Dec. 31, 1963 A. MOROSINI 3,115,903

REVOLVING BEATING UP TOOL AND SHUTTLE FOR RIBBON LOOMS

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Fig.1

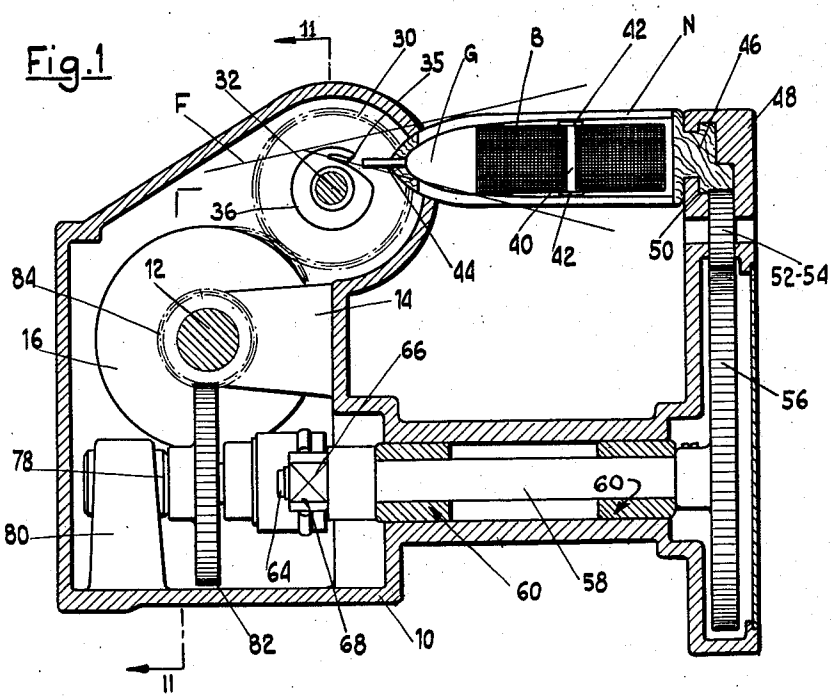
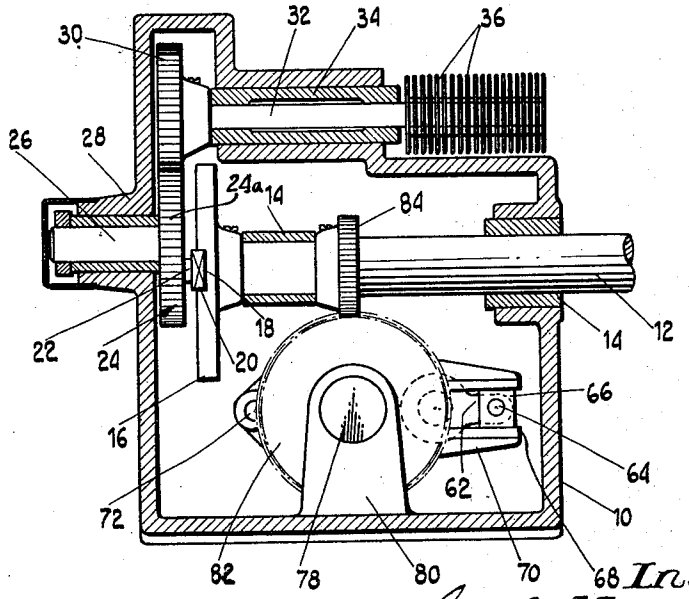


Fig.2



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Fig.3.

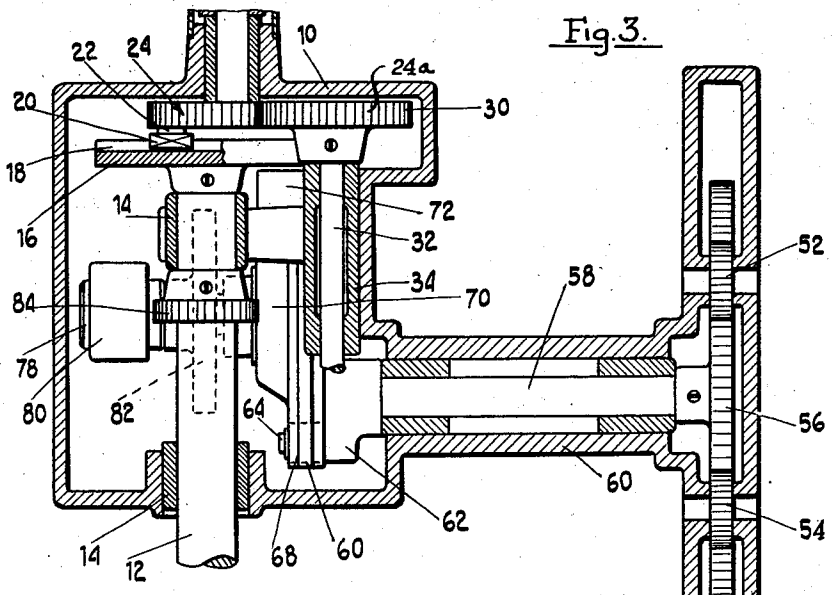


Fig.4

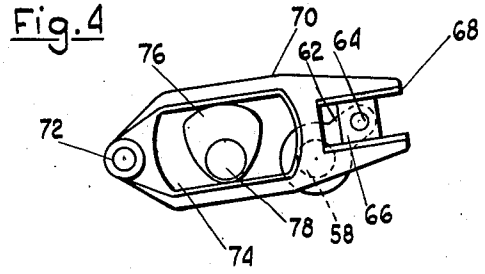
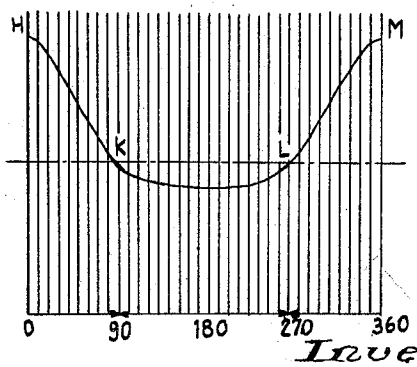


Fig.5.



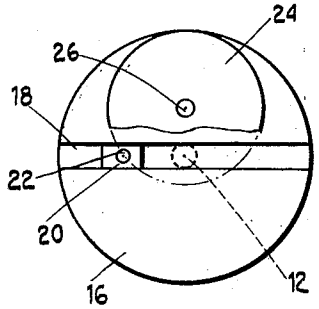


Fig.6.

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REVOLVING BEATING UP TOOL AND SHUTTLE FOR RIBBON LOOMS

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5 Claims. (Cl. 139—191)

This invention relates to a device which can be attached to looms, and in particular to ribbon looms, and designed to drive in the proper kinematic sequence the beating-up tool of the revolving type which consists of a plurality of profile disks interposed between the warp threads and which is continuously rotated to insert the weft into the warp shed.

Moreover, the device comprises a control mechanism to drive, in connection with the operation of a beating-up tool, the weft supply consisting of a shuttle reciprocated across the warp shed.

As already known, a plurality of profile disks keyed on a common shaft can be used as the beating-up tool, in place of the conventional comb supported by a slay box. Such disks serve to insert the weft into the warp shed, and have same weft beaten-up therein. However, such beating-up tools do not allow the attainment of high loom productions since their drive must be synchronized with that of the weft supply. More precisely, the means by which the weft thread insertion device is driven are not such as to allow a proper synchronism, when account is taken of the time required for the insertion of the weft into the warp shed. Since a given time is required to insert the weft into the warp shed, it follows that a variable speed motion must be imparted to the shuttle, in order to have the weft picked in a time period as short as possible.

The main object of this invention is the provision of a driving device of the above specified type which, while being of simple design, allows a reliable operation and higher operating speeds, with the added advantage of improving the warp and weft weave.

A further object of the invention is the provision of a high speed operating mechanism for shuttles designed to insert the weft into the warp shed thereby obtaining wholly equal and symmetrical border ties to the right and left.

The device according to the invention designed to operate a revolving beating-up tool consisting of a plurality of profile disks keyed on a common shaft, is characterized in that the shaft is driven by the loom main driving shaft through a linkage designed in such a manner as to impart a first accelerated motion, and a subsequent decelerated motion to the beating-up tool at each turn of the main driving shaft.

The kinematic connection of the driving shaft and beating-up tool shaft is established, according to the invention, by means of a disk provided with a diametral groove. A pin slidingly engaged in said groove is keyed to a mating disk by which the beating-up tool is driven at a variable speed ratio, depending upon the amount of misalignment of the mating disk to the grooved disk.

The weft yarn is wound on a cop positioned in a shuttle slidably fitted between straight guides secured to the loom and attached to be driven by gear means alternatively engaging with the shuttle and the alternative drive of said components being derived from the loom main drive shaft by means of a cam co-operable with a suitable lever for imparting an alternate motion to the gear means by means of a crank and connecting rod in order to obtain a properly accelerated and decelerated to and fro motion.

The above inventive solution allows, in addition to already stated advantages, the use of a shuttle of the conventional type which however is fitted with a cop holding a large yarn reserve whereby the loom can be operated for longer times without having to replace the woven-off cop since the cop is fitted with its axis substantially perpendicular to the longitudinal mid-line of the shuttle.

The invention will now be disclosed in the following description, taken with the accompanying drawings, wherein a ribbon loom head according to the invention is shown, as an illustrative example. In the drawing:

FIG. 1 is a longitudinal section of the head.

FIG. 2 is a section taken along the line II—II of FIG. 1.

FIG. 3 is a horizontal section of the head, with shuttle and beating-up tool removed.

FIG. 4 is a front view of a detail of shuttle operating mechanism.

FIG. 5 is an acceleration and deceleration diagram of the revolving beating-up tool, and

FIG. 6 is an elevational view of the disk carried by the drive shaft showing the diametral groove and slider.

Referring now to above figures, the head as shown, consists of a casing 10 in which the different devices as hereinafter described, are located.

A drive shaft 12 has one end thereof projecting from the casing and suitably connected with a driving motor, is positioned in a bearing 14 within the casing, and a disk 16 is keyed on its opposite free end.

A slider 20 as shown in FIGS. 2 and 3 is slidingly positioned in a diametral groove 18 formed on the outer side of the disk 16, and is engaged by a pin 22 keyed in a proper position on a mating disk 24 provided with a stub shaft 26, which latter shaft is held in a support 28 secured to the casing 10.

As shown in the figures, and particularly in FIG. 6, the axes of shaft 12 and of pin 26 are conveniently misaligned respecting each other depending on the purposes which are to be attained, and on the maximum width of the band which is to be woven.

The disk 24 is provided with teeth 24*a* on its periphery and the teeth mesh with the teeth on a pinion 30 secured to a shaft 32. The shaft 32 is rotatably supported in a tube of bearing 34 mounted in the casing 10 and the shaft 32 is arranged in parallelism to the drive shaft 12 as shown in FIGS. 2 and 3.

The opposite end of the shaft 32 projects from the casing 10, and a row of suitably spaced profile disks 36, as shown in FIG. 2, designed to act as a beating-up tool are keyed thereon. The strands of warp yarns F as shown in FIG. 1 are guided between the disks 36 and the weft yarn is inserted therebetween to form the woven fabric.

The weft yarn is wound on a cop B as shown in FIG. 1 positioned in a bow shuttle N.

More precisely, the cop B is held within the shuttle N by a pin 40 supported by two removable studs 42 in such a manner that the axis of the cop B is perpendicular to the longitudinal mid-line of the shuttle. Such arrangement allows the use of cops which are intended to hold an amount of yarn much greater than that of conventional cops fitted longitudinally in the shuttle.

The weft yarn unwound from cop B is inserted in the warp shed formed by the yarns F through a thread-guide 44 secured to middle portion of the bow shuttle N that is in a position much closer to the beating-up tool 36.

The back of shuttle N is formed, in a manner already well known in the art, with a prismatic rib 46 as shown in FIG. 1 slidingly held in suitable guides 48 provided for the casing 10. The lower toothed section 50 of the rib is in mesh with pinions 52—54 supported on the casing 10. Pinions 52—54 each mesh with a large gear 56 secured to a shaft 58 and the shaft 58 is supported in bearing 60 and suitably located in the casing 10. The axis of the shaft 58 is orthogonal to the axis of the drive shaft 12.

A crank 62 keyed on the free end of shaft 58 is engaged by pin 64 in a recess of a slider 66, slidingly fitted (see FIG. 4) in a slot 68 formed on the free end of a lever

70 pivoted as at 72 on the casing 10, and positioned in such a manner that its axis is orthogonal to the axis of the shaft 12.

A suitably profiled cam 76 is engaged in a further slot 74 formed on the lever 70 at a location midway between the pivot 72 and the slot 74. This cam is keyed on a shaft 78 mounted in a bearing 80 secured to the casing 10. A spiral gear 82 keyed on the same shaft meshes with a mating pinion 84 keyed on the main drive shaft 12, and the latter shaft is located orthogonally to the shaft 78.

As stated above, it follows that the rotary motion of the shaft 12 is transmitted, through the disk 16, the mating disk 24 and the pinion 30 to the beating-up tool 36 in such a manner that the latter unit can be shifted, at each turn, at the speed shown in FIG. 5.

More precisely, in the first length H—K of the curve, the recesses 35 formed on the disks are drawn near to the hooked end of the shuttle yarn guide 44 while during the next curve section K—L the weft yarn is brought into the recesses 35 of the disks 36. Immediately after this operation is accomplished, a further rotary motion (of about 90°) is effected by the disks, and the non-recessed peripheral portion thereof is caused to travel at a slower speed across the section L—M. During the latter cycle, the weft yarn inserted into the warp shed is beat-up therein.

As already stated, the drive of shuttle N is synchronized with the drive of the revolving beating-up tool 36.

More precisely, during the period K—L, the weft yarn is inserted by the shuttle into the hooked end of the recesses 35, thereby weaving in the same yarn. The advantages which can be attained by the above disclosed inventive solution are apparent. In addition to the possibility of increasing the loom operating speed, woven fabrics with exactly equal and parallel border ties, while the breakages of warp threads, caused in other loom types by the slay box motion, can be positively prevented. A highly profitable advantage is effected by the use of a bow type shuttle, fitted with a cop wherein a materially larger yarn reserve can be held, and it is pointed out that such reserve might be up to ten times greater than that allowed by the conventional cops fitted in the standard shuttles.

It must be understood that the invention also applies to looms fitted with the revolving beating-up tool, and/or with the shuttle as described and shown.

It is to be understood that the invention is not limited to the exact details of construction shown and described, as variations, modifications and changes may be made therein as fall within the scope of the claims hereunto.

What I claim is:

1. In a loom, particularly a ribbon loom, a frame, a main drive shaft rotatably mounted in the frame, a second shaft rotatably mounted in the frame, a beating-up tool secured to said second shaft, a drive connection between the main drive shaft and the second shaft for imparting rotation to the second shaft and beating-up tool, said drive connection including gear means operably coupled to the second shaft, and crank means operably connected to the main drive shaft and the gear means operative for imparting an accelerated and decelerated motion to the beating-up tool during each revolution of the main drive shaft, a shuttle mounted for to and fro motion relative to the beating-up tool, gear teeth on the shuttle, at least two pinions mounted on the frame meshing with said gear teeth, a further pinion meshing with said two pinions, a drive connection between said further pinion and the main drive shaft, said last-named drive connection comprising a pivoted lever operably connected to said further pinion, a cam operably connected to said lever, and gear means between the main drive shaft and cam operative on rotation of the main drive shaft to rotate the cam thereby moving the lever about its pivot for imparting rotation of the further pinion and two pinions for moving the shuttle to and fro.

2. In a loom, particularly a ribbon loom, a frame, a main drive shaft rotatably mounted in the frame, a second shaft rotatably mounted in the frame, a beating-up tool secured to said second shaft, a drive connection between the main drive shaft and the second shaft for imparting rotation to the second shaft and beating-up tool, said drive connection including gear means operably coupled to the second shaft, and crank means operably connected to the main drive shaft and the gear means operative for imparting an accelerated and decelerated motion to the beating-up tool during each revolution of the main drive shaft, a shuttle mounted for to and fro motion relative to the beating-up tool, drive means operably connecting the shuttle and main drive shaft for imparting to and fro motion to the shuttle, said shuttle having a pair of supports, and a pin mounted in said supports so that the axis of the pin is perpendicular to the longitudinal mid-line of the shuttle thereby allowing the shuttle to hold a cop containing a greater amount of yarn than cops positioned in conventional shuttles.

3. A loom as claimed in claim 1 including a shaft for said further pinion arranged perpendicular to the main drive shaft, a crank on said further shaft, a sliding connection between the crank and the pivoted lever and said cam being operably coupled to the lever midway between the pivot of the lever and the sliding connection between the lever and crank.

4. A loom as claimed in claim 3, in which said pivoted lever is provided with a pair of longitudinally extending slots, the cam being arranged between the walls of one slot for defining the operable coupling between the cam and lever and a slider on the end of the crank being slidably mounted in the other slot for defining the sliding connection between the crank and pivoted lever.

5. A loom as claimed in claim 4, wherein the axis about which the crank is swung is located between the turning axes of the crank and the slider mounted in said other slot of the pivoted lever.

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