May 13, 1958 E. L. GRANGIER 2,834,381

DROPPERS FOR WARP DETECTORS

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Fig. 1

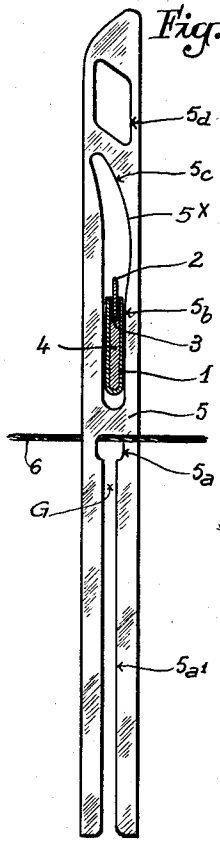


Fig. 2

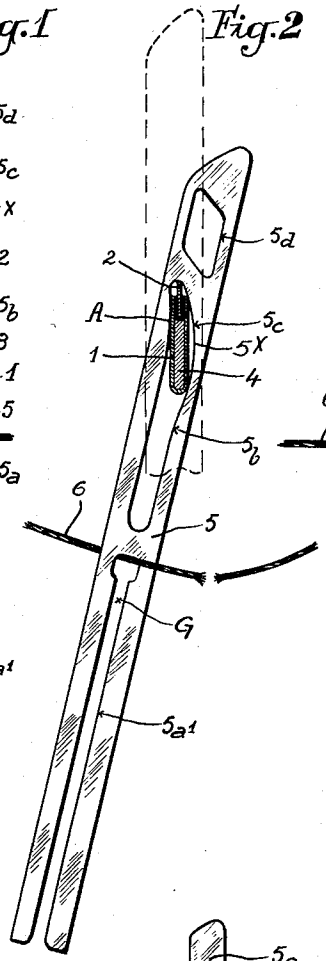


Fig. 3

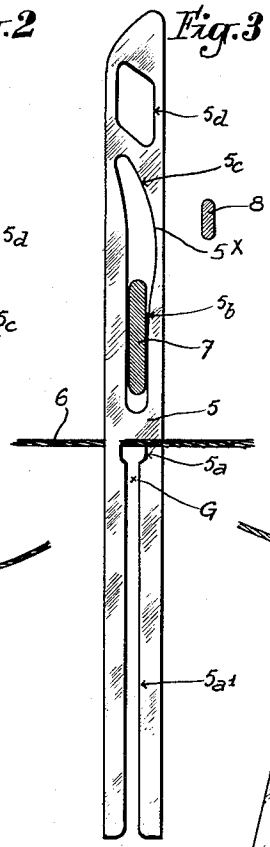


Fig. 4

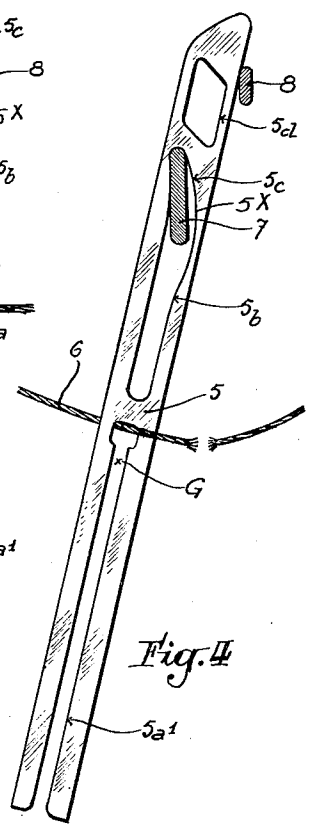
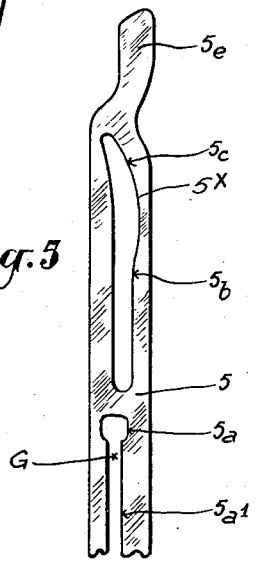


Fig. 5



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DROPPERS FOR WARP DETECTORS

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1 Claim. (Cl. 139—368)

My invention relates to warp detectors of the kind comprising dropper blades supported by the individual warp threads and which, when the corresponding thread breaks, fall and actuate an electrical or mechanical device which stops the loom. Under their conventional form these dropper blades are vertically elongated and they are provided with a lower downwardly opening eye adapted to receive the corresponding warp thread and with an upper elongated hole through which there is freely passed a transverse electrode in the case of an electric detector, or a transverse pair of thin racks in the case of a mechanical detector.

When the loom stops owing to breakage of a warp thread it is in practice difficult for the operator to locate the broken thread. Of course the latter may be detected by the fact that the corresponding dropper is now supported by the electrode or by the racks and is therefore at an abnormally low position. But the difference is small and besides this dropper can only be located by looking below the row of droppers where the lower end of the dropper of the faulty thread projects downwardly from the row. In mechanical detectors transverse displacement of the faulty dropper by the racks causes a slight gap in the close transverse succession of droppers; but such a gap is not clearly apparent and can only be located by rather close examination.

A first object of my invention is to provide a warp detector wherein the dropper blade corresponding to a faulty thread may be easily and rapidly located by the operator from the side of the loom.

Another object of my invention is a dropper blade for warp detectors and the like, wherein the upper hole provided in the blade above the thread receiving eye is formed with an oblique upper end portion whereby, when the dropper blade falls, the transverse electrode or the transverse pair of racks of the detector engages the said upper oblique portion of the hole of the blade, thus constraining the latter to assume an oblique position in the row of normally vertical dropper blades. Owing to the oblique position the faulty dropper is immediately located by the operator.

The dropper blade according to my invention preferably comprises an extension above the upper hole thereof to form a protruding head which still facilitates location of a faulty dropper. And in order to maintain the center of gravity of the blade well below the upper end of its thread receiving eye without having to extend the blade downwardly in an abnormal manner, this upper extension or head is formed with a large aperture to reduce its weight as much as possible.

In the case of an electrical warp detector the obliquity assumed by the dropper blade corresponding to a faulty thread may be used to ensure contact between the said dropper and an auxiliary electrode disposed on one side of the main electrode on which the droppers are mounted. The main electrode may thus be formed of a simple metallic bar, while in the conventional constructions it should

be formed as a two-pole unit. Of course in a mechanical detector the oblique dropper could also operate an additional rod or rack to actuate the loom stop motion.

It is to be noted that the dropper blade according to my invention remains of substantially rectangular contour with parallel vertical sides and without any lateral extension, whereby it may be directly cut from a ribbon of steel. This is a material advantage since the loss of metal resulting from the punching operation is reduced to a minimum, also because the lateral edges of each individual blade have not to be polished after the punching operation since they have not been formed by the punch.

In the annexed drawings:

Fig. 1 is an elevation showing a dropper blade according to my invention in an electrical warp detector, the corresponding warp thread being at its normal position.

Fig. 2 is a view similar to Fig. 1, but showing the blade after breakage of the warp thread.

Figs. 3 and 4 are views respectively similar to Figs. 1 and 2, but corresponding to a modified embodiment of an electrical warp detector comprising an auxiliary lateral electrode.

Fig. 5 shows a modified form of a dropper blade according to my invention.

In Fig. 1 the electrical warp detector comprises a transverse two-pole electrode formed of an outer U-shaped metallic member 1 opening upwardly and of an upper metallic strip 2 which projects above member 1, the base of strip 2 being clamped between the arms or branches of member 1 while being insulated therefrom by a layer 3 of an appropriate insulating material. A flat rod 4 is preferably disposed between strip 2 and the bottom of member 1 to fill the void space between the branches of the U and to re-inforce the assembly.

The two-pole electrode 1, 2, 3, 4 is passed through a row of dropper blades 5 disposed in close succession, each corresponding to a warp thread of the loom. Each dropper blade 5 is in the form of a vertically elongated rectangular member cut from a thin ribbon of spring steel or like highly resistant and elastic metal. Each blade comprises a lower eye 5*a* through which the corresponding warp thread 6 is passed as shown. Eye 5*a* is preferably of square shape with round angles, and it extends downwardly in the form of a relatively narrow vertical slot $5a_1$ which opens at the lower end of the blade. Above eye 5*a* each dropper blade has a hole comprising a lower portion 5*b* extending substantially vertically in co-axial relation to the blade, and an upper portion 5*c* which extends upwardly and obliquely without however opening along the vertical edge of the blade. The above-described electrode 1, 2, 3, 4 is passed through hole 5*b*, 5*c* and it is normally situated in the lower vertical portion 5*b* thereof as illustrated in Fig. 1.

As shown, an intermediate portion 5*x* connects the lower portion 5*b* and said upper portion 5*c*, the edge of said intermediate portion 5*x* which is exterior to the angle formed by said lower portion 5*b* and upper portion 5*c* being curved outwardly with respect to the mean axis of said opening to provide in said intermediate portion 5*x* a progressively increasing and then decreasing width to permit passage of said transverse member from the lower portion 5*b* into the upper portion 5*c*.

Each dropper blade extends above hole 5*b*, 5*c* to form an upper head which has a wide aperture 5*d*.

The general arrangement of each dropper blade is such that its center of gravity G is situated on the vertical axis of the blade substantially below the upper edge of eye 5*a*.

Under normal operating conditions of the loom all the dropper blades 5 are vertically supported by the corresponding warp threads 6, as shown in Fig. 1, electrode

1, 2, 3, 4 being in the lower portion 5*b* of the elongated hole 5*b*, 5*c* of each blade. Owing to the position of the center of gravity G the blades have no tendency to tilt. When a warp thread breaks the corresponding dropper is no more supported and falls, in the downward movement of the dropper blade electrode 1, 2, 3, 4 enters the oblique upper portion 5*c* of hole 5*b*, 5*c* and compels the blade to assume an oblique position as illustrated in Fig. 2. The upper edge of strip 2 of electrode 1, 2, 3, 4 now abuts against the upper end of portion 5*c* while owing to the obliquity of the blade the inwardly curved edge of portion 5*c* rests against the side of member 1, as indicated at A. An electric contact is thus established between strip 2 and member 1, whereby there is closed an appropriate electric circuit actuating the loom stop motion.

The dropper corresponding to the faulty thread is quite easily detected by the operator, since its upper end or head projects laterally from the row, as clearly illustrated in Fig. 2 wherein the normal position of the droppers has been diagrammatically indicated in dotted lines. This projecting head may be seen at a distance from the side of the loom without any close examination of the row.

In the embodiment of Figs. 3 and 4 the electric warp detector comprises a main one-pole electrode 7 in the form of a plain flat metal bar with the cross-section disposed vertically, and a lateral one-pole auxiliary electrode 8 arranged on the side of electrode 7 and at a somewhat higher level. The dropper blades 5 are threaded on electrode 7 which is passed through their hole 5*b*, 5*c*. As in the case of Figs. 1 and 2, blades 5 are normally supported at the vertical position by warp threads 6 and they thus remain spaced from electrode 8 (position of Fig. 3). After a thread breakage the dropper corresponding to the faulty thread drops and assumes the oblique position of Fig. 4, whereby its upper end or head comes into contact with electrode 8 while the edge of portion 5*c* of hole 5*b*, 5*c* is in contact with electrode 7 at A. In this case also the upper end or head of the dropper is easily located by the operator.

The dropper blade illustrated in Figs. 1 to 4 as applied to electric warp detectors may also be used with advantage with mechanical detectors. In these detectors the two-pole electrode of Figs. 1 and 2 is replaced by a pair of thin racks disposed close to each other. One of the racks may be given a small reciprocating movement in unison with the loom. Normally, i. e. when all the droppers are supported by the warp threads, the second rack remains at rest, but when a thread breaks the corresponding dropper falls and engages both racks at the same time, whereby the second one is displaced and actuates the loom stop motion. The corresponding displacement of the dropper causes formation of a gap in the close succession of droppers, whereby this faulty dropper may be located more easily than by observing the lower ends of the droppers below the warp. But this gap is hardly noticeable from a distance and detection of the faulty thread by this means requires close examination of the row of droppers, while with my improved dropper blade the faulty dropper is quite apparent and is much more easily and more rapidly detected by the operator.

As in the case of the electric warp detector advantage could be taken of the oblique position of the faulty dropper to dispose the racks laterally of the row of droppers. Referring to Figs. 3 and 4 it may be supposed that 7 is merely a dead bar adapted to form a guide for the droppers, while 8 would designate a pair of thin racks, namely a driving rack reciprocated in unison with the loom and a detector rack adapted to actuate the loom stop motion. The dropper of the faulty thread would assume the oblique position of Fig. 4 and would thus engage both racks, whereby the detector rack would be actuated.

In the modification of Fig. 5 the upper head 5*e* of the dropper blade 5 is in the form of a plain extension, without any perforation, but of reduced width. This extension has a curved general contour which may render same more apparent under certain particular conditions.

In all the above-described embodiments, to facilitate engagement of the transverse electrode or pair of racks into the upper oblique portion 5*c* of the elongated hole 5*b*, 5*c*, it is of advantage to enlarge this hole in the zone of the bend which connects both portions of the hole.

My improved blade may be directly obtained from a ribbon of steel or other metal by cutting therefrom a piece of appropriate length and by punching the various holes or eyes. The loss of metal in the manufacturing process is therefore reduced to a minimum. It is besides known that the dropper blades used in the textile industry should have no sharp edge to avoid any damage to the threads. The edges resulting from a punching operation must therefore be carefully ground and polished, which is a long and expensive operation. In my improved blade the lateral or vertical sides or edges of the blade are those of the ribbon from which the blade has been cut and such edges may easily be rounded and polished during the manufacture of the ribbon itself without any substantial cost.

It will be easily appreciated that many other modifications may be brought to my improved dropper blade without departing from the main features of my invention.

I claim:

A dropper for warp detectors having a transverse member of flat vertically elongated cross-section, said dropper being formed of a vertically elongated blade with parallel vertical edges, having an eye for the passage of a warp thread adapted to normally support said dropper; and an elongated opening above said eye for passage of said transverse member, said opening comprising a lower vertically elongated lower portion having substantially the same width as said transverse member and wherein said transverse member is situated when said dropper is supported by said warp thread, an upper obliquely directed blind portion adapted to be engaged by said transverse member when said dropper falls to cause said dropper to assume a substantially oblique position, and an intermediate portion connecting said lower portion and said upper portion, the edge of said intermediate portion which is exterior to the angle formed by said lower and upper portions being curved outwardly, with respect to the mean axis of said opening to provide in said intermediate portion a progressively increasing and then decreasing width to permit passage of said transverse member from said lower portion into said upper portion.

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