

Feb. 18, 1930.

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1,747,722

BEATER MECHANISM FOR LOOMS

Filed June 14, 1928

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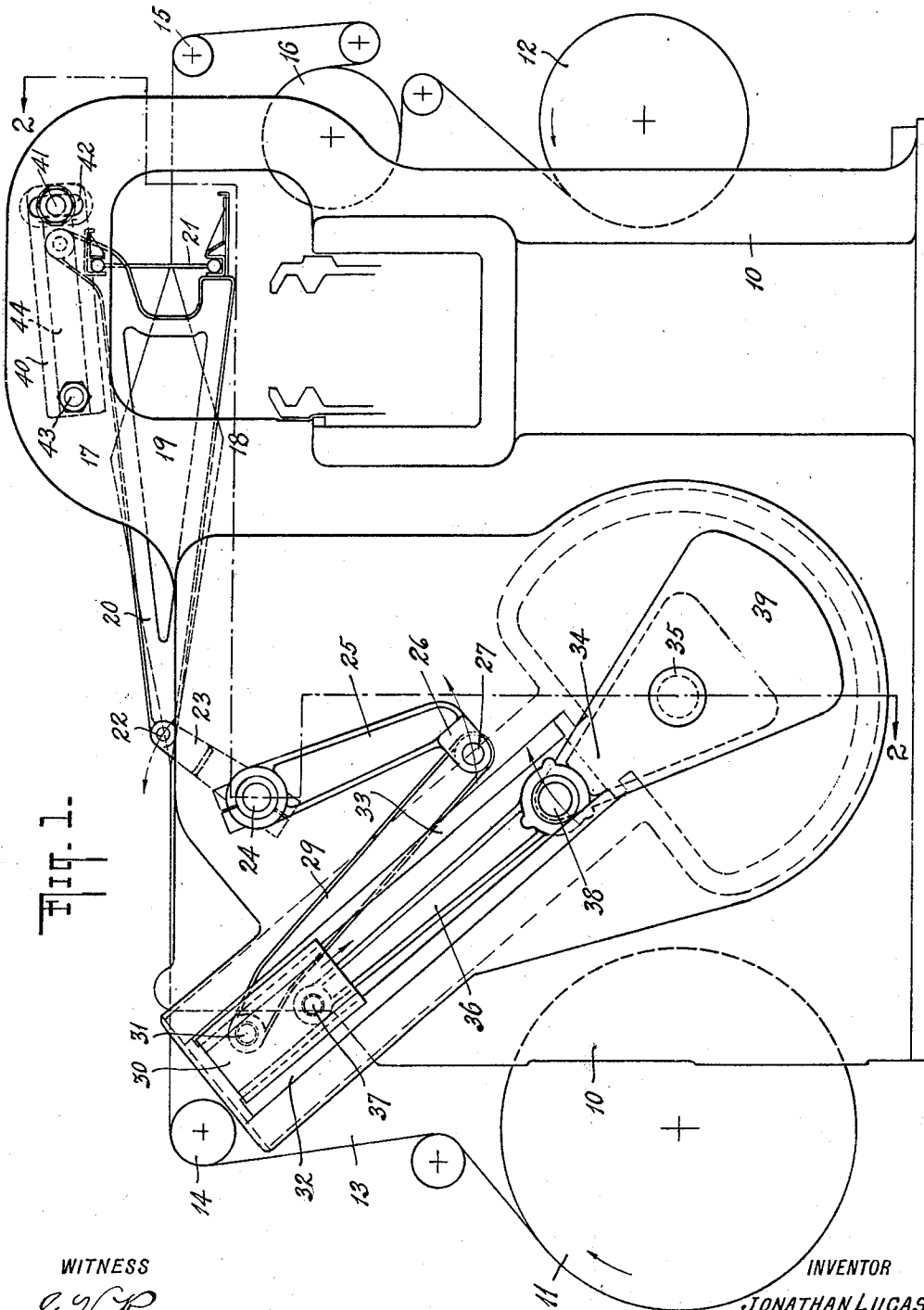


FIG. 1-

WITNESS

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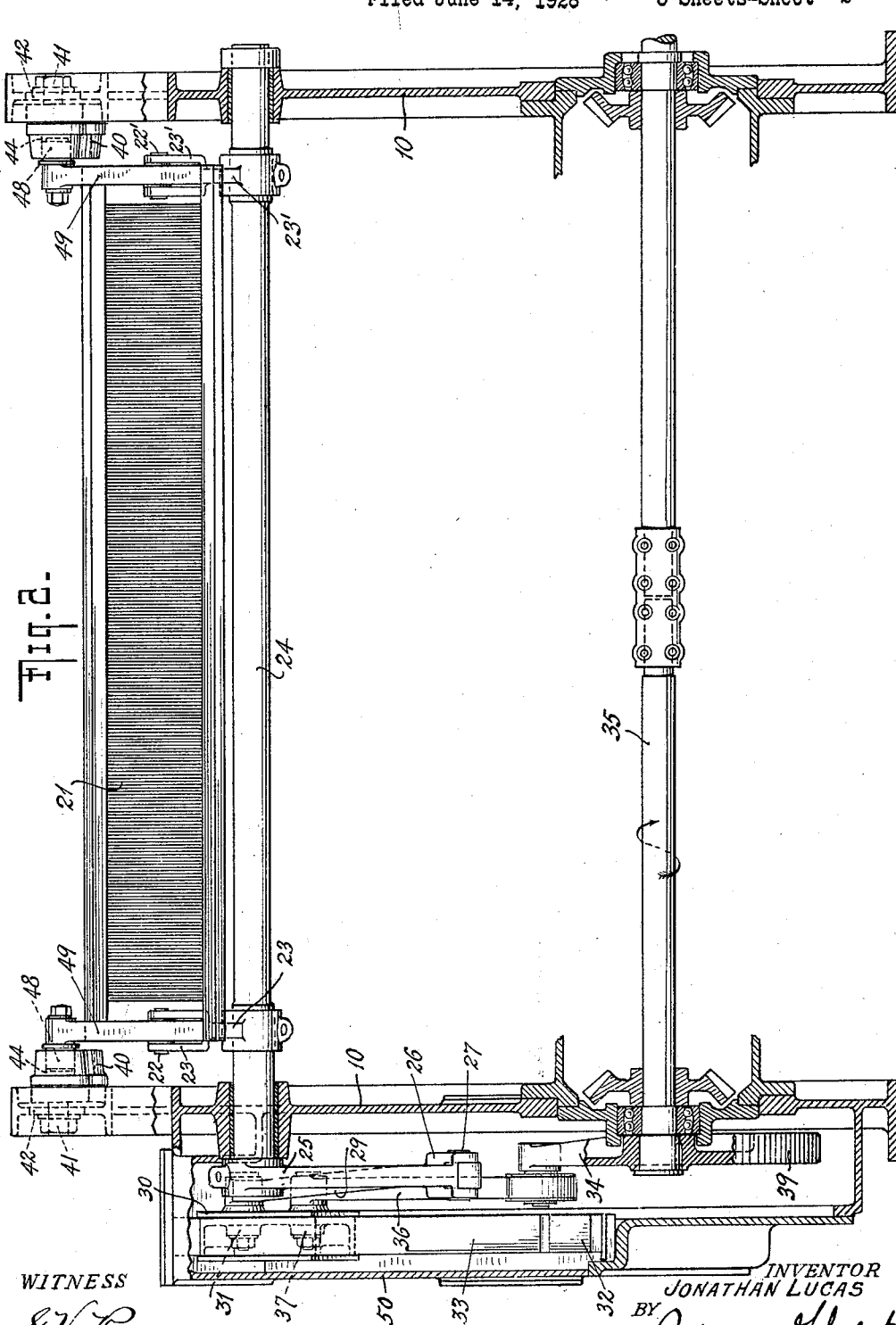
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

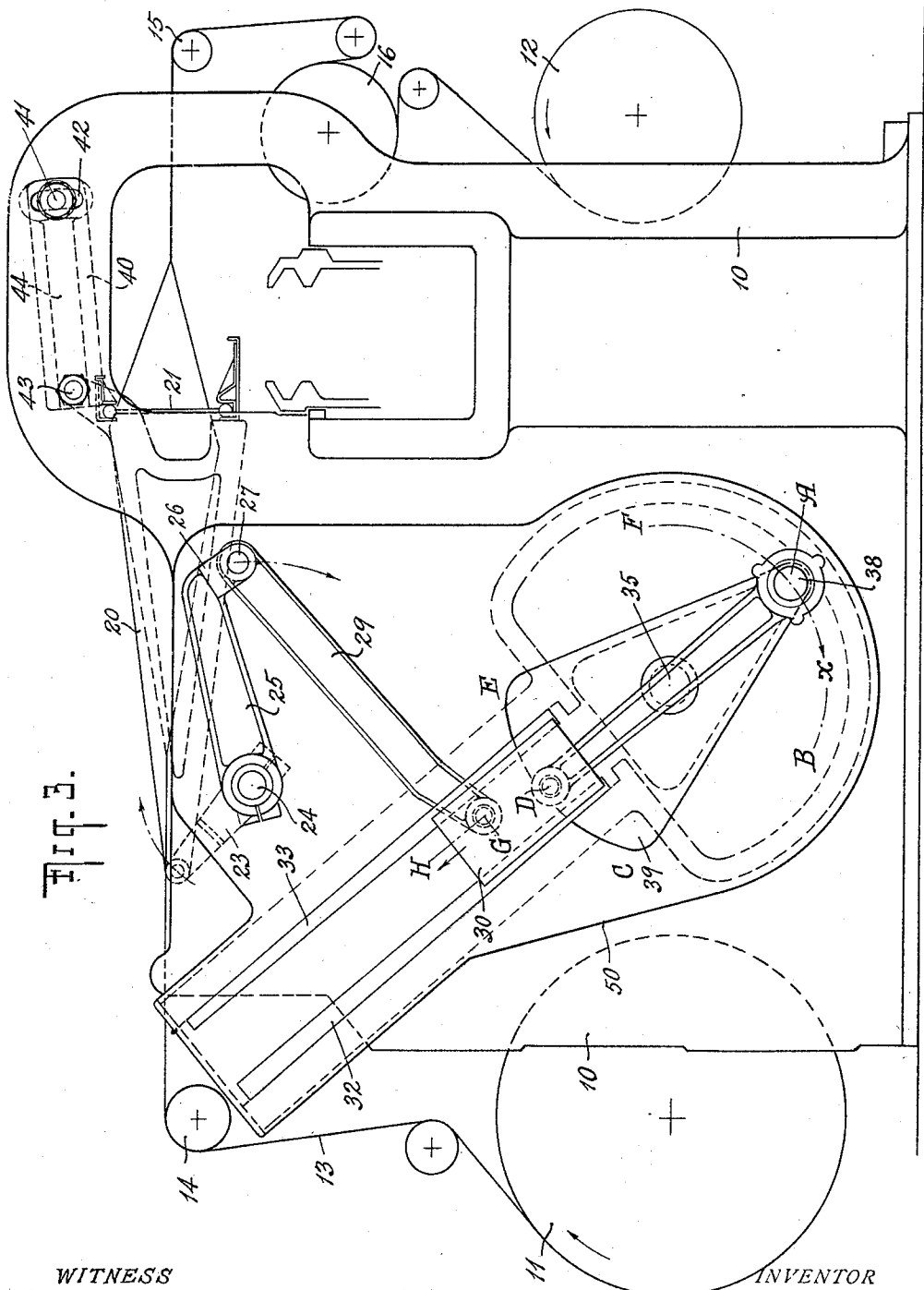


Fig. 3.

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BEATER MECHANISM FOR LOOMS

Application filed June 14, 1928. Serial No. 285,350.

My invention relates to looms and has for its object to provide a beater arm mechanism of novel construction, whereby the filler threads are uniformly and efficiently packed 5 after they have been laid by the shuttle across the warp threads forming the shed. A further object of my invention is the provision of a beater arm mechanism which is simple in construction and free from shocks and excessive friction in operation so as to reduce 10 the wear and tear on the parts and the noise of operation to a minimum. The invention contemplates further the provision of mechanism capable of producing a novel mechanical movement, whereby there is imparted to 15 the beater arm of a loom a rapid forward movement followed immediately by a rapid return movement, which in turn is followed by a dwell or idle period to permit the shuttle 20 to be moved across the shed to lay the filler thread, the same being fully described hereinafter and the features of novelty thereof pointed out in the claims.

In the accompanying drawings, which illustrate by way of example, a form of my invention without defining its limits, Fig. 1 is a side view in elevation of the mechanism showing the beater arm in advanced position; Fig. 2 is a vertical section approximately 30 upon the line 2—2 of Fig. 1; Fig. 3 is a view similar to Fig. 1 showing the beater arm in fully retracted position.

Referring to the drawings, 10 indicates the frame of a loom of any well-known or special 35 construction upon which are supported a warp beam 11 and a cloth roll 12. The warp threads 13 pass over a whip roll 14, and extend along the length of the machine, finally passing, in the form of woven cloth, over 40 guide roll 15, a friction roll 16 and onto cloth roll 12 upon which the cloth is wound. The warp threads are connected at the points 17, 18 to harness mechanism of any desired type which is operated in any suitable manner to 45 produce the shed 19 as shown in Fig. 1. The machine is provided also with the usual shuttle transfer mechanism (not shown) for laying the filler thread through the shed and across the warp threads. This mechanism 50 forms no part of the present invention and

therefore need not be shown on the drawings, the same being well understood by persons skilled in the art.

The beater mechanism according to the present invention comprises a frame composed of a pair of beater arms 20, 20' connected to each other and positioned at the sides of the machine, the arms being provided with the usual reed 21 extending between the warp threads and adapted to engage and pack the 60 filler threads after they have been laid by the shuttle across the warps. The beater arms are pivotally connected at 22, 22' to the ends of rock-arms 23, 23', respectively, which are fixed upon a shaft 24 extending across and 65 journaled in the sides of the frame 10, as shown in Fig. 2. Also fixed on the shaft 24 is a rock-arm 25 provided with a pair of ears 26 at the free end thereof. Pivotally mounted at one end upon a pin 27 journaled in said 70 ears is a link 29 which at its other end is pivotally connected to a block or cross-head 30 as shown at 31. The cross-head 30 is arranged to be guided for reciprocatory or translatable motion between a pair of guides 32, 33. The 75 cross-head and guides are preferably so positioned with respect to the arm 25 that one of the limits of movement of the cross-head is slightly beyond the perpendicular drawn from the pivot 27 of link 29 to the axis of guides 32, 33 as shown in Fig. 3, the said pivot 80 being assumed to be in its farthest removed position with respect to the guides (i. e. when the beater arm is in fully retracted position).

The cross-head 30 may be reciprocated 85 along its guides 32, 33 in any suitable manner. In the embodiment illustrated in the drawings such reciprocation may be effected by means of a crank 34 secured to a shaft 35 journaled in the sides of the frame 10 as 90 shown in Fig. 2. A connecting rod 36 is pivotally secured at one end, by means of the wrist pin 37, to the cross-head 30 and at its other end to the crank pin 38 of the crank 34. The crank is provided with a counter-weight 95 39 positioned diametrically opposite thereto with respect to the shaft 35.

The beater arms are supported at their forward ends upon a pair of guides 40 mounted upon the inner faces of the sides of the frame 100

10 of the machine. These guides are positioned at an angle to the longitudinal axis of the machine and are each adjustably secured to the frame by means of a bolt 41
 5 passing through a slot 42 in said frame and curved about a center defined by the other supporting bolt 43. The inclination of the guides is preferably so selected that the reed 21 will be in the vertical position at both its
 10 end positions, as shown in Figs. 1 and 3. As will be obvious, the degree of inclination of the guides will depend upon the difference in elevation between the two end positions of the oscillating pivot 22 of the beater arm.
 15 The guides 40 are provided with a trackway 44. Rollers 48, rotatably mounted upon arms 49 and which extend upwardly and forwardly of the beater arm and are preferably integral therewith, are arranged to engage the
 20 trackway 44 so as to support the beater frame thereon and prevent lateral play of said frame.

The above-described mechanism operates as follows: Assuming that the parts are in
 25 the position shown in Fig. 3, it will be seen that the crank pin 38 is positioned at a point diametrically opposite the cross-head 30 with respect to the shaft 35. As the shaft continues to rotate at a constant speed in the
 30 direction shown by the arrow X, the cross-head will be moved upwardly along its guides by means of the connecting rod 36. As the crank pin moves from the position A to the position B (Fig. 3) the pin 31 will be
 35 moved from position G to position H, which movement is very small in comparison with the angle through which the crank pin travels in moving approximately through the arc A—B. As the crank pin travels from the
 40 point B to approximately the point C the cross-head is given a greater longitudinal movement than during the interval A—B for an equivalent angular rotation of the crank pin. As the latter moves from C to D, the
 45 velocity of the cross-head rapidly decreases to zero, and as the pin continues its movement and travels from D to E (the latter corresponding to the position C), the cross-head rapidly gains in speed, reaching its maximum
 50 speed during the interval E—F. The point F corresponds to the point B, and during the movement of the crank pin from F back to A, the pin 31 of link 29 moves from H to G, during which interval, as during the interval A—B, the link 29 rocks about its pivot
 55 27 without causing any appreciable movement of the arm 25 so that the beater arms remain practically stationary.

It will therefore be seen that during the
 60 movement of the crank pin 38 through the arc F—A—B, which subtends an angle of about 140°, the pin 31 will move from H to G and back again to H; in other words, from a position slightly above the perpendicular line
 65 above referred to to a position slightly be-

low said line. During this oscillation of the link 29 between H and G, the beater arms, which are connected to said link, will be practically motionless, there resulting, in effect, lost motion for a definite length of time between the actuating mechanism and the beater arms. Theoretically, the beater arms are stationary only during the instants that the pin 31 connecting link 29 to the reciprocating element 30 reverses at the point G and
 70 passes through the vertical line drawn from pin 27 (and also when the pin 31 reverses at the other end of its travel); practically, however, any movement that would tend to be transmitted to the beater arms as the pin
 75 31 travels through the path H—G—H is substantially completely absorbed by the play in the bearings of the pins or shafts 31, 27, 24, and 22, so that the beater arms remain practically at rest during this interval. There is thus a reduced motion connection between the reciprocating element and the beater arms which produces a dwell over a considerable or finite period of time. The relationship of the parts is such that, as the beater arm approaches the left-hand limit of its motion, as
 80 viewed in Figs. 1 and 3, the reciprocating element imparts thereto an average rate of movement over the interval H—D—H which is less than that over any other equivalent interval in the reciprocating cycle; and that during this interval the reciprocating element receives its minimum average rate of movement, for an interval of such duration, from the crank 38. It will be understood that during this dwell or period of rest the shuttle mechanism is operated to transfer the shuttle through the shed of the loom.

It will thus be seen that as the crank pin makes a complete revolution (starting from the point B), the beater arms are given a rapid forward motion followed immediately by a rapid return motion, after which the beater frame is practically at rest for a definite period. While the movements are rapid, they are not sudden and the mechanism is not subjected to sudden blows or impacts, so that wear and tear on the machine and also the noise are kept at a minimum.

It will be understood that the mechanical movement above described is by no means limited in its application to a beater arm mechanism but is capable of being utilized in many other types of machines, and that my invention broadly embraces such mechanical movement, or the mechanism for producing the same, no matter of what kind of machine or device it forms a part.

While I have shown the guides 32 and 33 inclined to the vertical and the arm 25 fixed to the shaft 24 at an angle to the arms 23, it will be clear that such specific arrangement is not essential to the successful operation of my invention. The arrangement shown offers, however, the advantage of compactness

of construction and in addition has no parts of the operating mechanism projecting above the line of the warp threads.

The guides 32 and 33 may if desired be tapered, as shown, and adjusting means may be provided to move the same toward each other to take up wear.

The beater arm actuating mechanism above described may be housed in a casing 50 attached in any suitable manner to the frame of the machine. The shaft 35 may be geared to the driving mechanism that operates the shuttle and other parts of the loom so as to be synchronized therewith.

While I have found the above mechanism reliable and efficient in operation, it is to be understood that my invention is not limited to the specific construction shown but is capable of many variations. For instance, the cross-head 30 may be operated by means of an eccentric or a suitably designed cam, and the lost motion may be obtained in other ways than in the manner shown, while the arms 23 and 25 may be integral in the form of a single lever pivoted on the shaft 24.

I claim:

1. In a beater mechanism, the combination of a beater arm, a reciprocable element, a reduced motion connection between said element and said arm whereby said beater arm remains substantially at rest during a portion of the movement of said element, and means for actuating said reciprocable element.

2. In a beater mechanism, the combination of a beater arm, a shaft, a rock-arm on said shaft connected to said beater arm, a reciprocable element, a reduced motion connection between said element and said rock-arm whereby said beater arm remains substantially at rest during a portion of the movement of said element, and means for actuating said reciprocable element.

3. In a beater mechanism, the combination of a beater arm, a rock-arm connected to said beater arm, a second arm, rigidly connected to said rock-arm, a reciprocable element, a reduced motion connection between said element and said second arm whereby said beater arm remains substantially at rest during a portion of the movement of said element, a constantly rotating shaft, a crank secured to said shaft, and a connection between said crank and said reciprocable element.

4. In a beater mechanism, the combination of a beater arm, a rock-arm connected to said beater arm, a second arm rigidly connected to said rock arm, a reciprocable element connected to said second arm, said second arm and said element being so related that when said beater arm is in fully retracted position a line drawn from the point on said second arm, through which the latter is connected to said element, perpendicular to the path of movement of said element falls to one side

of the center of said path, and means for actuating said reciprocable element.

5. In a beater mechanism, the combination of a beater arm, a rock-arm connected to said beater arm, a second arm rigidly connected to said rock-arm, a reciprocable element connected to said second arm, said second arm and said element being so related that when said beater arm is in fully retracted position a line drawn from the point on said second arm, through which the latter is connected to said element, perpendicular to the path of movement of said element falls adjacent to one end of said path, and means for actuating said reciprocable element.

6. In a beater mechanism for looms, the combination of a beater arm, a rock-arm connected to said beater arm, a reciprocable element, means including a link connecting said rock-arm to said element, and means for actuating said reciprocable element.

7. In a beater mechanism for looms, the combination of a beater arm, a rock-arm connected to said beater arm, a reciprocable element, means including a link connecting said rock-arm to said element, said rock-arm and said element being so related that when the beater arm is in fully retracted position said link is substantially perpendicular to the path of movement of said element at a point adjacent one end of said path, and means for actuating said reciprocable element.

8. In a beater mechanism for looms, the combination of a beater arm, a rock-arm connected to said beater arm, a reciprocable element, means including a link connecting said rock-arm to said element, said rock-arm and said element being so related that when the beater arm is in fully retracted position said link is substantially perpendicular to the path of movement of said element at a point adjacent one end of said path, a rotatable shaft, and a crank secured to said shaft and connected to said reciprocable element for actuating the same.

9. A mechanical movement comprising a rock-arm, a reciprocable element, a reduced motion connection between said rock-arm and said element, whereby said rock-arm remains substantially at rest during a portion of the movement of said element, and means for reciprocating said element.

10. A mechanical movement comprising a rock-arm, an oscillating arm connected to said rock-arm, a reciprocable element, a reduced motion connection between said oscillating arm and said element, whereby said rock-arm remains substantially at rest during a portion of the movement of said element, and means for reciprocating said element.

11. A mechanical movement comprising a rock-arm, a reciprocable element, a connection between said arm and said element, said arm and said element being so related that

when the arm is at one of its limits of oscillation a line drawn from the point on said arm through which the latter is connected to said element, perpendicular to the path of movement of said element falls adjacent to one end of said path, and means for reciprocating said element.

12. In a beater mechanism, the combination of a beater arm, a reciprocable element connected to said beater arm, said element transmitting to said arm a rate of movement varying from zero to a maximum and then back to zero, said arm and said element being so related that when the former approaches its retracted position the minimum average rate of such movement measured over a finite time interval is transmitted to said arm, and a crank connected to said element to actuate the same and adapted to transmit thereto a rate of movement varying from zero to a maximum and then back to zero, said crank and said element being so related that the minimum average rate of such movement measured over a finite time interval is imparted to said element by said crank during the first mentioned interval.

13. In a beater mechanism, the combination of a beater-arm, a rock-arm connected to said beater-arm, a reciprocable element connected to said rock-arm, said element transmitting to said arm a rate of movement varying from zero to a maximum and then back to zero, said rock-arm and said element being so related that when the former approaches its retracted position the minimum average rate of such movement measured over a finite time interval is transmitted to said arm, and means for reciprocating said element.

14. The combination as set forth in claim 13, wherein said reciprocating means comprises a crank connected to said element and adapted to transmit thereto a rate of movement varying from zero to a maximum and then back to zero, and so related to said element that the minimum average rate of such movement measured over a finite time interval is imparted to said element by said crank during the first mentioned interval.

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