July 18, 1967 H. FIRESTEIN ETAL 3,331,346

SEWING MACHINE SWITCHING DEVICE

Filed Oct. 15, 1964

3 Sheets-Sheet 1

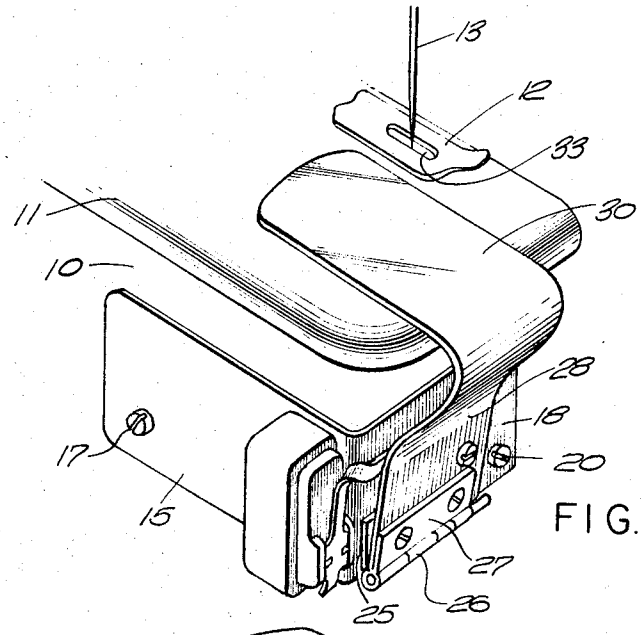


FIG. 1

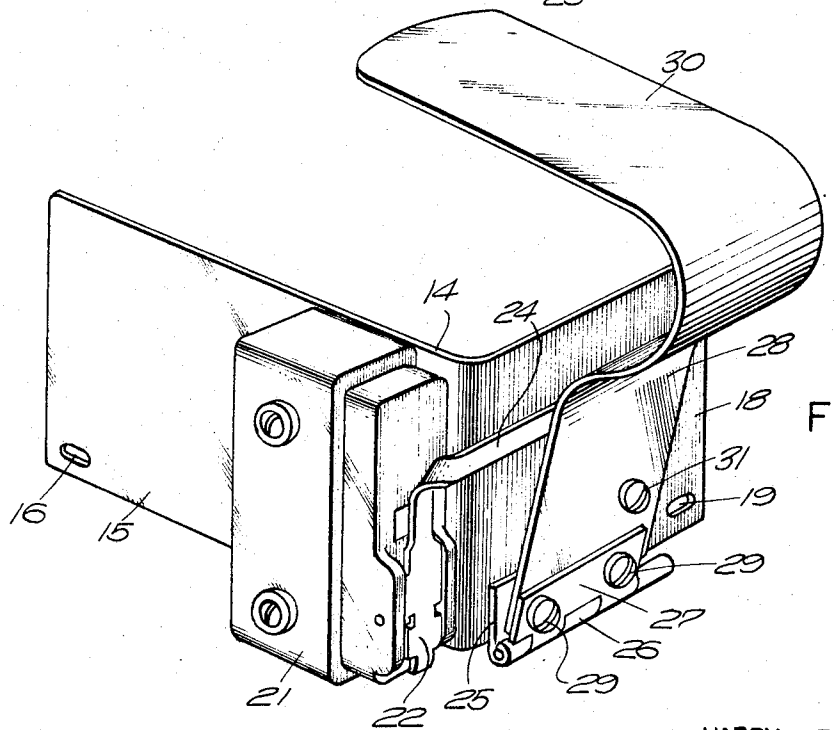


FIG. 2

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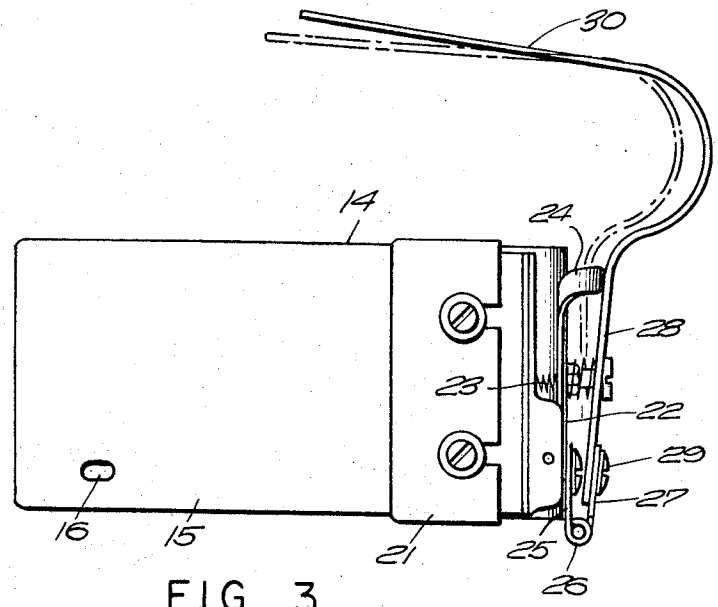


FIG. 3

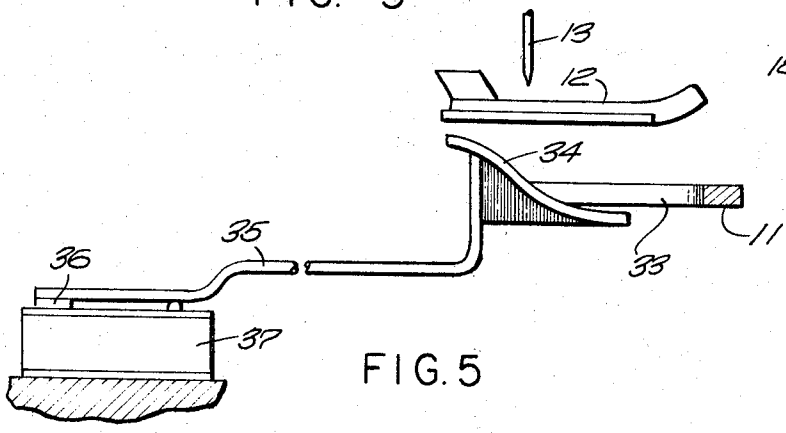


FIG. 5

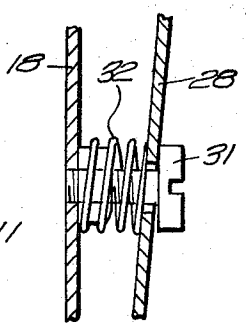


FIG. 4

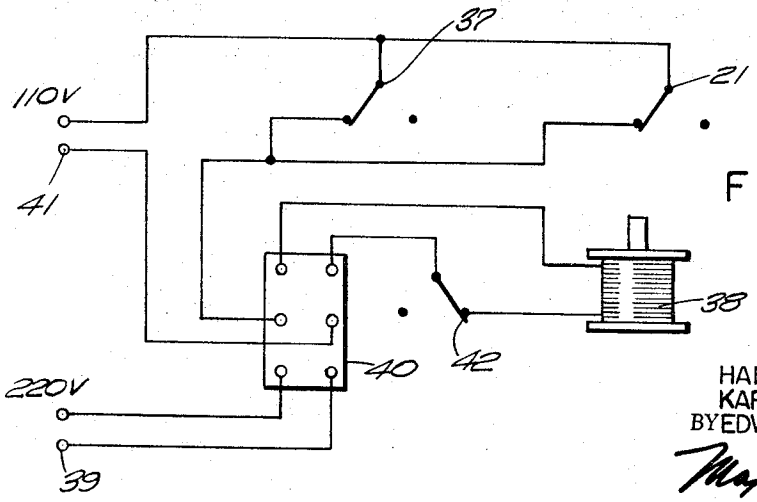


FIG. 6

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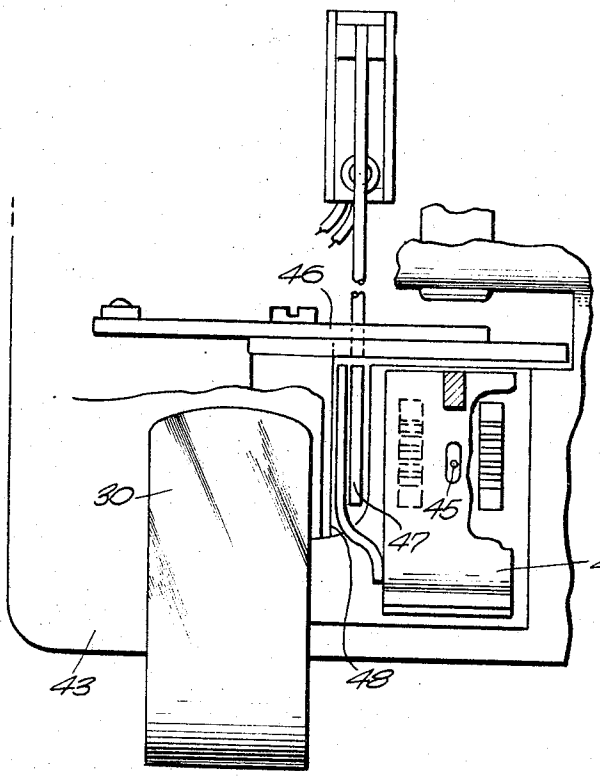


FIG. 7

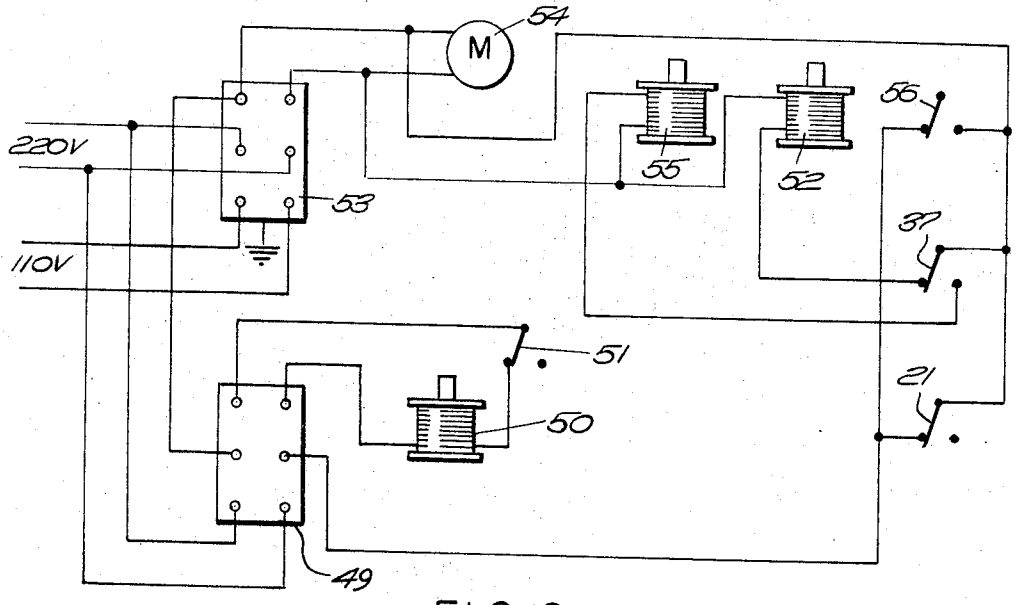


FIG. 8

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SEWING MACHINE SWITCHING DEVICE

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Filed Oct. 15, 1964, Ser. No. 404,086

6 Claims. (Cl. 112—219)

Our present invention relates to the sewing machine art, and more particularly to a novel construction of a switching device for a sewing machine.

The principal object of the present invention is to provide a sewing machine switch for automatically starting the sewing machine with the introduction of the work.

Another object of the present invention is to provide a sewing machine switch which saves a considerable amount of thread or tape being fed into the machine.

A further object of the present invention is to provide a sewing machine switch which relieves the strain on the operator's foot, especially in long periods of commercial piece work sewing.

Another object of the present invention is to provide a sewing machine switch which is readily adaptable to all types of sewing machines, household and commercial.

A further object of the present invention is to provide a sewing machine switch which can be used in combinabination with a thread cutter such as shown in our Patent No. 3,252,438, issued May 24, 1966, and entitled, Cutting Attachment for a Sewing Machine.

Another object of the present invention is to provide a sewing machine switch which is simple in construction and easy and economical to manufacture and assemble.

With the above and other objects and advantageous features in view, our invention consists of a novel arrangement of parts more fully disclosed in the detailed description following in conjunction with the accompanying drawings and more particularly defined in the appended claims.

In the drawings,

FIG. 1 is a perspective view of a sewing machine equipped with the switch of the present invention.

FIG. 2 is an enlarged perspective view of the switch mechanism.

FIG. 3 is a side elevation of the switch mechanism.

FIG. 4 is an enlarged detailed section of the stop mechanism.

FIG. 5 is a side elevation, partly in section of the sensing finger mounting.

FIG. 6 is a wiring diagram showing how the switch is hooked into the machine.

FIG. 7 is a plan view of a sewing machine equipped with both the switching device and a thread cutter.

FIG. 8 is a wiring diagram of the construction shown in FIG. 7.

Most sewing machines, both household and commercial, are equipped with foot pedals for starting and stopping the machine. Actually, the machine motor is started up by a switch and the foot pedal is used to operate a clutch mechanism for starting and stopping the sewing machine head. In order to avoid the constant up and down of the foot pedal, many operators will keep their foot down and allow the sewing machine to run even while they are adjusting the work or reaching for new work. In chain stitch machines, especially in commercial operation, this results in long lengths of thread chain stitches which are wasted. A piece work operator, after a long day, can make a considerable amount of waste thread just by allowing the machine to run between actual sewing operations. Furthermore, if a tape

is being attached to any piece of work, the lengths of tape are also wasted along with the chain stitches. This is so because the piece work operators are reluctant to lose the time necessary to take the foot off the pedal and then start it up again as each piece of work comes along.

The present invention is therefore designed to provide either a commercial or household sewing machine with a switching device which eliminates the foot pedal as a starting device for the sewing machine. The switching device of the present invention is so positioned that it will start the sewing machine as the work is being placed under the needle and the sewing machine will stop when the work has passed through the machine. The foot pedal is used only for stopping the machine at any point during the operation for inspection or emergencies.

While the various parts of the device of the present invention may readily be assembled directly on a sewing machine base, it is preferred that it be completely assembled and mounted as illustrated in FIGS. 1 and 2. This permits the parts to be accurately coordinated prior to mounting on a sewing machine. Furthermore, it permits the assembly shown in FIG. 2 to be attached to any type of sewing machine. FIGS. 1 to 6 inclusive illustrate the switch mechanism attached to any type of sewing machine to be used merely for starting and stopping the machine. FIGS. 7 and 8 illustrate the device mounted on a machine in combination with a thread cutting attachment such as shown in our Patent No. 3,252,438 above referred to.

Referring more in detail to the drawings illustrating our invention, FIG. 1 illustrates a conventional sewing machine having a base **10** on which is mounted a base plate **11** and above which is mounted the presser foot **12** and needle **13**. Mounted on the base **10** is the assembly illustrated in FIGS. 2, 3 and 4. An L-shaped base plate **14** is provided with an elongated side **15** having an opening **16** adapted to extend along the side of the sewing machine base **10** and to be mounted thereon by means of a bolt **17** extending through the opening **16** as shown in FIG. 1. The shorter leg of the base plate **14**, is positioned at **18** in the front of the machine and is also provided with an assembly opening **19** for assembly to the base by a bolt **20**. Mounted in vertical position on the portion **15** of the base plate **14** is a micro-switch **21** with its operating mechanism facing towards the front. The switch **21** is operated in the conventional manner by a rocking plate **22** held in disengaged position by the light spring **23**, see FIG. 3. The plate **22** is provided at its upper edge with an extended arm **24** extending laterally in spaced parallel relation to the surface of the front plate portion **18** as shown in FIG. 2.

Mounted on the bottom edge of the front plate portion **18** is a hinge plate **25** which is hinged at **26** to a similar front hinge plate **27**. An elongated flat generally L-shaped plate **28** is bolted at one end at **29** to the hinge plate **27**. The plate **28** extends upwardly to a point just below the level of the sewing machine plate **11** and then outwardly and over at **30** at right angles to the vertical portion of the plate in a general L-shape. The portion **30** extends across the surface of the machine plate **11** slightly spaced therefrom. It is preferably situated alongside of the presser foot **12** and in the path of the work which would be entering beneath the presser foot. The vertical portion of the plate **28** is provided with an opening through which a set screw **31** extends into the front plate portion **18**, as shown is FIG. 4. A coil spring **32** surrounds the set screw **31** and resiliently retains the plate **28** in rearmost position. The set screw **31** can be used to limit the backward movement of the plate **28** and set it so that it is just touching the arm **24** of the micro-switch **21** as shown in FIG. 3. Thus if the upper

portion 30 of the plate 28 is pushed or depressed into the dotted line position shown in FIG. 3, it will spring forwardly on the hinge 26 against the action of the spring 32 to operate the micro-switch 31 against the action of the spring 23. When the pressure on the plate portion 30 is released, it will return to its position assisted by the springs 23 and 32. The additional spring 32 is required because the micro-switch spring 23 is so light that there is a danger that the weight of the plate 30 and the vibration of the machine may set off the micro-switch spontaneously. However, the throw of the switch can be regulated by the set screw 31.

When the operator inserts a piece of work beneath the presser foot 12, he simultaneously presses on the plate 30 starting the machine. Release of the plate 30 can be made to stop the machine. However, it has been found desirable to provide other means of stopping the machine, since the continued pressure of the operator and the work on the plate 30 will be uncertain. Referring therefore to FIGS. 1 and 5, the machine plate 11 is provided with an elongated slot 33, a generally triangular sensing finger 34 extends upwardly from the surface of the plate 11 through the slot 33 as shown in FIG. 5. The sensing finger 34 is mounted on an arm 35 which is pivoted at one end 36 above a micro-switch 37. Downward movement of the sensing finger 34 will operate the micro-switch 37. The micro-switch spring (not shown) is used to bias the sensing finger 34 in its raised position as illustrated in FIG. 5.

As can be seen in FIG. 1, the sensing finger is positioned so that it will remain depressed until the work passes out from beneath the needle and the presser foot at which point the sensing finger springs upwardly to stop the machine. The hookup of the various above mentioned parts is illustrated in FIG. 6. With the motor running, operation of the machine is controlled by a solenoid 38 which is operated in turn by the 220 volt source of current 39. The current from the source 39 to the solenoid 38 is controlled through a relay 40 which is in turn operated by the 110 v. line 41. As can readily be seen, the 110 v. line 41 will operate the relay 40 at any time that the micro-switches 21 or 37 are closed. Now when the operator positions a piece of work in front of the presser foot 12 he simultaneously pushes the plate 30 into the dotted line position shown in FIG. 3. This closes the micro-switch 21 which in turn operates the relay 40 and causes the 220 v. current 39 to pass through the relay and operate the motor solenoid to start the motor. Almost immediately, the work passing beneath the needle engages the sensitive finger 34 and operates the second micro-switch 37. The first micro-switch 21 can now be released and is of no further consequence during the particular operation because the second micro-switch 37 will keep the machine running regardless of the position of the first micro-switch 21. Now when the work passes completely through the sewing machine, it will move off the sensitive finger 34 which is moved upwardly to open the second micro-switch 37. This opens the relay 40 and immediately stops the machine.

In addition to the foregoing, a micro-switch arrangement 42 may be inserted in the 220 v. line to the solenoid 38 and be operable by the machine foot pedal so that the operator can at any time cut off the 220 v. current to the solenoid 38 to stop the machine by means of the foot pedal regardless of the position of the other micro-switches. This is necessary for positioning of the work and for emergencies. Note that at the time that the foot pedal opens the switch 42 to stop the machine, if the work is still resting on the sensitive finger 34, the relay 40 will remain in its original position and when the foot pedal is released the machine will continue to operate as before to finish its particular phase of work.

By starting the machine only when the work is being introduced into the machine and by stopping the machine when the work is completely through it, all waste thread or tape is eliminated and the operator may fumble around for any piece of work for any length of time without providing any scrap or even wear and tear of the machine. Furthermore, even after continued operation of large numbers of pieces of work, the operator's foot will not become tired since it is unnecessary for the operator to keep moving the foot pedal up or down or to hold the pedal down. The device is therefore easily attached to the front base of a sewing machine and as indicated in FIG. 6, the wiring diagram is very simple and easy to install.

While the above described switching mechanism may be installed on any type of sewing machine, it is particulasly applicable to chain stitch and tape operations where the running of the machine forms a continual length of chain stitching. Such machines are often equipped with cutting devices such as illustrated in our copending application above referred to. FIGS. 7 and 8 illutrate such installation. In this form the sewing machine plate 43, presser foot 44 and needle 45 are similar to that illustrated in FIG. 1. The plate 43 is provided with a transverse opening through which the cutters 46 extend in the path of movement of the work as more particularly described in our copending application above referred to. Stopping of the machine and operation of the cutters 46 is accomplished by a sensing finger 47 extending through the plate 43 through an opening 48. The sensing finger 47 is similar to the finger 34 shown in FIG. 5. As illustrated in FIG. 1, the switching plate portion 30 extends over the machine plate 43 adjacent the sensing finger 47. Now when the operator inserts a piece of work into the machine he pushes the plate 30 inwardly to actuate the switching device illustrated in FIG. 2 and starts the machine. As the work moves beneath the presser foot 44 and needle 45 it immediately actuates the finger 47 which in turn actuates the micro-switch 37. In this form the micro-switch 37 accomplishes two things. It takes over the operation of the machine from the micro-switch 21 to keep it running and it moves the cutter 46 in down position. After the work has passed through the machine, the sensitive finger 47 is released and this now moves the cutter 46 upwardly to cut the thread and simultaneously stops the machine.

The wiring diagram illustrated in FIG. 8 shows the use of the switch of the present invention in combination with the thread cutting device. As shown in FIG. 8, at the lower right hand corner the micro-switch 21 is energized by pushing the plate 30 inwardly with the introduction of the work in the machine. This energizes relay 49 which sends the 220 v. current to the motor solenoid 50 for starting the sewing machine. This circuit is also provided with the disengaging switch 51 operated by the foot pedal to start and stop the machine in emergencies and for adjustment similar to the form illustrated in FIG. 1. As the work moves inwardly it immediately engages the sensing finger 47 which operates micro-switch 37 to immediately energize solenoid 52 to move the cutters downwardly. Note that the micro-switch 37 takes over the operation of the machine so that the machine keeps running regardless of the position of the micro-switch 21. This is also accomplished by the movement of the cutter downwardly. The solenoid 52 is designed to depress a micro-switch 56 which bypasses the micro-switch 21 and keeps the machine running. Simultaneously the main relay 53 is also actuated to send the energizing current to the suction motor 54 and to the cutter solenoids. After the material has passed through the work and the sensing finger is released, the switch 37 opens to move the solenoid 55 upwardly releasing micro-switch 56 and stopping the machine. The additional micro-switch 56 is necessary to permit a slight lag in the stopping of the machine to permit proper operation of the cutters. If the micro-switch 37 were immediately cut off the power to the solenoid 55 would also be cut off and the cutter

would not move upwardly completely. To permit a slight lag in the operation, micro-switch **56** takes over and allows the machine to operate continuously for a split second after the micro-switch **37** was cut off.

We have thus provided a simple switching device which can be attached to household or commercial sewing machines of all types designed to control the starting of the machine on the introduction of the work. The plate portion **30** can be elongated so that in and of itself it forms a sensitive finger which permits the device to also stop the machine. However these have been found to be inaccurate and impractical and it is best to use a sensitive finger such as the finger **34** for stopping the machine. The device is simple in construction and easy and economical to manufacture and install. Other advantages of the present invention will be readily apparent to a person skilled in the art.

We claim:

1. In combination with an electrically driven sewing machine including means for advancing a workpiece along a predetermined horizontal path past a sewing needle, a starting switch comprising a base plate, a micro-switch mounted on said base plate, a pivotally mounted switch arm for operating said micro-switch, means pivotally mounted on said base plate and having a portion extending into the path of movement of the workpiece for engaging said switch arm to operate said micro-switch when a workpiece is positioned on said sewing machine path, said switch arm engaging means comprising a plate having a vertical portion engaging said switch arm and a horizontal portion extending over said sewing machine in spaced relation thereto, said horizontal portion being engageable by the workpiece, and adjustable means extending through said switch arm engaging means and into said base plate to adjustably limit the pivotal movement of said switch arm engaging means.

2. In combination with an electrically driven sewing machine including means for advancing a workpiece along a predetermined horizontal path past a sewing needle, a switching arrangement comprising a base plate, a micro-switch mounted on said base plate, a pivotally mounted switch arm for operating said micro-switch, a plate pivotally mounted on said base plate having a vertical portion engaging said switch arm and a horizontal portion extending over said sewing machine and engageable by the workpiece to start said sewing machine when a workpiece is positioned on said sewing machine path, a second micro-switch, and a sensing finger extending upwardly into the path of movement of the workpiece adjacent the sewing needle for operating said second micro-switch to operate the sewing machine after the workpiece has disengaged from said horizontal portion of said switch arm engaging plate and to stop said sewing machine after the workpiece has passed said sensing finger.

3. The combination of claim **2** wherein adjustable means extends through said switch arm engaging plate and into said base plate to adjustably limit the pivotal movement of said switch arm engaging plate.

4. The combination of claim **2** including a solenoid, a switch and a relay operating said switch, said sewing machine being started by said solenoid and said relay operated switch controlling the current to said solenoid, said micro-switches being connected in parallel for controlling current for operating said relay, a thread cutter mounted on said sewing machine transversely to said path and past the needle, said second micro-switch moving said thread cutter downwardly when contacted by the work and moving said thread cutter upwardly after passage of the work.

5. The combination of claim **4** wherein a third micro-switch is connected in parallel with said first and second micro-switches, said third micro-switch delaying the stopping of said sewing machine after the release of said first and second micro-switches until the upward cutting movement of said thread cutter has been completed.

6. The combination of claim **5** wherein a foot pedal operated switch is provided for cutting the current to said solenoid regardless of the position of said micro-switches.

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