No. 646,866. Patented Apr. 3, 1900.

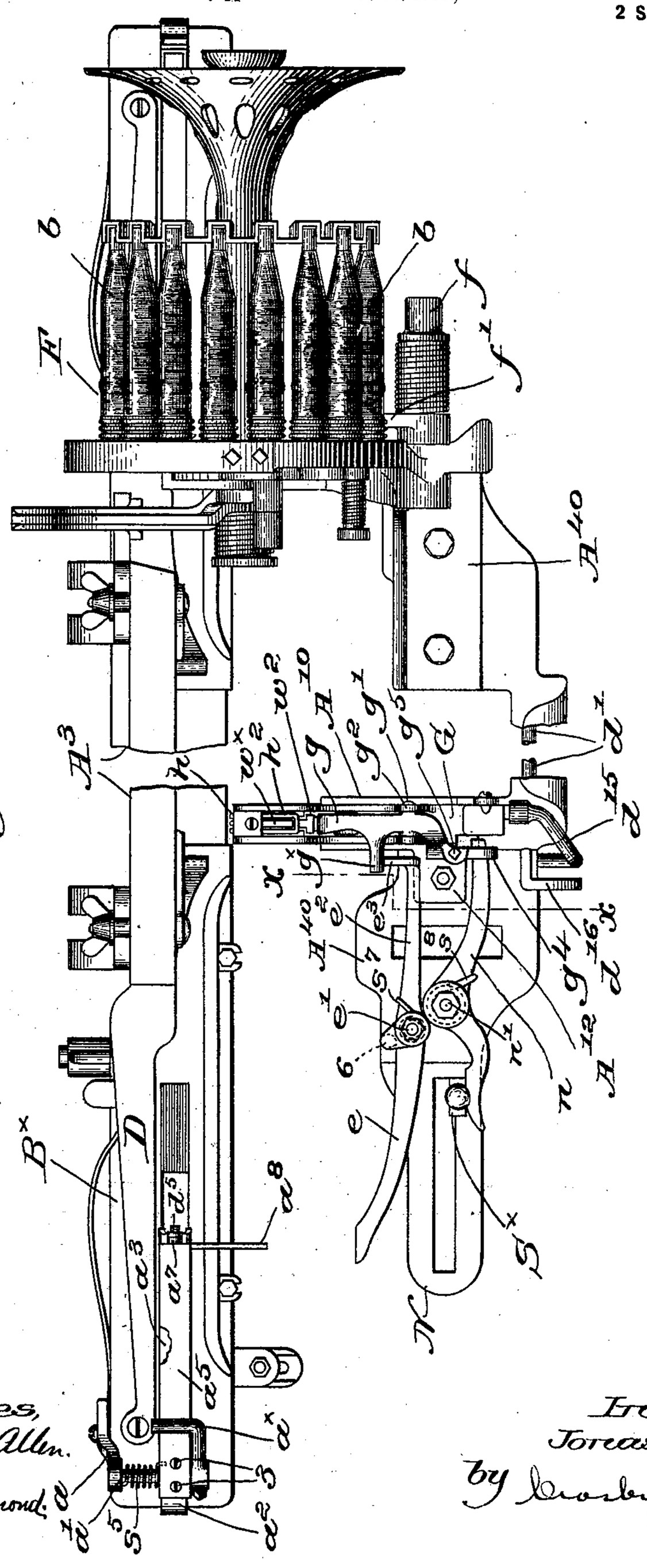
J. NORTHROP.

LOOM.

(Application filed Oct. 30, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.



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2 Sheets—Sheet 2.

Fig: 2.

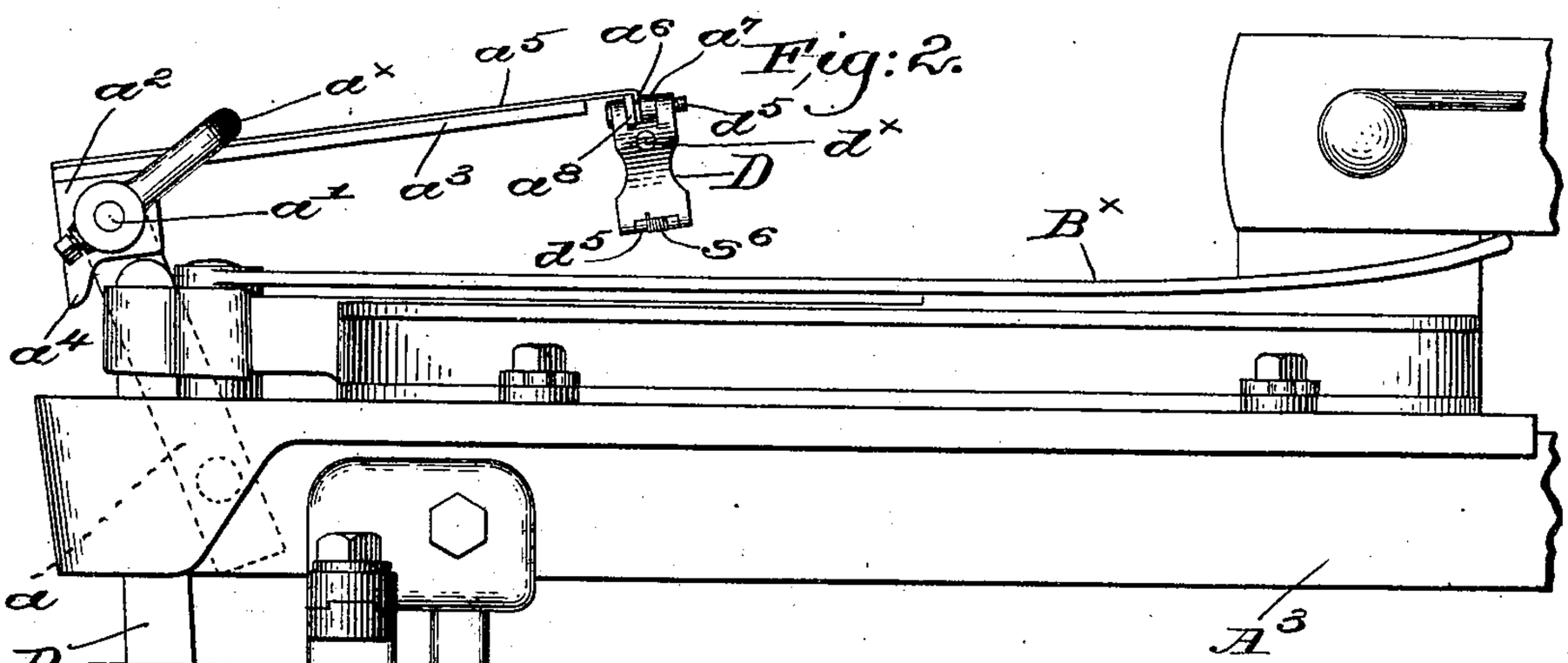


Fig: 3.

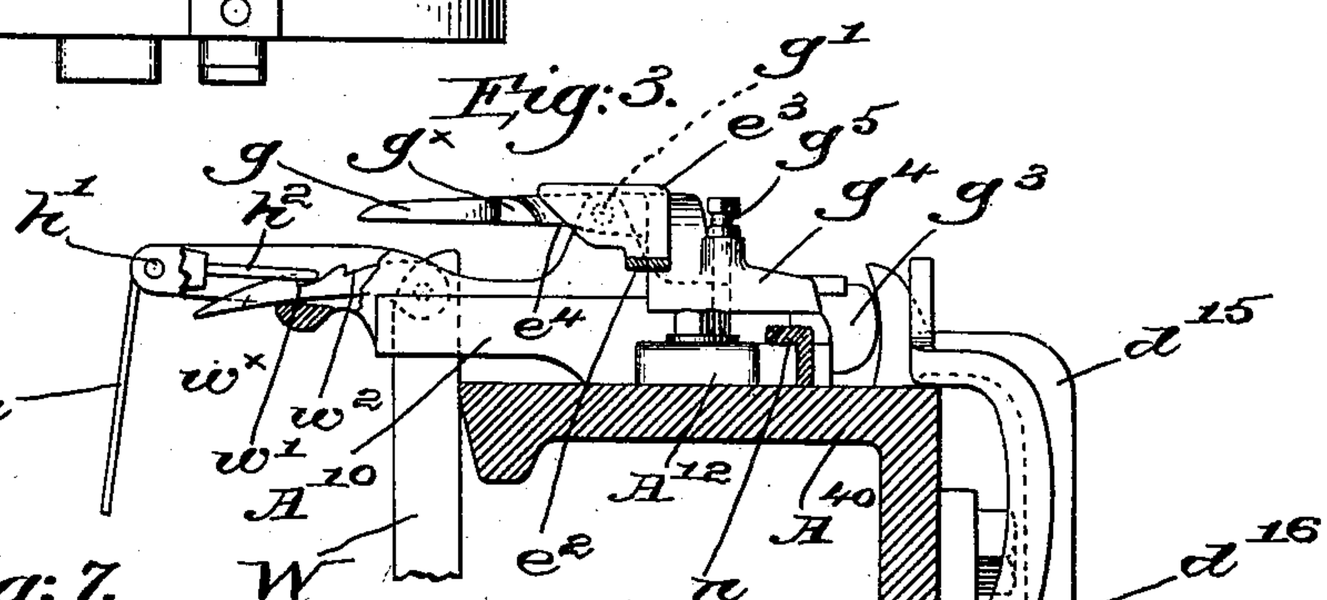


Fig: 7.

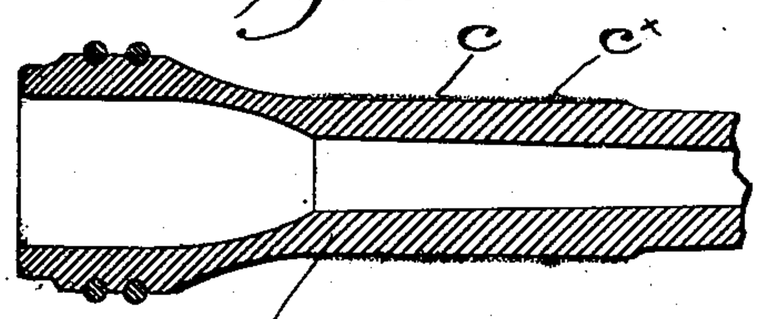


Fig: 4.

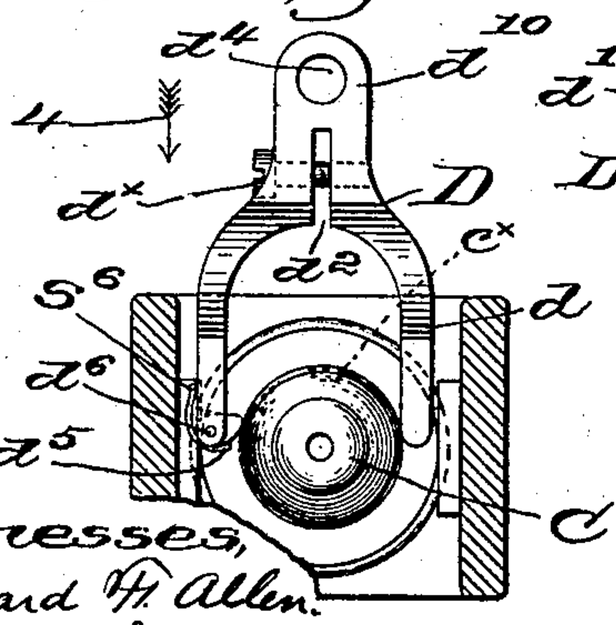


Fig: 6.

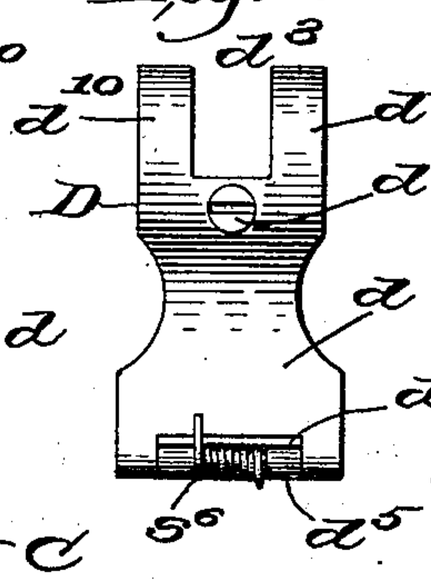
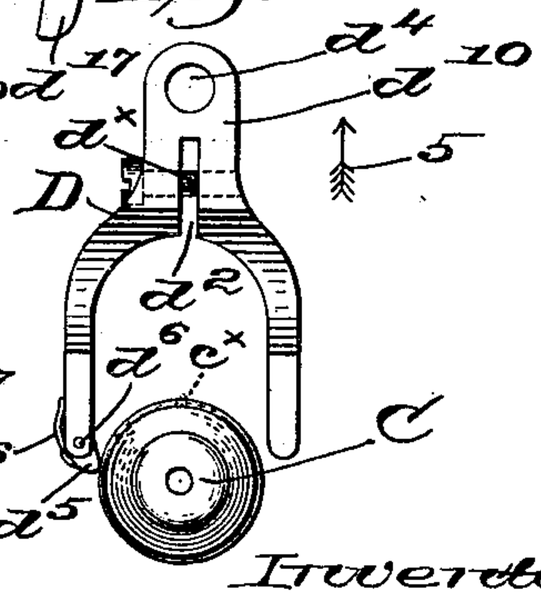


Fig: 5.



Witnesses,
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UNITED STATES PATENT OFFICE.

JONAS NORTHROP, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO THE DRAPER COMPANY, OF SAME PLACE AND PORTLAND, MAINE.

LOOM.

SPECIFICATION forming part of Letters Patent No. 646,866, dated April 3, 1900.

Application filed October 30, 1899. Serial No. 735,279. (No model.)

To all whom it may concern:

Be it known that I, JONAS NORTHROP, a subject of the Queen of Great Britain, residing at Hopedale, county of Worcester, 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 provided with automatic filling-supplying means wherein at the proper time a fresh supply of filling is provided; and the invention is more particularly adapted to so-called "feeler looms" of that general type wherein the volume of filling in the shuttle is from time to time determined by the engagement therewith of a feeler which controls the time of operation of the filling-supplying mechanism, the construction being such that when the filling has been exhausted to a predetermined extent the feeler will cause a fresh supply of filling to be provided. A loom of this character forms the subject-matter of United States Patent No. 626,187, dated June 27, 1899, to which reference may be had.

In my present invention the operative movement of the feeler to feel the filling is effected by or through the shuttle as it enters the shuttle-box, thereby obviating special feeler-actuating mechanism and also preventing the feeler from acting accidentally when the shuttle is at the other end of the lay. I have also provided herein a novel form of feeler, whereby the volume of filling in the shuttle is determined by calipering its diameter, so that I overcome the variable action of feelers which act upon or at one side only of the filling, the variations being due to changes in the relative position of the co-operating parts—that is, different filling-carriers vary, as they will not always be held in exactly the same relative position in the shuttle and movement of the shuttle relative to the side of the shuttle-box presents an opportunity for variation in the action of a feeler which feels at one side of the filling-carrier. So, too, feelers attached to the shuttle and operating on the side of the filling-carrier will be affected by the position of the latter as held in the shuttle.

I have herein so mounted the feeler that it can accommodate itself to different positions of the filling-carrier, so that the action of the feeler is determined wholly by the amount of filling present in the shuttle. A much greater range of operative movement is permitted, for when the proper diameter of the filling is reached in winding off the calipering-feeler will slide over or straddle the filling-carrier, thereby moving onward through a considerable distance, this latter movement being made effective to operate by suitable intervening mechanism the filling-supplying mechanism, whereas with the ordinary feeler mechanism the operative movement of the feeler is sometimes less than one one-hundredth of an inch.

Various other novel features of my invention will be hereinafter described, and particularly pointed out in the following claims.

Figure 1 is a top or plan view, centrally broken out, of a portion of a loom, including the lay and breast-beam, and provided with automatic filling-supplying mechanism and embodying one embodiment of my novel feeler mechanism. Fig. 2 is an enlarged front elevation of the shuttle-box at one end of the lay and the adjacent filling-feeler shown in normal position. Fig. 3 is a transverse sectional view of a part of the mechanism shown in Fig. 1, on the line $x\,x$ thereof, looking to the right. Fig. 4 is an enlarged detail in elevation of the feeler just as it engages the filling, a part of the shuttle-body being shown in section. Fig. 5 is a similar view, but showing the operation of the cast-off as the feeler is retracted to prevent its wedging on the filling-carrier. Fig. 6 is an enlarged detail of the feeler, taken at right angles to Fig. 4; and Fig. 7 is a sectional detail of part of the filling-carrier, to be referred to.

The loom-frame A, the breast-beam A^{40}, the lay A^{3}, the shipper-lever $S^{\times}$, normally held in the usual notched holding-plate H, attached to the breast-beam, the filling-feeder F, Fig. 1, comprising essentially-connected rotatable plates constructed to receive the ends of the filling-carriers *b*, the transferrer *f'*, mounted

upon the stud f, and the operating or controlling shaft d', adapted to be rotated in the direction of the arrow 20, Fig. 3, to effect a change of filling and normally held in the position shown in said figure by the spring s^2, are and may be substantially all as represented in said Patent No. 626,187 referred to, wherein like letters and numerals are used to designate like parts, the parts hereinbefore referred to being operated substantially as provided for in said patent.

The filling-feeder F is shown in Fig. 1 as located at one side of the loom and adapted to transfer a fresh supply of filling to the shuttle when in the adjacent shuttle-box, while the feeler mechanism is located at the other side of the loom, the feeler itself being mounted upon the lay adjacent the shuttle-box $B^\times$ and to coöperate with the filling in the shuttle when the latter is in the said box. The lay has secured to it at the end remote from the filling-feeder a stand or bracket a, extended above the lay and provided with a laterally-extended stud a', on which is mounted the enlarged end a^2 of the feeler-carrier a^3, the latter being normally held in the position shown in Fig. 2 by a spring s^5, attached at its ends to the bracket a and feeler-carrier, respectively, the upward movement of the feeler-carrier being prevented by an L-shaped guard $a^\times$, as herein shown, secured to the front end of the stud a'.

Referring to Fig. 2, it will be seen that the pivoted end of the feeler-carrier is located above the picker-stick P and the enlargement a^2 is provided with a downturned finger a^4 beyond and in the path of the upper end of the picker-stick to be moved thereby when the picker-stick is thrown out toward the end of the lay by the impact of the shuttle as it approaches the end of its stroke in the shuttle-box $B^\times$. The quick sharp blow thus imparted to the finger operates to quickly rock the feeler-carrier a^3 and to move the feeler itself, as will be described, into engagement with the filling in the shuttle.

A resilient arm or bar a^5, preferably of spring-steel, is suitably attached at its outer end, as at 3, Fig. 1, to the feeler-carrier resting upon the arm-like portion a^3 thereof and extending beyond the inner end of the latter, the arm a^5 being downturned, as at a^6, at its outer end and provided with a hub or bearing a^7, Figs. 1 and 2, and with a lateral projection a^8, extended beyond the front of the lay.

The feeler itself is shown on an enlarged scale in Figs. 4 to 6, inclusive, and it comprises a yoke-like or U-shaped frame D, the legs d thereof depending and forming continuations of the shank or stem d^{10}, which is shown as longitudinally slotted at d^2 to permit of adjustment between the ends of the legs by means of a suitable screw $d^\times$, passed through a hole in one leg and threaded into the other leg, as clearly shown in Fig. 4, rotation of the screw in one direction or the other drawing the legs together or permitting them to separate. The shank d^{10} is transversely slotted at d^3, Fig. 6, and the two ears thus formed are perforated, as at d^4, to receive a pintle d^5, passed through the hub a^7 on the arm a^5, forming a part of the feeler-carrier, so that the feeler may rock or swing transversely to the length of the shuttle.

As shown in Figs. 4 and 5, the feeler operates to determine the volume of filling in the shuttle by calipering its diameter—that is to say, when the feeler-carrier is depressed by or through the action of the shuttle, as described, the feeler is brought down toward the filling, the legs d entering the shuttle-body and engaging the filling at two points oppositely located relative to the longitudinal axis of the filling-carrier, and the effective distance between the legs of the caliper or feeler is determined beforehand and fixed by means of the adjusting-screw $d^\times$.

Referring to Fig. 7, the barrel of the filling-carrier C has wound upon it a small quantity of filling, as at c, and at one point the traverse is stopped until a bunch or ring $c^\times$ of the filling is wound thereupon, after which the winding is continued and completed in usual manner. This bunch $c^\times$ is in the path of the feeler, the legs thereof having a considerable width, as will be seen from Figs. 2 and 6, to compensate for slight variations in the position of the shuttle or of the filling-carrier in the shuttle, and so long as the diameter of the yarn on the filling-carrier is greater than the effective distance between the legs of the feeler the latter will be stopped by the filling, while the carrier a^3 completes its swinging movement. As the feeler is brought down with considerable force upon the filling, it would tend to wedge upon it were it not for a cast-off, shown as a lug d^5, pivotally mounted at d^6 in a recess d^7 in one of the legs d of the carrier and normally held in the position shown in Fig. 4 by means of a suitable spring s^6.

It will be manifest that in adjusting the effective distance between the legs of the feeler the cast-off will be taken into consideration, as the distance between the inner end of the cast-off and the nearest part of the opposite leg d is equal to the external diameter of the yarn on the filling-carrier when sufficient yarn has been unwound therefrom to exhaust the supply to a predetermined desired amount.

Referring to Fig. 4, when the feeler moves in the direction of the arrow 4 to engage the filling the cast-off d^5 will be pressed into the filling on the filling-carrier; but as the feeler is retracted, moving in the direction of the arrow 5, Fig. 5, the cast-off will be turned on its pivot against the action of the spring and will absolutely prevent any wedging of the feeler with the filling. So long as the amount of filling in the shuttle is over a certain volume, as determined by the calipering action of the feeler, the latter will be stopped before it reaches the limit of its possible downward movement, the resiliency of the arm a^5 permitting this stoppage of the feeler, while

the feeler-carrier a^8 continues or completes its movement; but when the diameter of the yarn is so reduced that the legs of the feeler can straddle and slide over the filling-carrier the feeler will then descend as far as each carrier is moved by or through the action of the shuttle, and at such time the lateral extension a^8 will be brought into position to engage one end of a lever e, fulcrumed at e' on the breast-beam and held in such position by a spring s^7, Fig. 1, a stop 6 holding the lever against the action of the spring. When the extension a^8 is thus in operative position, it swings the lever e on its pivot as the lay beats up, and the inner end e^2 of the lever is moved toward the lay. This end is upturned, as at e^3, Fig. 3, and enlarged, the rear under edge thereof being shaped to form a cam e^4, which is adapted to engage a lug or projection $g^\times$ on a latch g. This latch is fulcrumed at g' between the ears g^2 of a slide G, mounted in a suitable guideway in a stand A^{10}, secured to the breast-beam, the slide forming the support for the usual weft or filling fork h, pivoted thereon at h' and provided with a tail h^2 to be engaged by the usual hook $w^\times$, connected with the weft-hammer W, whenever the filling-fork is not tilted under the absence of filling. The hook is herein shown as provided with two notches w' w^2, the former to coöperate at times with the tail of the filling-fork, while the latter is adapted to receive or engage the point of the latch g when the latter is rocked on its pivot, as has been described, by the cam e^4 on the inward movement of the lever-arm e^2.

It will be manifest that the slide G will be moved outward upon failure of the filling by engagement of the hook $w^\times$ and the tail of the fork; and it will also be manifest that the weft hammer or "actuator," as it may be termed, will move the slide outward when the latch is in engagement with the hook.

The rock-shaft d' has rigidly secured thereto an upturned arm d^{15}, the upper end of which is in the path of the hook-like outer end g^3 of the slide, so that when the latter is moved outward either upon failure of the filling or when the filling in the shuttle has exhausted to a predetermined extent the shaft d' will be rocked, and through the connections between said shaft and the filling-supplying mechanism, as in the patent referred to, the said mechanism will be operated and a change of filling effected, it being understood that the feeling of the filling takes place at one pick and the transfer of a fresh supply of filling on the next succeeding pick when the shuttle is in the opposite shuttle-box.

The outer end of the latch is herein shown as enlarged or weighted, as at g^4, and a stop-screw g^5 is extended through such part of the latch to normally bear upon the extension A^{12} of the stand A^{10}, the weight of the outer end of the latch maintaining it normally in the position shown in Fig. 3, the lower end of the screw g^5 being hidden in said Fig. 3 by the bolt which secures the extension A^{12} to the breast-beam, and when the slide G is moved outward on account of filling failure the part g^4 of the latch will engage the upper end of an arm d^{16}, loosely mounted on the rock-shaft d', the lower depending end d^{17} of said arm (see Fig. 3) being thereby turned to throw out the take-up mechanism in well-known manner, while at the same time the lower end of the adjustable stop g^5 will be brought into engagement with the edge of a knock-off arm n, pivoted at n' on the breast-beam and controlled by a spring s^8, Fig. 1, such movement of the knock-off arm acting to bring its opposite end against and to force the shipper-lever $S^\times$ out of its holding-notch to thereby stop the loom, as it is desirable to stop the loom upon filling failure, so that the attendant may draw out the partial pick of filling, and so prevent a thin place in the goods; but while the loom is stopped it will also be noticed that the filling-supplying mechanism has operated to place a fresh supply of filling in the shuttle in readiness for the starting up of the loom.

When the filling in the shuttle has been exhausted to the predetermined point, so that the feeler can descend far enough to bring the extension a^8 into position to operate the lever e e^2, the cam e^4, acting upon the lug $g^\times$, depresses the latch g to engage with the weft-hammer hook, and at the same time the end g^4 of the latch is raised to lift the adjustable stud g^5 above the knock-off arm n, so that when the slide is moved outward a change of filling will be effected; but the loom will not be stopped nor will the take-up mechanism be stopped, as the part g^4 of the latch will be out of range of the upturned end of the arm d^{16}.

By means of the adjustable stop g^5 the latch can be adjusted so that a greater or less movement of the arm e^2 will be required to bring it into engagement with the hook $w^\times$ of the weft hammer or actuator.

It will be obvious from the foregoing description of the drawings that the controlling means for the filling-supplying mechanism, which includes the feeler, the lever e e^2, the slide and its latch, and the rock-shaft d', are only put into condition to operate by or through the action of the feeler at the proper time, it being left to the weft-hammer—a comparatively slow-moving part of the loom—to effect the operation of the controlling means after they have been brought into operative position.

Inasmuch as the weft-hammer moves one-half as fast as the lay, it will be obvious that even when the loom is running at high speed the movement of the weft-hammer will be comparatively slow, so that ample time is afforded for the controlling means to be placed in operative condition.

I have herein shown one practical embodiment of my invention without attempting to show or describe various modifications thereof which may be made, and my invention is

not restricted to the mechanism herein shown nor to the particular construction and arrangement of the calipering-feeler herein nor to the exact means for operating the feeler, for, so far as I am aware, it is broadly new to determine the volume of filling in the shuttle by calipering the same, and so, too, I believe it to be broadly new to effect the operative or feeling movement of a filling-feeler independent of the shuttle by or through the shuttle to directly engage and feel the filling in the shuttle.

I have herein shown the weft-hammer as forming the actuator for the controlling means, it being a very convenient member of the loom mechanism; but any other vibrating portion of the loom may be employed, if desired.

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

1. In a loom, filling-supplying mechanism, and means to determine the time of its operation, said means including a feeler independent of the shuttle and operatively movable by or through the shuttle to directly engage and feel the filling therein.

2. In a loom, filling-supplying mechanism, and means to determine the time of its operation, said means including a normally-inoperative feeler mounted independently of the shuttle and movable into operative position by the entrance of the shuttle into the shuttle-box, to directly engage and feel the filling in the shuttle.

3. In a loom, the lay, a shuttle filling-supplying mechanism, and a feeler mounted on the lay, to control the operation of said mechanism, actuation of the feeler to directly engage and feel the filling in the said shuttle being effected by or through the latter.

4. In a loom, the lay having a shuttle-box, a normally-inoperative feeler on the lay above the shuttle-box, filling-supplying mechanism controlled as to its operation by the feeler, and means governed by the entrance of the shuttle into the shuttle-box to move the feeler into direct engagement with and to feel the filling in the shuttle.

5. In a loom, filling-supplying mechanism, and means to determine the time of its operation, said means including a yieldingly-mounted feeler supported independently of the shuttle, operatively movable by or through movement of the shuttle as it approaches the end of its stroke to directly engage and feel the filling in the shuttle.

6. In a loom, the lay, a shuttle having an open top, a filling-feeler mounted on the lay, filling-supplying mechanism controlled as to its operation by the feeler, and means actuated by or through the shuttle to move the feeler through the open top of the shuttle and feel the filling therein.

7. In a loom of the class described, a filling-feeler mounted on the lay adjacent a shuttle-box, a finger connected with the feeler, and shuttle-operated means to engage the finger and actuate the feeler to feel the filling in the shuttle when the latter enters the shuttle-box.

8. In a loom of the class described, means to intermittingly determine, by calipering its diameter, the volume of the filling in the shuttle.

9. In a loom of the class described, means operated by or through the shuttle to intermittingly determine, by calipering its diameter, the volume of the filling in the shuttle.

10. In a loom of the class described, means to determine, by calipering its diameter, the volume of filling in the shuttle, and a device to adjust said means to a predetermined diameter.

11. In a loom, filling-supplying mechanism, and means to control its operation, including a feeler to determine the volume of filling in the shuttle by calipering the diameter of the filling mass, said means being operated by or through the shuttle.

12. In a loom provided with automatic filling-supplying mechanism, a feeler to intermittingly engage and feel the filling in the shuttle, a spring to maintain the feeler inoperative, and means actuated by engagement with the shuttle to move the feeler against its spring.

13. In a loom provided with automatic filling-supplying mechanism, a feeler to intermittingly engage and feel the filling in the shuttle, a spring-controlled resilient arm on which the feeler is mounted, and shuttle-impelled means to rock said arm and actuate the feeler against its controlling-spring, presence of filling up to a predetermined amount stopping the shuttle-impelled movement of the feeler, the feeler-arm flexing as the actuating means completes its movement.

14. In a loom provided with filling-supplying mechanism, a caliper-feeler, to intermittingly determine the volume of filling in the shuttle by calipering its diameter, a rocking arm on which the feeler is pivotally mounted to swing transversely of the shuttle, and means controlled by the shuttle to move the feeler-arm and bring the feeler into operative position.

15. In a loom provided with filling-supplying mechanism, a feeler to engage and feel the filling in the shuttle, a spring-controlled rocking carrier, a resilient arm supported by the carrier and rigidly connected thereto at one end, the feeler being mounted on the opposite, free end of the said arm, and shuttle-impelled means to depress the carrier against its spring, to bring the feeler into contact with the filling, the resilient arm flexing as the carrier completes its movement until the filling in the shuttle has been exhausted to a predetermined extent.

16. In a loom, filling-supplying mechanism, a yoke-like feeler to control the operation of said mechanism, the legs of the feeler straddling the filling in the shuttle to determine the volume thereof by calipering, a cast-off

on the feeler, to release it from the filling, and means to actuate the feeler by or through the shuttle.

17. In a loom of the class described, a caliper-feeler to determine the volume of the filling in the shuttle by or through its diameter, and a cast-off on the feeler, to release it from the filling as the feeler is retracted.

18. In a loom provided with filling-supplying mechanism, a feeler to feel the filling in the shuttle, a filling-fork, a slide on which it is mounted, a latch on the slide movable into abnormal position by or through the feeler when the filling is exhausted to a predetermined extent, the weft-hammer, to move the slide by or through engagement with the filling-fork or the latch, controlling means for the filling-supplying mechanism operated by movement of the slide, and stopping means for the loom, operated by or through the latch when in normal position, upon movement of the slide, whereby the filling in the shuttle will be changed before exhaustion thereof and also upon filling failure, the loom being stopped in the latter case.

19. In a loom, filling-supplying mechanism, means to determine the time of its operation, said means including a feeler operatively movable by or through the shuttle to feel the mass of filling therein at two points on opposite sides of its longitudinal axis.

20. In a loom, the lay, filling-supplying mechanism, a feeler-carrier mounted on the lay, a caliper-feeler pivotally mounted on the carrier, to accommodate itself to the position of the filling in the shuttle, means operated by or through the shuttle to intermittingly move the feeler into engagement with and to determine the volume of the filling by calipering the same, and connections between the feeler and filling-supplying mechanism, placed in operative condition when the filling has been exhausted to a predetermined extent.

21. In a loom, filling-supplying mechanism, a filling-fork and a latch mounted thereon, the weft-hammer, a stop-motion for the loom, including a knock-off arm in the normal path of the heel of the latch, failure of the filling acting through the fork to effect movement of the slide by the weft-hammer, connections between the filling-supplying mechanism and the slide and actuated by the latter, to change filling, the heel of the latch also moving the knock-off arm to stop the loom, and means operative upon failure of the filling in the shuttle to a predetermined extent to effect engagement of the latch and weft-hammer, to move the slide without effecting stoppage of the loom.

22. In a loom, a slide, a filling-fork having a tail, a gravity-latch, both fulcrumed on the slide, a weft-hammer having a hook, a stop-motion for the loom, actuated by the latch in normal position when the slide is moved, failure of the filling effecting engagement of the fork-tail and weft-hammer hook, to move the slide, and means operative upon exhaustion of the filling in the shuttle to tilt the latch into engagement with the weft-hammer hook and into inoperative position relative to the stop-motion.

23. In a loom, filling-supplying mechanism, and controlling means therefor including a U-shaped feeler the legs of which depend, to caliper the filling in the shuttle, and a yielding cast-off mounted on one of the legs, to release the feeler from the filling when retracted.

24. In a loom of the class described, means to determine by calipering its diameter the volume of the filling in the shuttle.

25. In a loom of the class described, means operated by or through the shuttle to determine, by calipering its diameter, the volume of the filling in the shuttle.

26. In a loom, filling-supplying mechanism, and means to control its operation, including a feeler to determine the volume of filling in the shuttle by calipering the diameter of the filling mass.

27. In a loom, filling-supplying mechanism, and means to determine the time of its operation, said means including a feeler to feel the mass of filling in the shuttle at two points on opposite sides of the longitudinal axis of the filling mass.

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

JONAS NORTHROP.

Witnesses:
GEO. OTIS DRAPER,
ERNEST W. WOOD.