(No Model.) 3 Sheets—Sheet 1.

E. W. DAVENPORT.

LOOM.

No. 596,854. Patented Jan. 4, 1898.

Fig. 1.

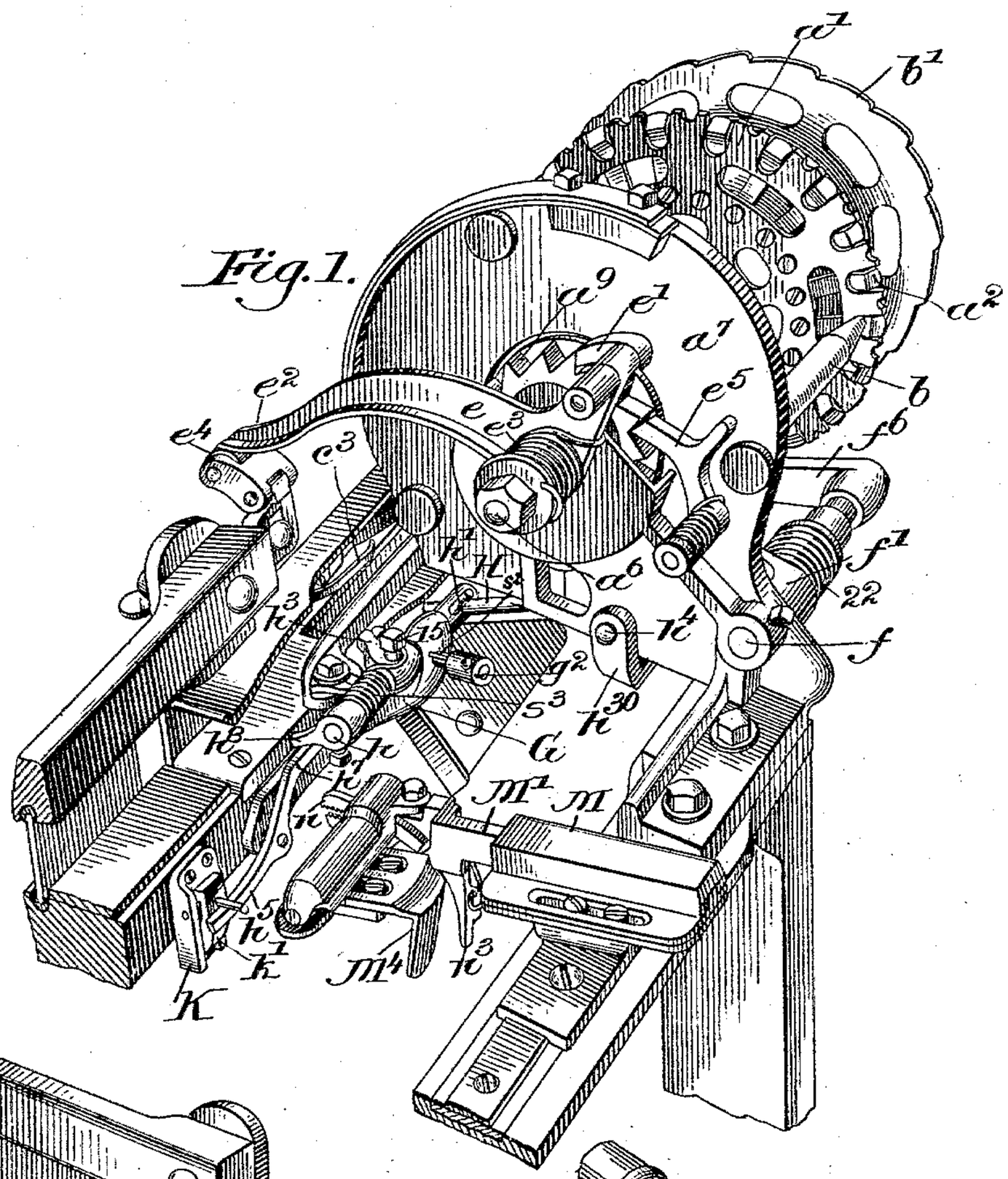


Fig. 2.

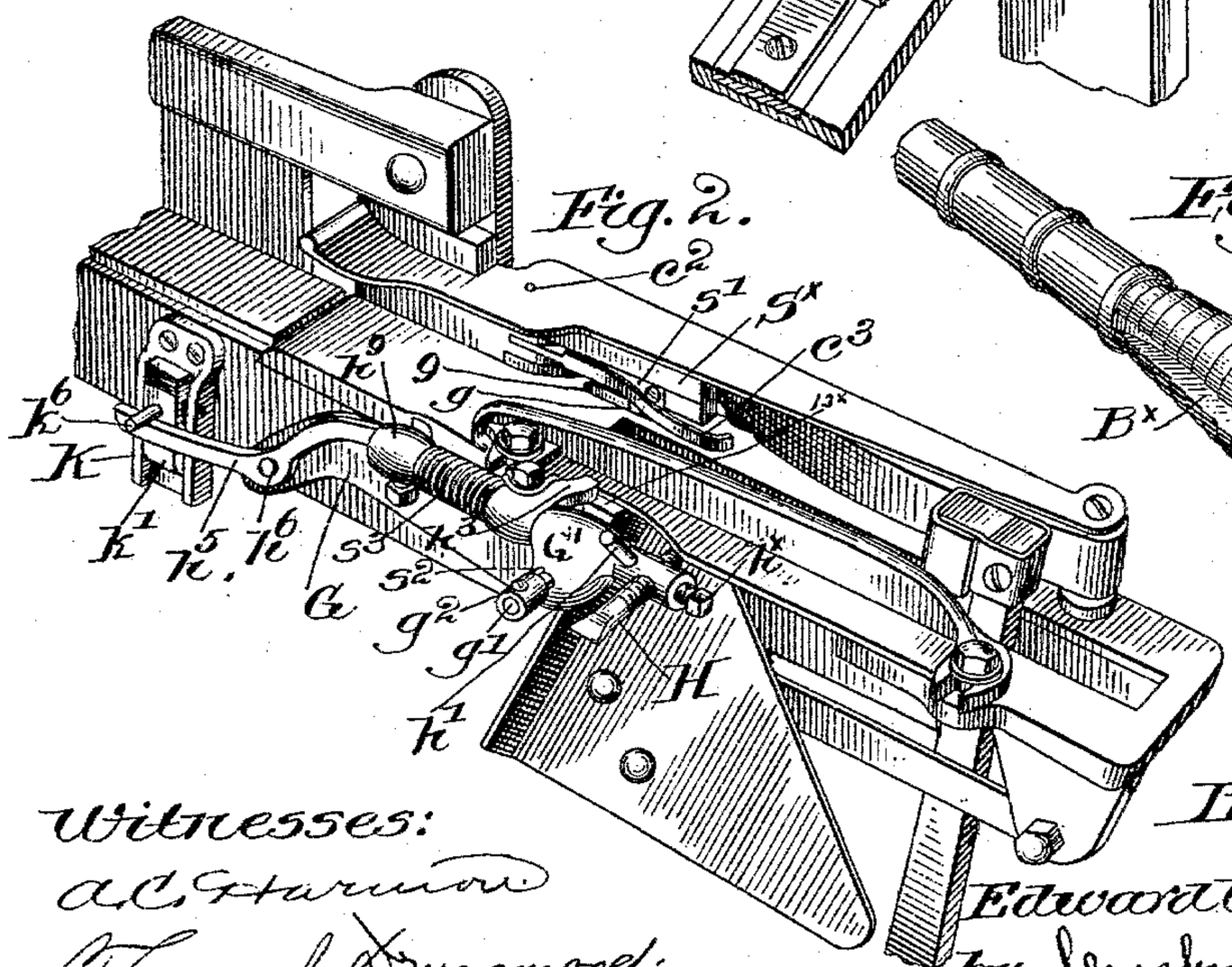
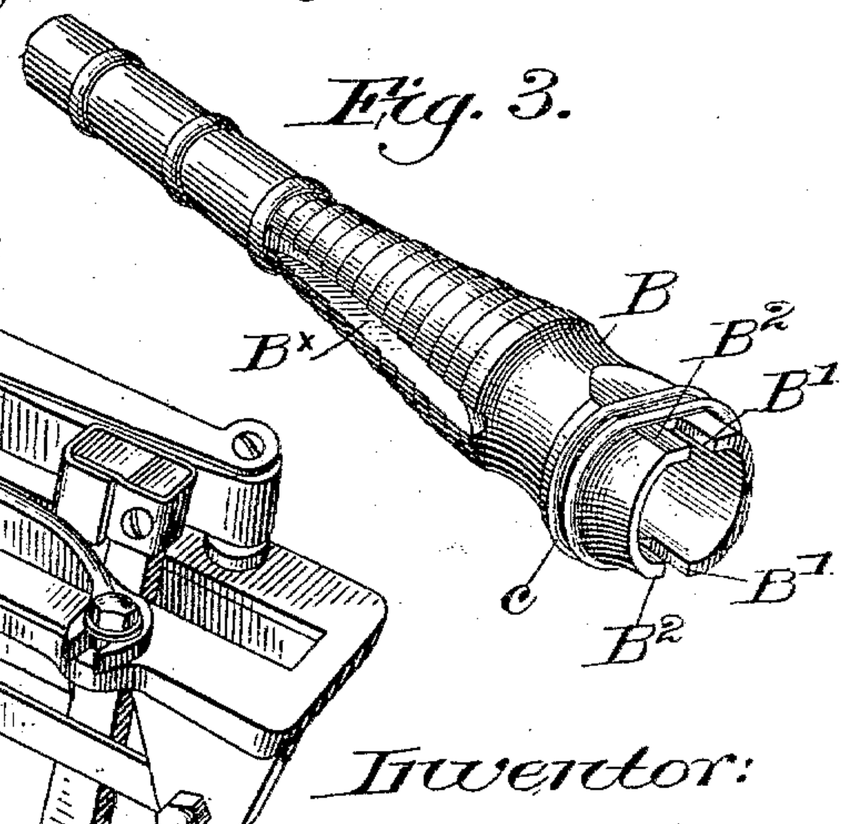


Fig. 3.



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(No Model.) 3 Sheets—Sheet 2.

E. W. DAVENPORT.

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Fig. 4.

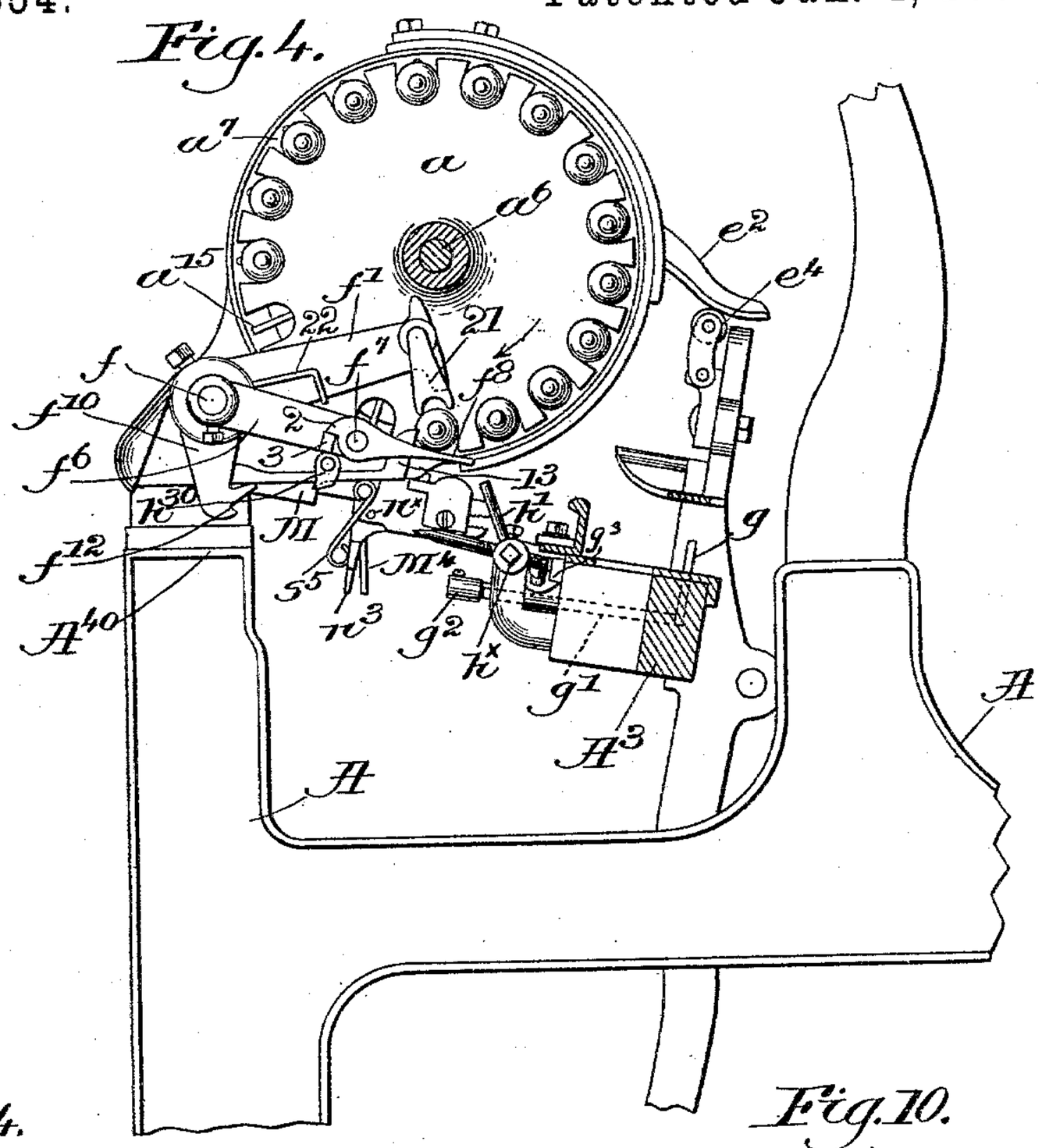


Fig. 14.

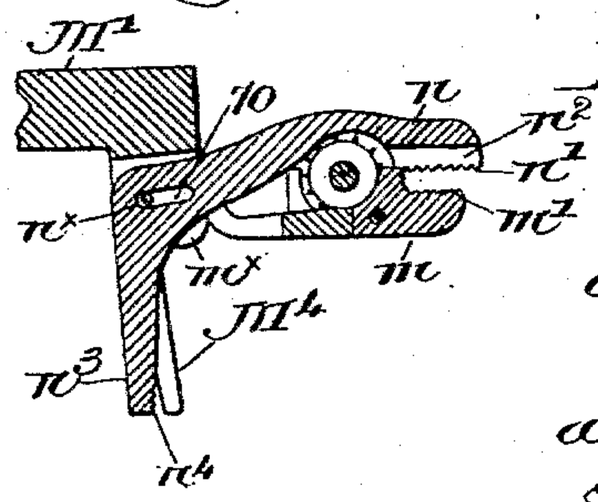


Fig. 5.

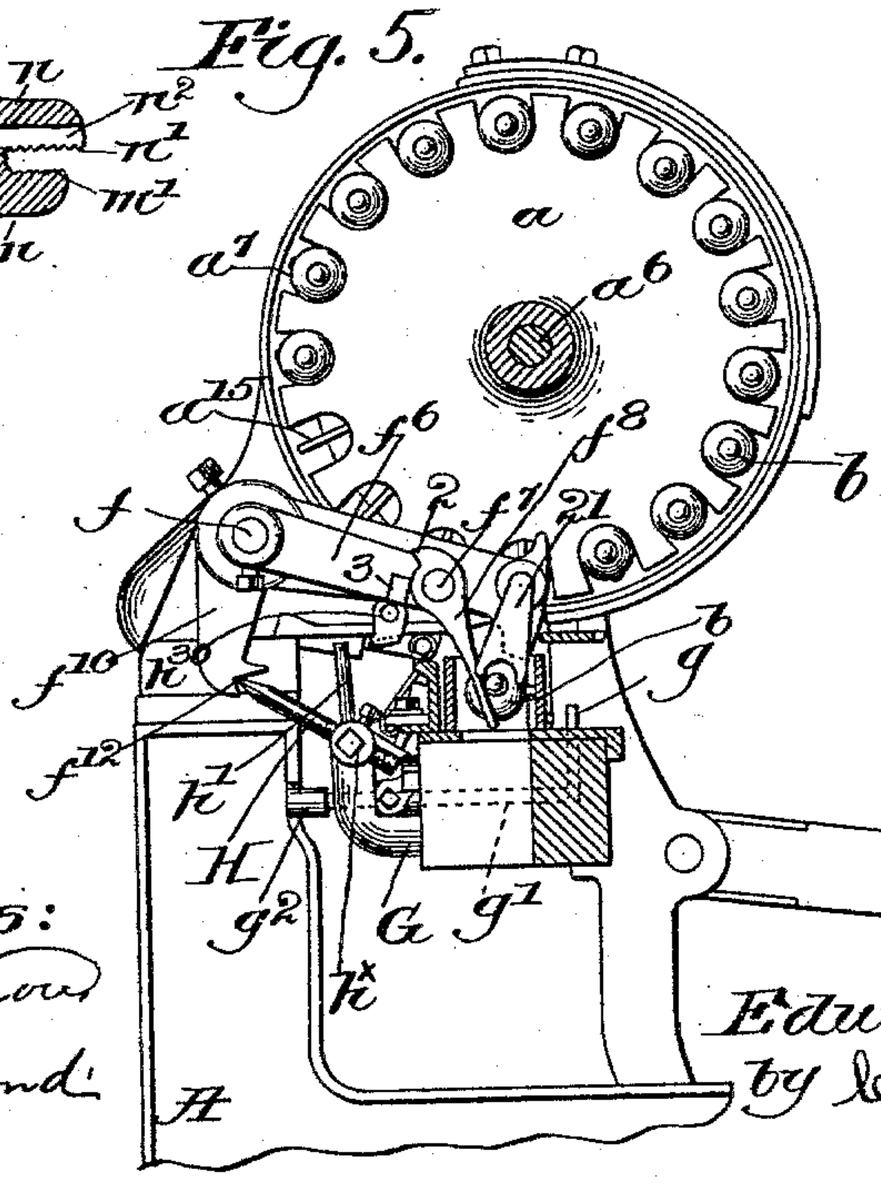
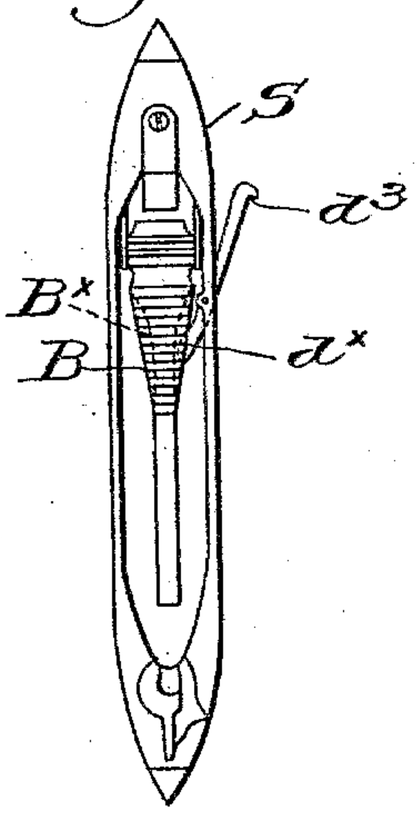


Fig. 10.



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(No Model.) 3 Sheets—Sheet 3.

E. W. DAVENPORT.

LOOM.

No. 596,854. Patented Jan. 4, 1898.

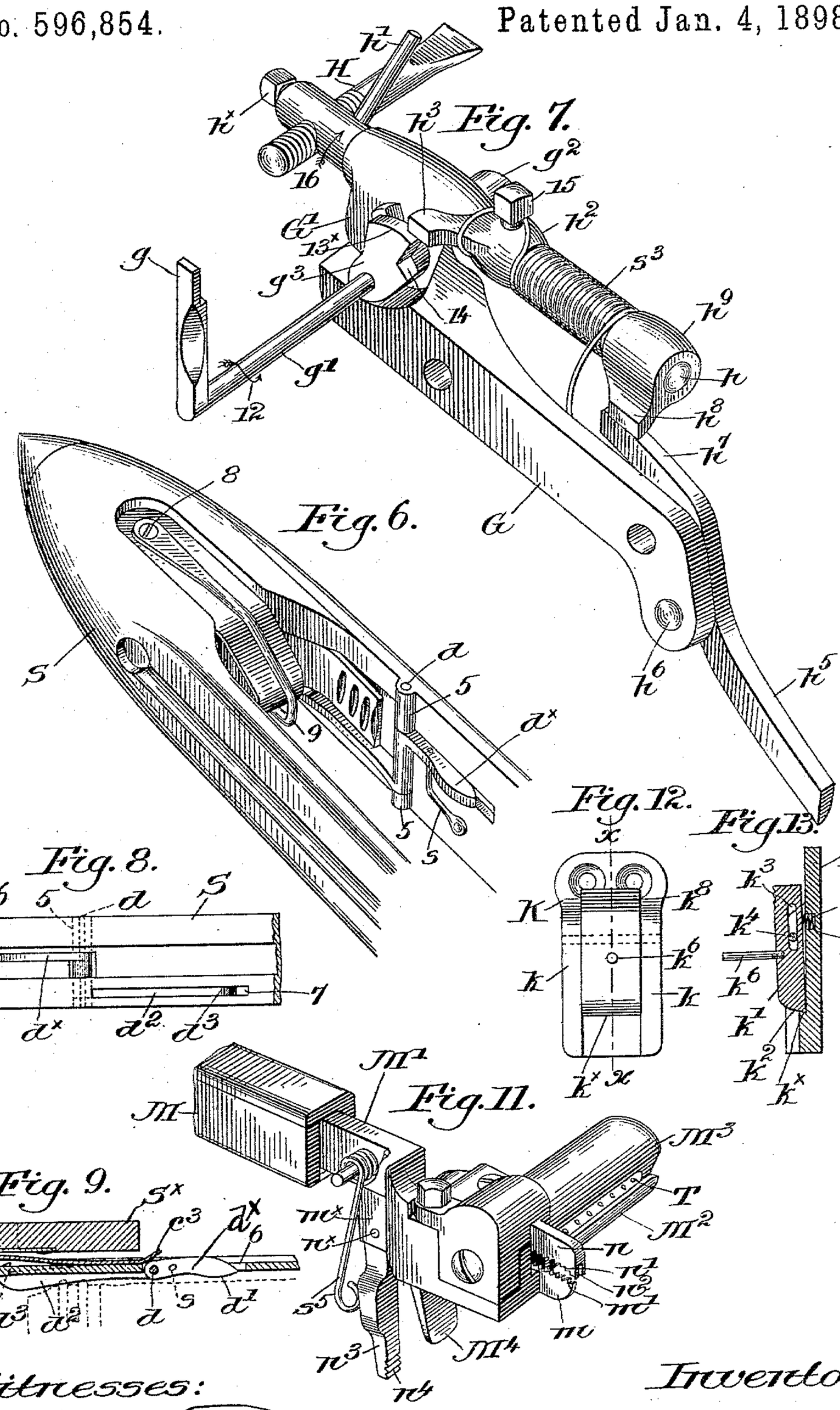

Fig. 8.

Fig. 9.

Fig. 12.

Fig. 13.

Fig. 11.

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UNITED STATES PATENT OFFICE.

EDWARD W. DAVENPORT, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO THE DRAPER COMPANY, OF SAME PLACE AND PORTLAND, MAINE.

LOOM.

SPECIFICATION forming part of Letters Patent No. 596,854, dated January 4, 1898.

Application filed February 3, 1897. Serial No. 621,730. (No model.)

To all whom it may concern:

Be it known that I, EDWARD W. DAVENPORT, of Hopedale, county of Worcester, 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 more particularly to that class of looms wherein the filling having been exhausted from the filling-carrier or broken a fresh supply of filling is automatically supplied to the shuttle, the spent filling-carrier being ejected from the shuttle, as in the well-known "Northrop" loom.

In United States Patent No. 527,014, dated October 2, 1894, means were provided to prevent a weft end from being left between the selvages, said means coöperating with filling-supplying mechanism acting to automatically supply to the shuttle a fresh supply of filling when the filling in the shuttle has been nearly exhausted or exhausted to a predetermined point. The amount of filling present in the shuttle is ascertained by a detector, which enters the open top of the shuttle at each beat of the lay and feels or engages the filling on the bobbin or cop generically termed the "filling-carrier." In such construction the end of filling from the spent and ejected filling-carrier extended thereto from the selvage of the cloth, and so, too, when the fresh filling-carrier was inserted and the shuttle thrown an end of filling would be left beyond the selvage and between it and the point of attachment of the filling end to the filling-supplying mechanism. Such filling ends are apt to become woven into the fabric, and in United States Patent No. 553,814, dated January 28, 1896, means were provided for parting the spent filling close to the selvage, and also to part the new filling adjacent thereto, so that no long loose ends of filling should be left beyond the selvage, and in that instance also the amount of filling on the filling-carrier is detected by a detector entering the shuttle at its open top and feeling the filling.

In this present invention I have provided a feeler or detector movable with the shuttle itself to detect the gradual decrease of the filling on the filling-carrier, the operation of the detector being so delicate that when the last portion of thread is being unwound the detector will come into such position as to through suitable intervening devices actuate the transferrer and transfer a fresh supply of filling into the shuttle. By this means only a very short length of filling is left on the ejected filling-carrier and considerable waste is prevented in consequence.

In order to render the action of the detector as fine or delicate as possible, I have provided the cop or bobbin, preferably in its cone, with a recess which is opposite the detector and which may be entered by the latter when the thread on the filling-carrier is wound off sufficiently to expose the entrance to said recess. When the detector is thus free to move, it is made operative to set in motion the transferring mechanism.

As the detector is mounted at a fixed point on the shuttle, it is essential that a filling-carrier when transferred to the shuttle shall always have the same position, so far as its recess is concerned, relative to the detector, and for this purpose I have shown the base of the filling-carrier as so constructed that it will always be placed in one position in the shuttle. This particular construction, however, is not broadly of my invention and is not so herein claimed, the same forming the subject-matter of United States Patent No. 587,652, dated August 3, 1897.

Various novel features pertaining to my invention will be hereinafter fully described, and particularly pointed out in the claims.

Figure 1 is a perspective view of the filling-supplying mechanism and a sufficient part of the lay and breast-beam of a loom to be understood with my invention embodied therein. Fig. 2 is a perspective view, enlarged, of the shuttle-box at the end of the lay adjacent the filling-supplying mechanism, showing some of the mechanism coöperating with the detector and also the controlling means for the thread-parting devices. Fig. 3 is a partial perspective view of a filling-carrier adapted to be used in connection with the detector in my invention. Fig. 4 is a longitudinal sectional view of a sufficient portion of the loom with the lay back, the transferring mechanism and the controlling means being in nor-

mal position. Fig. 5 is a like view, the lay, however, being forward, with the transferring mechanism in position transferring a fresh filling-carrier to the shuttle. Fig. 6 is a perspective view of one end of the shuttle with the filling-carrier removed, showing clearly the detector or feeler. Fig. 7 is a like view of the transferrer, actuator, and the controlling means for the thread-parting devices, said means being governed by the detector. Fig. 8 is a detail in side elevation of the outer side of the shuttle, showing the detector in position. Fig. 9 is a horizontal sectional detail of the shuttle-wall, the detector, and a portion of the shuttle-box with the means for imparting detecting movement to the detector. Fig. 10 is an outline view in plan of the shuttle, the filling-carrier, and the detector when the latter is in detecting position. Fig. 11 is a perspective view of the temple and temple-stand with the thread-severing device carried thereby. Fig. 12 is an enlarged detail in elevation of the latch-bunter for operating the severing device. Fig. 13 is a longitudinal sectional view thereof on the line $x\,x$, Fig. 12; and Fig. 14 is a partial sectional view of the thread-severing device.

The loom-frame A, the lay A^3, breast-beam A^{40}, the filling-supplying mechanism, including the disks or plates $a\,a'$, the former having a series of notches or pockets and the latter a series of grooves and springs a^2, the stand a^7, supporting a fixed stud a^6, on which the feeder rotates, the ratchet-teeth a^9, the cooperating pawl e' on the pawl-carrier e, having a tailpiece e^2, moved in one direction by the spring e^3 and in the other direction by a roller e^4 on the lay to rotate the feeder step by step whenever a filling-carrier has been transferred to thereby put the endmost filling-carrier of the series against the stop 13, the detent e^5, the stud f on the stand a^7, upon which stud is mounted the hub of the pusher f', having a finger 21 to act against the tip of the filling-carrier, the elevating-spring 22 for the pusher, and the weft-end holder b' may be and are all substantially as represented in United States Patent No. 529,940, the parts in practice being operated as therein provided for.

The arm f^6, attached to the stud f, has pivotally mounted at or near one end thereof on a stud f^7 a tip supporting or directing device f^8, (see Figs. 4 and 5,) having a lug 2, normally kept in contact with a stop 3, projecting from the arm by a suitable spring, (not shown,) all substantially as in United States Patent No. 529,942, to which reference may be had.

The feeder head or disk a is provided in each of its notches with a radially-disposed guide a^{15}, so that when the filling-carriers B (see Fig. 3) are put into the feeder the slots B′ in the heads of said carriers will each embrace a guide, preventing any rotative movement of the carriers while in the feeder or while being removed therefrom by the pusher f'.

In Fig. 3 the head of the filling-carrier is shaped to present two flat or secant surfaces B^2, whereby when a carrier is removed from the feeder one of said flat surfaces tends to and will contact with the flat upper side of a carrier then in the shuttle S, the head of the carrier being provided with metallic rings c, of usual construction, such construction being shown in and forming the subject-matter of application, Serial No. 617,869, referred to.

Inasmuch as it is essential to my invention that the filling-carrier will always enter and be held in a certain position relatively to the shuttle, I have adopted the hereinbefore-described construction for attaining such result.

Referring to Figs. 6, 8, 9, and 10, the open shuttle S has mounted on its inner wall in suitable ears 5 a pintle d, serving as a fulcrum for a detector or feeler, (shown as a finger $d^\times$,) preferably convexed on its inner side near its tip, as d', and laterally movable in a longitudinal slot 6 in the shuttle-wall.

Extended oppositely from and preferably below the detector and movable therewith I have provided an arm d^2, preferably shouldered on its outer side, as at d^3, and laterally movable in a longitudinal slot 7 in the shuttle-wall, the arm and finger presenting a lever of the first order, said arm d^2 being termed in the claims a "controller" for the transferring mechanism.

The detector is adapted to coöperate at times with a recess, as $B^\times$, Fig. 3, in the conical portion of the filling-carrier or bobbin B, two such slots being preferably provided opposite each other and longitudinally extended, the thread wound upon the carrier normally covering the slots and preventing pivotal movement of the detector toward the longitudinal center of the shuttle sufficient to operate the transferrer. When, however, the thread has been drawn off or unwound from the carrier until a sufficient portion of the recess $B^\times$ has been uncovered, then the detector can and will, as will be described, enter the recess and through the arm d^2 and suitable intermediate devices effect the operation of the transferring mechanism to transfer a fresh filling-carrier to the shuttle.

A light spring s, Fig. 6, normally acts upon the detector to press it outward and away from the mass of thread on the filling-carrier while the shuttle is passing through the shed and to normally maintain the detector in inoperative position.

To more certainly guide and retain the filling-carrier in proper position in the shuttle, I have secured to the latter at the jaw end, as by screw 8, Fig. 6, a bent wire 9, extended between the jaws and in a vertical plane to be embraced by the slots B′ in the head of the filling-carrier as the latter is transferred to the shuttle-jaws.

The back $S^\times$ of the shuttle-box, Figs. 1, 2,

and 9, has preferably pivoted thereto at c^2 a finger c^3, preferably of spring metal and convex in the direction of its length toward the exterior of the shuttle-box, said finger being acted upon by a leaf or other spring s', secured to the back $S^\times$ at one end. The finger c^3 is so located that when the shuttle enters the shuttle-box the detector $d^\times$ will be engaged by said finger and will be pressed inwardly thereby, the extent of the inward movement of the detector depending upon the amount of thread then present on the filling-carrier.

In Fig. 9 the shuttle is supposed to have fully entered the shuttle-box and the detector to have passed beyond the yielding-finger c^3, the thread on the filling-carrier not having permitted the detector to be moved inward to any great extent. The spring controlling the finger c^3 is stronger than the retracting-spring s of the detector. Referring to Fig. 10, however, it is supposed that the thread has been sufficiently drawn off from the filling-carrier to leave exposed the slot $B^\times$ therein, so that as the shuttle enters its box the finger c^3, acting on the detector, has pushed the latter into said recess, such movement of the detector throwing out into operative position the arm d^2. As the said arm d^2 is thrown out before the shuttle comes to a stop in the shuttle-box the continued movement of the shuttle will cause said arm to engage and move the upturned arm g of a rock-shaft g', mounted on the lay, the latter being slotted at the rear of the shuttle-box, as at 9, Fig. 2, to permit the reduced upper end of the arm g to project in the path of the arm d^2 when the latter is thrown out.

In Fig. 7 I have shown on an enlarged scale the mechanism controlled by the rocking of the shaft g'. A bracket or stand G has an enlarged portion G', which forms a bearing for the rock-shaft and also for a bunter-shaft h. The controlling-shaft g' has fast thereon at its outer end a collar g^2, to which is attached one end of a spring s^2, the other end being secured to the part G' of the stand and tending to normally turn the shaft in the direction of the arrow 12, Fig. 7, said shaft at the opposite side of its bearing being provided with a cam g^3, having high and low portions $13^\times$ and 14, respectively. The bunter-shaft h has inserted therein the threaded shank of a bunter H, held in adjusted position by a set-screw $h^\times$ in the end of the shaft, and a "resetting-pin" h', as it may be termed, is fixed in the said shaft. A collar h^2, rigidly secured to the bunter-shaft by a suitable set-screw, as 15, is provided with a lip h^3 to coöperate with the cam g^3, the lip in Fig. 7 being shown as resting on the high part $13^\times$ of the cam and held thereon by the action of a spring s^3, one end being fastened to the collar h^2 and the other end being suitably fixed to or bearing against the stand G.

The parts are shown in Fig. 7 in normal position, but when the detector has moved the arm d^2 into operative position the latter engages the upturned arm g of the rock-shaft g' to rock the shaft in the direction opposite to the arrow 12 as the latter continues its movement in the shuttle-box, thereby withdrawing the part $13^\times$ of the cam from beneath the finger h^3, the bunter-shaft then being free to turn under the action of the spring s^3 to raise the bunter into operative position, and as the lay comes forward to engage a dog f^{10}, shown as an arm secured to the pusher f' and preferably notched at f^{12} to receive the bunter, the pusher being thereby depressed, as shown in Fig. 5, to transfer a fresh filling-carrier from the feeder to the shuttle, the transferred filling-carrier engaging and ejecting the spent filling-carrier, as in Patent No. 529,940, the detector being withdrawn from the filling-carrier by its spring s before the transfer is effected. As the lay moves forward after the bunter-shaft has been turned into operative position, as described, the resetting-pin h' will, in the forward movement of the lay, pass beneath and temporarily lift a trip h^{30}, shown as U-shaped and embracing the lower part of the stand a^7, to which it is pivoted at h^4, and when the lay moves back the pin will strike the front edge of the trip and will be turned thereby to rock the bunter-shaft h in the direction of the arrow 16, Fig. 7, thus lowering the bunter and raising the finger h^3 from the part 14 of the cam g^3 and above the part $13^\times$, so that the spring s^2 will rock the shaft g' into normal position, thereby resetting the parts. The trip h^{30} can swing forward sufficiently to permit the passage of the resetting-pin h', as the latter when in abnormal position goes forward with the lay, but said trip acts as a rigid projection on the return or opposite movement of the pin. A lever h^5 is pivoted at h^6 to the bracket or stand G, one end of the lever, as h^7, being located in the path of movement of an ear h^8 on a collar h^9, secured to the bunter-shaft, so that when the latter is turned into operative position, as described, the outer end of the lever will be elevated.

On the front side of the lay I have rigidly secured a guide-plate K, (shown separately in Figs. 12 and 13,) provided with vertical parallel ribs k, the outer face of the said plate between the ribs being longitudinally recessed to leave a shoulder $k^\times$. (See Fig. 13.) A bunter, shown as a slide-block k', preferably beveled at its lower end, as at k^2, is longitudinally slotted at k^3 to receive a pin k^4, secured in the guide-ribs k, so that the block k' may slide vertically between the ribs, the pin being located sufficiently far from the outer surface of the plate as to permit slight rocking motion of the slide-block. A spring s^4, held in the recess k^5, acts to normally throw the upper end of the guide-block outward. The guide-block is provided with an outwardly-projecting pin or stud k^6, beneath which extends the outer end of the lever h^5, as clearly shown in Figs. 1 and 2, so that

when the lever is rocked on its fulcrum by the operative rotation of the bunter-shaft h the outer end of the lever will be elevated, carrying with it the slide-block k', the lower end of the latter at such time being raised above the shoulder $k^{\times}$.

As the bunter-shaft is not returned to normal position until the lay moves back, the lever h^5 will retain the slide-block raised until the lay is moving back, and during the time the block is so held up the spent or exhausted filling-carrier will be ejected and a fresh filling-carrier transferred to the shuttle, and the thread-severing mechanism will be operated to sever the filling end left by the ejected filling-carrier.

I have herein shown a severing device mounted so as to move with the temple, the cutting mechanism being so shaped that it normally stands in the plane outside of the path of the filling end, its movement being such that when operated it will sever the filling end just before or as the temple begins to move with the lay.

The temple-stand M, adapted to be secured to the breast-beam of the loom, the blade-bar M′, having the pod M^2, the cap M^3, the heel M^4, attached to the pod, and the toothed temple-roll T, between the pod and the cap and turning on the usual pivot, are and may be all as usual, the stand M in practice containing a spring to act upon and normally keep the bar M′ pressed inward toward the lay. The pod is slotted to receive a steel blade m, toothed on its upper side, as at m', and the shank or bar M′ has an ear $m^{\times}$, preferably recessed in alinement with the said blade to receive the body of the movable cutting-blade n, slotted at 70 and pivoted in the ear $m^{\times}$ on a pin $n^{\times}$, said outer end being longitudinally slotted at n^2 to receive the fixed blade m when the upper blade is moved. The body of the blade n is provided with a depending heel n^3, preferably roughened or corrugated on its front face, as at n^4, Fig. 11, and acted upon by a suitable spring s^5 to normally throw the heel forward, and thus raise the blade n to leave an open space between it and the fixed blade m, the blade n being also moved forward bodily on its fulcrum $n^{\times}$. In its normal position the heel n^3 is somewhat nearer the breast-beam than the heel M^4, as best shown in Fig. 4, so that if the loom is running properly the lay will engage the heel M^4 and will move the temple forward without operating the cutting mechanism. When, however, the transferring mechanism has been operated, as described, to transfer a fresh supply of filling to the shuttle and the slide-block k' has been raised by the lever h^5 into operative position, the upper end of said block, which may be serrated, as at k^8, will engage the heel n^3 and press the latter back as the lay comes forward, operating the movable cutting-blade to act upon the filling end and sever the same. This takes place the first time while the slide-block k' is upheld by the lever h^5. As the lay goes back it will be remembered that the lever h^5 returns to normal position and its support is therefore withdrawn from the slide-block, but the spring s^4 throws the upper end of the block out, so that its lower end will swing in to be engaged and held by the shoulder $k^{\times}$ of the plate K. As the lay comes forward on its next stroke the heel n^3 will be again engaged and operated by the slide-block still in its path, and the cutting mechanism will be operated a second time, this time acting upon the filling end between the selvage of the cloth and the weft-end holder b'. In its second engagement with the heel the slide-block will be again rocked on its pivot, withdrawing its lower end from the shoulder $k^{\times}$, so that when the lay goes back for the second time, withdrawing from the said heel, the block will be free to drop by gravity to its normal position.

It will be obvious from the foregoing description that the filling-end cutter is operated only when the transfer of filling takes place, and then it is operated twice in succession, the first time to sever the filling end left by the ejected filling-carrier and the second time to sever the filling end extending from the cloth to the filling-feeder, the shuttle with its new supply of filling having taken its first flight across the lay.

By providing the filling-carrier with a recess to be entered by the detector the operation of the latter is made more delicate and the amount of filling left on an ejected carrier is much less than would be the case if the detector was set to operate when the thread mass was reduced to a predetermined diameter, and by making the recess in the cone or base portion of the filling-carrier I insure the operation of the detector to set in motion the transferring mechanism only when nearly all of the thread has been withdrawn from the carrier. So far as I am aware this feature of my invention is broadly new, and it is also broadly new to operate a thread-cutting mechanism by a "latch-bunter," as the slide-block k' may be termed.

The detector or feeler is operated at the same side of the loom as the filling-supplying mechanism, thereby reducing the number and size of the parts of the intervening devices and making the operation quicker and more uniform.

The detector is intermittent in its action, inasmuch as the devices for giving it its detecting or feeling movement are located outside and independent of the shuttle and at the side of the loom adjacent the filling-supplying mechanism.

My invention is not restricted to the precise construction and arrangement herein shown and described, as it is obvious that the same may be modified or changed in various particulars without departing from the spirit and scope of my invention.

I do not herein broadly claim the severing

device mounted on the temple and comprising a fixed blade and a longitudinally-movable and rocking blade, as the same is not broadly of my invention.

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

1. In a loom, a shuttle provided with a filling-carrier, a detector on the shuttle, means to move it into operative position when the filling is substantially exhausted, and a pusher controlled through the movement of said detector into abnormal position, and thereafter positively actuated to insert a fresh filling-carrier into the shuttle, substantially as described.

2. In a loom, filling-supplying mechanism to supply the shuttle with fresh filling, the shuttle provided with a controller to positively effect the operation of said mechanism, and means to render said controlling device operative upon exhaustion of the filling in the shuttle, substantially as described.

3. In a loom, a shuttle provided with a recessed filling-carrier, a detector mounted on the shuttle and adapted to enter the recess in the filling-carrier when uncovered by exhaustion of the filling, means to effect movement of the detector, and filling-supplying mechanism operated through and upon detecting movement of the said detector, substantially as described.

4. In a loom, a shuttle provided with a filling-carrier, a normally-inoperative detector mounted on the shuttle, means independent of the detector to move it intermittingly toward the filling-carrier, to detect the presence or approximate exhaustion of the filling, and means governed by or through said detector to automatically transfer a fresh filling-carrier to the shuttle after movement of the detector from detecting position back to normal position, substantially as described.

5. In a loom, a shuttle provided with a filling-carrier having a slotted conical portion, means to retain the filling-carrier from rotation, in fixed position in the shuttle, a detector mounted on the shuttle and adapted to enter the recess when exposed by withdrawal of the filling, and means fixed relatively to and to move the detector toward the filling-carrier as the shuttle enters the shuttle-box, combined with a transferrer to insert a fresh filling-carrier in the shuttle, a controller therefor moved into operative position by entrance of the detector into the recess in the spent filling-carrier, and means to withdraw the detector prior to insertion of the fresh filling-carrier, substantially as described.

6. In a loom, a shuttle provided with a longitudinally-recessed filling-carrier, a detector mounted on the shuttle, and means to prevent rotation of and retain the carrier with its recess opposite said detector, combined with an actuator independent of and to momentarily engage and move the detector toward the filling-carrier as the shuttle nears the end of its throw, substantially as described.

7. In a loom, a shuttle provided with holding-jaws, to engage the head of a filling-carrier, a filling-carrier having a notched head, and a guide on the shuttle, to enter the notch of and prevent rotation of the filling-carrier, substantially as described.

8. In a loom, the lay, a shuttle-box thereon, detector-actuating means adjacent said box, filling-supplying mechanism at the same side of the loom, a shuttle provided with a filling-carrier, a detector on the shuttle, moved by said actuating means to detect exhaustion of the filling as the shuttle enters the shuttle-box, and a controlling device governed by said detector, to effect operation of the filling-supplying mechanism upon exhaustion of the filling in the shuttle, substantially as described.

9. In a loom, filling-supplying mechanism, a shuttle provided with a filling-carrier, a detector mounted on the shuttle, independent of the filling-carrier, actuating means at the same side of the loom as said mechanism, to move the detector to detect exhaustion of the filling, and connections intermediate said mechanism and the detector, to positively operate the former by or through movement of the latter upon exhaustion of the filling in the shuttle, substantially as described.

10. In a loom, a shuttle provided with a filling-carrier, a detector on the shuttle, means to move it into operative position when the filling is substantially exhausted, mechanism to part the filling-thread adjacent to and outside of the selvage after ejection of the filling-carrier from the shuttle, and actuating devices for said mechanism, controlled by movement of the detector when the filling has been exhausted, substantially as described.

11. The combination, in a loom, of filling-supplying mechanism to provide a fresh supply of filling to the shuttle, the shuttle having a detector mounted thereon, means to actuate the detector, means to part the filling-thread adjacent to and outside of the selvage, and a common controlling device for said means and the filling-supplying mechanism, abnormal movement of the detector upon exhaustion of the filling rendering said controlling device operative, to actuate the filling-supplying mechanism and parting means, substantially as described.

12. The combination, in a loom, of filling-supplying mechanism to provide a fresh supply of filling to the shuttle, the shuttle having a detector mounted thereon, means to actuate the detector, a parting mechanism to part the spent filling after its last shot and to part the fresh filling only at its first shot, at a point outside the selvage, on two successive beats of the lay, and a common controlling device for said mechanisms, rendered oper-

ative by abnormal movement of the detector upon exhaustion of the filling, substantially as described.

13. In a loom, normally-inoperative parting mechanism carried by the temple, to part the filling-thread at a point adjacent to and outside of the selvage, means to operate said mechanism, and the shuttle provided with a controlling device for said means, operative upon substantial exhaustion of the filling in the shuttle, whereby the filling-thread is parted after ejection of the spent filling-carrier, substantially as described.

14. In a loom, the lay, a normally-inoperative movable bunter thereon, parting mechanism carried by the temple, to part the filling-thread outside of and adjacent the selvage, a detector operative upon substantial exhaustion of the filling, and connections between it and the bunter, to move it into abnormal position for one beat of the lay, to actuate said parting mechanism to part the filling-thread of the spent filling-carrier, substantially as described.

15. In a loom, automatic filling-supplying mechanism, a parting mechanism for the filling-thread, carried by the temple, a movable actuating-bunter for said parting mechanism, and means to move and retain it in operative position for one beat of the lay, to part the filling-thread of the spent filling-carrier, combined with an independent retaining device to maintain said bunter operative upon the next beat of the lay, whereby the parting mechanism is operated a second time to part the fresh filling at its first shot, substantially as described.

16. In a loom, means to transfer a fresh supply of filling to the shuttle, a normally-inoperative actuating-bunter, a shuttle having a detector mounted thereon, means to move said detector into abnormal position upon substantial exhaustion of the filling in the shuttle, positively-operating connections between the detector and bunter, to move the latter into operative position, and independent means to return the bunter to normal position, substantially as described.

17. In a loom, filling-supplying mechanism, normally-inoperative parting mechanism to part a filling-thread adjacent to the selvage, a bunter for each mechanism, means to move the bunters into operative position, and a common controlling device for said means, combined with a shuttle provided with a filling-carrier, and a detector carried by the shuttle, to effect operation of the controlling device upon substantial exhaustion of the filling, substantially as described.

18. In a loom, the lay, a sliding bunter thereon, a temple provided with a fixed thread-cutting blade, a longitudinally and vertically movable blade provided with a heel, to be engaged by the bunter when the latter is in operative position, and means controlled by exhaustion of the filling to move the bunter into operative position, substantially as described.

19. A temple, a thread-cutting blade rigidly mounted thereon and having a toothed edge, a coöperating movable blade having a slot, and a toothed edge, a fixed fulcrum-pin for said blade, extended through the slot thereof, and means to rock said blade and thereafter move it longitudinally on its fulcrum during cutting operation, substantially as described.

20. In a loom, thread-parting mechanism carried by the temple, the lay having a transversely-shouldered guide thereon, a bunter for the parting mechanism, movable in said guide, a slot-and-pin connection between them, permitting the bunter to tip, and a spring to normally throw the lower end of the bunter inward, combined with means to move the bunter above the shoulder, release of the bunter causing it to be engaged by the shoulder, substantially as described.

21. In a loom, filling-supplying mechanism, to supply the shuttle with fresh filling, the shuttle having mounted upon it a detector to control the operation of said mechanism, and independent means to move the detector into operative position as the shuttle nears the end of its throw, the final movement of the shuttle positively effecting through the detector the operation of said filling-supplying mechanism, substantially as described.

22. In a loom, filling-supplying mechanism, a shuttle carrying a recessed filling-carrier, a detector mounted on the shuttle, means to move said detector into the recess of the filling-carrier when uncovered by removal of the filling, and a controlling device for the filling-supplying mechanism, operative upon movement of the detector into detecting position to engage and positively operate said mechanism, substantially as described.

23. In a loom, filling-supplying mechanism, including a pusher, the lay, a normally-inoperative spring-controlled bunter thereon, means to retain said bunter inoperative against the action of its spring, and a device carried by the shuttle and operative upon exhaustion of the filling and during final movement of the shuttle, to positively engage and move said means and thereby release the bunter upon exhaustion of the filling in the shuttle, substantially as described.

24. In a loom, filling-supplying mechanism, parting mechanism to part the spent filling-thread, and the fresh filling-thread at its first shot, a bunter to operate each mechanism, and means to move said bunters into operative position upon exhaustion of the filling in the shuttle, combined with a shuttle, and a device thereon to positively engage and actuate said moving means, substantially as described.

25. In a loom, filling-supplying mechanism, parting mechanism to part the spent filling-thread, and the fresh filling-thread at its first

shot, a bunter to operate each mechanism, and means to move said bunters into operative position upon exhaustion of the filling in the shuttle, combined with a shuttle, a detector thereon, operative upon exhaustion of the filling in the shuttle, and a controlling device operated by the detector, when in abnormal position, to positively actuate the bunter-operating means upon exhaustion of the filling, substantially as described.

26. In a loom the following instrumentalities, viz: a pusher, actuating mechanism therefor movable with the lay, a shuttle having a detector and a controller mounted thereon, the latter being adapted to be projected from the shuttle by said detector when the filling on the filling-carrier therein has been exhausted to a predetermined extent, to bring said controller into positive engagement therewith and to move the pusher-actuating mechanism to operate the pusher, and means to actuate the detector, substantially as described.

27. A loom-shuttle provided with a detector, and having a coöperating hooked controller adapted to be moved beyond the exterior of the shuttle when the detector is in abnormal position, and means to retain said detector normally out of contact with the filling, substantially as described.

28. A loom-shuttle having mounted thereon a detector to detect the exhaustion of the filling to a predetermined point by engagement with the filling on the carrier, a coöperating outwardly-moving controller, and means to retain said detector normally out of contact with the filling, combined with transferrer-actuating mechanism having an arm *g* arranged in the path of movement of and to be rocked by said controller when in its outward position, to operate, substantially as described.

29. A loom-shuttle provided with a combined detector and controller made as a lever of the first order, the controller lying substantially within the outer walls of the shuttle while the detector is out of contact with the filling and until the filling on the filling-carrier in the shuttle has been exhausted to a predetermined point, and means to normally retain the detector out of contact with the filling, substantially as described.

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

EDWARD W. DAVENPORT.

Witnesses:
HERBERT S. MANLEY,
GEO. OTIS DRAPER.