No. 677,513. Patented July 2, 1901.

K. HYDE.

PICK FINDER FOR LOOMS.

(Application filed Mar. 11, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 3.

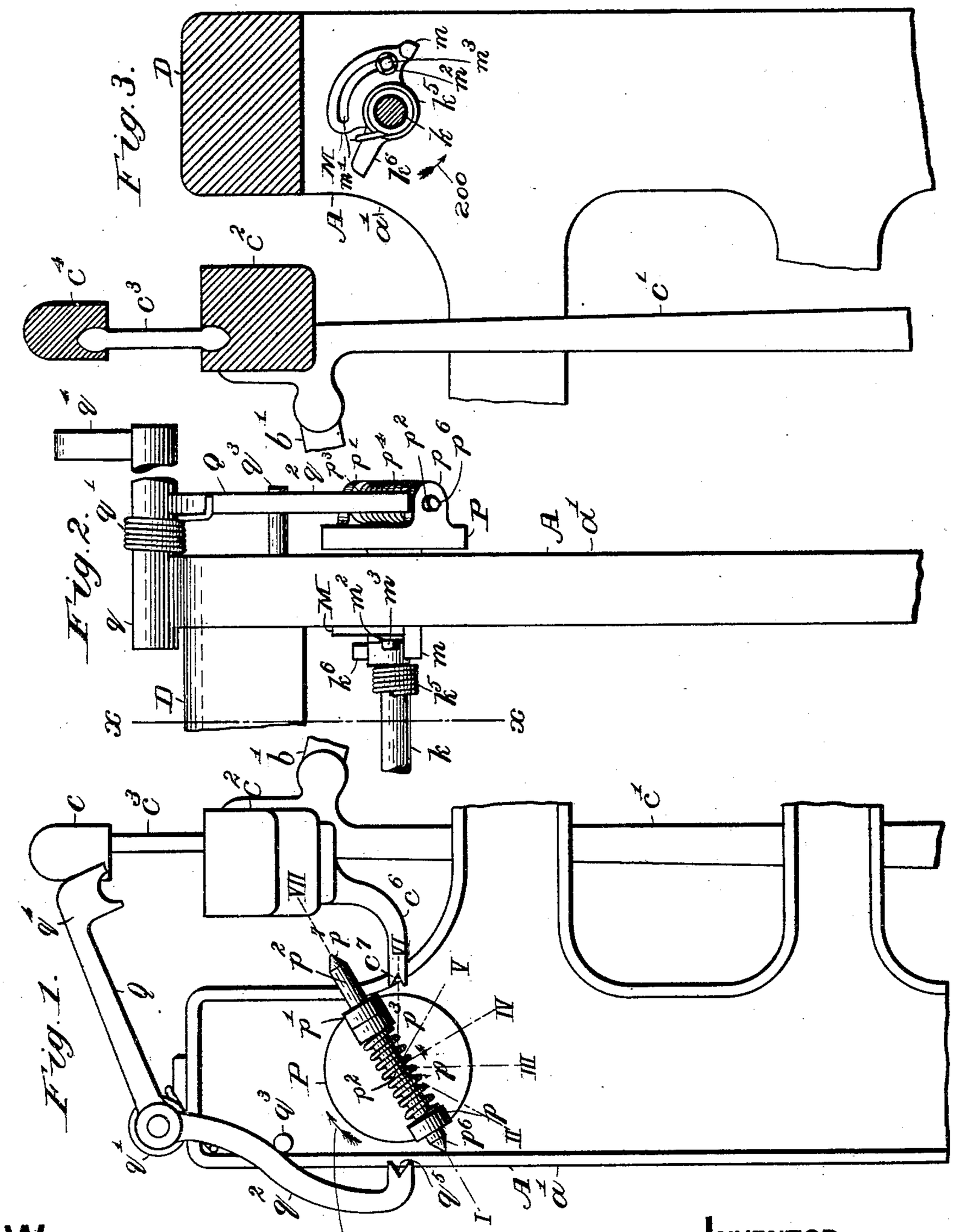

Fig. 2.

Fig. 1.

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(No Model.) 3 Sheets—Sheet 2.

Fig. 4.

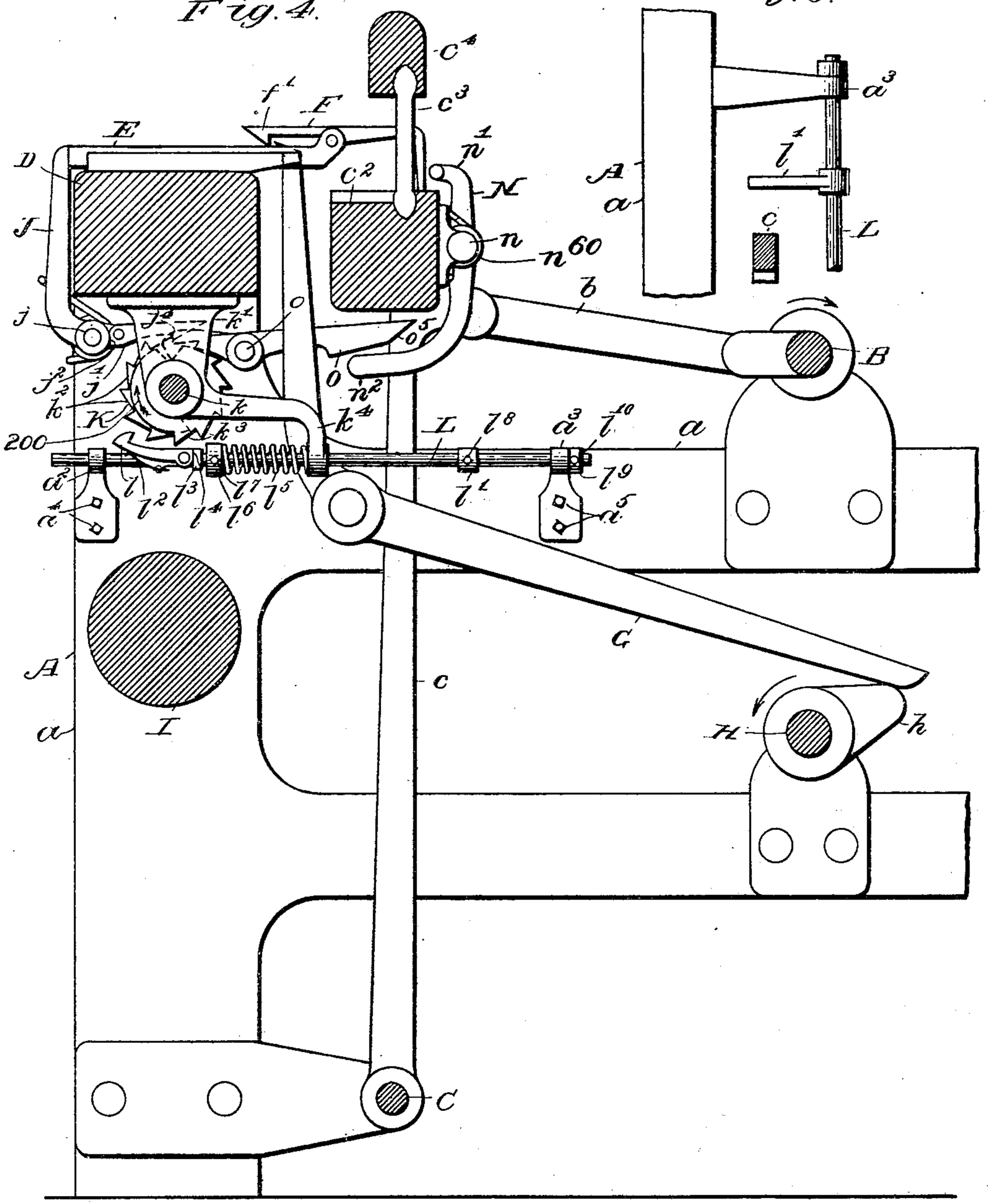

Fig. 8.

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Fig. 5.

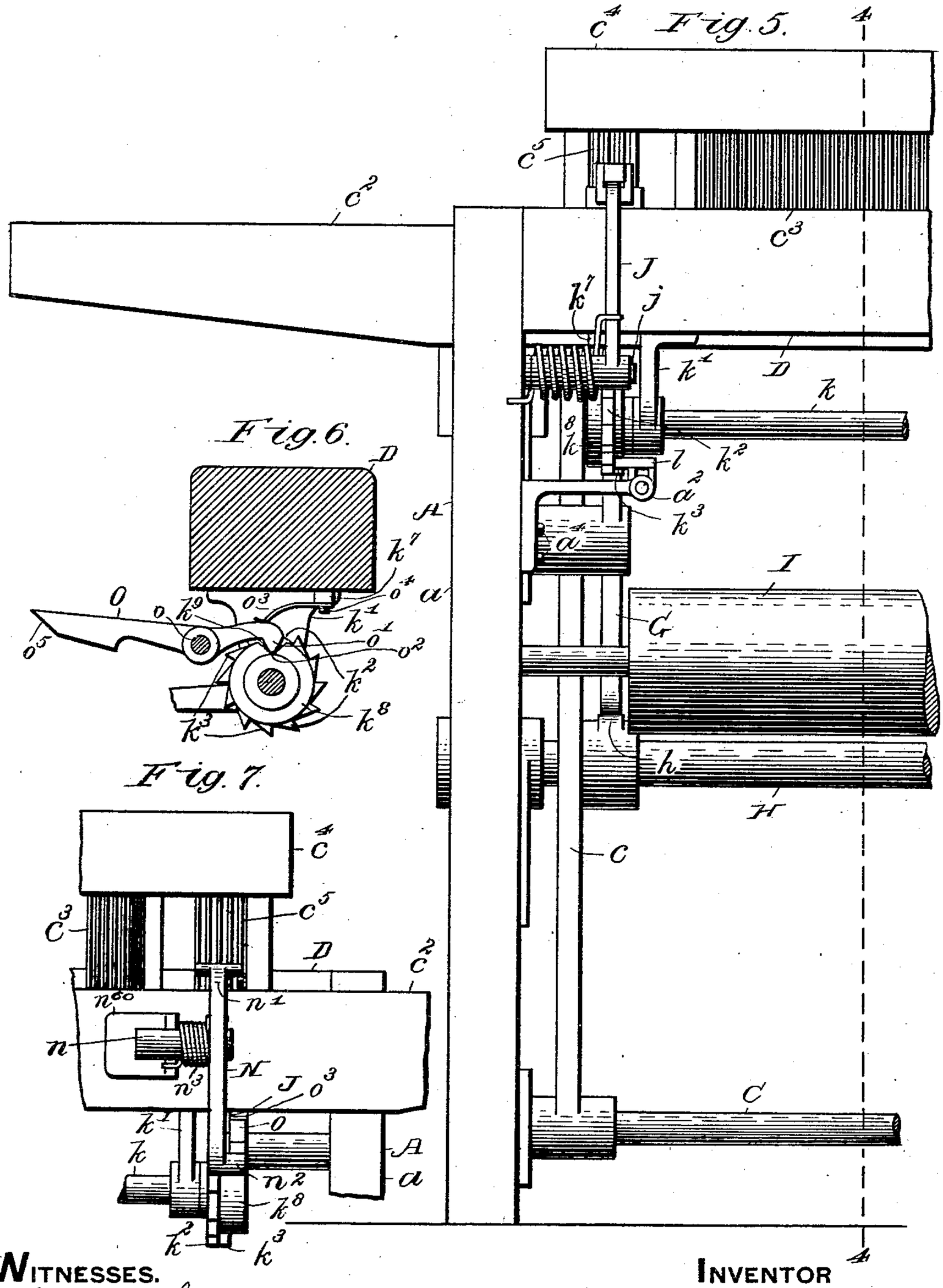

Fig. 6.

Fig. 7.

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UNITED STATES PATENT OFFICE.

KIRKLEY HYDE, OF LOWELL, MASSACHUSETTS, ASSIGNOR TO THE DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, AND PORTLAND, MAINE.

PICK-FINDER FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 677,513, dated July 2, 1901.

Application filed March 11, 1899. Serial No. 708,643. (No model.)

To all whom it may concern:

Be it known that I, KIRKLEY HYDE, a citizen of the United States, and a resident of Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Pick-Finders for Looms, of which the following is a specification.

This invention relates to pick-finders for looms for weaving or devices which when the filling in multiharness cam-looms is exhausted or broken will cause a new filling-thread to be introduced into the shed at some following pick of the same number in the series or cycle of picks required to make the pattern or figure; and my invention, as hereinafter disclosed, is applicable to any of the magazine type of looms or looms which are provided with means for automatically supplying the filling upon exhaustion or failure of the old filling, the new or fresh filling being introduced either by changing the shuttle or by the introduction of a new filling-supply into the shuttle already in the loom.

In the accompanying drawings, wherein like letters represent like parts, Figure 1 is a partial elevation of a sufficient portion of a multiharness-loom to be understood, taken at the side whereat filling is changed or supplied, one embodiment of my invention being applied to the loom. Fig. 2 is a front elevation of the parts shown in Fig. 1. Fig. 3 is a vertical sectional view taken on the line $x\,x$, Fig. 2, looking to the right. Fig. 4 is a vertical longitudinal sectional view of the apparatus, taken on the line 4 4, Fig. 5, looking to the left. Fig. 5 is a front elevation of a part of the loom at the filling-detector side. Fig. 6 shows in side elevation a portion of the controlling mechanism, including the ratchet device, its support, and the pick-finding lever, the breast-beam, ratchet-shaft, and fulcrum-stud of the pick-finding lever being shown in section. Fig. 7 is a rear elevation of the same parts, together with portions of the lay and lay-cap; and Fig. 8 is a plan view of a portion of the left-hand loom side, showing a part of the ratchet-actuating rod and its finger, one of the lay-swords being shown in section.

The loom-frame A, having its sides $a\,a'$, the main or crank shaft B, the lay-shaft C, the lay-swords $c\,c'$, connected by pitmen $b\,b'$ to the crank-shaft, the lay c^2, the reed c^3 and reed-cap c^4, the breast-beam D, the fork-slide E, the filling detector or fork F, pivoted upon said slide, the weft-hammer or vibrator G, the cam-shaft H, provided with the usual cam h to rock the weft-hammer G, and the sand-roll I are and may be all of well-known or usual construction and operation and in practice will be used with take-up and let-off mechanisms, shuttle and harness motions, and other parts commonly employed in looms of the type hereinbefore referred to.

As is usual, the filling fork or detector F is herein provided at its tail end with a hook f' normally raised when the filling is present in the shed and the lay comes forward, the hook being lifted thereby sufficiently to clear the upper end of the weft-hammer G, Figs. 4 and 5; but upon failure of the filling or its exhaustion from the shuttle the detector F will not be operated and the weft-hammer will engage the hook f' and move said detector and its slide E forward in usual manner in filling stop-motion devices of this character.

A stud j, extended inwardly from the loom side a, has pivotally mounted upon it a lever J, Figs. 4, 5, and 7, the upper end of said lever resting against the outer end of the slide E, while the lower arm of the lever extends backward for a short distance beneath the breast-beam and has pivoted thereto a pawl j', Fig. 4, the front end of which is downwardly extended to form a shoulder j^2. This shoulder when it strikes against the hub of the lever J will cause a hook-like tooth or projection j^4 on the pawl j' to be raised when the lever J is rocked by or through the outward sliding movement of the detector-slide E. The shoulder j^2 is so located, however, that the toothed end of the pawl j' may be raised without tending to rock or move the lever J on its fulcrum. This pawl acts as a detent or retaining-pawl for a ratchet-wheel K, fast on a shaft k, rotatably mounted in a hanger or bracket k', depending from the breast-beam and in a suitable bearing in the loom side a', through which said shaft is extended. The ratchet-wheel is provided with two sets of teeth $k^2\,k^3$, each set occupying

one-half of the periphery thereof and located side by side, the teeth k^2 being so located as to be engaged by the pawl j', while the set k^3 is located in the path of movement of an actuating-pawl l, clearly shown in Fig. 4, said actuating-pawl being pivotally mounted on a horizontal rod L, adapted to slide in suitable bearings a^2 a^3, secured in suitable manner, as by bolts a^4 a^5, on the inner face of the loom side a. The rod is provided with a collar l', adjustably held in place by means of a set-screw l^8, said collar being in the path of and to be engaged by the lay-sword c as the lay completes its backward stroke, to thereby move the rod L rearwardly at least far enough to turn the ratchet-wheel K through an angular distance measured by one of its teeth, the pawl l being herein shown as acted upon by a spring l^2 to lift its outer end normally into the path of the teeth k^3, upward movement of the pawl being limited by a collar l^3, fast on the rod L, against which collar the upper rear corner l^4 of the pawl is held by the spring.

The outward movement of the rod L, which may be termed a "pawl-carrier," is effected, as herein shown, by a spiral spring l^5, surrounding the rod between a collar l^6 therein, held in adjusted position by a set-screw l^7 and the lower end of an arm k^4, secured to or forming part of the hanger or bracket k'. By means of the set-screw l^7 the collar may be adjusted to vary the tension of the spring. The forward or outward movement of the pawl-carrier is limited by a collar l^9, adapted to strike against the back of the bearing a^3, said stop-collar being adjustably held on the pawl-carrier by a set-screw l^{10}.

From the foregoing description and reference to the drawings it will be obvious that every complete backward stroke of the lay will operate through the pawl-carrier and its pawl to turn the ratchet-wheel K through a distance of one tooth in a direction opposite to that of the arrow 200, Fig. 4, such step-by-step movement being continued until the end of the series of teeth k^3 is reached, the retrograde movement of the ratchet-wheel being prevented by the retaining-pawl or detent j', as hereinbefore described. When the last tooth k^3 has been engaged by the pawl l, the ratchet-wheel will thereafter remain at rest until the detent j' is moved into inoperative position, as by the rocking of the lever J, due to the detection of filling failure, when said ratchet-wheel and its shaft k will be given a return or retrograde movement, as herein shown, by a spring k^5, (see Figs. 2 and 3,) surrounding the shaft k, between the loom sides, and secured at one end to said shaft and at the other end to the adjacent loom side a', the extent of the return movement of the shaft being limited by a projection or arm k^6, fast thereon and adapted to strike against a stud or stop m, projecting from an adjustable stop-plate M. (Best shown in Fig. 3.) This stop-plate M is loosely mounted on the shaft k and is provided with a curved slot m', concentric with the shaft, a headed screw-bolt m^3 being extended through said slot and a washer m^2 and into the loom side, tightening of said bolt after the plate M is engaged adjustably retaining the latter in desired position. The slot m' is long enough to permit the shaft k and the parts secured thereto to rotate through an angular distance measured by all of the teeth k^3 before the arm k^6 will strike the stud or stop m in the reverse or retrograde movement of the shaft. By loosening the bolt m^3 the plate M may be turned to bring the stop-stud into such position that the reverse movement of the shaft k will be measured by less than the whole number of teeth k^3, for a purpose to be hereinafter described.

It will be manifest that the rotation of the shaft k in one direction will be step by step or intermittent, and in the ordinary operation of the loom such intermittent movement will continue until the end of the series of teeth k^3 is reached; but when the ratchet-wheel K is released upon failure of the filling to be properly laid in the shed the retrograde movement of the shaft k will be rapid and continuous and to an adjustable stopping-point, determined by the position of the stop m, so that while the step-by-step movement is effected to turn the shaft to a predetermined position its retrograde movement therefrom may be through a variable distance.

A C-shaped arm N, Figs. 4 and 7, is fulcrumed between its ends by a stud n in a suitable stand n^{60} on the back of the lay, the upper end n' of said arm being laterally extended or T-shaped, as best shown in Fig. 7, to reach across the usual grid or fork-rack c^5, through which the tines of the filling fork or detector project in the absence of the filling when the lay-beam is nearest the breast-beam and the lower end of the arm N extends forward under the lay and is offset at n^2. A spring n^3 serves to normally keep the upper end of the arm out of contact with or away from the back of the grid c^5; but when the end n' of the arm is pressed against the back of the grid in opposition to the action of the spring n^3 the fork-tines will be engaged and the front hooked end f' of the fork will be held up, as if an unbroken filling-thread were present in the shed.

A stud o, projecting inwardly from the loom side a, has pivotally mounted upon it a lever O, provided at its front or outer end with a downturned projection o', (see Fig. 6,) the front and back faces of which are oppositely beveled or converged downwardly to form an edge o^2, said projection being held by a spring o^3 upon a cylindrical or disk-like portion k^8 of the ratchet-wheel K at the left of the two series k^2 k^3 of teeth, said spring o^3 being herein shown as a leaf-spring attached by a screw o^4 to an extension k^7 of the bracket k' and pressing at its free end upon the front arm of the lever O. The disk k^8 has a peripheral wedge-shaped depression or notch k^9 therein,

Fig. 6, and also shown in dotted lines, Fig. 4, to receive the projection o' when the actuating-pawl has acted on the last tooth of the series k^3, to thereby bring said depression below the projection o', as shown in Fig. 4. At its rear end the lever O is beveled on its under side, as at o^5, to ride up on the offset n^2 of the arm N. When the projection o' is seated in the depression k^9, the rear end of the lever O is raised sufficiently to permit the offset n^2 to pass freely under the bevel portion o^5; but when the projection o' rests upon the curved periphery of the disk k^8 the rear end of the lever O will be so depressed that in the next forward movement of the lay the offset n^2 will strike the beveled part o^5, whereby said offset n^2 will be depressed to rock the arm N and force its upper end n' toward the grid c^5, to thereby tilt the fork F and prevent engagement therewith by the weft-hammer G.

It will be noticed that the detector mechanism is located adjacent one side of the loom in the present invention, and the filling-supplying mechanism, or so much of it as is shown, at the opposite side of the loom, as is common in magazine-looms, and to the end of the shaft k, extended through the loom side a', is attached a disk-like head P, provided with diametrically opposite ears p p', forming bearings for the controlling member of the filling-supplying mechanism, said member being herein shown as a rod p^2, angularly movable with the head P by rotation of the shaft k, and also adapted to slide in said ears radially to the axis of the shaft k, said controlling member having a collar or other projection p^3 fast thereon, between which and the ear p is inserted a spiral spring p^4, surrounding the slide-rod. The extremities p^6 p^7 are herein shown as pointed or conical for a purpose to be described.

Inasmuch as the filling-supplying mechanism *per se* is not of my invention, I have only shown herein one member thereof—viz., the transferrer Q, which effects the transfer of a fresh filling-carrier from the magazine or hopper to the shuttle, substantially as, for instance, in United States Patent No. 529,940, dated November 27, 1894—fulcrumed in a suitable bearing q, Fig. 2, mounted on the loom side a' and held by a spring q' normally in the position shown in Figs. 1 and 2, with a depending arm or dog q^2 bearing against a stud or stop q^3 on the loom side, the upper end q^4 of the transferrer being thus held in position to engage a new filling-supply and carry it from the magazine or hopper into operative position. The lower end of the arm or dog q^2 is notched, as at q^5, to receive the adjacent end of the controlling member p^2, the extremity p^6 of which is pointed or conical to more readily enter the notch. A bunter c^6 is secured to the under side of the lay and projects forward and below the latter, so that when the lay is in its extreme forward position the notched end of the arm q^2, the center of the disk-like head P, and the front end of the bunter will be substantially in alinement, the distance between arm q^2 and bunter c^6 at such time being less than the length of the controlling member p^2, the bunter being notched at c^7 to receive the pointed end p^7 of the controlling member, which latter when in operating position between the arm or dog q^2 and the bunter is moved longitudinally and bodily relatively to the head P as the lay beats up, to thereby rock the transferrer Q and effect the transfer of a fresh supply of filling from the magazine or hopper. In Fig. 1 I have indicated by a series of dotted lines radiating from the center of the head P certain positions, angularly considered, which the controlling member p^2 will assume in the operation of the mechanism, such lines being indicated by the numerals I to VII, inclusive, the controlling member p^2 being normally in the position shown in Fig. 1 and denoted by the line VII. Supposing now that the ratchet K is in the position shown in Figs. 4 and 6, the corresponding position of the head P and controlling member p^2 being best shown in Figs. 1 and 2, if for any reason the filling fails or is absent from its place in front of the grid c^5 when the lay moves forward the filling detector or fork F will not be tilted and its hook f' will be engaged by the weft-hammer, and the slide E will be moved outwardly, rocking the lever J, and thereby raising the detent-pawl j' to release the ratchet-teeth k^2. This release of the ratchet permits the latter and the shaft k to be rotated by or through the spring k^5 in the direction of the arrow 200, Figs. 1, 3, and 4, from the position shown by dotted line VII until the arm k^6 strikes the stop m, Fig. 3, the controlling member p^2 then being in starting position—that is, in the position from which it starts to move into operating position. This starting position is denoted by the dotted line I in the present instance, as the stop m is positioned to permit a rotation of the shaft k through one hundred and eighty degrees; but it is to be remembered that should the position of the stop m be changed for a different number of harnesses the position of the dotted line I would be correspondingly changed. The rotation of the disk k^8 depresses the rear end of the lever O, so that at the next forward movement of the lay the offset n^2 will strike the incline o^5, and the arm N will be rocked to tilt the weft-fork, so that the weft-hammer will not at that pick operate the slide E, and the lever O and arm N will continue to perform such function until by the operation of the pawl-carrier L and its pawl l, acting on the teeth k^3, the controlling member p^2 is moved pick by pick to the successive posititions denoted by lines II, III, IV, and V, Fig. 1, and next the position VI in line with the transferrer-arm q^2 and bunter c^6, so that at the next forward movement of the lay thereafter the transferrer Q will be actuated to transfer a fresh supply of filling from the hopper or magazine. The succeeding backward movement of the lay will operate

the pawl l to turn the disk k^8 sufficiently to move the controlling member p^2 out of operative position into final normal position, (indicated by line VII, Fig. 1.)

It will be understood that as many teeth of the series k^3 of the ratchet K will be used as there are harnesses, if the number of harnesses be even, while if the number of harnesses is odd one more tooth of the series k^3 than the total number of harnesses will be used, provided the filling-detector and filling-supplying mechanism are located at or near opposite sides of the loom in order that the new filling shall be thrown across the shed at the pick of the cycle in which the filling failure occurred. When less than the whole number of teeth of the series k^3 are used, such teeth will be used as are consecutive farthest from the depression k^9.

In Fig. 3 the stop-plate M is shown in position to utilize all of the teeth k^3, herein shown six in number, and is therefore in the position it would occupy when five or six harnesses are employed to make the figure.

By this invention should a filling fail in any shed of a series—as, for instance, shed No. 3 in a five-harness figure—the filling-fork after its detecting operation will be prevented from operating on successive figures, and when shed No. 3 of the next cycle is opened the fresh supply of filling will be transferred, so that the fresh filling will be laid in shed No. 3 of the next succeeding cycle, after which the parts operate normally until another failure of filling.

The continuous and intermittent angular movements of the controlling member p^2 may be termed "auxiliary" movements, the combined effect of which is to bring said member into operating position, and the longitudinal or bodily movement of said member may be termed the "main" movement thereof, the function of which is to effect the operation of the filling-supplying mechanism, said main movement of the controlling member being independent of the auxiliary movement. The controlling member has a quick continuous movement due to the spring k^5 when the shaft k is released by or through the devices governed by the filling-detector, such movement terminating at a predetermined point, (denoted by the line I, Fig. 1,) and thereafter the auxiliary movement of the controlling member will be intermittent or step by step from line II to line VI, Fig. 1—that is, until it is placed in position to effect the operation of the filling-supplying mechanism—and after it has reached such position at the latter point the main independent movement is effected, as has been described, after which the return to normal position (denoted at VII, Fig. 1) is effected.

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

1. In a loom, filling-supplying mechanism, a controlling member therefor, a detector to detect the absence of filling, devices governed by said detector and rendered operative upon detection of filling failure to effect movement of said controlling member to a predetermined position, and means to thereafter effect movement of said controlling member from such position into position to effect the operation of the filling-supplying mechanism.

2. In a loom, filling-supplying mechanism, a controlling member therefor,. a detector to detect the absence of filling, devices governed by said detector and rendered operative upon detection of filling failure to effect movement of said controlling member in one direction to a predetermined position, and independent means to effect subsequent movement of said controlling member in the opposite direction into operating position ready to cause the operation of the filling-supplying mechanism.

3. In a loom, filling-supplying mechanism, a controlling member therefor, a detector to detect the absence of filling, devices governed by said detector and rendered operative upon detection of filling failure to effect movement of said controlling member to starting position, means to effect subsequent movement of said controlling member into operating position, and means to change the starting position of said member to thereby vary the extent of its subsequent movement and the time of operation of the filling-supplying mechanism:

4. In a loom, filling-supplying mechanism, a controlling member therefor having main and auxiliary movements, a detector to detect the absence of filling, means governed by or through said detector upon failure of filling to effect auxiliary movement of the controlling member into operative position, the main movement of said member thereafter effecting the operation of the filling-supplying mechanism, and means to effect such main movement.

5. In a loom, filling-supplying mechanism, a controlling member therefor having a longitudinal, and an angular movement, a filling-detector, means the operation of which is governed by said detector upon failure of the filling to effect angular movement of said controlling member to a predetermined position, and to effect subsequent reverse movement thereof into operative position, and independent means to effect the longitudinal movement of said member to operate the filling-supplying mechanism.

6. In a loom, filling-supplying mechanism, a controlling member therefor, having continuous and intermittent auxiliary movements into operating position, and a main independent movement, separate means to effect the two auxiliary movements, a filling-detector, devices governed thereby to cause successive, continuous and auxiliary movements of said controlling member upon detection of filling failure, and means to thereaf-

ter impart the main movement to said controlling member to operate the filling-supplying mechanism.

7. In a loom, filling-supplying mechanism, a controlling member therefor, a rotatable carrier for said member and relative to which it is also movable, means to move said carrier to a predetermined position, and separate means to move it subsequently to place the controlling member in operating position, a filling-detector, devices between it and said carrier, operative upon detection of filling failure to cause the successive operation of said separate means, and a bunter to move the controlling member relatively to its carrier when in operative position, to effect the operation of the filling-supplying mechanism.

8. In a loom, filling-changing mechanism, a controlling member therefor, means to impart to it a continuous movement to a predetermined position, a filling-detector, devices governed thereby to permit the operation of said means to cause continuous movement of the controlling member upon detection of filling failure, an adjustable stop to determine the position to which the controlling member is so moved, means to thereafter move said controlling member step by step from such position into operating position, and a bunter to engage and move said controlling member when in operating position, to thereby actuate the filling-changing mechanism.

9. In a loom, filling-changing mechanism, a controlling member therefor, a filling-detector, means including a spring, operative upon detection of filling failure to move the controlling member to starting position, separate means to move said controlling member step by step from starting position into operating position, and a device to move the controlling member when in the latter position to thereby actuate the filling-changing mechanism.

10. In a loom, the lay, filling-changing mechanism, a controlling member therefor, an angularly-movable spring-controlled carrier upon which it is movably mounted, connections between the lay and carrier, to move the latter step by step into normal position, a detent to retain the carrier in such position, means, including a filling-detector, to withdraw said detent and permit spring-impelled movement of the carrier to a predetermined position, subsequent movement thereof by or through the lay bringing the controlling member into position to effect operation of the filling-changing mechanism, and means to prevent withdrawal of the detent during the step-by-step movement of the carrier.

11. In a loom, the lay, filling-changing mechanism, a controlling member therefor, an angularly-movable spring-controlled carrier upon which it is movably mounted, connections between the lay and carrier, to move the latter step by step into normal position, a detent to retain the carrier in such position, means, including a filling-detector, to withdraw said detent and permit spring-impelled movement of the carrier to a predetermined position, subsequent movement thereof by or through the lay bringing the controlling member into position to effect operation of the filling-changing mechanism, means to prevent withdrawal of the detent during the step-by-step movement of the carrier, and an adjustable stop to determine the extent of movement of the carrier.

12. In a loom, filling-supplying mechanism, a controlling member therefor, a detector to detect the absence of filling, means controlled by detecting action of the detector to effect the movement of said controlling member to a predetermined position, separate means to effect subsequent movement of said member in the same path from such position into operating position to cause actuation of the filling-supplying mechanism on the next succeeding pick of the cycle corresponding to that pick on which failure of filling was detected, and means to prevent detecting action of the detector during movement of the controlling member into operative position.

13. In a loom, a filling-detector, filling-supplying mechanism, normally inoperative means for controlling and actuating said mechanism, including a controlling member having continuous movement in one direction and an intermittent movement in the opposite direction, means controlled by or through detecting action of said detector to move said member to starting position and separate means to thereafter move the said member intermittingly for a predetermined number of picks into position to effect operation of the filling-supplying mechanism, and means to retain said detector inoperative during such intermitting movement.

14. In a loom, filling-supplying mechanism, normally inoperative controlling means therefor including an angularly-movable controlling member movable into operative position through a variable arc dependent upon the number of harness members, a filling-detector to detect the absence of filling, means controlled by detecting movement thereof to effect the movement of said controlling member into initial position means to thereafter move said member into operative position in accordance with that pick on which filling failure is detected, to thereupon effect the operation of the filling-supplying mechanism, and means to effect such operation of said mechanism.

15. In a loom, filling-supplying mechanism, including a transferrer, its actuating-dog, and a bunter, a normally inoperative controlling member movable into operative position between said dog and bunter, a filling-detector, and means the operation of which is controlled by or through detection of filling failure thereby to effect movement of said controlling member into starting position, and

means to thereafter move said member intermittingly for a predetermined number of picks into operative position.

16. In a loom, filling-supplying mechanism, controlling means therefor including a dog, a bunter, a spring-controlled and normally inoperative controlling member between the dog and bunter, and a detent to prevent spring-impelled movement of said member, a detector to detect the absence of filling, connections between the detector and detent, to release said spring-controlled member upon detection of filling failure, means to thereafter move said member step by step into operative position between the dog and bunter, to effect a change of filling by the operation of the dog, means to produce the operation of the dog, a device to determine the extent of movement of said controlling member, and means to retain the detector inoperative between the release of said member and its movement into operative position.

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

KIRKLEY HYDE.

Witnesses:
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LEWIS F. LONGMORE.