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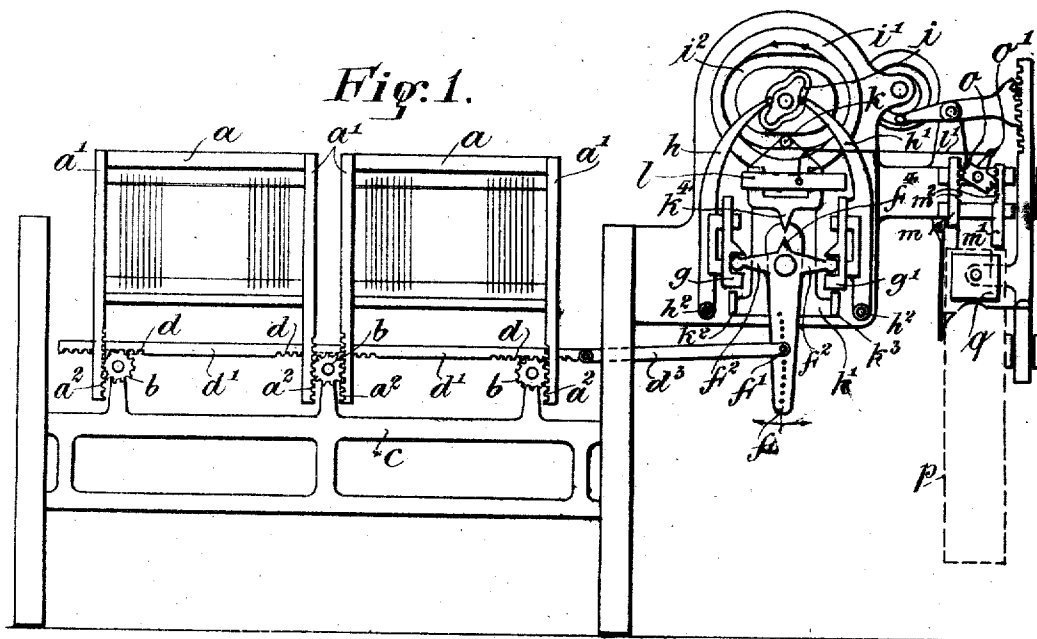
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SHEDDING MECHANISM FOR LOOMS

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SHEDDING MECHANISM FOR LOOMS.

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To all whom it may concern:

Be it known that I, CARL EGGART, a citizen of the Republic of Switzerland, residing in Arbon, Switzerland, have invented certain new and useful Improvements in Shedding Mechanism for Looms, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

The general object of this invention is to enable the speed of operation of looms to be increased as compared with the looms as heretofore constructed. To this end improvements have been made in the several mechanisms involved in the operation of shedding. The heddle frames are so interconnected and actuated that two heddle frames, moving in opposite directions, are counterbalanced one against the other. The mechanism by which the movement of the heddle frames is selectively effected under the control of the pattern mechanism is so constructed that it is quickly and certainly responsive and the pattern controlling devices are so constructed and arranged that the needles which co-act with the jacquard cards, are moved positively in both directions. The invention will be explained more fully hereinafter with reference to the accompanying drawings in which it is illustrated and in which—

Figure 1 is a partial view in front elevation of so much of a loom as is necessary to enable the application of the present improvements to be understood.

Figure 2 is a detail view on a larger scale, of one of the jacquard cards as used in the embodiment of the invention illustrated in Figure 1.

Figures 3 and 4 are detail views illustrating other arrangements of the jacquard cards and needles.

Figure 5 is a view similar to Figure 1 but showing a slightly different form of the devices for selectively actuating the heddle frames.

The heddle frames *a*, which may be of any usual or suitable construction and may be guided in any usual or suitable manner, except as hereinafter indicated, are interconnected in pairs, in endwise relation, as shown in Figures 1 and 5, so that the two heddle frames of the pair shall be in equilibrium, the one counterbalancing the other, so that but little power shall be required to

move them and the mechanism for moving them shall be simple and light in weight, developing but little friction to be overcome, whereby the speed of movement can be greatly accelerated as compared with looms constructed as heretofore. Preferably the desired interconnection of the heddle frames is effected through gears and racks. As shown in Figure 1, in which the heddle frames are disposed in endwise relation, the end members *a'* are formed with rack teeth as at *a''*, the racks being engaged by gears *b* which are suitably mounted on the frame *c* of the loom, and the several gears *b* are also engaged by rack teeth *d* formed on a bar *d'* which is capable of longitudinal movement and, in the preferred arrangement, is itself reciprocated longitudinally by the actuating mechanism. Obviously, in order to secure the desired counterbalancing of the heddle frames, the rack teeth *a''* are formed oppositely on the two heddle frames so that, through the engagement with the intermediate gear *b*, one heddle frame shall move up as the other moves down. If the counterbalancing of the heddle frames is not to be accomplished, as in the case of a single heddle frame, the operation of the heddle frames through gears as described will be found to be highly satisfactory and in such case, as will be obvious, the racks may be disposed as most convenient.

For the actuation of the heddle frames through the described devices, the rack bar *d'* is connected by a link *e*, with a three-armed lever *f* which is oscillated through the selective devices now to be described, under the control of the pattern mechanism, the link being adjustably connected to the lever *f* as at *f'*, so that the throw or extent of movement of the rack bar can be regulated.

In pattern controlled shedding mechanism heretofore devised, it has usually been possible for the selective devices to be set for a new operation only when the previous heddle movement has been completed. This has not only kept the possible speed of the loom low, but it has involved liability to uneven and uncertain operation of the selective devices. By the mechanism now to be described the selective devices are set or positioned during the movement of the heddles. The speed of the loom is, therefore accelerated since it is no longer neces-

sary to await the completion of the movement of the heddles before positioning the selective devices for the next operation and the positioning of such selective devices becomes more certain and satisfactory.

Referring first to the embodiment of this part of the invention which is illustrated in Figure 1, it will be seen that the two short, horizontal arms f^2 of the three-armed lever f are engaged with notches in slides or connectors g, g' mounted for vertical movement in carriers h, h' which are pivoted at h^2 in the housing and at their upper ends engage a cam groove i formed in the face of a cam disc i' , mounted in the housing and rotated, through mechanism not necessary to be shown or described, in synchronism with the loom. In the same cam disc i' is formed another cam groove i^2 engaged by a roller k of a vertically reciprocating frame or actuator k' provided with shoulders k^2 and k^3 by which the slides or connectors g, g' are lifted in the upward movement of the actuator k' . A spur k^4 carried by the actuator k' co-operates, when the actuator is moved down, with a corresponding spur f^4 of the three-armed lever f to lock the same in the position to which the lever has been swung, whether to the right or to the left.

Mounted movably on the actuator k' are the horizontally slidable selectors l , only one of which is shown, there being a plurality of selectors for the control of a plurality of sets of heddles. These selectors are controlled by a pattern mechanism to be described, through links l' the selectors being moved to the right or to the left, so that their ends shall stand above the corresponding connectors g and g' , for movement downward of the corresponding connectors and for the swinging of the lever f in one direction or the other and the corresponding movement of the connected heddle frames up or down as the case may be.

When the parts are in the positions represented in Figure 1, with the selectors l standing over the right hand connectors g' , the downward movement of the actuator k' will move downward the right hand connectors g' , swinging the three-armed lever f to the left, raising the right hand heddle frame and lowering the left hand heddle frame. As soon as this movement has been completed the cam groove i of the cam disc i' will swing the carriers h and h' outward, thereby swinging the connectors g and g' at their upper ends entirely free from the selectors l , in whichever direction such selectors may have been moved, whether to the right or to the left, and in the following movement upward of the actuator k' the connectors g and g' which have been lowered, whether at one side or the other, will be raised to normal position. At the same time the selectors l will be raised, clearing

all of the connectors, so that when the actuator has again reached its highest position the carriers h and h' will have been swung inwardly, thereby placing the connectors again in operative relation with the selectors. Meanwhile the selectors themselves, under the control of the pattern mechanism, will have been set or positioned for a new operation so that the entire mechanism will be ready immediately for a new operation without requiring the positioning of the selective devices to await the completion of movement of the heddle frames. It will be understood, of course, that in the upward movement of the actuator k' the lever f is swung back to its normal or neutral position and that the heddle frames are restored to the closed-shed position, in readiness for the next operation.

For effective co-operation with the devices already described and to further promote speed and certainty in operation, the pattern or jacquard devices for controlling the selective devices above described have been improved so that the needles, by which the selectors above mentioned are shifted, shall be moved by positively acting mechanical devices in both directions, instead of in one direction only as heretofore. In accordance with the invention there are provided two needles in operative relation with each selector, that is, two sets of needles in operative relation with the set of selectors. The pattern or jacquard card which co-operates with the needles is provided with two sets of perforations or two cards, each with its own set of perforations, are provided for co-operation with the two sets of needles. Each part of one card or each card of the two has perforations which permit the free passage of the needles of one set while the other part or the other card has blanks for co-operation with the corresponding needles of the other set, so that when the card or cards is or are moved toward the needles the selected needles of one set move freely through the perforations of the corresponding card or part of the card and the corresponding needles of the other set are moved positively by contact with the blank or imperforate portions of the card. Since the two corresponding needles are coupled to move about a common axis and are operatively connected to the corresponding selector, each selector will be moved positively in one direction or the other at each operation. In the embodiment of this part of the invention shown in Figure 1 the two needles (one only of each set being shown), being suitably supported in a frame m , are operatively engaged, on opposite sides of a common axis, with the link l' which, as heretofore explained, controls the position of the selector l . As shown each needle m' , or an extension of each needle, is formed with

rack teeth m^2 , the two racks being engaged by a gear segment o which is provided with an arm o' to which the link l' is connected. In this instance the two rows of perforations, which co-act with the two sets of needles, are shown as formed in a single card p which is supported by a rectangular drum or frame q to which a step by step motion of rotation and a to and fro motion are imparted as usual in devices of this character. The perforations p' of the one set or row and the perforations p'' of the other set or row have opposite them in the other set or row blanks or imperforate portions as at p^2 and p^1 . Therefore, when the card is moved in the usual manner toward the needles, those needles m which correspond to the blanks or imperforate portions p^1 will be moved positively and the corresponding needles m' being permitted to move freely through the corresponding holes of the other set or row. In like manner, certain of the needles m' are moved positively while the corresponding needles m are permitted to move through the perforations of the other set or row of holes. As the two needles in each pair, however, are positively and operatively connected with the same link l' , the corresponding selective device l of the shedding mechanism will be moved positively by mechanical means in one direction or the other.

As will be obvious, the two rows or sets of holes are not necessarily formed in the same card, but, as shown in Figure 3 at q^1 and q^2 , two cards might be supported independently, each being formed with perforations and blanks for co-operation with corresponding sets of needles. So also, as will be obvious, and as shown in Figure 4, the needles m^2 might be arranged horizontally for co-operation with the jacquard or pattern cards.

In the embodiment of the invention shown in Figure 1, the selector l and the connectors g and g' are arranged to slide, while in the construction shown in Figure 5, now to be described, the selectors and the connectors are pivoted. The three-armed lever f is connected as before by a link d^2 with the rack bar d' , but its arms are provided with shoulders f^3 and f^2 for co-operation with the respective connectors g^3 and g^4 which are pivoted on the carriers h^3 and h^4 , the latter being pivoted upon the same axis with the lever f . The extremities of the carriers h^3 and h^4 are connected by links h^2 and h' with the two shorter arms of the three-armed lever h' which is pivoted on the housing and has a roller h^1 which engages the cam groove z of the disc z^1 . The bell crank connectors g^3 and g^4 are slotted to engage pins z^2 and z^1 carried by an oscillating selector z^3 to which the needles m^2 and m^1 of the two sets of needles may be directly connected. The se-

lector z^3 is also provided with two notches, as at z^4 , adapted to be engaged by a dog u' which is pivoted on the housing and carries a roller u in engagement with the cam groove z of the cam disc z^1 , so that the selector is locked in one position or the other except during such portion of the rotation of the cam disc as is necessary for the operation of the selector by the pattern devices.

In the operation of this embodiment of the invention it will be understood that through the operation of the selector z^3 one of the connectors g^3 and g^4 is moved, as in the case of the selector g^3 , on its pivot into operative relation with the corresponding shoulder, f^3 , of the three-armed lever f . The corresponding carrier, as h^3 , is then moved by the actuator h' so that the connector g^3 , through contact with the shoulder f^3 , will swing the lever f in the proper direction, as toward the right, whereby the heddle frames will receive the desired movement. In the continued operation the other connector, as g^4 , will, when it has been moved into operative relation by the movement of the selector z^3 , then unlocked, cause the lever f to be swung again to neutral position, all parts being then in readiness for another operation, as determined by the movement of the selector under the influence of the pattern mechanism.

It will be understood that various changes can be made in details of construction and arrangement to suit different conditions of use and that the invention, except as pointed out in the claims, is not limited to the particular construction and arrangement shown and described herein nor to the combination in one loom of all of the features of improvements herein described. Such several features co-operate in the accomplishment of the general purpose of the invention, but each feature may be used with advantageous results independently of the other described features.

I claim as my invention:

1. In a loom, the combination of two heddle frames in endwise relation, each frame having two vertical rack bars, the rack bars of one frame facing to one side and the rack bars of the other frame facing to the other side, a gear engaging both of the adjacent rack bars of the two frames, other gears engaging respectively the other rack bars of the two frames, a common rack bar engaging all of the gears, and means to reciprocate said common rack bar.

2. In a loom, the combination of a heddle frame, a lever operatively connected to the heddle frame, a constantly operating actuator for said lever, a connector through which movement is transmitted from the actuator to the lever, means to move the connector into and out of operative relation with the lever, an independently mov-

able selector to determine the operation of the connector, and means to operate the selector.

3. In a loom, the combination of a heddle frame, a lever operatively connected to the heddle frame to move the same in one direction or the other, a constantly operating actuator for said lever, connectors through which movement is transmitted from the actuator to the lever to move the same in one direction or the other, means to move the connectors respectively into and out of operative relation with the lever, an independently movable selector to determine the operation of one connector or the other, and means to operate the selector.

4. In a loom, the combination of a heddle frame, a lever operatively connected to the heddle frame, a constantly operating actuator for said lever, a connector through which movement is transmitted from the actuator to the lever, a carrier for said con-

connector, means to operate the carrier to move the connector into and out of operative relation with the lever, means to operate the carrier, an independently movable selector to determine the operation of the connector, and means to operate the selector.

5. In a loom, the combination of a heddle frame, a lever operatively connected to the heddle frame, a constantly operating actuator for said lever, connectors through which movement is transmitted from the actuator to the lever, carriers for said connectors respectively, means to operate the carriers to move one or the other of the connectors into and out of operative relation with the lever, an independently movable selector to determine the operation of one carrier or the other, and means to operate the selector.

This specification signed this 30th day of August A. D. 1922.

CARL EGGART.