

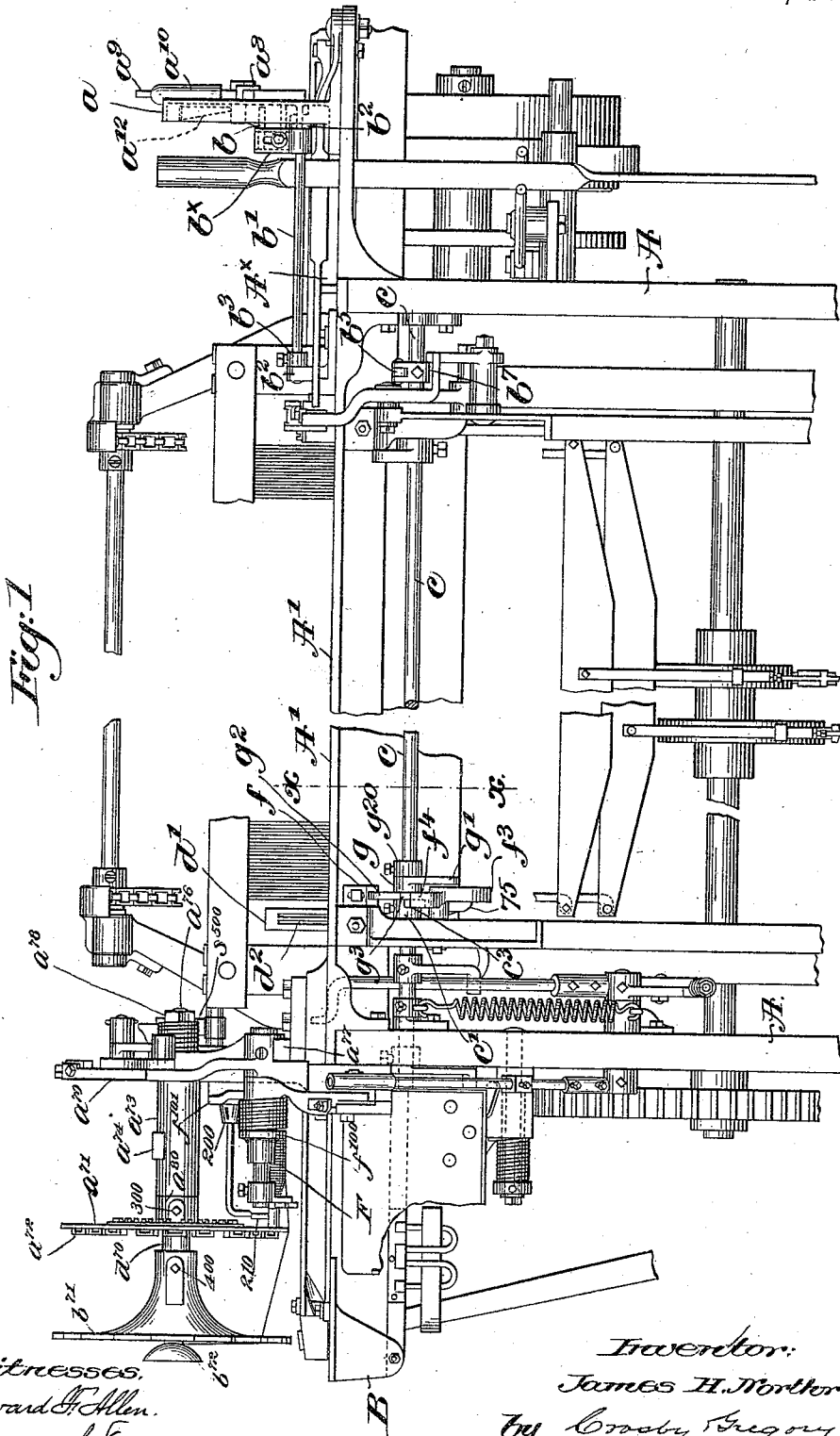
(No Model.)

4 Sheets—Sheet 1.

J. H. NORTHROP.
LOOM.

No. 553,814.

Patented Jan. 28, 1896.



Witnesses,
Edward T. Allen.
Thomas J. Drummond.

Inventor:
James H. Northrop
by Crosby Gregory -
Attys.

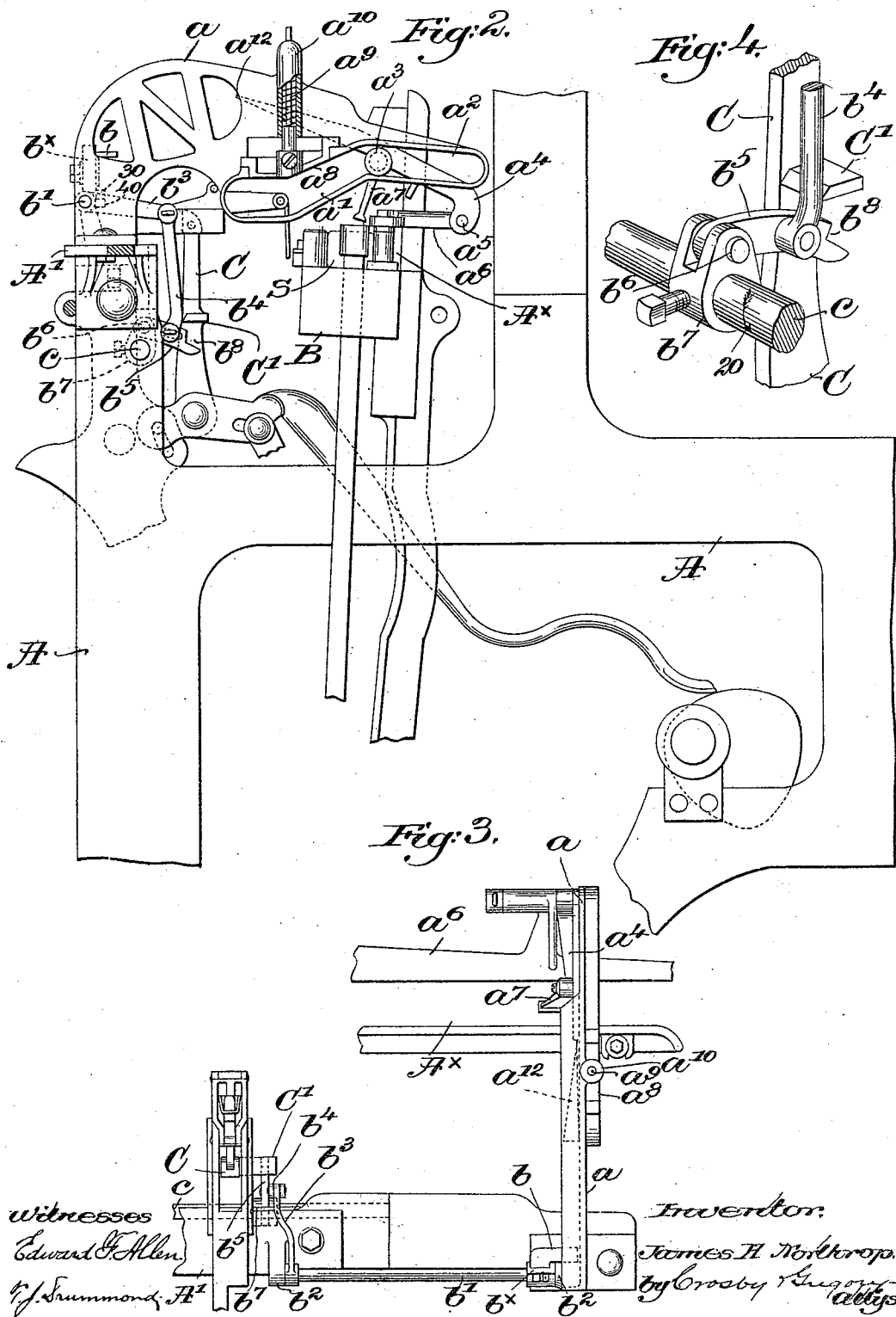
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4 Sheets—Sheet 2.

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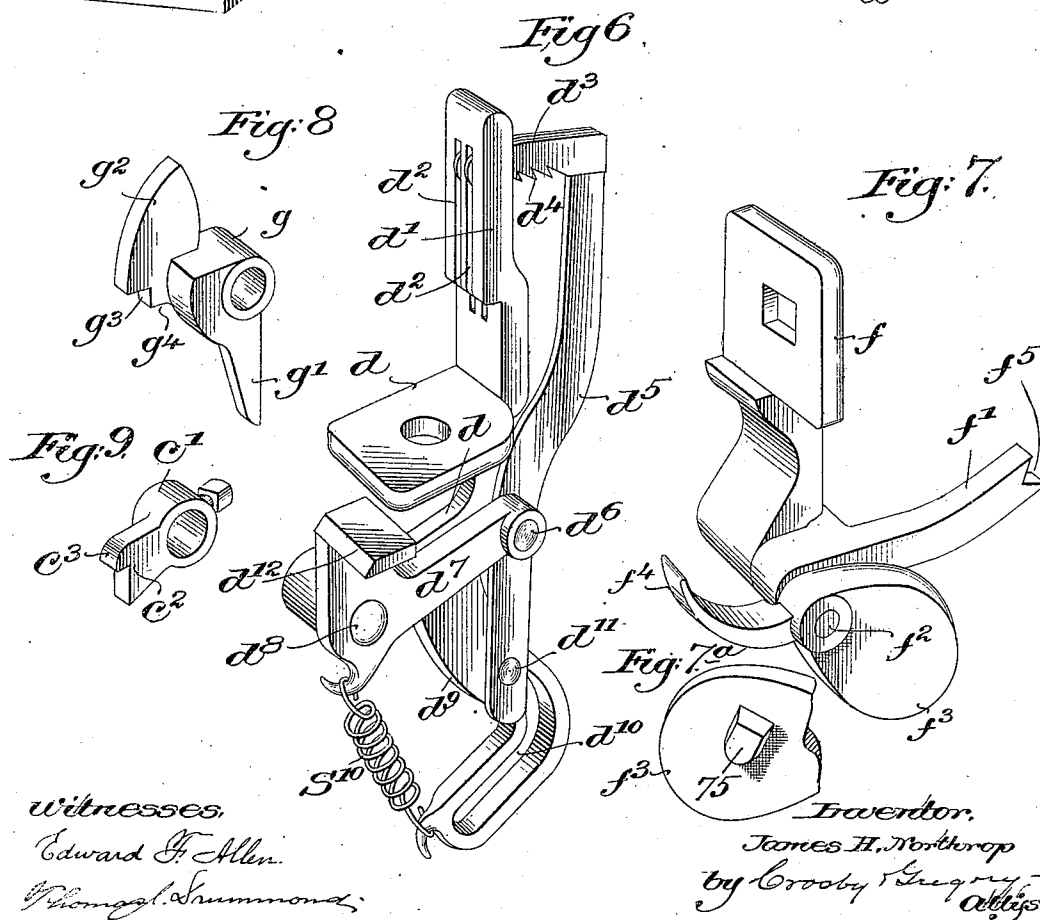
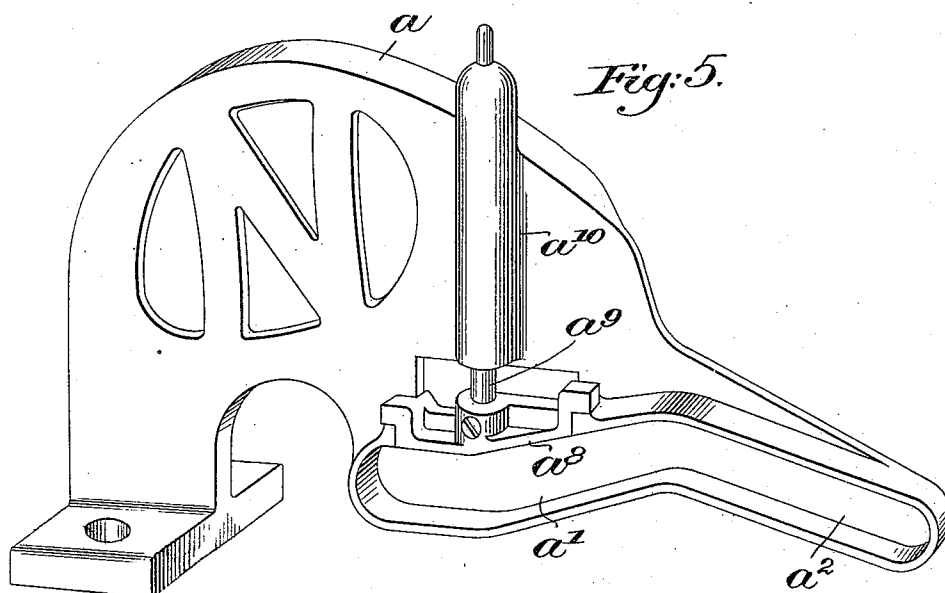
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4 Sheets—Sheet 3.

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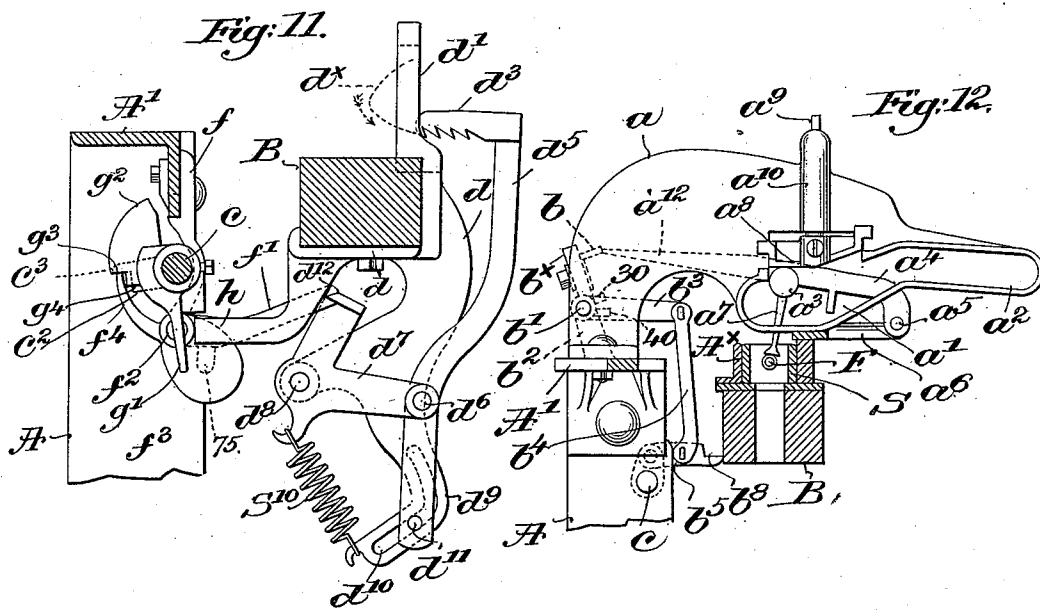
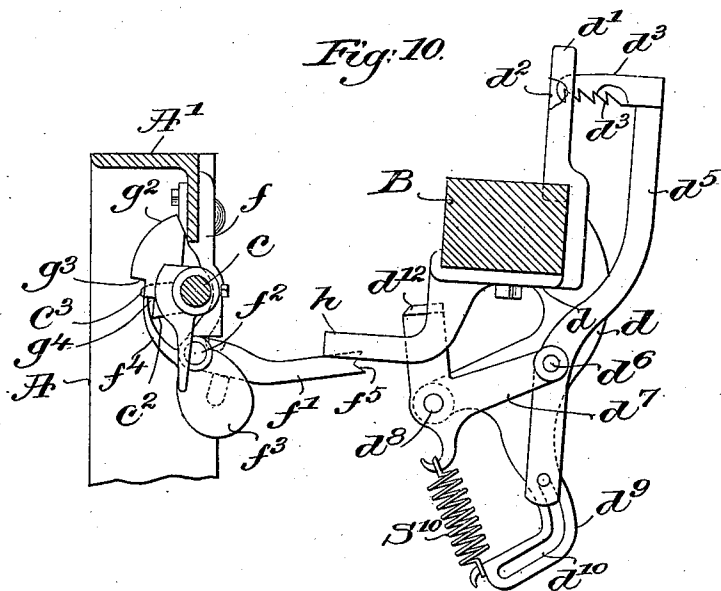
(No Model.)

4 Sheets—Sheet 4.

J. H. NORTHROP.
LOOM.

No. 553,814.

Patented Jan. 28, 1896.



Witnesses.
Edward F. Allen.
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UNITED STATES PATENT OFFICE.

JAMES H. NORTHROP, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO
GEORGE DRAPER & SONS.

LOOM.

SPECIFICATION forming part of Letters Patent No. 553,814, dated January 28, 1896.

Application filed August 5, 1895. Serial No. 558,295. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. NORTHROP, of Hopedale, county of Worcester, State of Massachusetts, have invented an Improve-
ment in Looms, of which the following description, in connection with the accompanying drawings, is a specification, like letters and numerals on the drawings representing like parts.

In the production of woven fabrics on looms whenever the filling is exhausted from the bobbin or cop in the shuttle the end of the filling is woven into the fabric, and in many instances said end is left at some point between the selvages to show badly or make imperfections in and lessen the value of the fabric, particularly if of high grade, and furthermore this last end of the filling is apt to crinkle because it is not subjected to the action of the usual tension exerted by the shuttle.

It has been customary in the better grades of fabric for the weaver to stop the loom, reverse the pattern mechanism, or turn the loom backward to reopen the shed containing the mispick or short filling, when the latter can be pulled out, so that a proper shot of filling may be put into that shed, thus obviating leaving the ends between selvages or crinkling of the filling.

In United States Patent No. 527,014, dated October 2, 1894, a loom is shown and described having mechanism adapted to prevent a weft end from being left between the selvages, the said mechanism co-operating with filling-supplying mechanism acting to automatically supply to the shuttle a new filling-carrier when the filling has been exhausted from the previous filling-carrier or broken, in said patent means being provided for actuating automatically the filling-supplying devices when the filling in the shuttle has been nearly exhausted or exhausted to a predetermined point, the nearly-spent filling-carrier being removed at the same time from the shuttle, the filling just left in the shed from the spent filling-carrier having its end remaining outside the selvage and extending therefrom to the filling-carrier ejected from the shuttle. In the said patent, moreover,

when the fresh filling-carrier has been inserted in the shuttle and the shuttle thrown across the shed an end of the filling is left beyond the selvage, between it and the point of attachment to the hopper of the filling-supplying mechanism, and these loose ends are very apt to become woven into the fabric, and furthermore the spent filling between the selvage and the ejected filling-carrier is apt to be drawn into the shed by the shuttle, causing a double filling to be made in the shed, so that instead of a single filling-thread being laid in the shed three threads will be laid partially across, as the looped portion of the spent filling will break after the shuttle has traversed a portion of the shed.

This invention has for its object the production of means for parting the spent filling close to the selvage and between it and the ejected filling-carrier, and also to part the new filling adjacent the selvage and between it and the point of attachment of said fresh filling to the hopper, so that there will be no long loose ends of filling left beyond the selvage, and entirely obviating any chance of the shuttle carrying in with it part way into the shed a double loop of the spent filling.

I have herein shown my invention as applied to a loom provided with automatic filling-supplying devices, and co-operating with the means for changing the filling-carrier in the shuttle when the filling has become exhausted or nearly exhausted to a predetermined point, as in the said United States Patent No. 527,014 referred to; but my invention may be applied to any loom when such parting devices would be of utility.

Figure 1 is a front view, centrally broken out, of a sufficient portion of a loom to be understood with my invention applied thereto, the loom being provided with automatic filling-supplying devices. Fig. 2 is a right-hand end view of the loom shown in Fig. 1, to more clearly show the feeler and the connections between it and the devices for actuating the parting mechanism. Fig. 3 is a top or plan view of a portion of the mechanism shown in Fig. 2 and at the right-hand end of Fig. 1. Fig. 4 is an enlarged perspective detail of a portion of the weft-hammer and the connec-

tions between it and the actuating rock-shaft to be described. Fig. 5 is an enlarged perspective detail of the cam-bracket at one end of the loom for directing the movement of the feeler. Fig. 6 is an enlarged perspective view of the filling-parting mechanism. Figs. 7, 7^a, 8 and 9 are details of a portion of the actuating devices for the parting mechanism. Fig. 10 is a sectional detail taken on the line *xx*, Fig. 1, looking toward the left, showing the lay as thrown back and with the actuating devices for the parting mechanism in normal position. Fig. 11 is a similar view, the parting mechanism having just parted a filling-thread; and Fig. 12 is a detail, partly in section and elevation, of the parts shown in Fig. 2, the feeler being shown as resting on the filling in the shuttle and at the time when the filling has been exhausted to the predetermined point, so that the feeler will cause the operation of the rock-shaft, to be described, to actuate the thread or filling parting mechanism at the next throw of the shuttle.

The loom-frame A, breast-beam A', the lay B, it being provided at each end with a shuttle-box, the weft-hammer C and the actuating mechanism therefor to rock it upon its support at every second pick of the loom, and the filling-supplying mechanism (shown at the left of Fig. 1) may be and are all as usual in the looms shown and described in United States Patents Nos. 454,810 and 529,940, to which reference may be had. The said filling-supplying mechanism consists essentially of a hopper and a pusher or transferrer, the hopper comprising a disk or plate *a*⁷⁰ having a series of notches to receive the heads of the filling-carriers F, only one being shown in Fig. 1, and a second disk or plate *a*⁷¹ having grooves provided each with a spring *a*⁷², serving to hold the tips of the filling-carriers, the hub *a*⁷³ of disk *a*⁷⁰ being provided with a suitable dog *a*⁷⁴ extended through a slot in the hub and entering an annular groove in a stud *a*⁷⁶ fixed relatively to the stand *a*⁷⁷ by a nut *a*⁷⁸, so that the hub and disk may be rotated intermittently by means of a spring *s*⁵⁰⁰. The hub *a*⁸⁰ of the disk *a*⁷¹ is secured by a screw 300 to a sleeve *a*⁷⁰ loosely surrounding the outer end of stud *a*⁷⁶, and a weft-end support *b*⁷¹ having a weft-end holder *b*⁷² is secured by a screw 400 to said sleeve, all as in said Patent No. 529,940, though lettered differently herein, and constituting a filling feeder or hopper.

The leading filling-carrier of the series held in the feeder is held against a stop (not shown) until it is transferred from the feeder to the shuttle by means of a pusher *f*¹⁰¹, the hub of which is mounted on a headed stud *f*¹⁰⁰ attached to the stand *a*⁷⁷, said pusher being shaped at its front end to present a portion 200 to act against the head of the filling-carrier F and a finger 210 to act against the tip of the filling-carrier to transfer the filling-carrier from the hopper into the shuttle at the proper time, all as in said Patent No. 529,940, to which reference may be had.

At the right-hand end of the loom is secured to the breast-beam A' a bracket *a* extending rearwardly above the path of the lay, as shown in Figs. 2 and 3, said bracket having therein a cam slot or groove *a'* *a*², to receive in it a roller or other stud *a*³ on an arm *a*⁴, pivoted at *a*⁵ to a stand *a*⁶ secured to the top of the lay, adjacent or near one of the shuttle-boxes A^x thereon, the arm *a*⁴ having depending therefrom a feeler *a*⁷, (see Figs. 2 and 12,) adapted to rest upon the filling-carrier F in the shuttle S when the lay moves forward, the part *a*² of the cam-slot in the bracket *a* acting on the roll *a*³ to lift the feeler *a*⁷ out of the path of the shuttle and picker-stick as the shuttle is thrown.

A portion of the upper side of the cam-slot is cut away and closed by a sliding piece or presser *a*⁸ supported on a spring-controlled plunger *a*⁹ mounted in a suitable housing *a*¹⁰ on the bracket *a*, the sliding piece being normally held in position by the spring, as shown in Figs. 2 and 5, and permitting the feeler *a*⁷ to rise or fall according to the diameter of the filling-carrier, it being understood of course that the filling-carrier is gradually decreasing in diameter during the running of the loom, the spring acting on the presser *a*⁸ to prevent rebound of the feeler during the operation of the loom.

The arm *a*⁴ of the feeler is extended toward the front of the loom at *a*¹² to form a dagger, and adapted at times to engage a dog *b* on an arm *b*^x mounted on a rock-shaft *b*¹, pivoted in suitable bearings *b*² on the front of the main framework of the loom and the bracket *a* respectively.

When the diameter of the mass of filling is larger than a predetermined diameter, the dagger *a*¹² will be held elevated by the feeler, so that it will pass above the dog *b* at each forward stroke of the lay, and when there is no filling-carrier at all in the shuttle, the shuttle being at the other end of the lay, the dagger will pass beneath the dog, and in neither instance will the latter be actuated. When, however, the diameter of the filling-carrier reaches the predetermined size, the feeler *a*⁷ will permit the dagger *a*¹² to drop sufficiently to engage the dog *b* on the forward stroke of the lay, turning the dog into the position shown partially in dotted lines, Fig. 12, and rocking the shaft *b*¹, said shaft having fast thereon a rocker-arm *b*³, (see Figs. 2, 3, and 12,) extended inwardly and connected by a link *b*⁴ to a latch *b*⁵ pivoted at *b*⁶ (see Fig. 4) to a hub or collar *b*⁷ fast on a rock-shaft *c* mounted in suitable bearings in the frame A of the loom and extended across the front thereof, the latch having a notch or shoulder *b*⁸ adapted at times to engage a lug or projection C' on the weft-hammer C.

When the shaft *b*¹ is rocked, as described, the latch *b*⁵ will be lifted to bring its shoulder into the path of movement of and to be engaged by the projection C' on the weft-hammer C as it moves forward, whereby the rock-

shaft *c* will be partially turned in the direction of the arrow 20, Fig. 4. As the weft-hammer moves forward the spent filling is ejected from the shuttle and a fresh filling-carrier inserted therein from the hopper, all in the same manner as shown and described in the patents hereinbefore referred to, the ends of the spent and the fresh filling extending beyond the selvage.

Referring now to Figs. 1, 6, 10, and 11, the opposite or left-hand end of the lay has secured thereto at the rear a bracket *d* having an upturned extension *d'* projecting above the lay just beyond the selvage and provided with one or more vertical slots *d²* to receive therein one or more blades *d³* of the filling-parting mechanism, said blades being preferably serrated at their under edges, as shown at *d⁴*, Fig. 6, and rigidly secured to the upper end of a bent lever *d⁵* fulcrumed at *d⁶* on an elbow-lever *d⁷* pivoted at *d⁸* to a suitable hub on a depending portion of the bracket *d* below the lay. The bracket has a depending ear *d⁹* having a substantially L-shaped cam-groove *d¹⁰* therein to receive a roller or other stud *d¹¹* on the lower end of the blade-carrying lever *d⁵*, whereby when the elbow-lever *d⁷* is turned on its pivot from the position shown in Figs. 6 and 10, by means to be described, into the position shown in Fig. 11 the lever *d⁵* will be moved in such manner that the blades *d³* will traverse a path substantially such as shown in dotted lines at *d^x*, Fig. 11, and in the direction of the arrow, first passing forward through the slots *d²* over the race of the lay sufficiently to engage the filling beyond the selvage, and as the blades *d³* are retracted into the position shown in Fig. 11 the filling will be parted, in this instance by being drawn against the extension *d'* and over the edges of the slots, the extension *d'* and the blades thus straining the filling in opposite directions.

A bracket *f* is secured to the front of the loom and has pivoted thereto a dagger *f'* on a stud *f²*, (see Fig. 7,) said dagger having secured to or forming a part of it a counterpoise *f³* and a forwardly and upwardly curved dog *f⁴*, the counterpoise normally acting to depress the dagger *f'* and elevate the dog *f⁴*, as shown clearly in Fig. 10.

The dagger is preferably notched at its end at *f⁵* to engage, when lifted, a laterally-extended lug *d¹²* of the elbow-lever *d⁷*, the normal position of the dagger being such that it is out of the path of movement of the said lug, it being remembered that the lever *d⁷* is secured to and movable with the lay B, a strong spring *S¹⁰* maintaining said lever and the blade-carrying lever *d⁵* normally in the position shown in Fig. 10. When the dagger is elevated into the path of the lug *d¹²* by means yet to be described, the elbow-lever *d⁷* will be rocked on its fulcrum, as shown in Fig. 11, to actuate the filling-parting mechanism, as has been described.

It is necessary to actuate the parting mechanism twice each time a fresh filling-carrier is inserted, the first movement acting to part the spent filling between the selvage of the cloth and the ejected filling-carrier, the second movement of the parting mechanism being necessary to part the fresh filling between its point of attachment to the hopper of the filling-supplying mechanism and the selvage.

The rock-shaft *c* has fast thereon a hub *c'*, (shown separately in Fig. 9,) provided with a notched or shouldered ear *c²*, and adjacent said hub and to the right, viewing Fig. 1, is mounted loosely on the rock-shaft a casting *g* (see Fig. 8) having a depending toe *g'* and an upturned ear *g²*, notched or shouldered at *g³*, to at times engage the dog *f⁴* described, a collar *g²⁰* preventing longitudinal movement of the casting *g* on the rock-shaft *c*, the casting forming a trigger.

When the rock-shaft *c* is partially rotated, as has been described, by the weft-hammer and intermediate connections, the hub *c'* is partially rotated, its shouldered ear *c²* engaging the dog *f⁴*, depressing the same and elevating the dagger *f'* to bring its notched end *f⁵* into the path of the lug *d¹²* on the actuating-lever *d⁷* of the parting mechanism to operate the said mechanism the first time.

Referring to Fig. 1 it will be seen that the width of the dog *f⁴* is sufficient to extend in the paths of the shouldered ear *c²* and the notched ear *g²* of the hub *c'* and trigger *g*, respectively, and referring to Fig. 10 the dog is shown as engaged by the ear *c²*, the shoulder *g⁴* of the trigger *g* resting on the dog. Now inasmuch as the centers of rotation of the ear *c²* and dog *f⁴* are not concentrically located the continued rotation of the rock-shaft *c* in the direction of the arrow 20, Fig. 4, will depress the dog *f⁴*, and at the same time swing it outwardly until the tip *c³* of the ear *c²* engages its inner face, and as the distance from the end of said tip to the center of the rock-shaft *c* is slightly greater than the distance from the said center to the outer edge of the shoulder *g⁴* the dog will be withdrawn from engagement with the said shoulder *g⁴*, and the trigger *g* will turn on the shaft *c* until the notch *g³* is brought into engagement with the dog, as in Fig. 11, the dagger *f'* being elevated into operative position by the depression of the dog *f⁴* by the ear *c²*. As the lay completes its forward stroke, the parting mechanism being operated once thereby, as described, an extended arm *h* on the lay strikes the depending toe *g'*, turning the trigger *g*, lifting the shoulder *g³* away from the dog *f⁴*; but inasmuch as the latter is held out by the tip *c³* of the ear *c²* fast on the rock-shaft *c* the dog is not released, nor the dagger *f'* lowered, and when the lay moves back the trigger *g* instantly resumes the position shown in Fig. 11, bringing the dog and notch *g³* into engagement. The rock-shaft *c* then returns to normal position, as the inward

swing of the weft-hammer C has disengaged it from the latch b^5 , and as the dog is held by the notch g^3 in the position shown in Fig. 11 the dagger f' is retained elevated in operative position to again actuate the parting mechanism at the next forward stroke of the lay. When this second operation is accomplished, the ends of both the spent and the fresh filling beyond the selvage having been parted close to the selvage, the loom is to run normally until there is another change of filling. On the forward stroke of the lay which actuates the parting mechanism the second time, the arm h strikes the toe g' of the trigger g and turns it to disengage the notch g^3 and the dog f^4 , and the latter is returned to normal position (shown in Fig. 10) by means of the counterpoise f^3 , lowering the dagger f' into inoperative position. A projection 75 (see Fig. 7^a) on the counterpoise f^3 is adapted to bear upon a suitable fixed portion of the loom-frame, to limit the movement of the counterpoise and attached parts.

Referring to Figs. 2 and 12, the arm b^x is shown as provided with a projection 30, to be engaged by a stop 40 on the inner side of the bracket a , when the latch b^5 is in normal inoperative position, to prevent undue rotation of the rock-shaft b' .

I have not described herein the mechanism for operating the lay, the weft-hammer, the shed-forming mechanism, or the stop motion for the loom, as they form no part of my present invention, and may be all as usual and well known.

So far as I am aware, it is broadly new to provide means for parting a spent filling-thread adjacent to and beyond the selvage after the exhausted or nearly-exhausted filling-carrier has been ejected from the shuttle. I also believe it to be broadly new to actuate the parting devices twice in succession—first, to part the spent filling-thread and then to part the new filling-thread. I believe it also to be new to control the operation of the parting mechanism by devices which replace the filling-carrier, when exhausted to a certain point, by a fresh filling-carrier; and accordingly my invention is not restricted to the precise construction and arrangement herein shown and described.

I claim—

1. In a loom, a shuttle carrying an exposed filling-carrier, a feeler to contact with the filling in the shuttle at predetermined intervals to thereby determine its volume, parting mechanism to part the filling-thread adjacent to and outside of the selvage, and devices intermediate the feeler and parting mechanism to operate the latter to part the filling when it has been exhausted to a predetermined volume, substantially as described.

2. In a loom, a shuttle carrying an exposed filling-carrier, a feeler independent of the shuttle to contact with the filling therein at

predetermined intervals to thereby determine its volume, parting mechanism to part the filling-thread adjacent to and outside of the selvage after the last shot of filling from the carrier has been ejected from the shuttle, and devices intermediate the feeler and the parting mechanism, to cause the operation of the latter when the filling has been exhausted to a predetermined volume, substantially as described.

3. In a loom, a shuttle carrying an exposed filling-carrier, a feeler to contact with the filling in the shuttle at predetermined intervals to thereby determine its volume, a filling-supplying mechanism to cause a new supply of filling to be placed in the shuttle when the former supply shall have been exhausted to a predetermined amount, a parting mechanism to part the fresh filling only at its first shot, at a point outside of the selvage, and devices intermediate the feeler and the parting mechanism, to control its operation when a fresh filling-carrier is about to be placed in the shuttle, substantially as described.

4. In a loom, a shuttle carrying an exposed filling-carrier, a feeler to contact with the filling in the shuttle at predetermined intervals to thereby determine its volume, a filling-supplying mechanism to cause a new supply of filling to be placed in the shuttle when the former supply shall have been exhausted to a predetermined amount, a parting mechanism to part the spent filling after its last shot and to part the fresh filling only at its first shot, both at a point outside of the selvage, and devices intermediate the feeler and the parting mechanism, to cause its operation on two successive beats of the lay when the filling has been exhausted to a predetermined volume, substantially as described.

5. In a loom, a lay having a shuttle-box, a shuttle therein carrying an exposed filling-carrier, a feeler independent of the shuttle, means to cause the feeler to contact with the filling in the shuttle at each beat of the lay, to thereby determine its volume, normally inoperative parting mechanism carried by the lay to part the filling-thread at a point adjacent to and outside of the selvage, and devices intermediate the feeler and the parting mechanism, to cause the operation of the latter when the filling has been exhausted to a predetermined volume, substantially as described.

6. In a loom, the lay, its shuttle-box, a shuttle therein carrying an exposed filling-carrier, a feeler carried by the lay, means to cause the feeler to contact with and determine the volume of the filling as the lay is moved forward, a dagger movable with the feeler, and a rock-shaft having a dog thereon to be engaged by the dagger, to turn the rock-shaft when the filling has been exhausted to a predetermined amount, combined with normally inoperative parting mechanism to part the filling at a point outside of the selvage,

and connections intermediate the rock-shaft and the parting mechanism, to cause the operation of the latter when the rock-shaft has been turned, substantially as described.

7. In a loom, the lay having a shuttle-box, a shuttle therein carrying an exposed filling-carrier, a feeler to contact with the filling in the shuttle at predetermined intervals to thereby determine its volume, and normally inoperative parting mechanism carried by the lay, to part the filling adjacent to and outside of the selvage, combined with a dagger to actuate the parting mechanism as the lay moves forward, and devices intermediate the feeler and dagger to move the latter into operative position when the filling has been exhausted to a predetermined volume, substantially as described.

8. In a loom, the lay, a shuttle carrying an exposed filling-carrier, a feeler adapted to contact with and determine the volume of the filling at predetermined times, parting mechanism carried by the lay to part the filling adjacent to and outside of the selvage, and a normally inoperative dagger to actuate said mechanism as the lay moves forward, combined with a rock-shaft, connections between it and the dagger to move it into operative position when the rock-shaft is turned, devices intermediate the said rock-shaft and the feeler, to turn the former when the filling has been exhausted to a predetermined volume, and means controlled by the lay to return the dagger to inoperative position when the parting mechanism has been operated, substantially as described.

9. In a loom, the lay, parting mechanism carried thereby to part the filling adjacent to and outside of the selvage, a dagger to at times actuate said mechanism as the lay moves forward, and a dog movable with the dagger, combined with a rock-shaft, an ear thereon to co-operate with and depress the dog when the rock-shaft is turned, to thereby move the dagger into operative position, and means including a feeler adapted to contact with the filling, and connections between the feeler and rock-shaft, to rock said shaft when a filling-thread is to be parted, substantially as described.

10. In a loom, the lay, parting mechanism carried thereby to part the filling adjacent to and outside of the selvage, a dagger to at times actuate said mechanism as the lay moves forward, and a dog movable with the dagger, combined with an actuating rock-shaft, an ear fast thereon, and a shouldered trigger loose on said shaft, means including a feeler adapted to contact with the filling, and connections between the feeler and rock-shaft, to rock the shaft when the filling is changed to cause engagement of the ear and dog to move the dagger into operative position as the lay moves forward, the dog being retained in position by the trigger when the rock-shaft and ear return to normal position, and an arm

on the lay to release the dog and trigger on the next forward movement of the lay, whereby the parting mechanism is operated at each of such forward movements of the lay, substantially as described.

11. In a loom, a shuttle, filling-supplying devices to cause a new supply of filling to be placed in the shuttle when the former supply is exhausted to a predetermined amount, parting mechanism to part the thread of an ejected filling-carrier at a point outside of the selvage, and to part the thread of an incoming filling-carrier only at its first shot, and means to actuate the parting mechanism when the filling has been exhausted to the predetermined amount, substantially as described.

12. In a loom, the combination with a shuttle, of devices for removing the filling-carrier from the shuttle when the filling is exhausted to a predetermined point, and parting mechanism to part the spent filling-thread adjacent to and outside of the selvage as the filling-carrier is removed from the shuttle, substantially as described.

13. In a loom, filling-parting mechanism comprising a slotted arm outside of the selvage, a serrated blade adapted to be moved through the slot of said arm into engagement with the filling-thread and to be drawn rearwardly within the slot thereafter, to part the thread, and a blade-carrier, combined with an actuating-lever upon which said carrier is pivoted, and a cam to direct the movement of the carrier, substantially as described.

14. In a loom, the lay having a shuttle-box, a shuttle therein carrying an exposed filling-carrier, a feeler to contact with the filling in the shuttle at predetermined intervals, to thereby determine its volume, and normally inoperative parting mechanism to part the filling-thread outside of the selvage, combined with the weft-hammer, normally disconnected actuating devices for the parting mechanism intermediate it and the weft-hammer, and connections between the feeler and the actuating devices, to bring the latter into engagement with the weft-hammer to be operated thereby when the filling has been exhausted to a predetermined volume, substantially as described.

15. In a loom, mechanism to part the filling-thread, consisting of a slotted member, a member bodily movable relatively thereto and having a blade-like portion movable in the slot of the other member, and an actuating-lever and a cam for said movable member, whereby the blade-like portion is drawn downward by the actuating-lever to engage the thread and then inward by the cam to part the thread, substantially as described.

16. In a loom, the combination with a shuttle, filling-supplying devices to cause a new supply of filling to be placed in the shuttle when the former supply is exhausted to a predetermined amount, and parting devices

to part the filling-thread at a point outside
the selvage, of mechanism which is brought
into position to actuate said parting devices
when a filling-carrier is ejected from the
5 shuttle, and which remains in position to
again actuate the parting devices after the
new filling-carrier has been supplied to the
shuttle, means to operate said mechanism, and
means for returning said actuating mechan-

ism to its normal position, substantially as is
described.

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

JAMES H. NORTHROP.

Witnesses:

GEO. OTIS DRAPER,
WALTER HASTINGS.