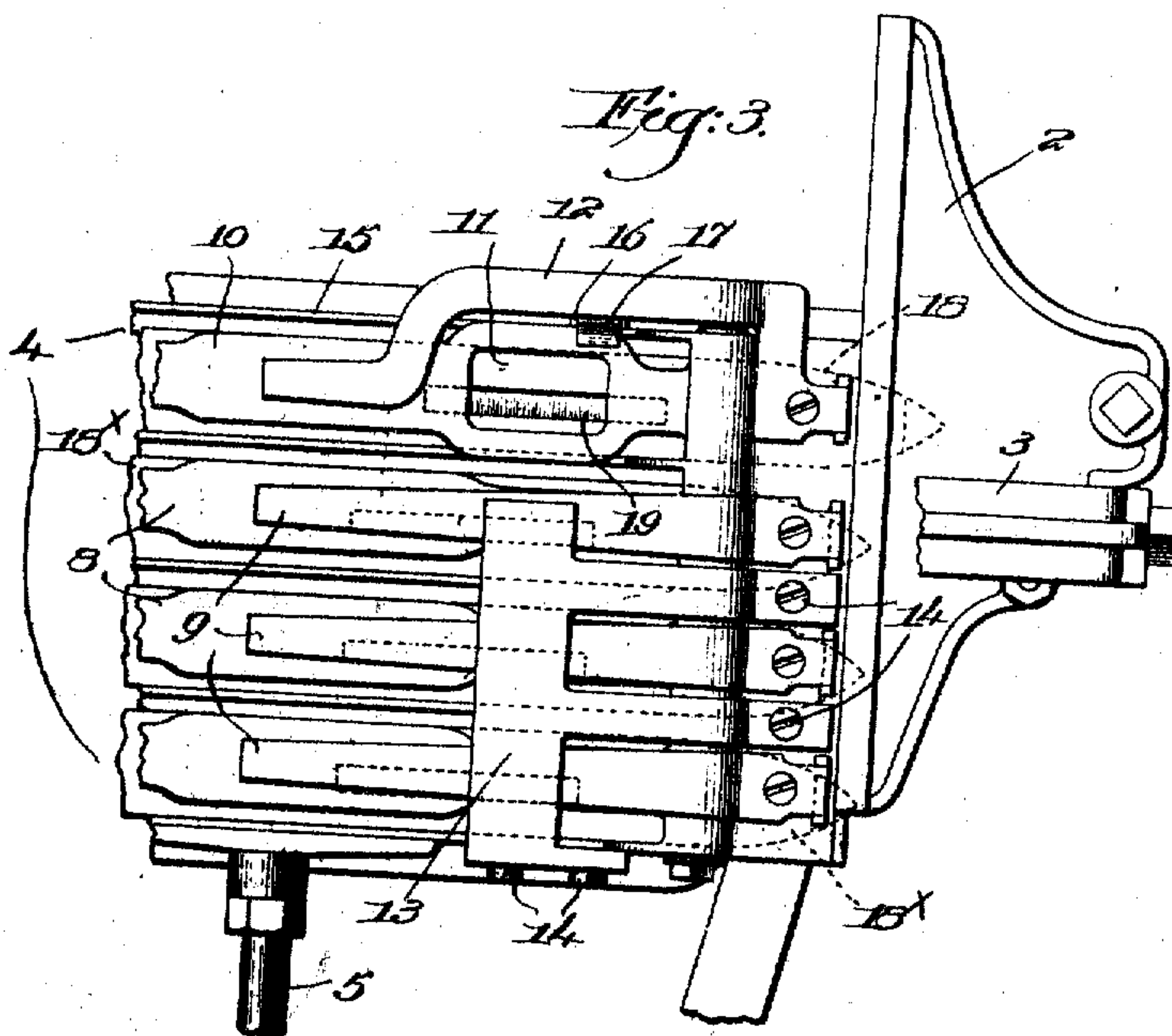
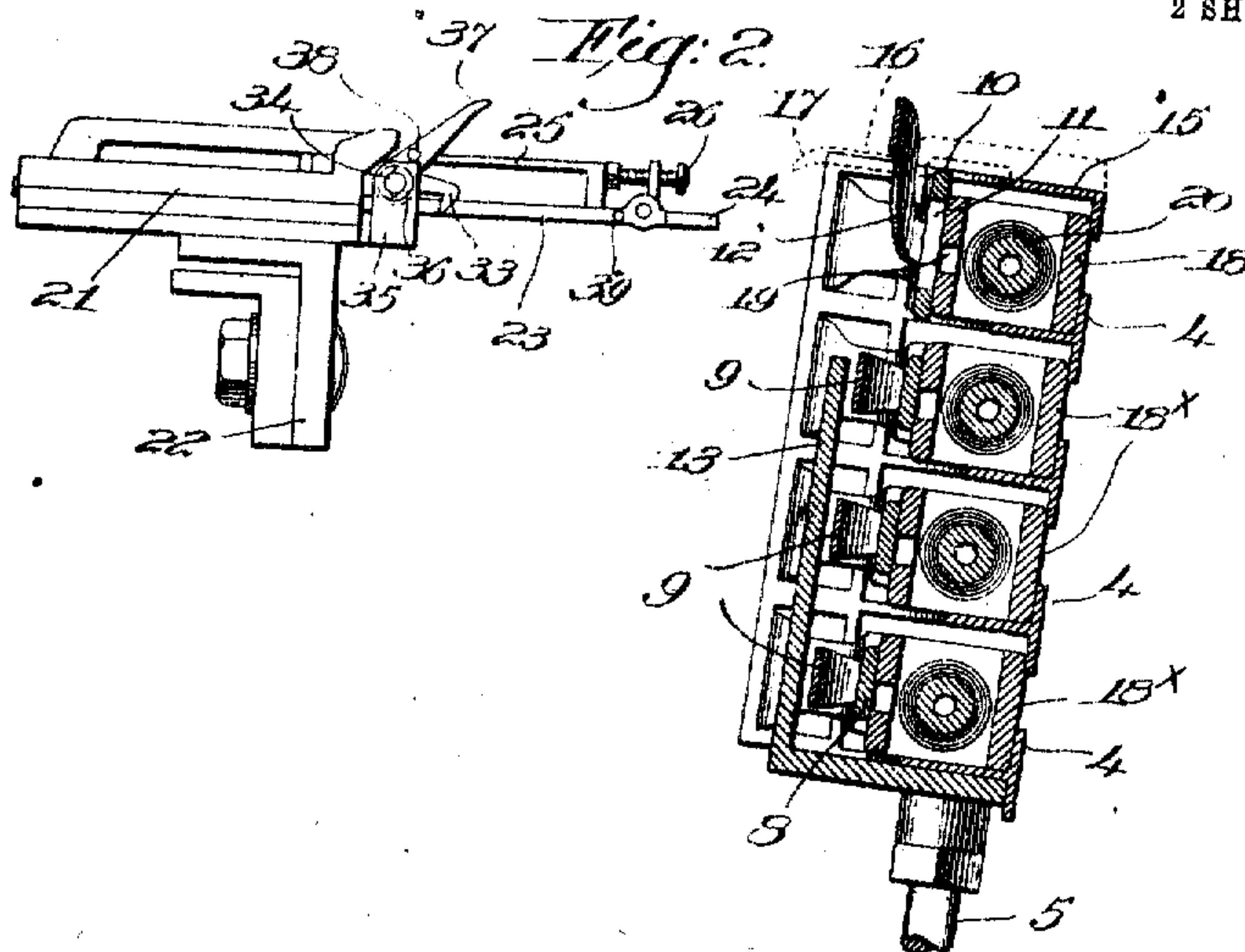


907,579.

C. H. DRAPER.
AUTOMATIC FILLING REPLENISHING LOOM.
APPLICATION FILED JAN. 28, 1908.

Patented Dec. 22, 1908.

2 SHEETS—SHEET 2.



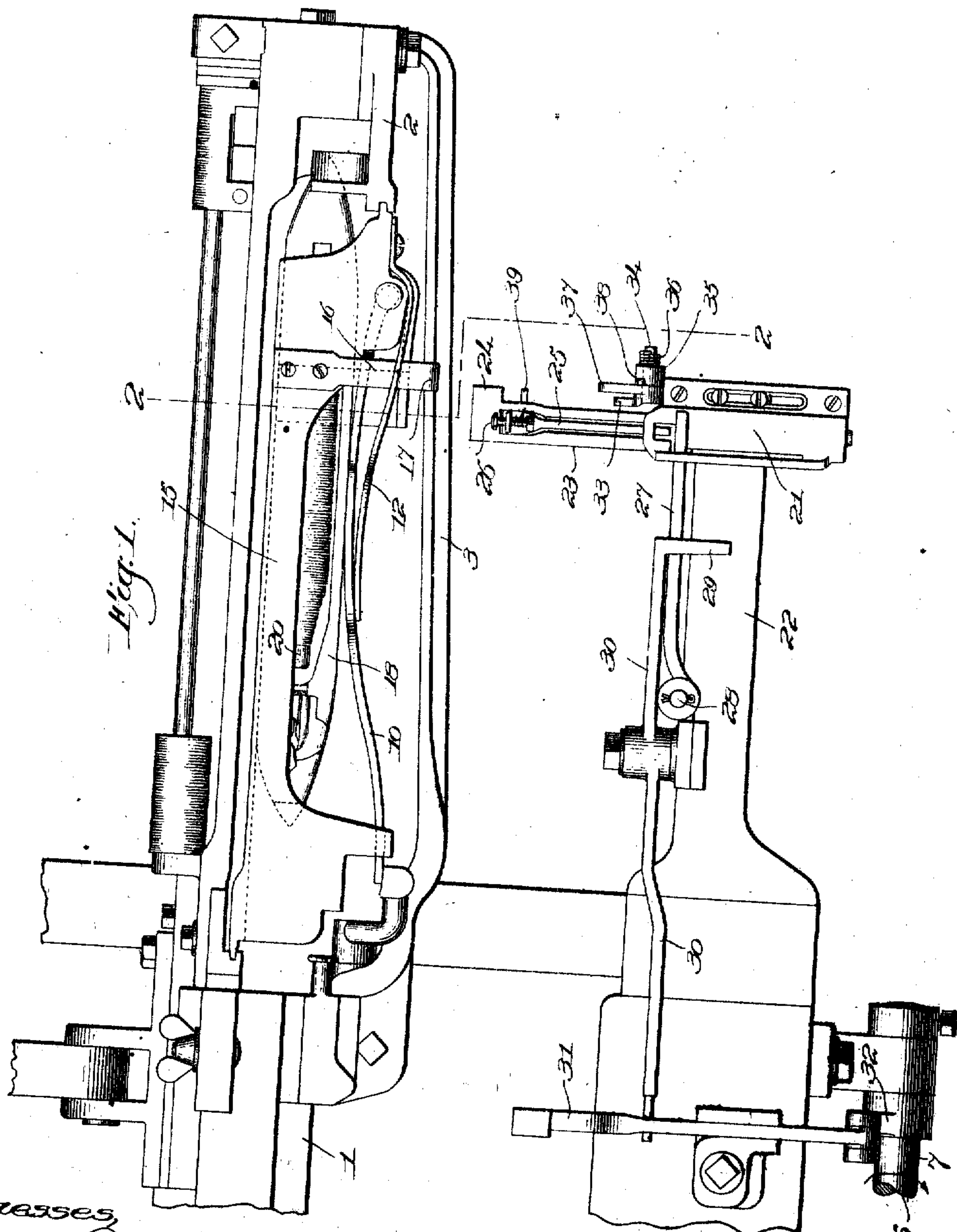
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2 SHEETS—SHEET 1.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC FILLING-REPLENISHING LOOM.

No. 907,579.

Specification of Letters Patent.

Patented Dec. 22, 1908.

Application filed January 28, 1908. Serial No. 418,118.

To all whom it may concern:

Be it known that I, CLARE H. DRAPER, a citizen of the United States, and resident of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Automatic Filling-Replenishing Looms, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

This invention relates more particularly to looms of the type wherein mechanism is employed to replenish automatically the running filling when the supply of filling has become substantially exhausted, and has especial reference to such looms when equipped with so-called "drop" or shifting shuttle-boxes.

In a loom having shifting shuttle-boxes and using filling of different characters or colors it is sometimes found desirable to change the filling of one character or color prior to complete exhaustion, when the shuttle carrying such filling is in action, without effecting such change in another shuttle, or shuttles, carrying filling of a different character or color. For instance, in weaving fabrics which have relatively narrow stripes differing in character or color from the main or body filling, and which stripes form a relatively small portion of a given length of the fabric, it is desirable to change the body filling prior to complete exhaustion of the supply in the active shuttle, while it is unnecessary to make such provision with regard to the shuttle or shuttles which carry the auxiliary or striping filling. Blanket fabric is an example, which is generally woven with a relatively extensive plain or body portion, having one or more stripes at one end, or both ends, as the case may be.

Looms have been devised wherein the replenishing mechanism is so constructed and arranged that the filling may be changed prior to complete exhaustion in all of the shuttles of a set carrying filling differing in character or color, involving considerable complication in the mechanism, which is unnecessary in properly weaving blankets and other fabrics having occasional stripes thrown into the pattern.

In my present invention I have combined, in a loom having automatic filling replenishing mechanism, and shifting shuttle-boxes, a filling-exhaustion-indicating mechanism so constructed and arranged that it is rendered

active or operative with respect to one of the shuttles and inactive with respect to other shuttles of the set or series. By such construction the main or body filling is carried in the shuttle with respect to which the exhaustion-indicating mechanism is active, the reserve supply of such filling being contained in the hopper or feeder of the replenishing mechanism, while the auxiliary or occasional filling, of different character or color, is carried by the shuttle or shuttles with respect to which the exhaustion-indicating instrumentality is inactive when such shuttle or shuttles may be in operation.

In the present embodiment of my invention I have shown the filling-exhaustion-indicating mechanism at the side of the loom adjacent the shifting shuttle-boxes, the replenishing mechanism being at the opposite side of the loom, and I have shown a group of four shifting shuttle-boxes, with the exhaustion-indicating mechanism to act with respect to but one shuttle when its box is in operative position. It will be manifest, however, that the particular number of shuttle-boxes in the group may be greater or less than four, and if for any reason it may be desirable to have the filling-feeler cooperate with more than one shuttle of the set such arrangement can be readily effected, as will appear, though it will be understood that so far as concerns my present invention each one of such shuttles would carry filling of the same character or color. As it is undesirable to have the feeler of the exhaustion-indicating instrumentality intermittently operating when the shuttle or shuttles with respect to which it is inactive may be in operation, I have provided means to move the feeler into inoperative position, in which position it is retained or locked until the shuttle with which it is to cooperate is put into operation, whereupon the feeler is unlocked automatically. This arrangement prevents unnecessary wear and tear upon the feeler and adjacent parts, as will be obvious.

The various novel features of my invention will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a top plan view of the right hand side of a portion of a loom provided with automatic filling-replenishing mechanism, showing the filling-exhaustion indicat-

ing instrumentality and the adjacent shifting shuttle-boxes; Fig. 2 is a transverse sectional detail on the line 2—2, Fig. 1, looking toward the left; Fig. 3 is a front elevation of the shifting shuttle-boxes and their guide, the front girt being broken off to show more clearly the means for moving the feeler into position to be locked.

The lay 1, having at one end a guide 2 and front girt 3, Fig. 1, and drop or shifting shuttle-boxes 4 vertically movable in the guide, four boxes or cells being shown in Figs. 2 and 3, and the rod 5 on which the boxes are mounted, may be and are of well known construction, the rod 5 serving to raise and lower the boxes under the call of the pattern of the shuttle-box motion of any usual form and construction, so timed that the box which contains the shuttle next to be put into action will be brought to the line of the raceway as the lay beats up. A structure of this general character is shown in United States Patent No. 692935 granted February 11, 1902, to H. W. Smith, and herein, as in that patent, it is supposed that a single shuttle-box will be mounted on the opposite end of the lay, and at that same side of the loom filling replenishing or changing mechanism of any desired character will be located. Such mechanism may conveniently be of the well known Northrop type, an example of which is found in United States Patent No. 529940 granted to Northrop November 27, 1894, the only part of such mechanism herein shown being the controlling or operating rock-shaft 6, Fig. 1. As is well known to those skilled in the art the turning of the rock-shaft in the direction of the arrow 7 will effect a change or replenishment of filling when the shuttle is in the box at the adjacent side of the loom.

The binders 8 and their springs 9 for the lower three boxes or cells of the shifting shuttle-boxes are of usual construction, but the binder 10 of the top box is enlarged to provide for an aperture 11, most clearly shown in Fig. 3, the spring 12 being bent or arched as shown to leave the opening clear. In substantial alinement with and below such aperture I have located a bunter, shown as a flat, upright plate 13 fixedly secured at 14 to the box frame and in front of each of the boxes or cells whose binders 8 are imperforate, the bunter being set forward some distance in front of the binders. Upon the top or cover-plate 15 of the topmost box I have secured a tripping or releasing device, shown as a finger 16 extended forward beyond the front of the boxes and preferably slightly downturned at its free end, at 17, for a purpose to be described. This projection or finger is shown in dotted lines Fig. 2 owing to the location of the line 2—2 on which the section is taken, but serving to clearly illustrate

the location of the finger with relation to other parts of the apparatus when the topmost box of the series is operatively positioned, as in Fig. 2.

In the present embodiment of my invention I have assumed that four shuttles are used, and that the topmost shuttle of the series, as 18, will carry the main or body filling and that this filling is to be replenished, while the other shuttles will carry auxiliary filling differing in some way, as to character or color, from the body filling, and from each other. That is, the body filling may be white, and the filling in the other three shuttles may be red, blue and yellow respectively, and will be thrown into the fabric occasionally, to give striped effects, for example. Obviously the number of shuttles and shifting shuttle-boxes is not essential, nor is the particular arrangement as to main and auxiliary filling-carrying shuttles, but inasmuch as the main or body filling carrying shuttle is the one in greatest use I consider it preferable to have it cooperate with the topmost shuttle-box, rather than with a lower box. In order that the body filling when being laid may be changed or replenished prior to complete exhaustion I have provided a filling-exhaustion-indicating instrumentality which is located at the side of the loom adjacent the shifting shuttle-boxes, such instrumentality including a feeler which is arranged to intermittently feel the filling in the shuttle carrying body filling but which is rendered inactive when another shuttle of the series is in operation. Such exhaustion-indicating instrumentality may be of any suitable construction, but for convenience I have herein illustrated a device substantially such as is shown in United States Patent No. 789471 granted May 9, 1905 to Wood and Northrop, to which reference may be had. Before briefly describing such instrumentality it should be stated that the shuttle 18 for the body filling has an opening 19 in its front wall, for the entrance of the feeler to feel the filling on the filling-carrier or bobbin 20 when such shuttle is in operation, and the other shuttles, as 18^x, Fig. 2, may or may not be provided with feeler openings, or adapted for use in a filling replenishing loom. That is, it is a matter of indifference, because the feeler is inactive when such shuttles are in operation, as will appear, and if a mill is equipped with shuttles for use in automatic feeler looms such shuttles can be used for the series, but ordinary hand filled and threaded shuttles may be used for the occasional or auxiliary filling if more convenient.

Referring to Fig. 1, a stand 21 mounted on an extension 22 of the breast-¹ cam supports a reciprocating yieldingly sustained feeler 23 having its rear portion or head 24 adapted to intermittently pass through the aperture 11 of the binder 10 and through the opening 19

into the shuttle 18 when said shuttle is in action, the feeler impinging upon the filling. Upon the feeler is fulcrumed a lever-like member 25 having at its rear end a bunter 26, the said member at its front end normally being held out of range of a controller 27, fulcrumed at 28 on the extension 22 and engaging a cam-slot, not shown, in the end 29 of a tilting transmitter 30, all substantially as in said Patent No. 789471 and operating as therein set forth. The transmitter extends inward toward the center of the loom and coöperates with a latch 31 which is pivotally connected at its front end to an arm 32 fast on the rock-shaft 6. Normally the latch is inoperative, but when the filling in the shuttle with which the feeler coöperates is exhausted to a predetermined extent the bunter 26 impinges upon the shuttle wall and depresses the front end of the lever-like device 25, effecting engagement with and rocking the controller 27 as the feeler is moved forward by the beat up of the lay. Thereby the transmitter 30 is tilted, the latch 31 is brought into engagement with an actuator and moved forward, turning the shaft 6 in the direction of the arrow 7 to cause replenishment of filling when the shuttle is boxed at the opposite or replenishing side of the loom. The latch actuator may be the weft-hammer, as in the patent last referred to.

When the shifting shuttle-boxes are positioned as shown in Fig. 2 the filling-exhaustion indicating instrumentality is operative and the feeler will feel the condition of the filling on every alternate forward beat of the lay, and the running filling will be changed or replenished when its substantial exhaustion in the shuttle 18 is detected by the feeler. When another shuttle of the series is in operation it is undesirable to have the feeler remain active, and I have provided a lock to retain it retracted. A hooked locking pawl or latch 33 has its pivot pin 34 mounted to rock in a bearing 35 on the stand 21, a spring 36, Figs. 1 and 2, normally acting to depress the pawl in the position shown in Fig. 2. Said pawl has an attached upturned and rearwardly inclined arm 37, and a lug 38 thereon rests on the bearing 35 to limit spring-controlled movement of the pawl, the latter being adapted to engage and hold a lateral pin 39 on the feeler when the latter is retracted or moved forward abnormally. The arm 37 is positioned to be engaged and rocked by the curved end 17 of the tripping projection or finger 16 as the lay beats up, provided the shifting shuttle-box is set as shown in Fig. 2, and the pawl 33 will be lifted into inoperative position, so that there can be no possible engagement with the stud 39 to lock the feeler in retracted or inactive condition. Now suppose the shuttle boxes are shifted to throw shuttle 18 out of operation and to bring into operation one of the

shuttles 18^x, then the bunter 13 which is normally below the feeler will be raised into position to engage the feeler on the beat up, retracting the feeler abnormally because the bunter 13 is set forward for that purpose, see Fig. 2. The stud 39 is thereby slid under the locking pawl 33, which immediately catches the stud and holds the feeler retracted, as will be manifest, so that there will be no material reciprocation of the feeler while the bunter 13 remains in its operative position, thus saving a great deal of unnecessary wear and tear on the feeler when one of the shuttles 18^x is operating to lay filling. As soon as the shuttle 18 is again brought into operation the finger 16 engages the arm 37, lifts the pawl 33 from stud 39 and unlocks the feeler, which is thereby automatically restored to activity and it continues active while the shuttle whose filling is to be changed or replenished remains in operation.

From the foregoing description it will be apparent that the feeler is active with respect to a predetermined shuttle of the series when such shuttle is laying filling and it is rendered inactive with respect to another shuttle, or shuttles, of the series when laying filling. Furthermore, the control of the feeler device is effected by or through the shifting shuttle-boxes, according to which of the shuttles may be operatively positioned, the feeler being rendered active or inactive correspondingly.

Various changes or modifications may be made by those skilled in the art without departing from the spirit and scope of my invention as set forth in the appended claims.

It will be understood that while one shuttle of the series coöperates with the feeler, and the remaining shuttles do not so coöperate, the filling laid by any of the shuttles in actual practice coöperates with a filling-fork, as usual, so that if filling breaks the loom is prevented from weaving bad cloth, and if the filling runs out in any of the shuttles with which the feeler does not coöperate then the filling-fork detects such filling absence and operates as usual.

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

1. In a loom adapted to replenish automatically the filling, in combination, shifting shuttle-boxes, a filling-exhaustion-indicating instrumentality including a feeler movable in a single path, to effect the operation of the replenishing mechanism, and automatic means to render said instrumentality inactive with respect to some of the shuttles when their boxes are operatively positioned, the path of movement of the feeler remaining fixed irrespective of the positioning of the shuttle-boxes.

2. In a loom adapted to replenish automatically the running filling, in combination,

a series of shuttles, means to render any of said shuttles operative to lay filling, a filling-exhaustion indicating instrumentality, including an intermittingly movable member, to cause filling replenishment prior to substantial exhaustion of the running filling, automatic means to positively lock said member and thereby render said instrumentality inactive with respect to one shuttle when operative to lay filling, and a device to release said member automatically and thereby render said instrumentality active with respect to another shuttle when it is operative to lay filling.

3. The combination, in a loom provided with filling-changing mechanism, of shifting shuttle-boxes, an instrumentality adjacent said boxes and including a filling-feeler, to effect the actuation of the replenishing mechanism prior to complete exhaustion of the filling in one of the shuttles, and automatic means to positively lock and thereby render the feeler inactive when such shuttle is out of operation and another of the shuttles is in operation.

4. The combination, in a loom provided with filling changing mechanism, of shifting shuttle-boxes, an instrumentality, including a single feeler, to effect the actuation of such mechanism prior to complete filling exhaustion in a running shuttle, and means controlled by shifting of the shuttle-boxes to render the feeler active with respect to one shuttle and inactive with respect to another shuttle when operatively positioned to lay filling, said means including a device to lock the feeler from movement and thereby render it inactive.

5. The combination, in a loom provided with filling-changing mechanism, of shifting shuttle-boxes, an instrumentality, including a reciprocable feeler, to effect the actuation of such mechanism prior to complete filling-exhaustion in a running shuttle, and means controlled by shifting of the shuttle-boxes to lock said feeler from reciprocation and thereby render it inactive with respect to some of the shuttles when placed in running position.

6. The combination, in a loom provided with filling changing mechanism, of a plurality of shuttles containing filling differing in characteristics, means to operatively position one or another shuttle to lay filling, a filling-exhaustion-indicating instrumentality to effect the actuation of the replenishing mechanism, and automatic means to render said instrumentality completely irresponsive when a shuttle carrying filling of one character is in operation and completely responsive when another shuttle carrying filling of a different character is in operation.

7. In a loom adapted to replenish automatically the filling in a predetermined shuttle, in combination, a series of shuttles,

means to operatively position them one at a time, an instrumentality, including a single feeler, to cause filling replenishment prior to complete exhaustion of the filling in the predetermined shuttle, and means to render the feeler responsive only when such shuttle is in operation and irresponsive when another shuttle of the series is in operation.

8. In a loom adapted to replenish automatically the filling in a predetermined shuttle, in combination, a series of shuttles, means to operatively position them one at a time, an instrumentality, including a feeler, to cause filling replenishment prior to complete exhaustion of the filling in the predetermined shuttle, a feeler lock, means to release the feeler from the control of the lock when the predetermined shuttle is in operation, and means to engage and move the feeler into the control of the lock when another shuttle of the series is operatively positioned.

9. In a loom adapted to replenish automatically the filling in a predetermined shuttle, in combination, a series of shuttles, shifting shuttle-boxes therefor, an instrumentality, including a feeler, to effect filling replenishment prior to complete exhaustion of the filling in the predetermined shuttle, a feeler lock, a releasing device on one of the boxes, to free the feeler when the predetermined shuttle is in operation, and means on another of the boxes to engage the feeler and place it under control of the lock when the predetermined shuttle is out of operation.

10. In a loom, in combination, shifting shuttle-boxes one of which has a feeler aperture, a series of shuttles controlled as to their operation by said boxes, an instrumentality, including a feeler, to cause filling replenishment prior to complete exhaustion of the filling in the shuttle entering the apertured box, a feeler lock, means on the apertured box to render the lock inoperative when said box is operatively positioned, and means on the other shuttle-boxes to engage and retract the feeler to place it under control of the lock when any one of such latter shuttle-boxes is operatively positioned.

11. In a loom, in combination, shifting shuttle-boxes one of which has a feeler aperture, a series of shuttles controlled as to their operation by said boxes, an instrumentality, including a feeler, to cause filling replenishment prior to complete exhaustion of the filling in the shuttle entering the apertured box, a feeler lock, a device on the apertured box to trip the lock and release the feeler when said box is operatively positioned, and a hunter to engage and place the feeler under control of the lock when any one of the other shuttle-boxes is operatively positioned.

12. In a loom provided with filling changing mechanism, shifting shuttle-boxes, means for causing said mechanism to effect a change

of filling on the substantial exhaustion of the filling in one of the shuttles when operatively positioned and means to prevent the operation of such mechanism notwithstanding substantial filling-exhaustion in another of the shuttles when operatively positioned.

13. In a loom provided with filling changing mechanism, a lay, shifting shuttle-boxes at one end thereof, an instrumentality adjacent the same end of the lay to detect the condition of the filling in a particular shuttle and to cause filling replenishment when predetermined filling exhaustion is detected, and means to render said instrumentality completely inoperative when some of the shuttles are in operation and to automatically restore said instrumentality to operative condition when another of the shuttles is in operation, whereby the filling in such latter shuttle only may be changed prior to complete exhaustion.

14. In a loom provided with mechanism to replenish the running filling, an instrumentality to cause the operation of such mechanism prior to complete filling exhaustion in an active shuttle, and including a reciprocating feeler adapted to intermittently enter an active shuttle and feel the filling therein, shifting shuttle-boxes and their binders, one of the binders having a feeler aperture, a bunter movable with said boxes and positioned to engage the feeler when any of those boxes having non-apertured binders are in operative position, to retract the feeler an abnormal amount, a lock to engage and hold the feeler when abnormally retracted, and a tripping device to engage and render the lock inoperative, to thereby release the feeler, when the shuttle-box having the apertured binder is operatively positioned.

15. In a loom provided with mechanism normally operative to effect automatically a change of filling in the running shuttle upon substantial exhaustion of the filling therein, shifting shuttle-boxes, and means to render said mechanism completely irresponsive when one of the shuttles is in operation even

if substantial filling-exhaustion occurs therein and to permit the normal operation of said mechanism when another shuttle is in operation.

16. The combination, in a loom provided with filling-changing mechanism, of a plurality of shuttles, means to operatively position one or another shuttle to lay filling, an instrumentality to effect the operation of the filling-changing mechanism upon substantial filling-exhaustion in one of the shuttles when in operation, and means to cooperate with and positively prevent any operation of said instrumentality when another shuttle is in operation.

17. In a loom provided with mechanism normally operative to effect automatically a change of filling in the running shuttle upon substantial exhaustion of the filling therein, shifting shuttle-boxes, and means controlled by shifting of said shuttle-boxes to render said mechanism completely irresponsive when one of the shuttles is in operation even if substantial filling-exhaustion occurs therein and to permit the normal operation of said mechanism when another shuttle is in operation.

18. The combination, in a loom provided with filling-changing mechanism, of a plurality of shuttles, means to operatively position one or another shuttle to lay filling, means controlled automatically by or through a repositioning of the shuttles to effect the operation of said mechanism on the substantial exhaustion of the filling in one of the shuttles when operative, and means to prevent the operation of such mechanism when another of the shuttles is operative notwithstanding substantial filling exhaustion therein.

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

CLARE H. DRAPER.

Witnesses:

GEORGE OTIS DRAPER,
ERNEST W. WOOD.