No. 618,362. Patented Jan. 24, 1899.

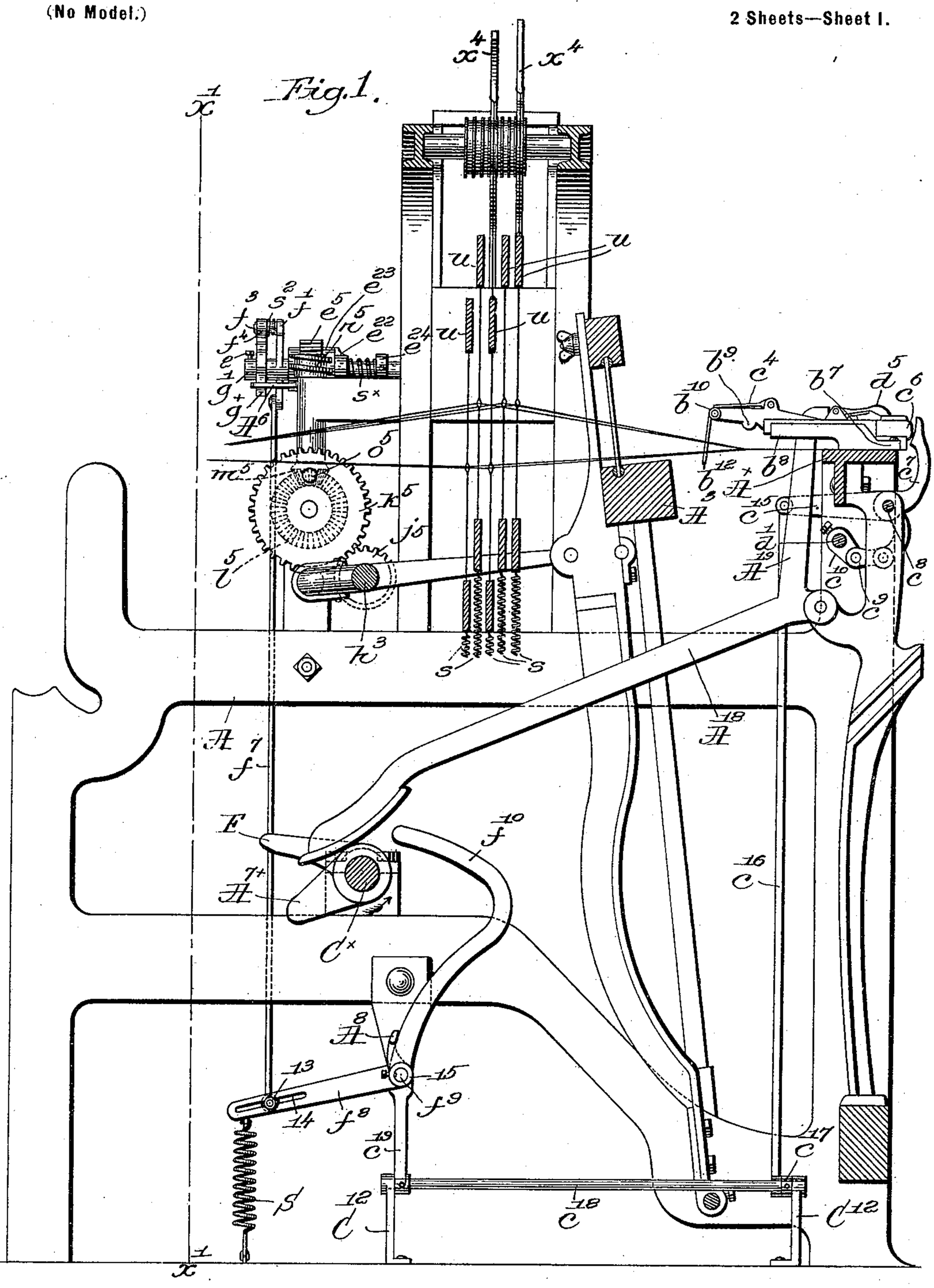
C. A. LITTLEFIELD.

LOOM.

(Application filed Aug. 22, 1898.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.



Witnesses:
Fred L. Grundy.
James M. Wrightsart.

Inventor:
Charles A. Littlefield,
By Crosby Gregory.
Attys.

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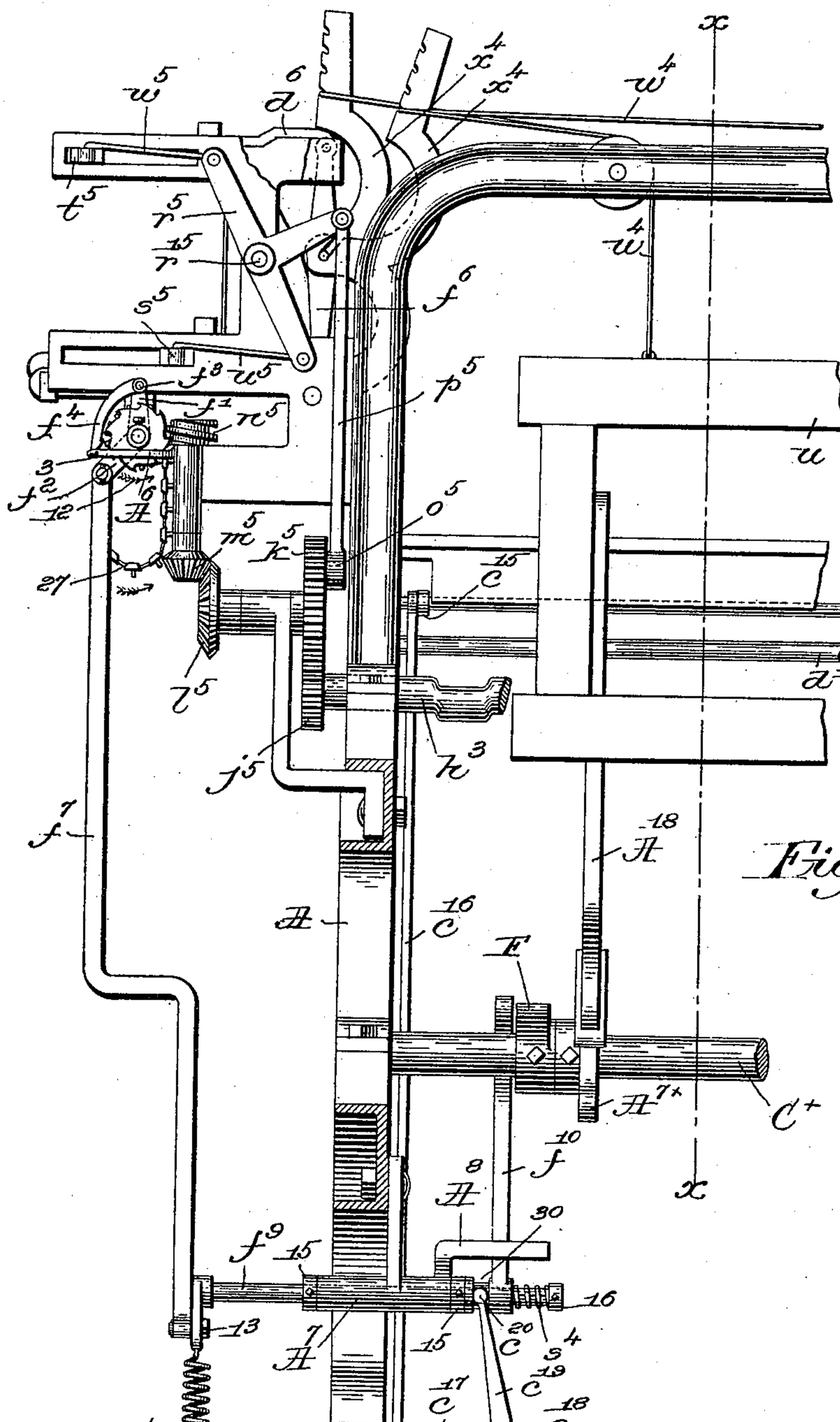

Fig. 2.

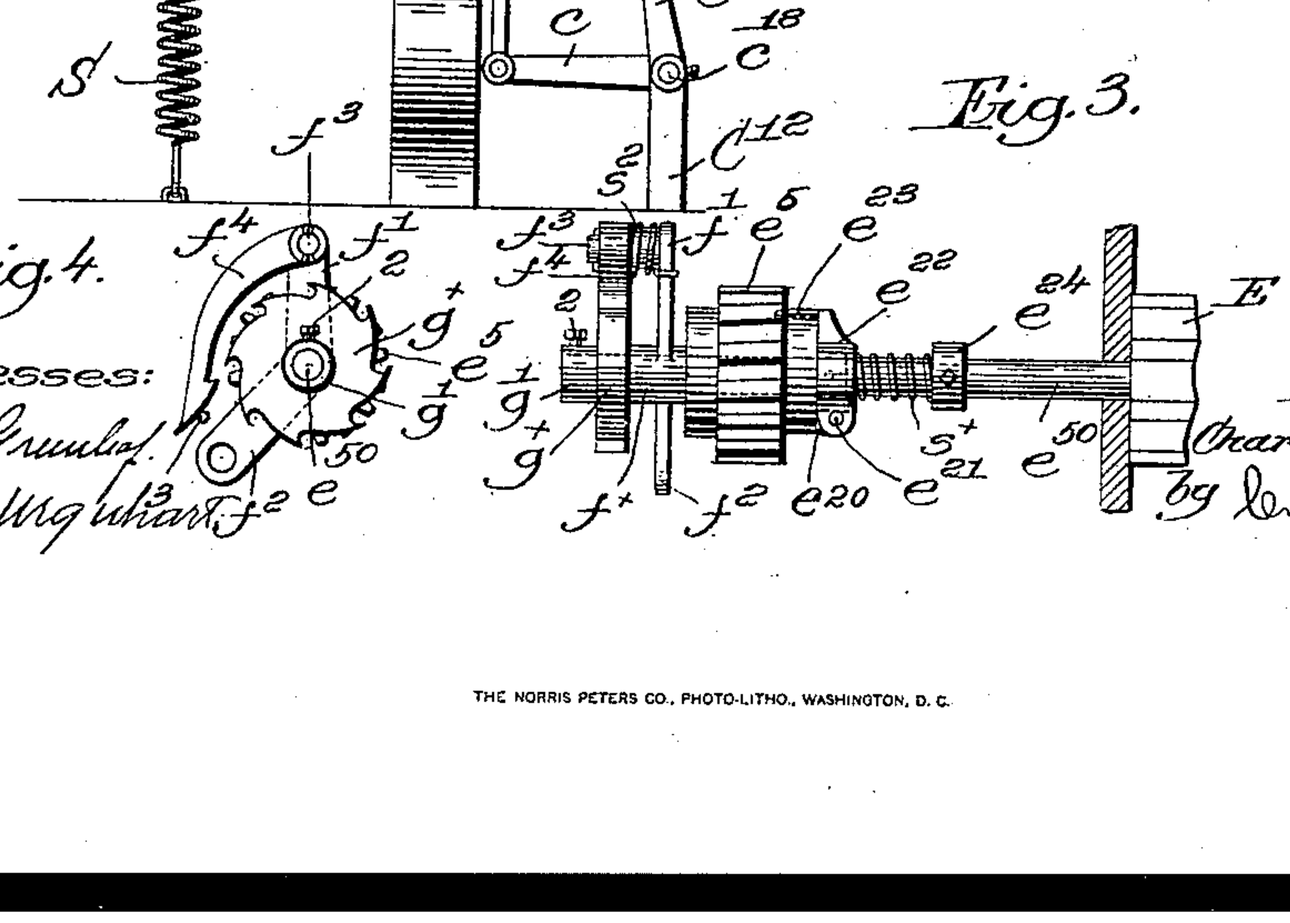

Fig. 3.

Fig. 4.

Witnesses:
Fred. L. Gruenbaum.
James Wright Hart.

Inventor:
Charles A. Littlefield,
by Crosby & Gregory.
Attys.

UNITED STATES PATENT OFFICE.

CHARLES A. LITTLEFIELD, OF LOWELL, MASSACHUSETTS, ASSIGNOR TO THE DRAPER COMPANY, OF PORTLAND, MAINE, AND HOPEDALE, MASSACHUSETTS.

LOOM.

SPECIFICATION forming part of Letters Patent No. 618,362, dated January 24, 1899.

Application filed August 22, 1898. Serial No. 689,226. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. LITTLEFIELD, of Lowell, county of Middlesex, and State of Massachusetts, have invented an Improvement in Looms, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention relates to looms for weaving, and more particularly to that type of loom wherein the operation of the shed-forming mechanism is controlled by or through a pattern-surface of any convenient character—as, for instance, in a "dobby-loom" the movement of the several harness members being effected by a dobby. In a loom of this character it will be obvious that if the pattern-surface is moved forward by suitable means at each pick the failure of the filling either by breakage or exhaustion will result in an improper advance of the picking mechanism, due to the continued movement of the pattern-surface, so that when fresh filling is supplied it will not be laid in the proper shed and the pattern being woven will be imperfect at such point in the cloth. The filling fork or detector is usually constructed to operate at every other pick to detect the presence or absence of filling, and in my present invention the filling-fork is supposed to operate in such manner. The fresh filling may be supplied either by hand or automatically—as, for instance, in the Northrop type of loom, wherein means are provided to furnish the shuttle automatically with a fresh supply of filling upon exhaustion or failure of the filling therein—and I have herein chosen to illustrate my invention as applied to a loom having automatic filling-supplying mechanism.

In accordance with my invention I have provided means for effecting a retrograde movement of the pattern-surface for a predetermined amount or number of picks upon failure of the filling, such retrograde movement being made operative by or through detecting movement of the filling-detector, as will be fully described hereinafter in the specification and particularly pointed out in the claims.

Figure 1 is a vertical sectional view, taken on the line $x\,x$, of a sufficient portion of a dobby-loom to be understood with one embodiment of my invention applied thereto. Fig. 2 is a transverse sectional view of the mechanism at the left-hand side of the loom looking from the back thereof, taken on the line $x'\,x'$, Fig. 1. Fig. 3 is an enlarged view of a portion of the pattern-surface-actuating means to be described, and Fig. 4 is a left-hand end view of Fig. 3.

The loom-frame A, breast-beam $A^{\times}$, the lay A^3, crank-shaft h^3, and the cam-shaft $C^{\times}$ may be and are all of well-known and usual construction in looms. The pinion j^5, fast on the crank-shaft h^3, the toothed gear k^5, having a crank-pin o^5 and fast on a shaft having a bevel-gear l^5, engaging a bevel-gear m^5 on a shaft having a worm n^5, in mesh with a worm-gear e^5 on the shaft e^{50} of the usual cylinder E, carrying the pattern surface or chain 27, the link p^5, the three-armed lever r^5, fast on one end of a rock-shaft r^{15}, there being another lever at the opposite end of said rock-shaft, the lifters t^5 and s^5, the rods w^5 u^5, joining them with the levers on the rock-shaft r^{15}, and the harness-levers x^4, the connectors f^6, mounted thereon and having at their ends usual notched jacks d^6, to be engaged by the lifters s^5 t^5, the harness-cording w^4, and the harness frames or members u^4, herein shown as depressed by springs s, are and may be all substantially as in United States Patent No. 217,589, dated July 15, 1879, to which reference may be had, similar parts herein being represented by like letters and figures.

Five harness members or frames u^4 are herein shown, though only two of the levers x^4 are illustrated, and it will be understood that each harness-frame has its corresponding lever x^4 and that while five harness-frames are shown my invention is not restricted to that number, nor, indeed, to the particular lifting mechanism for the harness-frames nor the precise means for operating the pattern surface or chain.

Referring now more particularly to Fig. 3, the shaft e^{50} has fast upon it a collar e^{20}, to which is pivoted at e^{21} a dog e^{22}, straddling the shaft and provided with a bevel-ended projection e^{23}, adapted to enter one of a series of sockets or recesses in the adjacent side of the

worm-gear e^5, which is loose on the shaft, the projection being pressed toward the gear by a suitable spring $s^\times$, fixed at one end to the shaft e^{50} by a collar e^{24}, which construction is well known and not of my invention, its object being to permit the shaft e^{50} to be turned independently of the worm-gear e^5 when desired. At its other end the shaft has loose thereon, next the worm-gear, a sleeve $f^\times$, provided with arms f' f^2, and at the outer end of the sleeve a ratchet-wheel $g^\times$ is rigidly secured to the shaft by a set-screw 2 through its hub g', so that the shaft and ratchet-wheel will always rotate together. A stud f^3, extended from the upper end of arm f', parallel to the shaft, has pivotally mounted upon it a pawl f^4, normally held by a spring s^2 against a stop 3 on a part A^6 of the frame, (see Fig. 2,) so that the pawl is held away from the ratchet-wheel, as shown in Figs. 2 and 4, the ratchet-wheel and shaft e^{50} being normally rotated in the direction of the arrow 12, Fig. 2. If, however, the sleeve $f^\times$ is rocked to lift the pawl, it will slide over the stop 3 and engage and rotate the ratchet-wheel and shaft e^{50} in the reverse direction or opposite to the arrow 12, and this rocking movement of the sleeve is effected, as herein shown, by means to be described, controlled by or through the detecting operation of the filling detector or fork.

The arm f^2 of the pawl-carrier or sleeve $f^\times$ has pivotally connected thereto a depending link f^7, adjustably attached at its lower end, as by a bolt 13 in a slot 14, to a rocker-arm f^8, fast on a rock-shaft f^9, mounted in a long bearing A^7, forming part of a stand attached to the loom side. Collars 15, fast on the shaft at the ends of the bearing, prevent longitudinal movement of said shaft, which latter has splined thereto at its inner end an upturned arm f^{10}, normally held against a lateral stop-finger A^8 on the bearing by the action of the spring S, one of whose ends is fixed and the other secured to the rocker-arm f^8.

Between the hub of the sliding arm f^{10} and a collar 16, fast on the rock-shaft f^9, is interposed a spring s^4 to normally maintain said arm in the position shown best in Fig. 2 at one side of the path of a cam F on the shaft $C^\times$; but when the arm f^{10} is slid on the rock-shaft f^9 to the right, Fig. 2, into the path of the said cam the latter will engage the arm and thereby rock the shaft to depress the link f^7, and thus cause the pawl f^4 to effect retrograde movement of the pattern-surface shaft e^{50}. The amount of such retrograde movement is determined by the point of attachment of the link with the rocker-arm f^8 and the shape and extent of the cam F, so that the pattern-surface will be turned back a distance equivalent to the desired number of picks, usually two or more.

It is now necessary to describe the connections between the filling detector or fork and the mechanism just described, and, referring more particularly to Fig. 1, the breast-beam $A^\times$ has mounted upon it near one end a stand b^7, having a guideway b^8, in which a slide b^9 is adapted to reciprocate, the filling detector or fork b^{12} being pivoted at b^{10} on the slide, the fork being engaged at times by the weft-hammer A^{19}, while a check c^4 is pivoted on the slide to aid the fork in turning about its pivot b^{10} after it has been tilted. The slide b^9 has at its outer end a projection c^6, against which normally acts a lever c^7, pivoted at c^8 and being shown as joined by a link c^9 to an arm c^{10} of the rock-shaft or rod d', and the parts just described are and may be all as in United States Patent No. 529,943, dated November 27, 1894, to which reference may be had, the weft-hammer A^{19} having a connected lever A^{18}, rocked by a cam $A^{7\times}$ on the cam-shaft $C^\times$ at every alternate pick of the loom.

I have provided the lever c^7 with an arm c^{15}, which is pivotally connected by a link c^{16} with a rocker-arm c^{17}, fast on a rock-shaft c^{18}, mounted in stands C^{12} and at right angles to the rock-shaft f^9. A second rocker-arm c^{19}, fast on the shaft c^{18}, is upturned and forked or formed with a yoke c^{20} at its upper end to enter a groove 30 (see Fig. 2) in the hub of the slide-arm f^{10}, so that when the link c^{16} is lifted the yoke-arm c^{19} will operate to move the slide-arm f^{10} against its spring s^4 into the path of the cam F to be engaged thereby and moved as described. Now, as in said Patent No. 529,943, if the filling is properly laid the detector b^{12} will be tilted; but if the filling fails and is not in the shed opposite the detector when the lay beats up the detector will not be tilted, and by the intervening devices the lever c^7 will be turned, and the arm c^{15} thereof will be elevated to thereby move the yoke-arm c^{19}, as has been described, and at the same time the rock-shaft d' will be turned. Such turning of the rock-shaft d' in the patent referred to causes a transferrer to operate (not herein shown) to transfer a fresh supply of filling from a suitable hopper into the shuttle then in the adjacent shuttle-box, ejecting the spent or partially-exhausted filling-supply then in the shuttle. Inasmuch as this automatic filling-supplying mechanism is not of my invention and is well-known I have not herein shown the same further than to show the rock-shaft d', which is the initial or prime actuator for effecting the operation of said mechanism. Now in looms provided with such filling-supplying mechanism the latter is located at one end of the lay and the filling-detector at the other end, and with the loom herein illustrated the transfer of filling would take place at the left-hand side of the loom and detection of the filling at the right-hand side.

In such a loom as described the detection of filling failure and the insertion of a fresh supply of filling in the shuttle usually consumes three picks, owing to the relative positions of filling-detector and filling-supplying mechanism and the detecting operation

of the detector at every alternate pick. So I have arranged the devices constituting my invention to effect retrograde movement of the pattern-surface a distance equivalent to three picks. Consequently when the fresh filling is again laid in the shed the pattern-surface is in position to resume control of the shed formation at the point where the filling failed.

Having fully described my invention in one practical embodiment thereof without attempting to show the various modifications thereof which may be made, I do not restrict myself to the precise construction and arrangement herein shown and described.

What I claim, and desire to secure by Letters Patent, is—

1. In a loom, shed-forming mechanism, a pattern-surface to control the operation thereof, actuating means for said pattern-surface, a filling-detector, and means operated by or through the said detector upon failure of the filling to effect retrograde movement of the pattern-surface for a predetermined amount.

2. In a loom, shed-forming mechanism, a pattern-surface to control the operation thereof, a shaft to effect the movement of the pattern-surface, means to normally rotate said shaft, independent normally-inoperative means to rotate said shaft in the opposite direction and effect retrograde movement of the pattern-surface, a filling-detector, and connections between it and said normally-inoperative means, to actuate the latter upon detection of filling failure by said detector.

3. In a loom provided with filling-supplying mechanism, a filling-detector to effect the operation of said mechanism upon failure of the filling, shed-forming mechanism, a pattern-surface controlling the same, means to actuate the pattern-surface, and independent means operated by or through detecting movement of the filling-detector to effect retrograde movement of the pattern-surface.

4. In a loom, shed-forming mechanism, a pattern-surface to control the operation thereof, a shaft to move the pattern-surface, means to normally rotate it, a ratchet-wheel fast on the shaft, a normally-inoperative pawl, a filling-detector, and means operated by or through detecting movement thereof to effect engagement of the pawl and ratchet-wheel and rotate the shaft in reverse direction to cause retrograde movement of the pattern-surface.

5. In a loom, shed-forming mechanism, a pattern-surface to control the operation thereof, actuating means for said pattern-surface, a filling-detector, means, including a rotating cam and a normally non-coöperative arm, to effect retrograde movement of the pattern-surface, and devices operative by or through said filling-detector upon failure of the filling to move said arm into position to be engaged and actuated by the cam.

6. In a loom, shed-forming mechanism, a pattern-surface to control the operation thereof, means to normally actuate the pattern-surface, independent means to effect retrograde movement thereof, and filling-supplying mechanism, combined with a filling-detector, a lever moved by or through said detector upon failure of the filling, and independent means operated by movement of said lever to operate the filling-supplying mechanism and to actuate the means for effecting retrogression of the pattern-surface.

7. In a loom, a pattern-surface to control the formation of the shed, normally-inoperative means to effect retrograde movement of said pattern-surface, and a filling-detector to control the operation of said means and effect actuation of the same upon failure of the filling.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES A. LITTLEFIELD.

Witnesses:
JOHN C. EDWARDS,
EMMA J. BENNETT.