No. 754,560. PATENTED MAR. 15, 1904.

W. H. & H. H. HACKING.

WEFT REPLENISHING MECHANISM FOR LOOMS.

APPLICATION FILED OCT. 13, 1902.

NO MODEL. 4 SHEETS—SHEET 1.

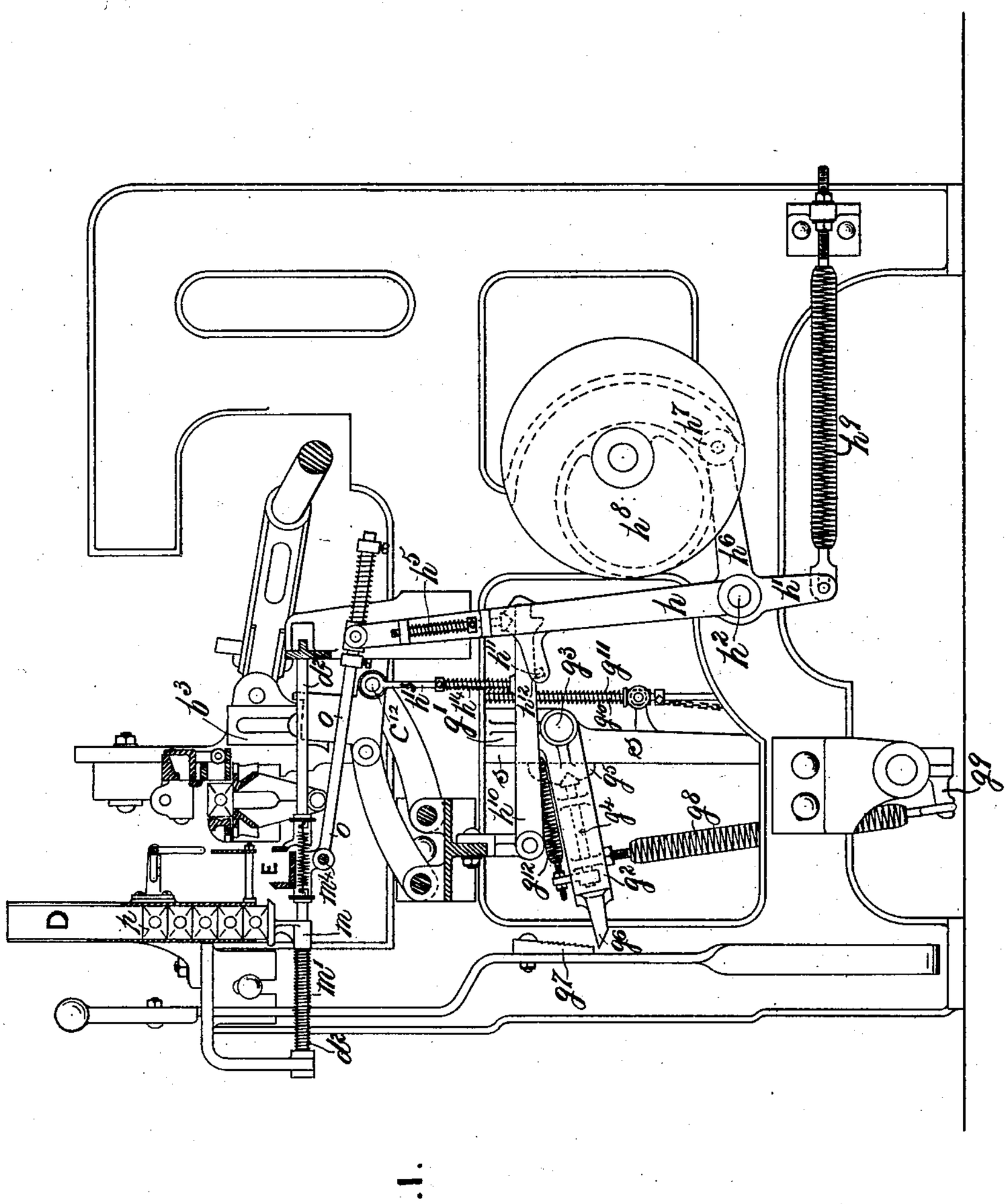

FIG. 1.

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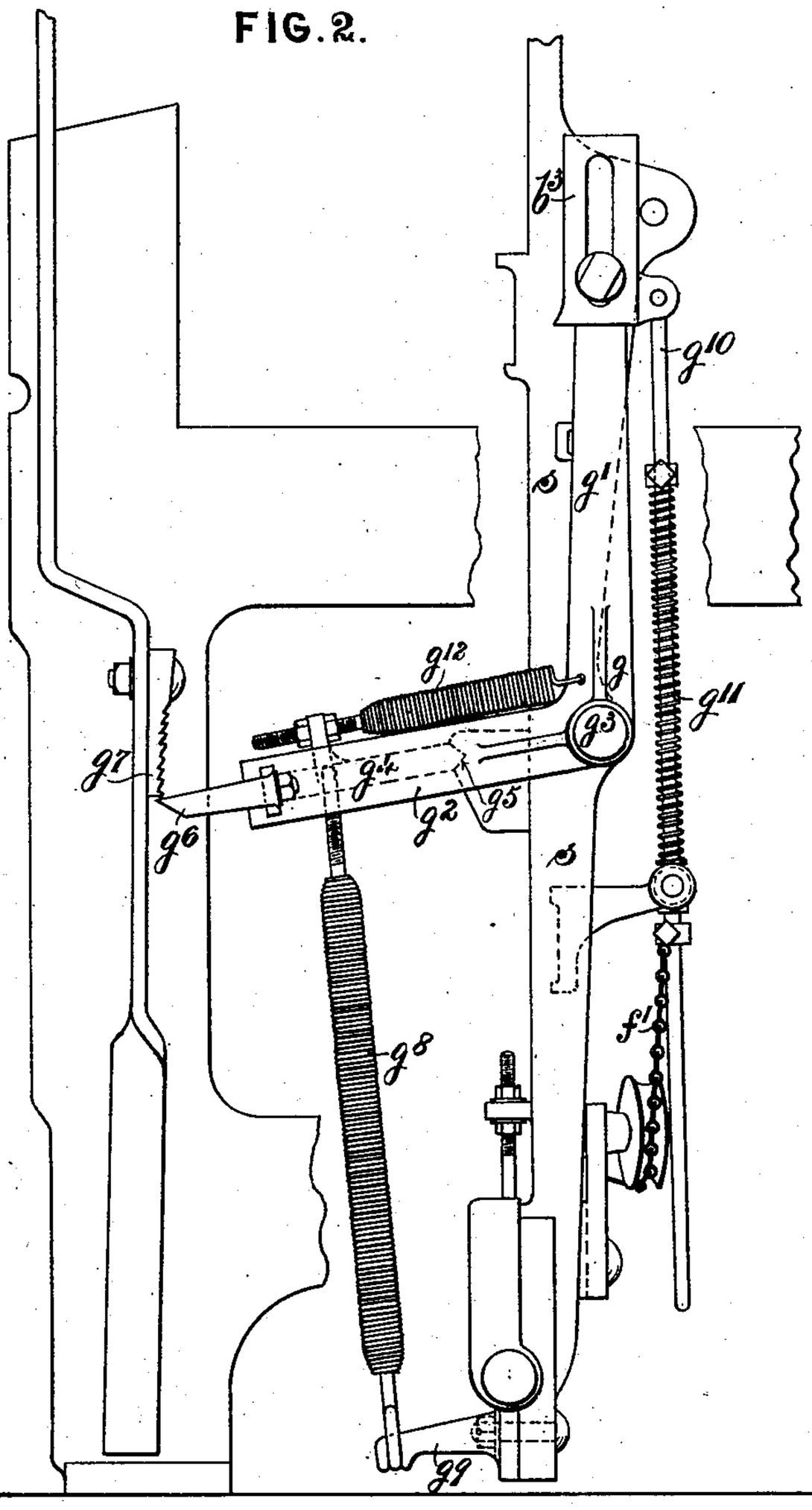
NO MODEL. 4 SHEETS—SHEET 2.

FIG. 2.



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NO MODEL. 4 SHEETS—SHEET 3.

FIG. 3a.

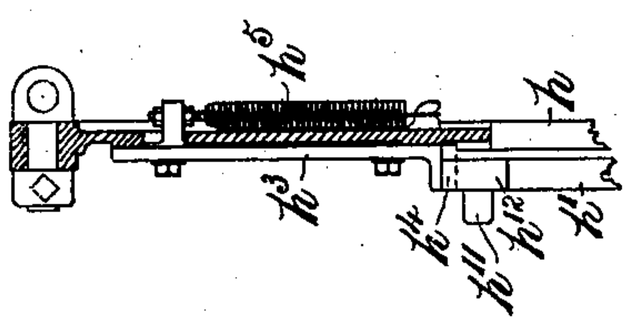
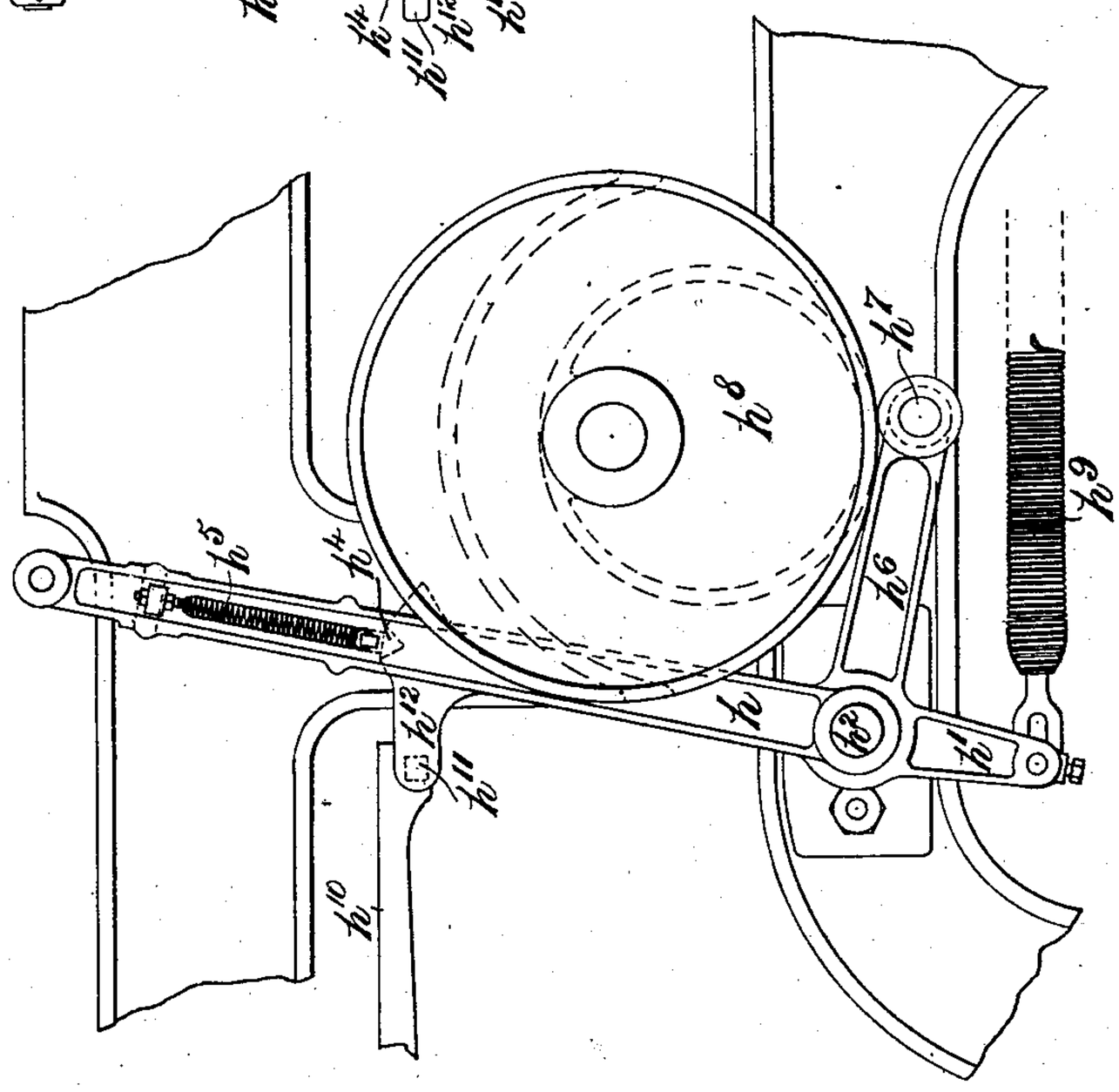


FIG. 3.



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NO MODEL. 4 SHEETS—SHEET 4.

FIG. 5.

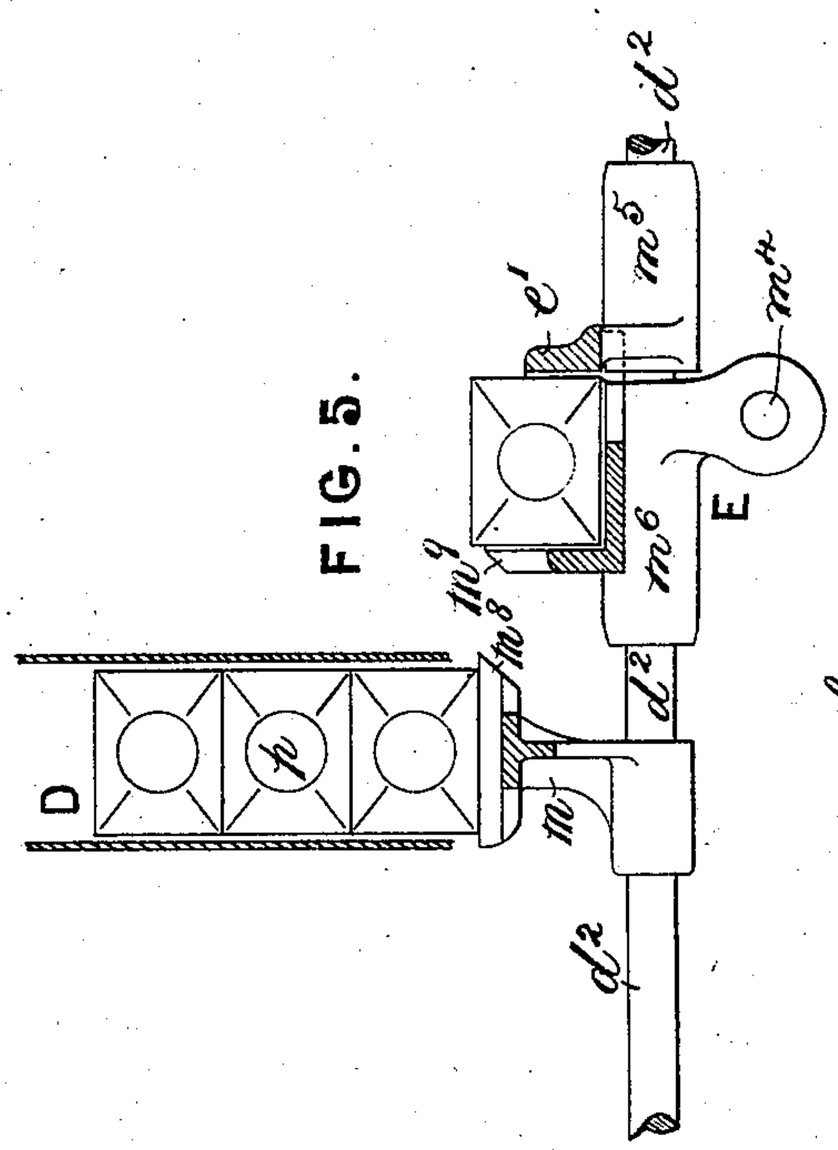
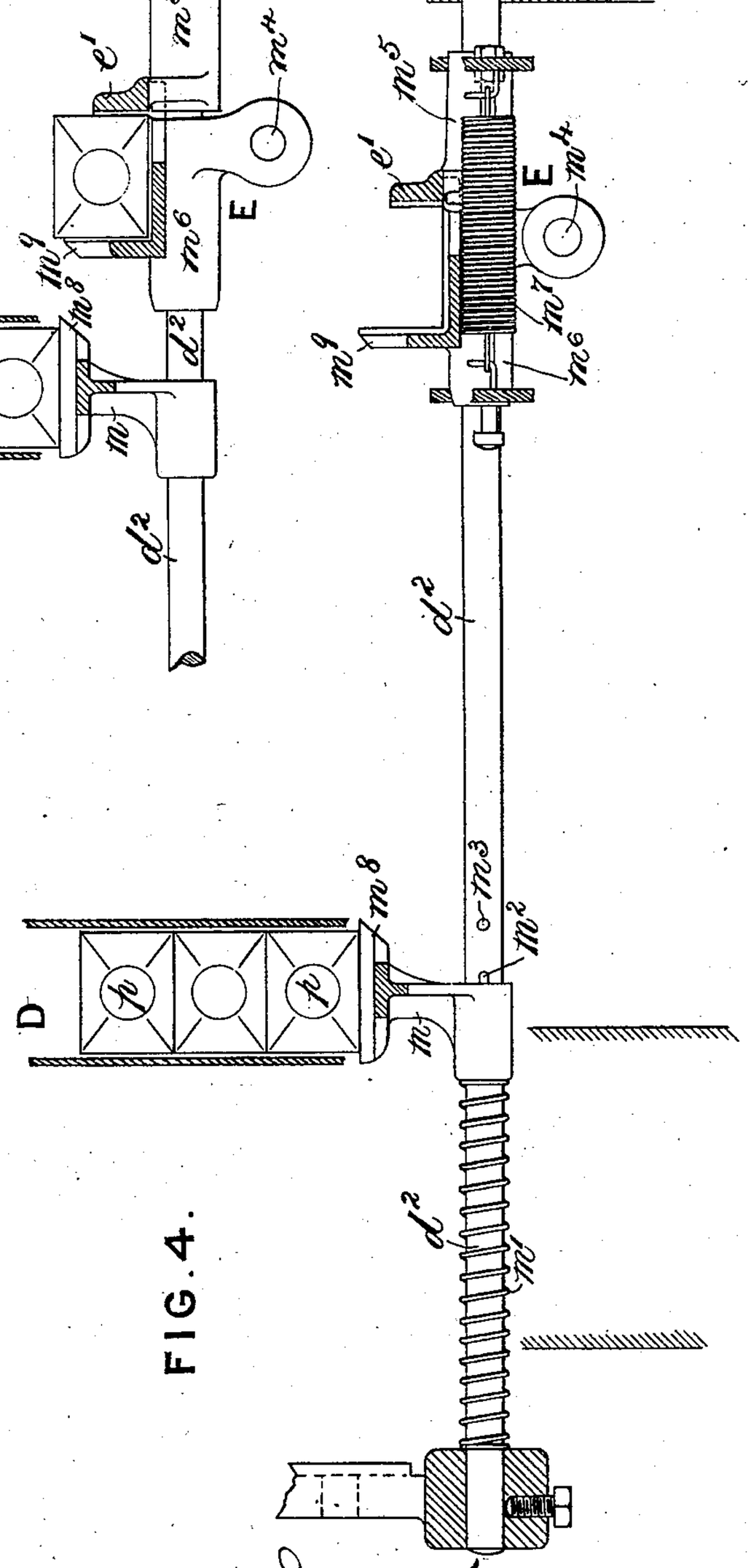


FIG. 4.



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No. 754,560. Patented March 15, 1904.

UNITED STATES PATENT OFFICE.

WILLIAM HENRY HACKING AND HENRY HAWORTH HACKING, OF BURY, ENGLAND.

WEFT-REPLENISHING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 754,560, dated March 15, 1904.

Application filed October 13, 1902. Serial No. 127,143. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM HENRY HACKING and HENRY HAWORTH HACKING, subjects of the King of Great Britain and Ireland, and residents of California Iron Works, Bury, county of Lancaster, England, have invented certain new and useful Weft-Replenishing Mechanism for Looms, (for which we have filed application for British Patent No. 7,890, dated April 4, A. D. 1902;) and we 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 an improved construction of the shuttle-changing mechanism described in the specification of Bernard Crossley's United States Patent No. 667,767, of February 12, 1901, to which reference is made for all features not herein particularly described. In such shuttle-changing mechanism a relay of spare shuttles is contained in a hopper, from the bottom of which they are transported one by one by means of lifter-arms operated by the slay-sword. As the new shuttle rises into the weaving position it pushes upward the used shuttle, which is discharged into a receiver on the next beat up of the slay. Generally the principle of operation of the shuttle motion as a whole remains the same as described in the specification of the said patent; but the improvements constituting the present invention have for their object to render the operation more perfect and to prevent breakages which are liable to arise in the event of intervening obstacles preventing the movement of the constituent parts of the apparatus.

In the drawings, Figure 1 is a side elevation of so much of a loom as is necessary to show the entire invention in an effective operative combination. Fig. 2 is a detail elevation of the interlocking-lever carrier for the catch b^3. Fig. 3 is a detail elevation of the interlocking-lever device and cam for operating the shuttle-carrier. Fig. 3^a is an elevation, partly in section, of the interlocking arrangement of the two levers h h' of Fig. 3. Figs. 4 and 5 are elevations, partly in section, of the shuttle-carrier.

This improvement relates to the mechanism which brings the shuttle-changing device into operation in the event of a shuttle becoming empty or the weft breaking. A bell-crank lever g is fulcrumed on the slay-sword s and carries a catch b^3 on its upper arm g', this catch having the same function as the one described in the said patent. The lower arm g^2 of said lever carries a bolt g^4, the point of which normally takes into a notch or conical recess in a lug g^5, secured to the slay-sword s. A spring g^{12}, secured at one end to the bolt and at the other end to the arm g', normally preserves the engagement of the bolt, and under ordinary conditions the bell-crank lever g behaves as though integral with the slay-sword. Should, however, the catch b^3 meet with resistance while the slay is advancing, the spring g^{12} expands and allows the bolt g^4 to escape from the lug g^5, so that during the continued advance of the slay (to the left in Figs. 1 and 2) the bell-crank lever g simply turns on its fulcrum g^3 and breakage is prevented. The arm g^2 carries a spur g^6, which rising as the lever g turns on its fulcrum and meeting the ordinary stop-rod g^7 of the loom displaces the latter and stops the loom. When the resistance is removed and the loom restarted, the arm g^2 is automatically pulled down by the spring g^8. This latter is secured at its upper end to the arm g^2 and at its lower end to a bracket g^9 on the slay-sword. When this occurs, the spring g^{12} pulls the bolt g^4 into reëngagement with its notch in the lug g^5.

We employ for operating the shuttle-carrier two parallel levers h h', fulcrumed at h^2 on a common pin on the loom-frame. Normally these two levers act as a single lever through being connected by a bolt h^3, carried by the lever h, engaging with a notch h^4 in the lever h', into which it is pulled by a spring h^5. The lever h'—*i. e.*, in the present instance the one nearest the loom-frame—is formed as an L-lever and carries on the arm h^6 a bowl h^7, operated when required by an eccentric h^8, toward which it is pulled by the

adjustable spring h^9, attached at one end to a prolongation of the lever h' and at the other end to the frame of the loom. The upper end of the lever h is hinged to a slide-rod o, which is connected at m^4 to the shuttle-carrier. The eccentric h^8 is mounted on and rotates with the tappet-shaft of the loom. Normally the bowl h^7 is kept out of the range of operation of the eccentric by a strut h^{10}, hinged at one end to the loom-frame. The free end of the strut h^{10} takes against and over a pin h^{11}, carried by a lug h^{12}, extending from the lever h'. The strut h^{10} is connected by a connecting-rod h^{13}, Fig. 1, to the lifter-arms, so that when the latter begin to move forward for the purpose of changing shuttles the strut h^{10} is lifted clear of the pin h^{11}. This enables the spring h^9 to bring the bowl h^7 within range of the action of the eccentric h^8. The latter in its revolution operates the lever h', and with it the lever h, to slide the shuttle-carrier for the purpose of bringing another shuttle from the hopper. Should the shuttle-carrier meet with any obstacle in its course, the resistance will cause the bolt h^3 to disengage itself from the notch h^4, whereupon the lever h is freed from the operation of the eccentric h^8 and breakage of the parts is prevented.

A spring h^{14} in compression under a collar on the connecting-rod h^{13} bears on the strut h^{10} with sufficient force to prevent it becoming displaced by the shaking or jar of the machinery.

The reserve shuttles are contained in a hopper open at its lower end, where the bottom shuttle rests on the slide-bars on which the shuttle slides. The shuttle-carrier is made in two parts, the fore part being hinged and operating as a spring-controlled latch which on striking the side of the shuttle is depressed and passing under the shuttle springs up on the other side, so as to embrace the shuttle between the two parts of the carrier.

According to the present invention (referring more particularly to Figs. 4 and 5) the hopper D is normally closed by a slide-block m, adapted to slide on a pair of parallel bars, one of which (marked d^2) is shown in Figs. 4 and 5. Normally the slide-block m lies immediately under the hopper, and the column of reserve shuttles p rests directly on it. The slide-block is held in position by the spring m' and a stop-pin m^2. The shuttle-carrier, referred to as a whole as E, which is attached at m^4 to the slide-rod o, operated by the lever h, (see Fig. 1,) is constructed of two horizontally-separably components m^5 m^6, both adapted to slide on the said parallel bars and normally drawn together by a spring m^7.

When the lever h is operated by the eccentric h^8 so as to move the empty carrier E toward the hopper D, the two parts m^5 and m^6 of the carrier E move together during the greater part of the stroke. On reaching the hopper the upper edge m^9 of the part m^6 takes against and under the part m^8 of the slide-block m. The further continued movement of the carrier E displaces the slide-block m until the projecting edge m^9 has passed beyond the edge of the lowermost shuttle. Just before it reaches the hopper the rear part m^5 of the shuttle-carrier is restrained by a pin m^3. The part m^6 still travels a short distance, opening the spring m^8, and thus providing a clearance for the drop of the shuttle from the hopper into the carrier. When the part m^5 leaves the pin m^3 on the back stroke of the lever h, the two parts of the shuttle-carrier come together and safely hold the shuttle until it reaches the shuttle-box, into which it is elevated by the lifter-arms.

In consequence of the construction above described the side of the shuttle is not liable to be injured by the depressible latch e', Figs. 4 and 5, and the action of transferring the shuttle from the hopper to the carrier is effected in a more gentle manner.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a loom for weaving having a shuttle-box on the loom-slay adapted to receive shuttles through the bottom thereof and a hopper whence reserve shuttles descend and lifting devices for elevating the shuttles, the combination of the slide-block m, the reciprocating longitudinally-divisible shuttle-carrier E, the slide-rod o, the normally simultaneously acting levers h h' adapted to disengage when meeting with a resistance, the strut h^{10} and the eccentric h^8 for transferring shuttles from the hopper to underneath the shuttle-box substantially as set forth and shown.

2. In a loom for weaving having a shuttle-box in the loom-slay adapted to receive shuttles through the bottom thereof and means for elevating the shuttles from a reciprocating shuttle-carrier into the shuttle-box, the combination with the slay-sword and the said shuttle-carrier, of the bell-crank lever g, having its fulcrum on the slay, a spring-operated locking-bolt g^4 adapted to disengage on the arm g' of the bell-crank lever meeting with resistance, and a spur g^6 on the other arm g^2 of said bell-crank lever adapted to strike the stop-rod when the lever g turns on its fulcrum, substantially as and for the purpose set forth and shown.

In witness whereof we have hereunto set our hands in presence of two witnesses.

WILLIAM HENRY HACKING.
HENRY HAWORTH HACKING.

Witnesses:
E. T. WHITELOW,
JOHN HALL.