

No. 878,337.

PATENTED FEB. 4, 1908.

W. H. BROTHERS.  
WEFT REPLENISHING LOOM.  
APPLICATION FILED MAR. 15, 1906.

3 SHEETS—SHEET 1.

Fig. 1.

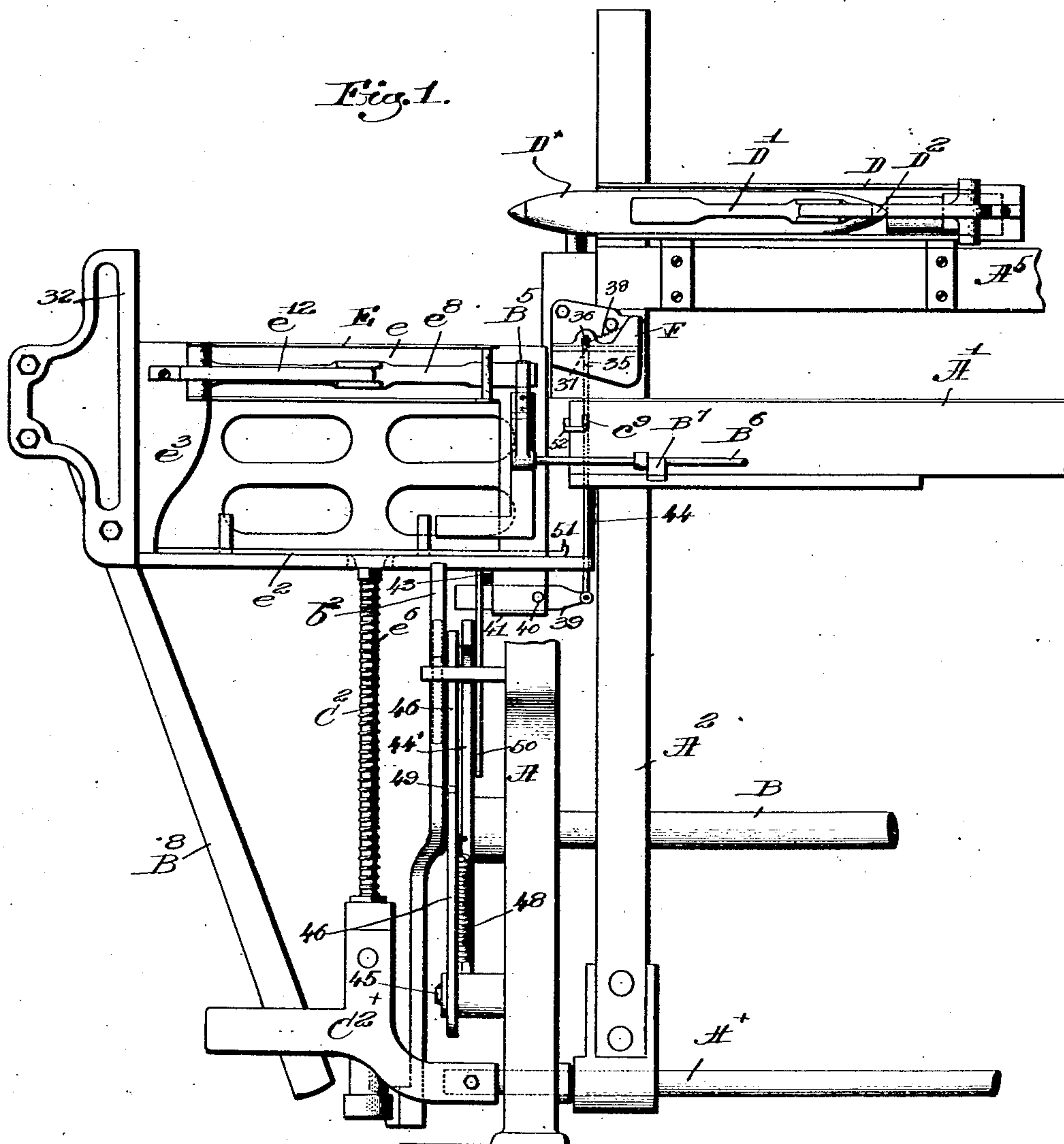
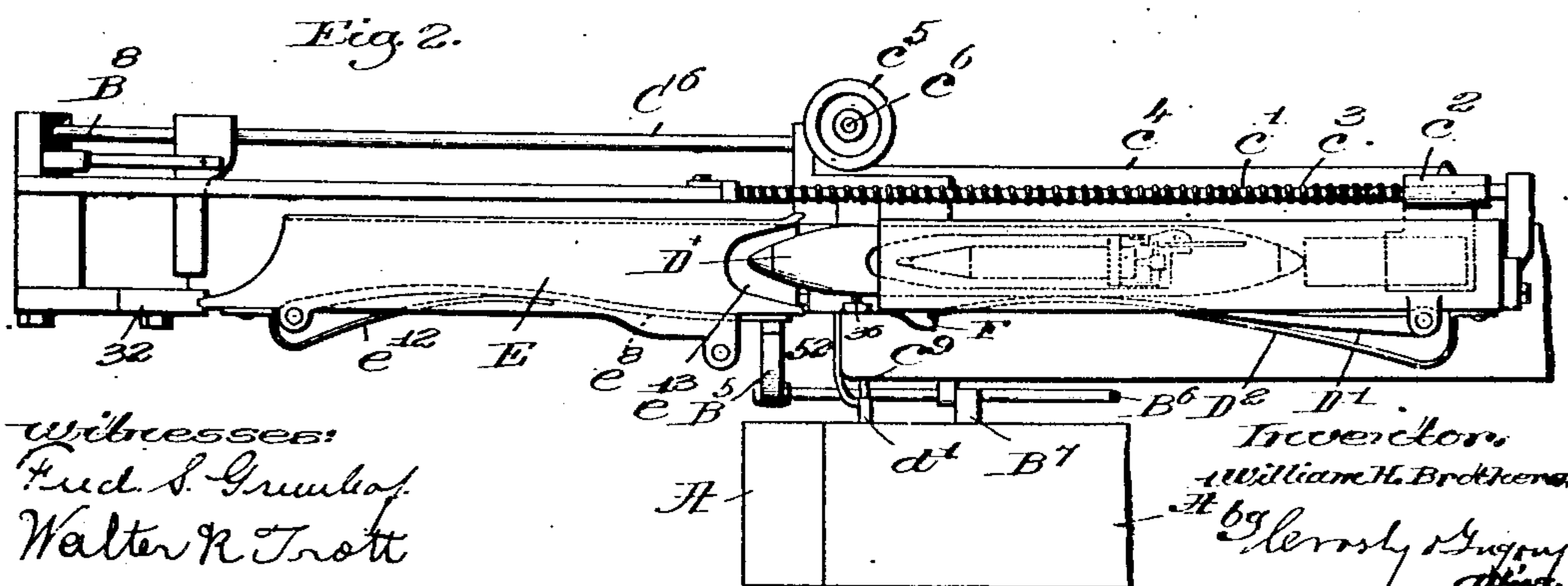


Fig. 2.



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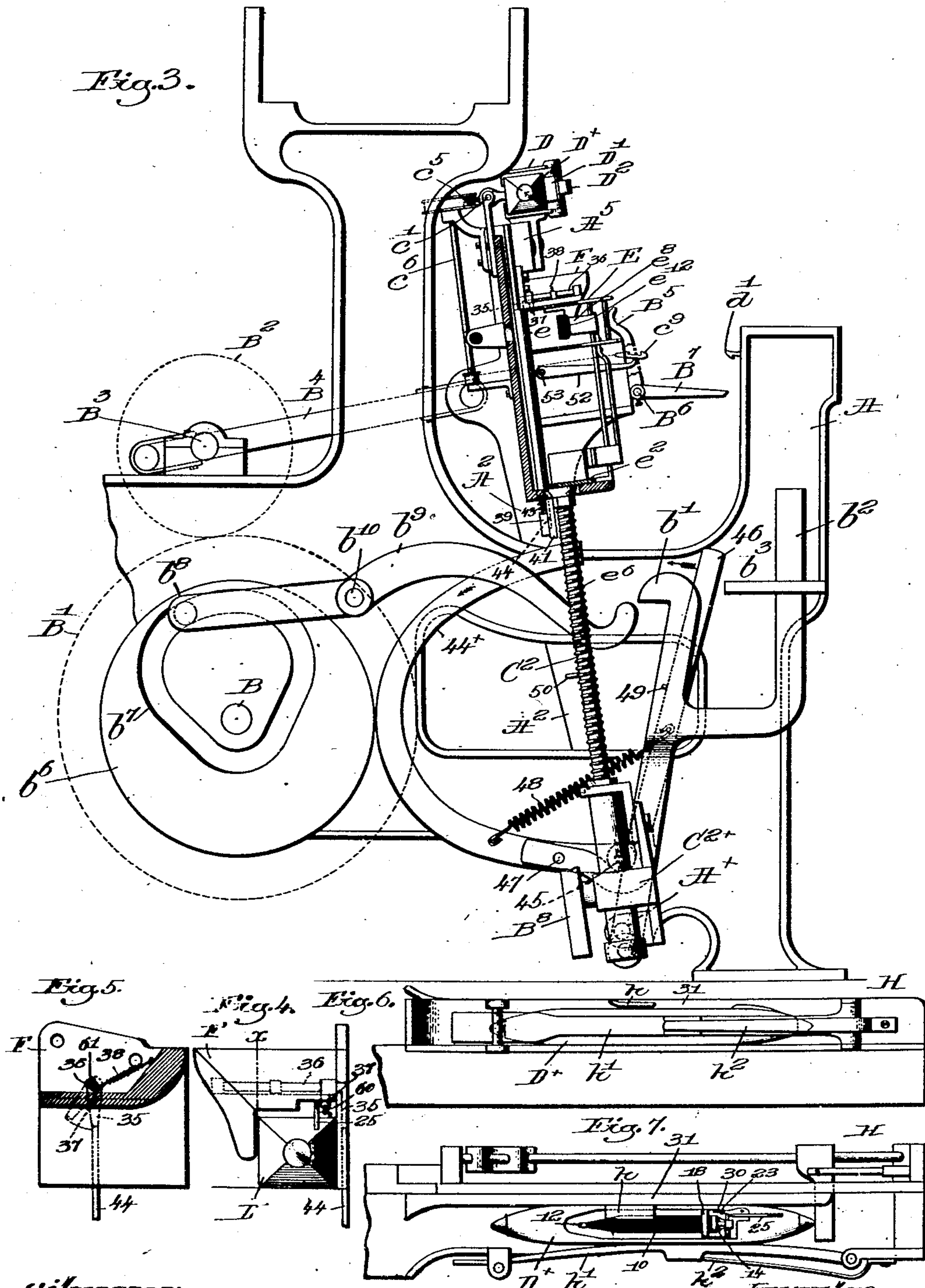
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

Fig. 8.

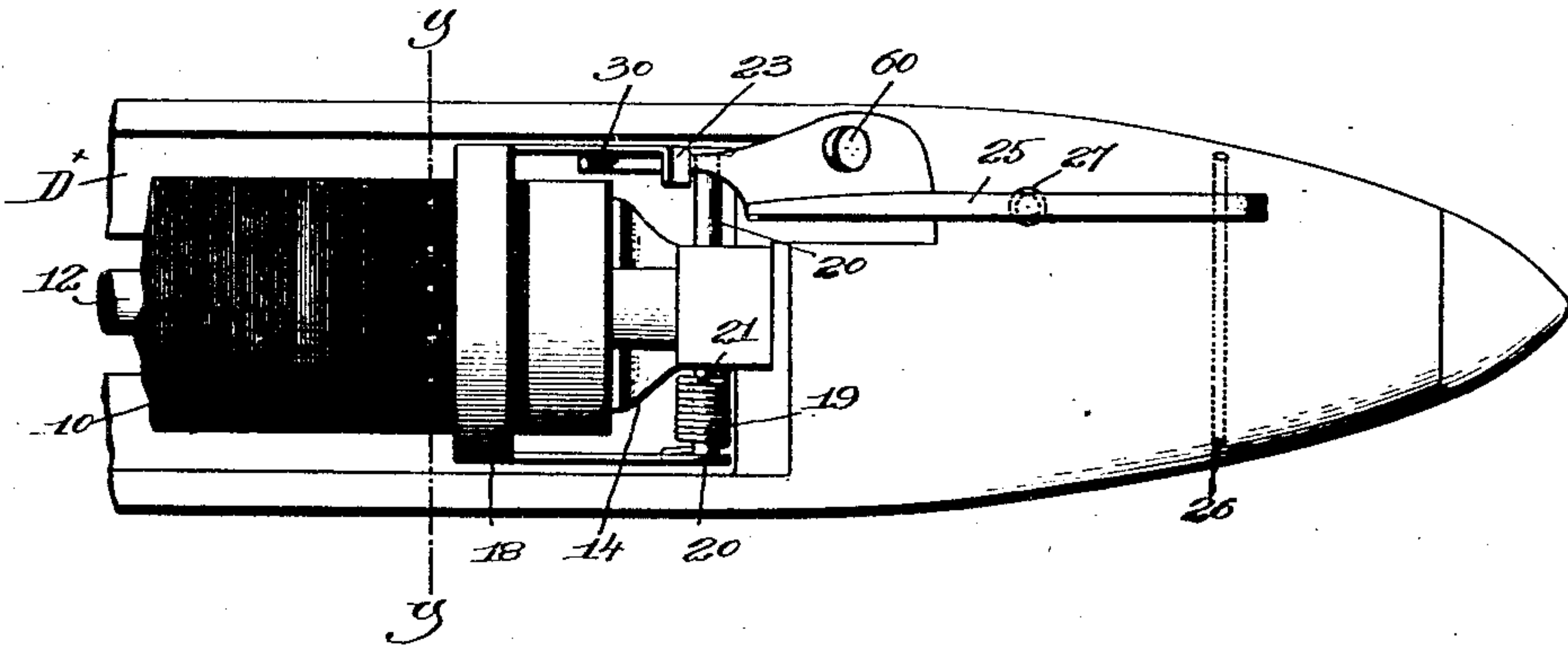


Fig. 9.

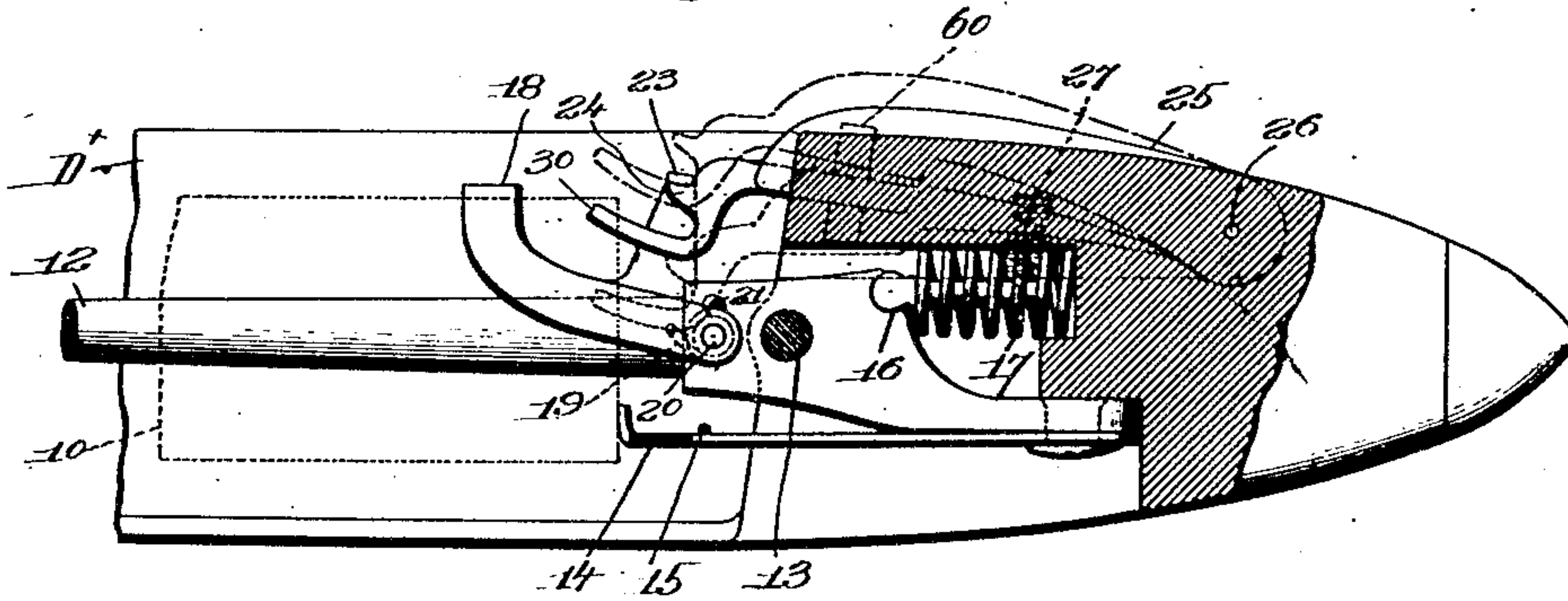
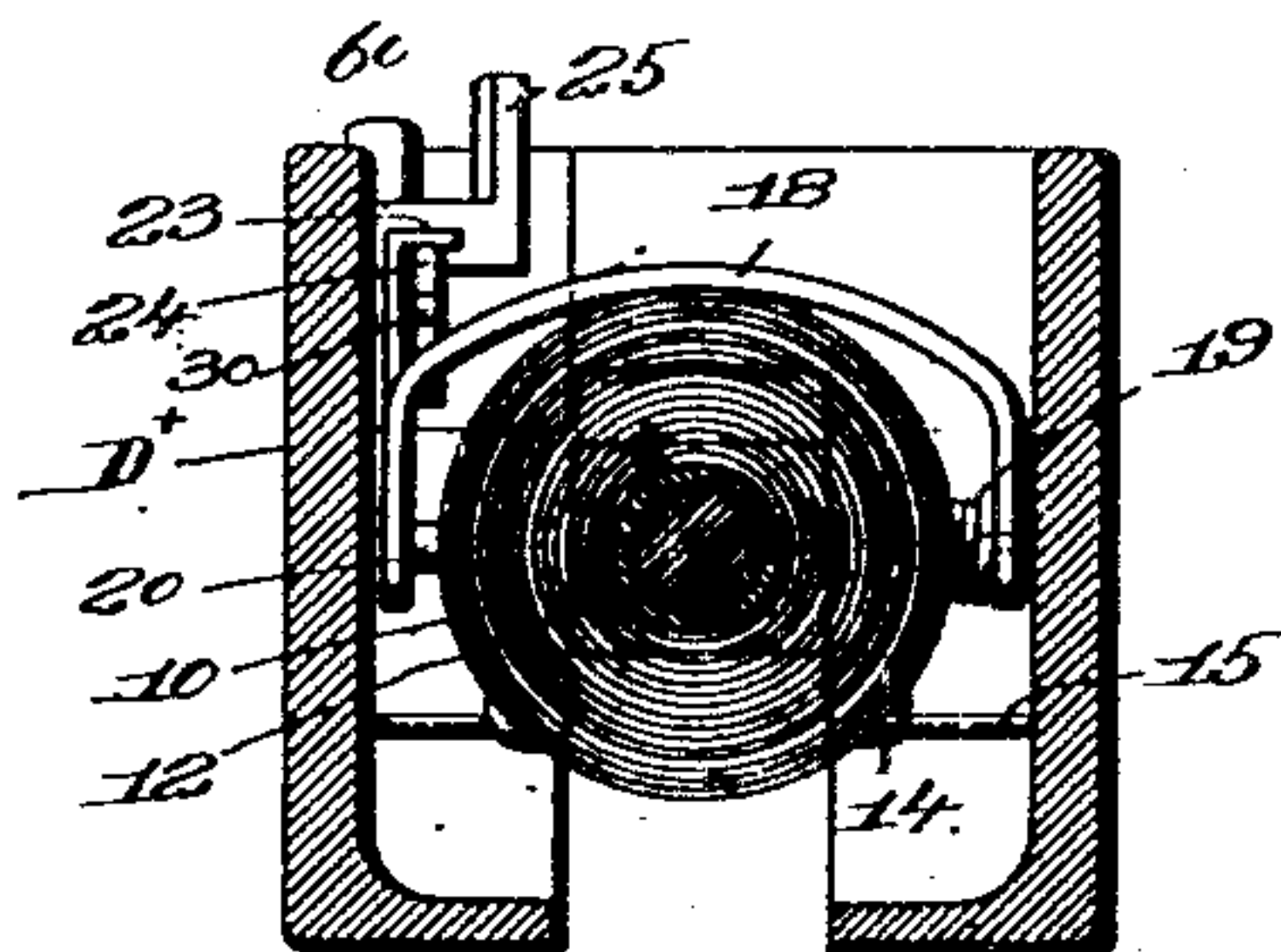


Fig. 10.



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# UNITED STATES PATENT OFFICE.

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## WEFT-REFLENISHING LOOM.

No. 878,337.

Specification of Letters Patent.

Patented Feb. 4, 1908.

Application filed March 15, 1906. Serial No. 306,175.

*To all whom it may concern:*

Be it known that I, WILLIAM H. BROTHERS, a citizen of the United States, and resident of Dedham, county of Norfolk, State of Massachusetts, have invented an Improvement in Weft-Replenishing Looms, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawings representing like parts.

This invention is an improvement on that class of loom wherein the shuttle is changed prior to complete exhaustion.

My invention is illustrated in connection with a loom of the kind represented in United States Reissue Patent No. 12,370, dated July 11, 1905.

In the patent referred to, the change of shuttle is effected at the desired time by a movement of the operator or manually, but herein I have provided means for automatically changing the shuttle prior to complete exhaustion.

Figure 1 is a partial view of the left hand end of a loom showing some of my improvements added thereto; Fig. 2 is a plan view of Fig. 1; Fig. 3 is a left hand end view, partially in section of the loom represented in Fig. 1; Fig. 4 is an enlarged detail of a mouth piece of the lay and parts carried thereby; Fig. 5 is a section in the line *x*, Fig. 4; Fig. 6 is a detail showing the right-hand end of the lay detached in front elevation, with a shuttle-sustained thereon; Fig. 7 is a plan view of the parts shown in Fig. 6; Fig. 8 is an enlarged top view of one end of a shuttle containing features of my invention; Fig. 9 shows the side of the shuttle partially broken out to illustrate the mechanism therein and for moving the feeler; Fig. 10 is a section on the line *y*, Fig. 8.

The loom-frame A, lay A' carried by swords A<sup>2</sup> fast on the lay rock-shaft A<sup>x</sup>, the hand or top-rail A<sup>5</sup>, the drop-box E having a top cell *e* and a depending wall *e*<sup>3</sup> and a bottom-plate *e*<sup>2</sup> with which is connected the usual box-rod C<sup>2</sup> surrounded by a give-away spring *e*<sup>6</sup>, the box-rod stand C<sup>2x</sup> connected with the shaft A<sup>x</sup>, the picker sticks B<sup>8</sup>, one at each end of the lay, the binder *e*<sup>8</sup>, its spring *e*<sup>12</sup>, the box guide 32, the protector rod B<sup>6</sup> having the dagger B<sup>7</sup> and binder finger B<sup>5</sup>, the cam shaft B, its gear B<sup>7</sup>, the crank shaft B<sup>3</sup>, its gear B<sup>2</sup> engaged and rotated by gear

B', the connecting rods B<sup>4</sup> attached to the lay, the disk *b*<sup>6</sup> carried by the cam shaft and having a groove *b*<sup>7</sup>, the stud *b*<sup>8</sup>, the pivoted hook *b*<sup>7</sup>, its arm *b*<sup>2</sup>, guide *b*<sup>3</sup>, lever *b*<sup>9</sup>, pivoted at *b*<sup>10</sup>, and having a roller or other stud *b*<sup>8</sup>, entering said cam groove, the cage D for the reception of the spare shuttle D<sup>x</sup> said cage being mounted on the hand rail, the binder D', spring D<sup>2</sup> acting on said binder, the rod *c*<sup>1</sup> on the hand rail, its picker *c*<sup>2</sup>, springs *c*<sup>3</sup>, cords *c*<sup>4</sup>, drums *c*<sup>5</sup>, shafts *c*<sup>6</sup> carried by said drum, hooks *c*<sup>9</sup>, catch *d*<sup>7</sup>, carried by the breast-beam, all are and may be as provided for in said United States patent, and said parts need not therefore be herein more fully described, as their operation is fully set forth in said patent. In that patent the hook *b*<sup>7</sup> was moved into position to be engaged by the lever *b*<sup>9</sup> through a push-rod or manually controlled device acted upon and moved by the workman, or loom attendant when a shuttle was to be changed, but in the invention herein contained the lever is moved automatically and the time at which said lever is moved preparatory to changing a shuttle prior to complete exhaustion is determined by or through means carried by the shuttle, as I will now proceed to describe.

Referring to Figs. 8 to 10, showing the end of the shuttle D<sup>x</sup> much enlarged, 12 represents the shuttle spindle on which is mounted the filling-mass 10. The head of the spindle pivoted on a pin 13 has an attached bobbin-engaging spring 14 which is released from the bobbin by contact with a pin 15 when the spindle is turned out of the space of the shuttle-body.

The spindle is maintained normally in its operative position in the shuttle by a rod 16 and spring 17.

In accordance with my invention I have combined with the shuttle, and as herein shown with the head of the spindle, a feeler 18 under the control of a spring 19 that acts normally to keep the feeler in contact with the filling mass 10 at its end nearest the pin 13.

The feeler is shown as pivoted on projections 20 extended laterally from the spindle-head and one of said projections is surrounded by the spring 19, one end of which is connected with the feeler and the other with a short pin 21 extended from the head.

One arm of the feeler is provided with a lug 23 that is engaged by a shoulder 24 of a



regulator 25 shown as a lever pivoted at 26, and having a prong 30, said regulator having its outer edge curved and standing normally in the full line position Figs. 8, 9 and 10, when there is sufficient filling on the spindle of the shuttle to warrant the continuance of the use of the shuttle in weaving.

A spring 27 of greater strength than spring 19 acts against the underside of the regulator and keeps the same normally in its full line position Fig. 9.

The back plate 31 carried by the lay at the single shuttle-box end thereof, see Fig. 6, has a forwardly extended depressor  $h$  that acts on the regulator 25 and depresses the same on each arrival of the running shuttle at that box to be picked therefrom in usual manner across the raceway of the lay by the usual picker mechanism that said shuttle may be returned to the cell  $e$  of the shifting or drop shuttle-box E.

In practice the single shuttle-box will be provided at its front side with a binder  $h'$  and a spring  $h^2$ , but partially shown, and the picker stick and its picker will be the same as in said patent.

Each time that the running shuttle  $D^x$  arrives at the single box-end H of the lay, the depressor  $h$  acting on the regulator depresses the same into the innermost dotted line position shown in Fig. 9, thus removing the shoulder 24 of the regulator from the lug 23 and permitting the feeler 18 under the action of its spring 19 to meet the filling in the shuttle. This movement is made instantly, and immediately thereafter, the regulator having passed the depressor  $h$ , rises under the action of the stronger spring 27 and the projection 24 of the regulator again contacts with the lug 23 of the feeler. This action continues until the filling is so far exhausted as to make it desirable to effect a change of filling, and the time at which this change of filling may be effected is predetermined according to the amount of filling it is desirable to leave on the bobbin before a change of filling.

When the filling has been exhausted sufficiently to call for a change of shuttle, the feeler acted upon by the spring 19 when the regulator is depressed, as stated, is moved far enough before contacting with the filling to place the lug 23 of the feeler out of the path of the projection 24 of the regulating device as the latter is raised by its spring 27, and the prong 30 then meets the lug 23 of the feeler and the regulator is arrested in its abnormal or most outward position, as indicated by the outermost dotted lines Fig. 9.

The regulator when in its abnormal position becomes effective to start automatically into operation means for raising the shuttle-box to effect a change of filling before complete exhaustion.

The mouth-piece F leading into the shuttle-box E is provided with bunter controlling

mechanism, herein represented as a leg 35 fast on one end of a rock-shaft 36 having an arm 37 and a pin 61 acted upon by a spring 38, said spring acting normally to keep the leg 35 in the position shown at the right in Fig. 5.

The regulating device has a projection 60 that when the regulator occupies its abnormal position meets the arm 37 and turns the rock-shaft, letting the bunter mechanism, which I will now describe, come into its operative position.

The bunter mechanism comprises a lever 39 pivoted at 40 in a stand 41 depending from a cross-plate  $e^2$  at the lower end of the shifting shuttle-box E, said lever being acted upon by a spring 43, and the lever has a rod 44 connected to its opposite end, said rod being extended upwardly and being held normally in contact with the leg 35 when the loom is running regularly.

When the projection of the regulator meets the arm 37 it turns the rock shaft and moves the leg 35 away from the rod 44, permitting the compressed spring 43 to act and depress the right hand end of the lever 39, this being done while the lay is moving forwardly and consequently as the lay is moved backwardly, the end of the lever 39 meets the end of a hook-controller  $44^x$  shown as a lever pivoted at 45 on a stud held in the loom frame, moving said lever backwardly in the direction of the arrow thereon, said lever at the same time moving with it in the direction of the arrow near its end an arm 46 loosely mounted on a stud 47 of said hook-controller, said arm being moved in the direction of movement of the lever through a spring 48 connecting the controller and arm, and as the arm meets the pin 49 on the hook  $b'$ , said hook is moved to the left, viewing Fig. 2 into the path of movement of the lever  $b^9$ , which I shall hereinafter designate as the actuator, and said actuator, in engagement with the hook  $b'$  and moved by the groove  $b^7$ , lifts the hook and with it the shuttle-box rod and shuttle-box E, placing the cell  $e$  opposite the cage D containing the spare shuttle  $D^x$ .

After the regulating device 25 has been permitted, through scarcity of filling in the shuttle, to occupy its outermost dotted line position Fig. 9, and has tripped the leg 35 as said shuttle enters the cell  $e$  of the shuttle-box E for the last time prior to its being changed, said shuttle is returned again to the single box end of the lay, and when the lay arrives at the proper position to again have the shuttle picked back to the shuttle-box end of the lay, the shuttle-box E having been raised to place its cell  $e$  opposite the end of the spare shuttle  $D^x$ , then the shuttle which is to be changed enters the shuttle-box E, drops on the shelf  $e^2$ , and substantially at the same time through mechanism to be described the shuttle  $D^x$ , the lay being then on



its back stroke, is picked from the cage D and enters the cell *e*. After this the shuttle-box E descends, and the spare shuttle placed in the cell *e* and containing a fresh supply of filling is picked across the lay to the single shuttle-box, and the spent shuttle resting on the shelf *e*<sup>2</sup> is discharged from the loom.

It will be understood when the shuttle-box E is raised prior to changing the shuttle as described, that a projection 50 at the lower end of a finger depending from the shuttle-box E meets the outer end of lever 39 forming part of the bunter mechanism, compresses spring 43, and lowers rod 44, permitting the leg 35 to again assume its normal position, as shown at the right, Fig. 5, under the action of spring 38. Also as the shuttle-box E is raised, a projection 51 rising from shelf *e*<sup>2</sup> meets the end of a lever 52 pivoted to the lay at 53 and extended forwardly, causing said lever to act against the under side of a hook *c*<sup>9</sup> common to said patent, lifting the hook to engage with catch *d*<sup>7</sup>, and thereafter as the lay is moved backwardly the shuttle D<sup>x</sup> is picked as described from the cage D into the cell *e* of the shuttle-box E.

It will be understood that the shuttle D<sup>x</sup> from the cage and the shuttle which is to be changed enter respectively the cells *e* and the space of the shuttle-box E to drop onto shelf *e*<sup>2</sup> when the lay is lifted and on its back stroke.

I have not described the action of the protector rod and dagger as they will be operated in usual manner, and they form no part of my present invention which is directed to automatically effecting the changing of a shuttle prior to complete exhaustion, the time of discharging the shuttle being regulated from the shuttle itself.

The shed forming devices, picking mechanism, and other usual parts of the loom not shown, will and may be such as commonly employed in power looms.

I believe that I am the first to provide a shuttle with a feeler to bear on the filling in the shuttle, said feeler determining when a regulating device with which it coacts and carried by the shuttle may be put into its abnormal position to actuate mechanism that determines when the shifting shuttle-box will be moved to effect a change of shuttles, and I desire to claim my invention broadly irrespective of the exact form in which I have chosen to construct the different elements hereinbefore described showing my invention in one of its best forms now known to me, as it will be apparent that the parts described as of my invention may be variously modified in shape without departing from my invention as herein broadly described and claimed.

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

1. In a loom, a lay, a shifting shuttle-box,

means for moving the shuttle-box on the lay, a shuttle having a feeler and a regulating device, and mechanism actuated by said regulating device to determine the time when the shifting shuttle-box shall be moved to effect a change of shuttle.

2. In a loom, a lay, a shifting-shuttle box, an actuator, a shuttle having a feeler and regulator, a hook, hook-controlling mechanism, bunter mechanism, and bunter-controlling means, the latter being actuated by the regulator of the shuttle when the filling is to be changed, to thereby place the bunter mechanism so that it may move the hook-controller to position said hook in the path of movement of said actuator to lift the shuttle-box.

3. In a loom, a lay, a shifting shuttle-box, an actuator, a hook, hook-controlling mechanism, bunter mechanism carried by the lay, and automatic means to move the bunter mechanism to engage and move said hook-controlling mechanism to effect the engagement of said hook with said actuator to raise the shuttle-box.

4. In a loom, a lay, a shuttle-box at one end thereof and a depressor, combined with a shuttle, a feeler carried thereby, a spring to move the feeler to engage the filling mass in the shuttle, a regulator, a stronger spring to move it in one direction, said depressor moving said regulator in the other direction that the spring of the feeler may move the latter to contact with the filling-mass.

5. A lay, having at one end a shuttle-box provided with a depressor, combined with a shuttle having a spring-controlled feeler, and a spring-controlled regulator, the action of the depressor on the regulator permitting the feeler to contact intermittingly with the filling in the shuttle.

6. A lay having at one end a shuttle-box provided with a depressor, combined with a shuttle having a spring-controlled feeler, and a regulator normally under the stress of a spring stronger than that used with the feeler the action of the depressor on the regulator permitting the feeler to contact intermittingly with the filling in the shuttle.

7. In a loom, a lay, a shuttle having a spindle, a spring-controlled feeler pivoted on said spindle, and a spring-controlled regulator, combined with a shuttle-box at one end of the lay provided with a depressor co-acting with said regulator to permit the feeler to contact intermittingly with the filling in the shuttle.

8. A lay having at one end a shuttle-box provided with a depressor, combined with a shuttle having a spindle and a spring-controlled feeler pivotally connected to said spindle and provided with a lug, a regulator pivoted on the shuttle-body and having a shoulder and a prong, a spring stronger than that employed with the feeler acting nor-



5 mally to move the regulator outwardly, the  
shoulder of the regulator contacting with the  
lip of the feeler to limit the outward move-  
ment of the regulator until the filling in the  
shuttle has been exhausted to a prede-  
10 termined point, when the descent of the feeler  
into its abnormal position places its lip out  
of the path of the regulator moved by its  
spring, and permits the regulator to occupy  
its abnormal position.

15 9. In a loom, a lay, a drop shuttle-box, a  
hook connected with the rod of said box, a  
continuously-operating actuator, a shuttle  
having a regulator abnormally positioned  
when the filling has been exhausted to a pre-  
determined point short of complete exhaus-  
tion, and means set in motion by said regu-  
lator to effect the engagement of said hook

with said actuator to lift the shuttle-box pre-  
paratory to effecting a change of shuttle. 20

10. In a loom, a drop shuttle-box, a hook  
connected with its rod, a continuously mov-  
ing actuator, a controller, an arm pivoted on  
said controller, a spring connecting said con-  
troller and arm, and means to move said con- 25  
troller that said arm may meet and place  
said hook in the path of movement of said  
actuator.

In testimony whereof, I have signed my  
name to this specification, in the presence of 30  
two subscribing witnesses.

WILLIAM H. BROTHERS.

Witnesses:

LESTER A. NEWCOMB,  
ADA V. MCBRIDE.