June 14, 1960 W. MITCHELL 2,940,407

POWER-DRIVEN SEWING MACHINES AND STOP MOTION DEVICES THEREFOR

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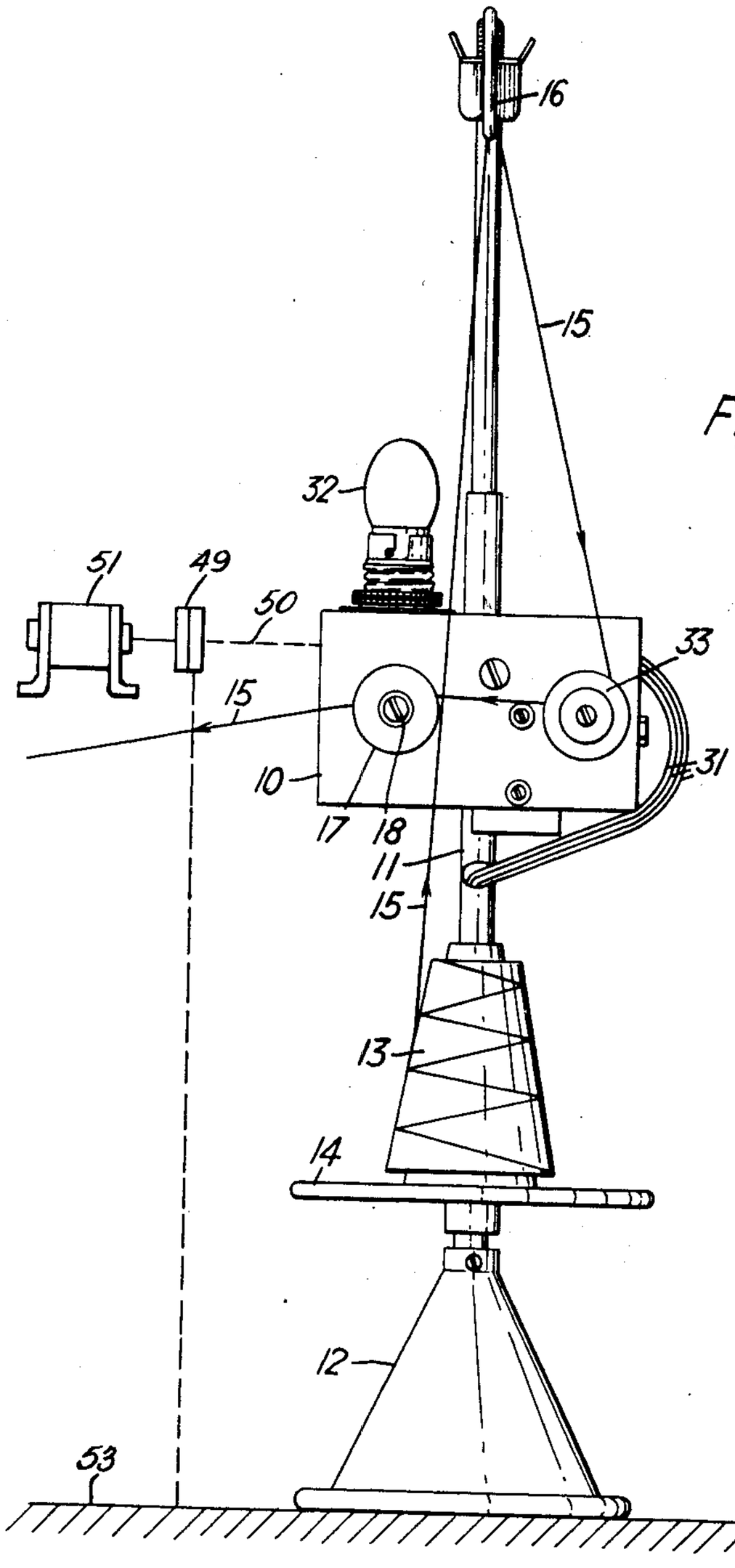


Fig. 1

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Fig. 2.

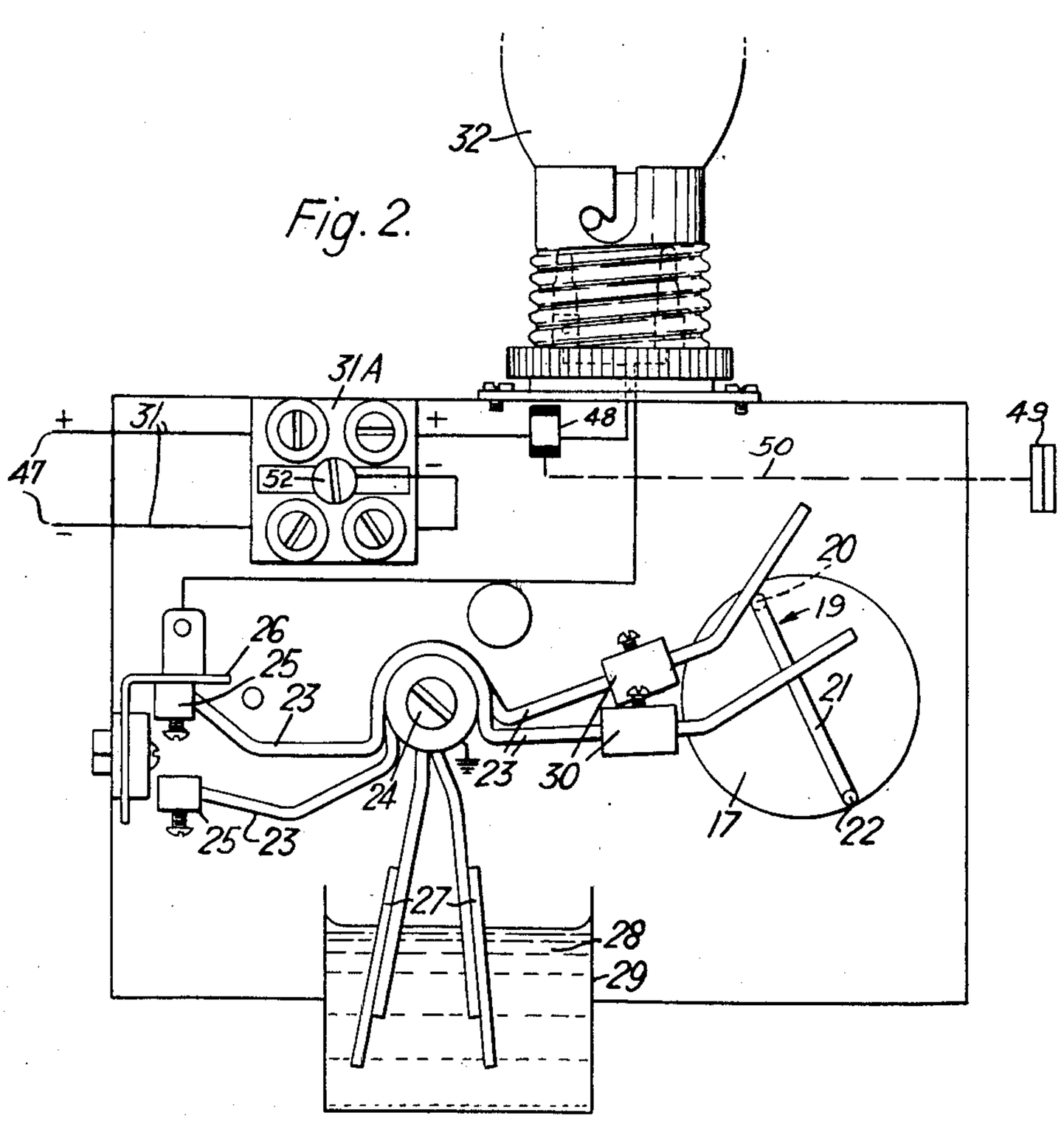
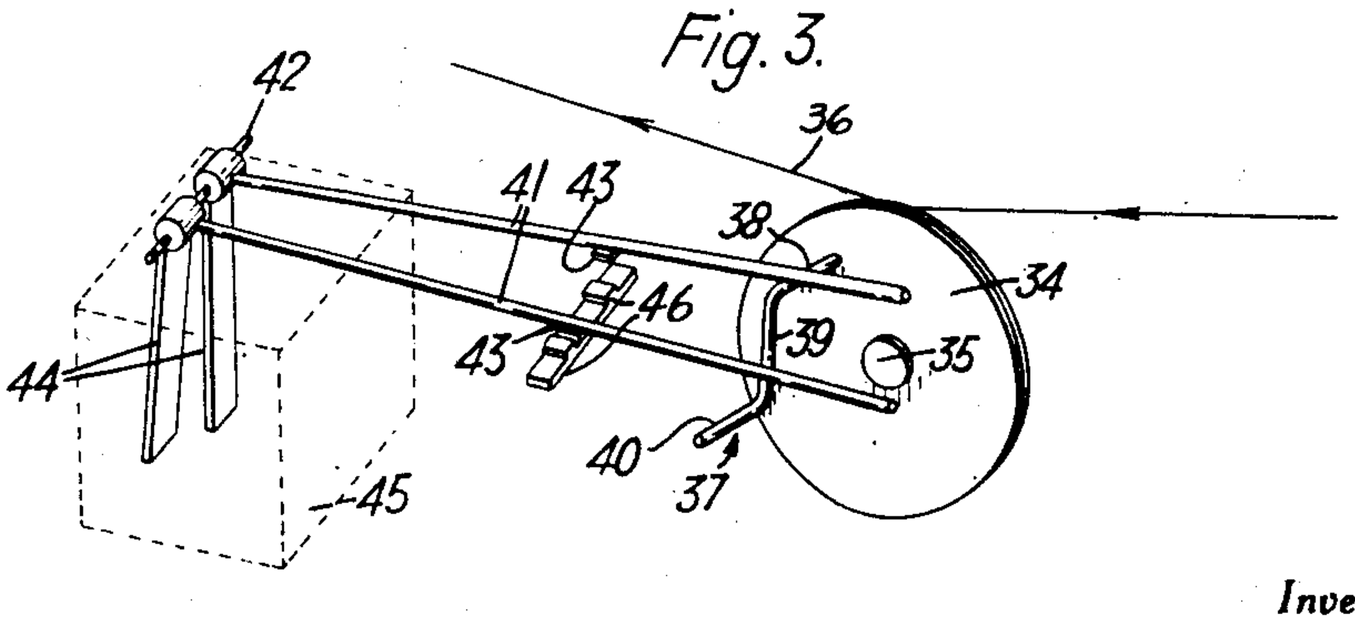


Fig. 3.



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6 Claims. (Cl. 112—219)

This invention relates to power-driven sewing machines and stop motion mechanisms therefor.

According to the present invention we provide, in or for a power-driven sewing machine, a stop motion mechanism for incorporation in an electric control circuit therefor, said mechanism comprising a circuit energizing device incorporating a fixed contact strip, a corresponding pair of movable contacts, a pulley wheel adapted to be driven by the upper thread being drawn from the cone and presenting an eccentrically anchored cranked member adapted, when rotating, to move, in turn, the movable contacts away from the fixed contacts, and the arrangement being such that, if the said thread breaks or ends or the speed of rotation of the pulley wheels is reduced below a pre-determined speed, one or other of the movable contacts engages the corresponding fixed contact and closes the circuit to stop the drive.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Fig. 1 is an end elevation of a stop motion mechanism according to the present invention;

Fig. 2 is a part sectional view of the circuit energizing device of the stop motion mechanism; and,

Fig. 3 is a perspective view of a modified circuit energizing device.

Referring to Figs. 1 and 2 of the drawings, the stop motion mechanism comprises a casing **10** rigidly mounted on a hollow post **11** supported in a fixed mounting **12**. The upper thread supply cone or bobbin **13** is rotatably mounted on the post **11** and is carried by a sprocket wheel or the like **14** adapted to be suitably rotated to feed off the upper thread **15**. A hook **16** is mounted at the top of the post **11**.

The stop motion mechanism also comprises a circuit energizing device including a lightweight pulley wheel **17** mounted on the casing **10** for rotation about a horizontal axis **18**. The pulley wheel **17** is driven by the upper thread **15** being drawn therearound prior to passing to a sewing machine (not shown). The pulley wheel **17** carries a cranked pin **19** inside the casing **10** and which is anchored at one end eccentrically thereon (Fig. 2). From said end, the pin **19** has a first portion **20** which projects horizontally outwards, a second portion **21** extending diametrically of and spaced from the pulley wheel **17**, and a third portion **22** projecting outwardly parallel to the first portion **20**.

The stop motion circuit energizing device further comprises two side-by-side contact arms **23** which are pivotally mounted intermediate their ends about a horizontal axle **24** and at one end lie respectively in the paths of rotation of the first and third portions **20** and **22** of the pin **19**. As the pulley wheel **17** rotates the pivotal arms **23** are alternately knocked upwards by the pin **19**. The other end of each arm **23** mounts a contact **25** adapted to engage a fixed contact strip **26** located thereabove. Each arm **23** mounts at the horizontal axle **24** a fin **27** extending downwards into a viscous liquid **28**

in a container **29** so as to damp the fall of each arm **23** under its own weight after being struck by the pin **19**. The damping may alternatively be effected by air. Each arm **23** moreover, carries a small weight **30** to counterbalance the weight of the contact **25**.

The contacts **26** are in circuit by means of leads **31** and a junction member **31A** with a source (not shown) of electrical current, a signal lamp **32**, and a solenoid (not shown) which is actuable to disengage the clutch of the motor (not shown) driving the sewing machine. A solenoid-operated clutch mechanism to disengage the motor from the sewing machine is shown and described by Kleber, U.S. Patent No. 2,418,356, and by Moser, U.S. Patent No. 2,251,368. In Fig. 1 there is shown an actuating means **50** from solenoid **48** which disengages spring-biased solenoid-operated clutch **49** from motor **51** which is the power means for driving the sewing machine **53**. The axle **24** is grounded or otherwise in circuit with the electrical circuit.

The casing **10** mounts a signal lamp **32** and a thread tensioning device **33**.

In Fig. 2 there is shown a simplified diagram of the control circuit of the stop motion mechanism. A source of current **47** grounded at **52** is connected in series with solenoid **48**, signal lamp **32** switch **26**, **23**, and axle **24** which is ground. Solenoid **48** when actuated disengages spring-biased clutch **49** through actuating means represented by broken line **50**.

In operation, the upper thread **15** passes from the supply cone or bobbin **13** up the post **11**, around the hook **16**, around the tension device **33** and the pulley wheel **17** and thence to the sewing machine. Movement of the thread **15** around the pulley wheel **17** causes the latter to rotate and, as aforesaid, the pin **19** strikes each arm **23** upwardly in turn, and by virtue of the damping of the fall of each arm **23** it is struck during each revolution of the pulley wheel **17** before it can fall far enough to permit either of the contacts **25** to engage the fixed contact strip **26**.

If the thread **15** breaks or ends, the pulley wheel **17** stops and one or other of the arms **23** falls so that its contact **25** engages the contact strip **26** and the electrical circuit is closed, and the drive of the sewing machine is made inoperative, for example by disengagement of the motor clutch. Simultaneously, the signal lamp **32** is illuminated to indicate that the sewing machine has stopped.

The stop motion mechanism is also effective if the thread from bobbin **13** ends or breaks, as, in this case, the speed of the upper thread **15** is immediately reduced, and this reduces the speed of rotation of the pulley wheel **17**, and the rate of fall of the arms **23** can be arranged so that one of the contacts **25** will engage the fixed contact strip **26** before the wheel **17** can complete one revolution.

Modifications may be made without departing from the scope of the invention as claimed in the accompanying claims which provides a simple and efficient actuating means for the stop motion of a sewing machine which is inexpensive to make and can be easily and quickly installed, and is especially useful for high-speed sewing machines, particularly when one operator has to attend to more than one machine.

The control circuit preferably actuates the clutch through a relay system, and the arrangement is such that, when the clutch is disengaged, a separate switch has to be operated manually before the clutch can be re-engaged. The stop motion mechanism may be used in conjunction with other stop motion devices arranged to operate when, for example, the fabric finishes or folds, and the other stop motion devices may be made inoperative by the switch to enable the machine to be driven to draw

off the end of the fabric and feed in fresh fabric, and a warning light is then lit to signal that the devices are inoperative.

Referring now to Fig. 3 of the drawings, the circuit energizing device again includes a light weight pulley wheel 34 driven about a horizontal axle 35 by the upper thread 36. The pulley wheel 34 carries a cranked pin 37 which is anchored at one end eccentrically thereon. From said end, the pin 37 has a first portion 38 which projects horizontally outwards, a second portion 39 extending diametrically of and spaced from the wheel 34, and a third portion 40 projecting outwardly parallel to the first portion 38. Two side-by-side contact arms 41 are pivotally mounted at one of their ends about a horizontal axis 42 and at the other end lie respectively in the paths of rotation of the first and third portions 38 and 40 of the pin 37 on the pulley wheel 34, and as the latter rotates, the pivotal arms 41 are alternately knocked upwards by the pin 37. Intermediate the ends of the arms 41 are two fixed contacts 46, one below each arm 41 and adapted for engagement with two contacts 43 carried by the arms 41 and the fall of each arm under its own weight after being struck by the pin 37 is damped by means of a fin 44 extending down from the pivotal mounting of each arm 41 into viscous liquid in a container 45, or the damping may be effected by air. The contacts 46 form part of the electric control circuit as shown in Fig. 2 of the drawings.

The mode of operation of the modified stop motion mechanism is in accordance with that of the mechanism described with reference to Figs. 1 and 2 of the drawings.

I claim:

1. In combination with a sewing machine, power means for driving the sewing machine, a clutch operated by a solenoid for connecting the power driving means to the sewing machine, a circuit energizing device comprising a fixed contact in the electric control circuit, a pair of movable contacts, a pair of pivotal arms mounting the pair of movable contacts, a pulley wheel adapted to be driven by a thread used in the sewing operation, an eccentrically anchored cranked member projecting out from one side of the pulley wheel and engageable with said pivotal arms to urge the movable contacts away from the fixed contact, and means associated with said arms for controlling the rate of movement of the movable contacts into engagement with the fixed contact whereby, if the thread breaks or ends or the speed of rotation of the pulley wheel is reduced below a predetermined speed, one of the movable contacts engages the fixed contact to energize the solenoid and operate the clutch to thereby disconnect the power driving means from the sewing machine.

2. The combination as claimed in claim 1 in which the means for controlling the rate of movement of the movable contacts is a damping medium.

3. In combination with a sewing machine, power means for driving the sewing machine, a clutch operated by a solenoid for connecting the power driving means to the sewing machine, a circuit energizing device comprising a fixed contact in the electric control circuit, a pair of movable contacts, a pair of pivotal arms mounting the pair of movable contacts, a pulley wheel adapted to be driven by a thread used in the sewing operation, an eccentrically anchored cranked member projecting out from one side of the pulley wheel and engageable with said pivotal arms to urge the movable contacts away from the fixed contact, and a fin associated with the pivotal axis of each arm and disposed in a damping medium to control the rate of movement of the movable contacts into engagement with the fixed contact whereby, if the thread breaks or ends or the speed of rotation of the pulley wheel is reduced below a predetermined speed, one of the movable contacts engages the fixed contact to energize the solenoid and operate the clutch to thereby disconnect the power driving means from the sewing machine.

4. The combination as claimed in claim 3 in which the damping medium is a viscouse liquid in a container.

5. In combnation with a sewing machine, power means for driving the sewing machine, a clutch operated by a solenoid for connecting the power driving means to the sewing machine, a circuit energizing device comprising a fixed contact in the electric control circuit, a pair of movable contacts, a pair of pivotal arms mounting the pair of movable contacts, a pulley wheel adapted to be driven by a thread used in the sewing operation, an eccentrically anchored cranked member projecting out from one side of the pulley wheel and engageable with said pivotal arms to urge the movable contacts away from the fixed contact, the cranked member being a pin having a first portion which projects horizontally outwards from the pulley wheel, a second portion extending diametrically of and spaced from the pulley wheel and a third portion projecting outwardly parallel to the first portion, and a fin associated with the pivotal axis of each arm and disposed in a damping medium to control the rate of movement of the movable contacts into engagement with the fixed contact whereby, if the thread breaks or ends or the speed of rotation of the pulley wheel is reduced below a predetermined speed, one of the movable contacts engages the fixed contact to energize the solenoid and operate the clutch to thereby disconnect the power driving means from the sewing machine.

6. The combination as claimed in claim 5, further comprising a signal lamp operable upon engagement of one of the movable contacts with the fixed contact.

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