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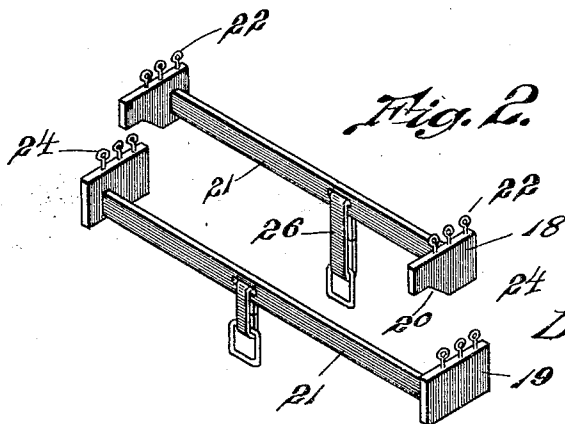
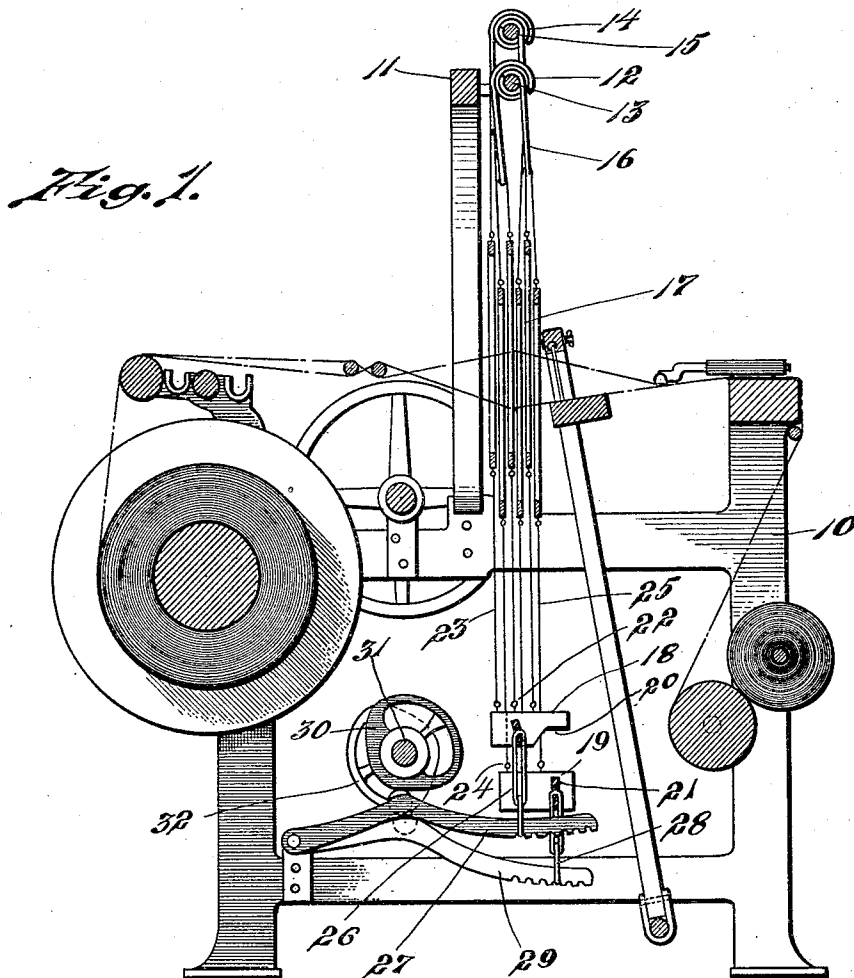
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**1,900,659**

## HARNESS MECHANISM FOR A LOOM

Filed April 15, 1930

3 Sheets-Sheet 1



*Fig. 2.*

**INVENTOR.**

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BY

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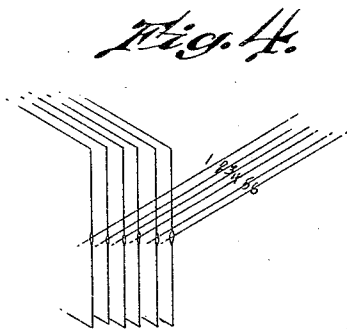
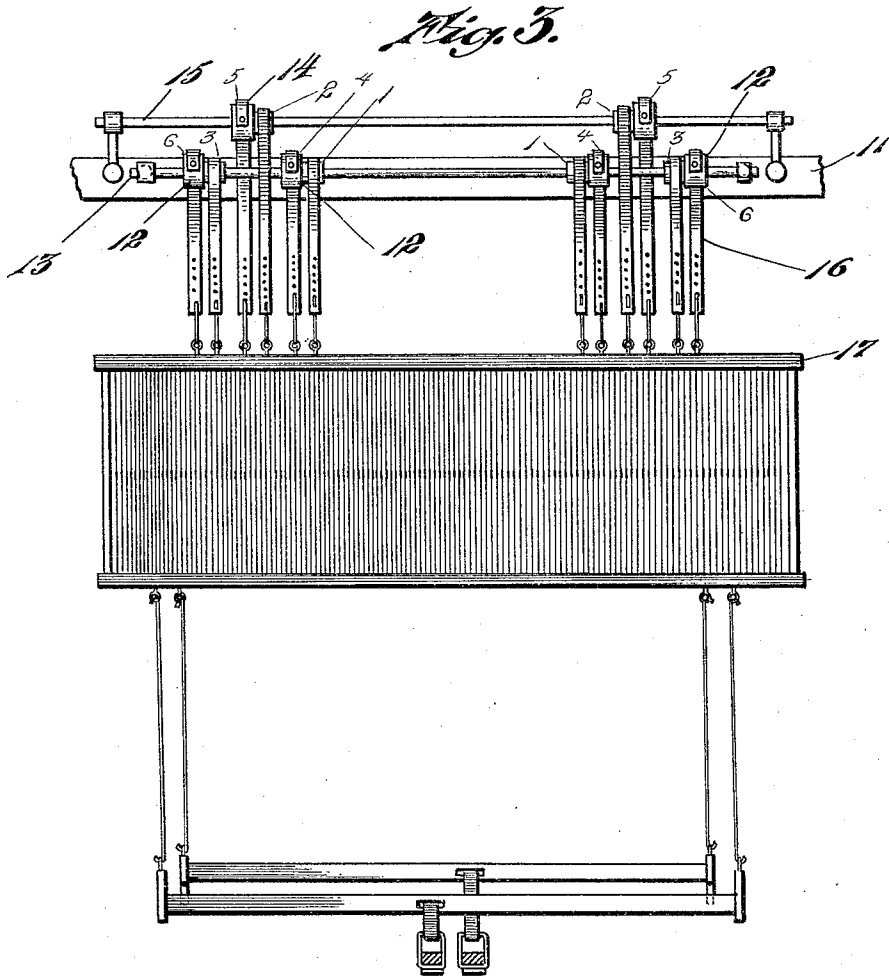
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HARNESS MECHANISM FOR A LOOM

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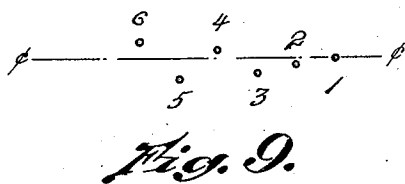
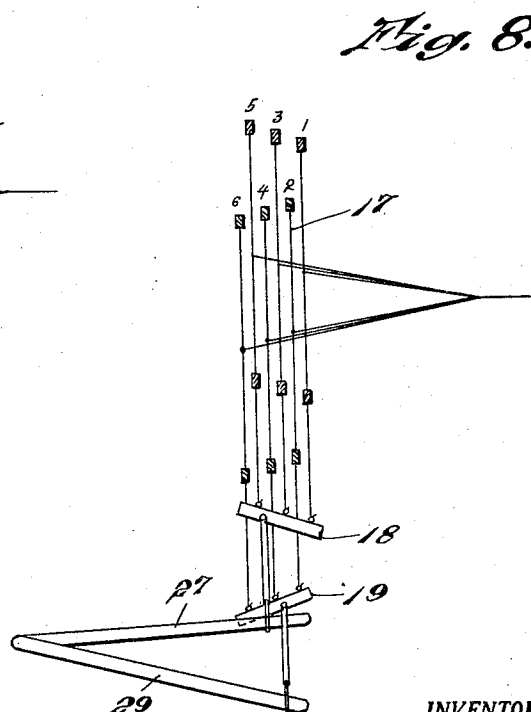
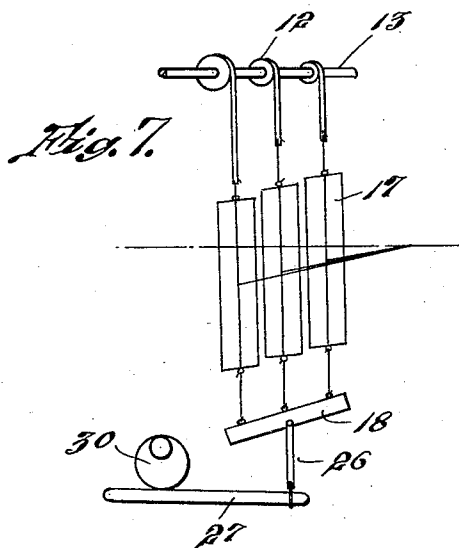
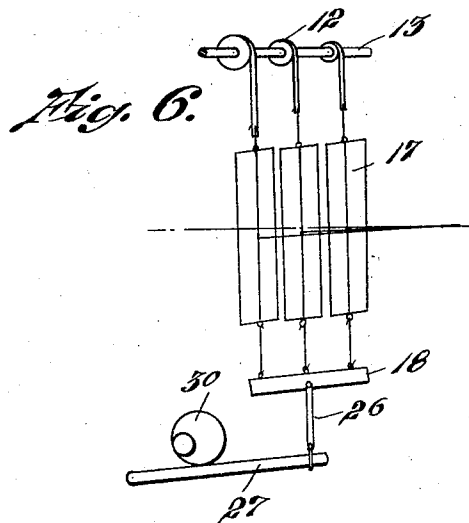
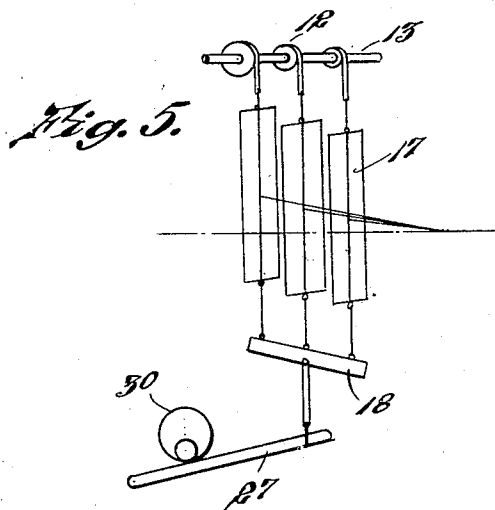
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HARNESS MECHANISM FOR A LOOM

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3 Sheets-Sheet 3



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## UNITED STATES PATENT OFFICE

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## HARNESS MECHANISM FOR A LOOM

Application filed April 15, 1930. Serial No. 444,404.

This invention relates to an improved construction of loom, more particularly to the harness action of the loom; and the object of this invention is to provide simple and effective means for connecting together the alternate harnesses of the group to form a set and the remaining harnesses of the group to form a second set and to oppositely reciprocate each of these sets of harnesses.

A further object of the invention is to provide a pair of jacks and reciprocate them in different horizontal planes, and to attach the different sets of harnesses to the different jacks and to operate each of the different jacks with a separate cam, whereby the minimum number of harness operating loom parts is employed to obtain the harness action desired.

The invention further consists in so arranging the harness action that the warp threads of alternate harnesses during the changing of the shed are caused to cross or pass each other progressively, or not all at the same time, thus preventing crowding and chaffing and so weakening of the threads, by which arrangement the thread breakage is materially reduced and a considerable increase in production obtained over the old method where all the threads of each set are caused to cross or pass each other simultaneously.

With these and other objects and advantageous features in view, the invention consists of a novel arrangement of parts more fully disclosed in the detailed description following, in conjunction with the accompanying drawings, and more particularly set forth in the appended claims.

In the drawings:

Fig. 1 is an end elevation partly in section, showing the loom with my improved arrangement of harnesses mounted therein;

Fig. 2 is a perspective view illustrating the two jacks to which the different sets of harnesses are connected, these jacks being mounted to operate in different horizontal planes, the upper jack overhanging portions of the lower jack and each provided with means to which a plurality of harnesses may be attached;

Fig. 3 is a diagrammatic view illustrating the harnesses as connected to the top rolls above them and to the jacks below them, each jack being connected independently to a separate treadle;

Fig. 4 is a diagrammatic view illustrating a group of heddles arranged to operate adjacent each other and by being connected in sets of alternate harnesses, the threads are permitted to be drawn successively into the heddles of each succeeding harness.

Fig. 5 is a diagrammatic view showing the relative positions of the heddles of one set when raised to the top of their stroke.

Fig. 6 is a diagrammatic view showing the relative out-of-alignment positions of the harnesses of a set, and the angular positions of the jack when the thread-engaging portions of the harnesses are passing those of the other set of harnesses during the changing of the shed.

Fig. 7 is a diagrammatic view showing the inclined position of the thread-engaging portions of the harnesses of a set and the relative inclined position of the jack when all are in down position.

Fig. 8 is a diagrammatic view showing the shed threads formed by the two sets of harnesses in their extreme open positions also indicating the relative positions of the jacks and treadles.

Fig. 9 is a diagrammatic view indicating the threads of the two sets as being out of alignment when crossing the center line in opposite directions.

It is found in practice that ordinarily where a group of any six harnesses are employed in a cam loom, the first three harnesses are connected together to form a set, and the second three harnesses are connected together to form a second set, and these two sets are each connected through jacks to the treadles to be reciprocated.

When the harnesses are arranged in this manner, it will be seen that the successive warp threads must be drawn into alternate harnesses so that adjacent warp threads will be oppositely reciprocated to properly open the shed, that is, so that threads in the upper and lower sheds will be formed of alternate

warp threads. By being obliged to so draw in the warp threads mistakes are very easily made by drawing a warp thread into the wrong harness, which causes these threads to cross and so unduly chafe and break and also to cause the threads to form bad places in the cloth; but by my improved arrangement the alternate harnesses in one set and the remaining harnesses in another set, and connecting these different sets of harnesses to their respective jacks to reciprocate oppositely, the warp threads may be drawn into each of these harnesses successively; that is, instead of drawing the first three successive threads into the harnesses 6, 4 and 2 and the next three successive threads into harnesses 5, 3 and 1, the operator may draw the successive threads into successive or adjacent harnesses 6, 5, 4, 3, 2 and 1, thereby reducing to the minimum the liability of making mistakes in this drawing-in process. Also, it is found of advantage to so arrange the harness operating mechanism that the threads of the different sets forming the shed will cross or pass each other progressively or one ahead of the other and not all at once, thus preventing crowding and chafing and so weakening of the threads, materially reducing thread breakage and so permitting a materially increased loom production; and the following is a detailed description of the present embodiment of my invention and showing one means by which these advantageous results may be accomplished:—

With reference to the drawings, 10 designates the frame of the loom and 11 the upper arched member thereof on which is supported a set of top rolls 12 on their shaft 13 and a second set of rolls 14 on their shaft 15, each roll being operatively connected through its straps 16 to individual harnesses of the group 17 in this particular case, six harnesses are shown, and each adjacent harness is connected on opposite sides of the adjacent top rolls 12, as best shown in Fig. 3, to operate oppositely and alternately.

Below this group of harnesses are mounted two jacks 18 and 19, each to be reciprocated in different horizontal planes, that is the upper jack 18 never passes below the lower jack 19 and is notched out as at 20 so as not to interfere with the cross bar 21 of the lower jack upon reaching the lower end of its stroke; also, it will be noted that the upper jack is provided with three attaching eyes 22, to which harnesses 1, 3 and 5 are connected at either end through connections 23 and that the lower jack is provided with a similar number of attaching eyes 24 to which harnesses 2, 4 and 6 are attached through their connections 25. Jack 18 is connected through its strap 26 to the treadle 27 and jack 19 is connected through its strap 28 to its treadle 29, treadle 27 being operated by its individual cam 30 and treadle 29 being

operated by its individual cam 32, both cams being mounted on cam shaft 31, whereby the operation of these two jacks through their individual cams cause an opposite reciprocating action of the two sets of alternate harnesses in the loom.

By this simple arrangement wherein the alternate harnesses are connected together in sets, each set to a separate jack, and each jack is operated by a separate cam and treadle, the harness operating parts are reduced to the minimum, and the chances of making mistakes in the drawing-in of the warp threads is also minimized.

In some instances it is found to be of importance to so arrange the harness-operating mechanism that the threads of the different sets in the shed will pass each other successively or progressively, while the shed is changing, instead of all passing at the same time as has heretofore been customary, thus avoiding crowding and chaffing of the threads, and I have herein shown one way of accomplishing this result which is by forming the rollers of the different harnesses of different diameters for instance the rollers of these different harnesses increase progressively in diameter, as shown in the diagrammatic Figs. 5, 6 and 7, thus causing the harness to travel at different speeds by initially setting these harnesses just out of alignment with each other when connecting them up, they will be out of horizontal alignment with each other and with those of the other set while these sets are passing each other during the shed changing operation, as illustrated in Fig. 9, thus causing the threads of the opposite sets to pass each other progressively. This difference in stroke of the harnesses of the same set is taken care of by a rocking motion of the jacks 18 and 19, to which they are connected, as best illustrated in Figs. 5 to 8 inclusive. The relative progressive increase in diameter may only be slight, say an increase in diameter of  $\frac{1}{8}$  of an inch for each roller from the first to the sixth inclusive. The difference in the stroke of the three harnesses connected to each jack being taken care of by the rocking of the jack, and this difference in stroke also serves to bring the shed threads into substantial alignment when the shed is open.

While I have described certain construction forms which embody the principles of my invention, it is obvious that other desired changes in arrangement may be made within the spirit and the scope of the invention as defined in the appended claims.

I claim:

1. In a loom, two sets of oppositely reciprocating thread-guiding harnesses, sets of rollers of different diameters connected to the different harnesses of the different sets, a jack to which the lower portion of each set of harnesses is connected, means for mounting said jack to rock, and means including said roll-

ers for operating said harnesses and jacks to cause the thread engaging portions of said harnesses of the different sets to pass each other successively during the changing of the shed.

means on said jack for securing it to a treadle.

8. In a loom, a group of harnesses, a pair of jacks having spaced members thereon, each of which members is connected to a single harness, rollers of different diameters, there being at least one such roller for each harness, means connecting the said rollers each to its respective harness, a pair of cam operated treadles, and means for flexibly securing said treadles to said jacks at a point to cause rocking motion thereof for causing the thread engaging portions of said harness to pass each other out of horizontal alignment during the changing of the shed.

In testimony whereof I affix my signature.  
DANIEL N. O'BRIEN.

2. In a loom, a group of thread-engaging harnesses, a pair of jacks, means connecting the alternate harnesses of the group to one of said jacks, means for mounting said jack to rock, means connecting the remaining harnesses of the group to the other jack, rollers of different diameters to which the different harnesses of the sets are connected, and means including said rollers for reciprocating the different harnesses of the sets alternately in opposite directions causing their thread-engaging portions to pass each other progressively during the changing of the shed.

3. In a loom, a group of thread-engaging harnesses, a pair of jacks, means connecting the alternate harnesses of the group to one of said jacks, means for mounting said jack to rock, means connecting the remaining harnesses of the group to the other jack, rollers of different diameters connected to the different harnesses of the sets, a pair of cam-driven treadles, and means including said rollers, cams, treadles, and jacks for reciprocating the different harnesses of the sets alternately in opposite directions causing their thread-engaging portions to pass each other progressively or out of horizontal alignment during the changing of the shed.

4. In a loom, a group of harnesses, a pair of jacks having spaced members thereon, each of which members is connected to a single harness, a pair of treadles, means for flexibly securing said treadles to said jack at a location to cause tipping of the jack when pulled, and cams for oppositely reciprocating said jacks.

5. In a loom, a pair of treadles, a group of harnesses, alternate harnesses forming one group, and the remaining harnesses forming another group, a pair of jacks having spaced members thereon, each harness of the first group being separately connected to one jack and each harness of the second group being separately connected to the other jack, and flexible means for securing said treadles to said jacks at a point to cause tipping of the jacks when pulled, and means for oppositely reciprocating said jacks through said treadles.

6. In a loom jack having an elongated body, members projecting laterally from each end thereof and spaced means thereon for securing individual harnesses thereto, and means on said jack for securing it to a treadle.

7. In a loom jack having an elongated body, members projecting substantially at right angles to said body positioned at the ends thereof and spaced means thereon for securing individual harnesses thereto, and

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