DEVICE FOR DRIVING THE CURVED NEEDLE IN LOOMS, ESPECIALLY IN TAPE LOOMS

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The present invention relates to a device for driving a curved needle in looms, especially in tape looms, where the weft thread is inserted into the warp by means of the curved needle, which takes this thread from a fixed bobbin.

The object of this invention is to provide a device of the specified type, which can be easily and quickly made and which permits a high working speed, thus raising the production of the looms. The device according to the invention for driving a curved needle oscillating on a journal is characterized by a crank connected with the swinging pivot. This crank is connected with the end of a lever which operates by means of at least one cam driven by the loom shaft.

In order to give to the curved needle sufficient movement to get a regular and uniform motion of the curved needle, without imparting considerable movement to the different driving parts, the device according to the invention provides a single part, shaped as a cam for the driving of the curved needle. This cam is driven by a continuous rotary motion and is directly connected with a lever, so that a whole reciprocating motion is carried out by the lever. The axis of rotation of the driving cam is advantageously placed between the fulcrum pin of the lever and the axis of oscillation of the curved needle.

The invention is set forth in the following specification which refers to the annexed drawing, both, however being given as an example only.

In the drawings:

Fig. 1 shows a side view of a tape loom provided with the driving device for the curved needle according to the invention.

Fig. 2 is a section along the line II—Ill of the Figure 1.

Fig. 3 is a vertical section which is taken perpendicular to the middle axis of Fig. 2.

Fig. 4 is a section along the line IV—IV of Fig. 2.

Fig. 5 is a diagrammatic view of the motion of the different parts of the device.

The loom as shown in Fig. 1 is provided with devices for driving the healds and the bobbin for the binding thread. More specifically, in this figure the curved needle is indicated by A and the device for driving the bobbin for the binding thread C is indicated by B. These members are operated by gears or the like, which are placed in a casing D. The latter is a part of the frame F, which has thereon both members for driving the healds G and the slay H. The device according to the invention is contained in the casing D.

In the Figures 2 and 4, 10 designates the main shaft of the loom on which a worm-wheel 12 is fitted which engages a worm-wheel 14; the axis of rotation of said worm-wheel 14 is perpendicular to the axis of the wheel 12. The worm-wheel 14 is fixed to a shaft 16, the axis of which is perpendicular to the axis of the shaft 10. The shaft 10 has mounted thereon the device B, which includes a cylinder 40 with a closed helical groove 42 which drives the bobbin carrying the weft thread of the binding thread according to applicant's copending application Serial No. 611,573.

On the shaft 16 is fastened a suitably shaped cam 18, having a shape according to the desired operating movements of the curved needle A. More particularly said cam is shaped in such a way as to actuate the curved needle at its starting and final position A1 and A2 (Fig. 5) with a limited speed whereas in the intermediate positions the speed of the curved needle is very high. This is in order to make the binding operation of the weft thread easier, especially in the position A2, where the bobbin C for the binding thread is positioned.

The periphery of cam 18 engages the walls of the opening 20. The latter is suitably shaped and placed in the lever 22 which in turn is mounted on the shaft 24 provided on the casing D. The axis of the shaft 24 parallels the axis of the shaft 16.

The lever 22 has on the other end a fork 26, between the arms of which a roller 28 is engaged. Roller 28 is fitted on the shaft 30 which in turn has pivoted thereon a crank 32, the crank 32 being connected to the shaft 34. The axis of the shaft 34 is parallel to the axis of the above mentioned shafts 16 and 24. The shaft 34 is supported in the bearings 35 provided on the casing D and on its other end, which protrudes from that casing the curved needle A is mounted. Advantageously the needle instead of being of metal, is molded at least partly of plastic material, which has the advantage, that the weft thread will not be damaged and of being light and durable.

The members as now described are enclosed in the casing D in order that they may be protected from contact with dust and other extraneous materials and moreover there is facilitated and insured a perfect lubrication, because these members can be arranged in an oil-bath that can be easily provided in the casing D.

In the operation of the device rotation of the shaft 10 causes a continuous rotation of the cam 18 and cam 18 oscillates the lever 22 around the axis of shaft 24. The oscillation of lever 22 causes oscillation of the crank 32 around the axis of shaft 34. However, as will be appreciated, the arc through which the crank 32 oscillates is far greater than the arc through which the lever 22 rotates because of the fact that the axis of rotation of the crank 32 is close to the point on the lever 22 which moves the maximum distance during its oscillation.

This is diagrammatically shown in Fig. 5 in which the angle α is the angle through which the lever 22 oscillates, while the angle β is the angle through which the crank 32 oscillates. The points in the diagram which are numbered correspond to the axes of the shafts as illustrated in Fig. 4.

When the distance between the axis of the shaft 30 and the shaft 34 is equal to L, the distance between the axis of the shaft 34 and the shaft 16 is 2.5L, and the distance between the axis of the shaft 16 and the axis of rotation of the shaft 24 is 2L, oscillation of the lever 22 through an angle α of about 19° will produce oscillation of the crank 32 through an angle β of about 140°. It follows, that even with a limited angular movement of the lever 22 the curved needle is given a considerable angular movement. In this way it is possible to impart to the curved needle a very high speed without the difficulties involved in moving a relatively large member at high speed.

It is to be understood that the device as described and illustrated could be modified, for instance the crank 32 could be made with a variable radius, thus permitting a variation of the angle β traversed by the curved needle A. Also the axis of the shaft 24 could be made so that it could be shifted along the line between the axes 34 and 16. Thus instead of a single cam 18
that drives the lever 22, two complementary profiled cams could be provided, one to drive the lever 22 in one direction and the other for driving it in the opposite direction.

It is thought that the invention and its advantages will be understood from the foregoing description and it is apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing its material advantages, the form hereinafore described and illustrated in the drawings being merely a preferred embodiment thereof.

I claim:

1. A device for driving a curved needle in a loom, particularly a tape loom, with a swinging movement, said needle being driven from a drive shaft on the loom, said device comprising a rotatable needle shaft on one end of which the curved needle is fixed, a crank on the other end of said shaft, a lever longer than said crank engaged at one end with said crank and pivoted at the other end to said loom, said lever connected to the drive shaft of the loom for oscillating movement about its pivoted end.

2. A device as claimed in claim 1 in which the connection between said lever and said driving shaft comprises a rotatable cam acting on said lever, said cam being geared to said drive shaft.

3. A device as claimed in claim 2 in which the axis of rotation of said cam is between the axis of said needle shaft and the pivoted end of said lever.

4. A device as claimed in claim 3 in which the axis of said needle shaft, the axis of rotation of said cam and the pivoted end of said lever are all on the same side of the point of engagement between said lever and said crank.

5. A device as claimed in claim 2 in which said lever has an aperture therein in which said cam is engaged, and said lever has a slot on the free end thereof, and a roller on the free end of said crank engaged in said slot.

6. A device as claimed in claim 5 and means for adjusting the position of said roller on said crank.

7. A device as claimed in claim 5 and means for adjusting the position of said cam along the length of said lever.

8. A device as claimed in claim 5 and means for adjusting the position of the pivoted end of said lever.

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