April 16, 1946. E. R. STAHL ET AL 2,398,473

TEXTILE APPARATUS

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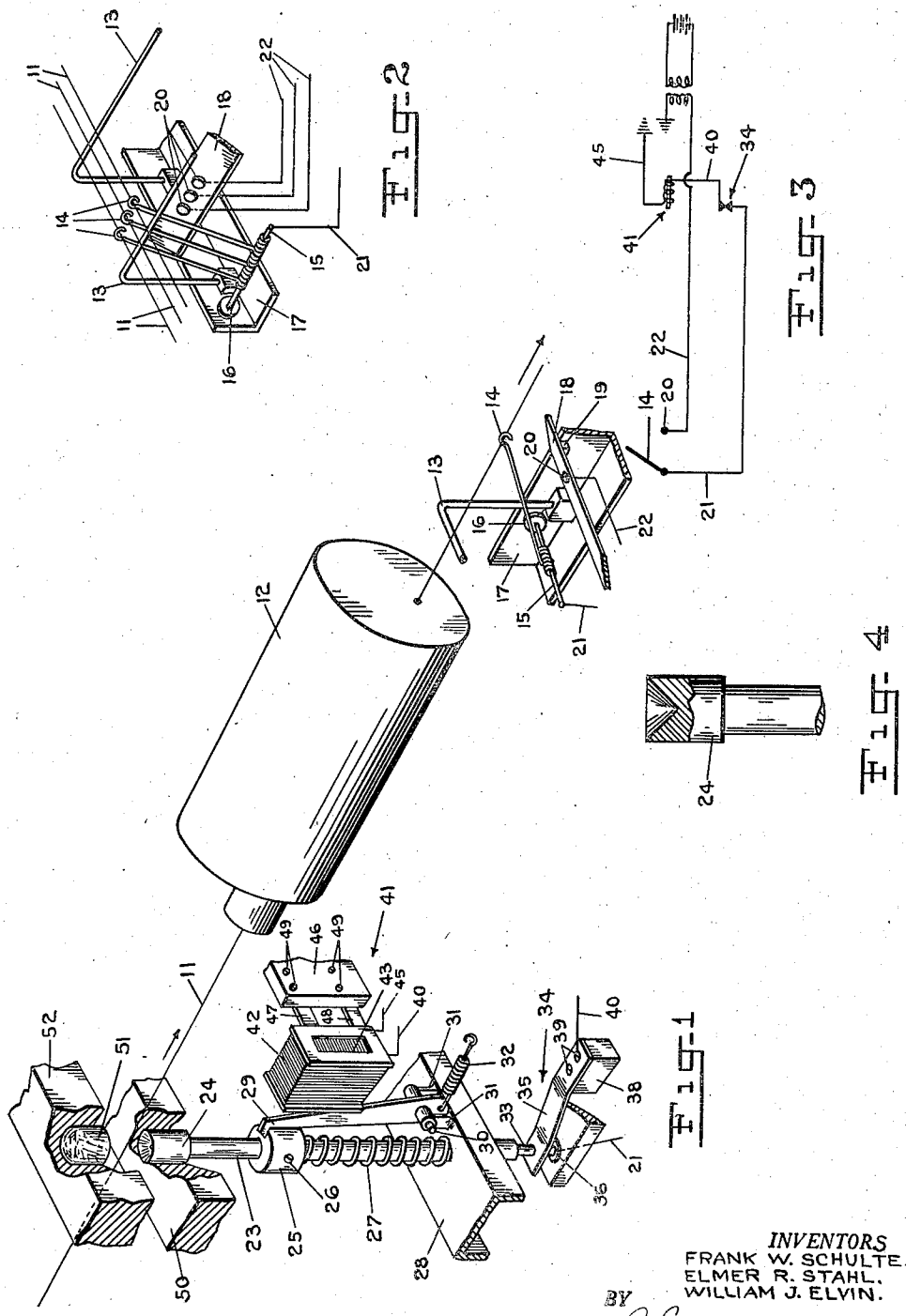


Fig. 2

Fig. 3

Fig. 4

Fig. 1

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TEXTILE APPARATUS

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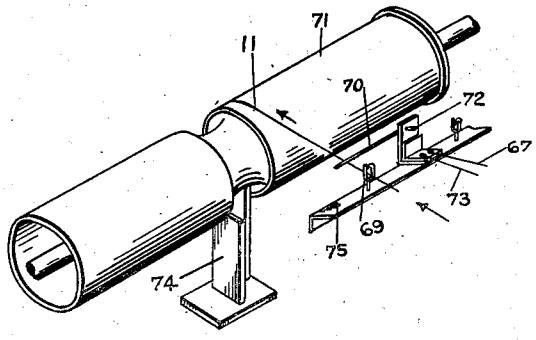


Fig. 5

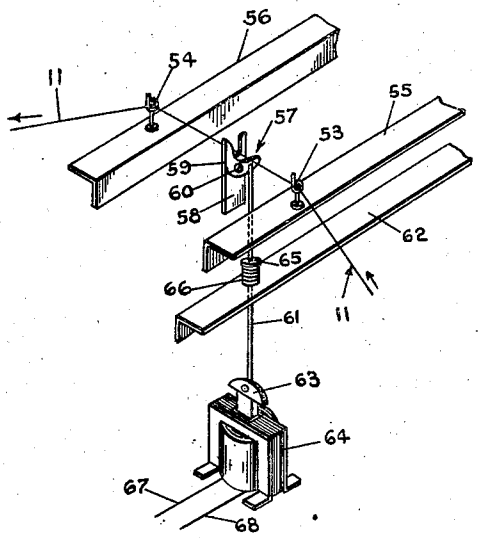


Fig. 6

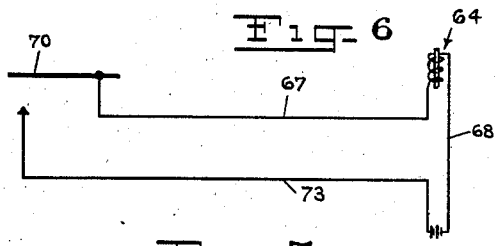


Fig. 7

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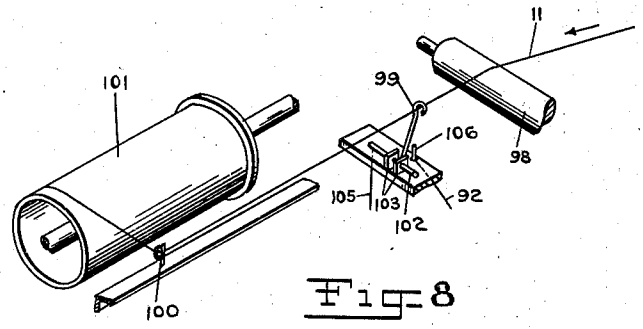


Fig. 8

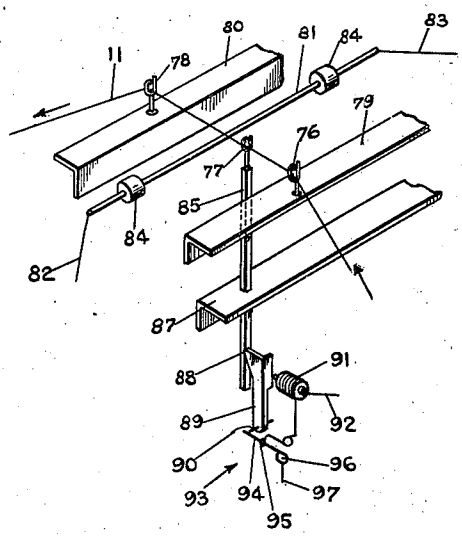


Fig. 9

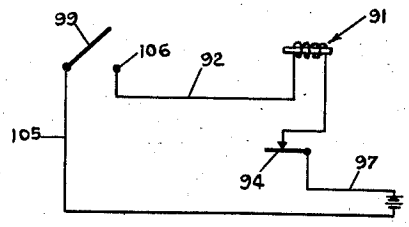


Fig. 10

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UNITED STATES PATENT OFFICE

2,398,473

TEXTILE APPARATUS

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Application October 26, 1943, Serial No. 507,678

13 Claims. (Cl. 28—1)

This invention relates to multi-end yarn stretching devices, and relates more particularly to attachments for multi-end yarn stretching devices for the purpose of severing the ends of threads which may break during the stretching operation, thereby preventing the broken ends of threads from becoming entangled with the threads which remain unbroken and forming double end threads, and also preventing the broken ends of threads from forming yarn laps about rolls over which the threads pass.

An object of this invention is the provision of an attachment for multi-end thread stretching devices for automatically severing a broken end of thread when an end break occurs so as to prevent the entanglement of the broken end with the unbroken ends, to prevent the formation of laps about the rolls around which the threads are wound, and to minimize the amount of thread wasted when an end break occurs during multi-end stretching operations.

Other objects of this invention will appear from the following detailed description.

In the accompanying drawings, wherein the preferred embodiments of our invention are shown,

Figure 1 is a perspective view, partly in section, showing one of our novel thread severing mechanisms in relation to the steam chamber, only one thread being shown in the interest of clarity,

Figure 2 is a detail view showing a section of the drop wire structure,

Figure 3 is an electric circuit or wiring diagram for the operation of the thread severing mechanism,

Figure 4 is a detail view, on an enlarged scale and partly in section, of the cutting tool,

Figure 5 is a detail view showing a drop wire structure in contact with a thread,

Figure 6 is a perspective view of another embodiment of our invention showing another thread cutting mechanism and solenoid means actuated by the fall of the drop wire shown in Figure 5,

Figure 7 is the circuit diagram of the device shown in Figures 5 and 6,

Figure 8 is a detail view of a part of yet another embodiment of our invention showing a running thread, feed rollers and a drop wire cooperating with the thread,

Figure 9 is a perspective view of another severing means actuated by the drop wire arrangement shown in Figure 8, and

Figure 10 is the wiring or circuit diagram of the embodiment of our invention shown in Figures 8 and 9.

Like reference numerals indicate like parts throughout the several views of the drawings.

Referring now to the drawings and more particularly to Figures 1 to 4, a thread 11, coming from a bobbin or other suitable source of supply and moving in the direction shown, is passed through a steam chamber 12 where it is softened and is withdrawn from the chamber under suitable tension so that it is stretched. The thread 11, which is drawn from chamber 12 by suitable take-up means (not shown), passes over a guide bar 13 and then through the eye of a drop wire 14. Drop wire 14 is mounted on and is freely rotatable about a conductive shaft 15 which is set in an insulated support 16 fixed to an angle-iron bracket 17. Positioned beneath drop wire 14 is a non-conducting plate 18, attached to bracket 17 by a support 19, in which are set contact points 20 formed of a suitable conducting material. A lead wire 21 is connected to shaft 15 and each contact point 20 has a lead wire 22 connected thereto. The lead wires are connected to a suitable source of electrical energy and form part of a closed circuit when a drop wire 14 falls and rests on contact point 20. While thread 11 remains unbroken, drop wire 14 rides on the running thread 11 and the thread severing attachment remains inactive. When, for any reason, thread 11 is broken, drop wire 14 falls on to contact point 20 thus closing the electrical circuit to bring the thread severing attachment into operation.

The thread severing device, which is brought into operation by the fall of drop wire 14 on contact point 20, comprises a rod 23 provided at its upper end with an edged cutting head 24 and at an intermediate point with an adjustable collar 25 which may be positioned as desired by means of a set screw 26. Rod 23 is spring-loaded as by means of a spring 27, one end of which bears against collar 25 while the other bears against a supporting channel member 28. Rod 23 is locked in position by means of a trigger 29 hooked over collar 25. Trigger 29 is pivoted on a shaft 30 journaled in bearing brackets 31 and is held in locking position against collar 25 by means of a spring 32 attached to trigger 29 at one end and suitably anchored in any convenient manner (not shown) at the other. When held in locked position by trigger 29 rod 23, provided at its lower extremity with a tip 33 of suitable insulating material, exerts a downward thrust against a switch, generally indicated by reference numeral 34 and forming part of the circuit containing the drop wire, thus maintaining the switch in a closed position by holding a contact comprising a flat

spring 35 against a contact point 36. Contact point 36 is provided with a lead wire 21, while flat spring 35, which is held in place on a support 38 as by screws 39, is provided with a lead wire 40.

Means are provided to release rod 23 and collar 25 from the restraining action of trigger 29 when an end break occurs and the broken thread 11 permits drop wire 14 to fall on to contact point 20. Such means comprises an electromagnet, generally indicated by reference numeral 41, having a plurality of windings 42 about a core 43 and forming part of the circuit shown in Figure 3 through lead wires 40 and 45. Electromagnet 41 is supported by a bracket 46 and is held in position by any suitable means as by arms 47 and 48 fixed to bracket 46 by screws 49.

When an end break occurs, drop wire 14 falls and strikes contact point 20 closing the circuit, thus energizing electromagnet 41. The electromagnetic field created by the current passing through the windings exerts a strong magnetic force on trigger 29, causing it to be drawn backward so that it releases collar 25 and allows rod 23 to be forced upward by the action of spring 27. The cutting head 24 at the top of rod 23 moving upward through a guide member 50 strikes block 51 set in a bar 52 severing thread 11 and leaving a short end which may be removed without any difficulty. The immediate severance of the broken thread at a point where the thread undergoing processing enters the system prevents the formation of roller laps and the tangling of the broken threads with those which are unbroken and are undergoing stretching.

The upward movement of rod 23 also opens switch 34 simultaneously with the cutting action which opens the circuit and halts the flow of current to the electromagnet 41 holding trigger 29 in a retracted position. Accordingly, trigger 29 and the cutting means may be reset merely by forcing rod 23 down sufficiently to permit trigger 29 to lock over collar 25. The cutting means may, of course, be reset only after the drop wire 14 is lifted off contact 20 and is placed in position over a running thread 11 after the latter has been rethreaded through the apparatus.

Referring now to Figures 5 to 7 wherein another embodiment of our invention is shown, and more particularly to Figure 6, thread 11 coming from a suitable source of supply (not shown) is passed in the direction indicated through pigtail guides 53 and 54 set in bars 55 and 56 respectively, and through a cutting device generally indicated by reference numeral 57. Cutting device 57 comprises a fixed blade 58 and a movable blade 59 pivotally mounted at 60. Fixed blade 58 is supported in any suitable manner (not shown). Pivotally attached to movable blade 59 is a rod 61 which extends downwardly through a guide bar 62 and is attached at its other end to the core 63 of a solenoid 64. Rod 61 carries a disc 65 fixed thereto and is spring-loaded as by a spring 66 which bears on disc 65 at one end and on bar 62 at the other. The action of spring 66 serves to force the rod 61 upwardly to maintain the cutting device 57 in an open position. Solenoid 64 is provided with lead wires 67 and 68 connected to a suitable power supply. From pigtail guide 54 the thread 11 may be directed to any textile apparatus such as a stretching chamber or any other treating means and, after emerging therefrom, thread 11 may be passed through a pigtail guide 69, under a drop wire 70 and then over a feed roller 71. Drop wire 70 comprises the make and break part of a switch 72, the switch being opened when drop wire 70 is in a horizontal position on running thread 11 and is closed when drop wire 70 is in a downward position. Switch 72 is provided with lead wires 67 and 73, the latter being connected to the power supply. Roller 71 may be supported in any suitable manner as by a post 74, while pigtail guide 69 is supported by means of a bar 75 which also carries switch 72.

When an end break occurs and thread 11 is severed at a point adjacent to pigtail guide 69, drop wire 70 falls and closes switch 72. This action permits current to flow through solenoid 64 thus drawing core 63 in a downward direction. Rod 61, which is connected to core 63, is thus drawn downwardly and causes blade 59 to pivot at 60 and to sever thread 11 between the blades 58 and 59 of the cutting device 57. This action prevents thread 11 from forming roller laps and from becoming entangled with the unbroken threads.

In the modification shown in Figures 8 to 10 of the drawings, thread 11, moving in the direction shown, is passed through pigtail guides 76, 77 and 78, and may then be passed to a stretching chamber, or the like, similar to that shown in Figure 1. Guide 76 is set in a bar 79 and guide 78 is set in a bar 80. It is to be understood, of course, that bars 79 and 80 may carry a plurality of similar guides when a large number of ends of thread are being treated. Set beneath thread 11, and at right angles thereto, is a rod 81 of a metal of such electrical resistance that a suitable current flowing therethrough causes it to become hot enough to burn through a thread coming in contact therewith. Lead wires 82 and 83 are provided at each end of the rod for introducing the current while insulators 84 enable the rod to be set in any desired position as by suitable supports (not shown). Guide 77 is set in a bar 85 which passes through a guide bar 87 and is slotted at 88 so that it rests on a trigger 89. Trigger 89 is journaled in any suitable bearings by means of pins 90 set therein. Adjacent to trigger 89 is an electromagnet 91 connected to a suitable source of current through a lead wire 92 and provided with switch, indicated by reference numeral 93, comprising a key 94 and a contact 95, key 94 pivoting at 96. A wire 97 leading to the remaining portions of the circuit is attached to key 94 at the pivot 96.

Thread 11, as shown in Figure 8, coming, for example, from a stretching operation effected at a point beyond pigtail guide 78, passes over a roll 98, under a drop wire 99 and then through a pigtail guide 100 to a driven feed roll 101 leading to a take-up bobbin (not shown). Drop wire 99 is pivotally mounted on a rod 102 set in brackets 103 fixed to an insulated base 104 being maintained in upright position by the supporting action of running thread 11 upon which it rests. A lead wire 105 connected to a suitable source of current passes through base 104 and is attached to rod 102 making drop wire 99 part of an electrical circuit as shown in Figure 10. The remainder of the circuit is formed by a contact 106 set beneath drop wire 99 and attached to wire 92 which leads to the electromagnet 91.

When an end break occurs, drop wire 99 falls and strikes contact 106 closing the circuit and energizing electromagnet 91. The current flowing through electromagnet 91 causes the latter to act on trigger 89 drawing it from slot 88. This action releases rod 85 and permits it to drop thus carrying thread 11 down and bringing it in

contact with heated rod 81 which chars and severs the thread. Simultaneously with this action, the base of rod 85 strikes key 94 and opens the circuit cutting off the current to the electromagnet 91 and destroying the electromagnetic force exerted by magnet 91 on trigger 89 and permitting the mechanism to be reset if desired. The severance of the thread prevents the broken end from forming yarn laps or becoming entangled with the unbroken threads.

Not only may the novel attachments of our invention be employed in connection with the yarn or thread stretching operations but they may also be employed in connection with winding, sizing or other thread processing operations to prevent broken ends of thread from becoming entangled with unbroken threads or from forming undesirable yarn laps.

It is to be understood that the foregoing detailed description is given merely by way of illustration and that many variations may be made therein without departing from the spirit of our invention.

Having described our invention, what we desire to secure by Letters Patent is:

1. In apparatus for treating running thread, thread severing means, means for positively maintaining said severing means inactive, and means including a vertical movable member for actuating said thread severing means upon breakage of the thread, said actuating means comprising an electric circuit including a source of power, and means operable by the thread for maintaining said electric circuit open and for closing said electric circuit upon breakage of the thread so as to cause the means for positively maintaining the severing means inactive to permit movement of said member to operate said severing means.

2. In apparatus for treating running thread, thread severing means including a cutter head, striking block and a vertically movable member for operating said cutter head, mechanical means for positively maintaining said severing means inactive and means for actuating said thread severing means upon breakage of the thread, said actuating means comprising an electric circuit including a source of power, and means operable by the thread for maintaining said electric circuit open and for closing said electric circuit upon breakage of the thread so as to cause said mechanical means to permit movement of said member to operate said severing means.

3. In apparatus for treating running thread, thread severing means including cooperating cutting blades and a vertically movable member for operating at least one of said cutting blades, and means for actuating said thread severing means upon breakage of the thread, said actuating means comprising an electric circuit including a source of power, and means operable by the thread for maintaining said electric circuit open and for closing said electric circuit upon breakage of the thread so as to cause said member to operate and effect a relative movement of said cutting blades to sever the thread.

4. In apparatus for treating running thread, thread severing means including a heated element, a vertically moving bar and means for actuating said thread severing means upon breakage of the thread, said actuating means comprising an electric circuit including a source of power, and means operable by the thread for maintaining said electric circuit open and for closing said electric circuit upon breakage of the thread so as to cause movement of said bar and the thread severing means to operate.

5. In apparatus for treating running thread, thread cutting means including a vertically movable member, mechanical means for positively maintaining said cutting means inactive and means for actuating said thread cutting means upon breakage of the thread, said actuating means comprising an electric circuit including a source of power, and a drop wire arrangement operable by the thread for maintaining said electric circuit open and for closing said electric circuit upon breakage of the thread so as to cause said mechanical means to permit movement of said member to operate said cutting means.

6. In apparatus for treating running thread, thread cutting means including a vertically movable member, mechanical means for positively maintaining said cutting means inactive and means for actuating said thread cutting means upon breakage of the thread, said actuating means comprising an electric circuit including a source of power, an electromagnet, and means operable by the thread for maintaining said electric circuit open and for closing said electric circuit and energizing said electromagnet so as to cause said mechanical means to permit movement of said member to operate said cutting means.

7. In apparatus for treating running thread, thread severing means comprising a vertically movable member, a cutter head mounted on said member and striking block, mechanical means for holding said member and cutter head in inoperative position, means for releasing said member and cutter head to cut the thread upon breakage thereof, said releasing means comprising an electric circuit including a source of power, an electromagnet, and means operable by the thread for maintaining said electric circuit open, for closing said electric circuit and energizing said electromagnet so as to cause said member to be released causing said cutter head to come into contact with said striking block to sever the thread therebetween.

8. In apparatus for treating running thread, thread severing means comprising a vertically movable member, a cutter head mounted on said member and striking block, mechanical means for holding said member and cutter head in inoperative position, means for releasing said member and cutter head to cut the thread upon breakage thereof, said releasing means comprising an electric circuit including a source of power, an electromagnet, means operable by the thread for maintaining said electric circuit open, for closing said electric circuit and energizing said electromagnet so as to cause said member to be released causing said cutter head to come into contact with said striking block to sever the thread therebetween, and means for de-energizing said electromagnet upon completion of the thread severing operation.

9. In apparatus for treating running thread, thread severing means comprising a vertically movable member, a cutter head mounted on said member and striking block, mechanical means for holding said member and cutter head in inoperative position, means for releasing said member and cutter head to cut the thread upon breakage thereof, said releasing means comprising an electric circuit including a source of power, an electromagnet, a drop wire arrangement operable by the thread for maintaining said electric circuit open, for closing said electric circuit and ener-

gizing said electromagnet so as to cause said member to be released causing said cutter head to come into contact with said striking block to sever the thread therebetween, and means for de-energizing said electromagnet upon completion of the thread severing operation.

10. In apparatus for treating running thread, thread severing means comprising cooperating cutting blades, means for holding said cutting blades in open position, a vertical rod for moving one of said cutting blades relative to the other of said cutting blades to cut the thread upon breakage thereof, said blade moving means comprising an electric circuit including a source of power, an electromagnet, and means operable by the thread for maintaining said electric circuit open, for closing said electric circuit and energizing said electromagnet so as to cause one of said cutting blades to be moved relative to the other of said cutting blades to sever the thread therebetween.

11. In apparatus for treating running thread, thread severing means comprising cooperating cutting blades, means for holding said cutting blades in open position, a vertical rod for moving one of said cutting blades relative to the other of said cutting blades to cut the thread upon breakage thereof, said blade moving means comprising an electric circuit including a source of power, an electromagnet, and a drop wire arrangement operable by the thread for maintaining said electric circuit open, for closing said electric circuit and energizing said electromagnet so as to cause one of said cutting blades to be moved relative to the other of said cutting blades to sever the thread therebetween.

12. In apparatus for treating running thread, thread severing means comprising a heated element, means including a vertical rod for causing the thread to come into contact with said heated cutting element upon breakage of said thread, said means comprising an electric circuit including a source of power, an electromagnet, means operable by the thread for maintaining said electric circuit open, for closing said electric circuit and energizing said electromagnet so as to operate said rod to cause said thread to come into contact with said heated element to sever the thread.

13. In apparatus for treating running thread, thread severing means comprising a heated element, means including a vertical rod for causing the thread to come into contact with said heated cutting element upon breakage of said thread, said means comprising an electric circuit including a source of power, an electromagnet, a drop wire arrangement operable by the thread for maintaining said electric circuit open, for closing said electric circuit and energizing said electromagnet so as to operate said rod to cause said thread to come into contact with said heated element to sever the thread.

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