

C. E. NUTTING.

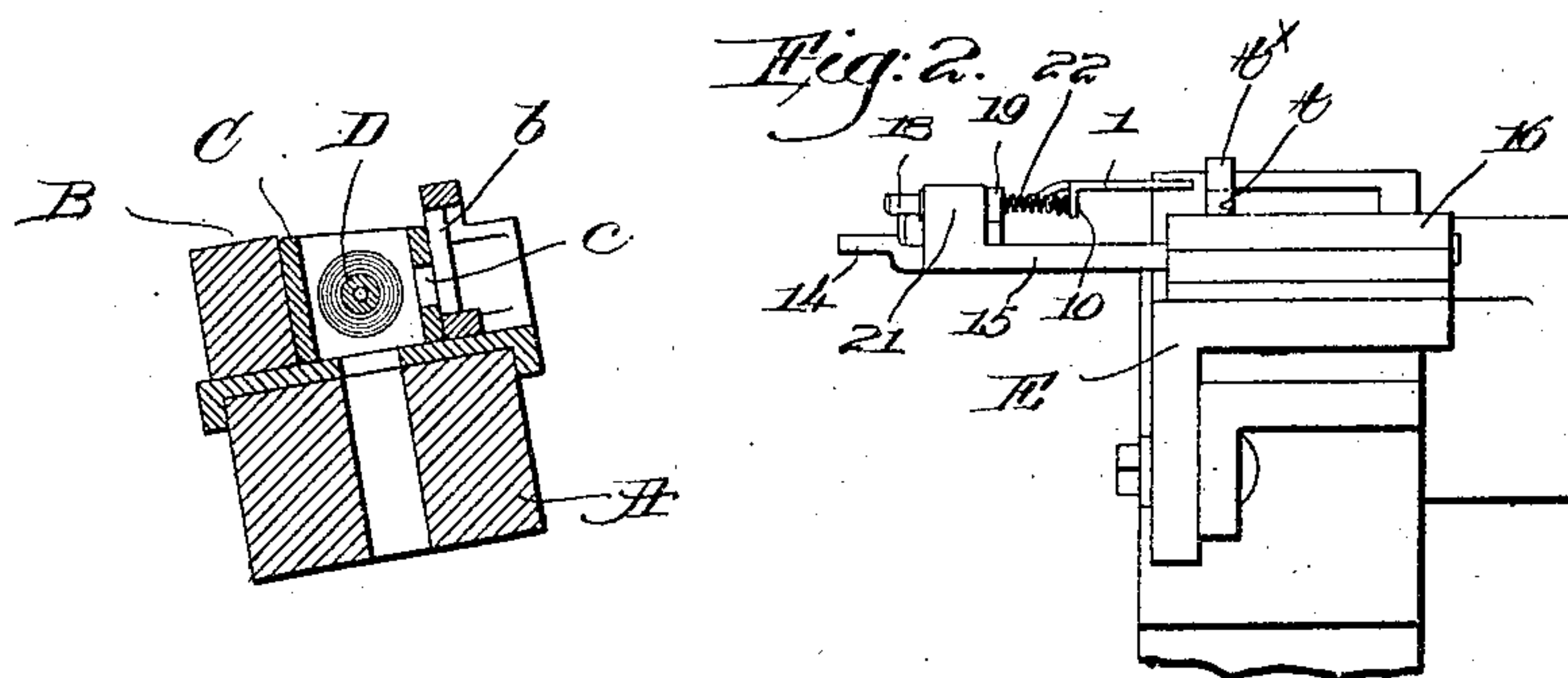
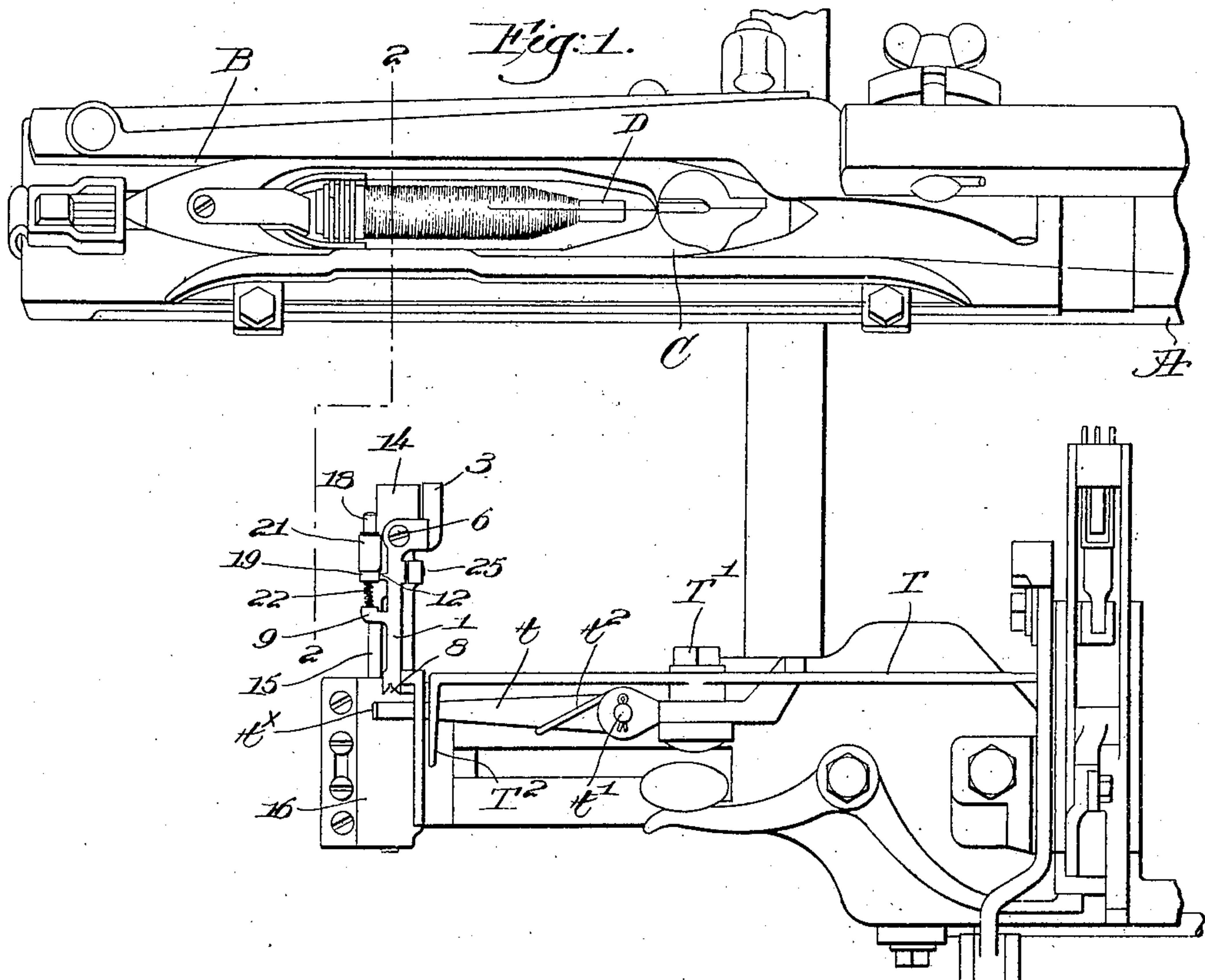
FILLING EXHAUSTION INDICATING MECHANISM FOR LOOMS.

APPLICATION FILED AUG. 26, 1908.

912,257.

Patented Feb. 9, 1909.

2 SHEETS—SHEET 1.



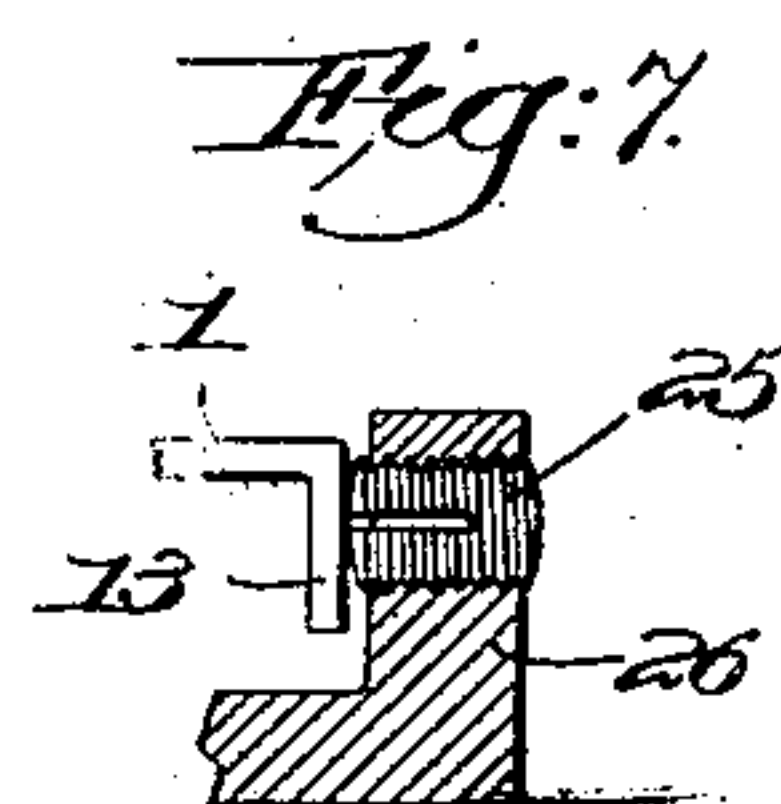
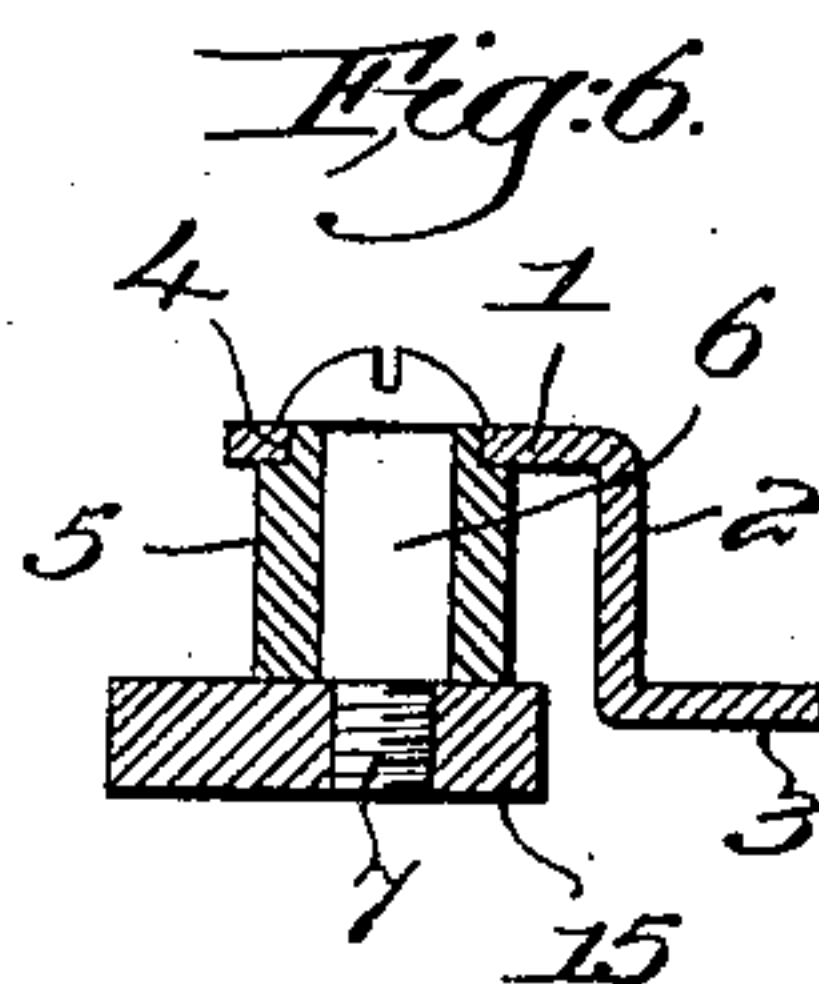
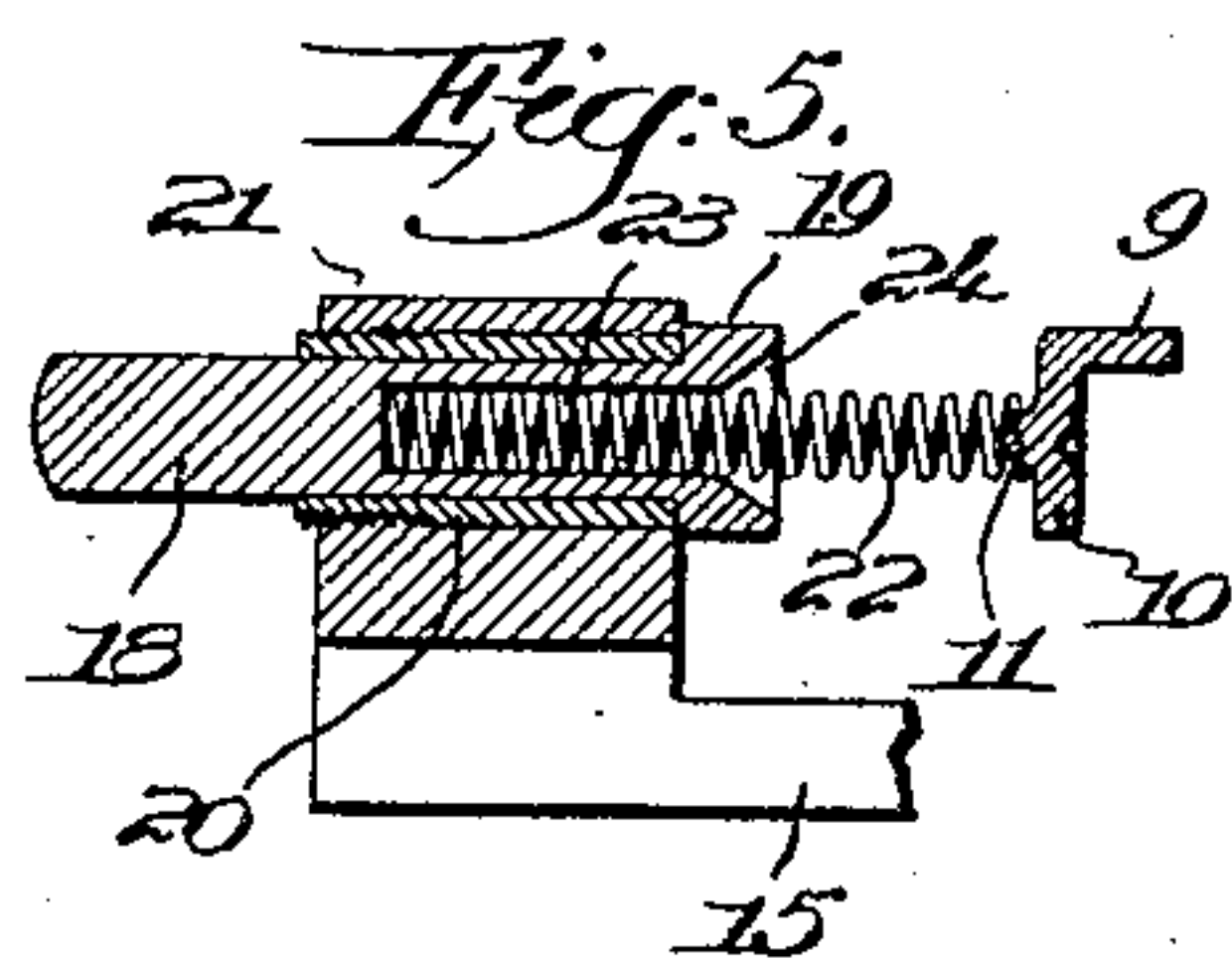
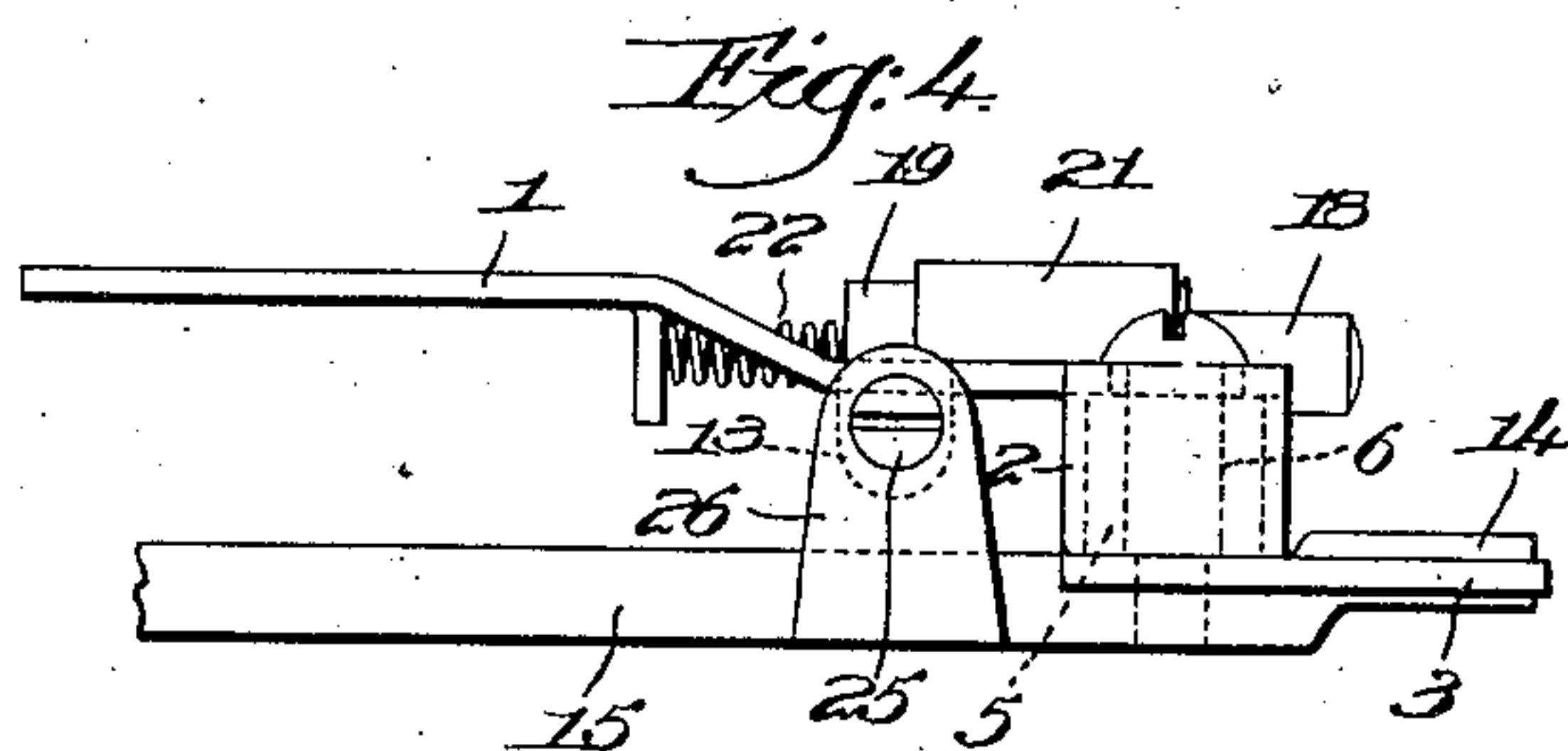
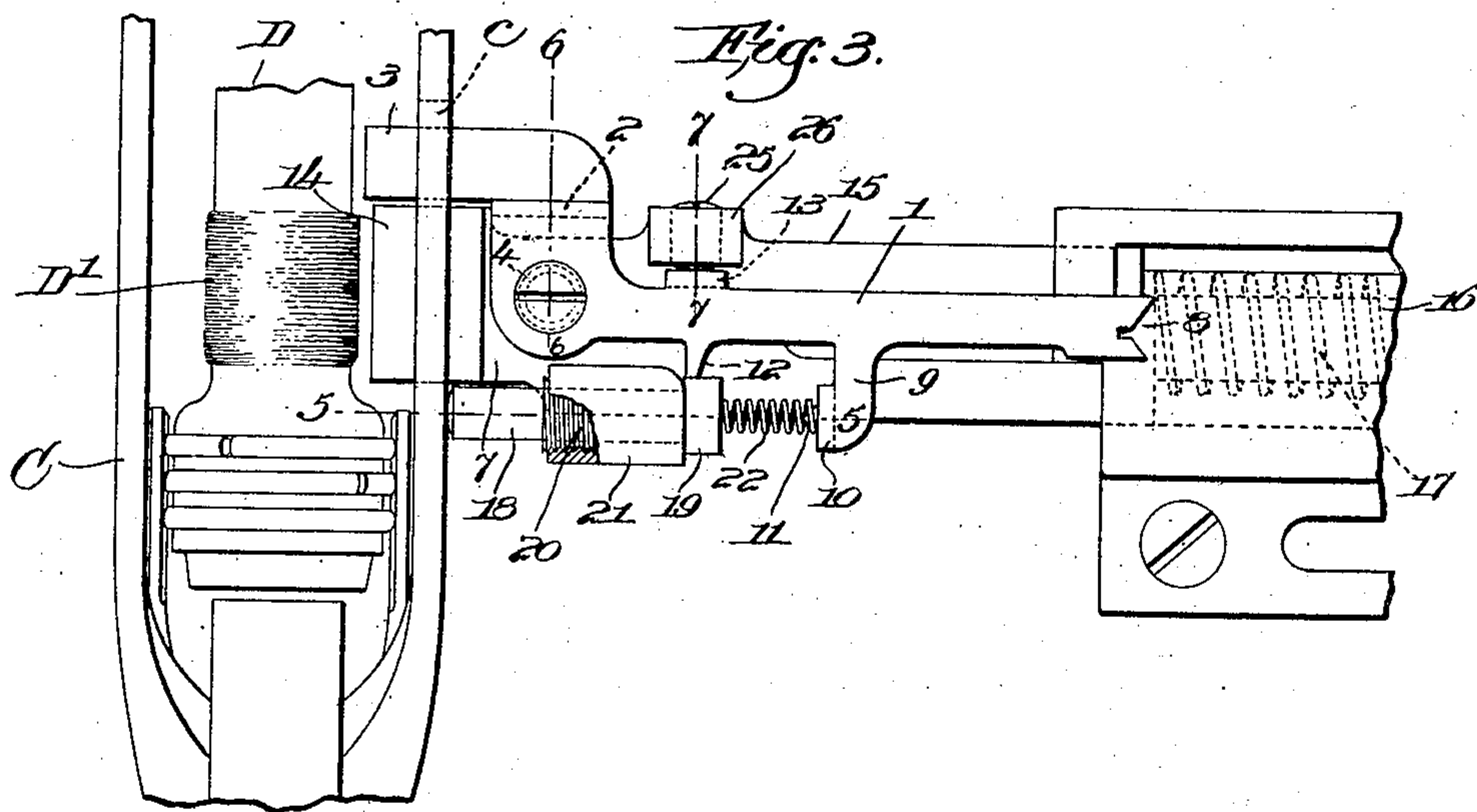
Witnesses,
Edward F. Allen,
Joseph M. Ward.

Inventor,
Charles E. Nutting,
by Lewis Dugan,
att'y

C. E. NUTTING.
FILLING EXHAUSTION INDICATING MECHANISM FOR LOOMS.
APPLICATION FILED AUG. 26, 1908.

912,257.

Patented Feb. 9, 1909.
2 SHEETS—SHEET 2.



Witnesses,
Edward G. Allen.
Joseph M. Ward.

Inventor:
Charles E. Nutting.
by Massey Ferguson
attys.

UNITED STATES PATENT OFFICE.

CHARLES E. NUTTING, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO DRAPER COMPANY,
OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

FILLING-EXHAUSTION-INDICATING MECHANISM FOR LOOMS.

No. 912,257.

Specification of Letters Patent.

Patented Feb. 9, 1909.

Application filed August 26, 1908. Serial No. 450,333.

To all whom it may concern:

Be it known that I, CHARLES E. NUTTING, a citizen of the United States, and resident of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Filling-Exhaustion-Indicating Mechanism for Looms, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates particularly to filling-replenishing looms of the type wherein the filling is replenished automatically prior to complete exhaustion thereof in the running or working shuttle, in order that no blank picks or picks of short lengths shall be woven into the cloth, such looms being technically termed "feeler" looms because of the presence of a "feeler", which periodically contacts with the filling in the running shuttle, and when the volume of filling has been reduced or exhausted to the desired extent effects automatically the actuation of the replenishing mechanism.

Various forms of feeler mechanism have been devised and put into practice, designed to obviate the uncertainty of operation due to the presence of variable factors in the practical operation of the loom, such as variations in the size of bobbins, slight changes in the position of the bobbin in the shuttle; variations in the beat of the lay, etc., and more recently a feeler mechanism has been devised wherein the feeler is provided with a lock to prevent the feeler from performing its function until filling replenishment is demanded.

In connection with such feeler and its lock a feeler-governor is provided, so constructed and arranged with relation to the feeler that the latter prevents impingement of the feeler-governor upon the filling in the shuttle until the filling is exhausted to a certain extent, after which the feeler is unlocked and its functional movement is effected at the time the desired denudation of filling is reached. As a result of such functional movement of the unlocked feeler a change is effected automatically in the operation of the loom, such for instance as the actuation of a filling-replenishing mechanism.

My present invention is of the class just described, and it has for its object the production of a feeler mechanism which can be readily constructed at a low cost, with means for adjustment to take up wear, and with

certain improvements in details of construction, to be fully described in the subjoined specification and particularly pointed out in the following claims.

I make no claim, broadly, to a feeler mechanism in which the feeler is normally locked, nor to the combination, with a feeler and feeler-lock of a feeler-governor, as the same is not of my invention.

Figure 1 is a top plan view of a portion of a loom equipped with feeler mechanism embodying my invention, the parts being shown in normal condition and ready to cooperate with the filling in the shuttle on the forward beat of the lay; Fig. 2 is a left hand end elevation and partial section on the line 2—2, Fig. 1; Fig. 3 is an enlarged plan view of the feeler mechanism, partly broken out, and just prior to the substantial or predetermined exhaustion of the filling in the running or working shuttle; Fig. 4 is an inner side elevation of the major part of the feeler mechanism; Fig. 5 is a longitudinal section, on the line 5—5, Fig. 3, of the feeler-lock and the support therefor; Fig. 6 is a sectional detail on the line 6—6, Fig. 3, looking toward the left, showing the pivotal support for the feeler; Fig. 7 is a sectional detail on the line 7—7, Fig. 3, showing the means for taking up wear between the feeler and the locking device therefor.

In Figs. 1 and 2 the lay A has at one end a shuttle-box B in which is shown a shuttle C provided with a removable filling-carrier or bobbin D, and in Fig. 3 the filling D thereon is illustrated as approaching exhaustion.

As shown in Fig. 2 the front wall of the shuttle has a slot *c* adapted to register with an opening *b* in the front plate of the shuttle-box when the shuttle is boxed through which opening and slot the feeler and feeler-governor enter as the lay beats up, to cooperate with the filling in the shuttle.

Upon an extension of the breast-beam is firmly bolted a bracket E, and upon the extension is mounted a transmitter T, fulcrumed to rock upon a substantially horizontal fulcrum-stud T' and having at its outer end a forwardly extended slot of cam portion T², all substantially as in United States Patent No. 789,471 granted to Wood & Northrop May 9, 1905. When the transmitter is rocked by or through the operation

of the feeler device a filling-replenishing mechanism is caused to operate, as in said patent, such mechanism being well known and not illustrated herein.

5 A controller *t*, pivoted at its inner end at *t'*, Fig. 1, is extended at its outer end through the slot in the cam portion *T*² of the transmitter, and is maintained in its normal rearward position by a spring *t*², all as in
10 said patent, the free end of said controller being provided with an upturned and beveled lug *t*^x, for a purpose to be described. When the outer end of the controller is moved forward by or through the operation
15 of the feeler device it acts through the cam portion *T*² of the transmitter to rock the latter on its stud *T*¹ and thereby effect automatically the replenishment of filling, as in said Patent No. 789,471.

20 In accordance with my present invention the feeler is made as a lever, stamped or struck up from plate metal and comprising a long arm 1, a short arm 3 in a different but parallel plane, and a connecting portion or bend 2, the arms being laterally
25 offset from each other, the part of the plate adjacent the bend having an opening 4 to receive with a driving fit the shouldered upper end of a sleeve hub 5, Fig. 6, which
30 loosely embraces the shank of an upright, headed fulcrum-stud 6, the stud head being shown as extending over the feeler beyond the aperture 4, to retain the feeler in position. This construction provides the feeler
35 with a long and firmly attached hub, in a very simple and cheap manner, the long bearing of the hub on the stud 6 resulting in steady movement of and a firm support for the feeler and reducing wear to a minimum. The threaded end 7 of the stud is
40 secured to the feeler-governor, to be referred to hereinafter, the forward end of the arm 1 having a beveled notch 8 to cooperate with the lug *t*^x of the controller *t*
45 when the feeler is swung on its fulcrum 6 from its normal position, Figs. 1 and 3, into position to register with said lug.

The long arm 1 has a lateral extension 9 downturned at 10 to form an abutment, provided on its rear face with a spring-positioning
50 teat 11, see Fig. 5, made by a suitable stamp or tool. On the same side of the arm 1 I provide a second lateral and tapered extension 12, between the fulcrum 6 and the
55 abutment, to cooperate with the feeler lock, to be described, and opposite the extension 12 a depending ear 13 is formed on said arm 1, for a purpose to be described. The extension 12, abutment 10 with its teat 11, and
60 the ear 13 are all integral with the feeler and are formed when the blank is made, said parts being bent into position by suitable dies or forming tools in an easy manner.

The feeler-governor comprises a flat impinging head 14 and a shank 15, the latter

being mounted for movement back and forth in a suitable guide 16 attached to the bracket *F*, said governor being moved rearwardly by a spring 17, (see dotted lines Fig. 3) within
70 the guide 16, and it is moved forward by the action of the filling upon the feeler device as the lay beats up. The governor constitutes a carrier for the feeler, and said feeler has a movement in unison with the feeler-gov-
75 ernor as the latter is reciprocated and it also has a relative swinging movement about its fulcrum 6.

The head 14 of the governor and the rear end of the short arm 3 of the feeler lie side by side and both pass through the aperture *b*
80 and slot *c* into the shuttle as the lay beats up, see Fig. 3, the filling on the filling-carrier or bobbin impinging upon the feeler (which is normally locked) and moving it and the feeler-governor forward in unison against
85 the spring 17, there being no relative movement of the feeler and governor during the usual and normal action, until the filling in the shuttle approaches exhaustion.

The normal locking of the feeler is effected
90 by engagement of the extension 12 with the feeler lock, which I have herein shown as a socketed, cylindrical plunger 18 having a circular head 19, the plunger being mounted to slide longitudinally in a bearing bushing
95 20 screwed into an upright, tubular and internally threaded support 21 forming a part of the feeler-governor. The plunger is thus adapted to slide forward and back in parallelism with the path of movement of the
100 feeler-governor, the head 19 normally being held in operative position against the front end of the support 21 by a spiral spring 22. The rear end of the spring enters the socket 23 of the plunger, see Fig. 5, and its front end
105 bears against the abutment 10 and is positioned thereon by the teat 11, the spring serving not only to maintain the lock normally in operative position, with the head 19 against the front end of the bushing and in
110 engagement with the extension 12, but also to return the feeler to its normal position after it has performed its functional movement.

When the feeler is unlocked and is swung to the left, viewing Fig. 1, to cooperate with
115 the controller, the spring 22 is deflected slightly from its normal position and to facilitate this deflection I prefer to cup out or countersink the front end of the socket, as at 24, Fig. 5. When the feeler is locked it cannot be swung into position to cooperate with
120 the controller *t*, and its movement in the opposite direction is limited by an adjustable stop, shown as a split screw 25, Fig. 7, in an ear 26 on the shank of the feeler-governor,
125 the end of the stop bearing against the depending ear 13 on the feeler.

By making the stop as a split-screw I obviate the use of a check-nut to lock it in adjusted position, adjustment of the stop en- 130

abling me to take up any wear between the extension 12 and the cooperating part 19 of the feeler lock, preventing back-lash or improper play of the parts.

5 The feeler-governor can be made as a casting, and requires but little finishing, the boring and tapping of the support 21 and the ear 26 being simple and cheap operations.

Referring to Fig. 3, it will be seen that the 0 impinging faces of the head 14 of the feeler-governor and the short arm 3 of the feeler are out of alinement, the feeler projecting rearward a short distance beyond the head of the governor, so that if the filling on the 15 bobbin D is in front of the feeler the feeler-governor cannot impinge upon the filling.

The aperture *b* in the front plate of the shuttle-box B is high enough to receive the rear end of the locking plunger 18 as the lay 20 beats up, but the plunger is above the slot *a* in the shuttle, so that the locking device cannot under any circumstances enter such slot.

A brief description of the operation of the apparatus will be sufficient for a thorough 25 understanding thereof. The projection of the feeler rearwardly beyond the feeler-governor is maintained at all times, whether said parts are outside of the shuttle or when either part is in contact with the filling, except 30 when the feeler is unlocked and is swung on its fulcrum. While there is ample filling in the shuttle it impinges upon the feeler as the lay beats up, and the feeler, feeler-governor and feeler lock are moved forward as a 35 unit, with the lay, and as the latter swings back the spring 17 moves said parts backward, the spring 22 keeping the feeler-lock in its normal, operative position and preventing any swing of the feeler. This action continues until the filling has been so far ex- 40 hausted that it does not impinge on the feeler, as illustrated in Fig. 3, wherein the bobbin D is bare opposite the feeler, the remaining portion D' of filling now impinging 45 upon the head 14 of the feeler-governor. The amount of filling, however, is still sufficient to prevent contact of the feeler with the denuded or bare portion of the bobbin, and the feeler-governor and parts mounted 50 thereon are intermittently moved forward as a unit, the feeler still being locked. The rear end of the feeler-lock is shown in Fig. 3 in contact with the shuttle body, while the forward movement of the lay has not quite ef- 55 fected contact between the filling D' and the feeler-governor, so that as the forward movement of the lay continues the feeler-lock will be first moved forward to carry the head 19 forward beyond the extension 12, unlocking 60 the feeler. The filling D' then impinges upon the feeler-governor, moving it and the parts thereon forward, but as the feeler does not touch the bare bobbin it remains quiescent on its fulcrum, and this action is repeated un- 65 til by further depletion of the filling the

feeler is permitted to impinge upon the bobbin, before the feeler-governor impinges upon the filling at D'. Inasmuch as the feeler has been unlocked previously by engagement of the plunger 18 on the shuttle the feeler will 70 be swung on its fulcrum, bringing its notched end 8 behind and into engagement with the lug *t*^x on the controller, and then as the feeler and feeler-governor move forward the controller is swung forward, rocking the trans- 75 mitter T and effecting the actuation of the replenishing mechanism. The effective feeling action, as will be manifest, is between the last windings of filling on the filling-carrier and the surface of the latter left bare by the 80 weaving off of the filling which previously covered it, such effective feeler action being dependent upon the difference in level between the residue of filling and the adjacent denuded body of the filling-carrier. The 85 spring 22 is light in comparison with the feeler-governor spring 17, and the former spring performs the double function of returning the feeler to normal position and restoring the feeler lock to operative position 90 after each movement thereof to releasing position. When the bushing 20 becomes worn it can be quickly removed and a new bushing inserted in the support 21, and as has been 95 stated the wear between the locking head 19 and the extension 12 can be taken up by the adjustable stop 25. The feeler first contacts with the filling on the working filling-carrier; then it is held idle or quiescent when it con- 100 tacts with neither filling nor filling-carrier, and finally it contacts with the denuded body of the filling-carrier. During the first of these periods the feeler and feeler-governor move as a unit and in the same direction, the feeler being locked from movement relatively 105 to the feeler-governor, and the latter has no functional contact with the filling or the filling-carrier. In the second period the filling in the path of the feeler has been so far exhausted that the feeler-governor impinges 110 upon the filling while the feeler is thereby held clear of both the filling and the filling-carrier, and the duration of this period of idleness of the feeler is governed by the feeler-governor. Toward the close of this 115 period the depletion of the filling between the filling-carrier and the feeler-governor permits the shuttle body to engage and move the lock relatively to the feeler-governor and feeler, unlocking the latter. Finally, by further 120 depletion of the filling in front of the feeler-governor the feeler again becomes active by impinging upon the denuded body of the filling-carrier, and being unlocked it is moved relatively to the feeler-governor and in a di- 125 rection different from that in which the governor moves, thus cooperating with the controller and effecting the desired change in the operation of the loom. This occurs while there is still enough filling on the filling-car- 130

rier to continue the weaving until the replenishment of filling has been effected, so that there is no discontinuance or break in the laying of the filling in the shed.

5 By reference to Fig. 3 it will be seen that when the feeler-lock is moved forward by engagement with the shuttle body the spring 22 will be compressed, so that when the feeler is swung on its fulcrum 6, performing its func-
10 tional movement, it will be against the spring, which thus acts at such time as a cushion for the feeler, preventing a jerky movement thereof. After functional movement of the unlocked feeler the backward movement of
15 the lay releases the feeler from contact with the filling-carrier and the shuttle body is moved away from the rear end of the feeler-lock, permitting spring 22 to expand and restore the lock to normal position, and should
20 the lock be released first the pressure of the rear side of the head 19 against the tapered edge of the extension 12 will act in conjunction with the spring pressure on the abutment 10 to restore the feeler to normal posi-
25 tion. That is, the tapered form of the extension 12 prevents any catching of the same between the head 19 and the support 21 after the feeler has been unlocked and has performed its functional swinging movement.
30 By adjustment of the bushing for the feeler-lock the rear end of the latter can be changed somewhat as to its normal position, so that the engagement thereof by the shuttle body will be effected a little sooner or a little later,
35 for the front end of the bushing limits rearward movement of the lock, the head of the latter being thick enough to permit the slight adjustment while still properly cooperating with the extension on the feeler.

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

1. A loom having a feeler-governor and a feeler movable relatively thereto, in combination with a feeler-lock which normally co-
45 operates with and locks the feeler, and an adjustable, self-locking stop to cooperate with the feeler and take up wear between it and the feeler-lock.

50 2. A loom having, in combination, a feeler to enter the shuttle and cooperate with the filling therein, a feeler-lock which normally locks the feeler but before the filling requires replenishment releases and thereby permits
55 functional movement of the feeler, means acting independently of the feeler to render the feeler-lock inoperative, and an adjustable stop cooperating with the feeler.

60 3. A loom having a feeler-governor and a feeler movable relatively thereto, both of which enter the shuttle to cooperate with the filling therein, an elongated hub fixed on the feeler, a fulcrum-stud on the feeler-governor, on which the hub is rotatably mounted, a

lateral extension on the feeler, a depending 65 ear on its opposite side, a normally operative feeler-lock cooperating with said extension to lock the feeler from movement about the fulcrum-stud, and an adjustable stop on the feeler-governor to cooperate with the ear on 70 the feeler.

4. A loom having a feeler-governor and a feeler movable relatively thereto, both of which enter the shuttle to cooperate with the filling therein, in combination with a feeler- 75 lock slidably mounted on the feeler-governor and normally locking the feeler, and a spring acting upon the feeler-lock and the feeler, to normally maintain the former in its operative position and to return the latter to 80 normal position after functional movement thereof.

5. A loom having a feeler-governor and a feeler movable relatively thereto, both of which enter the shuttle to cooperate with the 85 filling therein, a support on the feeler-governor, and a removable bushing mounted in said support, in combination with a spring-controlled feeler-lock slidably mounted in the bushing and which normally locks the 90 feeler, but, when the filling demands replenishment, releases the feeler and thereby permits functional movement thereof.

6. A loom having a feeler-governor and a feeler movable relatively thereto, both of 95 which enter the shuttle to cooperate with the filling therein, a support on the feeler-governor, and a removable bushing mounted in said support, in combination with a locking plunger longitudinally slidable in the 100 bushing and normally cooperating with the feeler to lock it, an abutment on the feeler, and a spring interposed between said plunger and abutment.

7. A loom having a feeler-governor and a 105 feeler movable relatively thereto, both of which enter the shuttle to cooperate with the filling therein, in combination with a feeler-lock slidably mounted on the feeler-governor in parallelism with its path of 110 movement, to normally lock the feeler, an abutment on the feeler opposite the forward end of the feeler-lock, and a spring interposed between the latter and the abutment, to operatively position the feeler-lock and 115 to return the feeler to normal position after functional movement thereof.

8. A loom having a feeler-governor and a feeler movable relatively thereto, both of which enter the shuttle to cooperate with 120 the filling therein, in combination with a socketed feeler-lock mounted on the feeler-governor and movable relatively thereto in parallelism with its path of movement, said feeler-lock normally locking the feeler, an 125 abutment on the feeler opposite the forward end of said feeler-lock, and a controlling spring seated at one end in the socket of

the feeler-lock and at its other end bearing against the abutment.

9. A loom having, in combination, a feeler-governor and a feeler pivotally mounted thereon, both of which enter the shuttle to cooperate with the weft therein, a feeler-lock movable with and also relatively to the feeler-governor, to normally lock the feeler, a spring cooperating with the feeler-lock and the feeler, to operatively position the former and to return the latter to normal position after functional movement thereof, and a stop to limit spring-induced movement of the feeler.

10. A loom having, in combination, a feeler-governor and a feeler pivotally mounted thereon, both of which enter the shuttle to cooperate with the weft therein, a feeler-lock movable with and also relatively to the feeler-governor, to normally lock the feeler, a spring cooperating with the feeler-lock and the feeler, to operatively position the former and to return the latter to normal position after functional movement thereof, and an adjustable, self-locking stop on the feeler-governor to limit spring-induced movement of the feeler and to take up wear between it and the feeler-lock.

11. A loom having, in combination, a feeler-governor and a feeler pivotally mounted thereon, both of which enter the shuttle to cooperate with the weft therein, a feeler-lock movable with and also relatively to the feeler-governor, to normally lock the feeler, a spring cooperating with the feeler-lock and the feeler, to operatively position the former and to return the latter to normal position after functional movement thereof, a support integral with the feeler-governor, in which the feeler-lock is slidably mounted, an ear on and integral with the feeler-governor, and an adjustable stop in said ear,

to limit spring-induced movement of the feeler.

12. A loom having, in combination, a feeler entering the shuttle, a feeler-lock which normally locks the feeler, but which, before the filling demands replenishment, releases and thereby permits the functional movement of the feeler, said feeler-lock comprising a slidably mounted, headed plunger, an extension on the feeler to cooperate with the plunger head, an abutment on the feeler opposite said head, and a spring interposed between the abutment and the plunger head, to act upon both the feeler and the feeler-lock.

13. In a feeler mechanism for looms, a feeler made of plate metal and having a long and a short arm, in different parallel planes, and an elongated, shouldered hub connected rigidly with the feeler by a driving fit, the feeler having an opening to receive the shouldered end of the hub.

14. A loom having, in combination, a feeler adapted to enter the shuttle and cooperate with the filling, a feeler-lock to normally lock the feeler from functional movement, the feeler-lock comprising a headed plunger, a support, an adjustable bushing carried thereby and in which the plunger is slidable longitudinally, and a spring to act upon the plunger and normally maintain its head against one end of the bushing, adjustment of the latter varying the position of the rear end of the plunger.

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

CHARLES E. NUTTING.

Witnesses:

W. PEPPERELL,

EDWARD DANA OSGOOD.