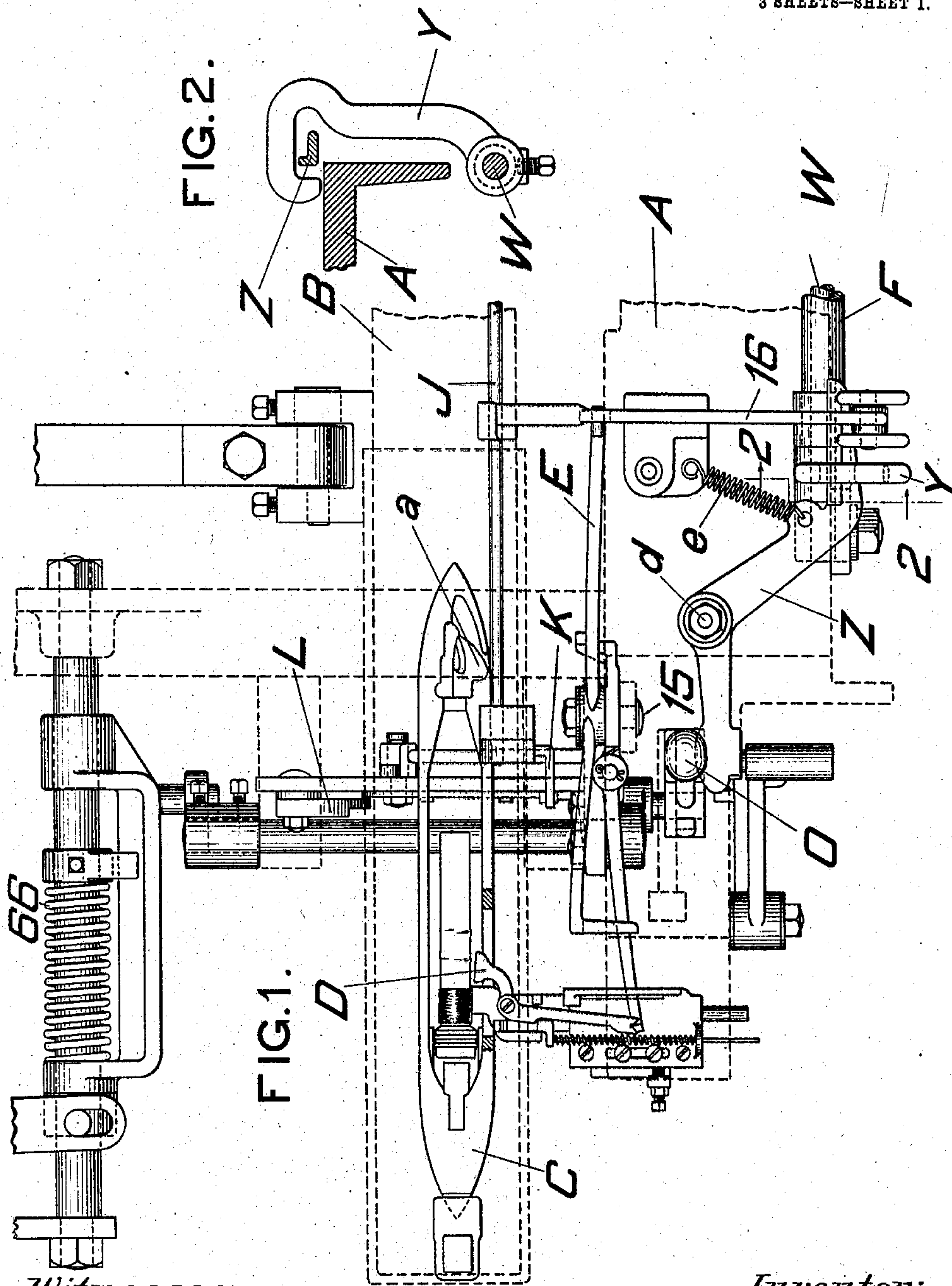


A. E. STAFFORD.  
LOOM.  
APPLICATION FILED MAY 31, 1908.

911,626.

Patented Feb. 9, 1909.  
3 SHEETS—SHEET 1.



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his Attorney.

A. E. STAFFORD.

LOOM.

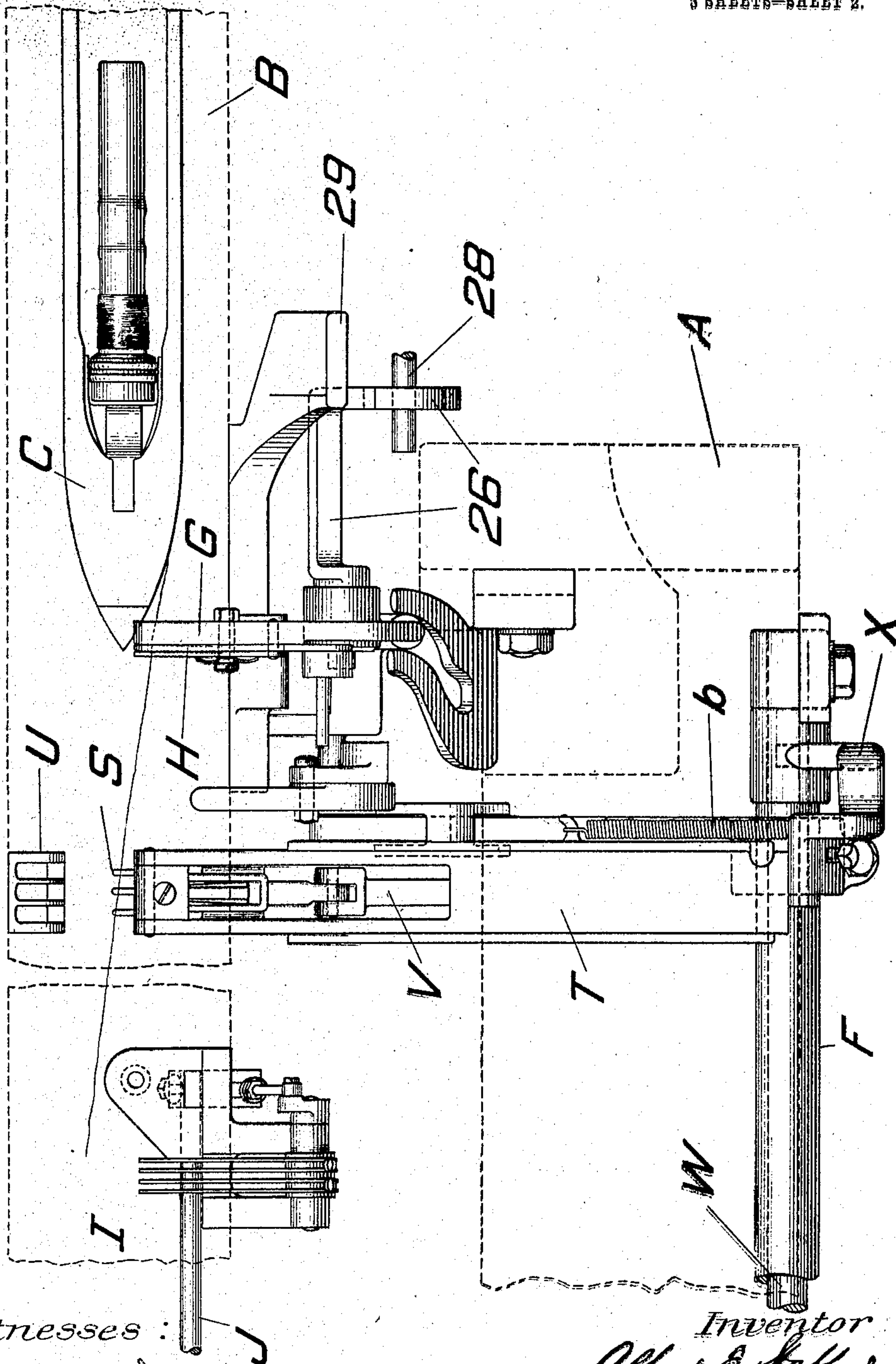
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3 SHEETS—SHEET 2.

FIG. 3



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3 SHEETS—SHEET 3.

FIG. 4.

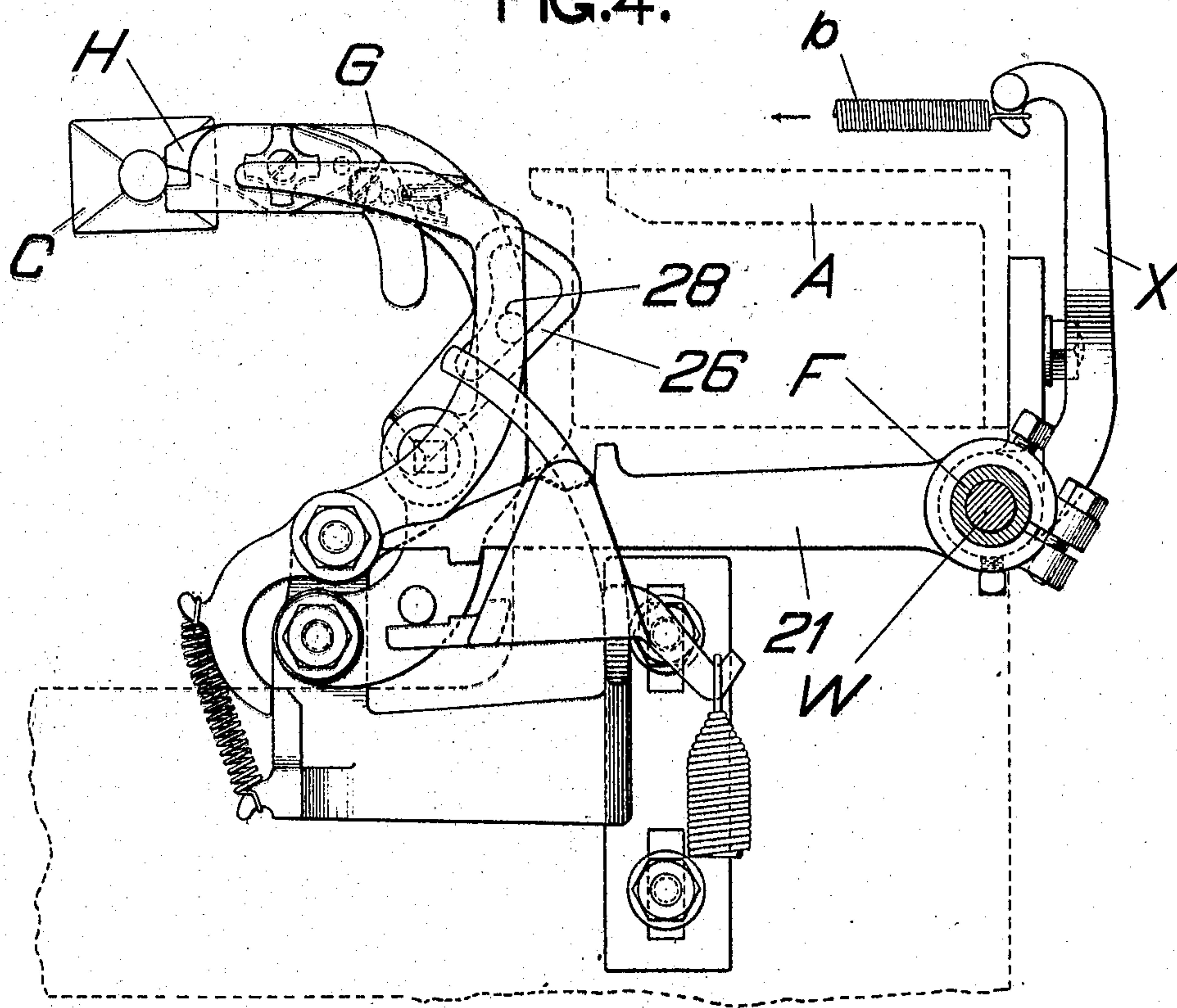
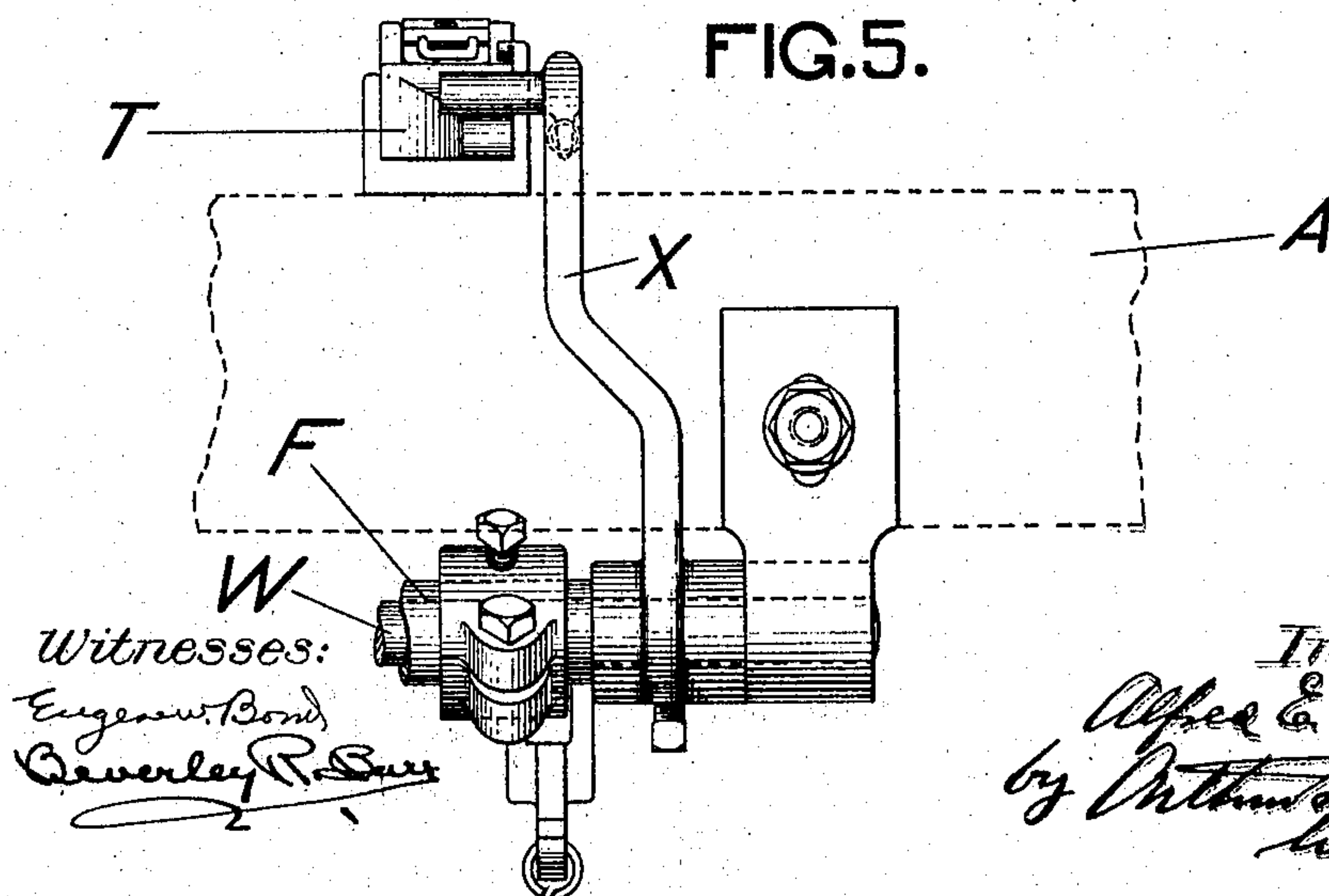


FIG. 5.





# UNITED STATES PATENT OFFICE.

ALFRED E. STAFFORD, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO DRAPER COMPANY,  
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## LOOM.

No. 911,626.

Specification of Letters Patent.

Patented Feb. 9, 1909.

Application filed May 31, 1906. Serial No. 319,535.

*To all whom it may concern:*

Be it known that I, ALFRED E. STAFFORD, a resident of Hopedale, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Looms, of which the following is a specification.

The present invention consists in certain improvements upon the invention of Charles Eaton Chase, upon which application for Letters Patent of the United States were filed May 31, 1906 Serial No. 319,552.

In accordance with the Chase invention, an automatic replenishing loom having a detector which detects the approaching exhaustion of the running weft and thereupon initiates the action of automatic weft replenishing devices is provided with a center weft-fork carried by the lay and working among the warp threads which detects breakage of weft and thereby stops the loom through intervening stopping mechanism acting to stop the loom before the lay completes its forward beat following the detecting action of the center fork. There is one contingency which may give rise to an imperfection in the cloth which is not provided against by the mechanism of the Chase invention. It may occur that the weft thread has a break in it which comes on the traverse of the shuttle to the replenishing end of the lay immediately following the detection of the approaching exhaustion of the running weft; and the thread may not run out until the shuttle has passed the center fork on its way to the change end of the loom. In such case the replenishing mechanism will act to insert fresh weft into the loom and the weaving will then continue uninterrupted, with the result that there is a partial pick only in one of the shed formations, thus making a blemish in the cloth. This contingency does not happen often in practice and in many fabrics would not cause them to be classed as "seconds"; but in the case of some fabrics a blemish of this character even though happening at remote intervals is objectionable.

The purpose of the present improvements is to stop the loom in such a case. To this end, the loom having weft replenishing mechanism brought into action by a detector which detects approaching exhaustion of weft and having a center-fork to stop the loom is also equipped with a side weft-fork located between the selvage of the cloth and the change

end of the lay which side-fork coöperates with the stopping mechanism to stop the loom. In case, therefore, the weft runs out after the shuttle passes the center-fork on its way to the change end of the loom immediately following the initiation of the weft replenishing operation, the loom will be stopped by the action of the side-fork, thus avoiding a possible blemish in the cloth.

The present improvements are illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of a portion of the loom at the detecting side, enough being shown to enable the present improvement to be understood; Fig. 2, is a detail vertical section in the plane indicated by the line 2—2 in Fig. 1; Fig. 3, is a plan view of the loom at the change side, only sufficient parts being shown to enable the present improvement to be understood; Fig. 4, is a vertical section at the change end of the loom illustrating the shuttle feeler and the connection between the side-fork and the stop rod; and Fig. 5, is a front view of the loom at the change side showing the side-fork slide and its connection with the stop rod.

Except so far as the present improvements are concerned, the accompanying drawings follow the drawings of the aforesaid Chase application, to which reference may be made for a full explanation of the detailed mechanism here illustrated.

So far as the parts here shown are identical with those illustrated in the Chase application, they have the same reference characters.

A, is the breast-beam; B, is the lay; and C, is the shuttle. As shown in Fig. 1, the nearly depleted shuttle coöperates with a detector comprising an external feeler D, which on performing its functional movement swings the controller E, on its horizontal pivot 15, thereby through intervening mechanism including a dagger 16, rocking the weft-replenishing starting shaft F. This shaft extends to the change side of the loom and is there equipped with an arm 21, (see Fig. 4) which acts to swing the shuttle feeler G, toward the then approaching lay. If the shuttle is improperly boxed it is encountered by the shuttle feeler and a change of weft is not effected. If, however, the shuttle feeler moves to its full extent, the usual transfer dog (not shown because being well known, see the dog  $m^{15}$ , in United States



Patent No. 718,587, to Stimpson, dated January 13, 1903) is encountered by a bunter 29 on the lay and the change of weft is effected.

At 28 in Fig. 3, is shown the pin of the 5 transferrer dog which coacts with an arm 26 on the shuttle feeler G. The shuttle feeler carries a cutting mechanism comprising a movable cutting blade H, for the purpose of cutting the thread extending from the adjacent selvage of the cloth to the nearly exhausted weft-carrier. All of these parts, or 0 their equivalents, are well known in automatic weft-replenishing feeler looms. The center weft-fork is shown at I. It is located 15 at the middle of the lay among the warp threads and it moves down to feel for weft by gravity and is elevated by a lifting cam L, shown in Fig. 1, with which it is operatively connected by mechanism including a 20 rock shaft J, journaled to and beneath the lay, and a dagger K, connected with the rock shaft and riding on the lifting cam. In case no weft is laid the weft-fork descends its full distance, and as the result the usual shipper 25 handle O, of the loom is knocked off from its holding notch, thus permitting a propelling spring 66, to act to move appropriate parts to stop the loom, the brake being simultaneously applied. Owing to the center-fork 30 being at the middle of the lay and to the parts controlled by it, it detects weft absence sufficiently early to enable the loom to come to a standstill before the lay beats completely forward, thus avoiding beating up 35 the last deficient pick into place in the cloth. The construction and action of the center-fork and the devices intermediate between it and the stopping mechanism are fully set forth in the Chase application.

40 In accordance with the present invention a side weft-fork S, is employed located at the change side of the loom between the weft-replenishing magazine and the adjacent selvage of the cloth and hence between the 45 center-fork and the shuttle-box at the change end of the lay. This side-fork S, is of usual construction, being pivoted to a fore and aft moving weft slide F, and cooperating with a grid U, carried by the lay. In case of 50 absence of weft between the fork and its grid, the tail of the fork is caught by an ordinary cam actuated weft-hammer shown at V, in Fig. 3. This side-fork detects weft absence just before the lay completes its 55 forward movement; it is then caught by the weft-hammer and it with its slide T, is moved forward against the stress of spring b. The weft slide T, in this forward movement acts upon an arm X, extending upwardly 60 from the stop rod W, its upper end being immediately in front of the weft-fork slide, as indicated in Fig. 5. The stop rod W, conveniently extends through the starting shaft F, which is constructed as a hollow 65 sleeve for this purpose. This stop rod W,

extends to the feeler or setting-on side of the loom and there has fast to it an upwardly extending downwardly hooked arm Y. As shown in Fig. 2, the upper end of this arm Y, hooks over the tail end of a knock-off 70 lever Z, which is pivoted at d, to the breast-beam, and the outer end of which is adjacent the shipper handle O. In case the side-fork S, detects weft absence, the stop rod W, is 75 rocked and the hooked upper end of the arm Y, is moved outwardly, thus swinging the knock-off lever Z, on its pivot and hence uncoupling the shipper handle O, from its usual holding notch, whereupon the spring 66, is free to disconnect the loom driver from the 80 loom and a brake is applied and the loom stopped. A spring e, restores the knock-off lever to its normal position; and the spring b, is connected with the arm X, so as to restore the stop rod to its normal position, 85 and this spring acts through the arm X, to restore the weft-fork slide T, and side-fork S, to their normal positions. With this side-fork the loom will be stopped should the thread run out after the shuttle has passed 90 the center-fork on its way to the change end of the loom after the feeler D, has detected approaching exhaustion of weft and has initiated the action of the weft-replenishing mechanism. 95

The loom will not stop until the weft-replenishing has been effected and until the lay is part or all the way back. The shuttle is hence ready for restarting. The defective pick has, however, been beaten into place 100 and it is necessary to turn the harnesses back in order to open the shed and remove the partial pick. The weaver then restarts the loom, seeing that the first automatic throw of the shuttle lays the fresh weft in the 105 proper shed. When this side-fork on the change side of the loom is used in combination with a detector which detects approaching exhaustion of weft and with a center-fork, as in the Chase application, the full 110 advantages of automatic weft-replenishment are secured and perfect cloth can be woven with the minimum of attention and care on the part of the weaver.

It is to be noted from Fig. 1, that the 115 shuttle-eye is approximately at the point a, and hence that the side-fork is between the center-fork and the shuttle-box occupied by the shuttle when its eye-end is farthest from the selvage. In other words, the side-fork 120 is located between the selvage and the end of the shuttle remote from its eye-end when the shuttle occupies the adjacent box.

While the center-fork specifically selected for illustration is moved down by gravity, it 125 may be aided in its descent by a spring.

I claim:—

1. A weft-replenishing loom having, in combination, a detector located at the side of the loom opposite to the location of the weft- 130



replenishing mechanism and which detects the approaching exhaustion of weft and sets in action the weft-replenishing mechanism to supply fresh weft before the running weft is completely exhausted, stopping mechanism, a center-fork working among the warp threads and coöperatively connected with said stopping mechanism to stop the loom both when weft absence occurs on the traverse of the shuttle to the replenishing side of the loom and when it occurs on the traverse of the shuttle to the detector side of the loom, and a side fork operatively connected with the stopping mechanism and located outside of the selvage of the cloth at the weft-replenishing side of the loom, said side fork detecting weft absence and stopping the loom when the weft runs out after the shuttle has passed the center fork on its way to the shuttle box at the replenishing side of the loom.

2. A weft-replenishing loom having, in combination, a detector located at the side of the loom opposite to the location of the weft-replenishing mechanism and which detects the approaching exhaustion of weft and sets in action the weft-replenishing mechanism to supply fresh weft before the running weft is completely exhausted, stopping mechanism, a center-fork working among the warp threads and coöperatively connected with said stopping mechanism to stop the loom when weft absence occurs on the traverse of the shuttle to the replenishing side of the loom, and a side fork operatively connected with the stopping mechanism and located outside of the selvage of the cloth at the weft-replenishing side of the loom, said side fork detecting weft absence and stopping the loom when the weft runs out after the shuttle has passed the center fork on its way to the shuttle box at the replenishing side of the loom.

3. A weft-replenishing loom having, in combination, a detector which detects the approaching exhaustion of weft and sets in action the weft-replenishing mechanism to supply fresh weft before the running weft is completely exhausted, stopping mechanism, a center-fork working among the warp threads and coöperatively connected with

said stopping mechanism to stop the loom when weft absence occurs on either traverse of the shuttle, and a side fork operatively connected with the stopping mechanism and located outside of the selvage of the cloth at the weft-replenishing side of the loom, said side fork detecting weft absence and stopping the loom when the weft runs out after the shuttle has passed the center fork on its way to the shuttle box at the replenishing side of the loom.

4. A weft-replenishing loom having, in combination, a detector which detects the approaching exhaustion of weft and sets in action the weft-replenishing mechanism to supply fresh weft before the running weft is completely exhausted, stopping mechanism, a center-fork working among the warp threads and coöperatively connected with said stopping mechanism to stop the loom when weft absence occurs on the traverse of the shuttle to the replenishing side of the loom, and a side fork operatively connected with the stopping mechanism and located outside of the selvage of the cloth at the weft-replenishing side of the loom, said side fork detecting weft absence and stopping the loom when the weft runs out after the shuttle has passed the center fork on its way to the shuttle box at the replenishing side of the loom.

5. A loom having, in combination, stopping mechanism, a center-fork working among the warp threads and coöperatively connected with said stopping mechanism to stop the loom when weft absence occurs on either traverse of the shuttle, and a side fork operatively connected with the stopping mechanism and located outside of the selvage of the cloth, said side fork detecting weft absence and stopping the loom when the weft runs out after the shuttle has passed the center fork on its way to the neighboring shuttle box.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

ALFRED E. STAFFORD.

Witnesses:

CLARE H. DRAPER,  
FRANK J. DUTCHER.