

July 16, 1963

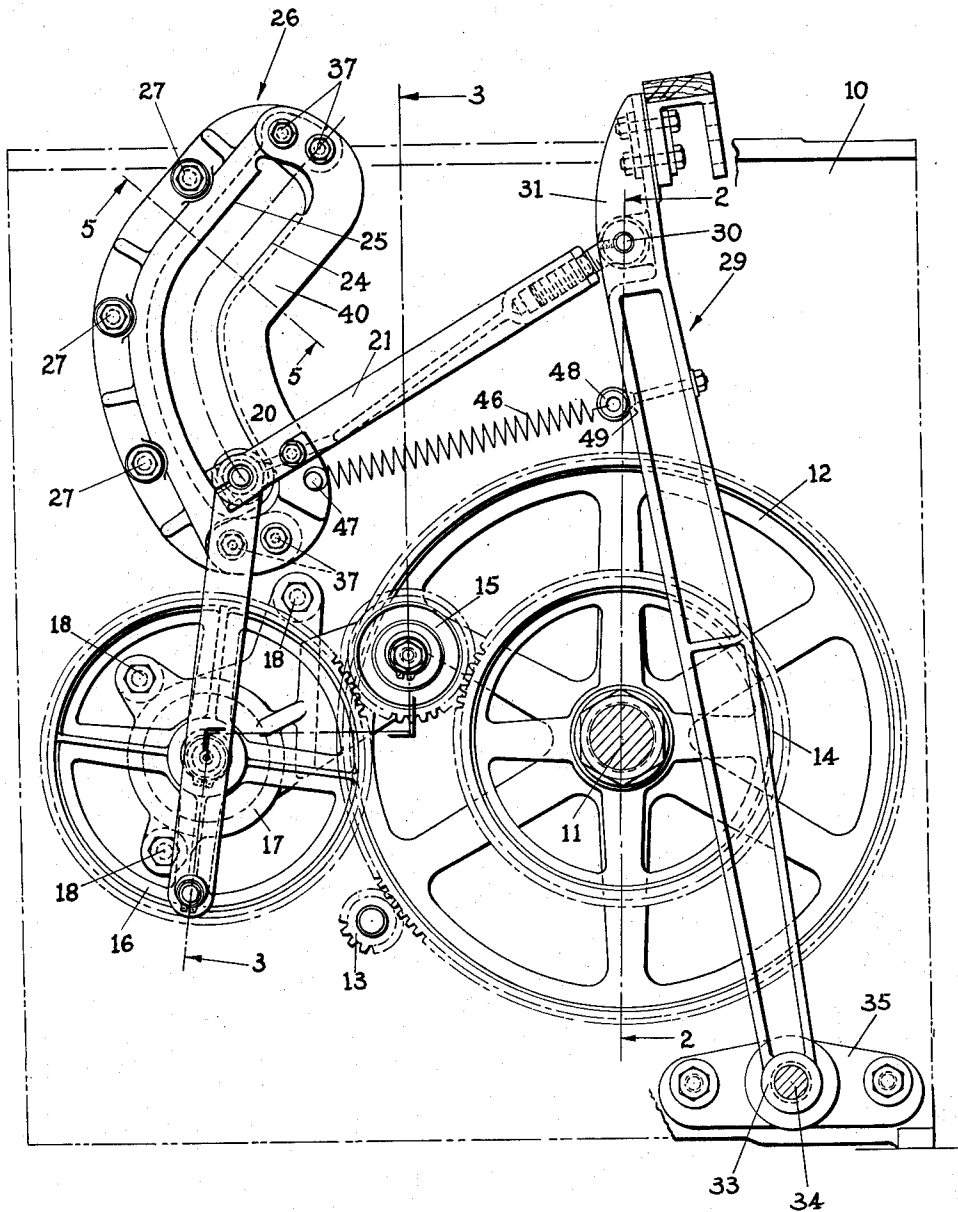
W. H. BANKS

3,097,669

LAY MOTION FOR LOOMS

Filed Sept. 28, 1961

3 Sheets-Sheet 1



INVENTOR.
WALDO H. BANKS

BY *Albert A. Maharsel*

ATTORNEY

July 16, 1963

W. H. BANKS

3,097,669

LAY MOTION FOR LOOMS

Filed Sept. 28, 1961

3 Sheets-Sheet 2

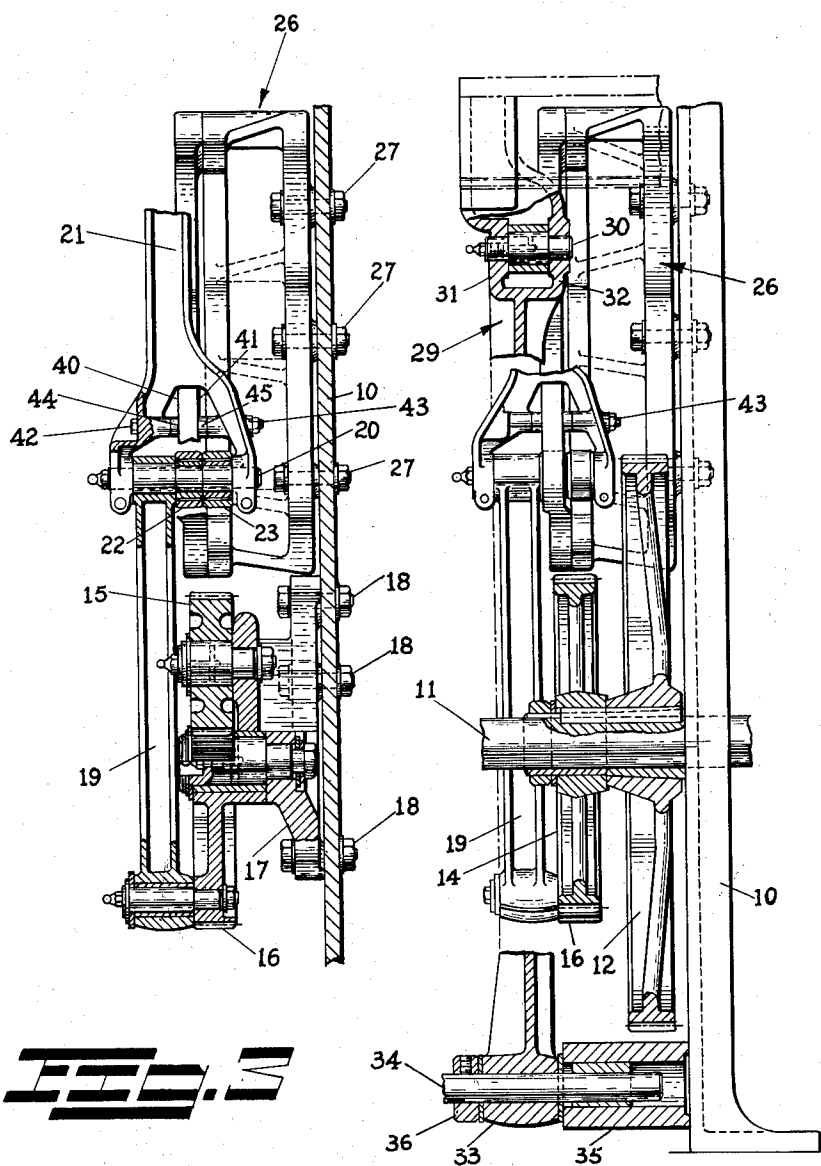


Fig. 2

Fig. 1

INVENTOR.
WALDO. H. BANKS

BY *Albert R. Mahassel*

ATTORNEY

July 16, 1963

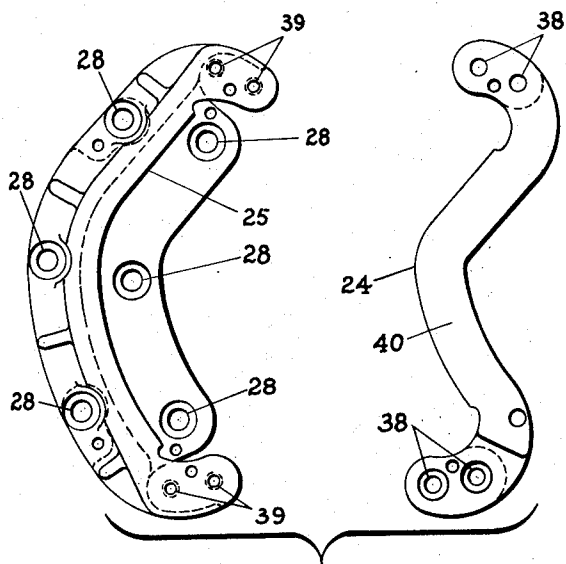
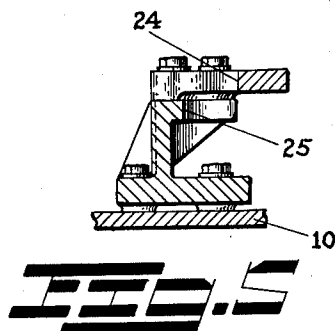
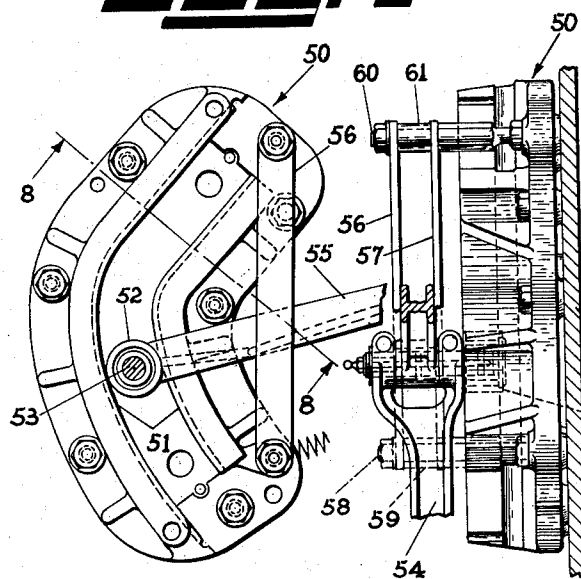
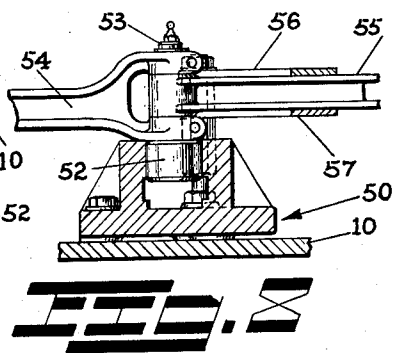
W. H. BANKS

3,097,669

LAY MOTION FOR LOOMS

Filed Sept. 28, 1961

3 Sheets-Sheet 3



INVENTOR.
WALDO H. BANKS

BY *Albert A. Mahand*

ATTORNEY

1

3,097,669

LAY MOTION FOR LOOMS

Waldo H. Banks, Hopedale, Mass., assignor to Draper Corporation, Hopedale, Mass., a corporation of Maine
Filed Sept. 28, 1961, Ser. No. 141,453
4 Claims. (Cl. 139-190)

This invention pertains to a lay motion for looms and, particularly, to such motions which are adapted for use with so-called shuttleless looms.

It is a general object of the invention to furnish a lay motion for looms which by means of its novel design provides a lighter and a less massive structure to actuate the lay and still maintain a sufficient lull period during its cycle to enable the filling yarn to be inserted and for the filling inserting elements to be withdrawn from the shed.

It is a further object of the invention to provide a lay motion which is less expensive to manufacture and less critical in its operating settings than the present lay motions used in shuttleless looms such, for example, as the lay motion disclosed in United States Patent No. 2,624,372.

It is a further object of the invention to provide a lay motion with a novel camming means thus eliminating the hard camming action to which the lay motions of the prior art are subjected.

Further objects of the invention will become apparent from the following more detailed disclosure.

In high speed looms, especially those of the shuttleless type, it has been found advantageous to lighten further the structure of the lay motion mechanism and to incorporate a novel camming means to swing the lay to and fro for performing the beat-up motion with additional smoothness and less acute camming than has been heretofore possible. Additionally, it is also necessary that the lay be allowed to dwell at its back center or rearmost position a period of time sufficient for the introduction of the filling yarn by its carriers into the fabric shed and withdrawal of said carriers therefrom.

The mechanism of the instant invention dispenses with the conventional rotating cams and follower members which form an integral part of the swords to which the lay assembles, and utilizes arcuated cam members fixedly positioned on the frame portion of the looms. These cams are provided with centrally disposed arcuated cam tracks which are adapted to receive freely rotatable cam followers therein. Pivotaly attached to one side of the followers there is provided a driving crank and a connecting rod. The driving crank has its opposite end eccentrically positioned to the side of a crank gear member and the opposite end of the connecting rod is pivotaly connected to the upper portion of the loom's sword member. Rotation of the driving gear causes the cam follower by means of the driving crank to follow the arcuated track of the cam member which in turn transmits a rocking motion to the loom swords through the connecting rod to provide the required movement of the lay which is necessary to permit entry of the filling introducing elements into the warp shed and to position the filling yarn at the fell of the cloth.

A portion of the arcuated cam track is formed in such a manner as to provide a substantially radial arc with respect to the pivot point of the connecting rod on the sword. This so-called radial arc provides a lull period enabling the lay to remain stationary, or nearly so, throughout a sufficient period of time to permit the introduction of the filling yarn by its carriers into the fabric shed and withdrawal of said carriers therefrom.

The invention will be described hereinafter in greater

2

detail by reference to the accompanying figures of drawing, in which:

FIG. 1 is a view transversely taken through part of a loom, showing the lay, rock shaft, arcuated cam member and the means by which the lay is swung to and fro.

FIG. 2 is an end view partially in section of the mechanism shown in FIG. 1.

FIG. 3 is a sectional view taken along line 3-3 of FIG. 1.

FIG. 4 is a side elevational view of the two-piece, double track, arcuated cam member in which the cam followers are caused to travel.

FIG. 5 is a sectional view taken along line 5-5 in FIG. 1 showing the cam of FIG. 4 in operating position.

FIG. 6 is a side elevational view of a modified form of an arcuated cam member of unitary construction which employs a single cam follower for obtaining the desired lay motion.

FIG. 7 is an end view of the cam illustrated in FIG. 6, showing its relationship to the cam follower and the driving crank and connecting rod which assemble at one side thereof.

FIG. 8 is a sectional view of the modified cam shown in FIG. 6 as taken along line 8-8 of that FIGURE of the drawing.

Now referring to the figures of drawing, there is shown in FIG. 1 a portion of the right-hand loomside 10 which supports one end of a cam shaft 11 in a suitable bearing (not shown) assembled thereto. Although the left-hand loomside is not illustrated, it is to be understood the opposite end of this cam shaft 11 is supported in a similar manner and the lay motion mechanism to be fully described subsequently also functions in a like manner at that end.

A transmitting gear 12 is fixedly positioned on cam shaft 11 immediately adjacent to loomside 10 and being in mesh with motor pinion 13 causes said cam shaft to rotate continuously in the direction of the indicating arrow during loom operation. Adjacent to and also fixedly positioned on the cam shaft is a gear member 14 which is in meshing relationship with an idler gear 15 which in turn meshes with a crank gear 16. Both the idler gear 15 and the crank gear 16 are rotatably mounted on a common mounting bracket 17 which by means of bolts 18 assembles to the inner side of loomside 10.

Pivotaly mounted and eccentrically positioned on one side of the crank gear 16 there is provided a generally upwardly directed driving crank 19. The opposite end of this driving crank is pivotaly assembled on a stud 20 the ends of which are supported by aligned apertures provided in the bifurcated end portion of a connecting rod 21 (FIG. 3). Additionally within this bifurcated section, stud 20 supports a pair of juxtaposed, freely rotatable cam follower members 22 and 23 which are adapted to follow offset arcuated cam tracks 24 and 25, respectively, of a fixed cam member indicated generally by numeral 26. This cam member is fixedly positioned to loomside 10 by a plurality of bolts 27 three of which are shown in FIG. 1 and are adapted to be received by the spaced apertures 28 illustrated in FIG. 4.

The forward end of the connecting rod 21 is pivotaly connected to the upper portion of the loom sword indicated generally by numeral 29 by means of a laterally disposed pin 30 the ends of which are adapted to assemble in aligned apertures provided in the rearwardly directed flanges 31 and 32, respectively, of the upper portion of sword 29 (FIGS. 1 and 2). The opposite or lower extremity of sword 29 terminates in the form of a hub 33 through which a rock shaft 34 is adapted to pass. Rock shaft 34 is supported in a known manner by rock shaft bearings assembled to the loomsides, one of which is de-

picted by numeral 35 in FIGS. 1 and 2. Sword 29 is freely rockable upon rock shaft 34 and is located thereon by means of an adjustable collar 36 being fixed to said rock shaft at one side of hub 33 with the opposite side of said hub being located immediately adjacent to the rock shaft bearing 35 (FIG. 2).

In operation cam shaft 11 is caused to rotate in a clockwise direction as viewed from the left side of a loom by means of motor pinion 13 being in meshing relationship with transmitter gear 12 which is fixedly positioned thereon. This rotary motion thus causes gear member 14 which is also fixed to the cam shaft to turn in a like manner. Gear member 14 being in mesh with idler gear 15 which in turn is in mesh with the crank gear 16 causes the latter gear to likewise rotate in a clockwise direction. Rotation of crank gear 16 causes the driving crank 19 eccentrically positioned at one side thereof to move upwardly for 180° rotation of this gear and downwardly for the remaining 180°. The upper portion of the driving crank being pivotally attached to cam follower members 22 and 23 and to one end of connecting rod 21 causes these members to follow the pattern defined by the arcuated cam tracks 24 and 25 provided in cam member 26. These cam tracks being offset from one another as shown in FIG. 5, are disposed in such a manner that the forces are absorbed through followers 22 and 23 by tracks 24 and 25, respectively. As shown in FIGS. 4 and 5, cam track 25 forms an integral part of cam member 26 and cam track 24 being separable is detachable therefrom. Assembly of cam track 24 is made by means of cap screws 37 passing through apertures 38 provided on the outermost ends of said track and thence into aligned tapped holes 39 provided on the outermost ends of the cam member itself.

When assembled, the forward sides 40 and 41 of cam track 24 serve as guides to retain the cam followers in their respective tracks and to keep the connecting rod 21 in vertical alignment during actuation thereof. This is accomplished by means of opposed and aligned laterally disposed adjusting screws 42 and 43 provided in the bifurcated portion of connecting rod 21 which when tightened cause button-like elements 44 and 45 to move inwardly toward sides 40 and 41 a distance sufficient to restrict excessive lateral movement of said connecting rod during actuation thereof.

Movement of these various members as heretofore described imparts to the sword 29 a rocking motion of sufficient travel to enable reception and proper beat-up of the filling as each length is inserted within the warp shed. Additionally, cam member 26 is formed in such a manner that a portion of the arcuated cam tracks define a substantially radial arc with respect to the pivot point of the connecting rod on the sword at back center and thus a lull period is provided presenting a desired delay in sword movement for the insertion and withdrawal of the filling inserting members from the warp shed.

To facilitate movement of the sword as it moves from front to back center and to the cam followers within the arcuated cam tracks due to the increased pressure angle to which they are subjected during this travel, an expansion spring 46 is connected at one end to the lower end of cam 26 as at 47 and its opposite end to an eye bolt 48 provided in the upper portion of sword 29 as at 49.

Another form which the instant invention may take is that illustrated by the modified components in FIGS. 6, 7 and 8.

These modified components include a cam member indicated generally by numeral 50 which is of unitary construction and includes a single arcuated cam track 51 integrally formed therewith. Cam track 51 is adapted to receive therein a freely rotatable cam follower 52 having a stud member 53 extending outwardly from one side thereof. Stud member 53 is adapted to receive thereon the bifurcated end of a driving crank 54, and the opposite end is attached in an eccentric manner to one side of

the crank gear 16 like driving crank 19 heretofore described. On stud 53 and between the bifurcated portion of driving crank 54 there assembles a pivotal connecting rod 55, the opposite end of which is attached to the loom sword 29 in the identical manner as connecting rod 21. Connecting rod 55 is held in vertical alignment and is restricted from lateral movement during actuation thereof by means of substantially vertical guide bars 56 and 57 extending generally upwardly on either side thereof. The lower ends of these guide bars are attached to the lower portion of cam 50 by means of an extended mounting stud 58 having spacers 59 for positioning said guide bars on said stud 58. The opposite ends of these bars are attached in a similar manner to the upper portion of the cam by means of an extended mounting stud 60 having a spacer 61 for positioning said bars thereon. Additionally, these guide bars 56 and 57 serve to keep cam follower 52 within the confines of the arcuated cam track and to restrict lateral movement thereof.

Although the various components of this modified form differ structurally from those heretofore described, it is to be understood the same lay movement is obtained along with the desired lull period while the swords are at back center to enable the insertion and withdrawal of the filling inserting elements from the warp shed.

While one embodiment and a modification of the invention have been disclosed, it is to be understood that the inventive concept may be carried out in a number of ways. This invention is, therefore, not to be limited to the precise details described, but is intended to embrace all variations and modifications thereof falling within the spirit of the invention and the scope of the claims.

I claim:

1. In a lay motion for a loom, a rock shaft, swords and a lay attached to the upper ends thereof, said swords being rockable on said rock shaft, a crank gear member, a stationary cam member having an arcuated cam track integrally formed therein, a cam follower, a driving crank and a connecting rod, said driving crank being freely rotatable and eccentrically connected at one side of said crank gear member, the opposite end being pivotally connected to said cam follower and to one end of said connecting rod, the opposite end of said connecting rod being pivotally connected to said sword for imparting thereto a rocking motion as said cam follower is caused to follow said arcuated cam track of said cam member.

2. The structure of claim 1 wherein a portion of said arcuated cam track of said cam member is formed so as to define a substantially radial arc with respect to the pivot point of said connecting rod on said sword to provide a lull period sufficient for the insertion of a pick.

3. In a lay motion for a loom, a rock shaft and swords, said swords being rockable on said rock shaft, a crank gear member, a cam member having an arcuated cam track integrally formed therein, a cam follower, a driving crank and a connecting rod, said driving crank being freely rotatable and eccentrically connected at one side of said crank gear member, the opposite end being pivotally connected to said cam follower and to one end of said connecting rod, said latter rod's opposite end being pivotally connected to said sword for imparting thereto a rocking motion as said cam follower is caused to follow said arcuated cam track of said cam member, said cam member being provided with a combined means for positioning said cam follower in said arcuated cam track and for keeping said connecting rod in vertical alignment during actuation thereof.

4. In a lay motion for a loom, a rock shaft and swords, said swords being rockable on said rock shaft, a crank gear member, a cam member having an arcuated cam track integrally formed therein, a cam follower, a driving crank and a connecting rod, said driving crank being freely rotatable and eccentrically connected at one side of said crank gear member, the opposite end being pivotally connected to said cam follower and to one end of

3,097,669

5

said connecting rod, said latter rod's opposite end being pivotally connected to said sword for imparting thereto a rocking motion as said cam follower is caused to follow said arcuated cam track of said cam member, said cam member comprising a pair of offset members defining arcuated cam tracks, a pair of co-axial cam followers, said cam tracks being adapted to act upon one each of said cam followers.

5

1,659,275
1,747,722

6

References Cited in the file of this patent

UNITED STATES PATENTS

Lucas ----- Feb. 14, 1928
Lucas ----- Feb. 18, 1930

FOREIGN PATENTS

3,485 Great Britain ----- of 1877