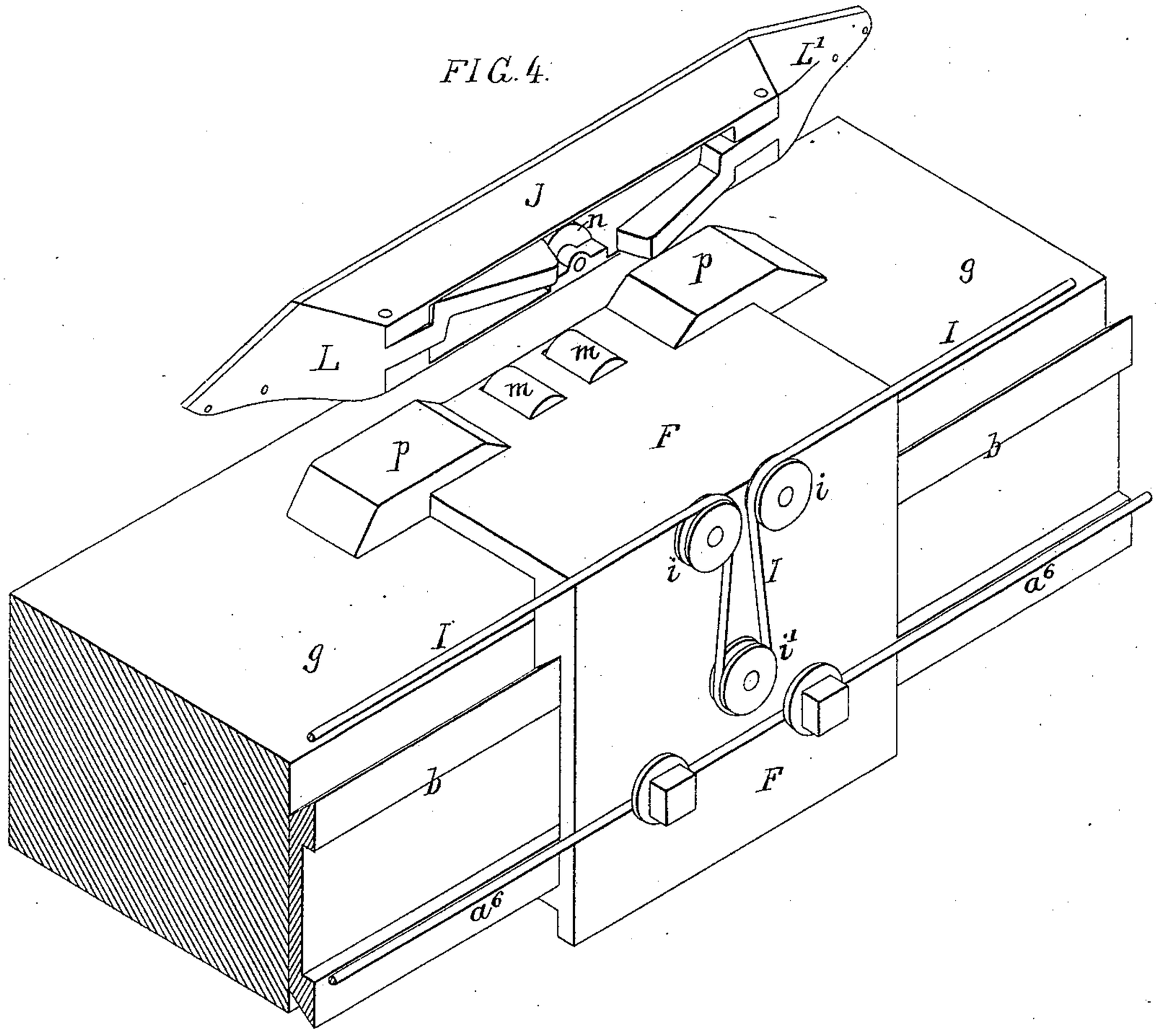

FIG. 5.

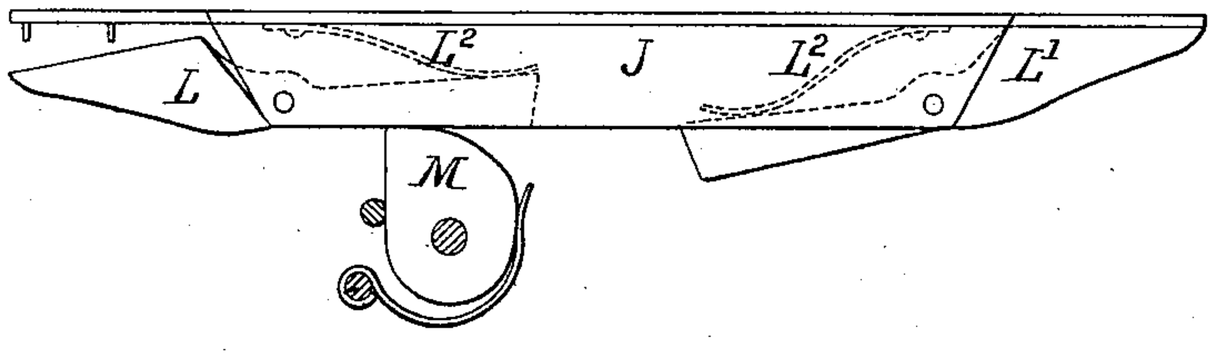

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FIG. 6

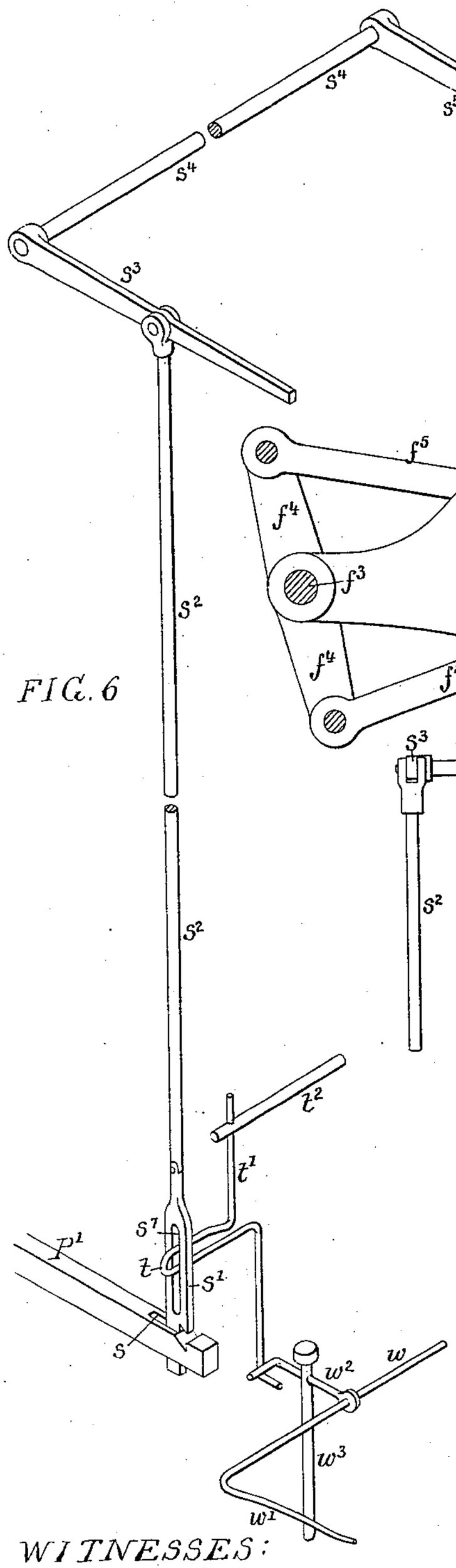

FIG. 7.

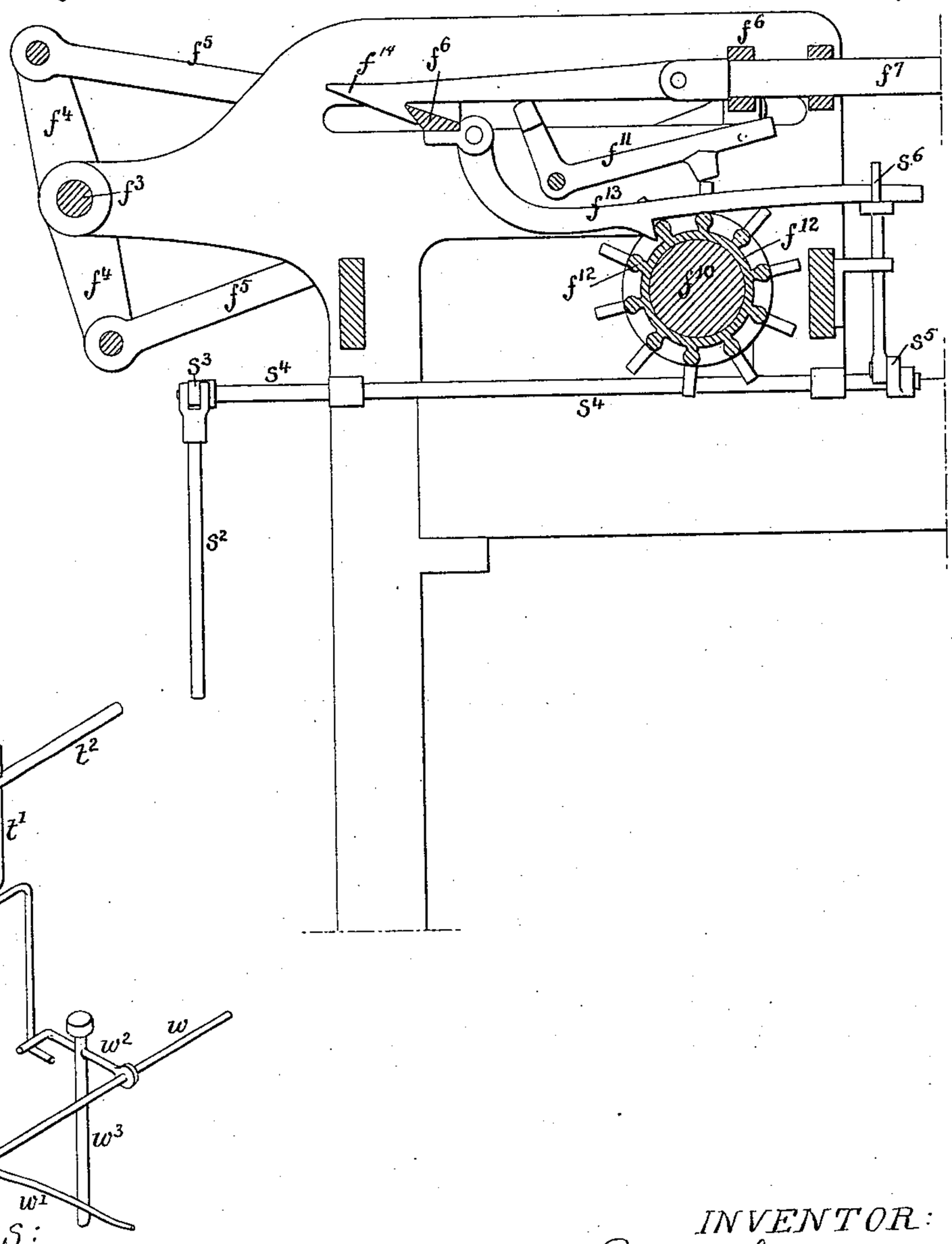

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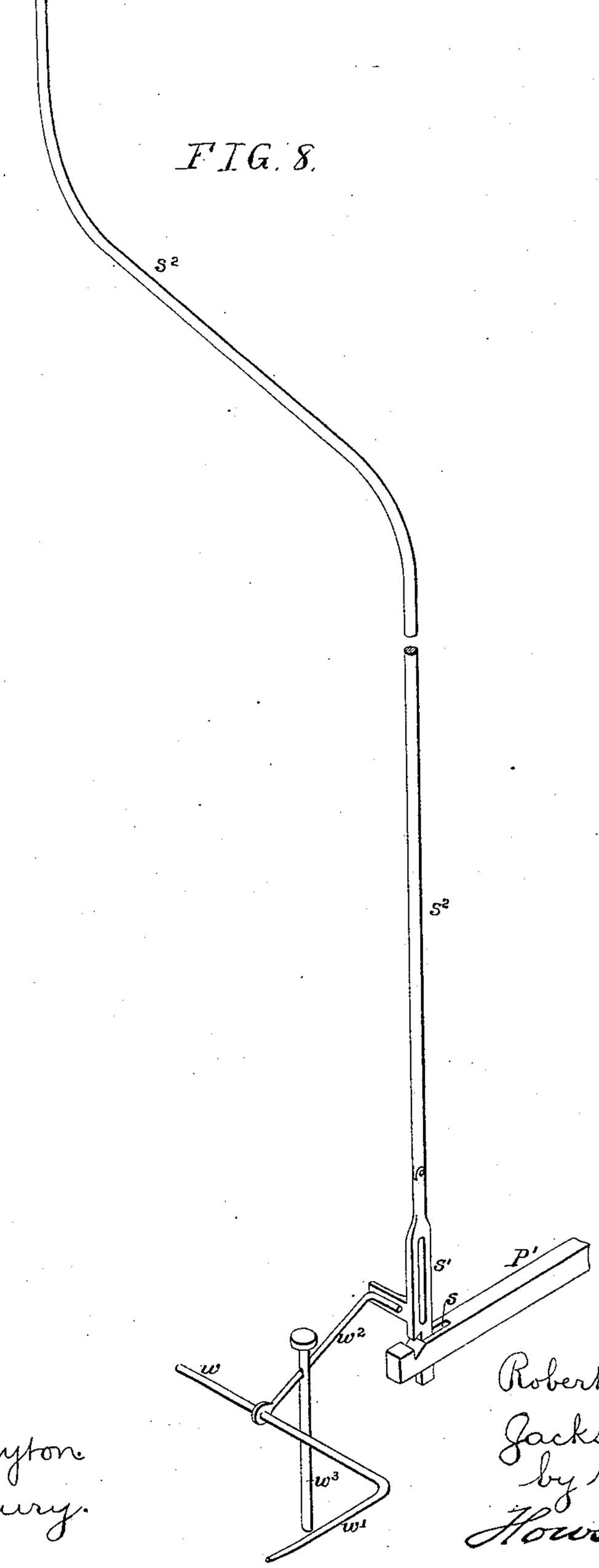
FIG. 8.



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UNITED STATES PATENT OFFICE.

ROBERT C. GREENHALGH AND JACKSON WADSWORTH, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO THE PAWTUCKET HAIR CLOTH COMPANY, OF PAWTUCKET, RHODE ISLAND.

LOOM FOR WEAVING HAIR CLOTH.

SPECIFICATION forming part of Letters Patent No. 308,489, dated November 25, 1884.

Application filed October 9, 1883. (No model.)

To all whom it may concern:

Be it known that we, ROBERT C. GREENHALGH and JACKSON WADSWORTH, citizens of the United States, and residents of Philadelphia, Pennsylvania, have invented certain Improvements in Looms for Weaving Hair Cloth, of which the following is a specification.

Our invention consists of certain improvements in positive-motion looms such as are used for weaving hair cloth, the improvements comprising certain details in the construction of the loom, with the object of rendering it more efficient in action than looms of this class as heretofore constructed.

In the accompanying drawings, Figure 1, Sheet 1, is a side view of a hair-cloth loom of the character to which our invention relates; Fig. 2, Sheet 2, a transverse section of the loom back of the breast-beam, the hair-troughs and selecting devices being omitted; Fig. 3, Sheet 3, a front view, on a larger scale, of the shuttle, shuttle-carrier, and cams for operating the nipping-jaws for the release of the hair; Fig. 4, Sheet 4, a perspective view of the shuttle, shuttle-carrier, and part of the lay; Fig. 5, a plan view of the shuttle and the cam for operating one of the nipping-jaws so as to cause it to grasp a hair; Fig. 6, Sheet 5, a perspective view of the devices for controlling the heddle-operating mechanism; Fig. 7, a sectional view of said mechanism on a larger scale; and Fig. 8, Sheet 6, is a view similar to Fig. 6, but showing some modifications.

In Figs. 1 and 2, A A represent the opposite side frames of the loom, having suitable bearings for the studs of the lay B, for the shafts D and D′, and for the spindles of the warp-beam E, cloth-beam E′, and the various guide-rollers common to looms of this class. The shafts D D′ are connected by spur-gearing, as shown by dotted lines in Fig. 1, and the said shaft D′ has a crank, a, connected by a rod, a', to a toothed segment, a^2, hung to a pin on the frame, and gearing into a spur-pinion, a^3, on the shaft of a drum, a^4, round which and round guide-pulleys a^5 on the lay B passes a cord, a^6, the opposite ends of which are connected to a slide, F, adapted to a dovetailed guide, b, on the front of the lay, and serving as a shuttle-carrier, as described hereinafter, this slide being caused to traverse from end to end of the lay as a movement of rotation or partial rotation first in one direction and then in the other is imparted to the drum a^4 by the mechanism described. The shaft D has a drum, d, which is connected by a chain belt, d', with a drum, d^2, the shaft of which is carried by a bracket, A^2, on the frame A, and has a cam, d^3, a crank-pin on which is connected by a rod, d^4, to a slide, d^5, guided in the bracket, and having at the lower end a fixed finger, d^6, and a pivoted finger, d^7, the latter being actuated by the cam d^3 through the medium of a lever, d^8, so that the fingers, when open, are caused to descend into the hair-trough d^9, and then to close, so as to nip a hair which is elevated by the rise of the fingers into the path of the nipping-jaws of the shuttle. The hair-trough is traversed beneath the fingers by a rod, d^{10}, connected to a crank-pin on a ratchet-wheel, d^{11}, the latter being actuated by a lever, d^{12}, connected by a rod, d^{13}, to the rod d^4 of the slide d^5. The hair-trough and the hair-selecting devices, it should be understood, are repeated at the opposite side of the loom. An eccentric, f, on the shaft D is connected by a rod, f', to an arm, f^2, on a rock-shaft, f^3, adapted to bearings in a frame at the top of the loom, said shaft having other arms, f^4, connected by rods f^5 to bars f^6, one of which acts directly upon shoulders on rods f^7, and the other upon hooked fingers f^{14}, pivoted to said rods. The rods f^7 are connected by bell-crank levers f^8 and cords f^9 to the heddle-frames G, the proper selection of the rods being governed by a pattern-drum, f^{10}, and levers f^{11}, and the pattern-drum having a ratchet-wheel, f^{12}, acted on by a pawl, f^{13}, hung to one of the bars f^6. (See Fig. 7.) All of these parts are common to the present looms of the class to which our invention relates, and we have shown and described them simply to give an idea of the construction and operation of the loom, having done which we will now proceed to describe the parts to which our invention relates. The slide F, which is guided on the front of the bar g of the lay, overlaps said bar, and in this

overlapping portion of the slide are formed bearings for two shafts, *h h*, each of which has at its outer end a grooved pulley, *i*, and at the inner end a roller, *m*, portions of the said rollers projecting above the top of the plate, as shown in Figs. 3 and 4. The shuttle J has a central roller, *n*, projecting beneath the same, and having a bearing upon the rollers *m*, the opposite ends of the shuttle projecting over bearings *p p* on the slide F, and said shuttle being held close to or against the reed by an overhanging bar, K, which forms part of the lay, the warp-threads lying between the rollers *m* and *n* and between the bottom plate of the shuttle and the bearings *p p*.

To suitable lugs at the opposite ends of the bar *g* of the lay are secured the opposite ends of a cord, I, which passes around the pulleys *i* and around a central pulley, *i'*, beneath the same, so that as the slide is drawn across the lay the pulleys *i* and their shafts *h* and rollers *m* are caused to turn, a movement in one direction being imparted to said pulleys, shafts, and rollers as the slide is drawn from left to right, and a movement in the opposite direction as the slide is drawn from right to left, the pulleys and rollers being so proportioned that as the slide and shuttle are carried across the lay the surfaces of the rollers *m* and hence of the roller *n* will move at a rate of speed equivalent to or slightly greater than that of the slide; hence as the weight of the shuttle is borne mainly by these rollers very little, if any, friction will be exerted upon the warp, and the passage of the shuttle through the shed will be materially facilitated. The shuttle has at the ends the usual pivoted nipper-jaws, L L', the tails of which are acted upon by springs L^2, Fig. 5, which tend to close the jaws, and there are at the ends of the lay the ordinary yielding cams, M M', which act upon the jaws so as to open the same on the outward passage of the shuttle—that is to say, the passage away from the center of the lay—but yield as the shuttle passes inward or toward the center of the lay, so as not to open the jaws and cause the release of the hair.

The operation of the jaws for the purpose of releasing the hair is effected as the shuttle leaves the warp at each side by cams N N', secured to the bar K. The shuttle passes both of these cams; but it is necessary that each cam shall act upon one jaw only of the shuttle. Thus the cam N must act upon the rear jaw, L, of the shuttle as the latter is leaving the warp at the right-hand side of the lay, and the cam N' must act upon the rear jaw, L', of the shuttle as the latter is leaving the warp at the left-hand side of the lay. If both jaws and both cams are in the same horizontal plane, mechanism must be employed for throwing the cams into and out of action; and in order to avoid the necessity for this we arrange the tails of the jaws and the cams for acting thereon in different planes. Thus, as will be seen on reference to Fig. 3, the tail of the jaw L and cam N are on a higher plane than the tail of the jaw L' and cam N', so that each cam will act only upon its proper jaw.

The devices for controlling the action of the heddle-operating mechanism are shown in Figs. 1, 2, 6, 7, and 8. A cam, P, on the shaft D acts upon an arm, P', hung to the frame, and in the outer or forward end of this arm is a slot, *s*, for the reception of a catch, *s'*, hung to the lower end of a rod, s^2, guided on the frame A, and connected at the upper end to an arm, s^3, on a rock-shaft, s^4, the latter having another arm, s^5, carrying a fork, s^6, which embraces the pawl f^{13} of the pattern-drum-operating mechanism. When the catch *s'* is allowed to hang vertically from the lower end of the rod s^2, it overlaps the end of the slot *s* in the arm P'; hence on each lift of said arm there would be an operation of the parts just described, and a lifting of the pawl f^{13} clear of the ratchet-wheel f^{12}, and hence no movement of the pattern-drum. The catch *s'*, however, has a slot, s^7, to which is adapted a finger, *t*, on a rod, *t'*, pendent from a rock-shaft, t^2, on the frame, so that whenever said rod is thrust rearward the catch *s'* will be moved into line with the slot *s*, and the elevation of the arm P' will have no effect upon the heddle-operating mechanism.

To bearings on the rear of the bar *g* of the lay is adapted a shaft, *w*, having at each end a finger, *w'*, and furnished also with an arm, w^2, bent at the outer end and connected to a guided rod, w^3, the lower end of which as the lay swings forward is brought under control of a cam, w^4, on the frame A of the loom, which has the effect of depressing the fingers *w'* and elevating the arm w^2, so that the rod *t'* will be in the path of the same as the lay swings rearward. If a hair has been lifted by the selecting device and caught by the shuttle at either side of the loom, it will, as the shuttle moves across the lay, be drawn over the finger at that end of the lay, and will hold said finger down as the lay swings back, thus maintaining the arm w^2 in the elevated position, so as to push back the rod *t'* and release the catch *s'* from the control of the arm P'; hence there will be the proper operation of the heddle mechanism necessary to effect a change of shed. If the shuttle fails to catch a hair, however, the fingers *w'* will rise as soon as the rod w^3 is free from the control of the cam w^4, the arm w^2 falling, so as to clear the rod *t'*, thus permitting the catch *s'* to engage with the arm P', and throwing the pawl and ratchet of the heddle mechanism out of gear; hence there will be no change in the shed.

If desired, the arm w^2 may be adapted to act directly upon the catch *s'*, or upon an arm projecting therefrom, and in some cases the heddle-operating mechanism may be arranged with reference to the rod s^2 acting directly upon the pawl f^{13} or through the medium of devices other than the rock-shaft and arms shown.

In Fig. 8 we have shown the above modifications, the arm w^2 being arranged to strike an arm on the catch s', and the upper end of the rod s^2 being bent so as to act directly on the pawl f^{13}.

We do not claim, broadly, a rotating-roller support for the shuttle, as such roller-supports have been heretofore employed, but have been operated by frictional contact with the lay, whereas our plan of driving the rollers is more positive and less liable to interruption during the working of the loom; neither do we claim, broadly, the nipping-jaws L L', having tails in different planes, in combination with cams, one for actuating one jaw, and the other for actuating the opposite jaw, as this has also been proposed; but in former looms the cams have been located on the front of the lay—a construction which is inadmissible in our loom, as the slide F traverses this portion of the lay; hence we secure the cams for operating the nipping-jaws to the upper bar, K, where they are out of the way of the slide.

We claim as our invention—

1. The combination of the lay, the slide F, guided thereon, and having a pulley, i', and shafts $h\,h$, provided with rollers $m\,m$, and pulleys $i\,i$, with the cord I, passing round said pulleys and fastened at its opposite ends to the lay, the shuttle having a roller, n, resting on the rollers m, and mechanism for reciprocating the slide on the lay, as set forth.

2. The combination of the lay, the shuttle, the slide F, guided on the lay and having a central roller-support for the shuttle, and bearings p on each side of the same, mechanism for reciprocating the slide, and devices for rotating the roller-support as the slide is reciprocated, as set forth.

3. The combination of the heddle-operating mechanism, its pattern-drum, and operating-pawl therefor with the arm P' and its cam, the lay B, the shaft w, having fingers w' and arm w^2, with rod w^3, the cam w^4, and devices, substantially as described, under control of the arm w^2, whereby the arm P' is caused to act upon or is thrown out of connection with the operating-pawl of the pattern-drum, as set forth.

4. The combination of the heddle-operating mechanism, its pattern-drum, and operating-pawl therefor with the arm P', the cam for vibrating the same, the lay B, its shaft w, having fingers w' and arm w^2, the rod w^3, the cam w^4, the rod s^2, with catch s', and the pivoted rod t', with finger t, as set forth.

5. The combination of the shuttle having nipping-jaws L L', with tails in different planes, the bar g of the lay having a front guide, b, the slide F, adapted to said guide, and having a roller-support for the shuttle, the upper bar, K, of the lay having two cams, N N', in different planes, and mechanism, substantially as described, for reciprocating the slide F and for rotating the shuttle-support carried thereby, as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

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JACKSON WADSWORTH.

Witnesses:
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HARRY SMITH.