

No. 678,294.

Patented July 9, 1901.

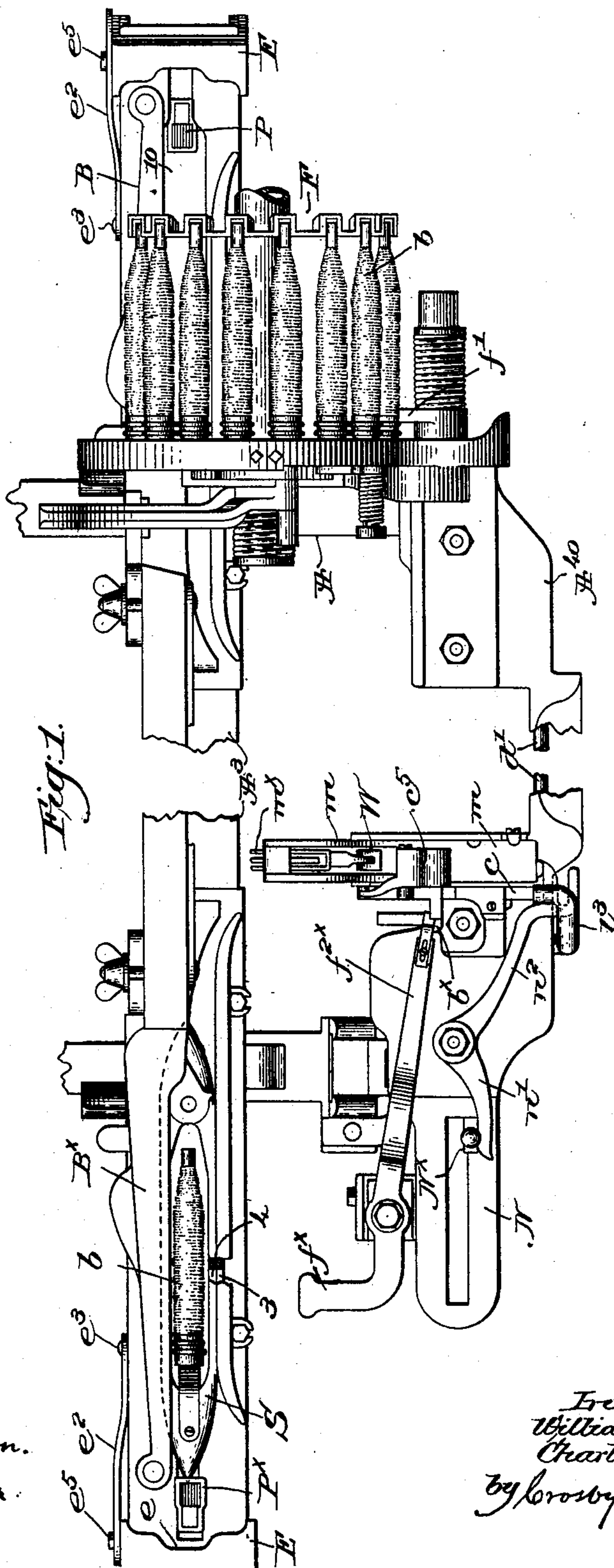
W. F. DRAPER & C. F. ROPER.

LOOM.

(Application filed Mar. 20, 1901.)

(No Model.)

2 Sheets—Sheet 1.



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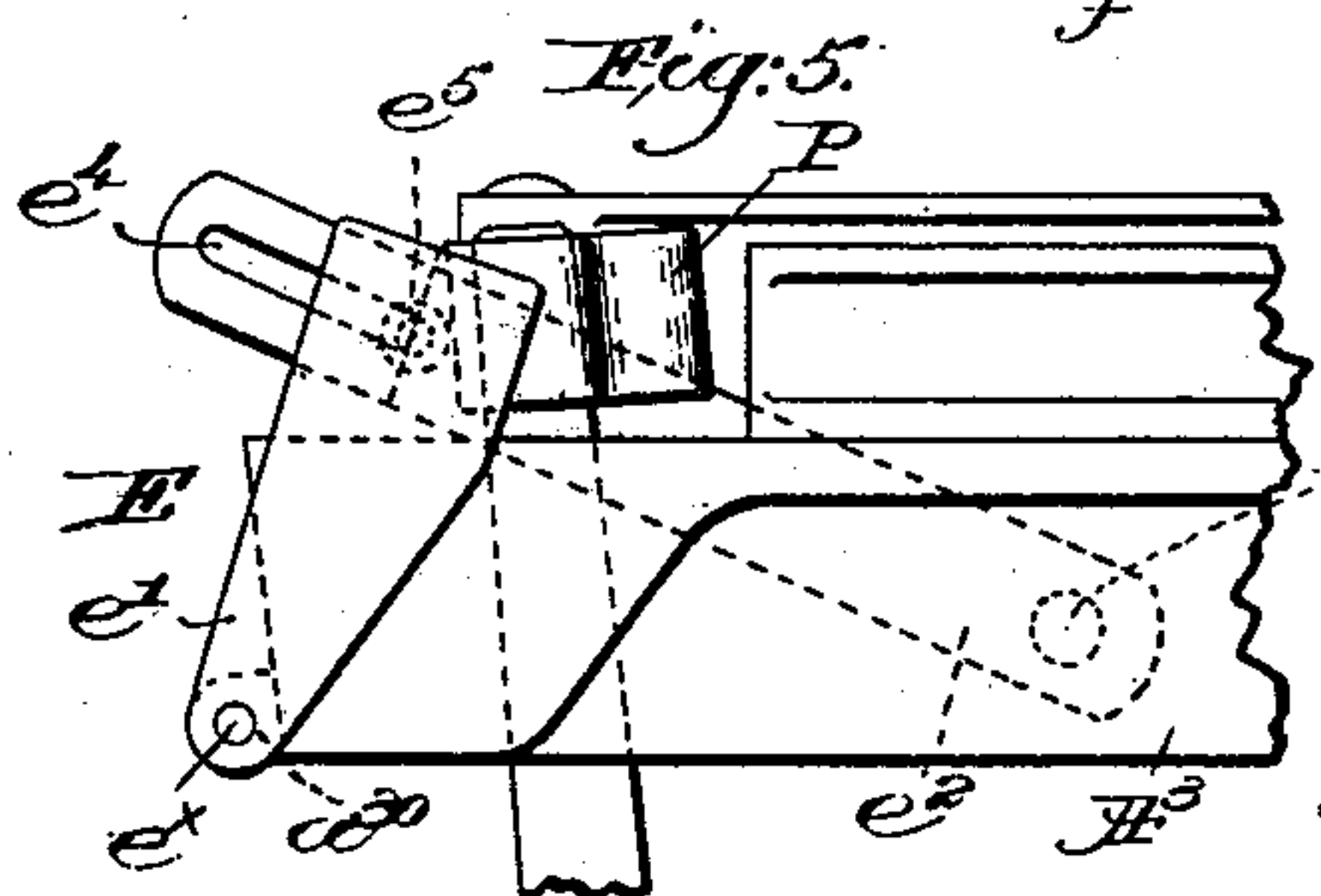
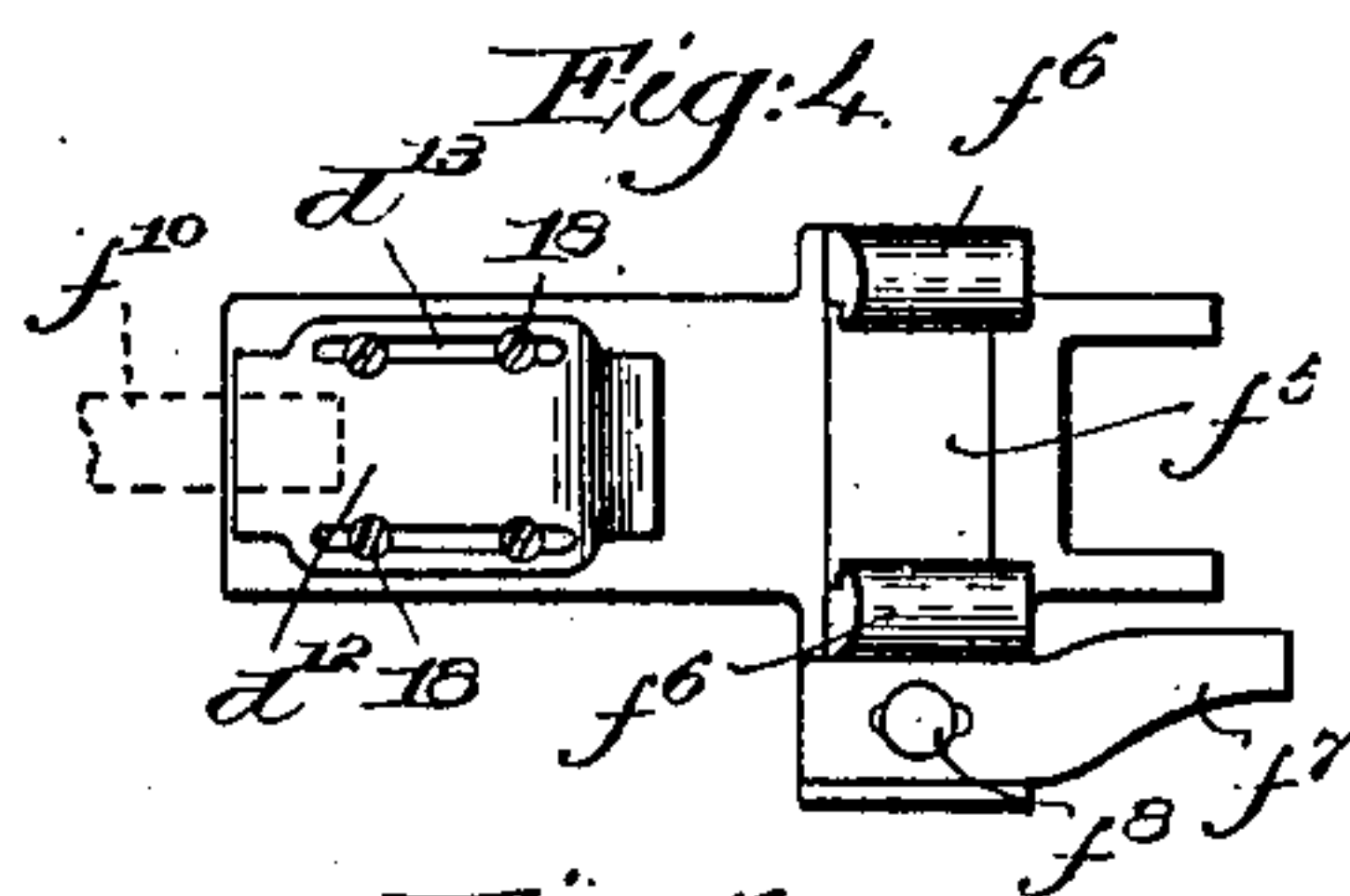
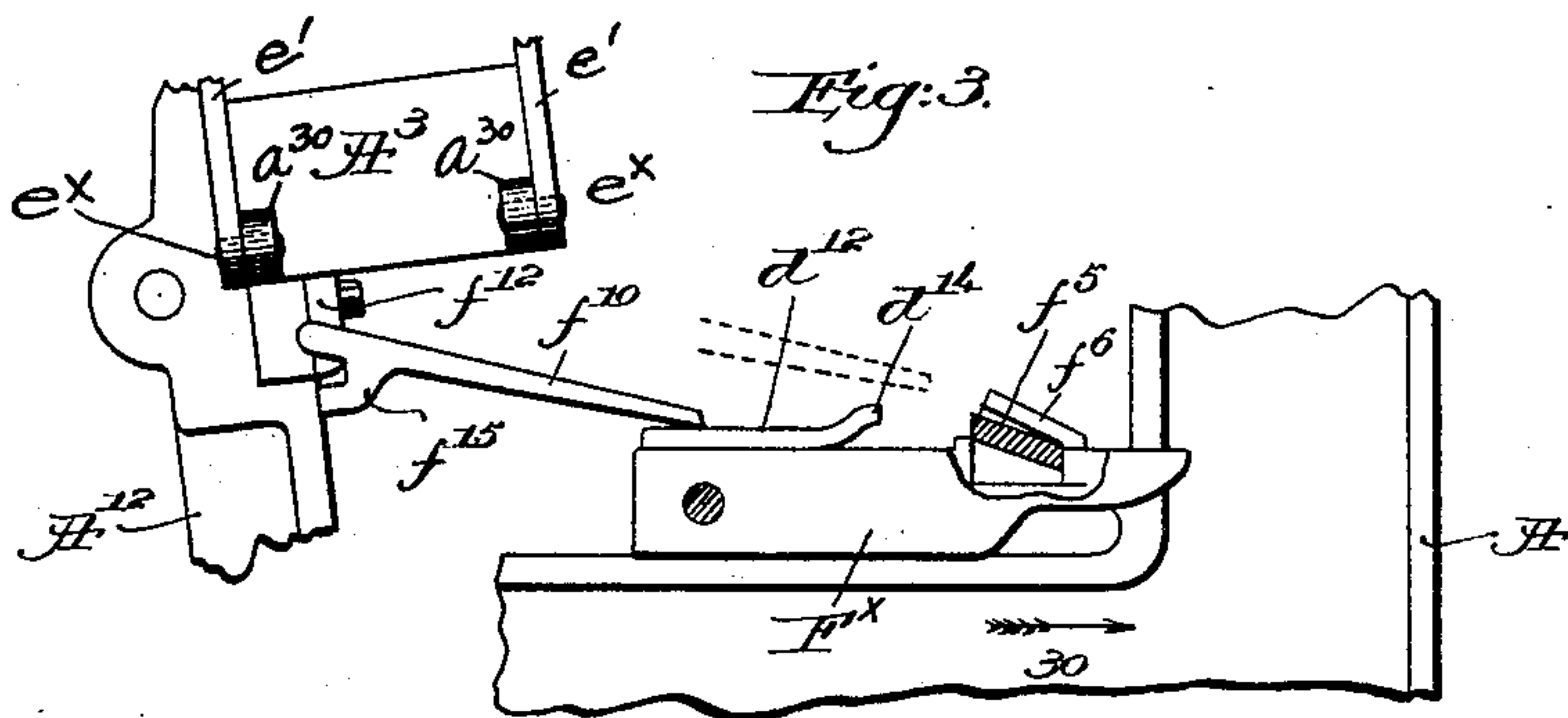
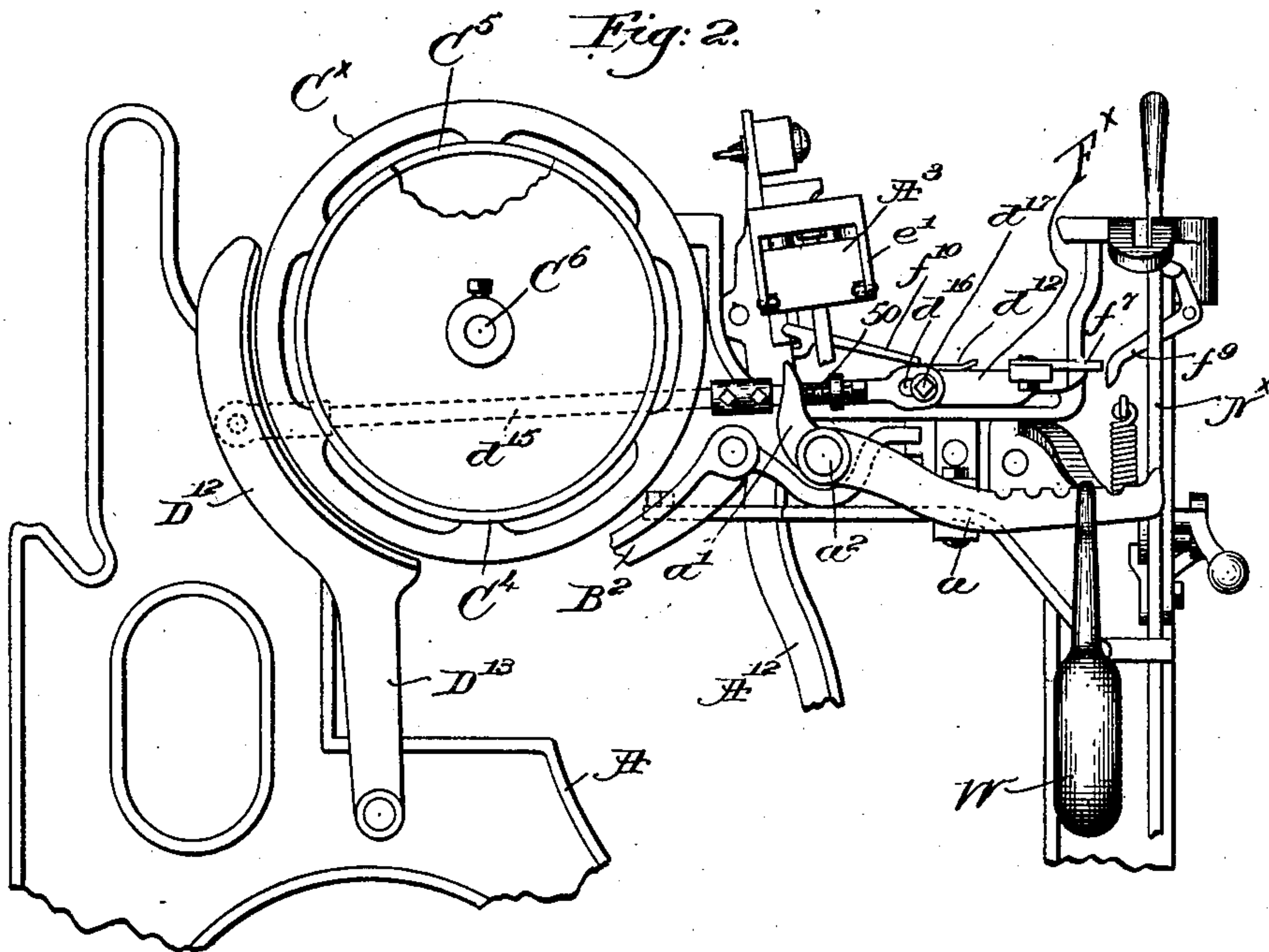
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2 Sheets—Sheet 2.



Witnesses.
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UNITED STATES PATENT OFFICE.

WILLIAM F. DRAPER AND CHARLES F. ROPER, OF HOPEDALE, MASSACHUSETTS, ASSIGNORS TO DRAPER COMPANY, OF SAME PLACE AND PORTLAND, MAINE.

LOOM.

SPECIFICATION forming part of Letters Patent No. 678,294, dated July 9, 1901.

Application filed March 20, 1901. Serial No. 52,039. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM F. DRAPER and CHARLES F. ROPER, citizens of the United States, and residents of Hopedale, in the county of Worcester and State of Massachusetts, have invented an Improvement in Looms, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention has for its object the production of an organized loom of great simplicity in its construction and characterized by increased accuracy and definiteness of operation.

Our invention is particularly adapted for looms provided with mechanism for automatically replenishing the filling when necessary, as will appear more fully hereinafter; but some of its features are also valuable with a "plain" loom of ordinary construction.

A filling-replenishing mechanism largely depends for its successful operation in actual practice upon an accurately or definitely positioned shuttle at the instant the filling is changed, whether the shuttle be changed with the fresh supply of filling or the filling be replenished in the shuttle. In order to attain such accuracy of position of the shuttle or to prevent breakage of mechanism if such position is not attained, various devices have been proposed and applied—such as binders, shuttle-checks, and feelers—to determine if the shuttle is properly positioned, improper positioning of the shuttle acting through the feeler to prevent operation of the filling-replenishing mechanism. Protector mechanism is also a component part of all looms as now constructed to effect the stoppage thereof if the shuttle is improperly boxed or is not thrown entirely through the shed.

In an application filed May 9, 1900, and bearing Serial No. 16,052 (the invention of one of us) a novel form of shuttle-checking means is described and broadly claimed, depending upon the mechanical principle that if a moving body is brought into engagement with a body at rest of substantially the effective weight of the moving body the latter

will be brought to rest at the moment of impact, while the motion is transferred to the body which was at rest. The practical embodiment of such principle applied to a shuttle-check results in stopping short the flight of the shuttle at a definite place—viz., in the shuttle-box—without rebound or overrunning. In our present application we have shown such shuttle-checking means with filling-replenishing means, and as the shuttle is stopped by the former at a definite point—in other words, accurately positioned—we are enabled to absolutely dispense with a shuttle-feeler and its attendant mechanism. An automatic loom is designed to run continually under ordinary circumstances, so long as the motive power of the factory is operative, with stops only at noon and night, when power is shut off, and at other times when warp breakage necessitates the attention of the weaver. It will be manifest that the picking mechanism and the momentum shuttle-checking means will not operate properly if the running speed of the loom decreases below a certain rate dependent upon surrounding circumstances, because the shuttle will not be thrown with sufficient force to strike the checking means a blow hard enough to effect the proper operation of said checking means, and as the speed gradually decreases when the power is shut off, as at noontime, it became necessary to provide means for automatically stopping the loom before the critical rate of speed is reached, meaning thereby such a rate as will prevent proper operation of the shuttle-checking means. We have accordingly provided means operative upon a predetermined decrease in the running speed of the loom to automatically stop the same, which means we refer to as "speed-controlling" means. In connection with such means we prefer to employ suitable brake mechanism which will operate substantially simultaneously with the speed-controller to prevent the loom from gradually running down or turning over unduly after the power has been cut off therefrom. By the cooperation of the speed-controller and shuttle-checking means protector mechanism is superfluous, and consequently we are enabled to dispense therewith. Thus we have an automatic

loom provided with filling-replenishing mechanism operative without the usual protector mechanism and shuttle-feeling devices, greatly reducing the number of parts and simplifying the construction very materially. On an ordinary loom without filling-replenishing mechanism such speed-controller is also of great utility for reasons above stated.

The various novel features of our invention will be hereinafter described, and particularly pointed out in the following claims.

Figure 1 is a top or plan view of a portion of a loom centrally broken out to save space, provided with automatic filling-replenishing mechanism and embodying one form of our present invention. Fig. 2 is a left-hand side elevation thereof, the filling-replenishing mechanism at the opposite side of the loom being omitted. Fig. 3 is an enlarged view, in side elevation, of one form of speed governor or controller. Fig. 4 is a top or plan view of a portion thereof, and Fig. 5 is an enlarged front elevation of the shuttle-checking means at one end of the lay.

In the organized loom herein illustrated the filling-replenishing mechanism is arranged to operate prior to complete exhaustion of the filling in the shuttle, breakage of the filling operating in usual manner through a filling-fork to effect actuation of the stopping mechanism.

Referring to Fig. 1, the main frame A, breast-beam A⁴⁰, lay A³, the filling-feeder F for the filling-supplies, shown as filling-carriers b, the transferrer f', the operating or controlling rock-shaft d', rocked to effect the operation of the filling-replenishing mechanism, the notched holding-plate N, the shipper N^x, the pivotally-mounted feeler-arm f^x f^{2x}, the stop b^x, against which the arm f^{2x} is held by a spring, (not shown,) the shuttle-box B, slotted in its bottom at 10, the shuttle-box B^x, having an aperture 3 in its front wall, through which the feeler f^x enters, and the self-threading shuttle S, having a slot 4 in its side wall, whereby the feeler can feel the filling in the shuttle, are and may be all as in United States Patent No. 662,320, granted November 20, 1900. So, too, the slide m, on which is mounted the filling-fork m^x, the vibrating weft-hammer W, the slide-bar c, latch-carrier c⁵, fulcrumed thereon, controlled by the arm f^{2x} of the feeler, and the arm d³, fast on the rock-shaft d' to be engaged by the slide-bar when moved outward to rock said shaft and effect actuation of the filling-replenishing mechanism, are as in said patent. The end n² of the knock-off lever n' n² passes under the upper end of the arm d³ and lies in the path of the outer end of the slide m, the arrangement shown being such that when the fork m^x detects absence of filling the outward movement of the slide m will operate the knock-off lever to release the shipper N^x and stop the loom.

The operation of the filling-feeler f^x is substantially as described in the patent referred

to and it is not necessary to further describe the same herein.

The picking mechanism may be of any suitable character, and herein only the pickers P P^x are shown, they operating in connection with the shuttle-checking means, which latter will be briefly described, referring to Figs. 1 and 5.

A momentum member E, preferably made of metal and recessed at its inner face, as at e, to receive the back of the picker, is mounted on pivots e^x, extended through ears e' at the lower end of the member and supported on lugs a³⁰ on the end of the lay, Fig. 5.

To limit movement of the member E, a controller, shown as an arm e², is fulcrumed on the lay at e³, and at its free end it is provided with a longitudinal slot e⁴ to receive a lateral stud e⁵, projecting from the momentum member, the ends of the slot limiting the swinging movement of the said member in both directions. Normally the momentum member is beyond the picker and adjacent thereto, and when the shuttle in its flight engages the picker the latter is brought against the momentum member, the momentum of the shuttle being transmitted thereto through the intermediate picker and the member E swings outward, while the shuttle is brought to rest at the proper and definite point in the shuttle-box without any rebound or overrunning. Mounting the inertia or momentum member so that its center of gravity is between its fulcrum and the slot of the controller the said member will normally resume its position shown in Fig. 5 and at the left-hand end of Fig. 1, and it will return thereto after the shuttle impact and stoppage. It will be understood that checking means will be provided at each end of the lay, as shown in Fig. 1.

The operation of the momentum-checking means will not be affected by allowable changes in the running speed of the loom—such variations as would naturally occur in a large mill—and so, too, the shuttle may vary somewhat in width without interfering with the operation of the stopping means.

It has been found in practice that the shuttle-check should have an effective weight at least equal to the weight of the shuttle, so that the latter will neither follow the check after striking nor rebound, and the check is so pivoted that it automatically returns by gravity to its normal position after the lay has passed the filling-changing position—that is to say, after the lay in its traverse has reached the position in which filling is automatically replenished—this being substantially at the front center in looms provided with filling-replenishing mechanism. This shuttle-checking means is not claimed herein *per se*, as it forms the subject-matter of claims in the other pending application hereinbefore referred to.

While it is true that the running speed of the loom may vary somewhat without inter-

fering with the action of the shuttle-checking means described, it is also true that when the speed decreases to or passes beyond a predetermined or critical point the shuttle-checking means will not operate properly—as, for instance, when the power is shut off—because the shuttle will not be thrown hard enough to permit coöperation with the checking means. The power is not shut off instantly, but gradually, and the gradual slowing down of the loom speed would result in a failure of the checking means to operate before the loom had stopped, with the result that the shuttle would probably be improperly boxed for a number of picks. To prevent such an occurrence, and also to prevent as far as may be the stoppage of the loom with the shuttle in the shed, we have combined with the other instrumentalities forming a part of the loom means operative upon a decrease in the running speed thereof to a predetermined rate to automatically stop the loom, and one embodiment of our invention is illustrated herein.

Referring to Figs. 2, 3, and 4, the loom side has mounted to slide upon it the usual frog F^x , provided with a catch or contact member f^5 , held in place between the side guides f^6 , and the arm f^7 is adjustably secured to the frog by a bolt f^8 , Fig. 4, projecting forward to coöperate with a knock-off lever f^9 , (see Fig. 2,) pivoted on the loom-frame below the breast-beam and adapted to engage and release the shipper when the frog is moved in the direction of the arrow 30, Fig. 3. A dog f^{10} is pivotally mounted on the lay in a bracket f^{12} , as herein shown, the free end of the dog traveling back and forth upon a deflector d^{12} , which is adjustably secured to the top of the frog by screws 18, Fig. 4, extended through longitudinal slots d^{13} in the deflector, the latter at its forward end being bent upward, as at d^{14} , the top of the upturned portion being substantially on a level with or slightly above the upper transverse edge of the contact member f^5 . When the lay beats up, the point of the dog travels along the front portion of the deflector and then up and over the lifted end d^{14} , and so long as the speed of the loom is high enough the end of the dog will jump the gap between the deflector and the member f^5 of the frog and will pass over said member f^5 without engaging the same, and, manifestly, as long as this condition of affairs continues the frog will remain in its normal inoperative position. When, however, the running speed of the loom decreases sufficiently to permit the end of the dog to drop after it passes the end d^{14} of the deflector, it will then hit the contact-piece f^5 and the frog will be moved forward in the direction of the arrow 30, to thereby swing the knock-off arm f^9 and release the shipper. The speed-controlling means herein shown may be designated as of the "hit-and-miss" type, the member f^{10} thereof missing the contact member of the frog until the speed has decreased

to a certain rate, after which it will hit said contact member and move the frog. As shown in Figs. 2 and 3, the dog f^{10} has projecting from its under side a stop projection f^{15} , which by engaging an adjacent part of the lay or the lay-sword A^{12} will prevent improper depression of the dog. By adjusting the deflector relatively to the piece f^5 the length of the gap is regulated. The higher the speed at which the loom is to operate the longer the gap, and vice versa. Any other suitable form of speed-controlling mechanism may be employed provided that it will operate to automatically effect the stoppage of the loom when the running speed thereof has decreased to a predetermined point. With such a controlling mechanism the loom is stopped before its speed decreases to such a rate that the operation of the picking mechanism is rendered uncertain or inaccurate.

When looms are run at high speed, the momentum of the various operating parts is usually sufficient to turn the loom over one or more times after the belt has been shipped, and to prevent such turning over and to stop the loom as promptly as possible we prefer to use brake mechanism in connection with the other features hereinbefore referred to, and in Fig. 2 we have illustrated a brake mechanism substantially such as is shown and described in United States Patent No. 653,153, granted July 3, 1900, wherein a brake-wheel C^x is secured to or forms a part of the fast pulley C^5 , rigidly secured to the crank-shaft C^6 , the belt-shifter B^2 (only partly shown) serving to shift the belt (not shown) from the fast pulley to the loose pulley C^4 when the shipper is released. A brake D^{12} , mounted on an arm D^{13} , pivoted to the loom side, is connected by a rod d^{15} with the frog F^x , the forward end of the rod being slotted at d^{16} to receive a stud d^{17} on the frog. The brake-actuator a , fulcrumed at a^2 on the loom side and having an upturned toe a' , is and may be as in said Patent No. 653,153, the actuator being moved by the action of a weight W when released by operation of the stopping means, as in said patent, the toe a' acting upon an adjustable stop 50 and the connecting-rod d^{15} . When the dog f^{10} engages the contact-piece f^5 and moves the frog forward, the brake mechanism will be instantly rendered operative to stop the loom and substantially simultaneously with the release of the shipper N^x by or through the knock-off lever f^9 . The brake will also be set independently of the movement of the frog by or through the actuator a and its weight W , as in Patent No. 653,153, referred to, or as in Patent No. 593,070, dated November 2, 1897, which shows and describes in more detail the structure of the brake mechanism.

So far as we are aware, it is broadly new to provide an organized loom having in combination filling-replenishing mechanism, shuttle-checking means, and means to automatically stop the loom upon a predetermined decrease

in the running speed thereof, and we believe it to be broadly new also to provide a loom with means to stop the latter automatically upon a decrease in the speed thereof to a predetermined rate, and accordingly our invention is not restricted to the precise construction and arrangement of parts herein shown and described nor to the particular construction of the various mechanisms which form the elements of the combinations set up in the following claims, as we have shown one practical embodiment of our invention without attempting to show or describe various changes or modifications which may be made by those skilled in the art without departing from the spirit and scope of our invention.

Having described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a power-loom, means operative upon a predetermined decrease in the running speed thereof to automatically stop the loom.

2. In a power-loom, stopping means therefor, and a speed-governor for said means, operative upon decrease of the running speed of the loom to a predetermined rate to automatically effect the actuating of the stopping means.

3. In a power-loom, stopping means, including a shipper, a speed-governor, and devices actuated thereby upon a predetermined decrease of the running speed of the loom to release the shipper and stop the loom.

4. In a power-loom, brake mechanism, and means operative upon a predetermined decrease in the running speed of the loom to render the brake mechanism operative.

5. In a power-loom, a driving-shaft, fast and loose pulleys thereon, a brake to cooperate with the fast pulley, a shipper, and means operative upon a predetermined decrease in the speed of the driving-shaft to move the shipper into stopping position, and to set the brake.

6. In a power-loom, a member to control the starting and stopping of the loom, normally inoperative brake mechanism, and means operative upon a decrease in the running speed of the loom to a predetermined rate to move the controlling member into stopping position and to render the brake mechanism operative.

7. A loom, having in combination, picking mechanism, means which by or through its inertia stops the shuttle in a substantially definite place in the shuttle-box while the running speed of the loom is above a predetermined rate, and means operative at substantially such rate of speed to automatically stop the loom, whereby stoppage of the loom with the shuttle in the shed is prevented and the use of protector mechanism obviated.

8. A loom having, in combination, a picker, a movable check arranged to take up the momentum imparted by the shuttle to the picker and to stop the shuttle correctly boxed, while the speed of the loom exceeds a predeter-

mined rate, mechanism to automatically provide the shuttle with fresh filling when correctly boxed, means to determine the time of operation of said mechanism, and means operative upon decrease in the speed of the loom to substantially the predetermined rate to automatically stop the loom, whereby protector mechanism and shuttle-feeling means are obviated.

9. In a loom, a shuttle, stopping means, shuttle-checking means, comprising a momentum-absorbing member the effective weight of which is at least equal to that of the shuttle, and an impact member interposed between said momentum-absorbing member and the shuttle, the momentum of the latter being transferred to the momentum-absorbing member by or through the impact member, leaving the shuttle at rest correctly boxed, and means operative to automatically stop the loom upon a decrease in the speed thereof to a rate below which the proper operation of the picking mechanism will be prevented.

10. In a power-loom, the lay, stopping means, including a shipper, and releasing means for the latter, including a member carried by the lay, and a normally inoperative member with which the member on the lay cooperates upon a decrease in the running speed of the loom to a predetermined rate.

11. In a power-loom, the lay, the shipper, and releasing means therefor, including a dog pivotally mounted on the lay, a frog, and a deflector to engage and deflect the tip of the dog at each beat of the lay and prevent its engagement with the frog while the speed of the loom is maintained above a predetermined rate.

12. In a power-loom, the lay, a dog pivotally mounted thereon, stopping means, a frog to control the operation thereof, and a deflector near the frog and in the path of the dog, the latter jumping from the deflector over the frog at each beat of the lay until the speed of the loom decreases to a predetermined rate, whereupon the dog will engage the frog and therethrough operate the stopping means.

13. In a power-loom, stopping means, and a hit-and-miss controller therefor, said controller being maintained inoperative to effect the actuation of the stopping means while the speed of the loom exceeds a predetermined rate.

14. In a power-loom, mechanism to provide fresh supplies of filling, means to effect the operation thereof upon failure of the filling or exhaustion thereof in the shuttle to a predetermined extent, the lay having a shuttle-box, a shuttle to receive a supply of filling when definitely positioned in the shuttle-box, picking mechanism, means which by or through its inertia stops the shuttle in the shuttle-box in such definite position, and means operative upon decrease of the running speed of the loom to a predetermined rate to automatically stop it.

15. In a loom, a shipper, the lay having a shuttle-box, a shuttle-picking mechanism therefor, means which by or through its inertia stops the shuttle accurately positioned in the shuttle-box, mechanism to replenish the filling when the latter fails, or is exhausted to a predetermined extent in the shuttle, said mechanism being operative only when the shuttle is accurately positioned in the shuttle-box, brake mechanism for the loom, and means operative upon a predetermined decrease in the running speed of the loom to release the shipper and to render the brake mechanism operative.

16. In a loom, a shipper, means controlled by an abnormal condition of the filling to release the shipper, and means operative upon a predetermined decrease in the running speed of the loom to release the shipper, to stop the loom.

17. In a loom, a shipper, means controlled by an abnormal condition of the filling to release the shipper, means operative upon a predetermined decrease in the running speed of the loom to release the shipper, to stop the loom, and normally inoperative brake mechanism rendered operative upon actuation of either of said means to release the shipper.

18. A loom having, in combination, means operative upon a predetermined decrease in the running speed thereof to automatically stop the loom, a shuttle-box, a picker, and a momentum shuttle-check cooperating therewith to stop the shuttle at a substantially definite place in the shuttle-box while the loom is running at the proper speed, the effective weight of the check being at least equal to that of the shuttle.

19. A loom, having in combination, means operative upon a predetermined decrease in the running speed thereof to automatically stop the loom, a shuttle-box, a picker, a momentum shuttle-check which stops the shuttle at a substantially definite place in the shuttle-box while the loom is running at proper speed, the effective weight of the check being at least equal to that of the shuttle, and means to control the check.

20. A loom having, in combination, a movable weighted check adapted to take up the momentum and be moved into abnormal position by impact of the shuttle on the picker, thereby stopping the shuttle at a substantially definite place, the effective weight of the check being at least equal to that of the shuttle, means to limit such movement of the check, and means operative to automatically stop the loom upon a decrease in the running speed thereof to a predetermined rate.

21. A loom having, in combination, a picker, a weighted swinging momentum-check mounted beyond the picker and normally adjacent thereto, the blow of the shuttle on the picker being transmitted thereby to the check, swinging the latter and stopping the shuttle in a substantially definite place,

and means operative upon a predetermined decrease in the running speed of the loom to automatically stop the same.

22. A loom, having in combination, a shuttle, means to actuate it, a momentum-check which stops the shuttle in a substantially definite place, the effective weight of said check being at least equal to that of the shuttle, and means operative upon a predetermined decrease in the running speed thereof to automatically stop the loom.

23. In a power-loom, brake mechanism, means operative upon a predetermined decrease in the running speed of the loom to render the brake mechanism operative to quickly stop the loom, a shuttle, means to actuate it, and a momentum-check which stops the shuttle in a substantially definite place, the effective weight of the check being at least equal to that of the shuttle.

24. A loom provided with mechanism to automatically replenish the filling when the shuttle is in a definite position, a picker, a movable check normally adapted to rest adjacent the back thereof, the effective weight of the check being at least equal to that of the shuttle, and means to control the check when moved, the momentum of the shuttle being transmitted through the picker to the check, so that the check moves while the shuttle is brought to rest in position to receive a supply of filling, combined with means operative upon a predetermined decrease in the running speed of the loom to automatically stop the same.

25. A loom, having in combination, the lay, a picker, a check pivotally mounted on the lay beyond and adjacent the picker, the effective weight of said check being at least equal to that of the shuttle, the pivot of the check being located eccentric to its center of gravity to cause its return automatically to normal position, means to limit the movement of said check due to impact of the shuttle upon the picker, the shuttle stopping at a substantially definite place as a result of the impact, and means operative upon a predetermined decrease in the running speed of the loom to automatically stop the same.

26. A loom, having in combination a lay, a shuttle, a check which is moved away from its normal position by the impact of the incoming shuttle and which returns automatically to said position after the lay has passed the front center, and means operative upon a predetermined decrease in the running speed of the loom to automatically stop the same.

27. A power-loom having, in combination, a lay, a shuttle, a check which is moved away from its normal position by the impact of the incoming shuttle, and which returns automatically to said position after the lay has passed the front position, stopping means for the loom, brake mechanism and a speed-governor operative upon decrease of the running

speed of the loom to a predetermined rate to automatically effect the actuation of the stopping means and brake mechanism.

28. In a loom, the combination of shuttle-
5 checking mechanism with means operative upon a predetermined decrease in the running speed to automatically stop the loom.

29. In a loom, the combination of shuttle-
checking mechanism, brake mechanism, and
10 means operative upon a predetermined decrease in the running speed to automatically stop the loom.

30. In a loom, the combination of means to stop the shuttle at a definite place in the

shuttle-box, brake mechanism, a shipper, and 15 means, operative upon a predetermined decrease in the speed of the driving-shaft of the loom, to move the shipper into stopping position and to set the brake.

In testimony whereof we have signed our 20 names to this specification in the presence of two subscribing witnesses.

WILLIAM F. DRAPER.
CHARLES F. ROPER.

Witnesses:

GEORGE OTIS DRAPER,
ERNEST W. WOOD.