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K. WINZ
MATERIAL-CONTROLLED CONTACT DEVICE FOR
POWER DRIVEN SEWING MACHINES

2,910,027

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2 Sheets-Sheet 1

FIG. 1

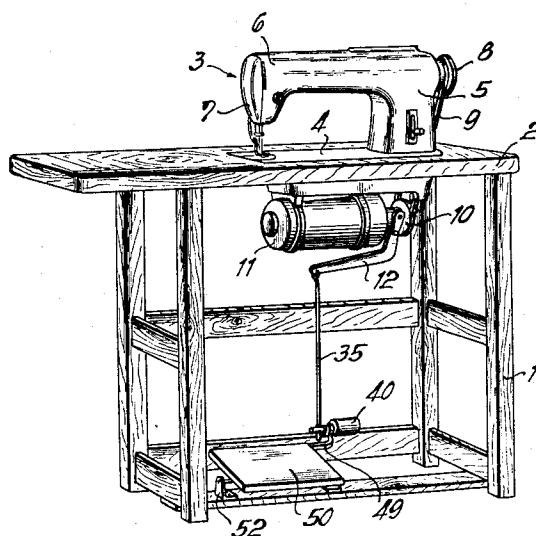


FIG. 3

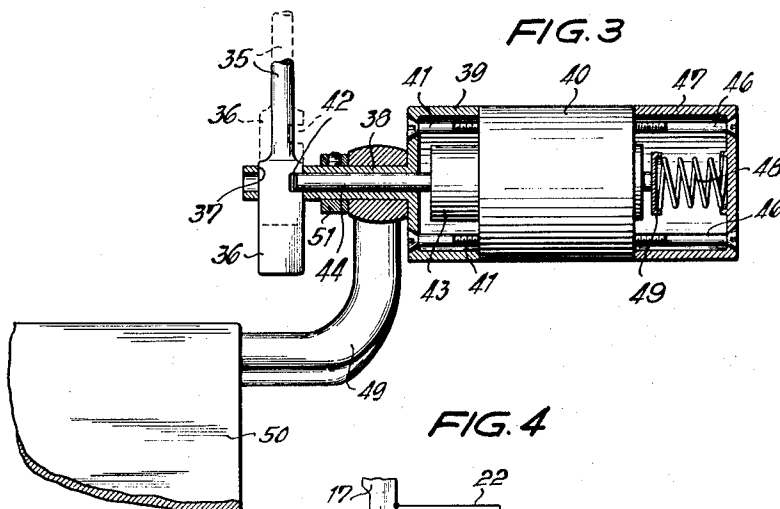
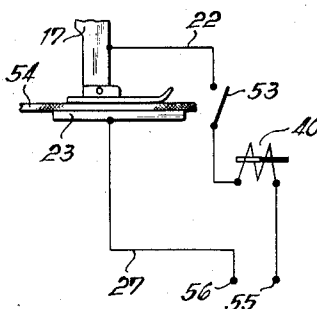


FIG. 4



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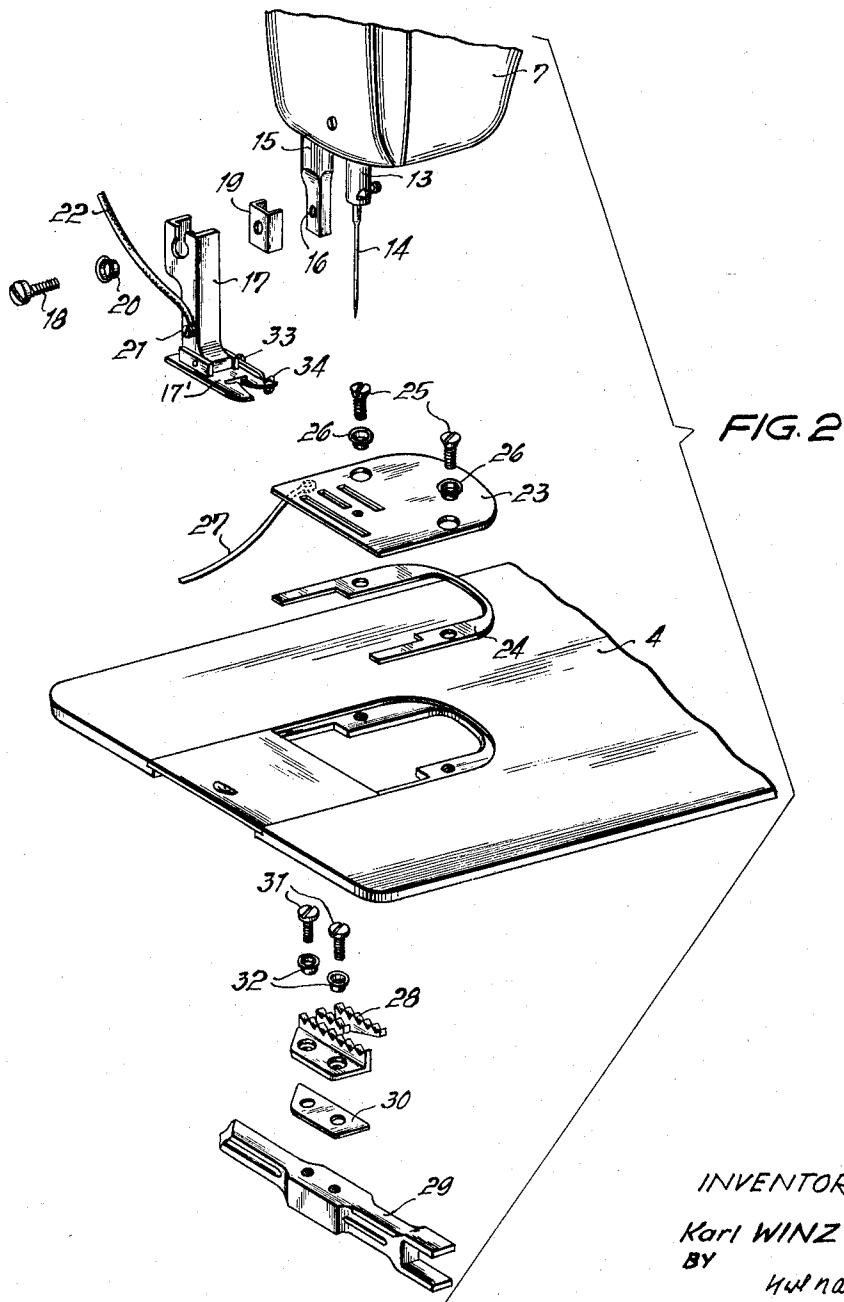
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MATERIAL-CONTROLLED CONTACT DEVICE FOR POWER DRIVEN SEWING MACHINES

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1 Claim. (Cl. 112—219)

The present invention relates to electrical contact devices for power driven sewing machines of the type adapted to be actuated by the work or material to be stitched, to produce a warning signal indicating the end of the material and/or to effect the stoppage of the machine when the end of the material has been reached or if the material should be broken or damaged during operation.

There have become known contact devices in connection with sewing machines, especially for the sewing of hollow or fagoted seams, comprising a resilient contact finger mounted upon the presser foot bar and cooperating with a contact member mounted upon the bed plate of the machine. The contact device is arranged behind the presser foot bar, as viewed in the sewing direction, and has for its purpose to test or monitor the completed hollow or fagoted seam. Its function is based on the stays or connecting threads of the fagoted seam intervening between the contact finger and member during normal operation, while, upon failure of the seam, the finger engages the contact member, thereby closing an electrical circuit and operating a relay which, in turn, effects the stoppage of the machine by disconnecting it from its driving motor. Contact devices of this type are greatly restricted in their use and, among other limitations, are unsuitable to effect the stoppage of the machine upon reaching the end of the stitching material, for the reason that, as soon as the material has left the presser foot, the feed mechanism ceases its operation, thus preventing response of the contact device on account of its mounting behind the presser foot of the machine.

Material-controlled contact devices are also known, for the indication of the end of the sewing material and/or to effect the stoppage of the machine, which comprise a pair of contact arms insulatingly mounted upon the bed or cloth plate of the machine and between which the material is passed during operation. In order to prevent a premature stoppage, it is necessary to mount the contact device as close as possible to the needle which is not always possible for constructional and other reasons. Besides, such built-on contact devices obstruct or are liable to otherwise interfere with the normal operation of the machine. Another disadvantage thereof is the fact that they are suitable practically only for the sewing of straight seams, the sewing of curved seams, especially those of considerable curvature, being greatly impeded by the presence of the contact device. Furthermore, since the contact device has to be mounted at a certain finite distance from the needle, the known devices are not suitable for effecting other controls, such as the operation of a thread or ribbon cutting mechanism or the like upon reaching the end of the stitching material.

Accordingly, an important object of the present invention is the provision of a simple and improved material-controlled electrical contact device for sewing machines, to indicate the end of the stitching material and/or to automatically effect the stoppage of the machine upon reaching the end of the material, by which the above and

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related difficulties and shortcomings inherent in previous related devices are substantially avoided.

A more specific object of the invention is the provision of an electrical contact device of this type, whereby the machine is stopped substantially instantly upon reaching of the end of the stitching material, whereby to eliminate or to reduce to a minimum the number of idle or unbound stitches effected by the machine.

In the manual operation of a sewing machine, it has been found that the operator reduces the speed of the machine well ahead of the instant of reaching the end of the material, in such a manner as to be in a position to positively and safely arrest the machine when the end of the material passes or leaves the presser foot or needle. For practical purposes, the machine should not make more than one or two idle or unbound stitches in order to prevent jamming of the lower or bobbin thread in the loop taker as well as other defects. This aim is readily achieved by the invention which has the further advantage over the prior contact devices of being free from obstructing or projecting parts liable to interfere with the operation of the machine. As a result, curved seams may be sewn in the same manner and with the same ease as straight seams and, as a matter of fact, the operation of the machine is in no way affected by the presence and operation of the contact device, the latter being structurally embodied in the machine of conventional construction.

Another important object of the invention is, therefore, the provision of a material-controlled contact device of this type which can be readily structurally embodied in conventional sewing machine structures, without requiring essential changes in the design and operation of the machines.

The invention, both as to its further object as well as novel aspects, will be better understood from the following detailed description of a preferred practical embodiment taken in reference to the accompanying drawings, forming part of this specification and wherein:

Fig. 1 is a perspective view of a conventional sewing machine embodying the improvements of the invention;

Fig. 2 is an exploded view of the needle head, presser foot, work plate and feed dog mechanism of the machine according to Fig. 1, showing in greater detail the improved contact device structurally combined with the parts according to the invention;

Fig. 3 is a cross-sectional view of the coupling magnet and de-clutching mechanism of Fig. 1; and

Fig. 4 is a wiring diagram of the electrical circuit of the contact device and magnetic clutch of the machine shown by the preceding figures.

Like reference numerals denote like parts in the different views of the drawings.

With the foregoing objects in view, the invention involves generally the provision of a material-controlled contact device of the type referred to the cooperating constituent parts of which are formed by structural parts of the machine, more particularly, the presser foot, on the one hand, and the throat or work plate supported by the table top or bed of the machine, on the other hand. At least one of said parts or a portion thereof is electrically insulated from the remaining metal parts of the machine, while the contacting portions of the parts are in resilient engagement with one another at a point close to the needle or separated by the stitching material as the latter is passed between the presser foot and work plate during a sewing operation.

Advantageously, one of the contacting parts, preferably the presser foot, carries a resilient contact finger or the like engaging the stitching material or work plate, respectively. The contact finger is positioned in proper

relation ahead of the needle as viewed in the sewing direction, in such a manner as to actuate the contact device and to effect electrical contact connection at just the right instant prior to the reaching of the end of the stitching material, thereby to effect a stoppage of the machine, substantially without effecting any idle or unbound stitches. In other words, the contact device, being completely structurally embodied or built in the machine, so to speak, constantly "feels" or monitors the stitches formed, in such a manner as to instantly initiate the stoppage of the machine and/or to operate a suitable warning device at the proper time, substantially without the defects and drawbacks of the related contact devices known in the prior art.

Referring more particularly to Fig. 1 of the drawings, the numeral 1 indicates the supporting frame and numeral 2 the table top of a conventional sewing machine 3, comprising a cloth plate or bed 4, an upright or standard 5 and an overhanging arm 6 terminating in a head 7, all of standard and well known construction. Mounted within the arm 6 is the arm shaft of the machine (not shown in the drawing) the projecting rear end of which carries a hand wheel 8 connected by a belt 9 with the driven pulley 10 of a coupling motor 11 mounted upon the underside of the table top 2.

The motor 11 has a coupling lever 12 of known construction for the control of the speed and operation of the machine. The opposite end of the arm shaft is in driving connection with the reciprocating needle bar 13, Fig. 2, mounted within the head 7 and carrying the needle 14. Further mounted within the head 7 is the presser foot bar 15 whose lower end is of square shape and provided with a tapped bore 16 for the securing, by means of a set screw 18, of the presser foot 17, the latter comprising a vertical shaft and a horizontal base of known construction.

The presser foot 17 is electrically insulated from the remaining metal parts of the machine by a separating element or spacer 19 of insulating material and by an insulating sleeve 20 surrounding the securing screw 18. An electrical conductor 22 is connected to the foot 17 by means of a screw 21 or in any other suitable manner.

The throat or work plate 23 of the machine is, in turn, insulated from the bed 4 and the remaining metal parts of the machine by an insulating spacer 24 and a pair of insulating sleeves 26 surrounding the securing screws 25. The work plate 23, in the example shown has connected to it a further electrical conductor 27, to complete the electrical circuit. Since the feed dog 28 is liable to come into contact with the plate 23, it is advantageously also insulated from its support 29 or the remaining metal parts of the machine, such as by means of an insulating spacer 30 and insulating sleeves 32 placed around its securing screws 31, respectively.

There is further provided, according to a preferred embodiment of the invention, a feeler or contact finger 34 electrically connected to the base 17' of the presser foot 17 by means of a screw 33 or the like, such as in the form of a resilient wire shown in the drawing having a loop-shaped end resiliently engaging the work plate 23 adjacent to and ahead of the needle 14 as viewed in the sewing direction. In this manner, the contact finger can be so positioned relative to the needle in such a manner as to close the electrical circuit and to effect the final stoppage of the machine at the instant of passage of the end of the stitching material past the needle with a minimum of idle or unbound stitches being effected by the machine.

There is furthermore shown, according to the embodiment illustrated, a pull rod 35, Fig. 3, connected to the coupling lever of the motor 11, said rod being provided at its lower end with an enlarged portion or extension 36 slidable within a slot 37 of a tubular extension 38 of a casing 39 secured to an electromagnet or solenoid 40 by means of screws or bolts 41. The extension 36 has a

groove or recess 42 adapted to engage the end of a rod 44 extending from one end of the armature or plunger 43 of the electromagnet 40. Rod 44 is normally urged into engaged position with the recess 42, as shown in the drawing, by a spring 48 having one end engaging the inside of a further casing 47 secured to the opposite end of the magnet 40 by screws 46 and having its other end engaging a spring cup 49 mounted upon the opposite end of armature 43.

The tubular extension 38 of the casing 39 is journaled in the arm 49 of a foot pedal 50 and retained by means of a securing ring 51. The foot pedal 50, Fig. 1, is rotatably mounted upon the frame 1 about a pivot or axis 52.

Fig. 4 shows the electrical circuit of the device being traced from the presser foot 17 through the conductor 22 to the main control switch 53 and the solenoid magnet 40 to one pole 55 of the current source whose opposite pole 56 is connected through the conductor 27 leading to the work plate 23.

During a sewing operation, the contact device comprised of the presser foot 17 and the work plate 23 is in open circuit position by the intervening stitching material 54 passed therebetween by the feed dog mechanism. As the end of the material is reached, the contacts are closed due to the metallic engagement of the finger 34 with the plate 23, resulting in energization of the magnet or solenoid 40. This, in turn, causes a release of the clutch interposed between the foot pedal 50 and the pull rod 35, whereby to disconnect the machine by the coupling lever by the action of a return spring or in any other manner well known in the art.

While in the example shown both contact members, that is, the presser foot 17 and the work plate 23 are shown insulated from the remaining metal parts of the machine, it is evident that only a single member may be insulated, in which case the return connection to the current source is made through the metal mass of the machine.

As pointed out, the provision of a feeler or contact finger 34 upon the presser foot base, if properly positioned relative to the needle 14, advances the closing of the contacts by the exact time interval required to result in a final stoppage or reduction of the motor speed to zero at just the instant when the end of the stitching material moves past the needle, in such a manner as to result in a minimum of idle or unbound stitches being effected by the machine.

In the foregoing the invention has been described with reference to a specific illustrative device. It will be evident, however, that variations and modifications, as well as the substitution of equivalent elements for those shown for illustration may be made without departing from the broader scope and spirit of the invention as set forth in the appended claim. The specification and drawings are accordingly to be regarded in an illustrative rather than in a restrictive sense.

I claim:

In a sewing machine comprising a reciprocating needle, a metallic work plate, work feeding means, a presser foot having a base engaging a work piece being fed therebetween and said plate and electrically-controlled stop-motion means for said machine having a control circuit; stop-motion control means comprising a first resilient metallic contact having one end connected to said base and having its opposite end projecting from the front of said base, as viewed in the sewing direction, the projecting end of said contact normally resiliently engaging said plate forming a second cooperating contact, means to electrically insulate at least one of said contacts from the metal parts of said machine, said contacts being separated by a work piece fed therebetween during the operation of said machine and connected to control said circuit upon engaging one another after passage of the work trailing edge beyond the projecting end of said first contact, to

initiate the operation of said stop-motion means, said projecting contact end being spaced from said needle by a distance to effect stoppage of said machine with a predetermined minimum number of idle stitches at the instant of passage of the work trailing edge beyond said needle.

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