J. A. GROEBLI.

PROTECTIVE DEVICE FOR EMBROIDERING MACHINES.

APPLICATION FILED OCT. 6, 1910.

1,040,938.

Patented Oct. 8, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

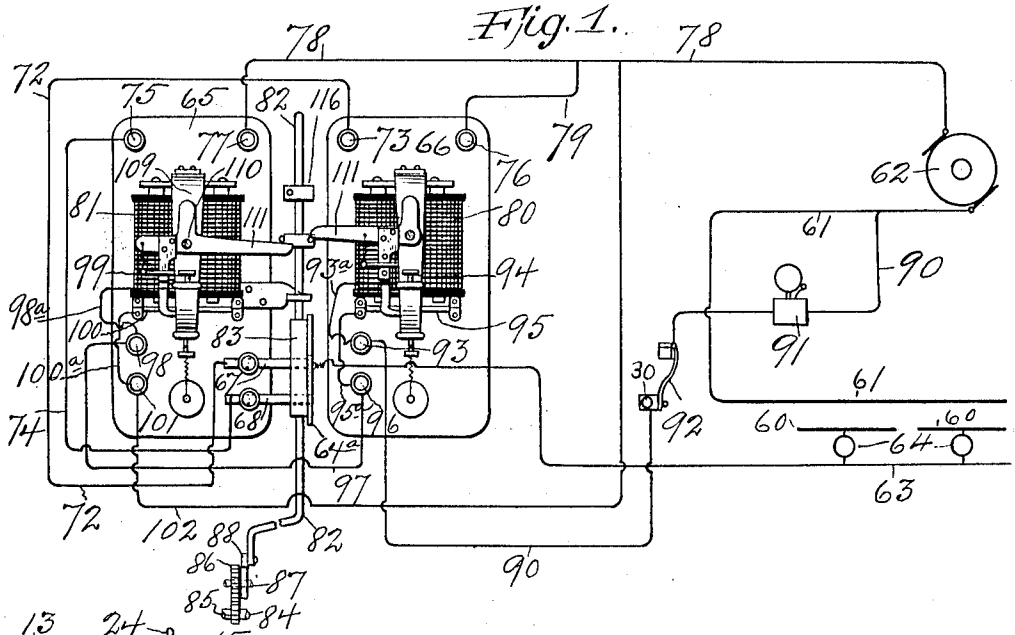

Fig. 2.

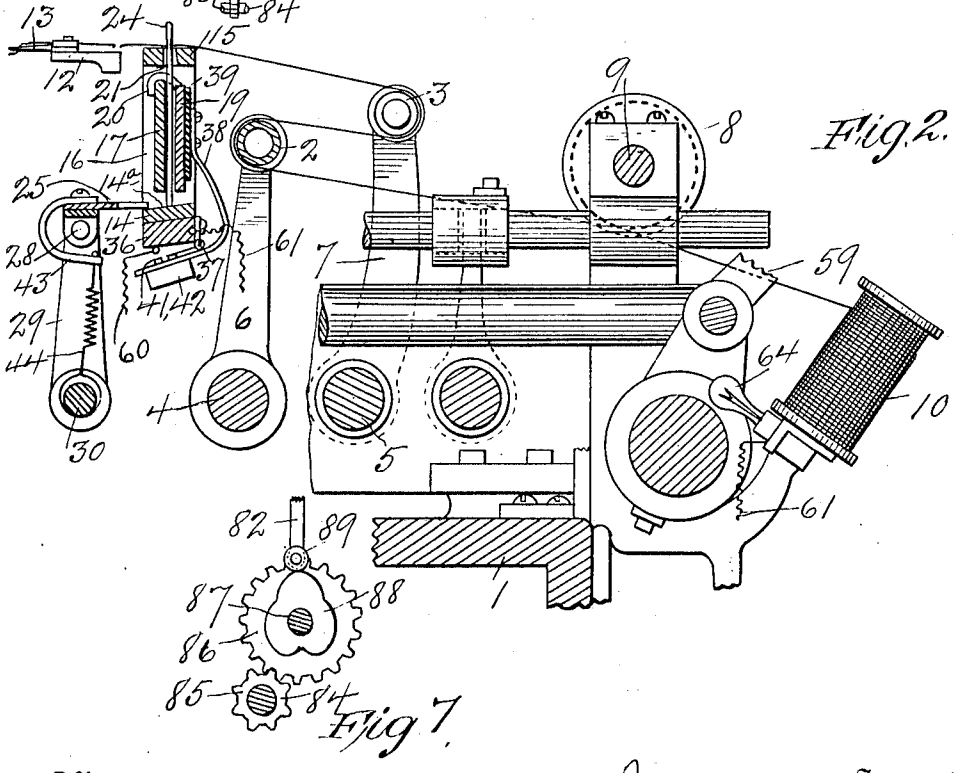

Fig 7.

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2 SHEETS—SHEET 2.

Fig. 4.

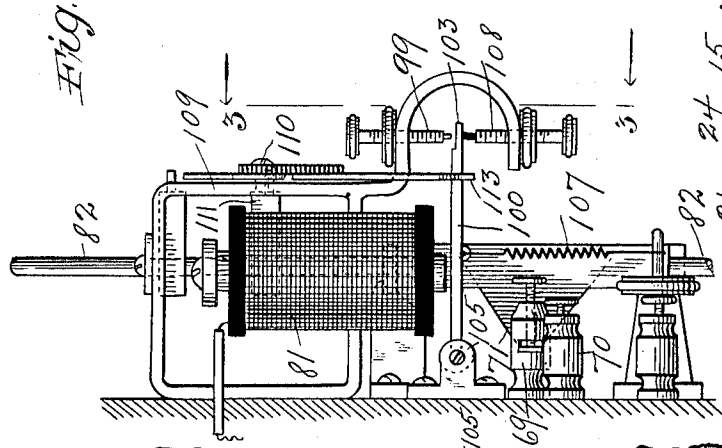
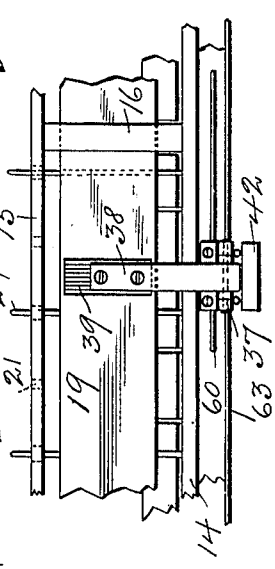


Fig. 6.



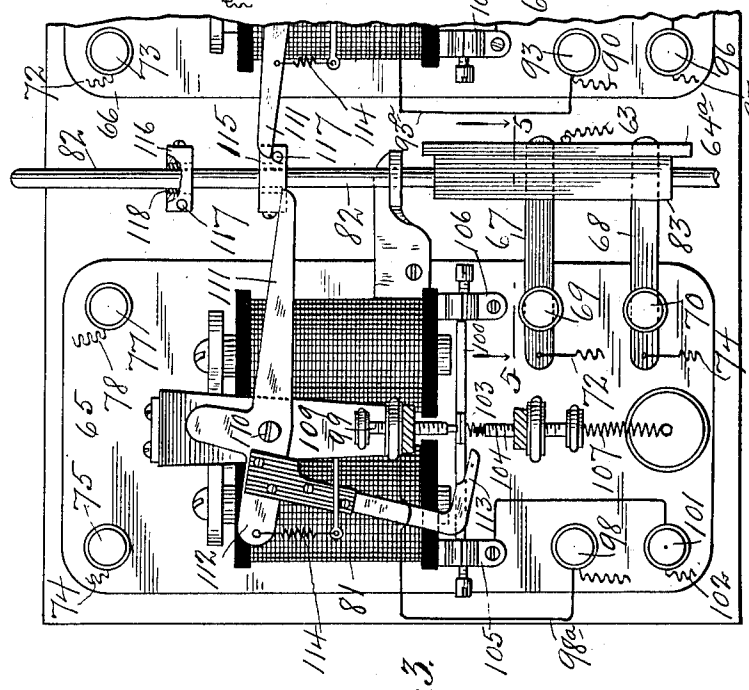
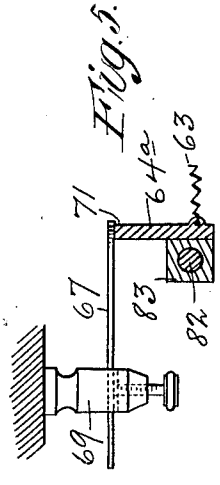


Fig. 3.

Fig. 5.



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UNITED STATES PATENT OFFICE.

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PROTECTIVE DEVICE FOR EMBROIDERING-MACHINES.

1,040,938. Specification of Letters Patent. Patented Oct. 8, 1912.

Application filed October 6, 1910. Serial No. 585,602.

To all whom it may concern:

Be it known that I, JOSEPH A. GROEBLI, a citizen of the United States, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Protective Devices for Embroidering-Machines, of which the following is a specification.

My present invention relates to improvements in protective devices for embroidering machines and the same is particularly advantageous in machines of the large type wherein several hundred needles simultaneously operate to produce an embroidered design in multiple on a fabric.

In such machines much difficulty has been experienced in attending to the many threads which become broken and unless the broken threads are immediately detected and remedied the needle having the broken thread fails to perform its embroidering function and the part of the embroidery being worked by such needle falls behind the other needles and the defect in the design has to be remedied by hand work after the fabric has been removed from the machine, which entails considerable labor which can not be previously estimated. This continual breaking of the threads is one of the greatest annoyances in the operation of the large embroidering machines and many attempts have been made to overcome the trouble with detecting devices, but in machines of the type herein specified these attempts have been unsatisfactory. Either the threads were tested at a distance from the needles where the threads could be kept uniformly taut while being tested, or the detecting device was placed near the needles where the threads are alternately taut and slack and the detecting became unreliable as many false signals were then given.

In the present invention it is my object to provide a mechanism which will test the several threads independently near the needles, where the thread is alternately taut and slack and denote when a thread is too slack or broken, by giving a signal either by visible means or by audible means and the invention in the complete embodiment is adapted to give both a visible and audible signal and the stopping of the machine is preferably left for the operator to control.

My present invention is designed to improve certain features of a device for which I made application for Letters Patent of the United States on August 17, 1909, Serial Number 513,246, and cross reference will be made herein to that application.

My present invention is also for the purpose of perfecting the said device and I prefer to employ the device contained in that application for use with my present invention except wherein the parts thereof are superseded by the present device, though my present invention is not limited to use with such.

In former devices it has been difficult to test the sewing threads near the needle and where devices have been used to signify a defect in the threads they have been objectionable in that they operated the signal or stop mechanism when there was no real trouble in the threads. They often operated the signal or stop mechanism when a slight slack existed that would ordinarily be taken up at the next stitch and the frequent signals thus caused made the safety mechanism almost useless.

In the present invention I have provided mechanism which requires that the thread fail to sustain the detecting element during at least two successive stitches, so that if the slack during a given stitch is so slight that it will be taken up in the ordinary working of the machine on the next stitch, the detecting and safety mechanism will not be operated and thereby the number of false signals are minimized.

Another branch of my invention relates to the distribution of the signifying mechanism, whereby the point where the difficulty in the threads exists can be readily located.

In the embodiment of my invention as herein shown I have employed both electrical and mechanical means for carrying out the above objects.

In the drawings forming a part of this application, Figure 1 is a diagrammatic view of the electrical circuits and the automatic mechanical device which makes a consecutive action of the detecting element necessary to operate at least one of the indicating means. Fig. 2 is a cross section of the detecting mechanism and corresponds with Fig. 2 of my copending application referred to herein, Fig. 3 is a sectional view taken on the line 3—3 of Fig. 4, Fig. 4 is a

side elevation of the relays which are controlled by and which control, an electrical circuit, Fig. 5 is a sectional view taken on the line 5—5 of Fig. 3, looking in the direction of the arrows, Fig. 6 is an elevation of part of the detecting mechanism, and, Fig. 7 is an elevation of the gear and cam mechanism which operates the device that controls the armatures of the relays.

In Fig. 2 I have shown most of the parts similar to the device shown in my co-pending application, and in so far as the parts are the same they bear the same reference numerals as in the said case. In addition to the parts of that device shown in Fig. 2 the device which retards the setting of the safety mechanism until one or more stitches have been completed after the starting of the machine, may be used in connection with the present invention if so desired and I prefer to use the same in connection with the present device, but since the same is fully shown and described in my said pending case I will not here describe the details thereof.

In Fig. 2 I have shown a supporting beam 1, for supporting various parts of the stitching devices and mounted upon brackets attached thereto are the spools 10 of sewing thread or silk in the usual manner. From the spool the thread passes around a tension or let off roller 8, which is revolved with the shaft 9. From the tension roller the thread passes around a bar 2 carried on the arm 6, which is one element of the take up and thence around the bar 3 on the arm 7 which is the other element of the two bar take up now commonly used in large embroidering machines. The bars 2, 3, moving in unison with their arms 6, 7, are operated by oscillating the shafts 4 and 5 on which the arms 6 and 7 are carried, in the usual way. From the take up bars the thread passes through the eye of a detecting element 24, which I prefer to form in the shape of a needle, and thence it passes to the eye of the sewing needle 13. All the parts thus far referred to are preferably arranged and constructed like the same parts in my pending application.

I prefer to dispose my detecting mechanism between the take up and the sewing needle, as it then will test the thread as near as possible to the needle, as it is not as accurate to test the thread at other places, since the thread, if tested before the tension or take up, is apt to test all right and then become broken through the action of the tension or take up and thus be imperfect before the needle is reached between the tension and the fabric and the defect would not be detected. In placing the detecting mechanism where it will test the thread near the needle it is necessary to overcome certain obstacles caused by the action of the take up. The thread near the needle is subject to the action of the take up and the threads are here alternately taut and slack and the slack is necessary at certain periods of the stitch. If the detecting elements were to respond to this natural slack the detecting device would become useless. I have therefore provided a device wherein the detecting element tests the threads at a certain period of the stitching operation, and I prefer to make the detecting element not only non-operative during the period of the natural slack, but to support the same at that period. I have shown a bar 15 arranged longitudinally below the path of the several threads of a row of stitching devices, and below the same a bar 14, the two being separated and supported by the uprights which connect them and which are supported in any suitable way on the machine frame. Between the two bars 14 and 15 I have provided parallel plates 17 and 19, the former of which is preferably stationary and the latter movably suspended from the former by means of lugs 20, which take over the top of the plate 17. The plate 19 is adapted to be swung on the lugs 20 as will appear in the subsequent description.

The upper bar 15 is provided with apertures 21, which I have arranged to come just below the path of the thread as it goes from the take up to the sewing needle and passing through each of these apertures I have provided the detecting elements, which I have shown in the form of a needle 24, with an eye, through which the thread passes. The several detecting needles 24 lie between the plates 17 and 19 and are adapted at certain times to actuate the latter. Upon a shaft 30 I have provided the arms 29 which carry a shaft 28 by which a plate 25 is supported and fulcrumed on the arms 29. The plate 25 is provided with an arm 43 which passes around the shaft 28, below it, and to the front of it, where it is engaged by a spring 44, which operates thereon to force the plate 25 into contact with the bar 14. The shaft 30 may be oscillated during each stitching operation of the machine preferably by the mechanism described in my pending application and this causes the plate 25 to be first withdrawn from under the testing needles 24 and then passed thereunder. So much of my present mechanism may be the same and may operate the same as the mechanism shown in my pending application. Instead of having the top surface 14^a of the bar 14 horizontal, however, I have shown the same slanting, in relation to the lower ends of the detecting needles 24. When the detecting needle is left by the plate 25 to be dependent upon the thread at the period when the take up is drawing the thread taut, if the thread should be broken or unduly slack, then the detecting needle

will fall to the bar 14 and therefore in the path of the plate 25, which is then moved across the path of the detecting needles. If the detecting needle should be down at the time that the plate 25 is moved across the plane thereof, the needle 24 will be engaged at its lower end by the front edge of the plate 25 and as a result the needle will be caused to swing and the needle will fulcrum from the point where it contacts with the upper bar 15. When one of the needles is thus swung it carries the plate 19 and thereby the contact arm 38, which is prevented from contacting directly with the plate 19 by the insulating block 39, is swung on its hinge 37 and the contact point 41 on the under end thereof will cause the closing of an electrical circuit. It will be noted that in the present device the top 14ª of the bar 14 slants in relation to the pivotal point of the needle 24 and therefore as the needle is engaged by the plate 25 in the reciprocation of the latter the needle will be kept in contact with the front edge of the plate 25 and will not ride up over the edge and make the device inoperative. Without this action the end of the needle 24 is apt to ride over the front edge of the plate 25 and fail to operate the safety device because the needle end moves in the arc of a circle and the weight of the needle may not be enough to cause it to ride down as the plate 25 moves it. By this means the action of the detecting device is made more certain.

The several contact arms 38 are connected with the wire 61 of a circuit and the contact points 41 are adapted to contact with the wires 60 forming the other part of the same circuit, thereby closing the circuit in so far as the detecting mechanism is concerned.

From here my description will relate to that branch of the invention which relates to the signaling. I prefer to employ a plurality of signals of different kinds, to wit., a visible signal which will preliminarily warn the attendant that a defect is imminent and indicate the location of the defect upon the machine and an audible signal which will be operated only in case the thread shows the presence of a defect in more than one successive stitch. The purpose of this latter is to avoid unnecessary signaling and to permit the slack to be taken up during the next succesive stitch in the event that the defect is trivial and is not caused by a very slack or a broken thread. For this I have employed an electrical circuit which includes the visible indicating means and I have included therein a pair of relays which are arranged to be alternately operated by the first circuit in such a way that successive closing of the first circuit will cause the closing of another circuit which latter includes the other signaling device, to wit., the audible signal. The alternate action of the relays I preferably control by mechanical means which is timed with relation to the embroidering machine and is preferably operated from the shaft of the machine.

What I shall here call for convenience the primary or controlling circuit is the one which is closed by the thread detecting mechanism previously described, while the other, or second circuit is the one which is controlled by the first circuit through the actions of the relays.

The primary circuit, which may be traced in Fig. 1, includes a generator 62 which generates the current for the two circuits and it may be here stated that the two circuits may travel over the same conductors at certain portions, or the circuits may be said to coincide for a portion thereof, although the same may be independently fed from the source of current supply. I prefer to employ a generator as a source of supply for the current although batteries may be used if desired. From one of the brushes of the generator the circuit may be traced through the wire 61, by which it connects with the several contact arms 38 which are controlled by the detecting mechanism as shown in the previous description. The contact arms 28 close the circuit with one or the other of the legs 60, according to which of the several contact arms 38 is operated by the detecting needle, it being understood that I prefer to arrange a number of the bars 19 and coöperating contact arms 38 at intervals throughout the length of the machine. Between each of the legs 60 and the wire 63 running along the machine, I have bridged a small light 64, which, as shown in Fig. 2 are disposed near the front of the machine where they will visibly indicate the closing of the primary circuit by the detecting mechanism and will indicate to the attendant the particular section at which the defect arises. The wire 63 passes on and is connected with a contact plate 64ª, which is automatically operated, preferably by mechanical means, to alternately energize the coils of the two relays by connecting the primary circuit with the coils of the two relays. There are two relays mounted on bases 65, 66, which are suitably located on the machine, and they are preferably mounted side by side and in a vertical position as shown in the drawings. I preferably employ an electric relay and preferably two, but it will be apparent from an understanding of my invention that the number is not limited thereto with an appropriate arrangement in the mechanical means for alternating the contacts. On the left of these two relays I have secured the two contact spring plates 67 and 68, which are held respectively by the binding posts 69 and 70, and they project into the path of the projection 71 on the under edge of the con-

tact 64ª. From the binding post 69 of the upper contact spring I have run the wire 72 to the binding post 73 on the base of the right hand relay, thus connecting with the coils 80 of the right relay. From the binding post 76 of this same relay the wire 79 runs into the main wire 78 and back to the generator 62 and completes the circuit. This completes a circuit through the wire 61, one of the legs 60, one of the lights 64, the wire 63, contact plate 64ª, contact spring 67, wire 72, coils 80, wires 79 and 78 and back to the generator, energizing the coils of the right hand relay. If the various contacts in this circuit are all closed the light 64 through which this circuit passes will be illuminated, and by its location the operator will be able to determine the part of the machine where the difficulty exists.

From the lower contact spring 68 a wire 74 passes up and is connected with the binding post 75, by which the current is carried to the coils 81 of the left hand relay. From these coils it emerges from the binding post 77, passes through the wire 78 and back to the generator 62. Thus if the contact plate 64ª is connected with the contact spring 68 and the other circuit closing means is closed a circuit will be formed through the wire 61, one of the legs 60, one of the lights 64, the wire 63, contact plate 64ª, contact spring 68, wire 74, coils 81, and wire 78, back to the generator, thus energizing the coils of the left hand relay. By alternating the connecting plate 64ª first with one of the contact springs and then the other, the relay coils will be alternately put in circuit with the thread detecting mechanism and this is timed with relation to the stitching operation of the machine, whereby one relay will be in circuit during one stitch and the other in circuit during the next successive stitch. The device for alternating the contact between the plate 64ª and the springs 67 and 68 I preferably operate automatically from the shaft of the machine, although the same may be otherwise operated so long as its action is properly timed with relation to the stitching operation of the embroidering machine. The device which I prefer for this purpose may be understood from Figs. 1 and 7. I have provided an upright rod 82 to which the plate 64ª is secured, but insulated therefrom by the block 83, which rod is adapted to be reciprocated for the purpose of throwing the plate 64ª in contact first with one and then the other of the springs 67, 68. The shaft 84, which is the main shaft of the machine is provided with a gear 85, which, like the shaft 84, revolves one revolution for each stitching operation of the embroidering machine and there is a gear 86, carried on a shaft 87, which meshes with the gear 85 and the gear 86 is twice the size of the gear 85, whereby the shaft 87 will revolve once for every two stitching operations of the embroidering machine. On the shaft 87 there is provided a cam 88 which contacts with a bowl 89 on the lower end of the rod 82 and by the action of this cam the rod 82 is moved up at one stitch of the machine and down at the next stitch etc. The result of this is to place the plate 64ª, and therefore the wire 63, in electrical contact with first the spring 67 and upon the next stitching operation of the machine, with the spring 68, thus alternating the connection.

What I have herein termed the second circuit may be traced as follows: The wire 90 may start from the generator or it may be taken from the wire 61. From here the circuit is traced through a signaling device, preferably an audible one, in the nature of a bell 91 in series, from there through a periodical make and break 92, which will be referred to, thence through the wire to the binding post 93; from there through a short wire 93ª, to the contact screw 94 of the right relay; from the armature 95 it runs through the short wire 95ª to the binding post 96; thence through the wire 97 to the binding post 98 of the left relay, through the short wire 98ª to the contact screw 99 of the left relay; from there it passes to the binding post 101 by way of the wire 100ª, thence through wire 102 back onto the main wire 78, or directly to the other side of the generator.

The relays may be of ordinary construction except for certain mechanical additions. Each relay consists of coils, a core to be magnetized thereby and an armature to be attracted by the cores and suitable contact and limiting screws. The armatures 95 and 100 of the relays are shown fulcrumed at the ends in the blocks 105 and 106 and the tip 103 of the armatures are adapted to contact with the screw 94 or 99, when drawn up by the magnetic action of the coils and when drawn down by their retracting springs 107 they rest against the insulated tip of the stop or limiting screws 108. The electrical contact is only made by contact with the screws 99 or 94. Each relay is provided with means for engaging its armature and retaining it in the contact position for a period. On the bracket 109 of each relay there is fulcrumed at 110 an armed member having an arm 111 extending in one direction and an arm 112 in the other, the latter having secured thereto and insulated therefrom an engaging finger 113 which is adapted to engage under the armature and retain it in its elevated position, when the armature has been lifted by the magnetic action. A spring 114, pulling down on the arm 112 tends to force the engaging finger under the armature. This armed member is provided on each relay, preferably with their arms

111 directed toward each other. The reciprocating rod 82 is provided with two collars 115 and 116, insulated from the rod by bushings 118, and each collar carries a forwardly extending pin 117, one being adapted to engage the arm 111 of one of the relays and the other the other arm 111.

The make and break 92 shown in Fig. 1 is the same and operates the same and for the same purpose as the device shown in Fig. 7 of my pending case. It is a contact plate which oscillates with the shaft 30 and alternately makes and breaks the line 90, so that the audible signal will not sound continually when once started. A full description of this device is given in my pending application.

The operation of my device is as follows: At each stitching operation of the embroidering machine the sewing needle is passed in and out of the fabric and the take up is operated after the needle emerges from the fabric for taking up the loop in the thread. While the sewing needles are passing in and out of the fabric the plate 25 rests under the detecting needles 24 and supports them so that their eyes are in the line of the threads and therefore do not depend upon the thread for support at this period. When the take up becomes active the plate 25 is withdrawn from the detecting needles and the latter are then dependent upon the sewing threads for their support. If any thread should be broken or unduly slack, the detecting needle engaging with that thread will fall into the path of the plate 25. Upon the reciprocation of the latter the detecting needle which has fallen will be engaged and will be rocked, fulcruming from the place where the needle 24 contacts with the upper bar 15. When the needle 24 rocks it carries the plate or bar 19 into contact with the contact arm 38, the latter is thereby rocked and the contact point 41 causes the wire 61 to be closed with the wire 60. If the parts are in the position shown in Figs. 1 and 3 at this moment, a circuit will be made through wire 63, plate 64^a, wire 72, coils 80 of the right relay and back to the generator. When the bar 82 moves up to its highest position contact 64^a makes contact with the upper spring 67 and thereby at that point closes the primary circuit with the right relay. It also lifts the arm 111 of the right hand relay and releases the armature of the right hand relay which may have been held by it through an action of two "stitch periods" previous. At this time the bar 25 is completing its active movement and in case a detector needle has dropped will close the primary circuit at that point. The primary circuit is then complete through the right hand relay and the coils will raise the armature of the right relay. At that moment the bar 82 commences to go down and releases the catch 111 of the right relay which will engage the raised armature and hold it, thereby closing one gap of the secondary circuit. The bar 82 continuing its descent the contact portion 71 of plate 64^a will lose contact with the upper spring 67 and remain for a time in an intermediate position out of contact with both springs 67 and 68, thereby breaking the primary circuit even if one of the detectors should remain in the advanced position. During the next stitch period the bar 82 will descend to its lowest position, thereby the part 71 making contact with the lower spring 68 and closing at that point the primary circuit through the left hand relay and depress the arm 111 of the left hand relay and release the armature of the left hand relay should it have been raised two stitch periods previously. At this time the bar 25 is again completing its active movement and in case a detector needle has dropped, closes the primary circuit at that point. The primary circuit is then complete through the left hand relay and the coils will raise the armature of the left relay. The armature of the right hand relay being held in position by the catch 111 the secondary circuit is now complete and will operate the signal connected thereto. As long as the defect in the thread continues and the detector closes the primary circuit at that point the secondary circuit will continue closed by the armatures of the two relays being held up alternately by the coils and the catch. The periodical circuit breaker breaks the secondary circuit every stitch for the purpose of repeating the signal every stitch in case a single stroke bell is used.

The periodical circuit breaker may be dispensed with if desired.

My invention is not limited to a device in which a defect exists for only two consecutive stitches.

If, after the detecting mechanism closes the primary circuit, the slack in the thread is taken up before a second stitch is completed, the first circuit will be opened and the action will start all over anew. When the armature of say the right relay is drawn up by magnetic action and then held by the engaging finger, if the detecting mechanism upon the next successive stitch does not show a continuation of the defect, then the coil of the left relay will not be energized upon the second stitch and the second circuit will not be entirely closed. When the rod 82 returns after this the finger which had been holding the armature of the right relay up will be withdrawn and the armature of the right coil will be subject to the same conditions which had existed previous to the operation herein set forth as an example.

Many changes may be made in the con-

struction and arrangement of the device and mechanical and electrical means may be alternated in various combinations without departing from the broad spirit of my invention. By the invention herein set forth it is possible to do away with much of the meaningless signaling heretofore experienced with delicate detecting devices and the device is adapted to signal when there is a defect existing during more than one successive stitch.

While I have shown a visible signal in the first circuit and an audible one in the second circuit changes may be made within the scope of my broad claims, and I do not limit my invention to the particular kind of signals herein shown, except where such are specifically mentioned in the claims.

While I have shown the visible signals disposed along the machine in the several sections thereof it is obvious that they may be grouped together in some convenient part of the machine and be arranged to indicate the particular section of the machine wherein the defect exists.

Having described my invention what I claim is;

1. An embroidering machine having a sewing needle and a take up, a safety device and means for operating the same, comprising a movable thread testing element, a movable element adapted to support the thread testing element during a period of the stitching and means for withdrawing the movable element from the support of the thread testing element during a period of the take up action and for moving the same across the path of the thread engaging element, means for causing the thread testing element to rise as it is moved by the movable element and means whereby the engagement of the thread engaging element with the said movable element will cause the operation of the safety device.

2. An embroidering machine having a sewing needle and a take up, a safety device and means for operating the same, comprising a movable thread testing element, a movable element adapted to support the thread engaging element during a period of the stitching and means for withdrawing the movable element from the support of the thread engaging element during a period of the take up action and for moving the same across the path of the thread engaging element, a slanting plate for limiting the movement of the testing element when the said supporting element is withdrawn and means whereby the engagement of the thread engaging element with the movable element will cause the operation of the safety device.

3. In a machine of the class described, the combination of means for stitching a fabric, means for indicating a defective condition of the sewing thread, means for periodically testing the sewing thread to detect a defective condition thereof, and mechanism for effecting the operation of the indicating means only after a plurality of operations of the detecting means, said indicating means being inoperative by said operating means except upon a plurality of operations of said detecting means.

4. In a machine of the class described, the combination of means for stitching a fabric, means for indicating a defective condition of the sewing thread, means for periodically testing the sewing thread to detect a defective condition thereof, and mechanism for effecting the operation of the indicating means only after a plurality of operations of the detecting means, said indicating means being inoperative by said operating means except upon a plurality of successive operations of said detecting means.

5. In a machine of the class described, the combination of means for stitching a fabric, means for indicating a defective condition of the sewing thread, means for periodically testing the sewing thread to detect a defective condition thereof, means for operating said indicating means, said operating means being adapted to be initiated by an operation of the said detecting means and to complete its operation upon a succeeding operation of the detecting means, and means for periodically restoring the operating means if the detecting means fails to be operated successively.

6. In a machine of the class described, the combination of means for stitching a fabric, a plurality of means for indicating a defective condition of the sewing thread, means for detecting a defective condition of the sewing thread, and means whereby the indicating means will be made successively operative by said detecting means when said latter means detects a defective condition of the thread during a plurality of stitches of the stitching means.

7. In a machine of the class described the combination of means for stitching a fabric, means for periodically testing the sewing thread to detect a defective condition thereof, means for indicating a defective condition of a sewing thread, and adapted to be operated by said testing device, other means for indicating a defective condition of a sewing thread and means whereby said second indicating means will be made operative by a plurality of operations of said first indicating means.

8. A machine of the class described, embodying a plurality of sewing needles adapted to stitch a fabric, means for detecting a defective condition of a sewing thread, an electrical circuit and lights operated thereby, said lights being so disposed on the machine as to indicate by their position the

location of the defect in a sewing thread and adapted to be operated by said detecting means.

9. A machine of the class described embodying means for stitching a fabric, means for detecting a defect in the condition of a sewing thread, a primary circuit including a plurality of visible indicating devices arranged to indicate by their position the location of a thread defect and adapted to be operated by said thread detecting means, a relay operated by said primary circuit and a secondary circuit including an audible signal and adapted to be operated by said relay.

10. A machine of the class described embodying a plurality of means for stitching a fabric, means for detecting a defective condition of a sewing thread, a primary circuit including a plurality of indicating devices arranged to indicate by their position the location of the thread defect and adapted to be operated by said detecting means, a secondary circuit and indicating means adapted to be operated by said first circuit upon a plurality of successive operations of the indicating means in said first circuit.

11. A machine of the class described embodying a plurality of stitching means, means for detecting a defective condition of the sewing thread, a circuit including local signals adapted to be operated by said detecting mechanism and a second circuit including a common signal and means whereby said common signal will become operative upon successive operations of a local signal.

12. A machine of the class described embodying means for stitching a fabric, detecting mechanism for testing the sewing threads, a primary circuit adapted to be closed by said detecting mechanism, a plurality of relays and means for alternately connecting said relays in said primary circuit, a secondary circuit in which the armatures of the relays are connected whereby said secondary circuit must be closed through both armatures, means for alternately engaging said armatures, if they are attracted by their coils and holding them closed until an alternate relay has been connected in said primary circuit and indicating means operated by said secondary circuit whereby a plurality of operations of said detecting mechanism will be necessary to operate said indicating means.

13. A machine of the class described embodying means for stitching a fabric, detecting mechanism for testing the sewing threads, a primary circuit adapted to be closed by said detecting mechanism, a plurality of relays and means for alternately connecting said relays in said primary circuit, a secondary circuit in which the armatures of the relays are connected whereby said secondary circuit must be closed by both armatures, means for alternately engaging said armatures if they are actuated while their respective coils are connected in the said primary circuit and holding them closed until the alternate relay has been connected in said primary circuit, said means being timed relative to the stitching operations of the machine and being adapted to release said armatures when their coils are again connected in the said primary circuit and indicating means operated by said secondary circuit, whereby a plurality of successive operations of said detecting mechanism will be necessary to operate said indicating means.

14. A machine of the class described embodying means for stitching a fabric, a detecting mechanism for testing the sewing threads, a primary circuit adapted to be closed by the said detecting mechanism, a plurality of local signals in said primary circuit, a plurality of relays and means for alternately connecting said relays in said primary circuit, a secondary circuit in which the armatures of the relays are connected whereby said secondary circuit must be closed by both armatures, means for alternately engaging said armatures if they are actuated while their respective coils are connected in the said primary circuit and holding them closed until the alternate relay has been connected in said primary circuit, said means being timed relative to the stitching operations of the machine and being adapted to release said armatures when their coils are again connected in the said primary circuit and indicating means operated by said secondary circuit, whereby a plurality of successive operations of said detecting mechanism will be necessary to operate said indicating means.

15. A machine of the class described embodying means for stitching a fabric, detecting means adapted to test the threads periodically during the stitching operations of the embroidering machine, a primary circuit adapted to be closed by said detecting mechanism, a plurality of relays and means for alternately connecting said relays in said primary circuit, a secondary circuit in which the armatures of the relays are connected whereby said secondary circuit must be closed by both armatures, means for alternately engaging said armatures if they are actuated while their respective coils are connected in the said primary circuit and holding them closed until the alternate relay has been connected in said primary circuit, said means being timed relative to the stitching operations of the machine and being adapted to release said armatures when their coils are again connected in the said primary circuit and indicating means operated by said secondary circuit, whereby a plurality of

successive operations of said detecting mechanism will be necessary to operate said indicating means.

16. A machine of the character described embodying means for stitching a fabric, detecting means adapted to periodically test the sewing threads during the stitching operations of the sewing mechanism, a primary circuit adapted to be closed by said detecting mechanism upon a defect appearing in the sewing thread, a plurality of relays adapted to be alternately connected in the primary circuit to be made operative by the detecting mechanism, a secondary circuit adapted to be closed by the armatures of both relays acting simultaneously, an indicating means operated by the secondary circuit, engaging fingers adapted to engage the armatures of the relays when said armatures are in their closing positions and means operated by the embroidering machine and alternating at each stitching operation of the embroidering machine and adapted to connect the relays alternately in the primary circuit and to alternately operate said armature engaging fingers, whereby if an armature is attracted by its coil while its coil is in the primary circuit the armature will be retained in its closed position until the other relay is connected in the primary circuit and whereby said engaging fingers will be released from engagement with their armatures when their respective coils are reconnected in the primary circuit.

Signed at the city, county and State of New York, this 4th day of October, 1910.

JOSEPH A. GROEBLI.

Witnesses:
WM. H. MOSITRER,
JAMES A. CRAIG.