June 26, 1956 E. VOSSEN 2,752,444

STOP-MOTION MERCURY SWITCHES FOR SEWING MACHINES

Filed June 1, 1953 2 Sheets-Sheet 1

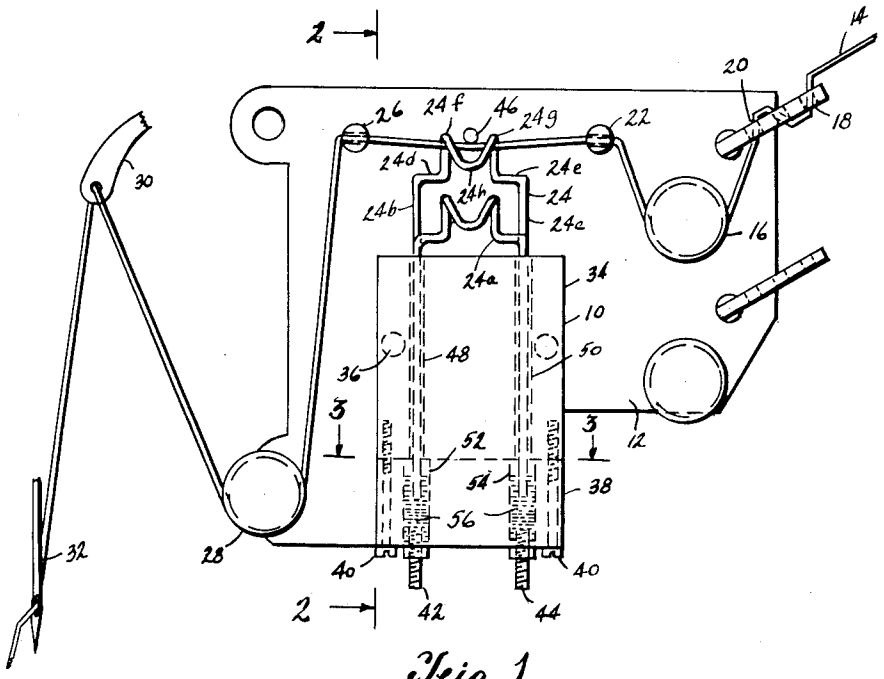


Fig. 1.

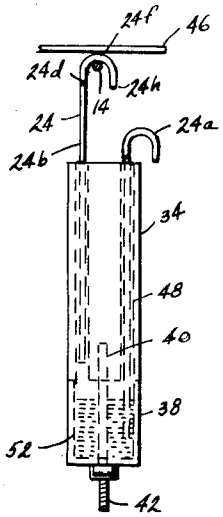


Fig. 2.

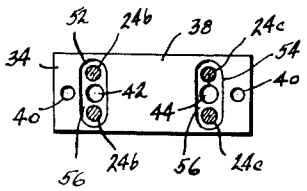


Fig. 3.

INVENTOR
EDWARD VOSSEN
BY Samuel Street
ATTORNEY

June 26, 1956 E. VOSSEN 2,752,444

STOP-MOTION MERCURY SWITCHES FOR SEWING MACHINES

Filed June 1, 1953 2 Sheets-Sheet 2

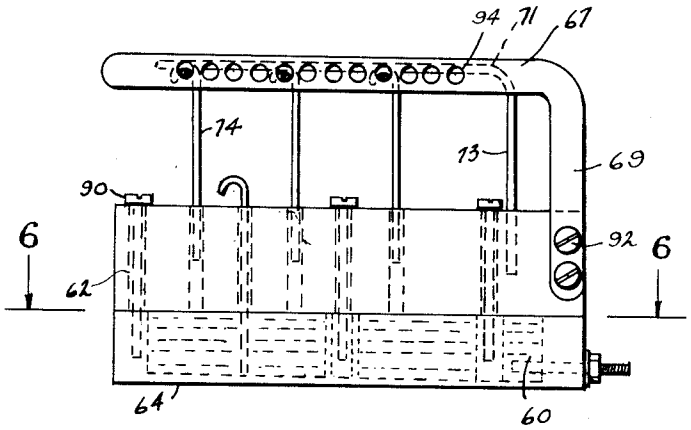


Fig. 4.

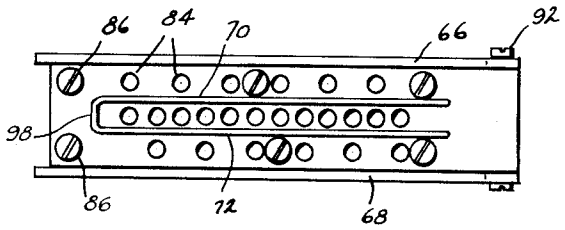


Fig. 5.

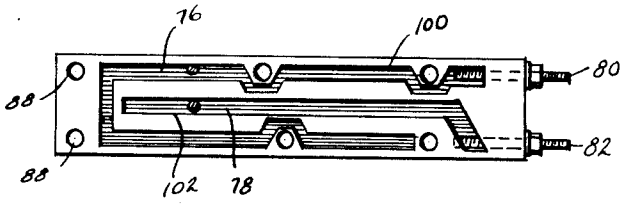


Fig. 6.

INVENTOR
EDWARD VOSSEN

BY Samuel J. Stone

ATTORNEY

United States Patent Office 2,752,444 Patented June 26, 1956

2,752,444

STOP-MOTION MERCURY SWITCHES FOR SEWING MACHINES

Edward Vossen, Lynbrook, N. Y., assignor to Stop-Motion Devices Corp., Brooklyn, N. Y.

Application June 1, 1953, Serial No. 358,824

5 Claims. (Cl. 200—61.18)

This invention relates to stop-motion mercury switches for sewing machines.

Thread is fed to sewing machine needles from two separate and independent sources: The first source is a spool or spools mounted on or adjacent the sewing machine head and the second is a bobbin or bobbin mounted within or below the sewing machine base. This invention pertains to the thread which is fed from the spool or spools and not to the thread from the bobbin or bobbins. Although the invention applies to industrial and domestic sewing machines of every description, it relates primarily to industrial machines which are operated in gangs. Sewing machines which are used in connection with long, continuous production runs are frequently operated in gangs of two, three, four, five and even more by a single operator. In such case, it is extremely important that a stop-motion mechanism be provided in connection with each individual machine for stopping the operation of the machine upon the breaking or termination of the spool thread.

The principal object of this invention is the provision of a highly efficient mercury switch which virtually instantaneously actuates the stop-motion mechanism (neither shown nor claimed herein) upon the breaking of the spool thread (sometimes identified or designated as the needle thread as distinguished from the bobbin thread) or upon the breaking of any one of a plurality of spool threads used in connection with a multiple needle sewing machine.

The mercury switch which is herein described and claimed may be provided with a single thread probe or a plurality of thread probes, one probe for each thread. When the single thread or any one of the plurality of threads happens to break or terminate, the probe which is individual to it drops in response to the pull of gravity and closes the circuit through the mercury to the stop-motion mechanism.

Two forms of this invention are shown in the drawing. In one form there are only two probes for use in connection with a sewing machine drawing thread from only two spools. In the second form of the invention twelve probes are provided for twelve threads. Nonetheless, the mercury switch with twelve probes is not much larger than the mercury switch with only two probes. The compact design which makes this possible is one of the important features of this invention.

Another important feature is the adaptability of the mercury switch herein claimed to sewing machines having any number of spool-fed threads. For example, the mercury switch which is shown in the drawing to possess or to be adapted to possess twelve probes, may be used in connection with a sewing machine having twelve threads or ten or eight threads or any other number of threads less than twelve. This may be done by simply removing the excess number of probes or by simply installing in said switch such number of probes as would correspond to the number of threads. Another possibility is to install the full quota of twelve probes but only to use as many

probes as there are threads, while supporting the remaining probes in open position.

Preferred forms of this invention are shown in the accompanying drawing in which:

Fig. 1 is a front view of a stop-motion mercury switch made in accordance with one form of this invention and provided with two thread probes or feelers.

Fig. 2 is a side view looking in the direction of arrows 2, 2 of Fig. 1.

Fig. 3 is a top view of the mercury-containing block, said view being taken on the line 3—3 of Fig. 1, showing the legs of the probes or feelers in section.

Fig. 4 is a front view of stop-motion mercury switch made in accordance with the second form of this invention.

Fig. 5 is a top view thereof.

Fig. 6 is a top view of the mercury containing block, said view being taken on the line 6—6 of Fig. 4, the legs of the probes or feelers being shown in section.

Referring now to the first form of this invention and to Figs. 1, 2 and 3, it will be seen that stop-motion mercury switch **10** may be mounted on a plate **12** which, in turn, is adapted to be mounted on the head of a conventional sewing machine. The type of sewing machine to which this particular switch as shown in the drawing is intended to be applied is one which has two needles to which thread is fed from two spools. The same switch may, of course, also be applied to a sewing machine having only a single needle which receives thread from a single spool.

The drawing shows only a single thread **14** which is fed from a single spool (not shown). The thread engages an adjustable tension device **16**, after passing through eyes **18** and **20**, and it then passes through another eye **22** and thence under and in engagement with a probe or feeler **24**. The thread then continues through still another eye **26** and then around and in engagement with a second adjustable tension device **28**. The thread then passes through the eye of the thread take-up arm **30** and thence down in the usual manner to the needle **32**.

Switch **10** has two probes or feelers **24** and **24***a* respectively. These two probes are mounted for slidable vertical movement in either direction in fiber block **34**. This fiber block is secured to plate **12** by means of screws **36** or any other suitable fastening means. Secured to the bottom of fiber block **34** is a second fiber block **38** and the two blocks may be secured to each other by means of screws **40** or any other suitable fastening devices. Fiber block **38** is provided with a pair of screw members **42** and **44** respectively which serve as binding posts or terminals for the wires which lead to the stop-motion mechanism (not shown). When the switches which are herein claimed are open, the circuit to the stop-motion mechanism is open and the stop-motion mechanism is inoperative. When the switches are closed, as when the thread breaks or terminates, the circuit to the stop-motion mechanism closes and said mechanism goes into operation, disengaging the sewing machine clutch and stopping the sewing machine.

It has been said that block **34** is made of fiber but it will be understood that this is purely illustrative of the many kinds of material that may be used for this purpose. This material must, of course, be non-conductive to electric current but if a conductive material is used, suitable insulation must be provided to avoid contact with the working parts of the switch. Wood and plastics are illustrative of other suitable materials for this purpose.

What has been said of block **34** is equally true of block **38**. It, too, may be made of fiber, wood or plastics or any other suitable material, including hard rubber. The material should be non-conductive with respect to electric current and it should also be capable of retaining a liquid, more particularly, mercury.

Block **34** serves no other purpose than to support the

probes or feelers 24 and 24*a* in such manner that they are free to slide vertically in either direction. It will be noted that the two probes or feelers are identical in construction and consequently a description of one will serve as a description of both. Taking probe 24 as illustrative, it will be noted that it comprises a single length of wire bent in such manner that it is provided with a pair of parallel legs 24*b* and 24*c*, a pair of shoulders 24*d*, and 24*e*, a pair of upwardly projecting loops 24*f* and 24*g* arising from said shoulders, and a downwardly extending loop 24*h* which lies intermediate loops 24*f* and 24*g* and joins said loops. It is through loops 24*f* and 24*g* that the thread extends and when the thread is whole, it is sufficiently taut to support the entire probe by means of said loops 24*f* and 24*g*. When the thread breaks or terminates the probe will drop and, as will hereinafter more clearly appear, the legs of the probe will close the circuit to the stop-motion mechanism through the mercury. Loop 24*h* is engageable with a pin 46 fixed to plate 12 in order to prevent the probe from jumping out of or being accidentally pulled out of its supporting guide block 34. It will now be seen how said guide block supports the probes. Each probe is provided, as above indicated, with two parallel legs and block 34 is provided with vertically extending holes 48 and 50 to accommodate said legs. The holes are spaced in accordance with the spacing of the legs and they are of a size sufficient to allow the legs to move freely either upwardly or downwardly without leaving any substantial clearance through which foreign matter might tend to enter. There are as many holes 48 and 50 in block 34 as there are probe legs to accommodate them and it will be understood that these holes all extend the full length of block 34, being open both at the top and at the bottom of said block.

Block 38 is provided with a pair of deep recesses 52 and 54 which serve as receptacles for mercury 56. These receptacles are spaced from each other, one being situated below the left legs of the probes and the other being situated below the right legs of the probes. When the probes are supported by the thread of the machine, as for example probe 24, the legs of the probes are prevented from touching the mercury and the circuit remains open. When, however, the thread breaks or terminates, the probes will drop and their legs will enter the mercury, thereby closing the circuit to the stop-motion mechanism. See the position of probe 24*a*.

Secured to block 38 and projecting into the mercury cavities are the two screw-threaded terminals 42 and 44. Suitable conductors connect these two terminals to the stop-motion mechanism. Normally the circuit is open since the two mercury cavities are spaced from each other and there is no electrical contact between them. It is only when the thread breaks or terminates and one of the probes drops that the circuit closes through said probe. One of the legs projects into one of the mercury cavities and the other leg projects into the other mercury cavity and since the two legs are integral with each other, the entire probe serves as a conductor to close the circuit.

Turning now to the second form of this invention and to Figs. 4, 5 and 6, it will be seen that mercury switch 60 comprises a pair of blocks 62 and 64, a pair of outside arms 66 and 68 secured to the sides of block 62 and supported thereby, a second pair of arms 70 and 72 supported by block 62 intermediate outer arms 66 and 68, twelve probes or feelers 74, two bodies of mercury 76 and 78 and a pair of terminals 80 and 82. The two blocks 62 and 64 are made of the same materials as blocks 34 and 38 above mentioned and they also serve substantially the same purpose. Block 62 is a guide block with a plurality of holes 84 formed therein for the legs of probes 74. Larger holes 86 are also formed in block 62 and corresponding holes 88 are formed in block 64 to receive screws or bolts 90 which fasten the two blocks together.

Arms 66 and 68 are each provided with a horizontal portion 67 and a vertical portion 69. It is the vertical portion which is secured to block 62 by means of screws or other fastening elements 92. The horizontal portions 67 are provided with holes or eyes 94 for the sewing machine threads. Inner arms 70 and 72 are also provided with a horizontal portion 71 and a vertical portion 73. The vertical portions of the two arms 70 and 72 project downwardly into block 62 and are securely supported by said block. The horizontal portions 71 of said arms 70 and 72 are parallel to each other and to the two horizontal portions 67 of arms 66 and 68. It will be noted that the ends of the horizontal portions 71 of arms 70 and 72 are joined by means of a bight 98 which tends to hold them in rigid parallel relation to each other. Arms 70 and 72 serve simply as stop or retaining members, like pin 46 above mentioned, to prevent the probes or feelers from jumping or being accidentally removed out of block 62. Probes 74 are so situated in block 62 that half of them are engageable with arm 70 and the other half are engageable with arm 72. In other words, six holes 84 are formed between arms 66 and 70 and six are formed between arms 68 and 72 and twelve are formed between arms 70 and 72. One of the legs of each of the twelve probes will project into a hole 84 formed between arms 70 and 72. The other leg of six of said probes will project into a hole 84 between arms 66 and 70. The other leg of each of the remaining six probes will project into a hole 84 between arms 68 and 72.

Block 64, like block 38, is formed with two mercury cavities but the shapes of the respective cavities are quite different. Cavity 100 is a U-shaped channel in plan view. Cavity 102 is an elongated channel with a bent end portion which gives said channel the appearance of an L in plan view. Terminal screw 80 projects into one of the arms of U-shaped cavity 100 and screw terminal 82 projects into the foot of L-shaped cavity 102. These two cavities are so situated relative to the probe holes in block 62 that there is substantial registration between the main portion of cavity 102 and the twelve holes which are situated between arms 70 and 72. There is also registration between one of the arms of U-shaped channel 100 and the six probe holes 84 which are formed between arms 66 and 70 and, similarly, there is registration between the opposite arm of said U-shaped channel and the remaining six probe holes which are formed between arms 68 and 72.

When one of the threads which project through eyes 94 and support the probes in elevated position breaks or terminates, the particular probe which is individual to said thread will drop of its own weight and one of its legs will enter the body 78 of merucry and the other leg will enter the body 76 of mercury. The circuit to the stop-motion mechanism will thereby be closed through said probe.

The foregoing is illustrative of preferred forms of this invention and it will be understood that these preferred forms may be modified and other forms may be provided and had within the broad spirit of the invention and the broad scope of the claims.

I claim:

1. A stop-motion mercury switch for sewing machines and the like, comprising a dielectric block having two elongated cavities formed therein in spaced relation to each other, a body of mercury in each cavity, a pair of terminal contact members secured to said block in spaced relation to each other and projecting into said cavities and into contact with said bodies of mercury, a dielectric cover secured to said block, a plurality of guide holes formed in said cover in registration with each of the two cavities in the block, and two-legged thread probes individually mounted for slidable movement in said guide

holes into and out of contact with said bodies of mercury, one leg of each said probe being positioned for contact with one of said bodies of mercury and the other leg being positioned for contact with the other body of mercury, thereby closing the circuit between said bodies of mercury and between said terminal contact members, each said probe comprising a single length of wire bent intermediate its ends to form a pair of downwardly extending parallel legs, a pair of upwardly extending loops being formed at the upper ends of said legs, and a downwardly extending loop formed between and joining the two upwardly extending loops.

2. A stop-motion mercury switch for sewing machines and the like, comprising a dielectric block having two elongated cavities formed therein in spaced relation to each other, a body of mercury in each cavity, a pair of terminal contact members secured to said block in spaced relation to each other and projecting into said cavities and into contact with said bodies of mercury, a dielectric cover secured to said block, a plurality of guide holes formed in said cover in registration with each of the two cavities in the block, and two-legged thread probes individually mounted for slidable movement in said guide holes into and out of contact with said bodies of mercury, one leg of each said probe being positioned for contact with one of said bodies of mercury and the other leg being positioned for contact with the other body of mercury, thereby closing the circuit between said bodies of mercury and between said terminal contact members, each said probe comprising a single length of wire bent intermediate its ends to form a pair of downwardly extending parallel legs, a pair of upwardly extending loops being formed at the upper ends of said legs to receive and engage a thread, a downwardly extending loop formed between and joining the two upwardly extending loops, and a stop member secured adjacent the cover in fixed relation thereto for engagement with said probe to prevent dislodgement thereof from said cover.

3. A stop-motion mercury switch for sewing machines and the like, comprising a dielectric block having two elongated cavities formed therein in spaced relation to each other, a body of mercury in each cavity, a pair of terminal contact members secured to said block in spaced relation to each other and projecting into said cavities and into contact with said bodies of mercury, a dielectric cover secured to said block, a plurality of guide holes formed in said cover in registration with each of the two cavities in the block, and two-legged thread probes individually mounted for slidable movement in said guide holes into and out of contact with said bodies of mercury, one leg of each probe being positioned for contact with one of said bodies of mercury and the other leg being positioned for contact with the other body of mercury, thereby closing the circuit between said bodies of mercury and between said terminal contact members, one of said cavities being U-shaped in plan view, the other cavity being channel-shaped and extending between the two arms of said U-shaped cavity substantially in parallel relation thereto.

4. A stop-motion mercury switch for sewing machines and the like, comprising a dielectric block having two elongated cavities formed therein in spaced relation to each other, a body of mercury in each cavity, a pair of terminal contact members secured to said block in spaced relation to each other and projecting into said cavities and into contact with said bodies of mercury, a dielectric cover secured to said block, a plurality of guide holes formed in said cover in registration with each of the two cavities in the block, and two-legged thread probes individually mounted for slidable movement in said guide holes into and out of contact with said bodies of mercury, one leg of each said probe being positioned for contact with one of said bodies of mercury and the other leg being positioned for contact with the other body of mercury, thereby closing the circuit between said bodies of mercury and between said terminal contact members, one of said cavities being U-shaped in plan view, the other cavity being channel-shaped and extending between the two arms of said U-shaped cavity substantially in parallel relation thereto, the cover having a first group of guide holes formed in registration with one of the arms of the U-shaped cavity, a second group of guide holes formed in registration with the opposite arm of said U-shaped cavity, and a third group of guide holes formed in registration with the channel-shaped cavity, one of the legs of each of said probes projecting through one of the third group of holes for movement into and out of engagement with the body of mercury in the channel-shaped cavity, the opposite leg of each of said probes projecting through one of the guide holes in either of the first and second groups of guide holes for movement into and out of engagement with the body of mercury in the U-shaped cavity.

5. A stop-motion mercury switch for sewing machines and the like, comprising a dielectric block having two elongated cavities formed therein in spaced relation to each other, a body of mercury in each cavity, a pair of terminal contact members secured to said block in spaced relation to each other and projecting into said cavities and into contact with said bodies of mercury, a dielectric cover secured to said block, a plurality of guide holes formed in said cover in registration with each of the two cavities in the block, and two-legged thread probes individually mounted for slidable movement in said guide holes into and out of contact with said bodies of mercury, one leg of each probe being positioned for contact with one of said bodies of mercury and the other leg being positioned for contact with the other body of mercury, thereby closing the circuit between said bodies of mercury and between said terminal contact members, each said probe comprising a single length of wire bent intermediate its ends to form a pair of downwardly extending parallel legs and a yoke joining said legs, a hook-shaped portion being formed on said yoke to engage a strand of yarn and to pendently support the probe therefrom.

References Cited in the file of this patent

UNITED STATES PATENTS

519,715	Keller	May 15, 1894
2,387,369	Vossen	Oct. 23, 1945