

No. 775,898.

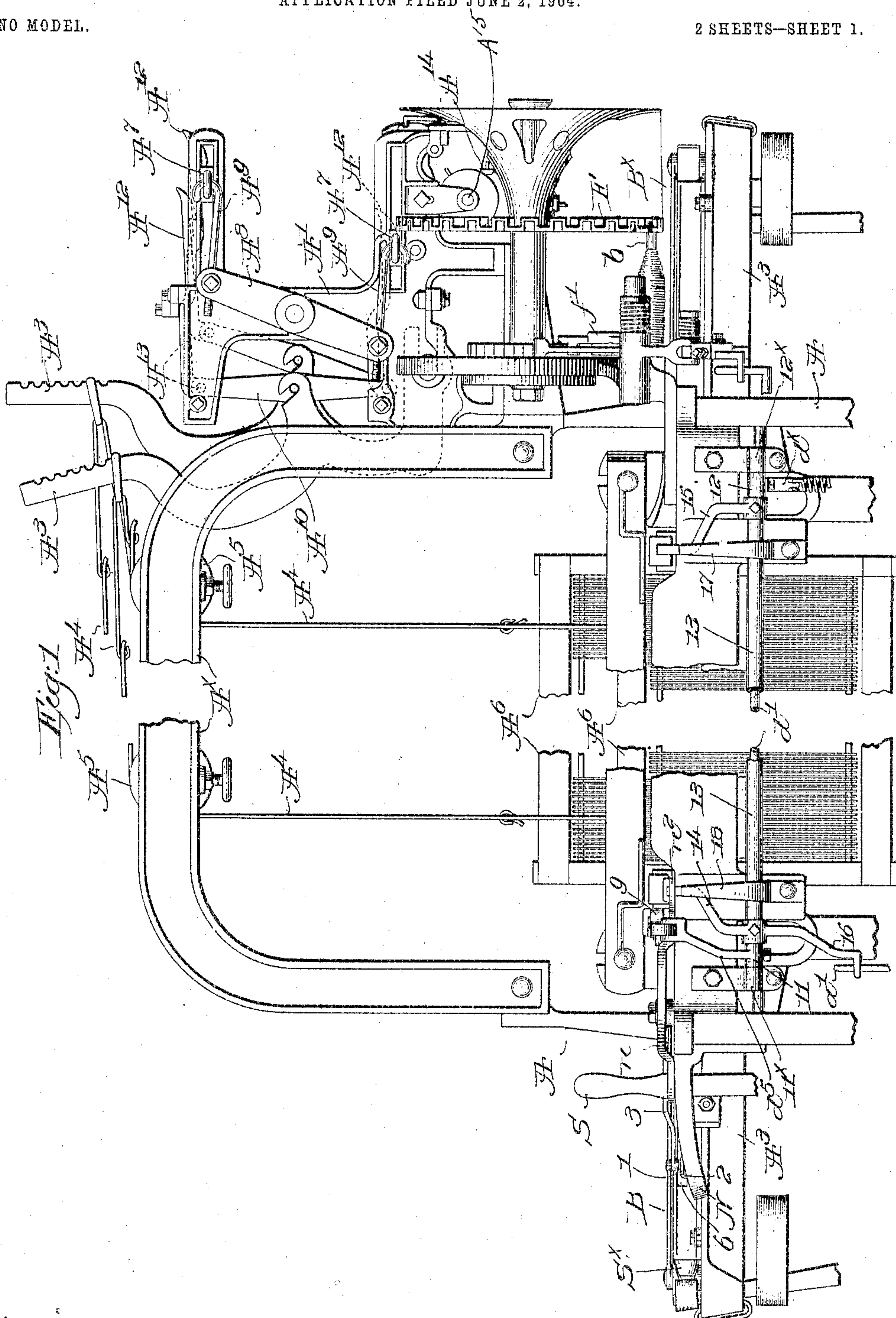
PATENTED NOV. 22, 1904.

E. S. DRAPER.  
LOOM.

APPLICATION FILED JUNE 2, 1904.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses,  
Edward O. Allen  
Warren D. Allen

Inwitnessed:  
E. S. Draper,  
by Lewis Gregory,  
attys.

No. 775,898.

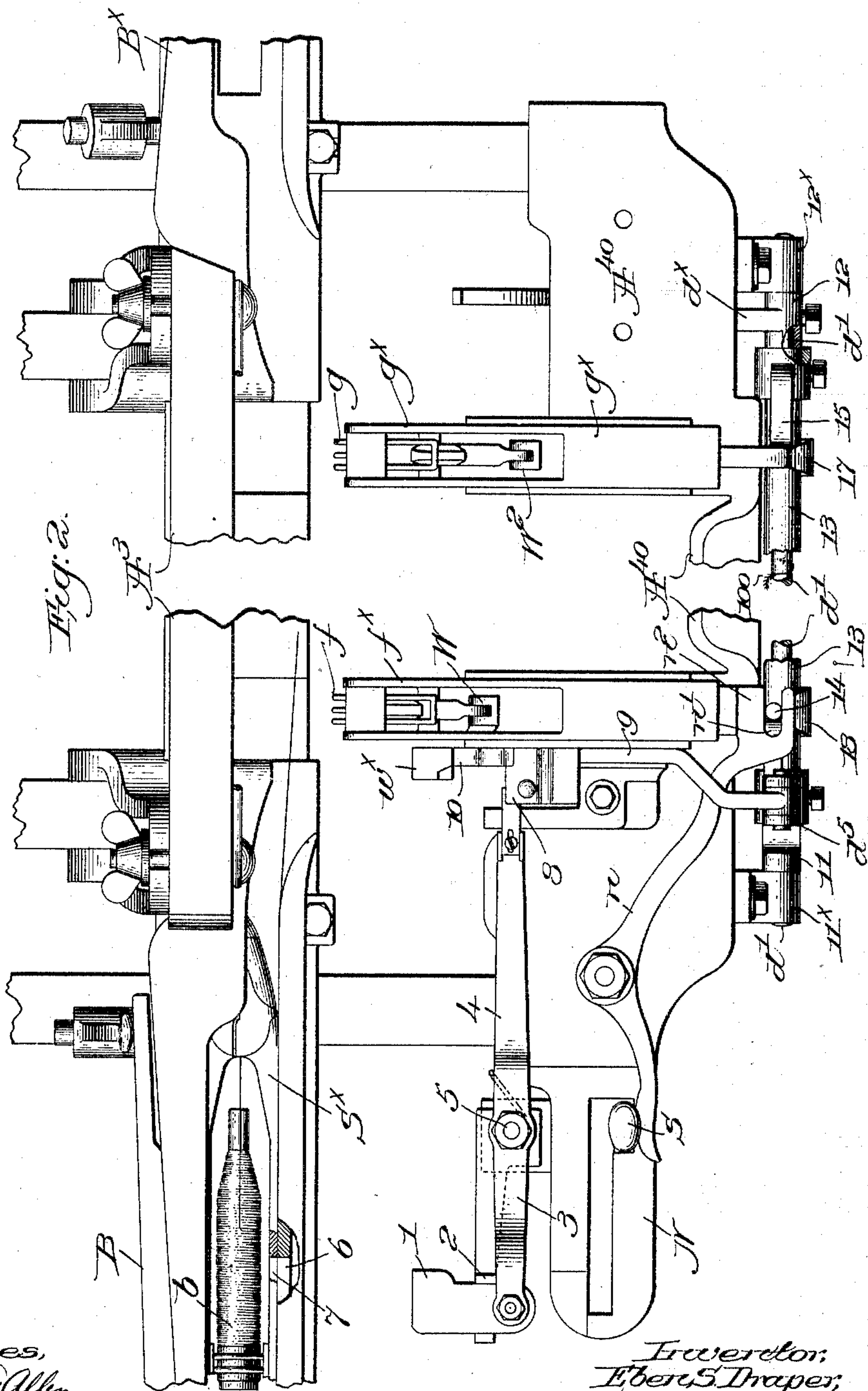
PATENTED NOV. 22, 1904.

E. S. DRAPER.  
LOOM.

APPLICATION FILED JUNE 2, 1904.

NO MODEL

2 SHEETS—SHEET 2.



Witnesses,  
Edward H. Allen.  
S. Wm. Lutton

Inventor:  
E. S. Draper;  
by Leroy H. Gregory,

attys.



# UNITED STATES PATENT OFFICE.

EBEN S. DRAPER, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO  
DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPO-  
RATION OF MAINE.

## LOOM.

SPECIFICATION forming part of Letters Patent No. 775,898, dated November 22, 1904.

Application filed June 2, 1904. Serial No. 210,805. (No model.)

*To all whom it may concern:*

Be it known that I, EBEN S. DRAPER, a citizen of the United States, and a resident of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Looms, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

10 This invention relates particularly to power-  
looms of the type wherein the manipulation  
of the warps to form the sheds in the pro-  
duction of a figure or pattern is effected by  
or through a shedding mechanism controlled  
15 by a pattern-surface; and it has for its object  
the production of an organized loom adapted  
to weave fabric in pattern or figure, having in  
combination means to prevent the formation  
of thin places in the cloth by arresting the  
20 operation of a take-up instrumentality when  
filling is not properly laid in the shed, such  
arrest of take-up being effected by or through  
the medium of a double-detecting mechanism.

My invention comprehends such a combi-  
25 nation with or without automatic filling-re-  
plenishing mechanism, and the filling-detect-  
ing mechanism may in either case be ar-  
ranged to effect stoppage of the loom  
promptly upon detection of filling failure.  
30 If the loom is provided with filling-replenish-  
ing mechanism and a feeler device to cause  
the operation of the same prior to complete  
exhaustion of the running filling, the double  
filling-detecting mechanism may be arranged  
35 to stop the loom upon detection of filling  
failure or after a predetermined number of  
successive filling-replenishments, according  
to the character of the filling-detecting mech-  
anism.

40 In so-called "fancy" looms—i. e., wherein  
the shedding mechanism is of the jacquard or  
dobby class—the weaving is always of an in-  
tricate pattern and the cloth produced is of  
high grade, so that defects are very notice-  
45 able and correspondingly costly.

Automatic-filling-replenishing looms of the  
"feeler" type effect filling-replenishment  
prior to complete exhaustion of the running

filling, and my broad invention is preferably  
employed in connection with such looms, 50  
though it is to be distinctly understood that  
my invention is not limited to such use.

With the ordinary loom having a filling-  
detector or fork located at the side opposite  
that at which filling replenishment is effected 55  
(if replenishing mechanism be employed) the  
breakage of filling may not be promptly de-  
tected, and a dragging filling end from the shut-  
tle may tilt the fork as if the filling were intact,  
causing mispicks and thin places in the cloth. 60  
In order to obviate this fault, a second filling-  
detector is located at the opposite side of the  
loom, both of the detectors being arranged to  
arrest the operation of a take-up instrumen-  
tality upon detection of filling failure. 65

So far as I am aware the combination in a  
power-loom of shedding mechanism controlled  
by a pattern-surface, with means to arrest the  
operation of a take-up instrumentality when-  
ever the filling is not properly laid, is broadly 70  
new, and accordingly my invention is not re-  
stricted to the particular take-up-arresting  
means herein shown and described, as any  
other means of the double filling-detector  
type which will accomplish the desired effect 75  
falls within the spirit and scope of my in-  
vention.

The double detecting means herein illus-  
trated is shown as employed in connection  
with a feeler device and with filling-replenish- 80  
ing mechanism, and it is so arranged as to  
stop the loom upon detection of filling break-  
age; but by using another form of double de-  
tecting means—such, for instance, as is shown  
in United States Patent No. 727,014—the loom 85  
will not stopped unless a predetermined num-  
ber of successive operations of the replenish-  
ing mechanism takes place. So, too, as will  
be more clearly apparent hereinafter, the  
double detecting means if employed without 90  
a feeler device or filling-replenishing mech-  
anism, either or both, may also be arranged to  
stop the loom upon detection of filling failure  
by either filling-detector in addition to arrest-  
ing the operation of the take-up. 95

The various novel features of my invention



will be fully described in the subjoined specification and particularly pointed out in the following claims.

The pattern-controlled shedding mechanism may be of any usual or desired type, dobby or jacquard, and I have chosen to illustrate the present embodiment of my invention in a loom having a dobby-head, and I have chosen to illustrate in connection therewith a filling-replenishing mechanism by or through which the running shuttle is provided with fresh filling, preferably as the filling therein approaches complete exhaustion, but prior thereto.

Figure 1 is a front elevation, centrally broken out to economize space, of a loom embodying one form of my present invention, the major part of the take-up mechanism being omitted for the sake of clearness of illustration; and Fig. 2 is an enlarged top or plan view, also centrally broken out, of a sufficient portion of the loom shown in Fig. 1 to enable the construction of the filling-feeler and double detecting devices to be clearly understood.

Referring to Fig. 1, the arch  $A^x$ , rising from the loom-frame  $A$ , supports the dobby or head motion sustaining bracket  $A'$ , having pivoted thereto at  $A^2$  the harness-levers  $A^3$ , notched at their upper ends, to which one end of the harness connection  $A^4$  is secured, said connection passing over suitable guide-rolls  $A^5$  on the arch to the harness or heddle frames  $A^6$ , all as usual in such form of shedding mechanism.

The knives  $A^7$ , sliding in guideways in the bracket  $A'$ , are driven from the vibrator-arm  $A^8$  through the connections  $A^9$ , there being preferably a vibrator-arm on each side of the bracket and oscillated in usual manner by means not herein shown—as, for instance, shown in United States Patent No. 243,361—and well known to those skilled in the art.

The connectors  $A^{10}$  are pivotally connected at  $A^{11}$  to the harness-levers  $A^3$  and carry the hooked jacks  $A^{12}$ , jointed at  $A^{13}$  to the connectors, (see dotted lines, Fig. 1,) the jacks under the control of the pattern-surface  $A^{14}$ , carried by the shaft  $A^{15}$ , being adapted to engage the reciprocating knives  $A^7$  to thereby raise and depress the heddle-frames  $A^6$ , all as usual in such type of dobby or head motions, as is herein illustrated and which is a matter of such common knowledge to those skilled in the art as requires no further detailed description. The order of formation of the sheds is thus controlled by or through the pattern surface or chain  $A^{14}$ , operated by the shaft  $A^{15}$ , which by any usual form of gearing (not shown herein) is driven from the crank-shaft of the loom, which shaft also effects by intermediate connections the oscillation of the vibrator-arms  $A^8$  in usual manner. Thus the wide range of pattern or figured effects on the fabric being woven is secured,

and manifestly any disarrangement in the operations or timing of the shedding mechanism with relation to the other parts of the loom will mar or destroy the continuity of the pattern or figure being woven, and a defect will be produced in the cloth. Such disarrangement may be caused by continued weaving after the filling in the shuttle has run out or become exhausted, and accordingly I have herein provided filling-replenishing mechanism, which will be caused automatically to supply fresh filling, preferably prior to complete exhaustion of the filling in the shuttle, in connection with my broad invention, viz: pattern-controlled shedding mechanism combined with double filling-detectors, to detect failure—*i. e.*, breakage of the filling on alternate picks—and arrest the operation of a take-up instrumentality upon detection of filling failure.

The filling-replenishing mechanism selected for illustration in the present embodiment of my invention is of the well-known Northrop type, such as shown and described in United States Patent No. 529,940 and other patents of later date, the filling-feeder  $F$  of such mechanism being shown in Fig. 1 as mounted at one side of the loom on the breast-beam  $A^{40}$ . The transferrer  $f'$  to remove the filling-carriers  $b$  one by one from the feeder and to insert them in the automatically self-threading shuttle  $S^x$  (see Fig. 2) may be and are all as common in the Northrop type of loom, hereinbefore referred to, the lay  $A^3$  having shuttle-boxes  $B$   $B^x$  thereon, and the breast-beam is provided with a notched holding-plate  $N$  for the shipper  $S$ , forming a part of the loom-stopping means.

Referring to Fig. 2, the automatically self-threading shuttle is shown in plan and is constructed and arranged with a thread-delivery eye at its right-hand end.

A knock-off lever  $n$  on the breast-beam is adapted to release the shipper from its holding-notch, and the inner end  $n^2$  of the lever is slotted at  $n'$  (see Fig. 2) for a purpose to be described. The replenishing of the filling-supply in the running shuttle is by the mechanism herein shown effected by inserting a fresh filling-carrier in the shuttle, and filling-replenishment is in the structure illustrated effected prior to complete exhaustion of the running filling, this result being secured by or through a feeler which coöperates with the filling in the shuttle, preferably by intermittingly engaging the same, as herein illustrated, so that when the requisite or desired filling-exhausting is reached the filling-replenishing mechanism will be operated.

Referring to Fig. 2, a feeler 1 is slidably mounted in a fixed guide 2 and pivotally connected with the outer end 3 of a feeler-carrying lever 3 4, fulcrumed at 5 to swing in a substantially horizontal plane, and so arranged



that the feeler will pass through an opening 6 in the front wall of the shuttle-box B on each forward beat of the lay.

When the shuttle is boxed opposite the 5 feeler, the latter will also pass through an opening 7 in the shuttle-wall to engage the filling-supply, and such intermittent engagement of the feeler by the filling causes forward movement of the feeler in its guide in 10 well-known manner and rocks the lever 3 4, the amplitude of such movement gradually decreasing as the filling weaves off.

The inner end 4 of the feeler-carrier coöperates with an overhanging portion 8 of a 15 latch 9, pivotally mounted at its front end to an upturned arm  $d^5$ , rigidly secured to the usual controlling or operating rock-shaft  $d'$ , extended across the loom, said rock-shaft when turned in the direction of the arrow 100, 20 Fig. 2, causing the operation of the filling-replenishing mechanism, substantially as set forth in Patent No. 529,940, before referred to.

The rear end 10 of the latch is adapted to be engaged by a bunter  $w^x$  on the weft-hammer 25 W at the left-hand side of the loom whenever the inner end of the feeler-carrier is beneath the overhang 8 of the latch.

Exhaustion of filling in the shuttle to such a point that filling-induced movement of the 30 feeler will not be sufficient to draw the end 4 of the feeler-carrier from the overhang 8 will be followed by coöperation of the bunter and latch, substantially as shown and described in United States Patent No. 720,209.

35 It will be understood, however, that the particular construction and arrangement of the feeler mechanism herein shown is not essential to my broad invention; but it has been chosen as a convenient form for the purpose 40 of illustration.

When the latch  $n^{10}$  and bunter  $w^x$  coöperate, as the weft-hammer W moves forward the rock-shaft  $d'$  will be turned in the direction of the arrow 100, and the replenishing 45 mechanism will be operated, and the shuttle will be provided with a fresh supply of filling when the shuttle on the next pick reaches the replenishing-box B<sup>x</sup>.

Inasmuch as the feeler causes a replenish- 50 ment of the running filling before complete exhaustion thereof, it will be obvious that no thin places can be produced in the cloth by weaving out or exhaustion of the running filling; but if the filling fails by breakage a fill- 55 ing-detector is provided to detect such failure and to prevent thin places in the cloth by arresting the operation of the take-up. Such a detecting device is shown at the left-hand side of the loom and comprises a filling-fork  $f$ , 60 pivotally mounted on a slide  $f^x$  of usual construction, the fork-tail coöperating with the usual hook of the weft-hammer W when filling failure is detected.

On its outward movement the slide engages 65 the slotted end  $n^2$  of the knock-off lever in

the construction herein illustrated and releases the shipper from its holding-notch, and such a detecting device is satisfactory if filling failure is promptly detected and the filling failure occurs when the shuttle is moving 70 toward the box B; but if the break occurs upon the opposite shot the detection of the fault may be delayed long enough to permit the formation of a thin place.

If when the filling breaks a long end is left 75 dragging or trailing from the shuttle, it will frequently act upon the detector  $f$  and tilt it just as if the filling were intact and properly laid, making a mispick, and this improper operation might possibly be repeated several 80 times before its discovery by the weaver. To prevent mispicks from such cause and also to obviate the use of let-back means which are not always certain in their operation, I provide a second filling-detecting device lo- 85 cated at the other side of the loom, herein shown as adjacent the filling-replenishing mechanism, and I have so arranged the mechanism that detecting action of either filling-detector will arrest the operation of a take-up 90 instrumentality.

The second filling-detecting device comprises a fork  $g$ , mounted on its slide  $g^x$  in usual manner, a second weft-hammer W<sup>2</sup> (see Fig. 2) causing outward movement of the 95 slide when filling failure is detected by the fork  $g$ .

The rock-shaft  $d'$  is mounted at its ends in bearings 11<sup>x</sup> 12<sup>x</sup>, and adjacent the former bearing the hub 11 of the arm  $d^5$  is rigidly se- 100 cured to the shaft, and at the other end of the latter the hub 12 of the spring-controlled arm  $d^x$  is fast on the shaft, the two hubs preventing any longitudinal movement of the shafts. Between said hubs a tubular rocking member 105 13 is rotatably mounted on the shaft and has rigidly secured to it a depending arm 16, (see Fig. 1,) said arm in practice being arranged to arrest the operation of a take-up instrumentality whenever the member 13 is turned 110 in the manner hereinbefore described. Such take-up instrumentality is included as a part of one of the operative instrumentalities of an organized loom and may be of any suitable construction—as, for instance, as is shown in 115 United States Patent No. 643,284—and in such case the arm 16 would when rocked coöperate with the take-up pawl-carrier  $d'$  to arrest its operation.

By the arrangement described detecting 120 action of either detector arrests the operation of the take-up instrumentality on the detected pick, and it will be manifest from the foregoing description that the detectors act on alternate picks to detect presence or absence of 125 the filling.

The rocking member 13 is herein shown as having rigidly secured to it the hubs of two upturned and bent arms 14 and 15, (clearly shown in Fig. 1,) the upper end of arm 14 en- 130



tering the slot  $n'$  of the knock-off lever, so that when the slide  $f^x$  is moved forward the member 13 will be rocked.

The arm 15 is upturned in front of the slide  $g^x$ , and consequently outward movement of the latter will also turn the member 13, so that in the double detecting means chosen for illustration not only will take-up be arrested, but the loom will be stopped upon detection of filling failure by either detector.

Springs 17 and 18, secured to a fixed part of the loom-frame, bear at their free ends upon the arms 15 and 14, respectively, to return the slides to their normal position after outward movement thereof.

Should a broken end of filling trailing or dragging from the shuttle prevent the detector  $f$  from detecting filling failure, it will not interfere with the detecting action of the other detector,  $g$ , because when the shuttle is in the replenishing-box  $B^x$  the delivery-eye is nearest the outer end of the box, and the trailing filling end is drawn out of the path of the detector  $g$ , so that the slide  $g^x$  thereof will be moved outward, as has been described.

In the foregoing specification I have described suitable means for effecting filling replenishment prior to complete exhaustion of the running filling to obviate the necessity of turning back the loom and the shedding mechanism; but my invention is not restricted to the use of filling-replenishing mechanism or a feeler device, either or both, of the particular construction herein shown and described or otherwise, and other forms of double filling-detecting means may be used within the spirit and scope of my invention, the gist of which, broadly considered, resides in the combination, with a pattern-controlled shedding mechanism, of any suitable or usual form, of means to detect promptly filling failure irrespective of the pick on which such failure occurs and to arrest the operation of a take-up instrumentality when filling failure is detected.

My invention also comprehends the combination, in a loom having a pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figure or pattern, of means to effect the stoppage of the loom by or through detection of filling failure on either pick.

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

1. In a loom comprising weaving instrumentalities, in combination, a pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figure or pattern, and means adapted to arrest the operation of a take-up instrumentality when filling failure is detected on either pick.

2. In a loom comprising weaving instrumentalities, in combination, a pattern-controlled shedding mechanism to manipulate the

warp-threads in the production of a figure or pattern, and two filling-detectors to detect filling failure on alternate picks and adapted to arrest the operation of a take-up instrumentality by or through detecting action of either detector.

3. In a loom comprising weaving instrumentalities, in combination, a pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figure or pattern, and two filling-detectors, located at opposite sides of the loom and adapted to arrest the operation of a take-up instrumentality when filling failure is detected by either detector.

4. In a loom comprising weaving instrumentalities, in combination, a pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figure or pattern, and means to prevent the formation of a thin place in the cloth when the filling is improperly laid on any pick.

5. In a loom, in combination, a pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figured fabric, mechanism to effect a change of filling, means to control the time of its operation, and two filling-detectors, located at opposite sides of the loom and adapted to arrest the operation of a take-up instrumentality upon detection of filling breakage by either detector.

6. In a loom provided with mechanism to effect a change of filling in the running shuttle, in combination, a pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figured fabric, and means to detect filling failure on either pick and adapted to arrest the operation of a take-up instrumentality when filling failure is detected.

7. In a loom the following instrumentalities in combination, viz: a pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figure or pattern, filling-replenishing mechanism operable to provide fresh filling prior to complete exhaustion of the filling in the running shuttle, and mechanism to detect filling failure at each side of the loom and adapted to arrest the operation of a take-up instrumentality whenever detecting action takes place.

8. In a loom the following instrumentalities in combination, viz: a pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figure or pattern, filling-replenishing mechanism, means to operate the same to effect a fresh supply of filling, and two filling-detectors to detect filling failure on alternate picks and adapted to arrest the operation of a take-up instrumentality when filling failure is detected by either detector, whereby fabrics may be woven in pattern or figure without the formation of thin places.

9. In a loom the following instrumentali-



ties, viz: a pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figure or pattern, mechanism to provide fresh filling prior to complete exhaustion of the supply of filling in the running shuttle, and two filling-detectors to detect filling failure on alternate picks and adapted to arrest the operation of a take-up instrumentality upon detection of filling failure by either detector.

10. In a loom provided with pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figure or pattern, filling-replenishing mechanism, means to cause the operation thereof prior to complete exhaustion of the filling in the running shuttle, and two filling-detectors, located at opposite sides of the loom and adapted to arrest the operation of a take-up instrumentality when filling failure is detected by either detector.

11. In a loom, in combination, a pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figured fabric, filling-replenishing mechanism, means to control the time of its operation, including a feeler to intermittently engage the filling in a running shuttle, and two filling-detectors located at opposite sides of the loom and each adapted to change the operation of a take-up instrumentality upon detection of filling failure.

12. In a loom comprising weaving instrumentalities, the combination of pattern-controlled shedding mechanism for manipulating the warp-threads, detecting devices to detect breakage of filling on alternate picks, and each adapted to govern the operation of a take-up instrumentality, a feeder to contain filling-carriers, mechanism to transfer a filling-carrier from the feeder to the weaving instrumentalities, and means to control the time of operation of such mechanism, including a feeler to cooperate with the filling in the running shuttle and effect the actuation of said mechanism prior to complete exhaustion of the filling in the shuttle.

13. In a loom comprising weaving instrumentalities, in combination, pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figured fabric, a feeder for holding filling-carriers, mechanism to automatically deliver a filling-carrier and eject an empty one, controlling means therefor including a feeler to cooperate with the filling in the running shuttle and cause the operation of said mechanism prior to complete exhaustion of the filling in the shuttle, and two filling-detectors to detect filling failure on alternate picks and adapted to change the operation of a take-up instrumentality upon detection of filling failure by either detector.

14. The combination, in a loom having a pattern-controlled shedding mechanism to manipulate the warp-threads in the production

of a figure or pattern, of means to effect the stoppage of the loom by or through detection of filling failure on either pick.

15. The combination, in a loom having a pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figure or pattern, of means adapted to arrest the operation of a take-up instrumentality when filling failure is detected on either pick, said means also acting to effect stoppage of the loom by or through detection of filling failure.

16. The combination, in a loom having a pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figure or pattern, of two filling-detectors to detect filling failure on alternate picks and adapted to arrest the operation of a take-up instrumentality, and stopping means for the loom operated by or through detecting action of either detector.

17. In a loom the following instrumentalities, viz: a pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figure or pattern, two filling-detectors, located at opposite sides of the loom and adapted to arrest the operation of a take-up instrumentality when filling failure is detected by either detector, and stopping means for the loom operated by or through detecting action of either detector.

18. In a loom, in combination, a pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figured fabric, mechanism to effect a change of filling, means to control the time of its operation, two filling-detectors, located at opposite sides of the loom, and means to stop the loom upon detection of filling breakage by either detector.

19. In a loom the following instrumentalities, viz: a pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figure or pattern, mechanism to provide fresh filling prior to complete exhaustion of the supply of filling in the running shuttle, two filling-detectors to detect filling failure on alternate picks and adapted to arrest the operation of a take-up instrumentality upon detection of filling failure by either detector, and stopping means for the loom operated by or through detecting action of either detector.

20. In a loom the following instrumentalities, viz: a pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figure or pattern, mechanism operable to replenish filling prior to complete exhaustion of the filling in the running shuttle, two filling-detectors to detect filling failure on alternate picks, and stopping means for the loom operated by or through detecting action of either detector.

21. In a loom provided with pattern-controlled shedding mechanism to manipulate the



warp-threads in the production of a figure or pattern, filling-replenishing mechanism, means to cause the operation thereof prior to complete exhaustion of the filling in the running shuttle, two filling-detectors, located at opposite sides of the loom and adapted to arrest the operation of a take-up instrumentality when filling failure is detected by either detector, and stopping means for the loom operated by or through detecting action of either detector.

22. In a loom the following instrumentalities, in combination, viz: a pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figure or pattern, filling-replenishing mechanism operable to provide fresh filling prior to complete exhaustion of the filling in the running shuttle, and mechanism to detect filling failure at each side of the loom and adapted to arrest the operation of the take-up instrumentality whenever detecting action takes place, and stopping means for the loom operated by or through such detecting action.

23. In a loom, in combination, a pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figured fabric, filling-detecting devices to detect filling breakage on alternate picks and adapted to arrest the operation of a take-up instrumentality, filling-replenishing mechanism operable to effect a replenishment of filling in the running shuttle prior to complete exhaustion of the filling therein, and means to stop the loom upon detection of breakage of filling by either of the detecting devices.

24. In a loom, in combination, a pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figured fabric, filling-replenishing mechanism, means to control the time of its operation, including a feeler to intermittently engage the filling in a running shuttle, two filling-detectors located at opposite sides of the loom and each adapted to govern the operation of a take-up in-

strumentality, a shipper, and releasing means therefor operated by or through either detector upon detection of filling failure thereby.

25. In a loom comprising weaving instrumentalities, the combination of pattern-controlled shedding mechanism for manipulating the warp-threads, detecting devices to detect breakage of filling on alternate picks, and each adapted to govern the operation of a take-up instrumentality, a feeder to contain filling-carriers, mechanism to transfer a filling-carrier from the feeder to the weaving instrumentalities, means to control the time of operation of such mechanism, including a feeler to cooperate with the filling in the running shuttle and effect the actuation of said mechanism prior to complete exhaustion of the filling in the shuttle, and means to stop the loom upon detection of filling breakage by either detecting device.

26. In a loom comprising weaving instrumentalities, in combination, pattern-controlled shedding mechanism to manipulate the warp-threads in the production of a figured fabric, a feeder for holding filling-carriers, mechanism to automatically deliver a filling-carrier and eject an empty one, controlling means therefor including a feeler to cooperate with the filling in the running shuttle and cause the operation of said mechanism prior to complete exhaustion of the filling in the shuttle, two filling-detectors to detect filling failure on alternate picks and adapted to govern the operation of a take-up instrumentality, stopping means for the loom, and operating connections between said means and the detectors, to effect the actuation of the stopping means upon detection of filling failure by either detector.

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

EBEN S. DRAPER.

Witnesses:

GEORGE OTIS DRAPER,  
ERNEST W. WOOD.