Oct. 23, 1945. E. VOSSEN 2,387,369

STOP MOTION DEVICE FOR SEWING MACHINES

Filed Feb. 12, 1944 2 Sheets-Sheet 1

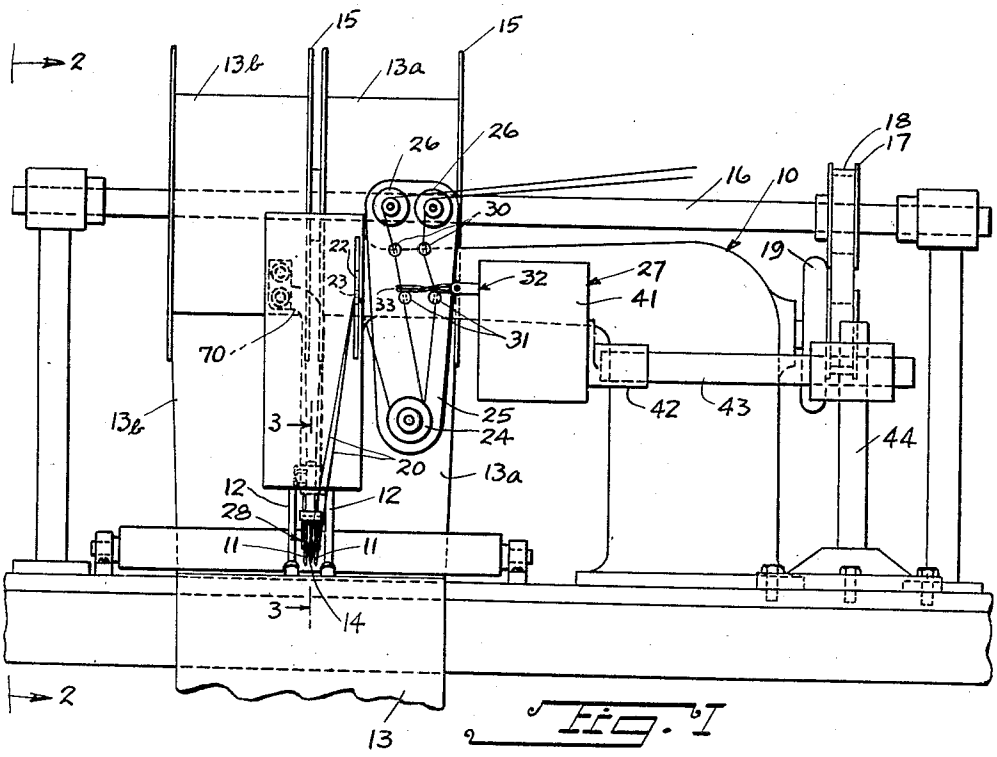


Fig. 1

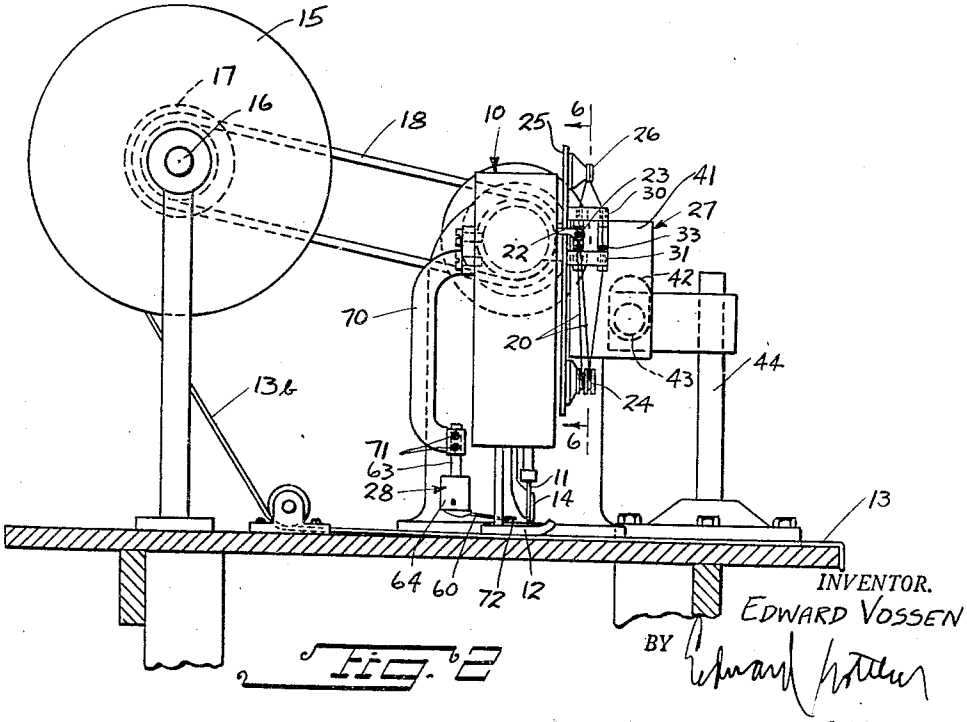


Fig. 2

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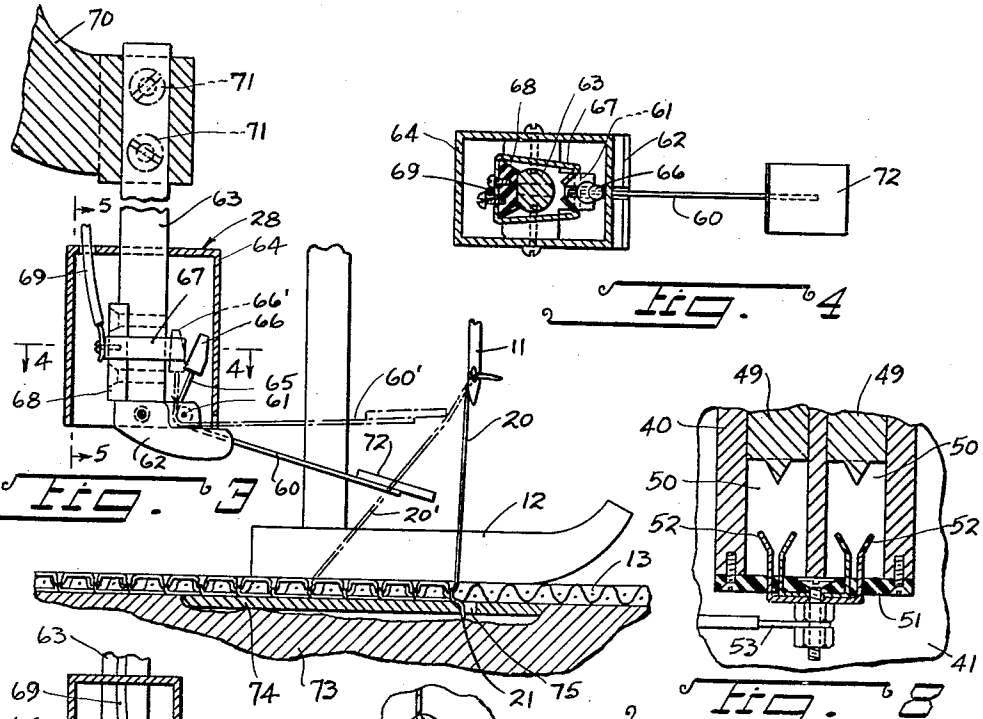


Fig. 3

Fig. 4

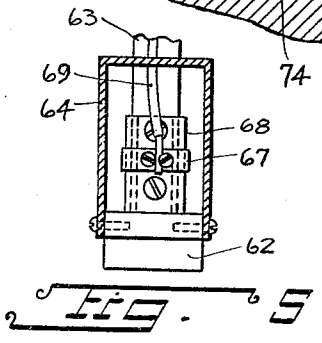


Fig. 5

Fig. 8

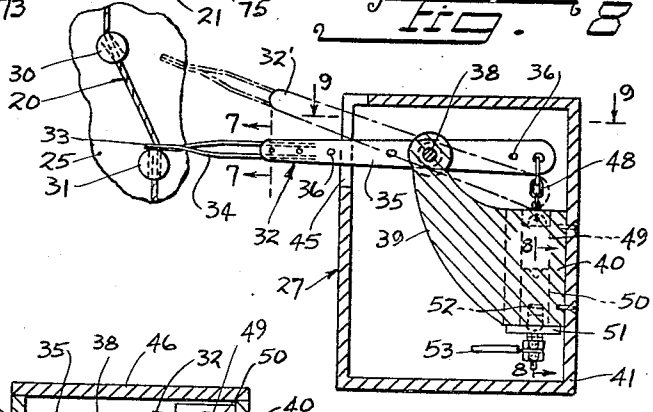


Fig. 6

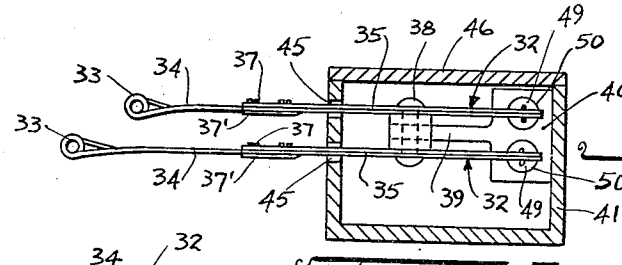


Fig. 9

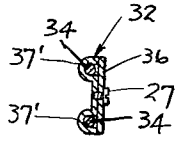


Fig. 7

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2,387,369

UNITED STATES PATENT OFFICE

2,387,369

STOP MOTION DEVICE FOR SEWING MACHINES

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Application February 12, 1944, Serial No. 522,061

3 Claims. (Cl. 112—219)

This invention relates to new and useful improvements in stop motion devices for sewing machines, and is particularly intended for automatic sewing machines where one operator takes care of a group of machines. Of course the invention is also valuable for a sewing machine worked on by one operator.

The need for a stop motion device for sewing machines has been generally recognized, but as yet very little progress has been made in this direction. The application of a stop motion device on a sewing machine presents quite a number of problems. In the first place the needle thread of the sewing machine does not run smoothly but is periodically slacked and then jerked tight as each stitch is drawn into position. This erratic motion of the needle thread makes it particularly difficult for a stop motion device to work satisfactorily. In the second place the bobbin thread is very hard to reach. It cannot be passed around the fingers of a stop motion device because the needle thread must continuously slip around the bobbin during the operation of the sewing machine for producing the lock stitches.

This invention proposes two detector units to be used in combination with a sewing machine having a needle thread interlocking with a bobbin thread, one of these detector units being designed for detecting a broken or exhausted needle thread, and the other for detecting whether or not the needle thread is interlocking with the bobbin thread. This indirectly detects whether or not the bobbin thread is broken or exhausted, or whether there is some defect in the sewing machine which prevents the lock stitches from forming. These two units must operate simultaneously, otherwise the stop motion device is ineffective. Frequently, the needle thread is working satisfactorily, but the bobbin thread is broken or exhausted, and unless this is detected a stop motion device would be futile. Similarly, a stop motion device which only detected defects on the bobbin thread would be of no use since the defect could be a broken or exhausted needle thread; and the machine would continue operating.

The invention proposes to so construct the stop motion device that it may be applied to various types and kinds of sewing machines, for example to the usual one needle sewing machine, or machines having more than one needle operating at the same time. It is also applicable to machines making various types of lock stitches. It is also applicable to machines using various kinds of pressure feet.

In this specification one specific embodiment of the invention has been disclosed so that its advantages and construction may be readily understood. In the particular embodiment shown, the stop motion device has been applied to a two needle sewing machine having a reciprocal knife severing a continuous strip of goods which is being sewed with a selvage edge, and the severed strips are being wound upon take-up drums. The importance of the invention may be understood by realizing that if one of the needles stopped sewing because of a broken needle thread, or a broken bobbin thread, and if this was not immediately detected by the operator, one of the strips would have its edge unsewed. When detected the operator would have to unwind the unsewn strip portion, unthread the needle which was sewing, rethread the needle which was not sewing, and sew up the edge portion that was unsewed, until a point is reached where both needles may be set into operation again. It will readily be understood that the stop motion device, in accordance with this invention, saves time in constructing articles since it avoids unnecessary resewing of seams, edges and parts which were supposed to be sewed. It also saves labor in that an operator is not required to correct defective material which was being operated on for quite a while. Consequently, the stop motion device is a money saver.

The invention also proposes to construct the stop motion device in a particularly simple manner so that it may be installed and operated at a low cost.

It is proposed to characterize the detector unit previously referred to for detecting a broken or exhausted needle thread by the fact that it tends to close a controller circuit for the sewing machine when the thread loosens, but is immediately reset when the thread is jerked tight, so that it operates the controller circuit only if a certain period of time elapses and the thread is not jerked tight.

It is proposed to characterize the detector unit for detecting whether or not the needle thread is interlocking with the bobbin thread, previously referred to, by the fact that it is operated by the needle thread, as the sewing machine continues its sewing operation and a section of the needle thread becomes loose because it is not being interlocked with the bobbin thread.

For further comprehension of the invention, and of the objects and advantages thereof, refer-

ence will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

Fig. 1 is a front elevational view of a sewing machine equipped with a stop motion device constructed in accordance with this invention.

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary enlarged sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is a horizontal sectional view taken on the line 4—4 of Fig. 3.

Fig. 5 is a fragmentary vertical sectional view taken on the line 5—5 of Fig. 3.

Fig. 6 is a fragmentary sectional view taken on the line 6—6 of Fig. 2.

Fig. 7 is a fragmentary sectional view taken on the line 7—7 of Fig. 6.

Fig. 8 is a fragmentary enlarged detailed vertical sectional view taken on the line 8—8 of Fig. 6.

Fig. 9 is a horizontal sectional view taken on the line 9—9 of Fig. 6.

The stop motion device for sewing machines, in accordance with this invention, is shown applied to a driven sewing machine 10 which is stopped by an electric controller, not shown on the drawings. The sewing machine 10 has two needles 11, and a pressure foot consisting of the pressure foot sections 12 spaced laterally of each other. The sewing machine 10 is shown operating upon a strip of cloth 13 which is being cut by the usual reciprocating knife 14 of the sewing machine, into two separate strips 13*a* and 13*b*. These strips are shown being wound upon drums 15 which are mounted on a rotatively supported shaft 16 connected by a pulley 17 and belt 18 with the driving wheel 19 of the sewing machine 10. The needles 11 of the sewing machine are sewing hems upon the cut edges of the strip portions 13*a* and 13*b*.

The sewing machine 10 is of standard design having needle threads 20 and bobbin threads 21 (see particularly Fig. 3) interlocking at the point where the needles passes through the material being sewn. The particular type of interlocking stitch is not important. The sewing machine 10 has the usual reciprocating finger 22 which pulls the needle threads 20 tight to form each of the interlocking stitches, and which slackens the needle thread 20 so that it may be caught by the bobbin holder and slipped around the bobbin to form the interlocking stitch. The threads 20 are shown engaged through the needles 11 and passing up through an opening 23 in the reciprocating finger 22, and then continuing around tension button means 24 mounted on a plate 25 supported on the body of the machine 10. The threads 20 continue upwards through additional button tension means 26 and then continue to the spools or other supply. The stop motion device includes a detector unit 27 for detecting broken or exhausted needle thread or threads 20, and a second detector unit 28 for detecting whether or not the needle thread or threads 20 are interlocking with the bobbin threads 21.

The detector unit 27 includes, for each thread 20, a pair of spaced guides 30 and 31, preferably located between the tension means 24 and 26 and mounted on a plate 25. A lever 32 for each thread is movably mounted and is provided with an eye 33 through which the thread 20 passes. The spaced guides 30 and 31 are slightly offset from each other, as particularly shown in Fig. 6, so that when the thread 20 is pulled tight there is a tendency for the thread 20 to force the eye 33 downwards and against the guide 31.

Each lever 32 is formed from two sections. There is an outer wire section 34 which is twisted to form the eye portion 33, and there is an inner section 35 formed by a pair of adjacent strips spot welded at spaced points 36, see Fig. 6. The inner ends of the wire section 34 are attached to the section 35 by engaging them between the outer end portions of the strips forming the section 35. These ends are clamped in position with screws 37 which clamp the end portions of said strips together, one of said strips being formed with grooved portions 37' into which the ends of the wire section 34 are engaged. The section 35 is pivotally supported intermediate of its ends by a pintle 38 upon an arm 39 of a bracket 40. This bracket 40 is attached upon one wall of a casing 41. This casing 41 is supported by a bracket 42 and an arm 43 on a standard 44 mounted on the table of the sewing machine.

It is pointed out that since the sewing machine 10 has two needles and two needle threads, that there are two levers 32, one for each thread, and two pairs of spaced guides 30 and 31, as clearly shown in Fig. 1. These levers 32 pass through slots 45 in the casing 41. The casing 41 has a removable cover 46 for enclosing the mechanism within the casing. The wire sections 34 of the levers 32 are shown slightly offset one from the other, see particularly Figs. 1 and 9. This permits the two threads 20 to separate from the tension means 24 to the tension means 26.

The levers 32 are associated with means for slowly urging them to move said eye portions 33 away from the guides 31 when said threads 20 loosen. This means includes light chains 48 connected with the inner ends of the levers 32 and connecting with pistons 49 vertically slidably mounted in cylinders 50 formed in said bracket 40. The pistons 49 are capable of sliding in cylinders 50 and act in the nature of air dashpots. The bottom ends of the cylinders 50 are closed by a strip 51, so that the entrapped air must escape around the pistons 49. The mass of the pistons 49 are depended upon to slowly move the levers 32.

The pistons 49 are associated with switch means for closing the controller circuit to the sewing machine, when said eye portions 33 move away from the guides 31 for a period greater than the periodic loosening and jerking of the needle threads 20. This switch means includes electric contacts 52 mounted on the strip 51 which is of insulation material. These contacts 52 connect with a lead 53. The pistons 49 are engageable with the contacts 52 and form the ground connection for the controller circuit.

The detector unit 28 includes a movably mounted lever 60 and means for supporting said lever 60 slightly above and slightly rearwards of the point of sewing of the sewing machine (see particularly Fig. 3). The lever 60 is pivotally supparted by a pintle 61 mounted upon a foot 62 which is mounted upon the bottom of a rod 63. A casing 64 is engaged upon the bottom portion of the rod 63 and partially encases and is mounted upon the foot 62. The lever 60 has an upwardly projecting rear end 65, projecting past the pivot 61. A contact 66 is mounted on said end 65 and is cooperative with the ends of a stationary spring 67 which is mounted on an insulation block 68, which in turn is supported on the bottom por-

tion of said rod 63. A lead 69 connects with the spring 67.

When the lever 60 is free it naturally assumes the full line position illustrated in Fig. 3, resting in a groove formed in the top of the foot 62, due to gravity. When the lever 60 is lifted to the dot and dash line position 60', the contact 66 will engage the spring 67 for closing the controller circuit from the lead 69 to the ground. The rod 63 is supported on a bracket 70 which is mounted upon the head of the sewing machine 10. Specifically, the rod 63 is slidably engaged through the bottom portion of the bracket 70 and held in a fixed position by several set screws 71. A relatively broad plate 72 is mounted upon the front of the lever 60 and is of sufficient width so as to extend back of both of the needles 11 of said sewing machine 10. The lever 60 passes between the pressure foot sections 12 of said sewing machine.

In Fig. 3 reference numeral 73 indicates the bed of said sewing machine which is provided with the bobbin covering plate 74 having openings 75 through which the needles 11 pass during the sewing operation. The strip of cloth 13 is illustrated in the act of being sewed. It is pointed out that if the bobbin thread 21 breaks or becomes exhausted, the top thread 20 will no longer interlock with said bobbin thread. However, the sewing machine 10 will function in the usual way so that the cloth 13 moves rearwards as if the sewing were continuing. Consequently, the needle thread 20 soon assumes a slack and inclined position, one of such positions being indicated in Fig. 3 by the dot and dash lines 20'. The needle 11 keeps reciprocating up and down and the loose needle thread 20 assuming the inclined position 20' soon strikes the plate 72, pivoting the lever 60 from the full line position shown in Fig. 3 to the dot and dash line position 60'. This action takes place only if one or the other of the needle threads 20 is not interlocking with the bobbin threads 21.

The operation of the device is as follows:

In the normal operation of the sewing machine 10 the needle threads 20 loosen and then are jerked tight by the operation of the reciprocating finger 22. When the threads 20 loosen, the eye portions 33 of the levers 32 are freed. The piston weights 49 start descending in the cylinders 50 due to gravity and pivoting the levers 32 upwards towards the dot and dash line position 32' illustrated in Fig. 6. However, before this position is reached the threads 20 are jerked tight by the finger 22. Because the guides 30 and 31 are offset, as illustrated for example in Fig. 5, the threads 20 return the eye portions 33 of the levers 32 back against the bottom guides 31. However, if one or the other, or both, of the needle threads 20 break or become exhausted, the lever or levers 32 will continue rising since they are not being jerked back as explained, and soon will reach the fully raised position indicated by the dot and dash lines 32' in Fig. 6. In this latter position or positions of the levers 32, the piston or pistons 49 will engage the contacts 52, closing the controller circuit from the lead 53 to the ground. The controller of the sewing machine 10 then functions to stop the sewing machine.

It should be noted that the sewing machine will stop a fraction of a second after a thread 20 breaks because the time of motion of the levers 32 from the full line position shown in Fig. 6 to the dot and dash line position requires but a short period of time greater than the normal periodic slacking and tightening of the needle threads 20.

In the event that the needle thread or threads 20 cease interlocking with the bobbin threads 21, the needle thread or threads 20 soon reach a position, indicated by the dot and dash lines 20', in Fig. 3. This occurs each time that the needle or needles 11 move upwards. The inclined needle thread 20 soon strikes the plate 72 and throws the lever 60 upwards so that the contact 66 move towards and engages the spring contact 67, as indicated by the dot and dash lines 66'. This closes the controller circuit from the lead 69 to the ground of the machine, and the controller acts to stop the sewing machine.

It is pointed out that sewing machines come equipped with various kinds and designs of pressure feet. A single needle sewing machine usually has merely an aperture in the pressure foot through which the needle passes. A pressure foot of this kind must be slotted from the aperture rearwards to prevent the pressure foot from holding the needle thread down so that the needle thread may assume the inclined position illustrated in Fig. 3.

A division of this application has been filed under Serial No. 579,410, on the 23rd day of February 1945.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise constructions herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by United States Letters Patent is as follows:

1. A controller detector unit for a machine having a moving thread which is periodically loosened and jerked tight, a pair of spaced guides for said thread, a movably mounted lever having an eye for said thread to pass, said thread being threaded through said guides and said eye to force said eye towards one of said guides when said thread is jerked tight, means for slowly urging said lever to move said eye away from said last mentioned guide when said thread is loosened, and switch means for closing a controller circuit when said eye is moved away from said last mentioned guide for a time period greater than said periodic action of said thread, said means including a dash pot for cushioning the movements of said lever.

2. A controller detector unit for a machine having a moving thread which is periodically loosened and jerked tight, a pair of spaced guides for said thread, a movably mounted lever having an eye for said thread to pass, said thread being threaded through said guides and said eye to force said eye towards one of said guides when said thread is jerked tight, means for slowly urging said lever to move said eye away from said last mentioned guide when said thread is loosened, and switch means for closing a controller circuit when said eye is moved away from said last mentioned guide for a time period greater than said periodic action of said thread, and said controller including a casing, a bracket mounted within said casing, said lever being pivotally mounted on said bracket and extending through a slot in said casing, and said means for urging said lever as stated, comprising a piston connected with the inner end of said lever, and a cylinder in which said piston vertically slidably reposes so as to be air cushioned in its movements.

3. In a controller detector unit for a machine having a moving thread which is periodically loosened and jerked tight, a pair of vertically spaced guides for said thread and being slightly offset laterally of each other, a pivotally mounted lever having an eye for said thread located between said guides so that said thread may be threaded through said guides and said eye to force said eye towards the bottom one of said guides when said thread is jerked tight, a weight of a mass capable of being lifted by said thread when it jerks and connected with said lever for urging said lever up and away from said bottom guide, switch means for closing a controller circuit when said eye is moved away from said bottom guide for a time period greater than said periodic action of said thread, and a cylinder into which said weight extends for cushioning the movements of said lever.

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