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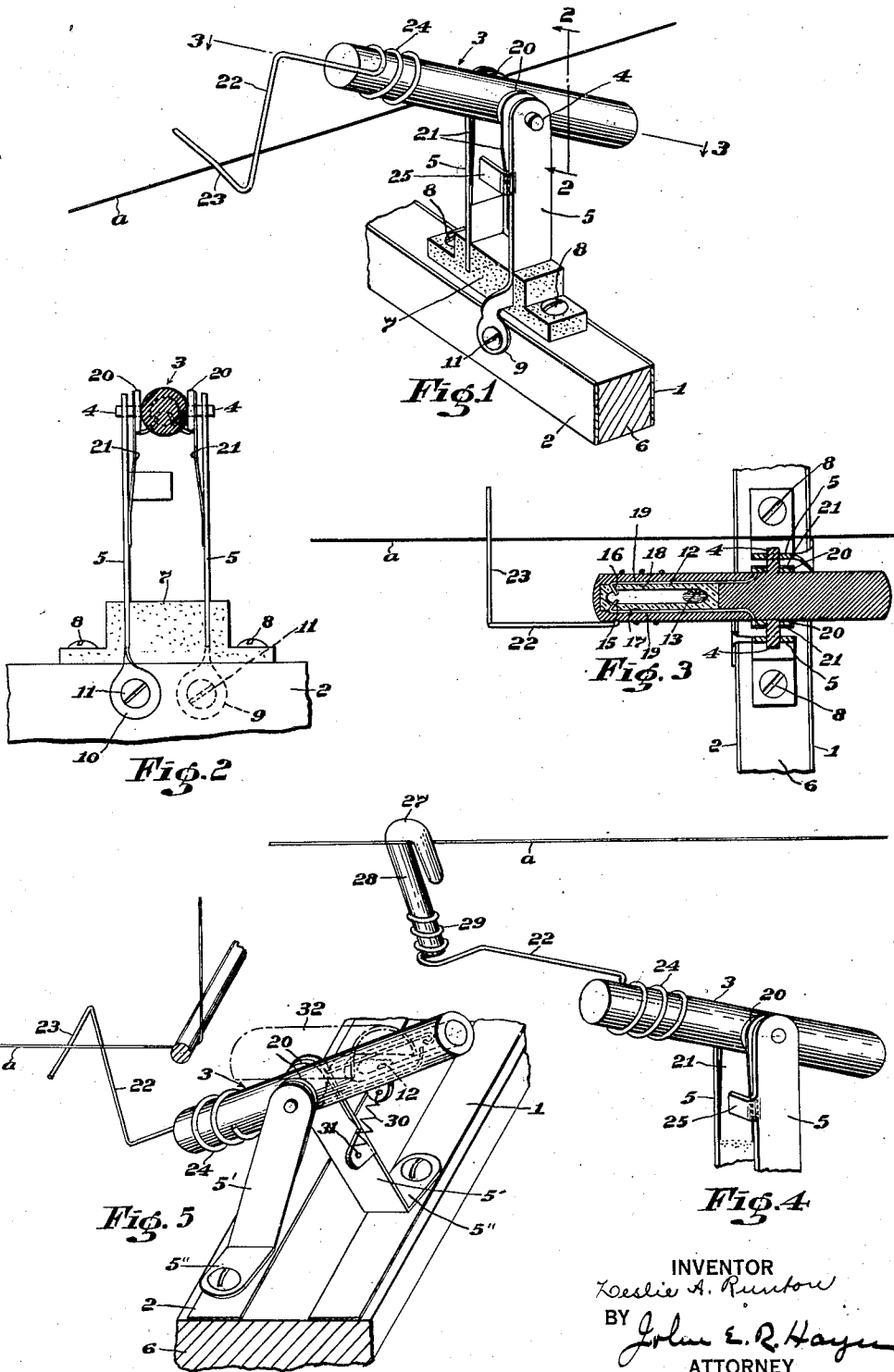
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ACTUATING MECHANISM FOR STOP MOTIONS

Filed July 16, 1937

2 Sheets-Sheet 1



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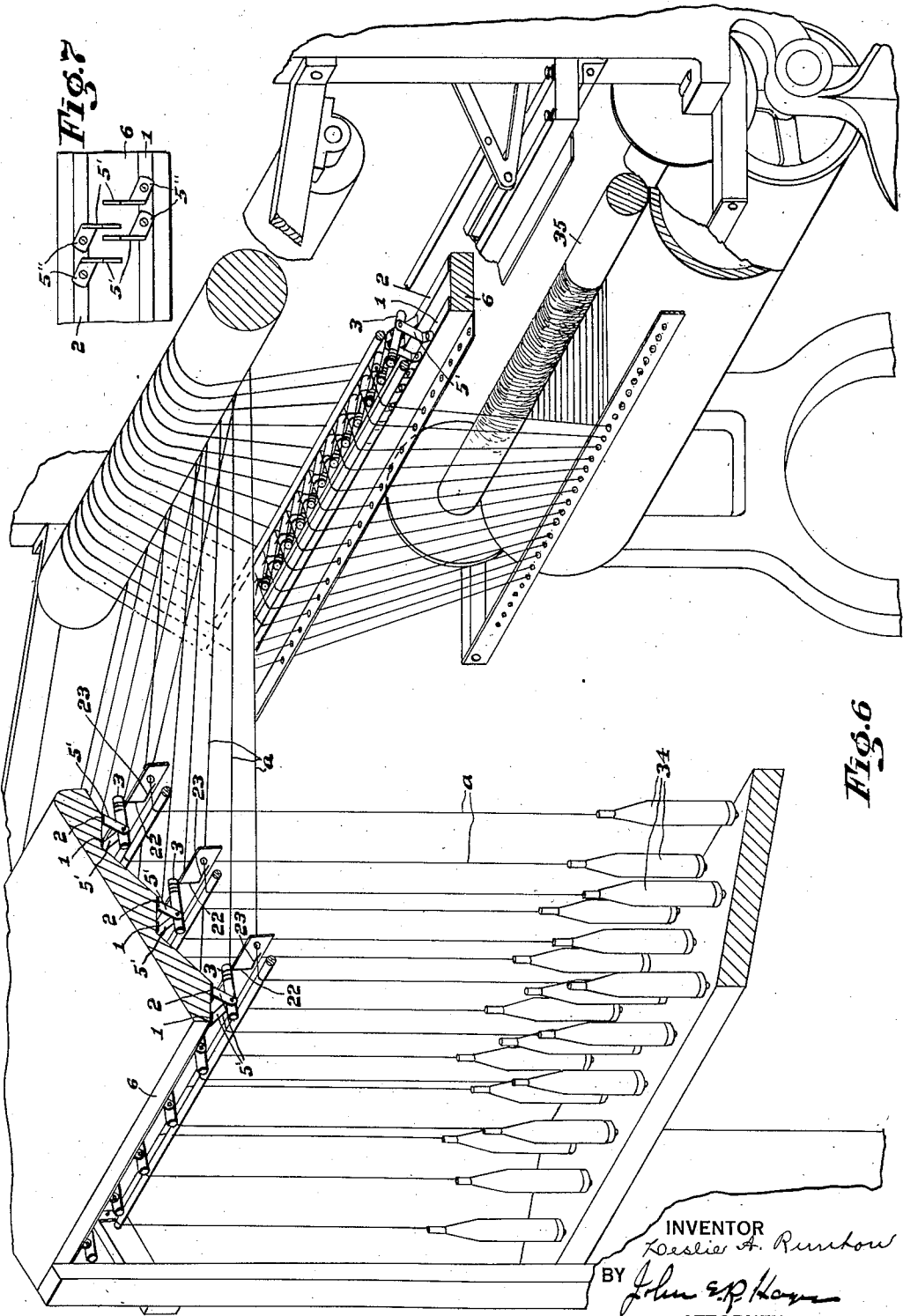
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UNITED STATES PATENT OFFICE

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ACTUATING MECHANISM FOR STOP MOTIONS

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6 Claims. (Cl. 28—51)

The invention relates to an improvement in actuating mechanisms for stop motions by which a machine is stopped when a break occurs in yarn travelling in the machine under tension. The actuating mechanism pertains especially to a type in which the stop motion is operated upon the completion of an electric circuit and the actuating mechanism controls the passage of electric current for completing the circuit.

Among the objects of the invention are:

To provide an actuating mechanism of positive action, and especially one that will be unaffected by lint, oil, and corrosion, which are common sources of trouble in devices of this kind;

To provide a mechanism which will occupy very little space and may be located in places where it would be impossible to locate devices of similar character commonly employed.

In many machines it is desirable to locate a stop motion actuating mechanism at the very point where the yarn enters the machine as the break in the yarn most often occurs at this point. This is especially true of knitting machines, the breakage occurring mostly at the point where the yarn enters the needles. Knitting machines having their product wound up below the needle cylinder possess the advantage of a space above the cylinder for a yarn stop motion system which includes a mechanism which actuates the stop motion on the breaking of the yarn. Knitting machines, however, having their product wound up above the needle cylinder cannot, in so far as I am aware, successfully adopt any of the systems used on other types of machines. In fact I have no knowledge of any yarn stop motion actuating mechanism for this type of knitting machine which actuates at the point of knitting, and one of the objects of my invention is to provide a mechanism for these machines which actuates at the point of knitting.

A further object of the invention is to provide an actuating mechanism for a stop motion so made and operable that a series of such mechanisms may be located in a comparatively restricted space in association with a multiplicity of yarns as in certain types of thread winding or spooling machines for stopping the machine on the breakage of any one of the yarns.

The invention can best be seen and understood by reference to the drawings in which

Fig. 1 shows the actuating mechanism in perspective.

Fig. 2 is a view partly in cross section and partly in end elevation taken on the line 2—2 of Fig. 1.

Fig. 3 is a longitudinal cross section taken on the line 3—3 of Fig. 1.

Fig. 4 is a perspective of a portion of the mechanism as shown in Fig. 1 illustrative of a changed disposition of the yarn engaging finger.

Fig. 5 is a perspective showing essentially a modified mode of mounting the mechanism.

Fig. 6 is a perspective illustrative of the application of the mechanism to a spooling machine; and

Fig. 7 shows in plan a detail of construction to which special reference will later be made.

1 and 2 represent the mains to an electric circuit. These mains connect with a stop motion (not shown) of any suitable character for stopping a machine, and which operates upon the completion of an electric circuit through the mains. The mains may consist of wires or strips which are good conductors of electricity, and are insulated from the bed or object on which they are mounted when such bed or object is itself a conductor of electricity.

The electric circuit is completed through the mains on the breakage of a thread or yarn, as follows: 3 represents a lever, preferably tubular in form, made of some non-conductor material such as fibre. This lever is mounted to turn upon a pin 4 passed through it and this pin is also a non-conductor of electricity such as rawhide. The opposite projecting ends of the pin forming trunnions are mounted to turn in supporting arms, 5, 5, both of which are conductors of electricity. The arms are out of electrical contact with one another and insulated from the bed or part 6 of the machine on which the device is mounted excepting where the arms are secured directly to the mains, as will later be explained. As shown in Fig. 1, the arms are set into a base 7 of insulating material and this base is secured by suitable fastenings 8 to the bed or body 6. The arms are in electrical connection with the mains 1 and 2 through contact extensions 9 and 10, respectively, from the respective arms, the ends of the extensions being secured to the respective mains by threaded fastenings 11, or may be welded thereto.

Located within the lever 3 is a closed glass container 12, preferably tubular in form, containing a ball of mercury 13, preferably lubricated with oil. The mercury flows through the glass container from one end to the other, depending upon the inclination of the lever with relation to its pivotal axis. It is this ball of mercury which is depended upon to assist in completing the circuit and according to its preferred arrangement the mercury container is located in that portion of the lever lying forward of its pivotal axis, the circuit being made when the lever is so inclined that the ball of mercury will flow to the forward end of the container. Fused into the forward end of the glass container 12 are wires 15, 16. These wires are oppositely arranged and are electrically joined by the ball of mercury when at the forward end of the container. The wires 15, 16 are extended by

wires 17, 18 which pass through grooves 19 formed in the interior of the lever 1 between the body of the lever and the container 12, and connect through the wall of the lever with conductor disks 20, 20 on the opposite exterior sides of the lever at the point of its pivotal axis, the pin 4 passing through these disks. The disks turn with the lever and are preferably cemented to its sides.

The disks 20, 20 are electrically connected, respectively, to the arms 5, 5 by tongues 21, 21 secured to the arms and tensioned to bear against the sides of the disks, the pin 4 which forms the pivotal mounting for the lever 1 passing through these arms. The tongues are secured to the arms 5, 5 in any suitable manner as by welding. The tongues are tensioned sufficiently to have constant bearing against the disks 20, 20 but without impeding free pivotal action of the lever. Thus arranged the arms will constantly engage the disks with a wiping action as the lever 1 is turned, and provide self-cleaning joints. The disks 20, 20 and tongues 21, 21 are preferably coated where they contact each other with a non-oxidizing silver alloy.

Borne by the lever 3 is a wire finger 22 having a yarn engaging end 23. This finger is detachably secured to the end of the lever by means of coils 24 in the wire, within which the end of the lever is contained.

With a mechanism thus made the yarn engaging finger is brought to bear downwardly upon the yarn *a* assumed to be travelling under tension. At such time the mechanism is so mounted that the lever 3 will occupy an upwardly inclined position as shown in Fig. 1, with the ball of mercury occupying a position at the rear end of its container out of contact with the wires 15, 16. Although restrained by the yarn the normal tendency is for the lever to tip forward owing to the overbalancing weight of the mercury carrying container borne by it forward of its pivotal axis and this, supplemented by the weight of the yarn engaging finger. In consequence, when the yarn breaks the lever will tip forward, whereupon the mercury will flow to the forward end of its container and will form electrical connection between the wires 15, 16, the electrical circuit then being completed between the mains 1, 2 by way of the wires 17, 18, disks 20, 20, tongues 21, 21, arms 5, 5, and contact extensions 9, 10, connecting with the mains as aforesaid. For limiting the tip of the lever when the yarn breaks the device is preferably provided with a stop 25 extending from one of the arms 5.

In Fig. 4 it will be observed that the position of the yarn engaging finger has been changed upon the lever 3. There are times when it is desirable to mount the device beneath the yarn instead of above it as shown in Fig. 1. Accordingly, as shown in Fig. 4 the yarn engaging finger extends upward from the end of the lever, this change being effected simply by turning the coiled end of the finger on the barrel of the lever. It is also desirable at times to lengthen the finger and provide it with a porcelain yarn engaging end, especially when the finger is bearing against heavy rough yarns, accordingly, the finger is here shown provided with a porcelain yarn engaging end 27, the shank 28 of which is socketed in coils 29 in the wire. The precise position of the yarn engaging end of the wire is controlled to a certain extent by simply bending the wire. The general operation of the device as shown in Fig. 4 is the same as that shown in Fig. 1.

In Fig. 5 the device is shown embodying various modified features, some, or all of which may be embodied in the device, depending upon the ends sought to be attained. Here it will be seen that the supporting arms 5', 5' for the lever 3 are provided with out-turned feet 5'' secured directly to the mains 1 and 2. The feet may be fastened to the mains in any suitable manner but preferably by welding. The angular position of the arms with relation to one another, connecting as they do with the respective mains, permits of these supporting arms and series of levers carried by them being placed very close together as they have to be placed when associated with a large number of close running yarns. (See Fig. 7.)

As shown in Fig. 5 the device is so made that the engaging end of the finger 22 will not bear down upon the yarn but engage the yarn from underneath. On this account change is made in the overbalancing of the lever. The mercury container 12, instead of being located forward of the pivoted axis of the lever is located rearward of the pivoted axis, which becomes the over-weighted portion of the lever, enabling the yarn engaging end of the finger being held up to engage the yarn from the under side and tipping back for closing the electrical connections when the yarn breaks.

The lever may also be provided with a spring which will give it quick action when the yarn breaks and not depend upon gravity alone. To this end a spring 30 is located between the lever 1 and a clip 31 extending from one of its supporting arms.

The device may also be provided with a hood 32 secured in any suitable manner to one or both of the arms supporting the lever. This hood may also function as a stop for limiting the turned position of the lever. When the lever tips back on the breaking of the yarn the fore end of the lever will rise until it engages the hood which acts as a stop.

In Fig. 6 illustration is shown of the application of the invention to a spooler having a large number of travelling yarns *a* very close together. Here the yarns are wound off bobbins 34 onto a spool 35. Two sets of the actuating mechanisms are shown. One set is located above the bobbins and the other set is located above the spool. In other words, each strand of yarn has two separate stop motion actuating mechanisms associated with it, one located above the bobbin from which the yarn is drawn and the other located above the spool onto which the yarn is wound.

The mains 1 and 2 are located on beds 6 which may consist simply of wooden bars suitably built into the frame of the machine, the running disposition of the yarn being such as will make it adaptable for receiving the bearings of the respective fingers to the stop motion actuating mechanisms as previously described.

I claim:

1. A stop motion actuating mechanism for a machine in which the yarn travels under tension and the stop motion is electrically operated to stop the machine upon the completion of an electric circuit through separate mains by said stop actuating mechanism when the break occurs in the yarn, said stop motion actuating mechanism comprising a tiltable lever, a yarn engaging element borne by said lever, means providing an axial mounting for said lever whereby it is tiltable to occupy operative and inoperative positions, a mercury switch borne by said lever with

connections whereby an electric circuit will be completed through said switch by the mercury therein when the lever is occupying an operative position and the circuit be broken when the lever is occupying an inoperative position, and means whereby the electrical connection through said switch is extended to said mains for completing the electric circuit through said mains when said lever is occupying its operative position as aforesaid including wiping elements adapted and arranged to have electrical contact with each other during the pivotal turning of said lever when the electric circuit is completed through said switch by the mercury therein.

2. A stop motion actuating mechanism for a machine in which the yarn travels under tension and the stop motion is electrically operated to stop the machine upon the completion of an electric circuit through separate mains by said stop actuating mechanism when the break occurs in the yarn, said stop motion actuating mechanism comprising a tiltable lever, a yarn engaging element borne by said lever, means providing an axial mounting for said lever whereby it is tiltable to occupy operative and inoperative positions, a mercury switch borne by said lever with connections whereby an electric circuit will be completed through said switch by the mercury therein when the lever is occupying an operative position and the circuit be broken when the lever is occupying an inoperative position, and means including wiping contacts at the axis of said lever whereby the electrical connection through said switch is extended to said mains for completing the electrical connection through said mains when said lever is occupying its operative position as aforesaid.

3. A stop motion actuating mechanism for a machine in which the yarn travels under tension and the stop motion is electrically operated to stop the machine upon the completion of an electric circuit through separate mains by said stop actuating mechanism when the break occurs in the yarn, said stop motion actuating mechanism comprising a tiltable lever, a yarn engaging element borne by said lever, separate arms both electrical conductors upon which said lever is pivotally mounted and is tiltable to occupy operative and inoperative positions, said arms electrically connecting, respectively, with said respective mains, a mercury switch borne by said lever with connections whereby an electric circuit will be completed through said switch by the mercury therein when the lever is occupying an operative position and the circuit be broken when the lever is occupying an inoperative position, and means whereby the electrical connection through said switch is extended to said mains along the axis of said lever and through said arms for completing the electrical circuit through said mains when said lever is occupying its operative position as aforesaid.

4. A stop motion actuating mechanism for a machine in which the yarn travels under tension and the stop motion is electrically operated to stop the machine upon the completion of an electric circuit through separate mains by said stop actuating mechanism when the break occurs in the yarn, said stop motion actuating mechanism comprising a tiltable lever, a yarn engaging element borne by said lever, separate arms both electrical conductors upon which said

lever is pivotally mounted and is tiltable to occupy operative and inoperative positions, said arms electrically connecting, respectively, with said respective mains, a mercury switch borne by said lever with connections whereby an electric circuit will be completed through said switch by the mercury therein when the lever is occupying an operative position and the circuit be broken when the lever is occupying an inoperative position, and means including wiping contacts at the axis of said lever whereby the electrical connection through said switch is extended to said mains along the axis of said lever and through said arms for completing the electric circuit through said mains when said lever is occupying its operative position as aforesaid.

5. A stop motion actuating mechanism for a machine in which the yarn travels under tension and the stop motion is electrically operated to stop the machine upon the completion of an electric circuit through separate mains by said stop actuating mechanism when the break occurs in the yarn, said stop motion actuating mechanism comprising a tiltable lever, a yarn engaging element borne by said lever, separate arms both electrical conductors upon which said lever is pivotally mounted and is tiltable to occupy operative and inoperative positions, said arms electrically connecting, respectively, with said respective mains, a mercury switch borne by said lever with connections whereby an electric circuit will be completed through said switch by the mercury therein when the lever is occupying an operative position and the circuit be broken when the lever is occupying an inoperative position, and means whereby the electrical connection through said switch is extended to said mains including disk members mounted to turn axially with said lever on opposite sides thereof, electrical connections borne by the lever between said connections of the mercury switch and said disk members, and spring tongues borne by said arms and tensioned to have normal bearing, respectively, against said disk members.

6. A stop motion actuating mechanism for a machine in which the yarn travels under tension and the stop motion is electrically operated to stop the machine upon the completion of an electric circuit through separate mains by said stop actuating mechanism when the break occurs in the yarn, said stop motion actuating mechanism comprising a hollow tiltable lever a non-conductor of electricity, a yarn engaging element borne by said lever, means providing an axial mounting for said lever whereby it is tiltable to occupy operative and inoperative positions, a mercury switch contained within said lever with connections whereby an electric circuit will be completed through said switch by the mercury therein when the lever is occupying an operative position and the circuit be broken when the lever is occupying an inoperative position, and means whereby the electrical connection through said switch is extended to said mains, including disk members mounted to turn axially with said lever on opposite sides thereof, electrical connections extending along said lever between the terminals of the mercury switch and said disk members, and other elements having wiping contact with said disk members.

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