J. G. KING.

WEFT REPLENISHING LOOM.

APPLICATION FILED JAN. 26, 1909.

972,872. **Patented Oct. 18, 1910.**

4 SHEETS—SHEET 1.

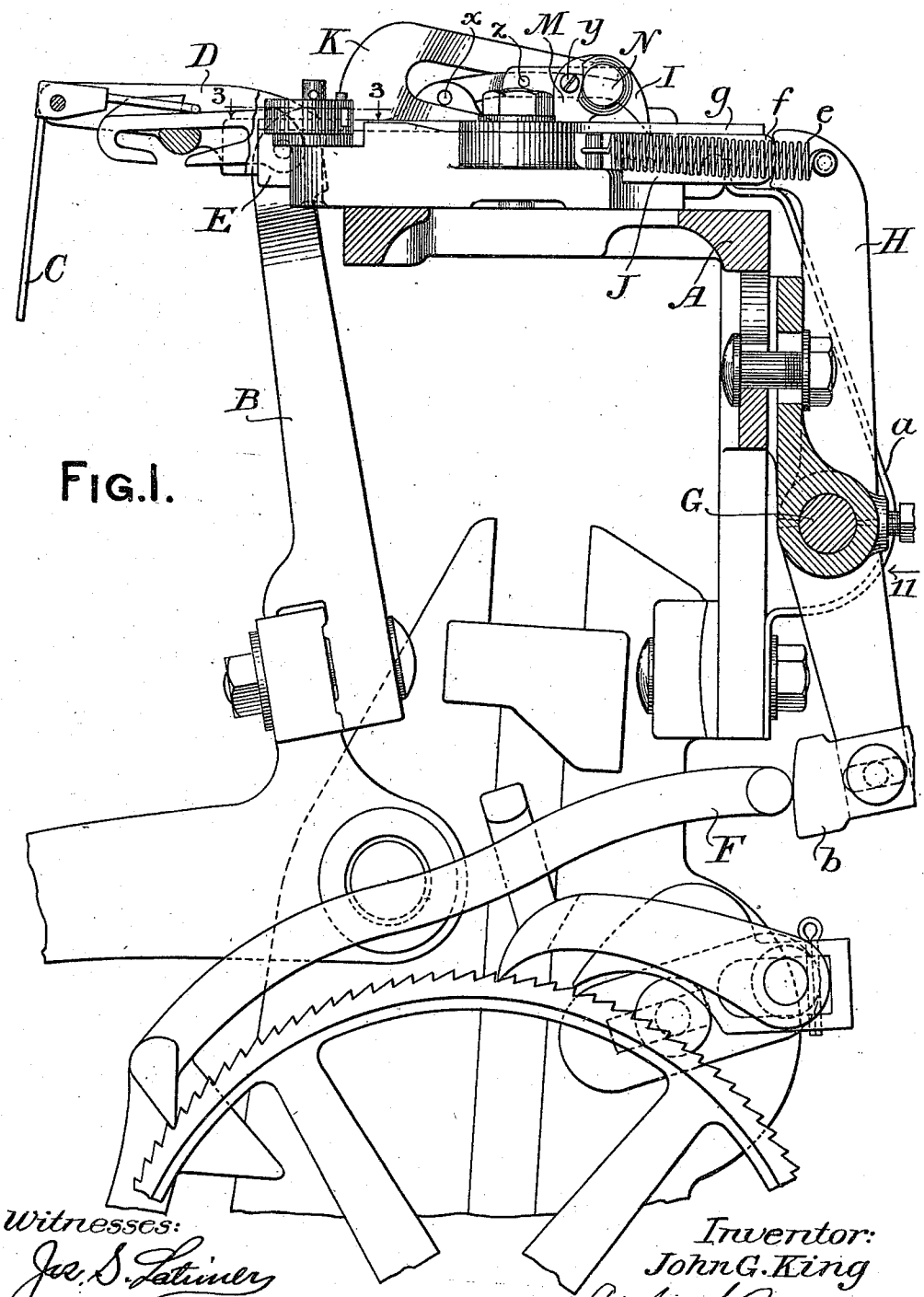

FIG. I.

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4 SHEETS—SHEET 2.

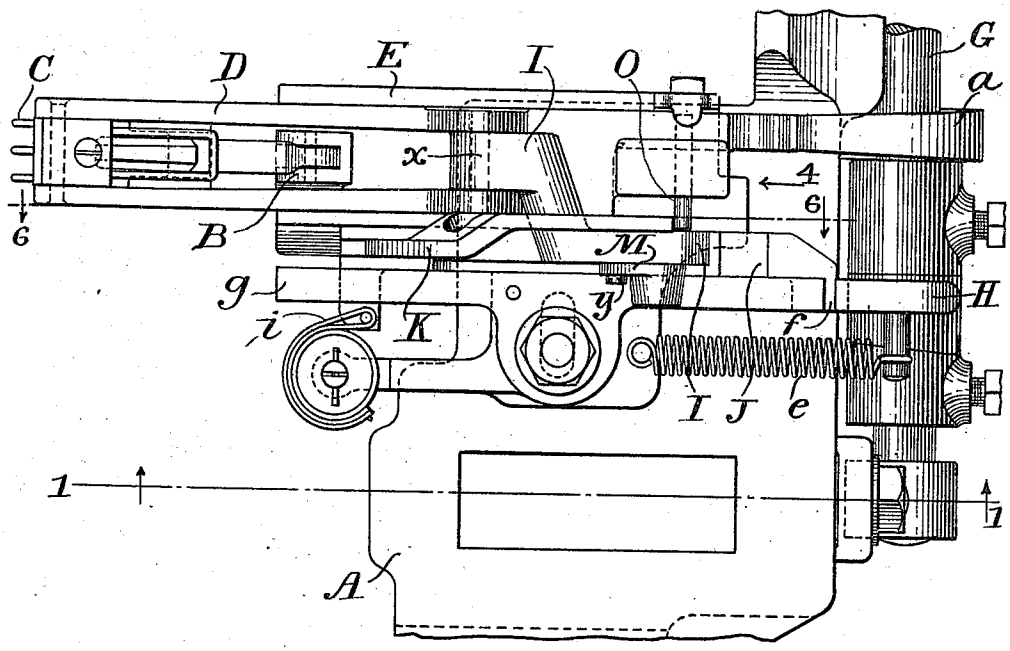

FIG. 2.

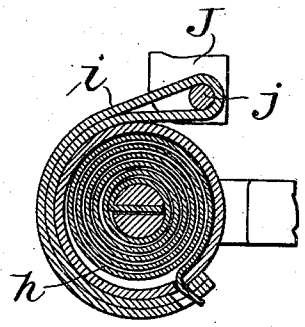

FIG. 3.

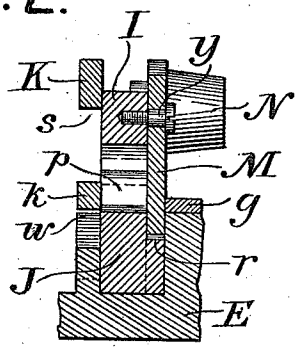

FIG. 5.

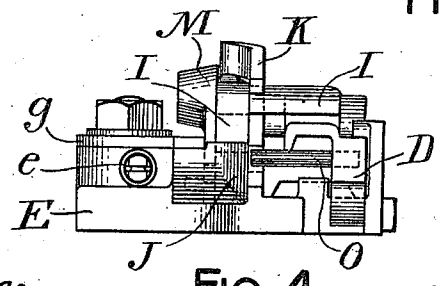

FIG. 4.

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4 SHEETS—SHEET 3.

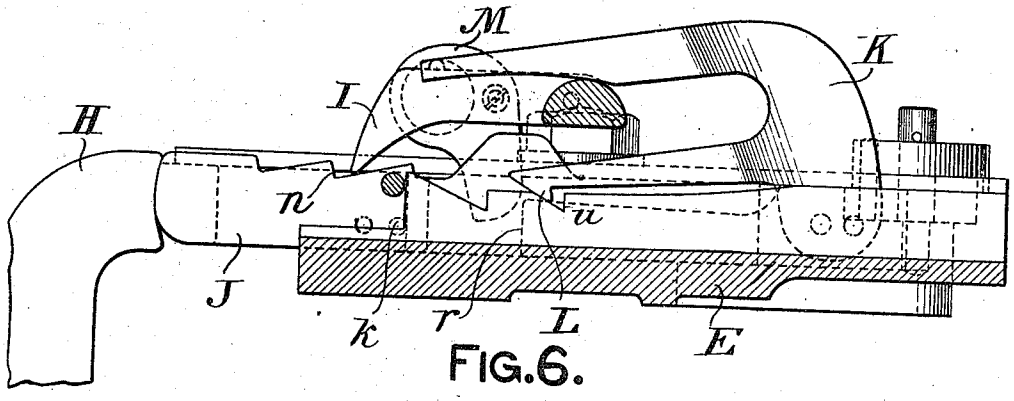

FIG. 6.

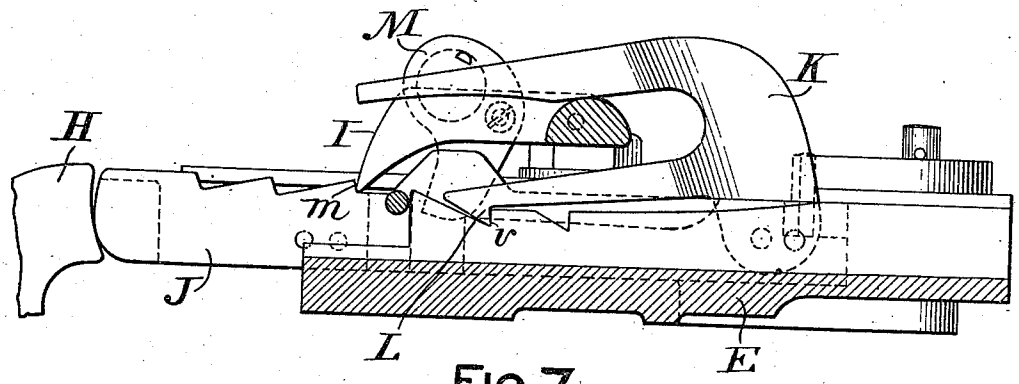

FIG. 7.

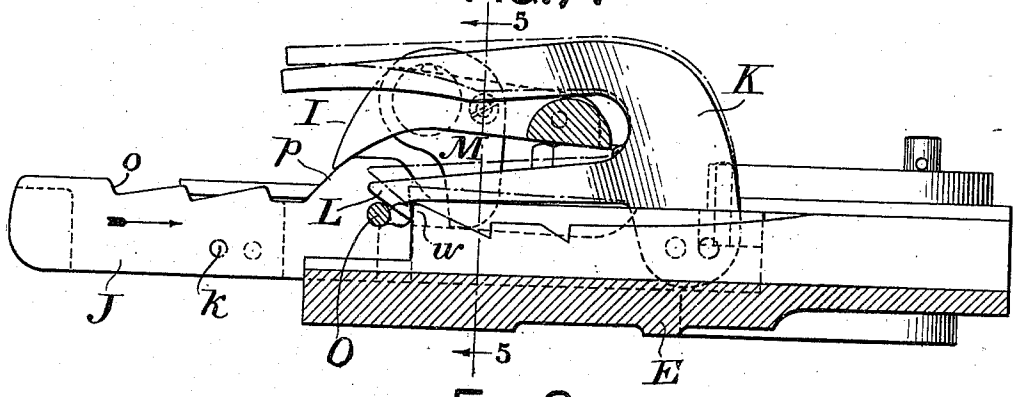

FIG. 8.

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WEFT REPLENISHING LOOM.

APPLICATION FILED JAN. 26, 1909.

972,872. **Patented Oct. 18, 1910.**

4 SHEETS—SHEET 4.

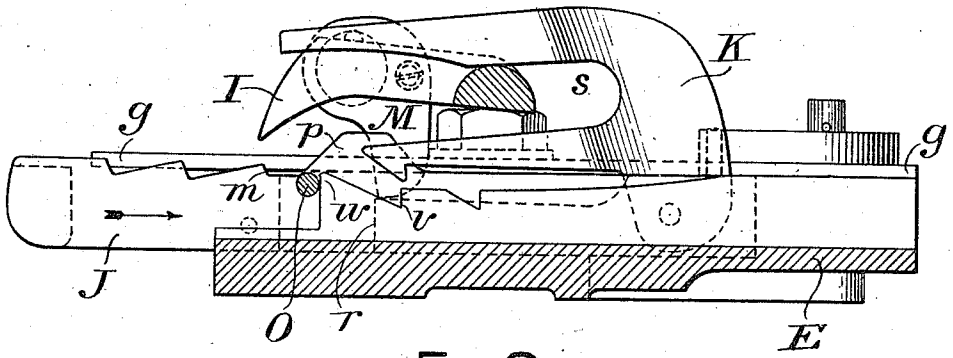

FIG. 9.

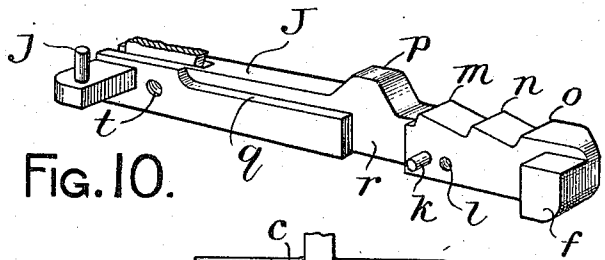

FIG. 10.

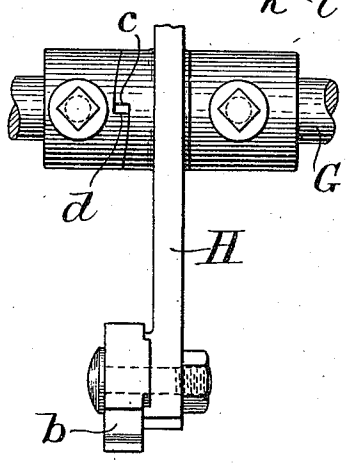

FIG. 11.

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UNITED STATES PATENT OFFICE.

JOHN G. KING, OF BURLINGTON, NORTH CAROLINA, ASSIGNOR TO DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

WEFT-REPLENISHING LOOM.

972,872. Specification of Letters Patent. **Patented Oct. 18, 1910.**

Application filed January 26, 1909. Serial No. 474,212.

To all whom it may concern:

Be it known that I, JOHN G. KING, of Burlington, in the county of Alamance, in the State of North Carolina, have invented certain new and useful Improvements in Weft-Replenishing Looms, of which the following is a specification.

The present improvements relate to a pick finding mechanism for an automatic weft-replenishing loom wherein the picking and shedding mechanisms continue to act in regular order and succession during the interval which elapses between the detection of weft absence and the replenishment of the weft.

A particular object of the invention is to enable the pick-finding mechanism to be readily adjusted to enable it to be used with different numbers of harnesses or shed formations. Also, the take-up is put out of action during the delay involved in the weft replenishment with equal efficiency, no matter what number of harnesses are employed. The pick-finding mechanism which is herein illustrated and described is especially for use with an even number of harnesses or shed formations, and the mechanism is illustrated for use with either four or six harnesses. The pick-finding mechanism comprises a delaying mechanism which is controlled by the weft-absence detector and which in turn governs the action of the change-shaft which determines the action of the weft-supplying mechanism. At the first detection of weft absence the take-up is put out of action irrespective of the different adjustments of the delaying mechanism. This delaying mechanism always requires a plurality of detections of weft absence before the change-shaft is actuated; but the number of these plural detections can be regulated by adjustment to correspond with the number of shed formations.

The special embodiment of the present improvements, for use with four and six harnesses, is illustrated in the accompanying drawings, wherein:

Figure 1 is a vertical section of the pick finding devices with the parts in position just previous to detection of broken or absent weft by the weft fork, the same being a section on the line 1—1, of Fig. 2, and with parts of the fork slide broken away. Fig. 2, is a plan view. Fig. 3, is an enlarged detail horizontal section taken on line 3—3, Fig. 1. Fig. 4, is a detail end view looking from the direction indicated by the arrow 4, Fig. 2. Fig. 5, is a detail vertical section taken on line 5—5, Fig. 8. Fig. 6, is a section on line 6—6, Fig. 2. Fig. 7, is a section similar to Fig. 6, showing the parts as they appear after the fork slide has completed its first operation. Fig. 8, is a section similar to Fig. 6, showing the parts in position ready to transfer, the fork slide not having returned to its normal position. Fig. 9, is a section similar to Fig. 6, showing the parts just before reaching normal position. Fig. 10, is a detail of the coupler. Fig. 11, is a detail view looking from the direction indicated by arrow 11, Fig. 1.

The drawings only show so much of the mechanism of a weft-replenishing loom as is necessary for an understanding of the improvement.

Referring to Fig. 1, A, is the breast beam of a loom; B, is the weft hammer; C, is the weft-fork; D, is the weft-fork slide which is maintained in its normal rearward position by spring *a;* E, is the fixed guide stand for the slide D; F, is a controlling pawl of the take-up; and G, is the starting or change shaft which when rocked sets in action the weft-replenishing instrumentalities. All of these parts act in the customary manner of the well-known Northrop loom, as illustrated, for example, in Letters Patent of the United States No. 529,940, November 27, 1894.

Loosely mounted on the change shaft G, is a lever or bunter H, having an adjustable toe *b*, which co-acts with the take-up pawl F. The bunter H, has a hub with a clutch shoulder *c*, (Fig. 11) which is adapted to engage a clutch shoulder *d*, of a collar fast on the change shaft G, when the bunter is swung far enough. When the upper end of the bunter H, is swung one step forward it renders the take-up pawl F, inoperative thus stopping the take-up; and when it is swung an additional step (or steps, as will hereinafter appear), shoulder *c*, acts on shoulder *d*, the shaft G, is rocked, and the weft is replenished. The bunter H, is maintained normally in the position shown in Fig. 1, by a spring *e*. The movements of the bunter H, are controlled by a coupler J, shown detached in Fig. 10, and its action is governed by a dagger I.

The coupler J, at its front end has a lug *f*, (Fig. 10) against which the upper end of bunter H, is held by spring *e*, as shown in Figs. 1, and 2. The coupler slides fore and aft parallel with the fork-slide D, being suitably guided by the stand E, and by a top-plate *g*, (Figs. 2, 4 and 9) on the stand. The coupler is normally held in its rearward position by a spring *h*, (Fig. 3) connected by flexible strap *i*, with a pin *j*, (Fig. 10) at the rear end of the coupler. The rearward movement of the coupler is limited by a stop-pin *k*, (Fig. 10), which encounters a fixed wall of the stand E, as shown in Fig. 6. The position of the stop-pin *k*, on the coupler J, can be varied. As shown, the coupler has an additional hole *l*, (Fig. 10) in which the pin can be placed, in which case the coupler will move farther to the rear. The coupler has a plurality of teeth *m*, *n*, and *o*, a cam *p*, a level shelf *q*, and a recess *r*, all shown in Fig. 10, which take part in the pick-finding action, as will hereinafter appear.

Pivoted to the rear end of the coupler is a slotted detent K, having longitudinal slot *s*. The pivot of this detent is adjustable along the coupler J, an additional pivot hole *t*, being provided in the slide as shown in Fig. 10, it being important that the detent pivot and the stop-pin *k*, should be definitely located with respect to each other. The detent K, has a hook L, (Fig. 6) at its front which is adapted to coöperate with a series of fixed notched teeth *u*, *v*, *w*, (Figs. 6, 7, and 8) on the fixed stand E, for the purpose of holding the coupler J, temporarily in its several advanced positions against the retractive force of the spring *h*.

The shank of the dagger I, extends through the detent slot *s*. This dagger is pivoted at *x*, (Fig. 1) to the weft-fork slide D. The front point of the dagger is over the teeth *m*, *n*, and *o*, and cam *p*, of the coupler J. A gravity dog M, (Fig. 1) is pivoted at *y*, to the dagger, a weight N, thereof causing the dog to occupy the position shown in Fig. 1, with its lower end normally occupying the recess *r*, (Fig. 10) in the coupler J. The dog is adjustable along the dagger so that its position may correspond to that of the stop-pin *k*, and detent K, and for this purpose the dagger has an extra pivot hole *z*, as shown in Fig. 1.

A pin O, (Figs. 4, and 8) on the weft-fork slide D, is in the path of the lower beveled face of the hook L, and acts to lift said hook from the holding tooth *w*, when the weft-slide is moved to the rear by its spring *a*, after the weft has been replenished.

With the parts *b*, *k*, K, and M, in the illustrated positions of adjustment, Figs 1, 2, and 6 show the parts in a normal state of rest when the loom is running with the weft intact. In this position, the dagger I, is down and just back of the tooth *n*, of the coupler J; the lower end of the dog M, occupies the recess *r*, in the coupler J; the detent hook L, is down; and the toe *b*, (Fig. 1) is in readiness to engage the take-up pawl F. Should, now, the weft fail, the weft-hammer B, catches the fork C, and moves the slide D, forward, carrying the dagger I, forward. The dagger I, engages the tooth *n*, (Fig. 6) of coupler J, thus moving said coupler forward. The coupler J, in this movement rocks the bunter H, sufficiently to swing take-up pawl F, (Fig. 1) to stop the take-up action but not enough to rock the change shaft G. This forward movement continues until the coupler J, reaches the position shown in Fig. 7, when the hook L, engages the fixed tooth *v*. The slide D, is then moved back by its spring *a*, thus carrying back the dagger I, which then falls behind the next tooth *m*, of the coupler J, (Fig. 7) which has been held from backward movement by the detent hook L, engaging the fixed tooth *v*. During this backward movement, the dog M, encounters the rear wall of the recess *r*, (Fig. 9) and is swung on its pivot *y*, to the position shown in Fig. 7, which shows the parts in the position they occupy after the slide D, has returned to its rear position. At the next detective action of the fork, the slide again moves forward, and the dagger I, acting on tooth *m*, Fig. 6, forces the coupler J, another step forward, thereby swinging the bunter H, another step, and hence causing shoulder *c*, (Fig. 11) to act on shoulder *d*, thereby rocking shaft G, and effecting weft-replenishment. The replenishment thus requires two successive detections of weft-absence by the weft-fork, involving a delay of two picks following the initial detection owing to the actuation of the weft-hammer in the customary manner from a cam on the low-shaft of the loom, this delay being additional to that commonly present in weft-replenishing looms. During these idle picks of the empty shuttle the harnesses continue to act. Hence, if the fork is at the side of the loom opposite to the weft-supply magazine and the weft fails as the shuttle is traversing toward the fork side of the loom, the fresh weft will be laid in the same shed as the deficient pick in case there are four harnesses or four shed formations. The second forward movement of the coupler J, carries the detent hook L, forward of the tooth *w*, which it engages, as shown in Fig. 8, thereby holding the coupler J, forward. After the shaft G, has been rocked the slide D, is returned to its rearward position by spring *a*. During this rearward movement, the dagger I, encounters and rides up the cam *p*, thereby lifting the dog M, above the shelf *q*, of the coupler J, whereupon said dog by gravity assumes the position shown

in Fig. 8. Just before the slide D, reaches its rear position, its pin O, encounters the beveled side of the hook L, as shown in Fig. 8, thereby lifting it from the full to the dotted line position and disengaging it from the tooth *w*. The coupler J, is then pulled rearwardly by the spring *h*, (Fig. 3). During the initial part of this movement, the dog M, rides on the shelf *q*, thereby holding up dagger I and detent hook L, as shown in Fig. 9, so that the dagger does not encounter tooth *m*, nor does hook L encounter tooth *v*. Tooth *w*, is higher than teeth *v*, and *u*, so that the uplifted dagger I while sufficing to hold hook L, above said teeth *v*, and *u*, as shown in Fig. 9, does not affect the engagement of tooth *w*, by said hook when the dagger and hook occupy the full line positions shown in Fig. 8. As the coupler J, completes its backward movement the dog M drops into the recess *r*, thus restoring all parts to their normal position of rest, as shown in Fig. 6. During the thus described action, the teeth *u*, (Fig. 6), and *o*, (Fig. 10) are idle. To utilize them the stop-pin *k*, is adjusted into hole *l*, (Fig. 10); the pivot of detent K, is adjusted into hole *t*, (Fig. 10); the pivot of dog M, is adjusted into hole *z*, (Fig. 1); and the toe *b*, of bunter H, is adjusted rearwardly, so as to maintain its relation to the pawl F, while separating still further the shoulders *c* and *d*, (Fig. 11) so that the change shaft G, will not be rocked until the third step in the swing of the bunter H. These adjustments bring the teeth *o*, and *u*, into action; and they are then the first to be engaged by the dagger I and hook L, respectively; and, therefore, three successive forward movements of the slide D, will be necessary to rock the change shaft G, with the result that there will then be two additional idle picks and two more shed formations. Hence, with these adjustments the action is the same with six harnesses as with four harnesses under the adjustments shown in the drawings. Manifestly, by increasing the teeth in the slide J, and on the stand E, and providing additional and corresponding adjustments for the stop-pin *k*, the detent K, the dog M, and the toe *b*, the mechanism can be adapted to an increased number of harnesses, or shed formations.

I claim:—

1. A weft-replenishing loom, provided with picking, shedding and weft-supplying mechanisms, a take-up, a weft-absence detector, a weft-hammer, and a change-shaft controlling the weft-supplying mechanism, combined with a slide which carries the detector; a plurality of fixed teeth the forward one being the higher; a bunter loosely mounted on the change-shaft; a shoulder on the change-shaft; a shoulder on the bunter coöperating with said shoulder on the change-shaft; a sliding coupler engaging the bunter, said coupler having a plurality of teeth, a cam, a shelf, and a recess forward of the shelf; a slotted detent adjustably pivoted to the coupler and having a hook adapted to engage said fixed teeth; a dagger pivoted to the detector slide, extending through the detent slot, and adapted to engage the teeth and cam on said coupler; a gravity dog adjustably pivoted to said dagger and adapted to engage the recess and shelf of said coupler; a stop-pin adjustably secured to said coupler to limit its rearward position; springs which retract said slide and coupler; and an adjustable toe on the bunter adapted to engage and put out of action a pawl governing the take-up.

2. A weft-replenishing loom, provided with picking, shedding and weft-supplying mechanisms, a take-up, a weft-absence detector, a weft-hammer, and a change-shaft controlling the weft-supplying mechanism, combined with a slide which carries the detector; a plurality of fixed teeth the forward one being the higher; a bunter loosely mounted on the change-shaft; a shoulder on the change-shaft; a shoulder on the bunter coöperating with said shoulder on the change-shaft; a sliding coupler engaging the bunter, said coupler having a plurality of teeth, a cam, a shelf, and a recess forward of the shelf; a slotted detent pivoted to the coupler and having a hook adapted to engage said fixed teeth; a dagger pivoted to the detector slide, extending through the detent slot, and adapted to engage the teeth and cam on said coupler; a gravity dog pivoted to said dagger and adapted to engage the recess and shelf of said coupler; a stop-pin secured to said coupler to limit its rearward position; springs which retract said slide and coupler; and a toe on the bunter adapted to engage and put out of action a pawl governing the take-up.

3. A weft-replenishing loom, provided with picking, shedding and weft-supplying mechanisms, a weft-absence detector, a weft-hammer, and a change-shaft controlling the weft-supplying mechanism, combined with a slide which carries the detector; a plurality of fixed teeth the forward one being the higher; a bunter loosely mounted on the change-shaft; a shoulder on the change-shaft; a shoulder on the bunter coöperating with said shoulder on the change-shaft; a coupler engaging the bunter, said coupler having a plurality of teeth, a cam, a shelf, and a recess forward of the shelf; a slotted detent pivoted to the coupler and having a hook adapted to engage said fixed teeth; a dagger pivoted to the detector slide, extending through the detent slot, and adapted to engage the teeth and cam on said coupler; a gravity dog pivoted to said dagger and adapted to engage the recess and shelf of

said coupler; a stop-pin secured to said coupler to limit its rearward position; and means to retract said slide and coupler.

4. A weft-replenishing loom, provided with picking, shedding and weft-supplying mechanisms, a weft-absence detector, a weft-hammer, and a change-shaft controlling the weft-supplying mechanism, combined with a slide which carries the detector; a bunter coöperating with the change-shaft and adapted to actuate it after a plurality of movements; a coupler engaging the bunter; and a dagger controlled by the detector slide and adapted to engage said coupler to feed said coupler step-by-step toward said bunter.

5. A weft-replenishing loom, provided with picking, shedding and weft-supplying mechanisms, a take-up, a weft-absence detector, and a change-shaft controlling the weft-supplying mechanism, combined with a bunter coöperating with the change-shaft and with the take-up, and adapted to stop the take-up at its first movement but to actuate the change-shaft only after a succession of movements; a coupler engaging the bunter; and means governed by the detector to feed said coupler step-by-step toward said bunter.

6. A weft-replenishing loom, provided with picking, shedding and weft-supplying mechanisms, a weft-absence detector, and a change-shaft controlling the weft-supplying mechanism, combined with a bunter coöperating with the change-shaft and adapted to actuate it after a plurality of detections of weft-absence; a coupler engaging the bunter; and means governed by the detector to feed said coupler step-by-step toward said bunter.

7. A weft-replenishing loom, provided with picking, shedding and weft-supplying mechanisms, a take-up, a weft-absence detector, a weft-hammer, and a change-shaft controlling the weft-supplying mechanism, combined with adjustable delaying mechanism controlled by the detector and governing the action of the change-shaft and of the take-up, said mechanism always stopping the action of the take-up on the first detection of weft-absence but requiring a plurality of such detections to affect the change-shaft, the number of such plural detections being regulated by the adjustment to correspond with the number of shed formations, and connections for moving said delaying mechanism always to stop the action of the take-up on the first detection of weft-absence but requiring a plurality of such detections to set in action the change-shaft.

8. A weft-replenishing loom, provided with picking, shedding and weft-supplying mechanisms, a take-up, a weft-absence detector, a weft-hammer, and a change-shaft controlling the weft-supplying mechanism, combined with adjustable delaying mechanism controlled by the detector and governing the action of the change-shaft, said mechanism always requiring a plurality of detections of weft-absence to affect the change-shaft, and the number of such plural detections being regulated by the adjustment to correspond with the number of shed formations, and connections for moving said delaying mechanism always to stop the action of the take-up on the first detection of weft-absence but requiring a plurality of such detections to set in action the change-shaft.

9. A weft-replenishing loom, provided with picking, shedding and weft-supplying mechanisms, a weft-absence detector, and a change-shaft controlling the weft-supplying mechanism, combined with a bunter coöperating with the change-shaft and adapted to actuate it after a plurality of detections of weft-absence; an adjustable coupler engaging the bunter; and means governed by the detector to feed said coupler step-by-step toward said bunter, the number of steps required to move the change-shaft depending upon the adjustment of the coupler.

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

JOHN G. KING.

Witnesses:
CLYDE L. MAY,
JAS. A. R. DAVIS.