May 24, 1949. F. A. HARDICK 2,470,981

SHUTTLE FOR NARROW WARE LOOMS

Filed June 11, 1947 2 Sheets-Sheet 1

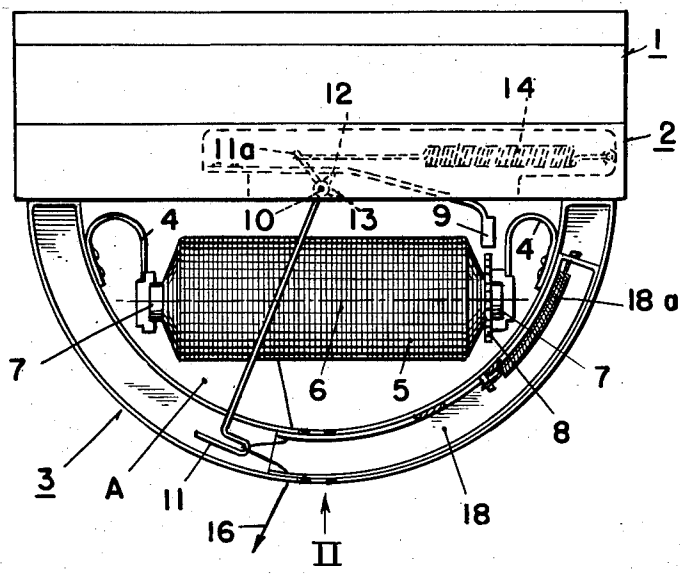


FIG. 1

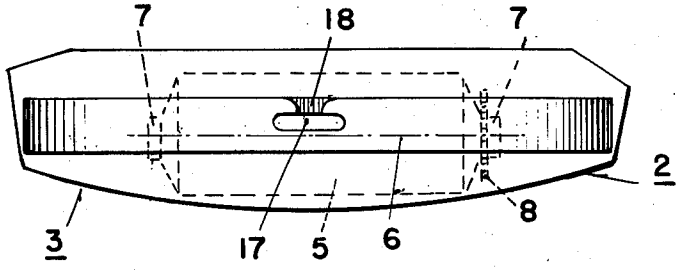


FIG. 2

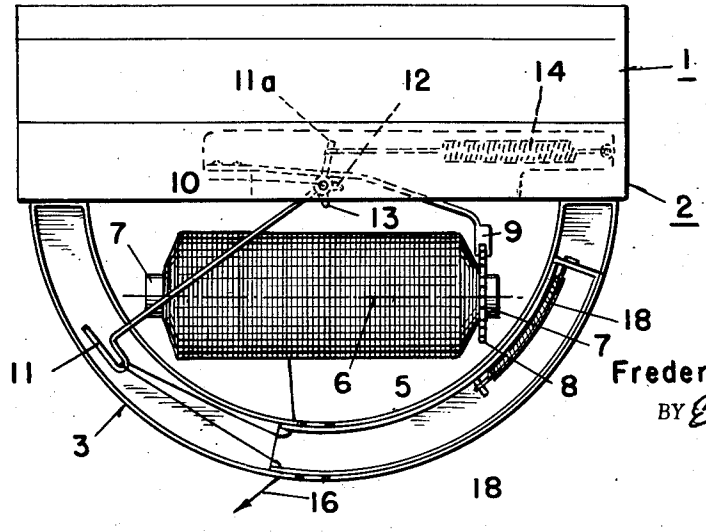


FIG. 3

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May 24, 1949. F. A. HARDICK 2,470,981

SHUTTLE FOR NARROW WARE LOOMS

Filed June 11, 1947 2 Sheets-Sheet 2

FIG. 4

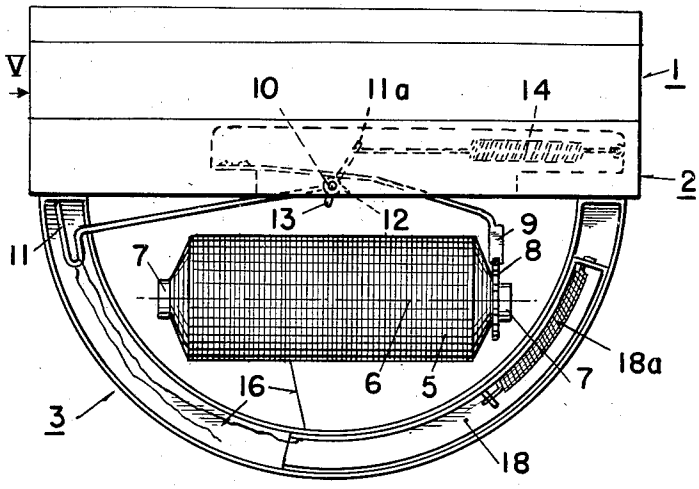


FIG. 5

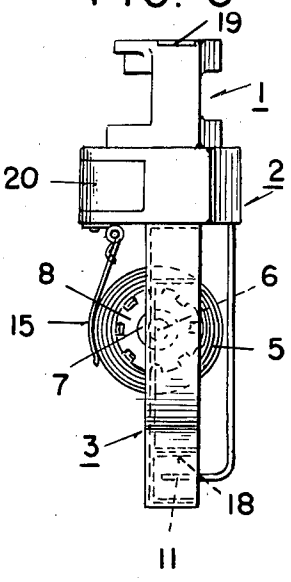


FIG. 6

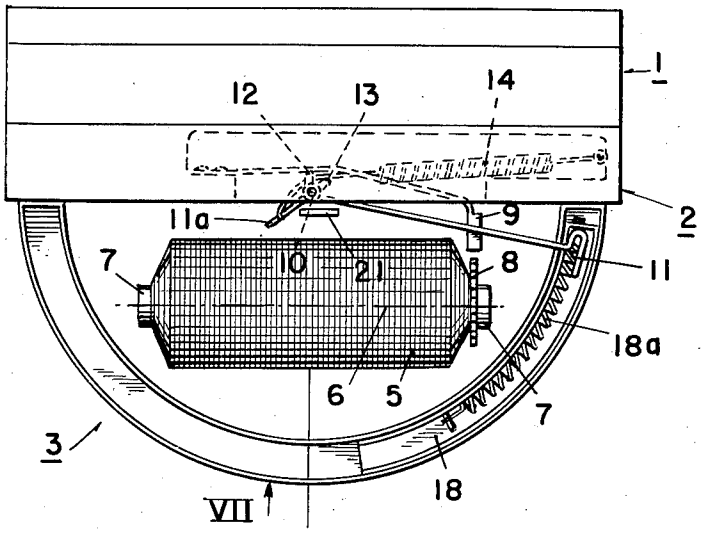
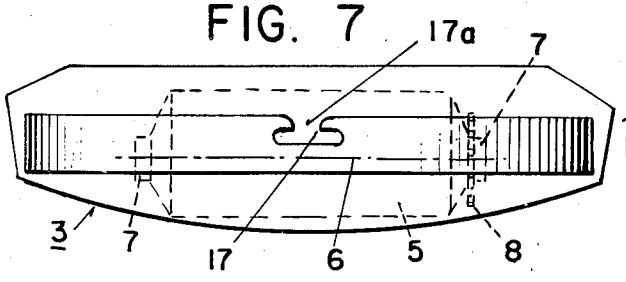


FIG. 7



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SHUTTLE FOR NARROW WARE LOOMS

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Patent expires February 26, 1966

6 Claims. (Cl. 139—199)

1

The invention relates to a shuttle for a ribbon loom or a similar loom with positive drive of the weft, which shuttle is provided in its front portion which extends beyond the slay, with a semi-circular opening for receiving the thread bobbin.

The invention has for its purpose the construction of a shuttle of this kind which, when the weft thread is used up or broken, will allow of a speedy exchange of the bobbin contained in the shuttle for a new one, in such a way that this exchange of bobbins may preferably take place entirely automatically. Needless to say, the possibility of such a speedy, preferably automatical, exchange of bobbins is of the highest importance considering that on the average with the known ribbon looms 20% of the effective working time is spent for the necesary exchange of bobbins.

According to the invention there are provided in the semi-circular opening in the front portion of the shuttle resilient bearings for the thread bobbin, in such a way that a thread bobbin when moved in the direction of the axis of the continuous opening is urged into the said bearings, whereas with a continued movement in the said direction the bobbin will be expelled, from the same, while there is provided in the front wall of the shuttle a guiding opening for the thread of the thread bobbin, which opening is provided in the direction of the insertion of the thread bobbin with an entrance that is preferably adapted to be closed. A fresh thread bobbin therefore may be quickly inserted while expelling the spent one from the semi-circular opening, while at the same time the thread from the fresh bobbin will enter quickly into the guide opening in the shuttle through the said entrance.

A simple and speedy exchange of bobbins of this nature will also be possible in the case of a shuttle in which the unwinding of the thread from the bobbin, as is usually the case with shuttles for ribbon looms, is controlled by a spring. With the known shuttles for ribbon looms the said spring control is generally exerted by the so-called "Swiss spirals," i. e. tension springs made of brass wire which are located in the side portions of the shuttle and are provided at their free ends with an eye through which the thread of the thread bobbin is passed. According to the invention the thread of the bobbin is guided to the guide opening in the front wall of the shuttle by means of a spring controlled thread guide which is movable either above or below the semi-circular opening in the shuttle, and is provided with a hook or a similar guide member that is open on one side; the said thread guide for the

2

purpose of exchanging the thread bobbin for a fresh one, is displaceable against the action of the spring to such an extent that it substantially frees the semi-circular opening in the shuttle and that after the insertion of the fresh bobbin the thread drawn from the same, which thread is placed into the guide opening, may be gripped during the spring controlled movement of the thread guide, by the hook or other guide member open on one side that is provided on the said thread guide.

The resilient thread guide replaces the "Swiss spirals" of the known shuttles and executes the same function, since with the increasing tension of the thread, the thread guide will give while tensioning its spring, whereas with decreasing tension of the thread, the thread is drawn back by the thread guide under the influence of the relaxing spring. The said thread guide, however, permits of an automatic opening and closing at the right moment of the entrance into the thread guide opening provided in the front wall of the shuttle. For this purpose according to the invention the front portion of the shuttle consists in a bow-shaped member constructed as a trough or gutter into which the hook of the thread guide may reach, while there are provided in a given place in the walls of the said gutter two corresponding slot-shaped thread guiding openings each having an open entrance along the upper edges of the gutter walls, while a spring controlled slide valve cooperating with the thread guide is displaceably located in the gutter-shaped bow member, in such a way that in the active position of the thread guide the said slide valve under the action of its spring will keep the entrances into the slot-shaped guiding openings in the gutter-walls closed, whereas in the position for the exchange of the bobbins the thread guide will shift the said slide valve against the action of its spring in such a way that the said entrances will be opened.

According to the invention the thread guiding member will preferably execute a rotary movement, for which purpose the gutter-shaped bow member viewed from above has the form of an arc of a circle the center of which is the pivoting point of the thread guide.

The shuttle according to the invention is very suitable for effecting the exchange of the bobbin entirely automatically, preferably by means of electricity. The exchange of the bobbins in itself, however, does not constitute the subject matter of the present application and will therefore not be described any further. If, however, the shuttle

according to the invention is used with an automatic bobbin exchanging device of the said kind, then the shuttle according to the invention will be provided with an electrical contacting device that will become active when the thread on the bobbin gives out or is broken, whereupon the thread guide is brought into the bobbin exchanging position by means of an actuating device provided for this purpose. The electrical contact may be brought about in different manners: i. e. in the case of breakage of the thread by the fact that the metal thread guide under the action of its spring establishes a contact with the metal end wall of the gutter-shaped bow member, and in case of the spool running out then by means of a metal feeler located contiguously to the thread on the bobbin, which feeler will finally contact with the metal sleeve of the said thread bobbin.

In order to be sure of an adequate supply of thread under a practically constant tension, there may be provided a gearing device for the thread bobbin that is influenced by the tension of the thread in such a way, that it will allow the said bobbin to rotate freely when the thread tension is increasing, whereas the rotation is prevented when the tension of the thread is decreasing. When using the above mentioned thread guide, the thread bobbin, according to the invention may be provided with a ratchet wheel cooperating with a pawl that is influenced by the movements of the thread guide, in such a way that with an increasing tension of the thread (consequently with the movement of the thread guide against the action of the spring), the pawl is lifted out of the ratchet wheel, so that the thread bobbin will be allowed to rotate freely, whereas with a decreasing tension of the thread (consequently with the movement of the thread guide in the direction of the action of the spring) the pawl will drop into the ratchet wheel once more, so that the rotation of the thread bobbin will be prevented.

Further characteristics of the invention will be explained in the description given below with the aid of the drawing in which an embodiment of a shuttle of an arcuate shape according to the invention is represented.

In the said drawing

Fig. 1 is a plan view of the shuttle in the normal or active position of the thread guide in which the thread bobbin is allowed to rotate freely,

Fig. 2 is a front view according to the arrow II in Fig. 1,

Fig. 3 is a plan view with the thread guide in the position it takes when the thread bobbin is prevented from rotating,

Fig. 4 is a plan view with the thread guide in the position of thread breakage,

Fig. 5 is a side view according to the arrow V in Fig. 4,

Fig. 6 is a plan view with the thread guide in the bobbin exchanging position,

Fig. 7 is a front view according to the arrow VII in Fig. 6.

The shuttle consists of a rear piece or body 1, 2 made of wood or some other material that will not conduct electricity of which body the part 1 is guided in grooves of the slay, while the part 2 is located in front of the slay. An arcuate member made of metal is secured to the part 2, which member has the form of an approximately semicircular trough or gutter open at the top. This gutter-shaped bow 3 provides a semi-circular

opening A in the shuttle that is intended to receive the thread bobbin. In the said space A there are provided on the bow 3 two resilient clamping straps 4 (only represented in Fig. 1) between which the thread bobbin 5 is clamped by means of a spindle 6 denoted by a dot- and dash line. The clamping straps 4 are open at the top and at the bottom and will hold the spindle 6 in such a way that the bobbin 5 can be pressed into and out of the said clamping straps 4 in a direction perpendicular to the plane of the drawing.

The thread of the bobbin 5 is wound on a metal sleeve 7 which is freely rotatable about the spindle 6. Near the one end of the said sleeve 7 there is provided a ratchet wheel 8 (see also Fig. 5) with which a pawl 9 is adapted to co-operate. If the said pawl 9 engages the teeth of the ratchet wheel 8, the thread bobbin 5 will be prevented from rotation.

A metal cylinder 10 is rotatably mounted in the non-conducting part 2 of the body of the shuttle. The pivoting point of the cylinder coincides with the center of the arcuate member 3. A metal thread guide 11 is rigidly connected with the cylinder 10 which thread guide by means of its hook extends into the trough-shaped arcuate member 3 (see also Fig. 5), but which normally does not establish any contact with the metal parts of the said bow strap.

On the cylinder 10 there are also provided two projections 12 (see Fig. 1) and 13 (see Fig. 6) which are adapted to cooperate with the pawl 9 in order to lift the said pawl out of the ratchet wheel 8. An arm 11*a* is also secured to the cylinder 10 to which arm there is attached a tension spring 14 urging the cylinder 10 and with it the thread guide 11 to rotate in a clockwise direction. A metal feeler 15 (see Fig. 5) resiliently adjoins the thread bobbin 5 which feeler is intended to contact with the metal sleeve 7 when the bobbin is run out. The thread coming from the bobbin is represented by the line 16 and runs off in the direction of the arrow.

In each of the two concentric walls of the gutter-shaped bow 3 there are provided slot-shaped openings 17 (see Figs. 2 and 7) which are accessible from above at the point 17*a* (Fig. 7), the said entrances 17*a* being, however, adapted to be closed by means of a trough-shaped slide valve 18 having a similar cross-sectional shape to bow 3 and being slidably contained therein which slide valve is controlled by a spring 18*a* (see Fig. 6).

The metal parts of the shuttle with its contents may be divided into two groups electrically insulated with regard to each other, to wit:

(*a*) a group comprising the cylinder 10, the thread guide 11, the spring 14 and the feeler 15,

(*b*) a group comprising the bow-shaped member 3 with the slide valve 18, the clamping straps 4, the spindle 6 and the sleeve 7.

Group *a* is conductively connected with a copper strip 20, and group *b* with a copper strip 19 provided on the body of the shuttle (see Fig. 5) which strips are continuously in contact with brushes provided in the slay which brushes are connected with the poles of an electrical power source.

The shuttle is operated as follows:

According to Fig. 1 the thread 16 is drawn off by the weaving process in the direction of the arrow. The pawl 9 made of insulating material is lifted out of the ratchet wheel by means of the projection 12, so that the thread bobbin 5 is able

to rotate freely and the thread will run off the said bobbin. Under the action of the spring 14 the thread guide is now turned into the position according to Fig. 3 in which the projection 12 will no longer lift up the pawl 9, so that the said pawl will drop into the ratchet wheel 8, thus preventing rotation of the thread bobbin. The tension of the thread will now be increased again, the thread guide 11 is moved once more into the position according to Fig. 1, etc. The thread bobbin therefore is made to rotate each time during a short period and then stopped again. This has the advantage that the thread supply will be adequate all the time under a practically constant tension. The said tension may be regulated, if desired, by shortening or lengthening the spring 14.

In case of breakage of the thread the thread guide 11 is moved by the spring 14 into the position according to Fig. 4, in which position the hook of the thread guide will establish contact with the end wall of the gutter-shaped arcuate member 3 and there will be formed an electrical connection between the groups *a* and *b*, and consequently also between the strips 20 and 19. The circuit will then be closed, whereby an automatic bobbin exchanging device, which does not form the subject of the present application, is actuated.

The exchange of the bobbins is, however, only possible, if the entrances 17*a* into the slot-shaped openings 17 for the insertion of the thread of the fresh bobbin have been opened. This is effected by bringing a small block 21 or a similar device into the position represented in Fig. 6 after the circuit has been closed, whereby the thread guide 11 is turned back against the action of the spring 14 until it butts against the end wall of the slide valve 18, pushing the said slide valve along, whereby the spring 18*a* will be tensioned. At the same time the pawl 9 is lifted out of the ratchet wheel 8 by the projection 13 on the cylinder 10. The fresh thread bobbin can now be inserted between the clamping straps 4 while expelling the spent bobbin, the tensioned thread 16 of the fresh bobbin entering into the slot-shaped opening 17 through the entrances 17*a*.

If the thread bobbin is nearly empty the resilient feeler 15 will establish a contact with the bobbin sleeve 7, whereby the electric circuit will be closed and the same things will happen as in the case of breakage of the thread.

I claim:

1. A shuttle for a ribbon loom or the like having a positive weft drive comprising a body member, a semi-circular bow secured to said body member forming a semi-circular bobbin receiving opening, said bow being trough shaped in cross-section, resilient bearing members in said opening, a bobbin releasably secured in said bearing members, said trough-shaped bow having a thread guide opening in each side wall thereof, an entrance in the side walls of said bow connecting with said openings in the side walls for insertion of thread from said bobbin and means for closing said entrances.

2. A shuttle as claimed in claim 1, a rotatable shaft mounted in said body member at the center point of said semi-circular bow, a thread guide member secured to said shaft, said guide member having a hook shaped thread engaging end, said hook shaped end extending into said trough-shaped bow and being movable therein, a spring connected to said shaft for normally biasing said hook shaped end of said guide member against an end wall of said trough-shaped bow and permitting displacement thereof to an opposite end wall of said trough-shaped bow for substantially clearing said semi-circular bobbin opening for permitting insertion of said bobbin therein and thread in said guide openings.

3. A shuttle as claimed in claim 2, said guide openings being elongated slots, said means for closing said entrances comprising an arcuate member of trough-shaped cross-section slidably mounted in said trough-shaped bow, said arcuate member being of slightly smaller dimensions than said trough-shaped bow and of similar shape, a spring connected to an end of said arcuate member and to said trough-shaped bow, said arcuate member having slotted openings in an end thereof for coacting with said elongated slots, said spring normally biassing said arcuate member toward said guide openings, portions of said arcuate member closing said entrances to said guide openings in the biassed position, said arcuate member being displaceable by said hook shaped end of said guide member into a bobbin changing position and for opening said entrances for insertion of thread from said bobbin.

4. In a shuttle as claimed in claim 3, an electrical contacting device on said shuttle, said contacting device being actuated upon thread from said bobbin being exhausted or broken, and means actuable by said contacting device for moving said thread guide whereby said thread guide is moved to bobbin exchanging position.

5. In a shuttle as claimed in claim 1, a rotatable shaft mounted in said body member at the center point of said semi-circular bow, a thread guide member secured to said shaft, said guide member having a hook shaped thread engaging end, said hook shaped end extending into said trough-shaped bow and being movable therein, a spring connected to said shaft for normally biassing said hook shaped end of said guide member against an end wall of said trough-shaped bow and permitting displacement thereof to an opposite end wall of said trough-shaped bow for substantially clearing said semi-circular bobbin opening for permitting insertion of said bobbin therein and thread in said guide openings, a gearing device operatively connected to said bobbin, said device being operatively connected to said rotatable shaft, said device being so influenced by tension of the thread in said thread guide member that said bobbin will rotate freely when thread tension increases and said bobbin will be prevented from rotation when thread tension decreases.

6. In a shuttle as claimed in claim 5, said gearing device comprising a ratchet wheel secured to said bobbin and a pawl operable by said rotatable shaft, said pawl being operable into and out of engagement with said ratchet wheel by said rotatable shaft.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
838,123	Lemyre	Dec. 11, 1906
1,891,572	Ott	Dec. 20, 1932
1,979,766	Payne	Nov. 6, 1934

FOREIGN PATENTS

Number	Country	Date
510,536	France	Sept. 8, 1920