Sept. 26, 1944. W. D. STEGALL 2,358,884

HARNESS ACTUATING MECHANISM

Filed May 29, 1943 3 Sheets-Sheet 1

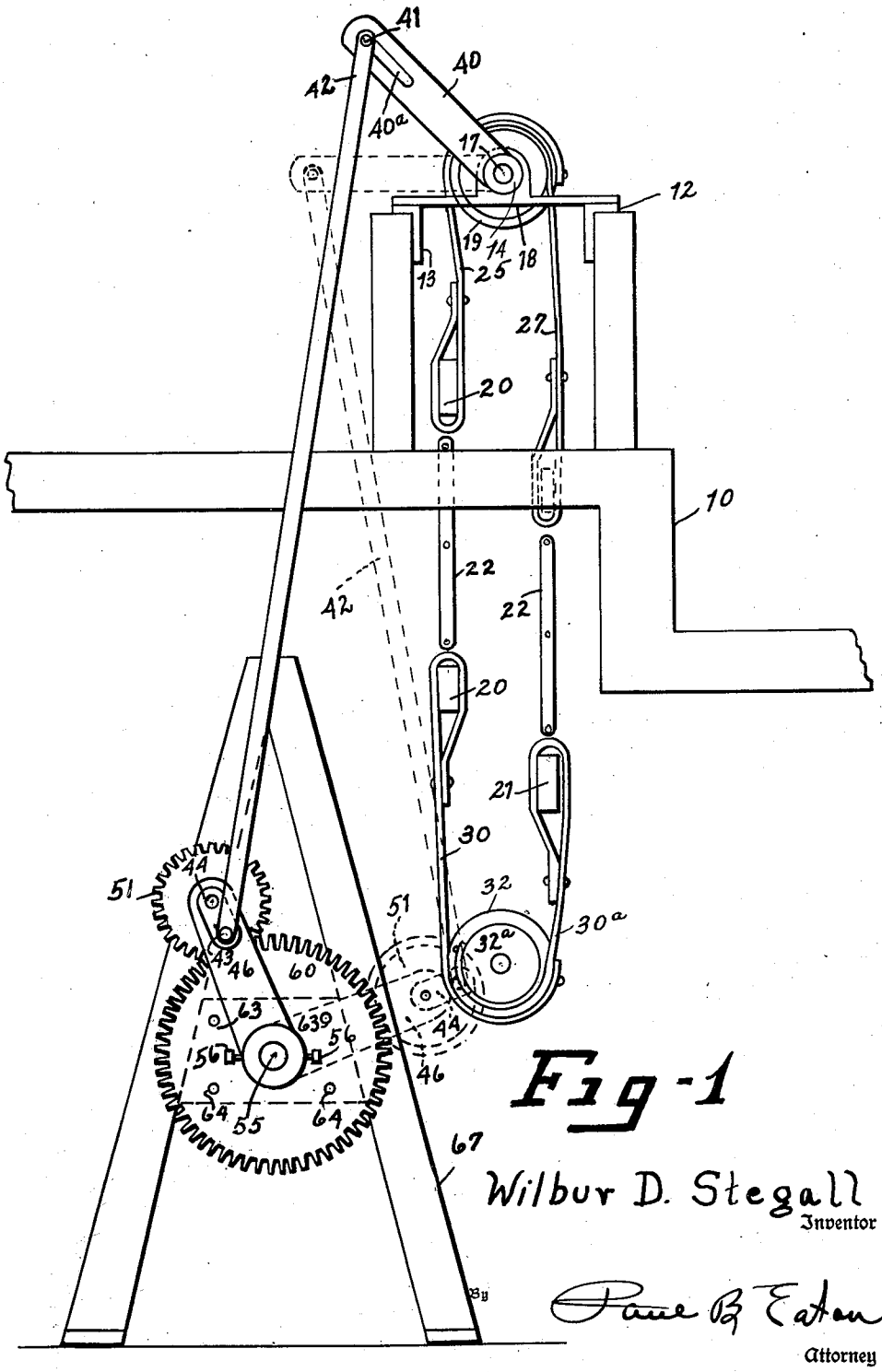


Fig-1

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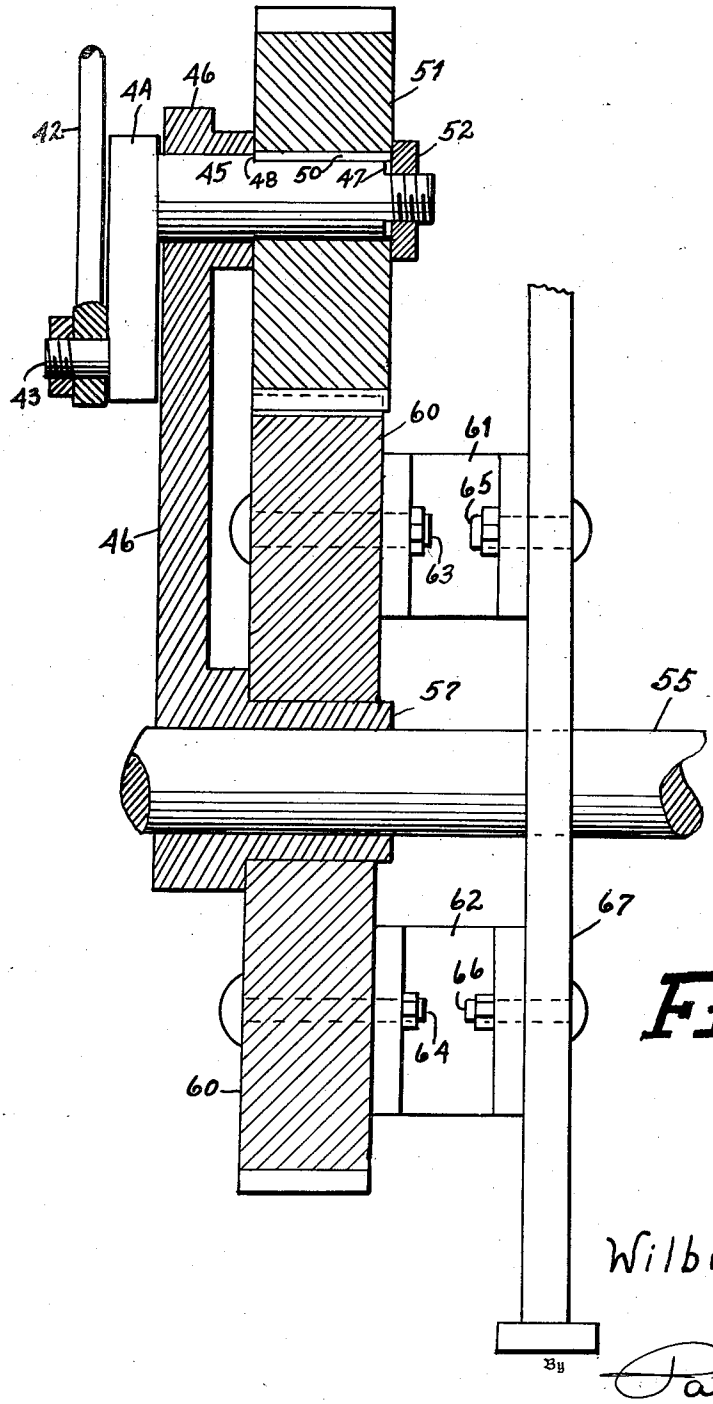


Fig-2

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Filed May 29, 1943 3 Sheets-Sheet 3

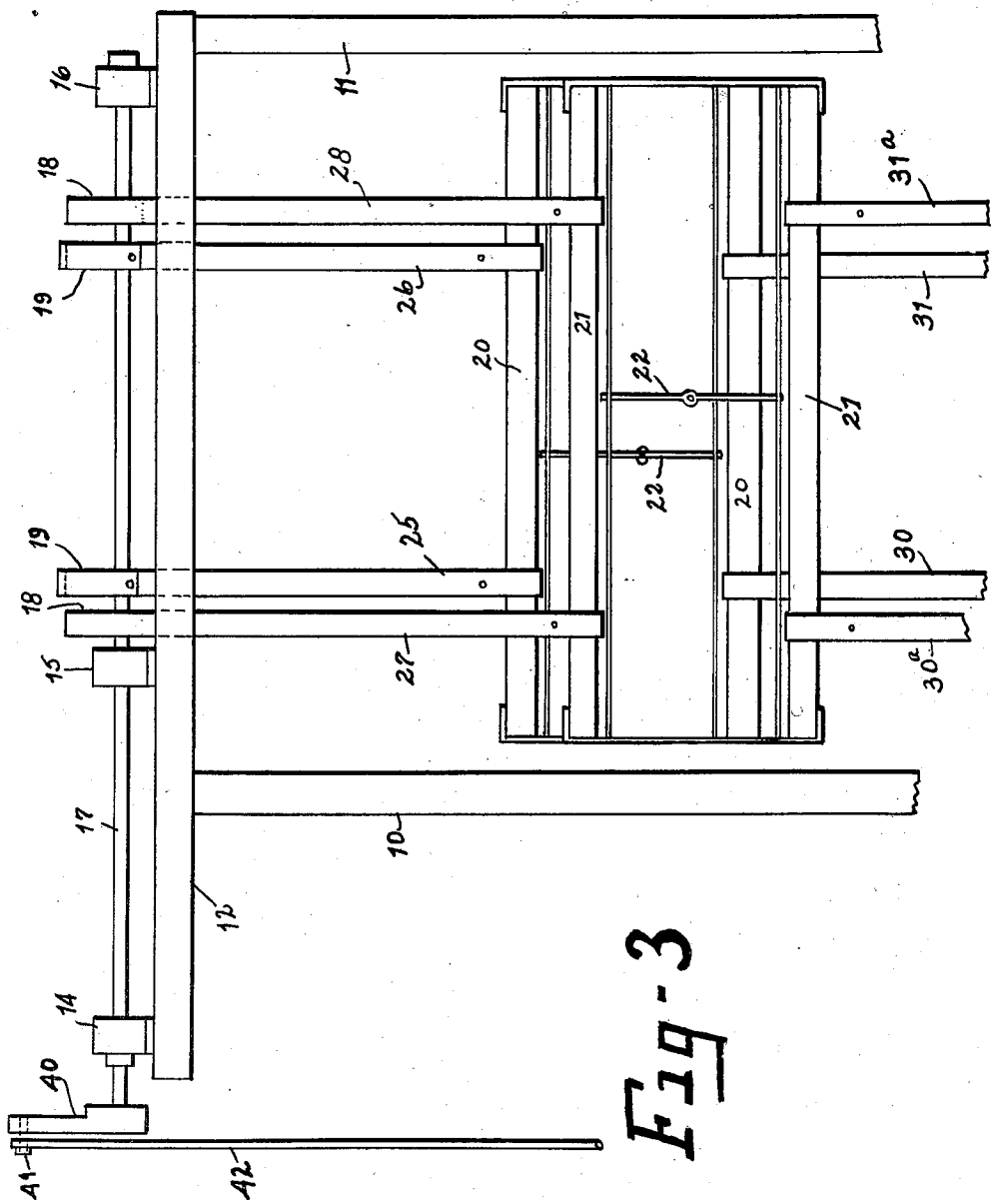


Fig-3

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HARNESS ACTUATING MECHANISM

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Application May 29, 1943, Serial No. 489,029

3 Claims. (Cl. 139—55)

This invention relates to a harness actuating mechanism for looms and more especially to means for actuating the harness in forming sheds in the warp of the loom whereby there is produced a substantial dwell at the upper and lower positions of the harnesses.

In a loom, there are two or more harnesses with means for alternately raising and lowering the harness for forming sheds in the warps so that the shuttle can be projected through the shed in a weaving operation. In conventional looms, the up and down motion of the harnesses is usually at the same rate and when a harness is raised or lowered, it is immediately moved in the reverse direction. By so doing, the warp threads engage the shuttle and deflect the same causing a smashup, pick out, or other undesirable results, which not only cause great damage to the loom but in many instances cause defective weaving of the cloth. While the shed is open and the shuttle is being projected through the shed, if the lowered harnesses move upwardly too soon, they have a tendency to deflect the shuttle and cause a smashup in the box. During the projection of the shuttle from one side of the loom to the other, the lower warps are lying flush on top of the race plate, and in the event that the lower warps are raised upwardly before the shuttle has completed its travel through the shed, deflection of the shuttle results, causing it not to box properly, and to do more or less damage to the shuttle or to the box into which it is supposed to be cast. In looms, there are various methods and means employed for moving the harnesses up and down. Some looms employ a rocker arm, which is usually a T-shaped lever pivoted at the junction point of the two legs, and harness cords pass from the ends of this lever over suitable sheaves or pulleys and are secured to the upper sides of the harness, and in the case where only two harnesses are used, or in case of four, six, or eight harnesses, one end of the lever actuates half of the harnesses and the other end of the lever actuates the other half. Therefore, half of the harnesses are in raised position, and half of the harnesses are in lowered position during the time the shuttle is projected from one side of the loom to the other. In other forms of harness actuating mechanism, simple levers are pivoted to the loom frame and these are connected by suitable cords to the harnesses for raising and lowering the same. All of these various harness motions are usually controlled by a reciprocating rod connected to the harness motion and also connected to a driven shaft of the loom for imparting reciprocatory movement to the connecting rod to thereby reciprocate the harness motion, and to cause the up and down movement of the harnesses.

In the present invention, I have shown the harness actuating mechanism associated with a shaft disposed transversely across the top of the loom with a crank on the shaft connected to the driven mechanism and with pulleys mounted on the shaft so that the driven mechanism through the medium of the connecting rod, will impart oscillatory motion to the shaft, and straps are connected to the pulleys and to the upper edges of the harnesses for thus imparting vertical reciprocatory motion to the harness frames due to the oscillation of the transversely disposed shaft. Of course, the lower portion of the harnesses is connected by straps around a suitable idler pulley for holding the harnesses in proper position. By holding the shed open for a longer time, less power is required to propel the shuttle and therefore, there is less wear on the loom.

It is evident that regardless of the type of harness motion wherein vertical reciprocatory motion is imparted to the harnesses, that my driving means hereinafter more fully described will work equally well with any type of harness actuating mechanism now employed.

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 an end elevation of the mechanism driven by the loom for actuating the harness motion;

Figure 2 is a side elevation of Figure 1 with parts in section;

Figure 3 is a view looking from the right-hand side of Figure 1, and showing the oscillating rod disposed above the loom but omitting the driving mechanism shown in Figures 1 and 2.

Referring more specifically to the drawings, the numerals 10 and 11 indicate the end frames of a loom and across the upper portions of these are secured a pair of angle iron bars 12 and 13, and mounted on top of the members 12 and 13 are a plurality of bearing members 14, 15, and 16 in which an oscillatory shaft 17 is mounted. This oscillatory shaft has a pair of wheels or pulleys 18 and 19 thereon for each harness frame employed in the loom. In the present invention only two harness frames are shown for forming a simple shed in the warp, but of course, it is understood that as many different harness frames may be employed as desired. In the

present drawings, there are two harness frames indicated by reference characters 20 and 21. The harness frame 21 is known as the front harness frame, that is, the one next to the roll of cloth which has been woven, and the harness frame 20 is the back harness frame in which is disposed on the side of the shed next to the warp beam. These harness frames have a plurality of heddles 22 therein, only one heddle being shown in each frame, but it is of course understood that several hundred heddles are disposed in each frame, there being a heddle for each warp thread in the warp. These harnesses are suspended by means of straps 25 and 26 for the back frame and 27 and 28 for the front frame. These straps are secured around the upper bar of the harness frames, but, of course, it is understood that these straps may be secured to the harness frames by means of hooks or eyes or any other suitable conventional means for connecting harness straps to harness frames. The lower bar of the rear harness frame 20 has secured thereto straps 30 and 31 which are secured to an idler pulley 32, and the straps 30*a* and 31*a* are secured to the lower bar of the front harness frame 21 at one end and their other ends are secured to idler pulley 32*a*. Pulleys 32 and 32*a* are secured together so they will oscillate together. The upper ends of the straps 25 and 26 are secured to pulleys 18 and 19 and it is noted that pulleys 19 are larger than the other pulleys 18 to which the straps 27 and 28 for the front harness frame are secured. This is for the reason that greater up and down motion is necessary in the back harness frame than in the front harness frame.

It is of course evident that when the shaft 17 is oscillated in one direction that one harness frame will be lowered and the other raised, and when the shaft 17 is oscillated in the opposite direction, the positions of the harness will be reversed, forming a shed upon each up and down motion of the harness.

The end of the shaft 17 has mounted thereon a crank arm 40 which has pivotally secured as at bolt 41 a connecting rod 42. Bolt 41 is adjustably mounted in slot 40*a* in arm 40. The lower end of this connecting rod 42 is connected to extension 43 of a crank arm 44. The crank arm 44 has a portion 45 rotatably mounted in the end of a crank 46. The portion 45 being rotatably mounted in crank 46 has keyed thereon as by key 50 a pinion 51 and is secured in position by means of a nut 52, threadably secured on the right-hand end of bolt 45 in Figure 2. The portion 45 is shouldered as at 47 and 48 so that pinion 51 may be secured thereon, but will leave portion 45 free to rotate in crank 46. The crank arm 46 is adjustably mounted on a suitable driven shaft 55 of the loom which in the present instance is the cam shaft, but, of course, it is evident that any continuously rotating shaft may be employed for driving this harness motion mechanism. The means for suitably and adjustably securing the crank arm 46 on the shaft 55 is shown in Figure 1 where suitable set screws 56 are employed for this purpose.

The crank arm 46 has an elongated sleeve portion 57 which extends loosely through a gear 60 which is fixedly secured by means of brackets 61 and 62 and bolts 63, 64, 65, and 66 to a bracket or stand 67 secured to the floor on which the loom rests. The gear 60, as can be observed, is a stationary gear, and the pinion 51 rotates around this gear. The pinion 51 has one-half as many teeth therein as the gear 60. It can be observed that just before the crank arm 46 reaches vertical upward position, that the crank 44 will be pointing radially inwardly as shown in Figure 1, and just before the crank arm reaches horizontal position either to the right, as shown in dotted lines in Figure 1, or the left in a position 180 degrees from the dotted line position shown in Figure 1, the crank 44 will be extended radially outward from crank 46 and in horizontal or parallel position to the crank arm 46. When the crank arm 46 has moved to a point just before it points straight downwardly in Figure 1, the crank 44 will be pointing radially upwardly and therefore, it is seen that there will be a substantial dwell in the movement of the harness frames when they reach uppermost or lowermost position.

It is thus seen that while the portion 45 at the end of the crank arm 46 rotates in a circle, the portion 43 will travel in an ellipse. This will thus convert rotary motion into elliptical motion, and will give a substantial dwell to the harness frames while in uppermost and lowermost positions. By observing Figure 1, it is seen that in the bold line position, the portion 43 until it reaches vertical position will continue to travel farther away from the floor upon which the loom is disposed, but the crank portion 43 will be traveling in a clockwise direction and will continue to exert an upward movement to the crank 40 until it reaches a position 45 degrees from that shown in bold lines, and then it will travel to the dotted line position where it will, during the next 45 degrees of movement, gradually lengthen the effective stroke of crank arm 46 and move the harnesses at a swifter rate. After passing the dotted line position shown in Figure 1 until the crank 46 reaches a position 180 degrees from bold line position in Figure 1, the effective length of the crank 46 will be shortened to gradually slow down the movement of the harnesses. Thus a substantially and gradually decreasing rate of movement will be imparted to the harnesses as they approach their limit of oscillation and a greater period will be provided in which the harnesses will remain stationary before moving in the opposite direction.

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 vertically reciprocable harness frames, means driven by the loom for imparting vertical reciprocatory motion to the harness frames, said means comprising a crank mounted on a driven shaft of the loom, a pinion rotatably mounted on the free end of the crank, a crank on said pinion, a connection between the crank on the pinion and the means for imparting vertical reciprocatory motion to the harness frames, a fixed gear loosely surrounding said shaft and being in engagement with the pinion at all times, the pinion having one-half as many teeth as the gear, whereby when the crank on the driven shaft has almost reached uppermost and lowermost positions, the crank on the pinion will be extended radially toward the driven shaft, and when the crank on the driven shaft has almost reached horizontal position, the crank on the

pinion will be extended radially outwardly from the end of the crank on the driven shaft.

2. In a loom having a plurality of vertically movable heddles for supporting the warp threads and for forming sheds therein, oscillatable means for supporting the heddles, means driven by the loom for imparting oscillation to the oscillatory means, comprising a fixed gear surrounding a continuously driven shaft of the loom, an arm fixed on the shaft, a pinion shaft having a crank arm rotatably mounted in the free end of the arm, a connecting rod extending from the crank arm to the oscillatory means, a pinion fixedly mounted on the pinion shaft and engaging the gear, the pinion having one-half as many teeth therein as are present in the gear, whereby rotation of the arm on the crank shaft will impart rotary motion to the pinion engaging the gear to thereby rotate the pinion one-half revolution for each 90 degrees of travel of the arm, the crank arm on the pinion shaft being positioned to point radially inwardly towards the center of the gear when the arm approaches but has not quite reached uppermost and lowermost positions, and said crank arm extending radially outward from the arm as the arm approaches but has not quite reached horizontal positions to thereby shorten the effective throw of the arm as the arm approaches vertical positions and to increase the throw of the arm as it approaches horizontal positions, thus causing the lower end of the connecting rod which is connected to the crank arm to travel in an elliptical path, the foci of the ellipse in which the lower end of the connecting rod travels being disposed in a plane slightly inclined to the horizontal.

3. In a loom having oscillatory means for supporting a plurality of harness frames, means for imparting oscillatory motion to the oscillatory means for forming sheds in the warp supported by the harness frames, said means comprising a continuously rotating shaft, a gear concentrically disposed in fixed position around the shaft, an arm having one end fixed on the shaft, a pinion assembly rotatably mounted in the free end of the arm, said pinion assembly having an eccentrically disposed pivot pin extending therefrom, said pinion assembly comprising a pinion having one-half as many teeth therein as the gear and being in mesh with the gear and being so enmeshed with the gear that as the arm nears vertical positions, the pivot will be disposed between the shaft and the center of the pinion, and as the arm nears horizontal positions, the pivot will have moved a semi-circle from the first-named positions, and a connecting rod connecting the pivot and the oscillatory means.

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