Dec. 16, 1947. E. VOSSEN 2,432,953

STOP MOTION SYSTEM FOR KNITTTNG MACHINES

Filed Oct. 17, 1946 4 Sheets-Sheet 1

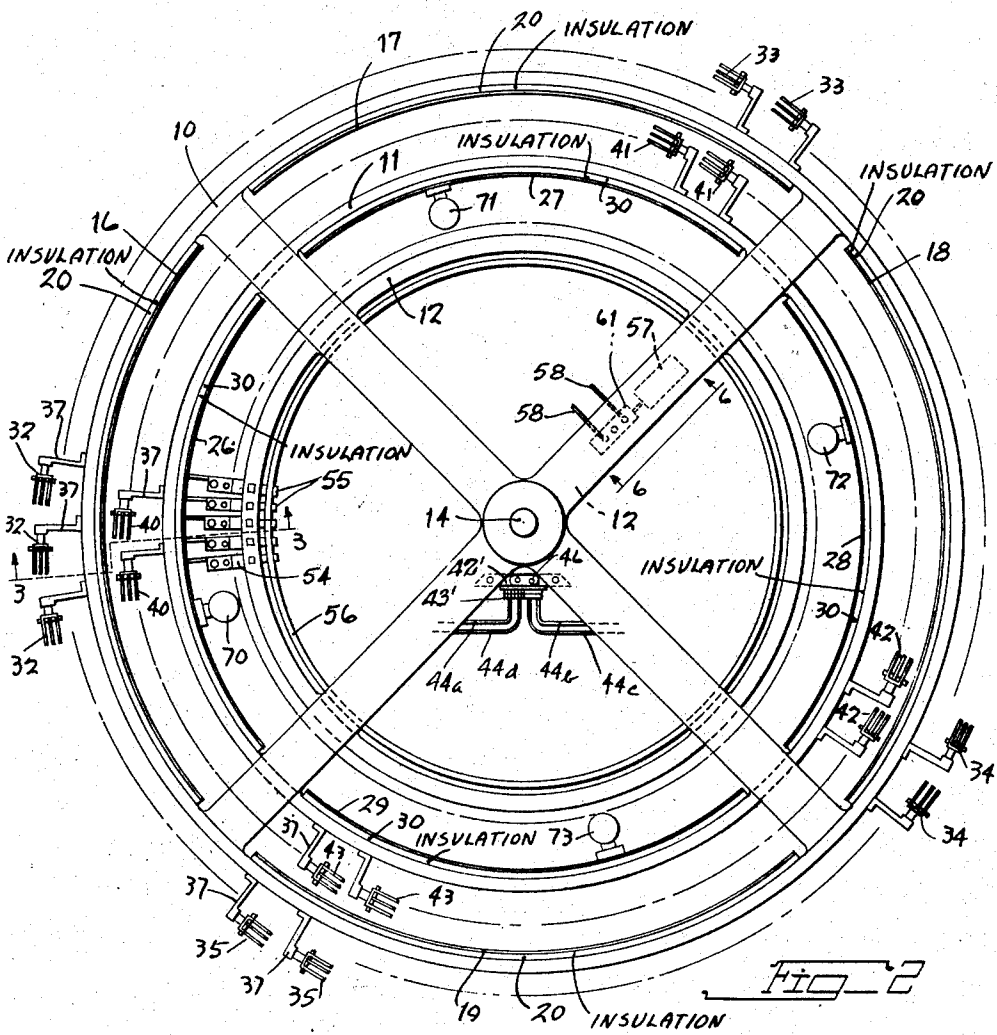


FIG 2

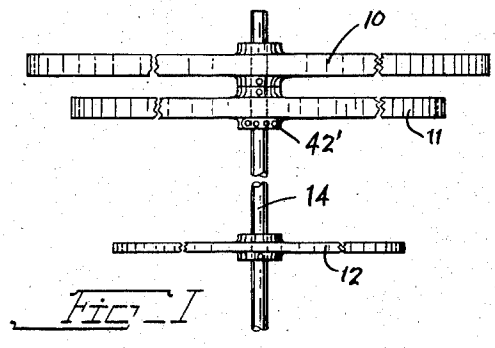


FIG 1

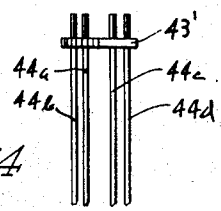


FIG 4

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STOP MOTION SYSTEM FOR KNITTTNG MACHINES

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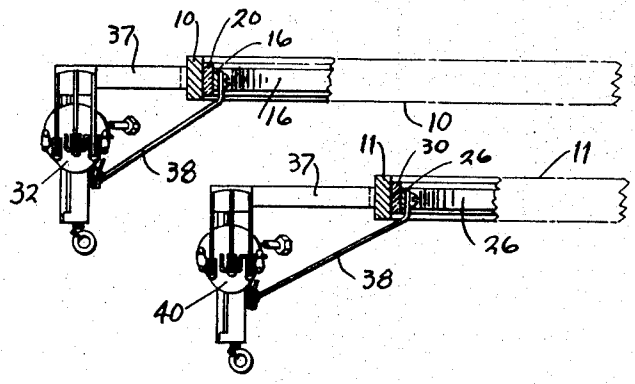
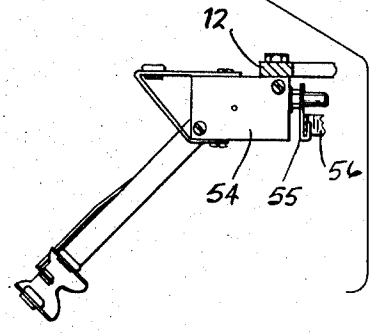


Fig 3



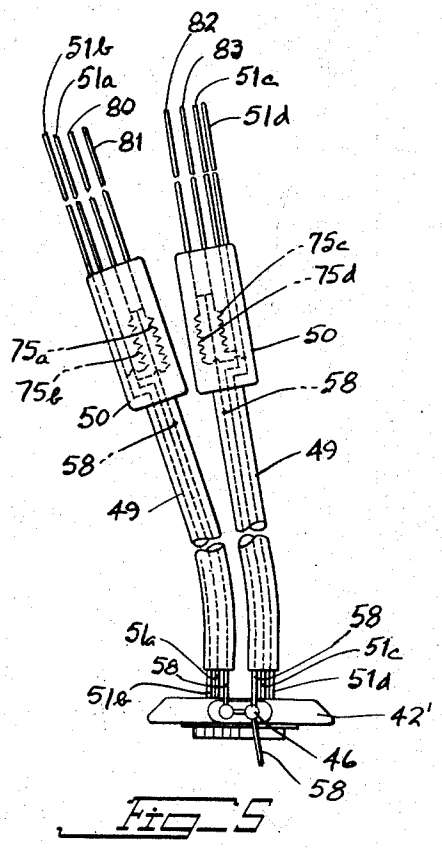


Fig 5

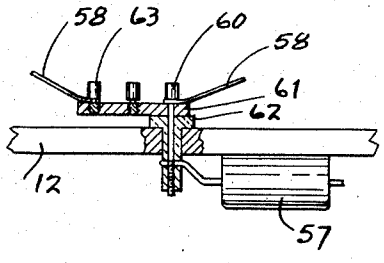


Fig 6

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STOP MOTION SYSTEM FOR KNITTTNG MACHINES

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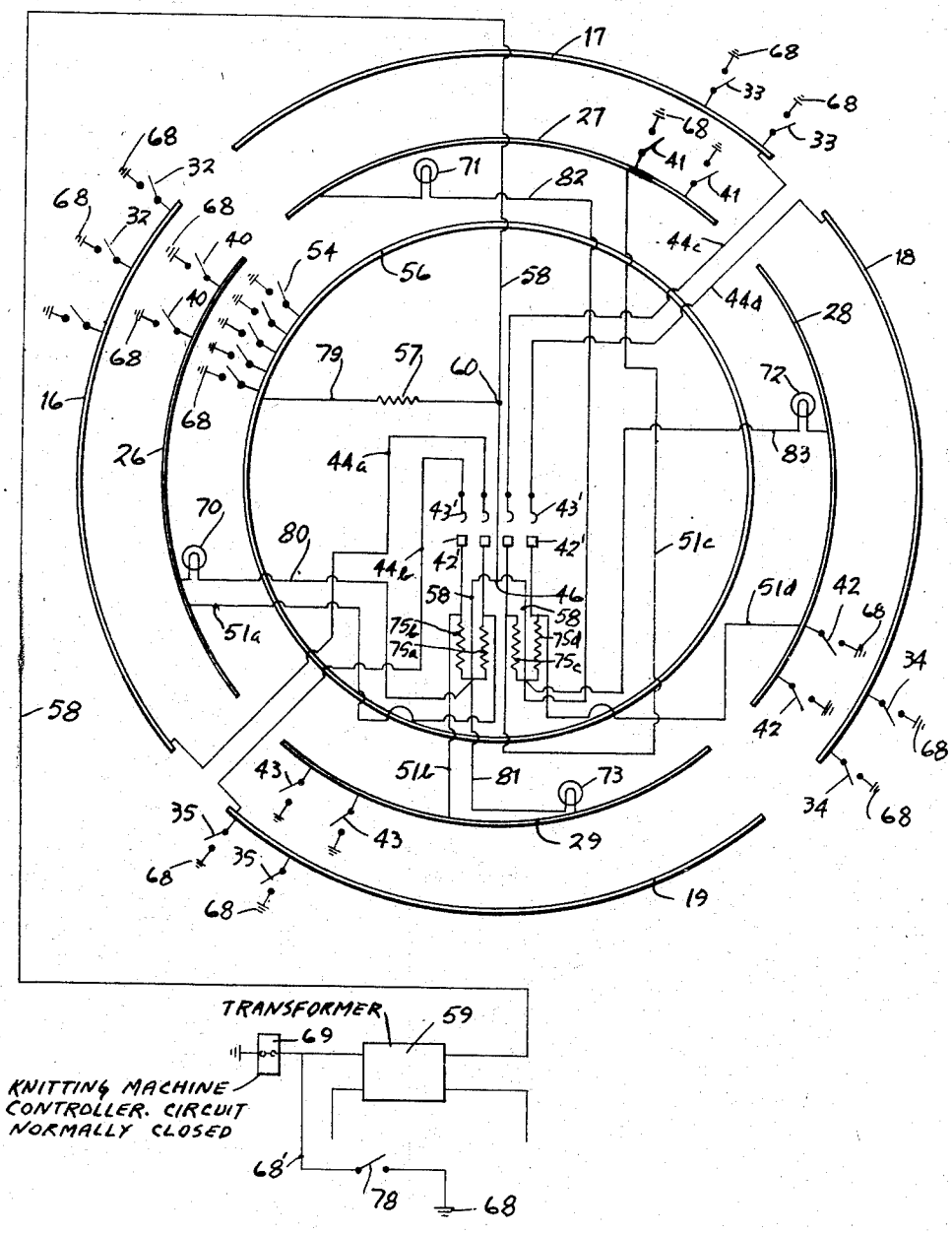


Fig. 7

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STOP MOTION SYSTEM FOR KNITTTNG MACHINES

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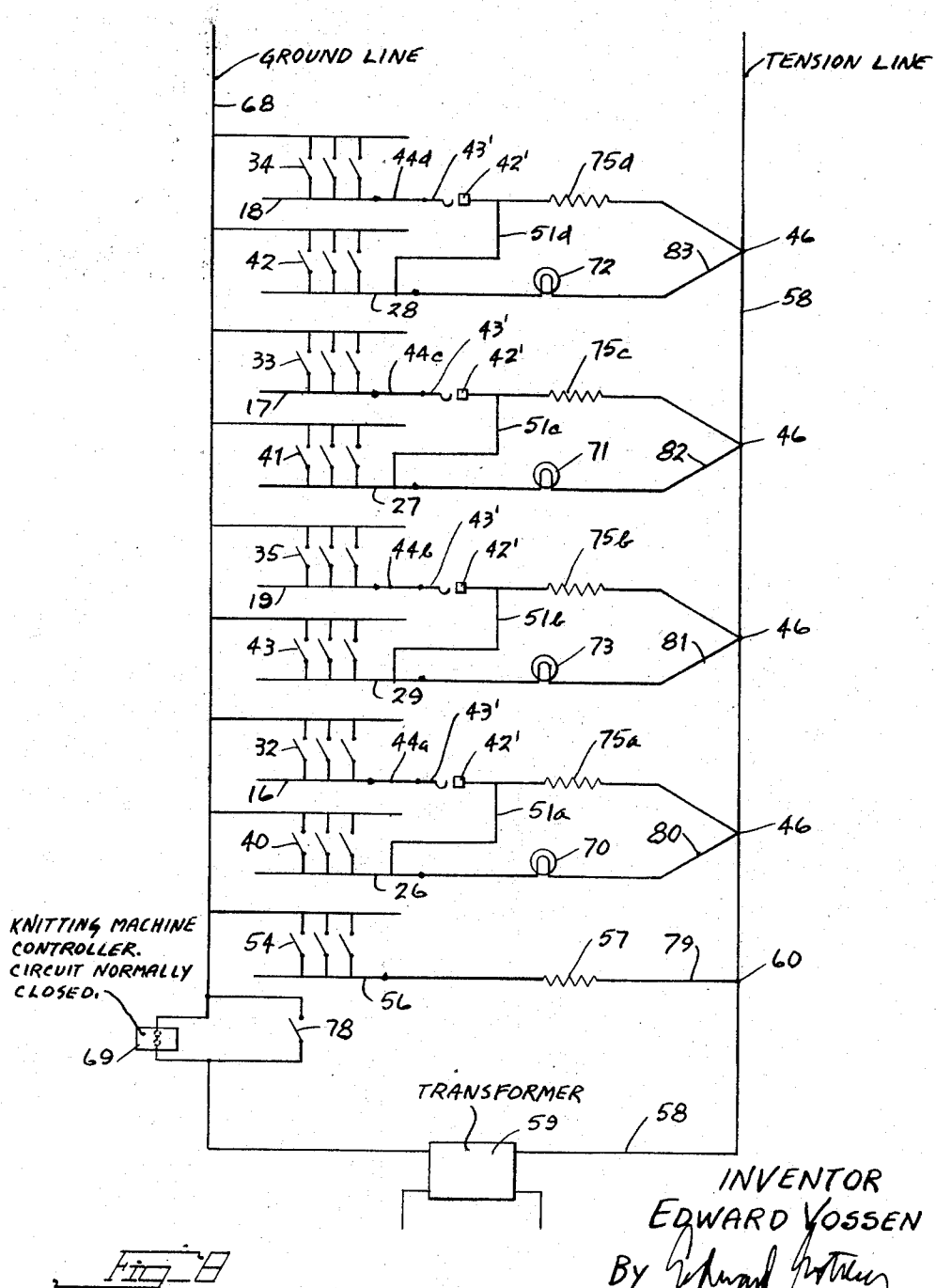


Fig. 4

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Patented Dec. 16, 1947

2,432,953

UNITED STATES PATENT OFFICE

2,432,953

STOP MOTION SYSTEM FOR KNITTING MACHINES

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Application October 17, 1946, Serial No. 703,856

10 Claims. (Cl. 66—163)

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This invention relates to new and useful improvements in stop motion systems for knitting machines.

At the present time knitting machines are equipped with a large number of automatic stop motion switches which are adapted to be closed by defects in the yarn or thread of the knitting machine. Each thread is protected by one or more of these automatic stop motion switches located at different places along the threads. These automatic stop motion switches come in various types and designs, depending primarily on their location at different strategic points upon the knitting machine. Some are located on the yarn head of the knitting machine, while others are located in the vicinity of the needles. Those stop motion switches which are located on the yarn head are high up and often quite close to the ceiling, and hard to see and reach.

When the controller of the knitting machine stops the machine the operator in charge of a group of machines usually wastes considerable time in locating which one of the automatic stop motion switches closed and caused the operation of the controller which then stops the machine. Those stop motion switches located near the vicinity of the needles of the machine are readily accessible to be closely inspected and the off switch may be easily reset. To reset one of the switches on the head of the knitting machine requires a special stick-like tool or it is necessary for the operator to climb up a ladder. This invention particularly proposes a signal system to assist the operator in locating the stop motion switch on the head of the knitting machine which caused the controller to operate and stop the machine.

The advantages of a signal system as proposed by this invention may best be realized by noting that knitting machines as constructed at the present time have 32, 36, 48, 64, 72, 84 or 96 feeds. This means that there are this many or more threads of yarn being fed into the machine and that there are as many cones of yarn as the number of feeds. It is also well to note that any machine, or any number of machines, may double up on their yarn, and each will then be in effect the same as a multiple of the feeds of the machine. For example, a 32 feed machine running two yarns per feed would have 64 yarns each of which requires one or more stop motion switches for each thread. An operator in a mill usually attends to more than one machine. For example an operator attending three 64 feed machines would be required to attend to 192 threads of

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yarn. It is quite obvious that the human eye cannot possibly watch that many threads. In addition, different yarns of different colors are used which makes it even more difficult to spot a broken or loose thread from a distance.

During the operation of the knitting machine, by process of events, a thread breaks or an end pulls down, caused by a knot or slub or other reason. The stop motion systems brings the machine to a halt. The operator does not know where the loose or broken thread of yarn is to be located around the machine. Therefore he is obliged to look and examine all around the machine until he locates the faulty thread. This occurs dozens of times a day, depending upon the condition and quality of the yarn. The physical effort expended and the time lost is therefore of great consequence. Production is impeded. With this invention when the knitting machine stops, the operator simply operates the signal system and a signal thereof goes on in one group of the stop motion switches indicating to the operator that the loose or broken thread is in that group. Thus the operator is enabled to find the loose or broken yarn rapidly.

In reality the invention actually reduces a 64-end stop motion system to a 16-end stop motion system, when the stop motion switches are divided into 4 groups in so far as the effort of the operator is concerned in locating the broken or defective yarn. In accordance with this invention it is proposed that any number of signals may be used. That is, the stop motion switches may be grouped into 4 sections, 6, 8, 10, etc., and each section or group will have its own signal, thereby reducing the problem of finding the broken or defective yarn further. Preferably the signals are visible, such as signal lamps.

A further advantage of the new signal system resides in the fact that should any one or more of the stop motion switches develop a short circuit, which would also cause the knitting machine to stop, the operator can rapidly locate the defective stop motion switch by limiting it within a certain group of the stop motion switches, in accordance with this invention.

More specifically, the invention contemplates dividing the stop motion switches on the head of the knitting machine into any number of groups and providing a signal for each group. It is proposed to so arrange each signal that if any stop motion switch of the group closes the signal will be operable to indicate this condition. A push button or other type of switch is provided, to act as a testing switch, which may be closed

to cause the specific signal to function. Preferably, the signals are in the nature of small lamps. When the lamp of any group of stop motion switches becomes lit, when the testing switch is closed, the operator knows that the closed switch which operated the controller is located within that group. Since the field of search is thus reduced the operator can locate the closed switch in a moment.

Another object of this invention is to provide a new stop motion signal system which has a simple electric circuit which is exceptionally reliable and efficient in operation. It is proposed to provide the circuit with a number of resistors arranged in a certain way to supply the correct amount of current to the signals as needed, and to supply the correct amount of current to the controller of the knitting machine so as not to interfere with the action and operation of the stop motion device.

The invention also proposes an improved circuit for the bottom group of stop motion switches generally used on knitting machines, that is those stop motion switches before the yarn carriers which are placed above the feeds near the needles. It is proposed to place resistors in the circuit so that the contacts of these stop motion switches will not burn, or arc when the testing switch is closed. A further feature of the invention is that only one wire is required to connect the top group or groups of stop motion switches to the lower (yarn carrier) group of stop motion switches and only one wire is used to the transformer. With this one wire system there can be no wrong hook ups. The invention saves time, trouble and temper during installation and operation and is therefore a great aid to production.

Another object of the invention is the construction of a device as described which is simple and durable and which may be manufactured and sold at a reasonable cost.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure—

Fig. 1 is an elevational view of the supports for the stop motion switches of a knitting machine to which the instant invention is to be applied.

Fig. 2 is a plan view of the supports shown in Fig. 1 but illustrated with the stop motion switches and certain other portions of the new system in position.

Fig. 3 is a fragmentary enlarged vertical sectional view taken on the line 3—3 of Fig. 2.

Fig. 4 is a fragmentary elevational view of a multiple plug and a group of wires used in the electric circuit of the new stop motion system.

Fig. 5 is an elevational view of a multiple socket and a group of wires, and cables, of the new stop motion system.

Fig. 6 is a fragmentary enlarged elevational view of a portion of Fig. 2 looking in the direction of the line 6—6 thereof.

Fig. 7 is a schematic wiring diagram of the new stop motion system.

Fig. 8 is a simplified schematic wiring diagram corresponding with Fig. 7 but more clearly indicating the circuits.

The new stop motion system for knitting machines, in accordance with this invention, includes a plurality of superimposed supports 10, 11 and 12 for supporting stop motion switches of a knitting machine. The supports 10 and 11 and 12, as illustrated, are in the nature of wheels which are mounted upon vertical support rod 14. The support 12 is intended to be used for the stop motion switches which are in the vicinity of the yarn carriers, or needles of the knitting machine. The supports 10 and 11 are intended for the stop motion switches which are on the head of the knitting machine. The invention relates particularly to the mechanism which is associated with the stop motion switches on the supports 10 and 11. It should be borne in mind that these supports are usually close to the ceiling of a factory and difficult to see and reach. The support 12 is usually below eye level and readily viewable.

A plurality of conductor strips 16, 17, 18 and 19 are indirectly mounted upon the support 10 by being mounted on insulation strips 20 which are directly mounted on the support 10. As illustrated, the support 10 is provided with four of these conductor strips though it should be borne in mind that any other suitable number may be used. The support 11 is provided with complementary conductor strips 26, 27, 28 and 29 which are insulated from each other because they are mounted on insulation strips 30 directly mounted on the support 11. It should be noted that the conductor strips 26, 27, 28 and 29 are arranged to be radially aligned with the conductor strips 16, 17, 18, and 19 respectively. It should be further noted that because the support 10 is above the support 11 we may refer to the conductor strips 16, 17, 18 and 19 as being arranged in superimposed positions of the conductor strips 26, 27, 28, and 29.

Each of the conductor strips referred to above is provided with a group of automatic normally open stop motion switches which are adapted to be closed by defects in or on the yarn or thread of the knitting machine. More specifically, the conductor strip 16 is connected with a group of stop motion switches 32, the conductor strip 17 with a group of stop motion switches 33, the conductor strip 18 with a group of stop motion switches 34, and the conductor strip 19 with a group of stop motion switches 35. These stop motion switches are mounted upon the support 10. Each of these stop motion switches is mounted on a radial arm 37 which in turn is mounted on the support 10. Each of these stop motion switches is grounded to the support 10. A lead 38 connects the terminal of each of these stop motion switches with its conductor strip, see Fig. 3. It should be noted that the stop motion switches of each group are connected in parallel between its conductor strip and the ground, see Figs. 7 and 8.

A group of stop motion switches 40 is connected with the conductor strip 26. A group of stop motion switches 41 is connected with the conductor strip 27; a group of stop motion switches 42 is connected with the conductor strip 28, and a group of stop motion switches 43 is connected with the conductor strip 29. These stop motion switches are also supported on radial arms 37 which are mounted on the support 11. Each of these stop motion switches is grounded to the support 11 and are in parallel with each other. Each is connected with its conductor strip by a lead 38, see Fig. 3.

A multiple plug electric socket 42' is mounted upon the bottom support 11 and is adapted to receive a multiple plug 43' having leads 44*a*, 44*b*,

44c and 44d, one for each of the conductor strips 16, 17, 18 and 19. These leads are electrically connected with said conductor strips as illustrated in Figs. 7 and 8. It should be noted that when the plug 43' is removed from the socket 42' it is possible to remove the support 10 with all its stop motion switches as a unit. Half of the plug 43' and socket 42' are coloured "red" to indicate correct engagement thereof. The stop motion switches upon the top support 10 may be connected into the signal system by merely engaging the plug 43' correctly into the socket 42'. The socket 42' is provided with a terminal 46 for receiving electric lines 58 which also connect with a transformer 59. A pair of electric lines 58 are connected with and extend from the terminal 46. The sockets of the multiple socket 42 are connected with leads 51a, 51b, 51c and 51d. These leads and said electric lines 58 are divided and joined into a pair of cables 49, see Fig. 5, upon which packs 50 are mounted which contain resistors 75a, 75b, 75c and 75d more fully shown in the schematic wiring diagrams Figs. 7 and 8. From the packs 50 where extends control circuit wires 80, 81, 82 and 83 which connect with the electric lines 58 and which are connected with signals or signal lamps 70, 71, 72 and 73 mounted on certain of the conductor strips, namely 26, 27, 28 and 29 as will be clear from the schematic wiring diagrams Figs. 7 and 8. The unit illustrated in Fig. 5 is manufactured and pre-assembled for the stop motion signal system to facilitate mass production thereof.

The bottom support 12 is provided with a plurality of stop motion switches 54 which are adapted to guard the yarn to the carriers of the knitting machine. The stop motion switches 54 are low down on the machine, at or below eye level, and may readily be inspected. For this reason they are not connected with the electrical signalling system which includes said lamps 70, 71, 72 and 73, though it would be an easy matter to provide them with a signal, if desired. Each of the stop motion switches 54 is grounded to the support 12. Each has a terminal 55 which is engaged by a conductor strip 56 so as to connect the stop motion switches 54 in parallel. A resistor 57 is connected in series with the conductor 56 and thus in series with the parallel connected stop motion switches 54. The resistor 57 is mounted upon the support 12, see Figs. 2 and 6. It is connected in a circuit 79 with the electric lines 58 which connect with the current supplying transformer 59 of the stop motion system of the knitting machine. The electric lines 58 connect with a terminal 60 mounted on a strip 61 insulated from the support 12 by insulation material 62. The strip 61 has another terminal 63 to which is connected the electric lines 58 which extends upwards and is intended to be connected with the high tension terminal 46 of the socket 42'.

The wiring of the stop motion system may best be understood by first examining schematic Fig. 7. The electric lines 58 are connected with the transformer 59 which is grounded by the line 68' to the body of the knitting machine. The controller 69 of the knitting machine is connected in series in the ground line 68. The controller 69 is of the general type shown in patents to Edward Vossen No. 2,357,713 and No. 2,385,174. The circuit through the controller 69 is normally closed. When the controller operates to stop the knitting machine, the circuit through the controller is opened. The stop motion switches referred to in this specification are of the type shown in patent to Edward Vossen No. 2,329,427.

The electric lines 58 at the terminal 60 connects with said resistor 57 which is connected in series with the conductor strip 56. The terminal 60 connects with the electric lines 58 which extends upwards and connects with the terminal 46. From the terminal 46 the electric lines 58 extends and connects in parallel, the signal lamps 70, 71, 72 and 73 mounted in series with the conductor strips 26, 27, 28 and 29, respectively. Resistors 75a, 75b, 75c and 75d are connected in parallel on the electric lines 58 and in series with leads 51a, 51b, 51c and 51d connected in series with the conductor strips 26, 29, 27, and 28. The resistors 75a, 75b, 75c and 75d are also connected in series with plug 43' and socket 42' and with the lines 44a, 44b, 44c and 44d which connect with the conductor strips 16, 19, 17 and 18. The conductor strips 16, 19, 17 and 18 are in parallel with conductor strips 26, 29, 27 and 28 respectively.

Up to this point we have reviewed the physical connections of the various parts of the stop motion system. Fig. 8 schematically illustrates the circuits of the stop motion system in simplified form. The ground line is schematically indicated by the ground lead 68. A testing switch 78 shunts the controller 69. The bottom group of stop motion switches 54 are connected in the circuit 79. The switches 54 are in parallel with each other and in series with the resistor 57. The circuit 79 merely extends between the electric lines 58 and the ground 68. Control circuits 80, 81, 82 and 83 are provided for the superimposed groups of the stop motion switches which are mounted on the top and bottom supports 10 and 11, namely switches 32 and 40, 35 and 43, 33 and 41, and 34 and 42. The stop motion switches 32 are in parallel with each other. The stop motion switches 40 are in parallel with each other. These groups of switches are connected in parallel with each other. The circuit 80 includes the signal lamp 70. The resistor 75a shunts the signal lamp 70. The groups of stop motion switches 32 and 40 are connected in series with each other by line 51a and the plug and socket switch 43', 42', but in parallel in the circuit 80.

The circuit 81 includes the lamp 73 in series and includes the stop motion switches 35 and 43 in parallel. The resistor 75b shunts the signal lamp 73. The stop motion switches 35 and 43 are connected in series by the plug 43' and socket 42'. The circuits 82 and 83 are provided with the signal lamps 71 and 72, respectively, and are connected with the groups of stop motion switches 33 and 41, and 34 and 42, respectively, as clearly shown in Fig. 8, and understandable from the detailed disclosure of the circuits 80 and 81 which they resemble.

The operation of the new stop motion system may be understood from the following:

Should any one, or more, of the stop motion switches in the groups of stop motion switches 32 to 35 and 40 to 43 close, an electric circuit will be established through the controller 69 which then acts to stop the knitting machine. Normally the circuit is closed through the controller 69. However, when it operates to stop the knitting machine the circuit opens up in the controller. The operator may now close the testing switch 78 for testing to limit the field of search for the closed stop motion switch. When the testing switch 78 is closed, the open circuit controller 69 is shunted. An electric circuit is now established from the transformer 59 through the switch 78 to the

ground 68 and then through one of the circuits 79, 80, 81, 82 or 83 depending upon which one or more of the stop motion switches is or are closed. Should the closed stop motion switch be located in one of the circuits 80, 81, 82 or 83 the signal lamp (70, 71, 82 or 73) of this circuit will light and the operator thus locates the group of stop motion switches involved. If none of the signal lights 70, 71, 72 and 73 become illuminated, the operator then checks the stop motion switches of the group of stop motion switches 54. Since these switches are at eye level and readily accessible it is a simple matter to check them.

When one of the signal lamps (70, 71, 72 or 73) light the operator merely must check the stop motion switches in the particular group which the lit lamp represents. If none of these switches are in an off position and the lamp lights then the operator must assume that one of the switches has developed internal trouble and is short circuited. He then must hunt for this. However, a situation of this kind is very rare as the stop motion switches are very reliable.

The function of the resistors 75*a*, 75*b*, 75*c* and 75*d* is to shunt the signal lamps 70, 73, 71 and 72, respectively. In this way a correct amount of current may flow through any of the circuits 80, 81, 82 and 83 to the controller 69. Usually the signal lamps 70, 71, 72 and 73 are of too great a resistance to permit sufficient current to flow to the controller. Moreover, should any one of the signal lamps 70, 71, 72 and 73 become broken and have an open circuit the current may still flow through the resistors 75*a*, 75*b*, 75*c* and 75*d* and operate the controller 69 to stop the knitting machine in the usual way.

While I have illustrated and described the preferred embodiment of my invention, it is to be understood that I do not limit myself to the precise construction herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by United States Letters Patent is:

1. A stop motion system for knitting machines, comprising a plurality of groups of automatic normally open stop motion switches adapted to be closed by defects in the yarn or thread of the knitting machine, a main electric circuit, a control circuit for each of said groups of switches connecting the switches of each group in parallel and said control circuits being connected in parallel with each other in said main circuit, a controller for said knitting machine normally closed and connected in series in said main circuit and adapted to open when stopping said knitting machine, a signal in series with each of said control circuits, and a testing switch normally open and shunting said controller.

2. A stop motion system for knitting machines, comprising a plurality of groups of automatic normally open stop motion switches adapted to be closed by defects in the yarn or thread of the knitting machine, a main electric circuit, a control circuit for each of said groups of switches connecting the switches of each group in parallel and said control circuits being connected in parallel with each other in said main circuit, a controller for said knitting machine normally closed and connected in series in said main circuit and adapted to open when stopping said knitting machine, a signal in series with each of said control circuits, a testing switch normally open and shunting said controller, and a resistor shunting each of said signals and connected in series with the stop motion switches of the control circuit of the signal.

3. A stop motion system for knitting machines, comprising a ground connection, a support for supporting stop motion switches on a knitting machine, a plurality of conductor strips insulated from each other and mounted on said support, a group of automatic normally open stop motion switches adapted to be closed by defects in the yarn or thread of the knitting machine connected in parallel between said conductor strips and said ground connection, a main electric circuit including electric lines and said ground, a control circuit for each of said group of switches and including in series the conductor strip of the particular group of switches and connected in parallel between said electric lines and said ground connection, a controller for said knitting machine normally closed and connected in series in said main circuit and adapted to open when stopping said knitting machine, a signal in series with each of said control circuits, and a testing switch normally open and shunting said controller.

4. A stop motion system for knitting machines, comprising a ground connection, a support for supporting stop motion switches on a knitting machine, a plurality of conductor strips insulated from each other and mounted on said support, a group of automatic normally open stop motion switches adapted to be closed by defects in the yarn or thread of the knitting machine connected in parallel between said conductor strips and said ground connection, a main electric circuit including electric lines and said ground, a control circuit for each of said group of switches and including in series the conductor strip of the particular group of switches and connected in parallel between said electric lines and said ground connection, a controller for said knitting machine normally closed and connected in series in said main circuit and adapted to open when stopping said knitting machine, a signal in series with each of said control circuits, a testing switch normally open and shunting said controller, and a resistor shunting each of said signals and connected in series with the stop motion switches of the control circuit of the signal.

5. A stop motion system for knitting machines, comprising a plurality of supports for supporting stop motion switches on a knitting machine, a plurality of conductor strips insulated from each other and mounted on said supports, a main electric circuit including electric lines and a ground, a group of automatic normally open stop motion switches adapted to be closed by defects in the yarn or thread of the knitting machine for each conductor strip connected in parallel between said conductor strips and said ground, a control circuit for each of said groups of switches and including in series the conductor strips of one or more particular groups of switches, said control circuits being connected in parallel between said electric lines and said ground, a controller for said knitting machine normally closed and connected in series in said main circuit and adapted to open when stopping said knitting machine, a signal in series with each of said control circuits, and a testing switch normally open and shunting said controller.

6. A stop motion system for knitting machines, comprising a plurality of supports for supporting stop motion switches on a knitting machine, a plurality of conductor strips insulated from each

other and mounted on said supports, a main electric circuit including electric lines and a ground, a group of automatic normally open stop motion switches adapted to be closed by defects in the yarn or thread of the knitting machine for each conductor strip connected in parallel between said conductor strips and said ground, a control circuit for each of said groups of switches and including in series the conductor strips of one or more particular groups of switches, said control circuits being connected in parallel between said electric lines and said ground, a controller for said knitting machine normally closed and connected in series in said main circuit and adapted to open when stopping said knitting machine, a signal in series with each of said control circuits, a testing switch normally open and shunting said controller, and a resistor shunting each of said signals and connected in series with the stop motion switches of the control circuit of the signal.

7. A stop motion system for knitting machines, comprising a plurality of superimposed supports for supporting stop motion switches on a knitting machine, a plurality of conductor strips insulated from each other and mounted on each of said supports and the conductor strips of said supports being arranged in superimposed positions, a main electric circuit including electric lines and a ground, a group of automatic normally open stop motion switches adapted to be closed by defects in the yarn or thread of the knitting machine for each conductor strip connected in parallel between said conductor strips and said ground, a control circuit for groups of said groups of switches and including the conductor strips thereof in parallel series, said control circuits being connected in parallel between said electric lines and said ground, a controller for said knitting machine normally closed and connected in series in said main circuit and adapted to open when stopping said knitting machine, a signal in series with each of said control circuits, and a testing switch normally open and shunting said controller.

8. A stop motion system for knitting machines, comprising a plurality of superimposed supports for supporting stop motion switches on a knitting machine, a plurality of conductor strips insulated from each other and mounted on each of said supports and the conductor strips of said supports being arranged in superimposed positions, a main electric circuit including electric lines and a ground, a group of automatic normally open stop motion switches adapted to be closed by defects in the yarn or thread of the knitting machine for each conductor strip connected in parallel between said conductor strips and said ground, a control circuit for groups of said groups of switches and including the conductor strips thereof in parallel series, said control circuits being connected in parallel between said electric lines and said ground, a controller for said knitting machine normally closed and connected in series in said main circuit and adapted to open when stopping said knitting machine, a signal in series with each of said control circuits, and a testing switch normally open and shunting said controller, and a resistor shunting each of said signals and connected in series with the stop motion switches of the control circuit of the signal.

9. A stop motion system for knitting machines, comprising a plurality of groups of automatic normally open stop motion switches adapted to be closed by defects in the yarn or thread of the knitting machine, a main electric circuit, a control circuit for each of said groups of switches connecting the switches of each group in parallel and said control circuits being connected in parallel with each other in said main circuit, a controller for said knitting machine normally closed and connected in series in said main circuit and adapted to open when stopping said knitting machine, a signal in series with each of said control circuits, a testing switch normally open and shunting said controller, another group of automatic normally open stop motion switches adapted to be closed by defects in the yarn or thread of the knitting machine, and a control circuit for said latter group connecting the individual switches of the latter group in parallel and being connected in parallel with said other control circuits, and a resistor in said last-named control circuit.

10. A stop motion system for knitting machines, comprising a plurality of groups of automatic normally open stop motion switches adapted to be closed by defects in the yarn or thread of the knitting machine, a main electric circuit, a control circuit for each of the said groups of switches connecting the switches of each group in parallel and said control circuits being connected in parallel with each other in said main circuit, a controller for said knitting machine normally closed and connected in series in said main circuit and adapted to open when stopping said knitting machine, a signal in series with each of said control circuits, a testing switch normally open and shunting said controller, another group of automatic normally open stop motion switches adapted to be closed by defects in the yarn or thread of the knitting machine, and a control circuit for said latter group connecting the individual switches of the latter group in parallel and being connected in parallel with said other control circuits, and a resistor in said last-named control circuit, said last named control circuit having a ground and electric lines by which it is connected in parallel with said other control circuits.

EDWARD VOSSEN.

REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Country	Date
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