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V. DIVÍSEK

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SHUTTLE FEELER WITH WEFT CUTTER FOR REPLENISHMENT LOOMS

Filed March 20, 1951

2 Sheets-Sheet 1

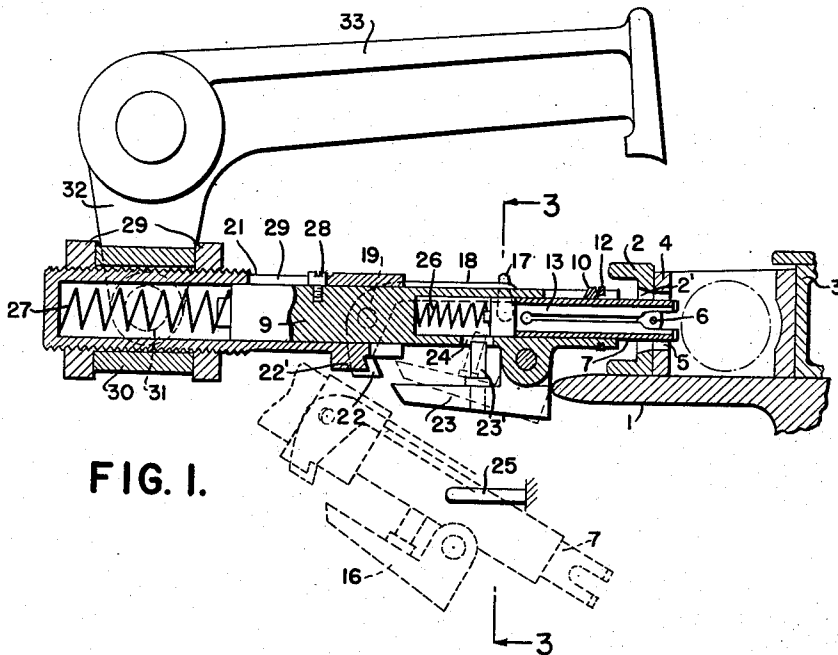


FIG. 1.

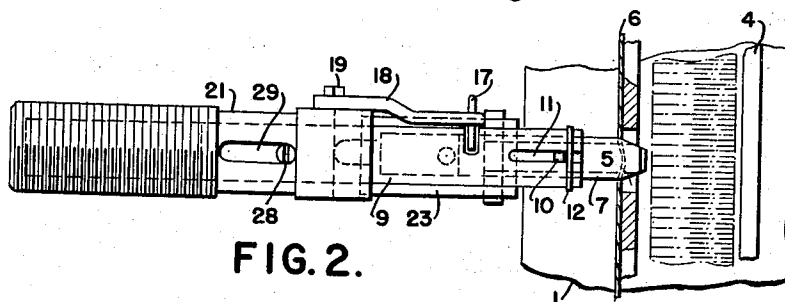


FIG. 2.

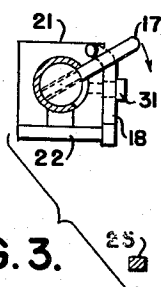


FIG. 3.

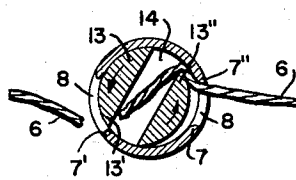


FIG. 4.

INVENTOR
Vladislav Divisek

BY *P. A. S. S. S.*
ATTORNEY

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V. DIVÍSEK

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2 Sheets-Sheet 2

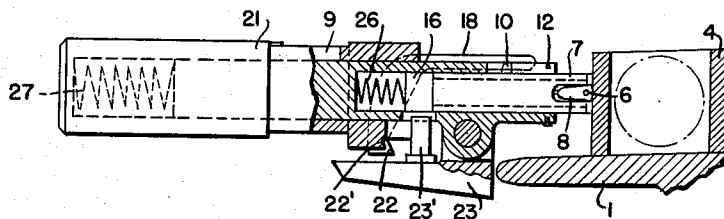


FIG. 5.

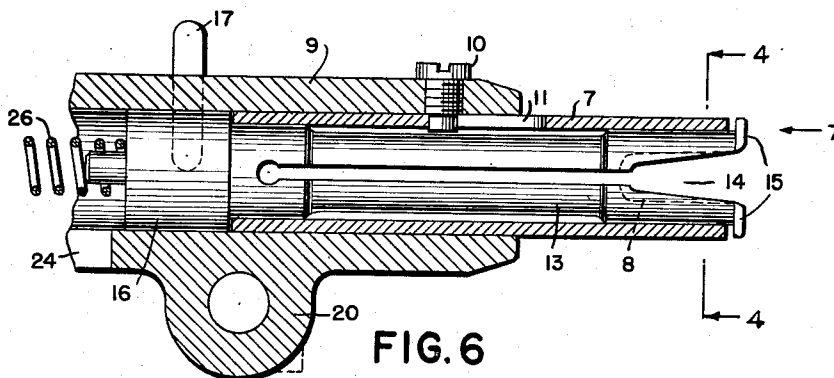


FIG. 6

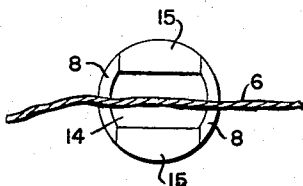


FIG. 7.

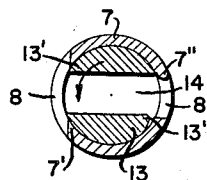


FIG. 8.

INVENTOR
Vladislav Divisek

BY *Pence & Sinner*
ATTORNEY

UNITED STATES PATENT OFFICE

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SHUTTLE FEELER WITH WEFT CUTTER
FOR REPLENISHMENT LOOMS

Vladislav Divíšek, Brno, Czechoslovakia, assignor
to Prototypa narodni podnik, Brno, Czechoslo-
vakia, a corporation of Czechoslovakia
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5 Claims. (Cl. 139—267)

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My invention relates to bobbin changing automatic looms and more particularly to devices for the control of the shuttle position and for cutting the weft thread before replenishing.

In mechanical weaving looms with automatic weft replenishment it is important to prevent the formation of unsuitably long weft thread ends susceptible to be seized and broken by the moving parts of the loom and carried into the shed which would result in a defect of the woven fabric.

In order to eliminate this drawback a special device has already been proposed, serving both for the control of the shuttle position before replenishment with a full bobbin and for severing the weft thread on a specially suitable place, i. e. in the common gate in the shuttle wall serving for penetration of the weft feeler controlling the amount of weft on the bobbin. The severed end of the weft thread is easily carried by the ejected bobbin into the waste container and the other end emerging from the selvage of the fabric is held by this device and is drawn out of the reach of the warp threads.

The said device, though being satisfactory in this respect, causes, especially when the shuttle box is not correctly adjusted, a relatively rapid depreciation of the wooden shuttle which is worn especially on the edges of the control gate. This is obviously due to the considerable inertia mass of the control feeler of the said device, the weight of the feeler, relatively high in itself, being increased by the weft cutters attached to it and by the weft gripper and their linkage and the driving pawl.

In order to eliminate these drawbacks mechanisms have been proposed which are provided with a special control feeler without cutters and without thread gripper to keep their weight low, these being placed in another place. Such mechanisms, however, cannot provide the advantage of the above described cutting of the weft ends.

The object of the present invention is not only to eliminate the drawbacks of the known devices but also to reduce still more the mass of the device, to simplify its design and to reduce the front dimensions of the cutting feeler.

According to the present invention all these requirements are satisfied by my new device in which the control feeler with the weft cutters forms a compact unit telescoped in the shuttle feeler.

My new device presents in addition to the aforementioned features the advantage that the

control cutting feeler has a negligible weight of about 10% of the weight of the known devices and also very small front dimensions so that a much smaller gate is sufficient for the control of the shuttle position whereby weakening of the shuttle wall is reduced to the least possible extent. My new device also permits the use of a substantially weaker feeler loading spring whereby wear to the shuttle caused by the feeler is reduced. Owing to all these circumstances the life of the shuttle will be independent from the function of the control and cutting mechanism and the shuttle will have a life equal to that of a shuttle in normal weaving looms.

The said and other objects of my invention will be more fully understood from the following specification when read with the accompanying drawing in which one embodiment of my invention is illustrated.

In the drawing

Fig. 1 shows a vertical longitudinal sectional view of my new control and cutting device in a position closely before the working stroke, the shuttle being in correct position in the shuttle box,

Fig. 2 shows a plan view thereof,

Fig. 3 shows a partial cross section along line x_3-x_3 of Fig. 1 illustrating the drive for the weft cutter,

Fig. 4 shows a cross section through the weft cutter in operative position along line x_4-x_4 of Fig. 6,

Fig. 5 shows a side elevation similar to Fig. 1, partly in section, illustrating the device in operation when the shuttle is not in proper position in the shuttle box,

Fig. 6 shows in enlarged scale a longitudinal section of the front portion of my control and cutting device namely of the front end of the shuttle feeler and of the weft cutter mounted therein,

Fig. 7 shows an end view of the cutter in the direction of arrow x_7 in Fig. 6, and

Fig. 8 shows a cross section through the weft cutter in non-operative position along line x_4-x_4 of Fig. 6.

The same reference characters indicate the same parts in all figures of the drawing.

Referring to the drawing and especially to Figs. 1 and 2, I have shown a lay 1 of a bobbin changing automatic loom with the customary front and rear shuttle box walls 2 and 3, respectively, between which the shuttle 4 is situated in correct position. The shuttle 4 has a slot 5 in its front wall and said slot is adapted for

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partial registry with the opening 2' in the front shuttle box wall 2 to permit the customary shuttle feeler to enter into the shuttle to feel the condition of the bobbin therein.

The shuttle feeler 9 is mounted telescopically for a limited axial displacement in a tubular push or starter rod 21 which actuates the transfer hammer 33 forming with an arm 32 a double-armed swing lever. The feeler 9 is provided with a screw or similar member 28 which slides in a longitudinal slot 29 of the push rod 21 limiting the axial displacement of the feeler 9 and securing the feeler 9 against angular movement within said push rod 21. A relatively weak spring 27 holds the feeler 9 in its most out jutting position shown in Fig. 1. This telescoping unit is jointly connected in any suitable manner to the said arm 32 for example by the sleeve 30 which is articulated by the pivot 30 to said arm 32 and is secured upon the push rod 21 by the units 29 against axial displacement.

The tubular front end of the shuttle feeler 9 houses telescopically a weft cutter which is composed of the outer sleeve-like member 7 and the essentially cylindrical inner member 13. The said member 7 is provided at its front end with two diametrically opposite slits 8 (see Figs. 4, 6, 7, 8) and is mounted in the shuttle feeler 9 for a limited axial but not angular displacement. To this effect the sleeve member 7 is provided with a projection 10 (Figs. 1 and 2) which engages a longitudinal slot 11 in the front end of the shuttle feeler 9. The effective length of said slot 11 cooperating with said projection 10 may be adjusted by an abutting ring 12. However, as shown in Fig. 6, the projection such as a screw 10 may be provided in the feeler 9 and the cooperating slot 11 in the sleeve member 7.

Within the sleeve 7 forming the outer member of the weft cutter is rotatably but not slidably in axial direction mounted the inner cylindrical member 13 of the weft cutter. The rear portion 16 of the member 13 fits into the tubular shuttle feeler 9 and the forward portion thereof is forked as illustrated so that the inner cutter member 13 will be resiliently housed in the outer member 7. The inner member 13 is provided at its front end with a gap 14 adapted to register and to cooperate with the slits 8 of the outer member 7 in a manner which will be fully described hereinafter. A buffer ring or flange 15 is attached to the front end of the inner member 13 and protects the front edge of the outer member 7. Said buffer ring or flange 15 which comes into contact with the shuttle 4 is preferably rounded to prevent or at least reduce any possible damage to the shuttle.

The slits 8 in the sleeve 7 and the mouth of the gap 14 of the insert are of substantially equal shape and in the inactive position of the weft cutters, formed by the said elements 7 and 13, they are aligned, as may be seen from Figs. 6 and 8, so that the weft thread 6 passes freely through the cutters (Fig. 7). As already mentioned the functional movement of the weft cutters is provoked by rotation of one of their elements, in this case 13, relatively to the other element, i. e. the sleeve 7. Thus, to obtain the required cutting and gripping action of the weft cutters these have to be provided with adequate cutting and gripping means and with a mechanism for provoking the cutting movement and for restoring the cutters to their open inactive position.

The first requirement is satisfied in that the

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edges 7' (Fig. 8 or 4) of one of the slits 8 of the feeler sleeve 7 and the edges 13' of the adjacent side of the gap 14 of the insert 13 are formed as cutting edges while on the diametrically opposite side the edges 7'', 13'' of the two elements are rounded or chamfered to permit gripping of the cut off end of the weft thread 6 between the sleeve 7 and the insert 13, by rotation of the insert with respect to the sleeve.

The rotation of the insert 13 is provoked by an element which is actuated by the driving pawl 23 and engages behind a cross pin 17 of the insert 13, said pin projecting from the feeler. The rotatable element is in this case a double-armed lever 18 articulated sideways on a pivot 19 of the shuttle feeler 9, its one arm forming an abutment for the driving pawl 23, rocking in an eye 20 on the lower side of the feeler 9. In the push rod 21 of the feeler is formed, opposite the pawl 23, a catch tooth 22 for this pawl.

The engagement of the driving pawl 23 with the control lever 18 of the insert 13 or with the catch tooth 22 of the shuttle feeler is controlled by a projection 23' of the pawl intervening through an aperture 24 into the path of movement of the feeler 7, 13 (Figs. 1 and 6). In the arrangement illustrated the projection 23' is a pin which, when the cutting feeler meets the shuttle 4 and the driving pawl 23 is rocked by the slay 1, strikes the end of the insert 13. Thereby engagement of the driving pawl 23 with the catch tooth 22 and consequently the actuating of the weft cutters by the control lever 18 is prevented, as the pawl 23 does not meet this lever and does not rock it. In the contrary case, i. e. when the feeler passes through the gate 5 of the shuttle 4, the pin 23' of the driving pawl 23, rocked by the abutting slay 1, penetrates through the aperture 24 of the shuttle feeler 9 into its hollow bore whereupon owing to the action of the slay the pawl 23 swings the lever 18 and, by rotating the insert 13 with respect to the sleeve 7 actuates the weft cutters.

In order to bring the cutters to their initial position when the slits 8 of the sleeve 7 of the feeler are aligned with the gap 14 of the insert 13, advantage is taken of the rocking cross pin 17 of the insert, in cooperation with a stationary abutment for the depressed position of the control feeler or shuttle feeler (Figs. 1 and 3). The arrangement may be for example, such that on a suitable place of the frame of the machine is situated an abutment 25 against which strikes the pin 17 of the insert 13 of the feeler, when the shuttle feeler is depressed to the position shown in dotted lines in Fig. 1 whereby backward rotation of the insert, opening of the cutters and releasing of the weft thread 6, gripped until now, is obtained. As it appears from Fig. 4 of the drawing, the gripping of the weft thread, as already stated, takes place immediately by the elements of the cutters, without use of any additional elements, by resilient action of the forked portion of the insert 13. This arrangement has the advantage that during return movement of the cutting elements to the initial inactive position shown in Fig. 8 the edge, shown in Fig. 4 above, of the gap 14 of the insert, pushes the possible rests of the weft thread out of the sleeve 7 so that such rests which would affect the function of the cutters, cannot be caught or gathered in the cutters as it was the case up to now.

My new device operates as follows:

When the bobbin of the shuttle is exhausted

and a customary electrical or mechanical weft feeler (not shown in the drawing) induces the replenishment of a full bobbin, my new control and cutting feeler is raised by a conventionally used mechanism from the normally lowered position shown in dotted lines in Fig. 1 into a substantially horizontal position shown in full lines in which position the front face of the driving pawl 23 linked to the shuttle feeler 9 and actuating the push rod 21 for the transfer hammer 33 opposes the front edge of the lay 1. As shown in Fig. 1 the weft cutter composed of the members 7, 13 is telescopically mounted for limited axial displacement protruding from the front end of the shuttle feeler 9 and penetrates freely an opening 2' in the front box plate 2 and a slot 5 in the front wall of the shuttle 4 when the same is properly boxed between the box plates 2, 3. In such position the weft thread 6 traverses freely the slits 8, 14 of the cutter parts 7 and 13, respectively, without being engaged by their cutting edges 7', 13', and their clamping edges 7'', 13''. When thereafter the forward moving lay 1 contacts with its front edge the driving pawl 23 the same is rocked in clockwise direction until it engages the catch tooth 22 of the lever 18 and causes said lever 18 to swing about its pivot 19 turning the actuating lever 17 of the inner cutting member 13 as indicated by the arrow in Fig. 3. This inner cutting member 13 while turning within the outer cutting member 7 (see Fig. 4) causes first a clamping of the weft 6 between the gripping edges or jaws 7'', 13'' thereof and thereafter a cutting of the weft 6 by the cutting edges 7', 13'. The driving pawl 23 in its forward movement takes along the catch tooth 22 of the lever 18 until said pawl reaches and engages the catch tooth 22' of the tubular push or starter rod 21 for the swingable transfer hammer 33 which pushes in customary manner a full bobbin from the magazine into the shuttle 4, at the same time ejecting the empty bobbin. As shown in the drawing said tubular push or starter rod 21 houses telescopically the shuttle feeler 9 which again houses telescopically the cutter members 7, 13 at its forward end.

The cut off end of the weft thread 6 emerging from the cloth selvage is held by the said gripping edges 7'', 13'', until the telescoping control feeler after completed replenishment is returned into its lowered rest position shown in dotted lines in Fig. 1. At the end this return movement the actuating lever 17 strikes against the stationary abutment 25 and is turned anticlockwise so that the inner cutter member 13 returns into its non-operative position shown in Figs. 7 and 8 and the end of the weft thread 6 is released by the gripping edges 7'', 13''. Thereafter, the telescoping control feeler will remain in this lowered rest position until a new impulse from the customary weft feeler raises the same into its horizontal working position as described before.

Should the shuttle 4 before replenishment occupy an incorrect position in the shuttle box as illustrated in Fig. 5 then the telescopic control and cutting feeler is raised upon an impulse from the weft feeler but the shuttle 4 on its forward movement with the lay 1 meets with its solid front wall the frontal buffer flanges 15 of the inner cutting member 13 and displaces the same in axial direction against the force of the weak spring 26 prior to the moment when the front edge of lay 1 will contact the front face of the pawl 23. The pawl 23 is thereafter prevented by locking means from operating the actuating means for the weft cutter and from en-

gaging the starter rod 21 actuating the transfer hammer 33. Said locking means in the shown embodiment comprise an arresting pin 23' which is integral with the pawl 23. This arresting pin 23' will contact the rear portion 16 of the inner cutting member 13 and will prevent the pawl 23 from being turned by the forward moving lay 1 and from engaging the catch teeth 22, 22' of the lever 18 and of the shuttle feeler 9, respectively. Thus the shuttle feeler 9 will slide into the tubular push rod 21 against the force of the weak spring 27 and the push rod 21 remaining at rest will not actuate the transfer hammer 33.

It is obvious from the foregoing description that my new control cutting feeler occupies owing to its compact design, a very limited space; being formed of tubular elements it also has a very low weight and consequently also low inertia mass. As its movement does not actuate the driving pawl 23 the mass of this pawl and of other parts is not added to the mass of the cutting feeler. The driving pawl 23 is brought to its engagement position only by the action provoked by the lay 1.

It will be understood that the meshing pin 23' may be as well arranged on the end of the insert 13 of the feeler. The driving pawl 23 would then be provided with a control gate which in the advanced position of the cutting feeler would permit the pawl to be raised and in the depressed position, when the said pin would be situated outside this gate, the pawl would be forced to miss the catch tooth 22 so that the function would remain unchanged. Likewise the drive of the cutting feeler may be carried out in a different way. Furthermore the end of the control feeler may be rectangularly enlarged to permit use of the existing shuttles with large control gate, and other modifications may be effected without departing from the scope of the invention.

I claim:

1. A device for the control of the shuttle position and for cutting the weft thread in bobbin changing automatic looms having a lay, a shuttle reciprocable thereon and a transfer hammer, said device comprising in combination a push or starter rod actuating said transfer hammer; a shuttle feeler telescopically mounted in said starter rod; a weft cutter telescopically mounted in the shuttle feeler at the operating end thereof; actuating means for said weft cutter; a pawl oscillatingly mounted on the shuttle feeler and actuated by the lay; said pawl operating said actuating means for said weft cutter and engaging said starter rod when the shuttle feeler enters the shuttle; and locking means cooperating with said pawl to prevent the same from operating said actuating means for said weft cutter and from engaging the starter rod when the shuttle feeler is prevented from entering the shuttle.

2. A device according to claim 1 wherein the weft cutter comprises a non-rotatable sleeve mounted for axial displacement in the shuttle feeler and a basically cylindrical insert rotatably mounted in said sleeve, a longitudinally extending gap in said insert and a pair of opposing slits in the sleeve, said gap and said slits adapted to receive the weft thread when in registering position and provided with mutually cooperating cutting edges for the weft thread.

3. A device according to claim 1 wherein the weft cutter comprises a non-rotatable sleeve mounted for axial displacement in the shuttle

feeler and a basically cylindrical insert rotatably mounted in said sleeve, a longitudinally extending gap in said insert and a pair of opposing slits in the sleeve, said gap and said slits adapted to receive the weft thread when in registering position and provided with mutually cooperating cutting edges for the weft thread and with mutually cooperating gripping edges to hold the end of the cut weft thread.

4. A device according to claim 2 comprising a radially extending arm attached to said insert and a lever mounted on said push rod and actuated by said pawl, said lever cooperating with said arm to turn the same and said insert relative to said sleeve.

5. A device according to claim 1 wherein said locking means comprise a projection extending from said pawl into the path of the weft cutter within the shuttle feeler.

VLADISLAV DIVÍŠEK.

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