No. 815,952.

PATENTED MAR. 27, 1906.

N. FOERSTER, D. J. CAREY & W. A. FOSTER.

FILLING STOP MOTION FOR LOOMS.

APPLICATION FILED DEC. 11, 1903. RENEWED AUG. 29, 1905.

2 SHEETS—SHEET 1.

FIG. 2.

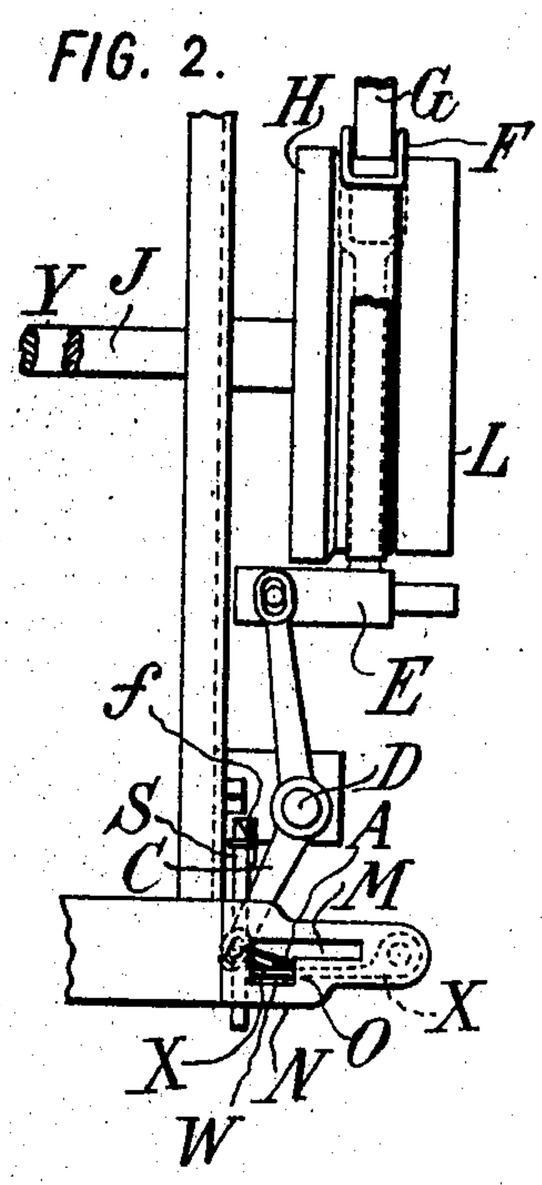


FIG. 3.

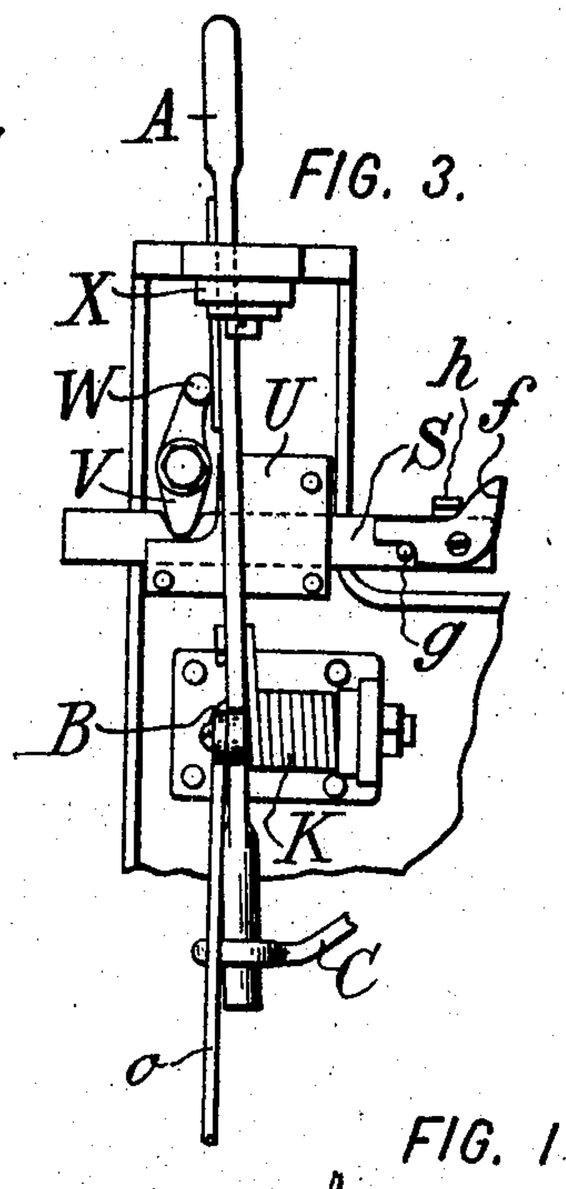


FIG. 4.

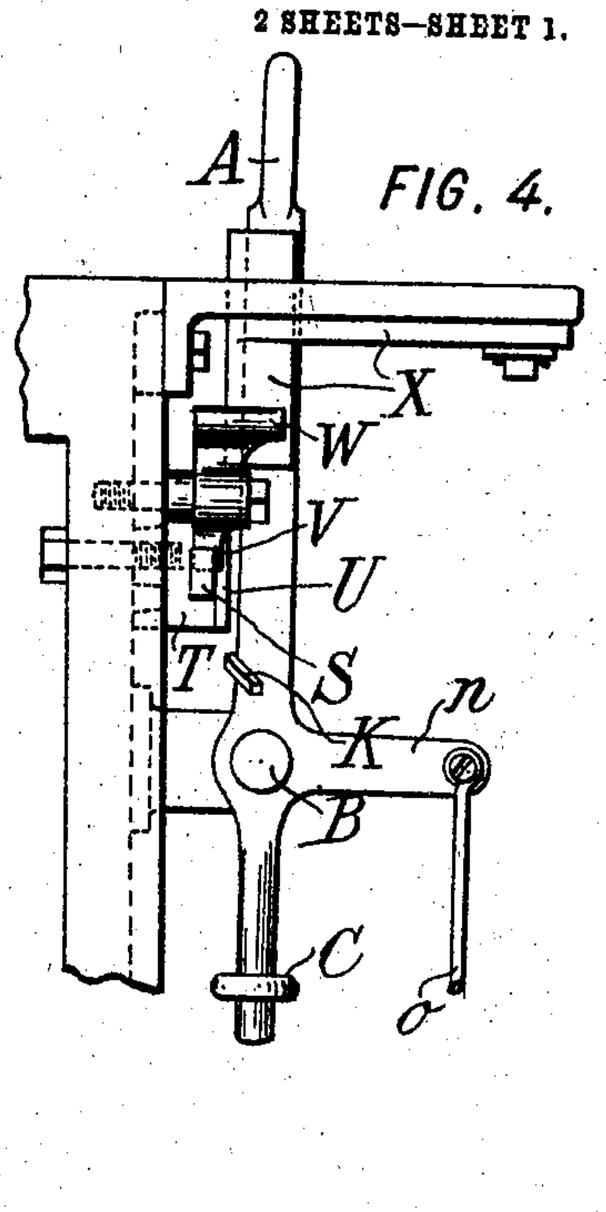
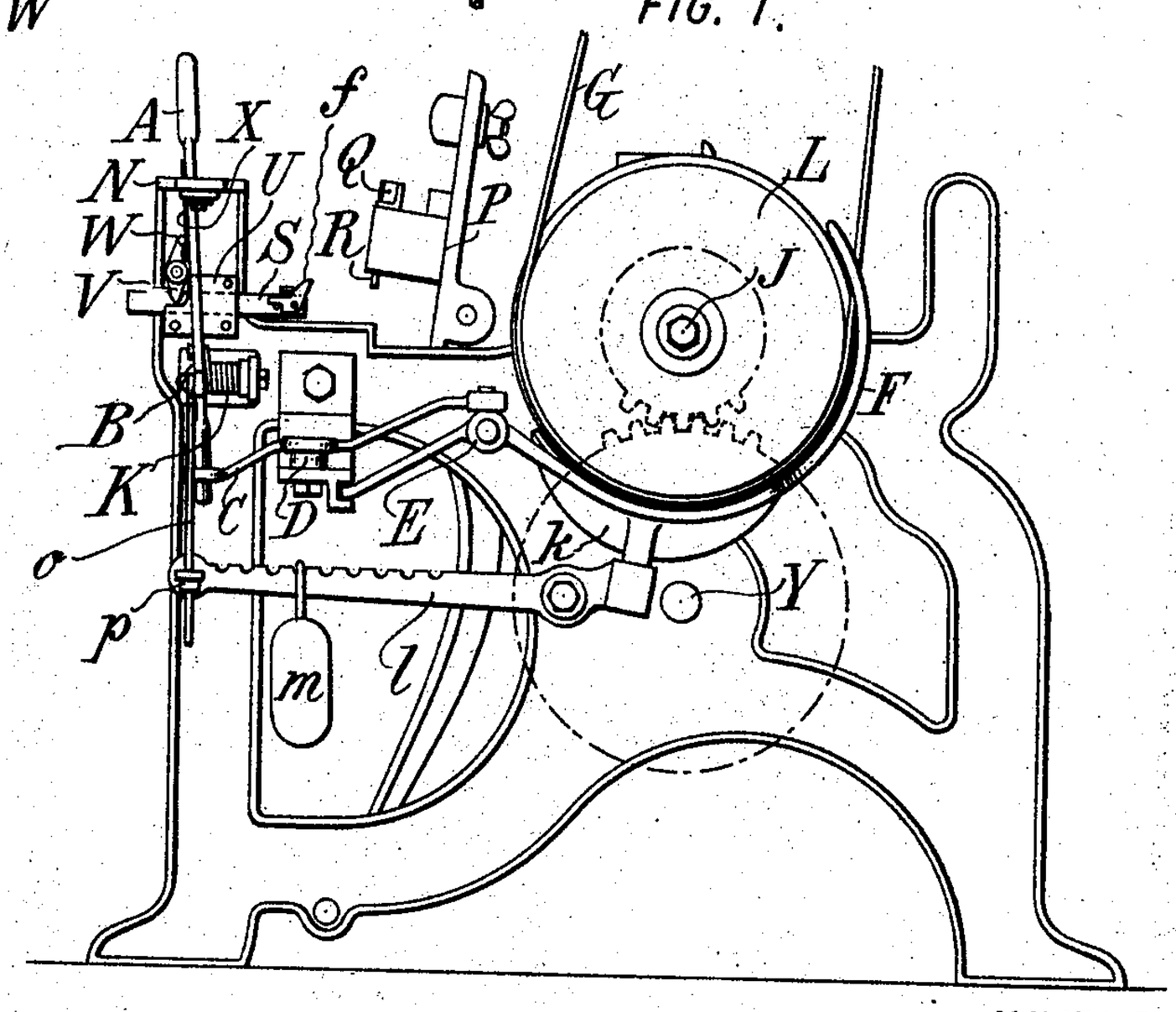


FIG. 1.



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2 SHEETS—SHEET 2.

FIG. 6.

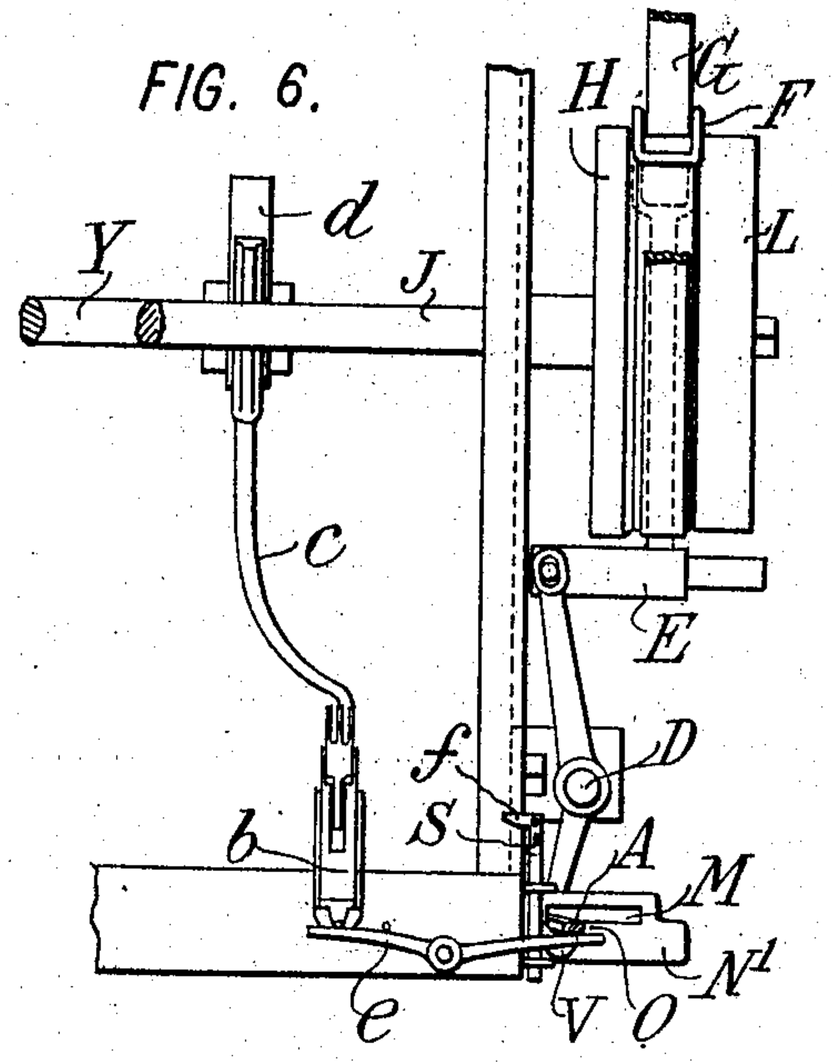


FIG. 7.

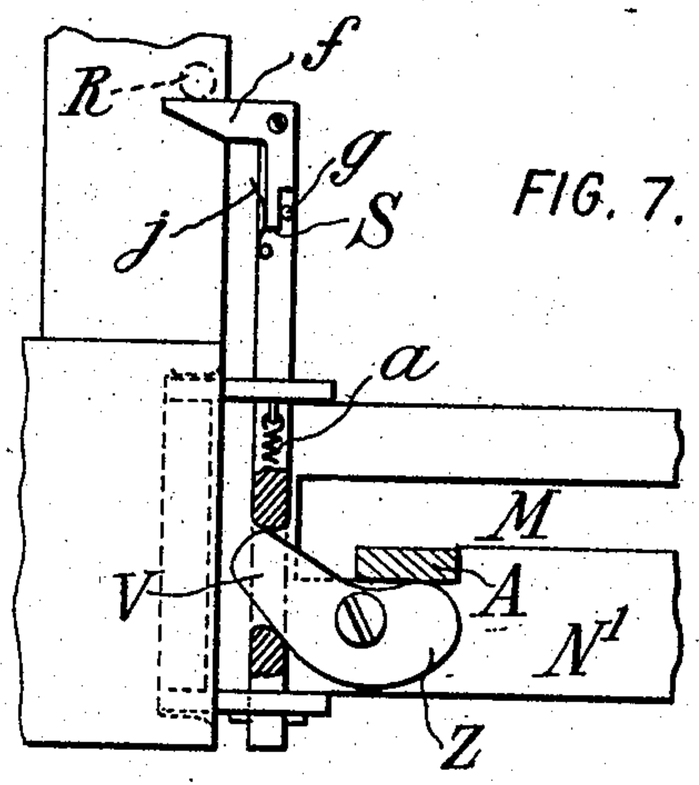
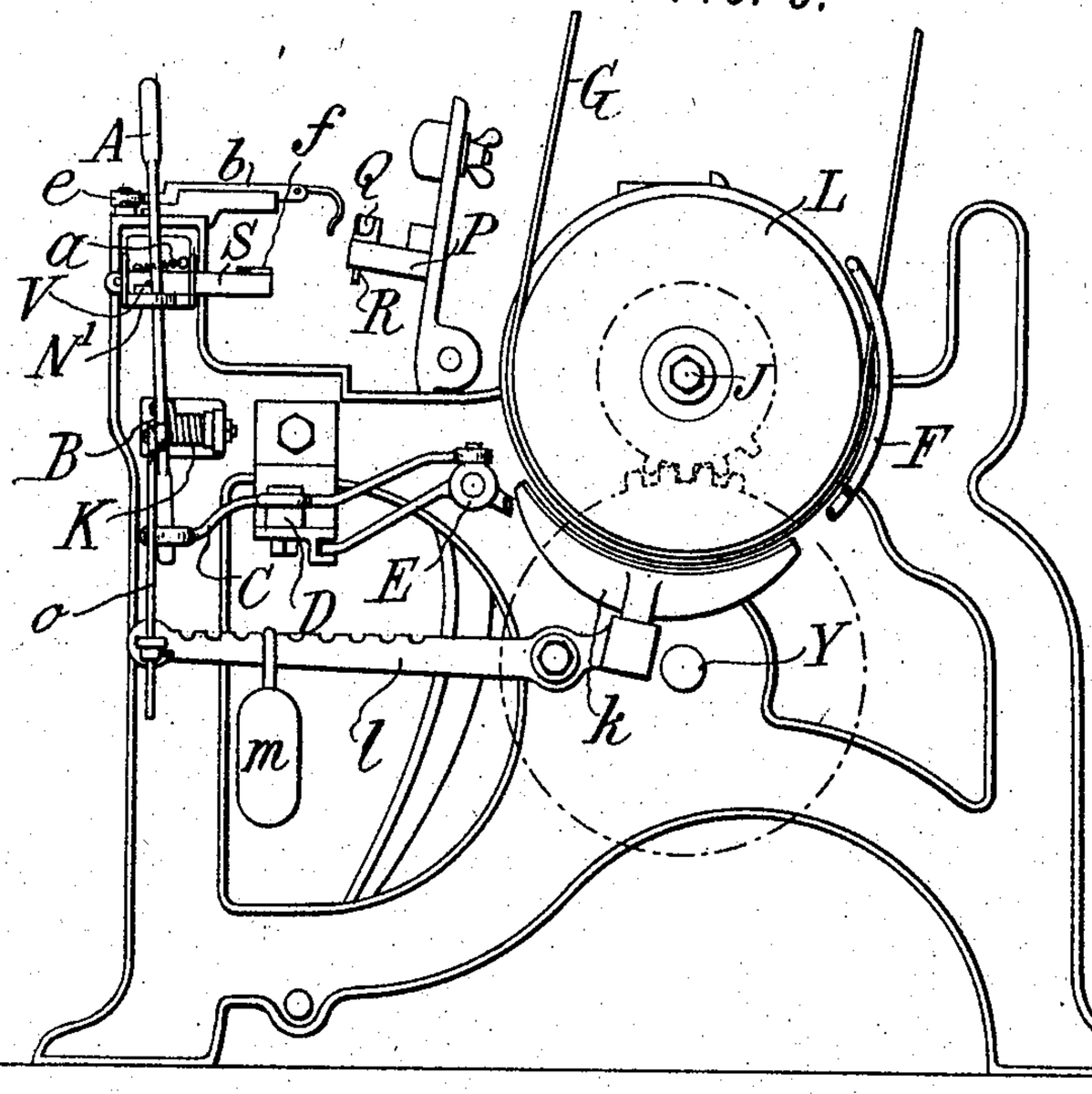


FIG. 5.



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UNITED STATES PATENT OFFICE.

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FILLING STOP-MOTION FOR LOOMS.

No. 815,952. Specification of Letters Patent. Patented March 27, 1906.

Application filed December 11, 1903. Renewed August 29, 1905. Serial No. 276,326.

To all whom it may concern:

Be it known that we, NORBERT FOERSTER, DANIEL JOSEPH CAREY, and WILLIAM ASTON FOSTER, citizens of the United States, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Filling Stop-Motions for Looms, of which the following is a specification.

It is common in looms to provide for the stopping of the loom when the filling or weft breaks or is exhausted by means of a weft-fork which is thrown into the path of a lever operated from the cam-shaft of the loom, so that as the cam-shaft rotates the weft-fork is slid forward and throws the hand-lever to disconnect and stop the loom. There are many disadvantages, however, in waiting until the thread is entirely exhausted before putting in a new shuttle. The end of the thread makes only an incomplete pick. In silk or other fine goods the weaver has then to turn back the pick-wheel until the goods are in position for the next pick, also withdrawing the incomplete pick. In a Jacquard loom the weaver must also turn back the cards. In fact, there is such a waste of time that the weaver usually watches the shuttles, and as each one nearly runs out stops the loom and replaces the nearly-exhausted shuttle with a full one. It has been proposed instead of the weft-fork to use a similar device which is set in operative position by the approximate exhaustion of the thread in the shuttle and which after being set in position is actuated by a lever and a cam, as in the case of the weft-fork. The cam-shaft operates at half the speed of the lay-shaft. Therefore such a device is set in operative position upon the entrance of the shuttle into its shuttle-box and is not actuated until the cam-shaft has made at least half a revolution and the lay has made one complete beat forward and back. Before the movement of the mechanism can be transmitted to the shifting-lever and from the latter to the driving-belt the shuttle is thrown to the opposite side of the lay, and in some cases a considerable advance of the machinery of the loom is made. It is necessary, therefore, to set the device to operate with a large quantity of thread in the shuttle or else to take the chance that the last shoot made after the mechanism is set in operative position for engagement by the cam-shaft lever shall form an incomplete pick. The continuation of the operation of the loom after the setting of the device also necessitates considerable turning back of the machinery.

Our invention provides a mechanism which is simpler than that described in eliminating entirely the cam and lever and in providing a device which is always set and ready for operation. The mechanism for stopping the loom is actuated directly by the lay and preferably on its forward beat immediately after the arrival of the shuttle in its box with the shuttle-thread nearly exhausted. The brake may be set to permit only one complete pick after the detector operates or so that there is no possibility of an additional pick after the setting of the mechanism, and there is therefore no necessity for making allowance for an extra length of thread in the shuttle. The shuttle device may therefore be set to operate with the very least quantity of thread. There is no danger of incomplete picks or of having to run back the machine to any considerable extent. Practically all that the weaver has to do is to take out the old shuttle and put in a new one and start the loom again. Various other points of improvement are specified in detail hereinafter.

The accompanying drawings illustrate embodiments of the invention.

Figure 1 is a side elevation of a loom to which our improvement is applied. Fig. 2 is a plan of the end of the loom. Fig. 3 is an enlarged view of a portion of Fig. 1. Fig. 4 is a front view of the mechanism shown in Fig. 3. Fig. 5 is a side view of another mechanism embodying the invention. Fig. 6 is a plan view showing the mechanism in connection with an ordinary weft-fork. Fig. 7 is a horizontal section of a detail.

The lever A controls the connection of the loom with a source of power by any suitable clutching mechanism. For example, it may be pivoted at B, its lower end being connected to a horizontal lever C, pivoted at D and actuating a horizontal slide E, carrying the belt-

shifter F, which engages the belt G, running to an overhead driving-shaft. The lever A is shown in the drawings as holding the belt in position to connect the power-shaft with the fast pulley H, carried on the lay-shaft J, and is spring-pressed—as, for example, by means of a coiled spring K, toward the position to throw the belt G to the loose pulley L and at the same time to apply a brake to the fast pulley H. The upper end of the lever A passes through a slot M in the extension N of the breast-beam, the slot being provided at its inner end with a lateral recess or socket, the end O of which serves to hold the upper end of the lever inward against the outward pressure of the spring K.

On the lay P is mounted a shuttle-box Q, carrying a pin R or other equivalent striker, adapted normally to be retracted from the position shown and adapted to be projected to the position shown when the thread in the shuttle is nearly or substantially exhausted. The particular details of the shuttle-box and shuttle for obtaining the motion of the pin R form no part of the present invention. A suitable style of shuttle-box and shuttle are specifically disclosed in our prior application, Serial No. 176,807, filed October 12, 1903.

In the path of the projecting pin R is a slide S, mounted in a guide T and held therein by means of a cover-plate U, the whole being carried on the frame of the loom, as shown. The slide S engages one end of a lever V, the other end of which is shaped to press against the belt-shifting lever A and throw it off the shoulder O, whereupon the spring K throws the upper end of the shifting-lever outward and shifts the belt from the fast pulley H to the loose pulley L. The lever V may be considerably varied in shape and position to meet the conditions of different looms. In the construction shown in Figs. 1 to 4 it is arranged vertically, being pivoted upon the side of the loom-frame and having a lateral extension W for acting against the shifting-lever A. In Figs. 5 to 7 it is arranged horizontally, being pivoted directly on the lateral extension N′, which corresponds with the extension N of the breast-beam, as shown in Fig. 2. Various other arrangements for transmiting the movement of the slide S to the shifting-lever will suggest themselves to those skilled in the art, the best form to be adopted in any case depending on the construction of the loom. A spring X, Figs. 1 to 4, serves to return the lever V and slide S to their original positions when the lay is retracted, so as to permit the starting of the loom again. The spring X is rigidly attached at its outer end and is of spring metal and T-shaped in front elevation. (See Fig. 4.) It normally stands in the position of Fig. 2, with its vertical arm between the main lever A and the extension W. When the latter forces the main lever beyond the shoulder O, the spring moves with it and then forces back the extension W, when the pressure on the latter is withdrawn.

Referring to Figs. 5, 6, and 7, the lay-shaft J, cam-shaft Y, fast and loose pulleys H and L, the belt-shifting mechanism, and the lay mechanism are the same as in the previously-described figures. The plate N′, upon which the shifting-lever A rests, is arranged below the level of the breast-beam, so that the slide S, which is engaged by the pin R, is just above the level of the plate N′, and the lever V is pivoted directly on said plate and moves horizontally, its outer end Z bearing directly against the shifting-lever A. A coiled spring *a* serves to retract the slide and lever upon the withdrawal of the lay.

It is proposed to employ our invention in connection with the usual or any suitable weft-fork *b*, so that in case of breakage of the thread the loom will be stopped. This mechanism, however, will not come into action upon exhaustion of the thread, as the slide S will always be operated before the thread is completely exhausted. The fork *b* will be actuated by a lever *c*, which will be operated by a cam *d* as the cam-shaft Y comes around to a suitable position after the forward beat of the lay or while the lay is at its forward position. The weft-fork slides and pushes forward a lever *e*, which throws back the upper end of the shifting-lever A and permits the spring K to throw the lever outward, and so actuate the belt-shifter. With the lay in the rearward position shown the shuttle enters the box, and if the thread is sufficiently exhausted the pin R is immediately projected. Almost at the same instant the lay beats up the pin R strikes the slide S and releases the shifting-lever, which at once springs to the position to shift the belt to the loose pulley and put on the brake, so that the loom stops almost before the lay again swings to its original backward position, in which a new shuttle is to be supplied. The action in a high-speed loom is almost instantaneous, and there is no backward working of the loom necessary. There is a possibility that the pin R will not be completely projected until the lay has nearly reached the forward end of its beat, the action of the lay being very rapid in some looms and its beating-up movement commencing before the shuttle completes its entrance into the shuttle-box. In such a case the machine would be injured by the engagement of the pin R with the slide S on its backward movement. In order to avoid this danger of injury, we provide at the end of the slide S a portion in the path of the pin R when projected and arranged to yield to permit the passage of the

pin R backward, but to hold fast when engaged by the pin in a forward movement, and thus to effect the forward movement of the slide S. The yielding projection may be in the form of a bent lever *f*, which engages a fixed stop *g* to prevent the projecting end of the lever from swinging forward about its pivotal point. The projection *f* yields to a backward pressure, a stop *h*, Fig. 3, preventing it from moving too far. The weight of the forward end of the lever returns it always to its normal position, or where the lever *f* projects horizontally from the slide, Fig. 7, a spring *j* serves to return it always to its normal position and also to prevent its moving too far on the backward movement of the lay.

Preferably a brake is applied to the fast pulley H at the same time that the belt is shifted from such fast pulley to the loose pulley L. This brake may be of any usual or suitable type. It is illustrated as comprising a brake-shoe *k*, carried upon one end of a lever *l*, upon the opposite arm of which is a weight *m* at an adjustable distance from the pivotal point of the lever, so that the brake may be made to stop the loom more or less quickly, as desired. The brake is withdrawn from the pulley H when the lever A is shifted to the running position. For this purpose the lever A is provided with an arm *n*, from which depends a rod *o*, which passes through the outer end of the brake-lever *l* and which carries a nut *p*, which engages and lifts the outer end of the brake-lever when the shifting-lever A is thrown to the running position. The adjustable brake permits the operation of the loom to be so accurately controlled as to stop the loom before the return of the shuttle to the opposite side of the loom, if desired. It is preferred with some looms, however, to allow the lay to complete the backward movement of the beat following the arrival of the shuttle in the special box carrying the pin R, and upon the completion of this beat, as is known, the picker operates to throw the shuttle to the opposite side. The brake may be adjusted so that the loom is stopped just at the completion of the beat and as the shuttle is thrown to the opposite box.

It will be seen that our invention provides a great improvement in looms, and especially in Jacquard looms. Instead of requiring one weaver to each loom, as has formerly been the case in order to watch the shuttles and stop the loom and replace each one when it is nearly run out, a single weaver can attend to a number of our looms, as he has only to let each loom run until it stops and then to substitute for the exhausted shuttle a new one. The weaver can be sure that the loom has stopped with a complete pick, and there is no delay for examining the web or for withdrawing an incomplete pick or turning back the mechanism.

It is not essential to the invention in its broadest sense that the stop-motion should be operated on the forward movement of the lay. It may be arranged so that the pin R or equivalent device engages the controlling mechanism on the backward movement of the lay and stops the loom upon the completion of the pick immediately following such backward movement. For very wide looms it may be advantageous to provide stop-motion devices on both sides of the loom, thus lessening the quantity of thread necessary to be in the shuttle when the stop-motion operates, and consequently with some styles of shuttle making the operation more certain.

Though we have described with great particularity of detail certain specific embodiments of our invention, yet it is to be understood that the invention is not limited to the specific embodiments disclosed. Various modifications of the same in detail and in the arrangement and combination of the parts may be made by those skilled in the art without departure from the invention.

What we claim is—

1. In a loom, in combination, a shuttle-box carrying a striker adapted to be projected when the thread in the shuttle is nearly exhausted, a slide S mounted on the loom-frame and in the path of said striker when projected, a lever V pivotally carried on the loom-frame and engaged by said slide, and means set in operation by said lever for stopping the loom.

2. In a loom, in combination, a shuttle-box carrying a striker adapted to be projected when the thread in the shuttle is nearly exhausted, a lever controlling the connection of the loom with the source of power and spring-pressed toward the disconnecting position, holding means for holding said lever in the connecting position, a slide S mounted on the loom-frame and in the path of said striker when projected, a lever V pivotally carried on the loom-frame, engaged by said slide, and engaging said controlling-lever for moving it free of said holding means.

3. In a loom, in combination, a shuttle-box carrying a striker adapted to be projected when the thread in the shuttle is nearly exhausted, and a device adapted to be engaged and pushed forward bodily in the line of movement of said striker when engaged by the latter in a forward movement, and to be forced out of the line of movement of said striker when engaged by the latter in a backward movement.

4. In a loom, in combination, a shuttle-box carrying a striker adapted to be projected when the thread in the shuttle is nearly

exhausted, and a slide adapted to be pushed forward by said striker in a forward movement of the latter, said slide carrying a contact device which upon receiving the impact of said striker in its forward movement transmits the same to said slide, and which upon receiving the impact of said striker in its rearward movement yields to permit the passage of said striker without transmitting its impact to the slide.

In witness whereof we have hereunto signed our names in the presence of two subscribing witnesses.

NORBERT FOERSTER.
DANIEL JOSEPH CAREY.
WILLIAM ASTON FOSTER.

Witnesses:
I. S. LAMBERT,
MARGARET MCDERMOTT