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VARIABLE BEAT-UP MOTION FOR LOOMS

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3 Sheets-Sheet 1

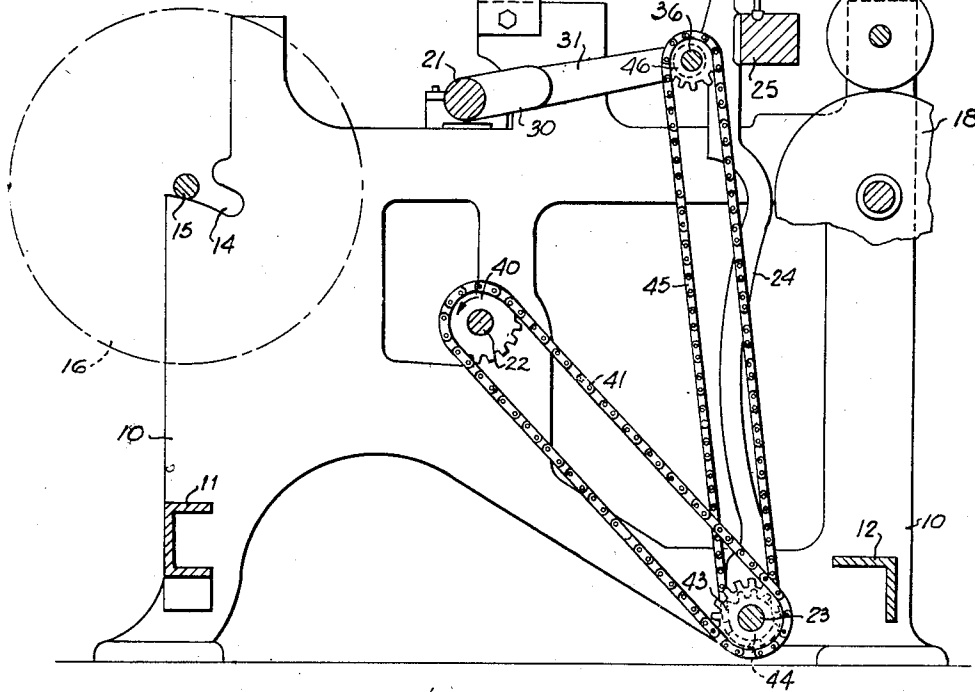
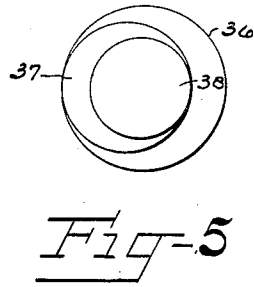
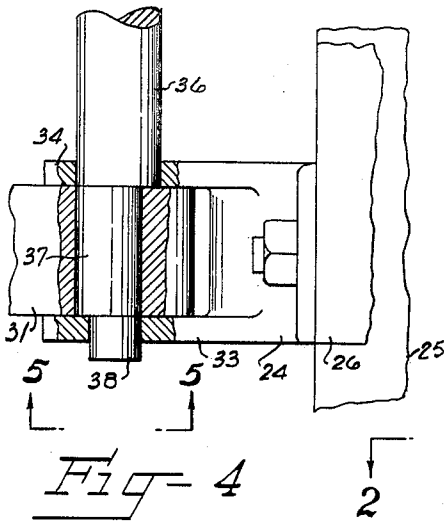


Fig-1

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3 Sheets-Sheet 3

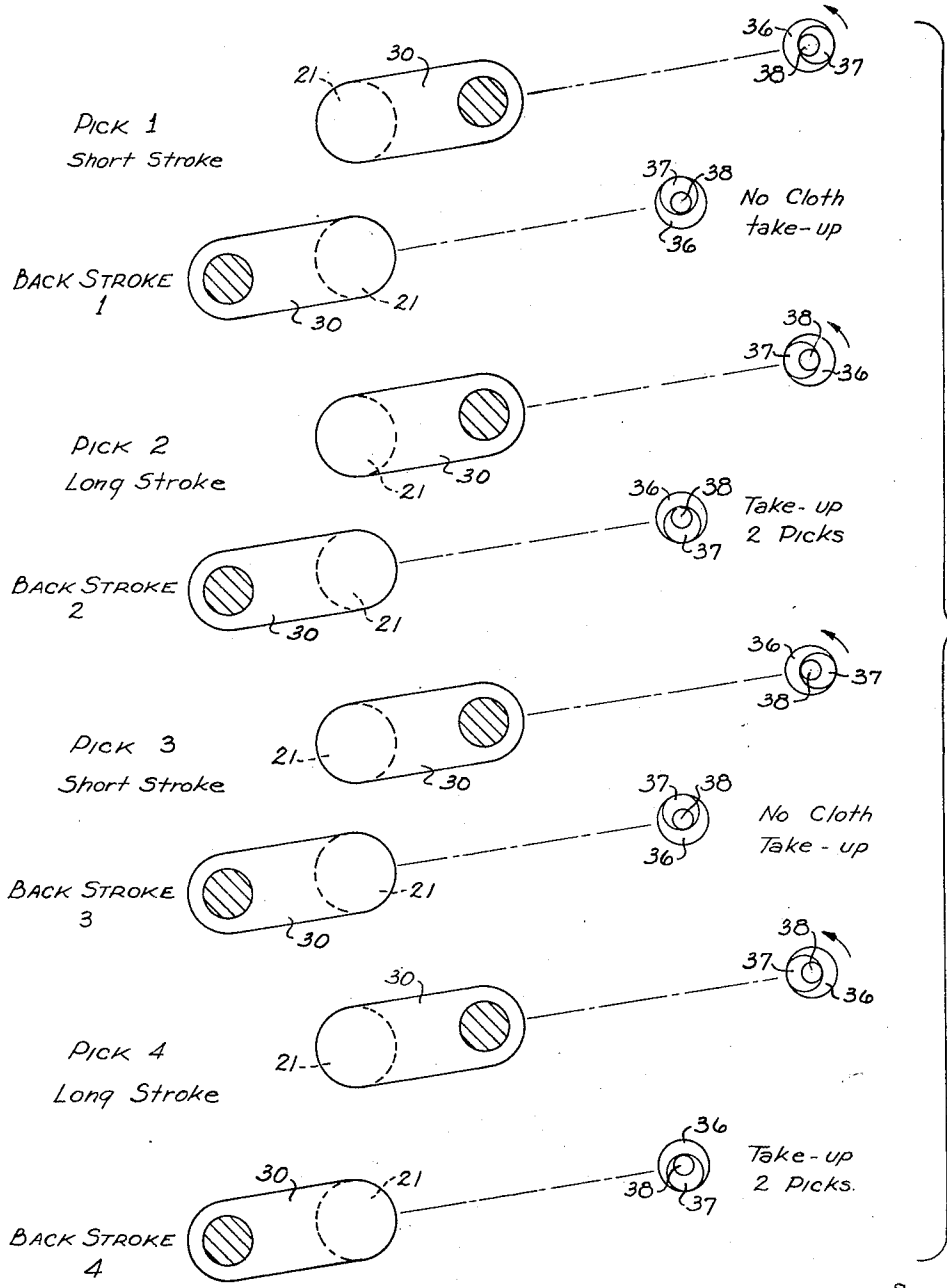


Fig-7

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VARIABLE BEAT-UP MOTION FOR LOOMS

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7 Claims. (Cl. 139—190)

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This invention relates to improvements in looms whereby the effective throw of the lay is varied to thus vary the overall length of the pitman rods, that is, the overall distance between the lay of the loom and the crank shaft of the loom to thus vary the length of beat-up of the fillings and means can also be provided whereby the cloth take-up can be intermittently operated to thus produce mesh cloth or lace cloth and this is done by placing two warp threads in alternate dents in the lay and so timing the mechanism for varying the effective stroke of the pitman rods to cause, for example, two fillings to be beat up in close proximity to each other and then to cause the next two fillings to be spaced from the previously woven fillings to thus provide square openings in the cloth to provide a mesh cloth, lace cloth and the like.

This is effected by having a shaft extending between the two swords of the loom and on the ends of this shaft eccentric portions are provided on which one end of the pitman rods which connect to the swords of the loom are mounted, the other ends of the pitman rod being mounted on the crank throws of the crank shaft and means are driven from the loom, preferably the cam shaft, for rotating the shaft associated with the swords of the lay of the loom to thereby vary the positions of the eccentrics on the shaft and to thus cause a pair of beat-ups with a lengthened stroke and the next two pairs of beat-ups with a shortened stroke and thus mesh cloth, lace cloth and the like can be provided.

The invention broadly relates to an eccentric connection between the pitman rod and the lay of the loom whereby the stroke of the lay is varied in regular cycles in order to beat up two fillings in close proximity to each other, at the same time the warp threads being spaced apart from each other such as by placing two warp threads in alternate dents of the reed in the lay.

It is therefore an object of this invention to provide a loom having a variable stroke of the lay whereby needle point canvas, lace cloth and the like having a mesh effect can be woven in a conventional loom by use of the modifications therein embodied.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds, when taken in connection with the accompanying drawings, in which

Figure 1 is a vertical sectional view through a loom and showing my invention applied thereto;

Figure 2 is a top plan view of the central portion of the loom and taken substantially along

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the line 2—2 in Figure 1 and showing the bow of the frame of the loom in section;

Figure 3 is an isometric view of the improved mechanism associated with various parts of the loom;

Figure 4 is a top plan view with portions broken away showing the eccentric connection between the pitman rod and one of the swords of the loom;

Figure 5 is an elevation taken along the line 5—5 in Figure 4 and omitting the sword portion which would be associated therewith;

Figure 6 is an enlarged detail of a portion of the cloth woven with this improved mechanism;

Figure 7 is a schematic view, showing the positions of the eccentrics during weaving.

Referring more specifically to the drawings, the numeral 10 indicates the side frame members of a loom joined together by suitable girts such as 11 and 12. This loom has suitable notches 14 in which the spindles 15 at each end of a warp beam 16 are mounted, and it also has a sand roll 17 and a cloth take-up roll 18 as well as a bow 19 connecting the two side frame portions of the loom. The loom also has a suitable crank shaft 21 and a cam shaft 22 and a rocker shaft 23 on which is oscillatably mounted the lower ends of swords 24. On the upper ends of the swords 24 is mounted a lay 25 and also a reed cap 26 accommodating a reed 27 for beating up the filling in the cloth 28 being woven. The crank shaft 21 has a pair of cranks 30 integral therewith to which are connected one end of pitman rods 31, the other ends of these pitman rods being oscillatably connected between the ears 33 and 34 which are integral with the swords 24 of the loom. Heretofore, the ears 33 and 34 have been penetrated by a pin which also penetrates the other end of the pitman rods 31. This gave a definite and uniform length of stroke to the lay of the loom upon each oscillation of the crank shaft 21.

Instead of having these ordinary pins for connecting the pitman rods to the swords, I provide a shaft 36 which is mounted for rotation in the lugs or ears 33 and 34 and each end of this shaft 36 has an eccentric portion 37 integral therewith and the extreme ends of the shaft 36 have a central smaller portion 38 which is concentric with the shaft 36.

The eccentric portion 37 penetrates a suitable hole in one end of the pitman rods 31. In order to vary the length of stroke of the reed 27 in a beat-up operation I provide on the cam shaft 22 a sprocket wheel 40 having a sprocket chain 41

mounted thereon and on the rock shaft 23 I mount in a rotatable manner a sleeve 39 having sprocket wheels 43 and 44 integral therewith. The sprocket chain 41 is also mounted on the sprocket wheel 43 and rotation of sprocket wheel 43 imparts rotation to sprocket wheel 44 which is integral with sprocket wheel 43. Sprocket wheel 44 has mounted thereon a sprocket chain 45 which is also mounted on a sprocket wheel 46 fixedly secured on the shaft 36. The sprocket wheels 44 and 46 are of the same size, and sprocket wheel 40 has the same circumference as the sprocket wheel 43 and therefore the shaft 36 is rotated the same number of revolutions per minute as the cam shaft 22, which means that the shaft 36 will make a complete revolution while the cam shaft 22 is making a complete revolution.

In making needle point cloth, canvas, lace cloth or mesh cloth, or whatever name it may be called, it will be noted that the splits of the reed 27 are indicated at 50 and the warp threads are indicated at 51. Two warp threads 51 are passed through alternate dents. With the low side of the eccentrics 37 disposed nearest to the crank shaft as shown at pick 1 Figure 7, a pick of filling 52 is projected through the shed in the warp threads 51 and beat up to the position shown in Figure 6 with the eccentrics 37 in the position at pick 1. While the crank shaft makes another complete revolution, no take-up will be effected in the cloth roll and with the eccentrics 37 disposed in the position shown at pick 2 or over next to the crank shaft, and the second filling 53 having been projected across the shed, the beat-up will take place with the shaft 36 rotated one-half revolution from the previous pick and during the beat-up of filling 53 it will be pushed against the filling 52 and may slightly advance filling 52. Then while the shaft 36 is making another half revolution for the crank shaft to advance the reed 27 and before the next filling 52 is projected through the shed, the take-up mechanism will take up two picks if desired to thus increase the width of openings 56 between the filling 53 and the next filling 52. This will of course cause the overall length of the pitman rods 31 to be shortened for pick 3 and filling 52 will be placed in the warp threads at the point shown in the drawings, then while the next filling 53 is being projected across the shed and while the pick shaft is making another revolution, no take-up will be effected until after the filling 53 has been thrown in the same manner as the previous filling 53 and the filling 53 will be beat up with the eccentric portion 37 projected towards the crank shaft to beat the filling 53 against the filling 52 in the same manner as filling 53 has been previously beaten up against the filling 52 to thus leave the openings 56 and this will continue throughout the weaving of a piece of cloth of any desired length. In other words, the first filling of a set is beat up with the overall distance between the crank shaft and the sword shortened and the second beat of a set is beat up with the overall distance between the crank shaft and the swords lengthened which will cause the second filling to push forwardly towards the top of Figure 6 to push the first filling slightly further along the warp threads along with the second filling to provide two fillings in close proximity to each other, and then while the crank shaft is making another revolution and the next filling is thrown, the take-up motion will take up the distance of two picks which will cause the vacancies between the two sets of fillings.

In other words it is well known that the cam shaft 22 makes one revolution while the crank shaft 21 makes two revolutions. It is also seen that the shaft 36 will make one revolution while the crank shaft is making two revolutions.

Even if the cloth take-up were not idled between the picks 52 and 53 these fillings would be close together, and even if the cloth take-up were not operated to move the cloth two picks before the next filling 52 was thrown, there would be a substantial space 56 between the sets of fillings.

By referring to Figure 7 it is seen that fillings 52 are beat up with the effective length of the pitman rods shortened on picks 1 and 3 and on picks 2 and 4 the effective length of the pitman rods would be increased.

By referring to Figure 7, it is seen that the timing is such that the shaft 36 makes one complete revolution while the crank shaft 21 is making two complete revolutions. Therefore, it is seen that on picks 2 and 4 the lay of the loom will be further away from the crank shaft than it will be on picks 1 and 3, thus a set of filling threads will be woven on picks 2 and 4 and then on picks 1 and 3 a second set of filling threads will be woven, which with the effective beat-up stroke decreased, the spaces 56 between the sets of filling threads will be formed. This can be accentuated by having the cloth take-up motion actuated two picks between the sets of filling and by not having the take-up motion actuate any at all between the two picks of each of the sets of filling.

In the drawings and specification there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only, and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. In a loom having a cam shaft and a crank shaft and a rocker shaft provided with a pair of swords oscillatably mounted at their lower ends on the rocker shaft and having a lay secured to their upper ends, said crank shaft having a pair of cranks thereon, a pitman rod having one end mounted on each crank and a pivotal connection between the other end of the pitman rod and the swords, said pivotal connection comprising a constantly driven rotary shaft mounted in both swords and having an eccentric portion near each end thereof around which one end of the pitman rods are mounted, means driven by the cam shaft for constantly rotating the shaft having eccentric portions thereon to shorten the throw of the lay on alternate picks and to lengthen the stroke of the lay on the other picks during operation of the loom to thus provide open spaces between the filling picks at regular intervals throughout the cloth being woven, the crank shaft having a speed of twice the number of revolutions per minute as the shaft having the eccentrics thereon.

2. In a loom having a rocker shaft and a pair of swords oscillatably mounted on the rocker shaft and having a lay secured on the upper ends of the said swords, said loom having a crank shaft and a cam shaft and a pair of pitman rods mounted at one end on the crank shaft and having their other ends pivotally connected to the swords, the pivotal connection between the pitman rods and the swords comprising a constantly driven rotary shaft extending from one sword to the other and having an eccentric portion on

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each end thereof adjacent said swords on which the ends of the pitman rods adjacent the sword are mounted, means driven by the cam shaft of the loom for rotating the rod having the eccentric portions on its ends during operation of the loom at a speed which is one-half the revolutions per minute as that of the crank shaft to thereby shorten the beat-up stroke of the lay on alternate picks and to lengthen the beat-up stroke on the intervening picks to thereby form spaces between certain of the filling threads which are woven in the loom.

3. In a loom having a crank shaft and an oscillatable lay and a pair of pitman rods connected to the crank shaft at one end and to the lay at the other end, the connection between the pitman rods and the lay comprising a constantly driven rotatable shaft having an eccentric portion on each end thereof on which the end of the pitman rods adjacent the lay are mounted, and means driven by the loom for rotating the shaft having the eccentrics thereon at a speed which is one-half the revolutions per minute as that of the crank shaft for varying the length of stroke of the lay during operation of the loom.

4. In a loom having a cam shaft and a crank shaft and a lay and a pair of oscillatable swords on the upper ends of which the lay is mounted, a shaft rotatably mounted in the swords means driven by the loom for constantly rotating the last-named shaft at a speed which is one-half the revolutions per minute as that of the crank shaft, the last-named shaft having an eccentric on each end thereof and a pair of pitman rods having one end mounted on the eccentric portions of the last-named shaft and the other ends of the pitman rods being mounted on the crank throws of the crank shaft, means for rotating the shaft having the eccentric on each end being timed to cause the shaft having the eccentric on each end to be rotated one revolution while the cam shaft is rotated two revolutions to thereby cause the high side of the eccentrics on the shaft to be advanced towards the lay on alternate picks and to be advanced towards the crank shaft on the intervening picks whereby pairs of filling threads will be woven in close relation and spaces will be provided between the pairs of filling threads.

5. In a loom having a cam shaft, a rocker shaft and a crank shaft provided with a pair of crank throws, and having the lower ends of a pair of swords oscillatably mounted on the rocker shaft and a lay fixedly secured on the upper ends of the swords and having a reed cap fixedly secured on the extreme upper ends of the swords, the swords having spaced projections near their upper ends and projecting towards the crank shaft, a rotatable shaft mounted in the spaced projections, eccentrics fixedly mounted on the shaft and disposed between each pair of projections on the swords, a pair of pitman rods having one end mounted on the crank throws of the crank shaft and having their other ends mounted on the eccentrics, means driven by the cam shaft for imparting constant rotation to the rotatable shaft on the swords at a ratio of one complete rotation of the rotatable shaft on the swords to each two revolutions of the crank shaft, to thereby shorten the effective length of the pitman rods on alternate beat-ups and to increase the effective length of the pitman rods on the intervening beat-ups.

6. In a loom having a cam shaft, a rocker shaft and a crank shaft provided with a pair of

crank throws, and having the lower ends of a pair of swords oscillatably mounted on the rocker shaft and a lay fixedly secured on the upper ends of the swords and having a reed cap fixedly secured on the extreme upper ends of the swords, and the crank shaft rotating at twice the revolutions per minute as the cam shaft the swords having spaced projections near their upper ends and projecting towards the crank shaft, a rotatable shaft mounted in the spaced projections, eccentrics fixedly mounted on the shaft and disposed between each pair of projections on the swords, a pair of pitman rods having one end mounted on the crank throws of the crank shaft and having their other ends mounted on the eccentrics, a driving wheel fixed on the cam shaft, a second driving wheel rotatably mounted on the rocker shaft, a driving belt mounted on the two driving wheels, a third driving wheel integral with and disposed to one side of the second driving wheel, a fourth driving wheel fixed on the rotatable shaft mounted on the swords, a driving belt disposed on the third and fourth driving wheels, the ratio between the first and fourth driving wheels being of a one to one relation to thereby cause the rotatable shaft on the swords to make one complete revolution while the crank shaft makes two complete revolutions.

7. In a loom having a cam shaft, a rocker shaft and a crank shaft provided with a pair of crank throws, and having the lower ends of a pair of swords oscillatably mounted on the rocker shaft and a lay fixedly secured on the upper ends of the swords and having a reed cap fixedly secured on the extreme upper ends of the swords, and the crank shaft rotating at twice the revolutions per minute as the cam shaft the swords having spaced projections near their upper ends and projecting towards the crank shaft, a rotatable shaft mounted in the spaced projections, eccentrics fixedly mounted on the shaft and disposed between each pair of projections on the swords, a pair of pitman rods having one end mounted on the crank throws of the crank shaft and having their other ends mounted on the eccentrics, a sprocket wheel fixed on the cam shaft, a second sprocket wheel rotatably mounted on the rocker shaft, a sprocket chain belt mounted on the two sprocket wheels, a third sprocket wheel integral with and disposed to one side of the second sprocket wheel, a fourth sprocket wheel fixed on the rotatable shaft mounted on the swords, a sprocket chain belt disposed on the third and fourth sprocket wheels, the ratio between the first and fourth sprocket wheels being of a one to one relation to thereby cause the rotatable shaft on the swords to make one complete revolution while the crank shaft makes two complete revolutions.

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