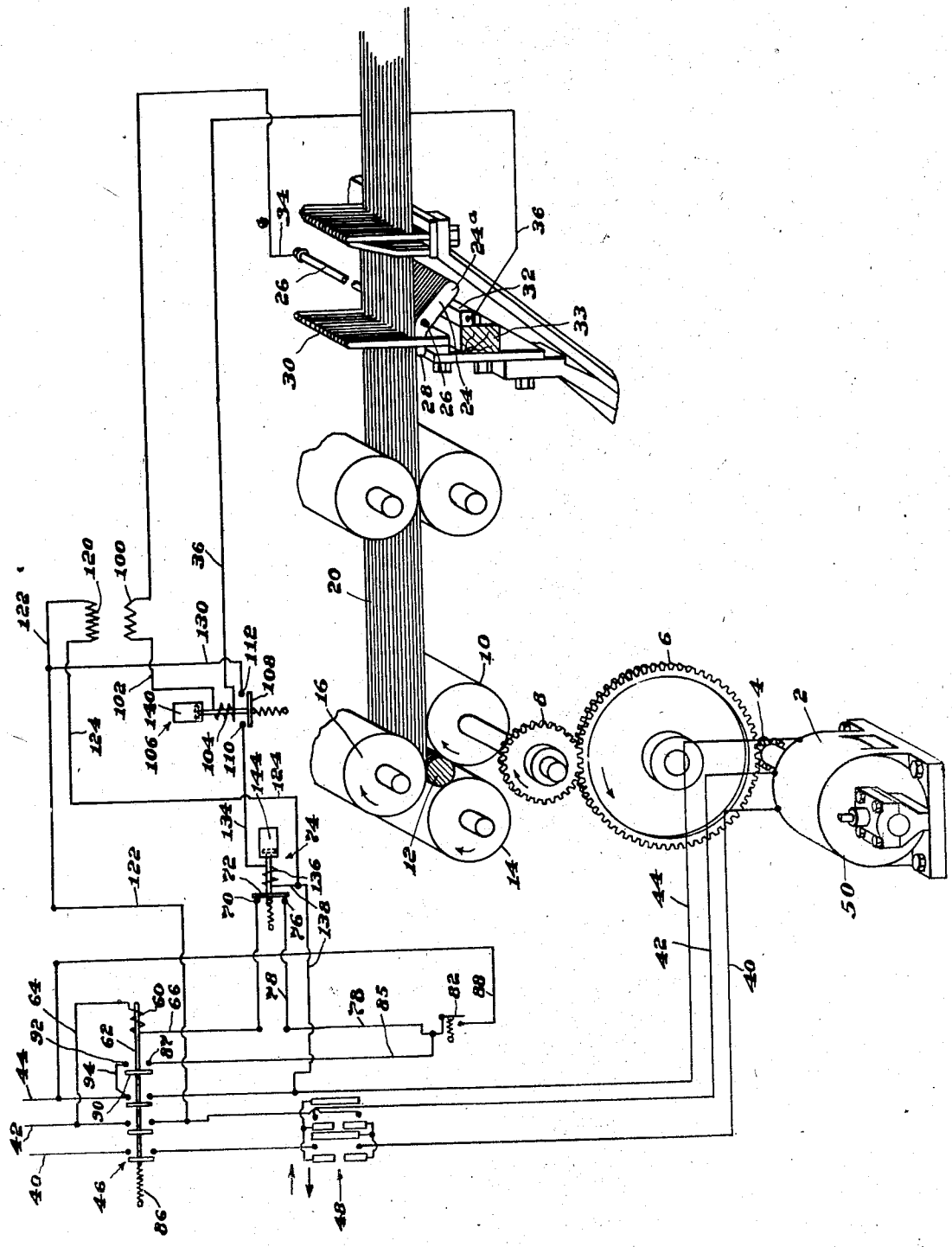
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STOP MOTION

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STOP MOTION

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This invention relates to automatic stop motions and its object is to provide a stop motion that has certain delayed actuations, effected in a novel manner, so that slack in the yarn upon starting, or during, the run will not be effective to stop the machine automatically unless the slack persists or a breakage occurs and so that once the machine has been stopped automatically it cannot thereafter be started immediately, but the starting will be delayed for a sufficient time to induce the operative to tie in the broken end rather than merely to thread it into the winding or weaving mechanism.

This application is a continuation in part of my prior application Ser. No. 45,838 filed October 21, 1935, for "Axminster setting frames."

A stop motion embodying my invention is adapted for use not only on a setting or winding frame, as shown in my prior application, but on any type of machine, such as warp beamers, looms, etc. which advance strands of yarn and which it is desired to stop automatically whenever one of the strands breaks.

The drawing is a diagram of apparatus embodying my invention and for purposes of illustration I have shown an Axminster spool winding frame of the type illustrated in my prior application. Such a machine has three winding rolls 10, 14 and 16 disposed in peripheral engagement with the spool 12 to be wound with yarn 20, one or more of which rolls is power driven from a motor 2 by means of gearing diagrammatically illustrated at 4, 6 and 8.

Apparatus embodying my invention includes a set of drop wires preferably adapted to close an electric circuit when any one of the threads breaks. Any conventional type of drop wire can be used, but for purposes of illustration I have shown a set of pivoted fingers 24, rotatably mounted on a shaft 26 and having yarn engaging portions 28 that project through the interdental spaces of a reed 30 and are depressed as shown when the yarn is taut. When a yarn strand breaks, the weighted end 24a of its respective finger falls into electrical engagement with conducting bar 32 mounted on an isulating block 33 and connected to a wire 36. The shaft 26 on which the fingers are pivotally mounted is connected to a wire 34 and each of the fingers is in electrical contact with the shaft 26 so that when a yarn strand breaks and the finger falls circuit is completed from wire 34 to wire 36.

The numerals 40, 42 and 44 indicate power mains leading from a suitable source of power such as a three phase sixty cycle current. The leads are connected to a self-maintaining magnetic switch 46 and thence through a reversing switch 48 to the motor 2. For the purpose of closing and holding closed the switch 46, I provide a holding coil 60 which, upon being energized, attracts the switch rod 62 to close the switch 46 across the three phase leads. The coil 60 is in circuit with the lead 42 through the line 64 and is connected by the line 66 to the terminal 70 engaged by the armature 72 of relay 74 which is normally maintained in closed position across terminals 70 and 76 to complete the circuit from the lead 66 to the lead 78 connected to momentary contact switch 82. Lead 85 connects wire 78 to the terminal 87 disposed adjacent a switch bar 90 mounted on bar 62 which closes circuit between the terminal 87 and a terminal 92 connected by wire 94 to lead 44. The other terminal of switch 82 is connected by wire 88 to power main 44 above switch 46.

With the device wired as above described, a momentary closing of the starting switch 82, which in practice may be a foot operated press button, closes the circuit from power main 44, through lines 88, 78 and 66 to holding coil 60 and, by means of the wire 64, back to the power main 42, thereby energizing the coil which attracts switch rod 62 to close the magnetic switch, whereby to start the motor 2. The starting switch 82 may be instantly released because the holding circuit through bar 90 and lines 85, 78 and 66 will be established.

The line 34 which, as above described, is connected in series with line 36 whenever a thread breaks or slacks unduly and a drop wire makes contact with bar 32, is connected to the secondary 100 of a step down transformer connected by wire 102 with the solenoid 104 of a relay 106, the armature 108 of which is normally spring pressed to open position away from the terminals 110 and 112. The circuit through the coil 104 is completed by the aforesaid wire 36 leading to the conductor bar 32.

The primary 120 of the transformer is connected by line 122 to the power main 42 between the magnetic switch 46 and motor 2. The other terminal of the primary is connected by line 124 to line 138 and thence to power main 44 and it is thus apparent that when the magnetic switch 46 is closed an electric circuit is established through the primary 120 of the transformer.

The aforesaid armature 108 of relay 106, upon being elevated, closes circuit across terminals 110 and 112, the latter of which is connected to

power line 42 by means of the wire 130 connected to the wire 122. The other terminal 110 of relay 106 is connected by the wire 134 to the coil 136 of the aforesaid relay 74, the circuit through which is completed by means of the wire 138 which leads to power main 44.

The relays 106 and 74 are both time delayed relays and each is provided for this purpose with a dashpot which may be of well known construction. Because of the dashpot 140 the relay 106, upon being energized, takes a brief period such as two seconds for the armature 108 to close across the terminals 110 and 112. The relay 74, on the contrary, is normally maintained in closed position and when it opens, through energizing of the coil 136, it opens instantly. It is provided, however, with a dashpot 144, whereby when coil 136 is thereafter de-energized the movement of the armature 72 to closed position is delayed and takes a period such as ten seconds until electrical contact is made.

With the device constructed as above described, momentary closing of contact switch 82 closes magnetic switch 46 to start the motor and energize the primary 120 of the transformer. When a finger 24 electrically contacts bar 32, circuit is completed through secondary 100 of the transformer energizing coil 104 of relay 106 and attracting armature 108. After a brief interval of two seconds or so, contact is made across terminals 110 and 112 so that coil 136 of relay 74 is energized, immediately breaking circuit across terminals 70 and 76 to de-energize holding coil 60 and permit the switch 46 to open through the action of spring 86, stopping the motor.

If at the start of, or during, the run, the yarn momentarily becomes sufficiently slack so that one or more of the contact fingers engages bar 32, the motor will not stop immediately but will continue to run for whatever period the dashpot 140 of relay 106 is set, in this instance two seconds. That period is sufficient for any amount of slack less than that for which the machine should be stopped, to be taken up and if taken up within the two second period the circuit to coil 104 is again broken and the armature 108 retracted without having contacted the terminals 110 and 112.

Once the machine has been stopped automatically as a result of excessive slack or a broken warp, the armature 72 of relay 174 will be fully retracted from the terminal 70 and 76 and will not return to engagement with the terminals for an adjustable period, in this instance ten seconds. As a result, the operative cannot, immediately the machine is stopped, step on the starting button 82 and run the machine, threading the broken end by hand, but is required to wait for a period until armature 72 returns to engaging contact with its terminals. Thereby the operative is induced to tie in the broken warp ends. After this brief period has elapsed closing the switch 82 will immediately start the motor 2.

My invention, the preferred embodiment of which has now been described, is not to be limited to any details above described, but may be varied to suit the needs of individual users. Thus, the time periods involved in the delayed relay actuations may, of course, be varied at will. My invention is to be limited only as indicated in the appended claims.

I claim:

1. In a stop motion, the combination of power operated means for advancing yarn, stop motion drop wires engaging the yarn, means for stopping said power operated means automatically when a wire falls as the result of broken or slacked yarn, a movable element advanced automatically when the power operated means is stopped by a fallen wire and means to prevent re-starting of said power operated means until said movable element has advanced for a predetermined time interval.

2. In a stop motion, the combination of power operated means for advancing yarn, stop motion drop wires engaging the yarn, a relay, a circuit for actuating said relay which is closed when a wire falls as the result of broken or slacked yarn, terminals on said relay, an armature on said relay for electrically bridging said terminals, said relay having a delayed action so that said bridging occurs at a predetermined delayed time interval after said circuit is closed and means for stopping said power operated means automatically when said terminals are bridged.

3. In a setting frame, the combination of feed rolls for winding yarn on a receiver, electrically operated means for driving said rolls, an electric circuit connected to said driving means for operating the same, a relay in said circuit, means for closing said relay, a relay circuit for opening said relay, switch means in said relay circuit, means connected to said switch means and engaging the yarn adapted to maintain in open position the switch means when the yarn is taut and to close said switch means when the tension in the yarn is released, means included in said relay circuit adapted to delay the completion of the circuit when the switch means is closed whereby to permit continuation of the power-driven means for a limited predetermined time after the tension in the yarn is released and means for retarding the closing of the said relay upon the opening of said relay circuit whereby to render inoperative the said electrically operated means for a predetermined period of time after the opening of said switch means.

4. In a stop motion, the combination of power operated means for advancing yarn, stop motion drop wires engaging the yarn and adapted to fall as the result of broken or slacked yarn, means for stopping said power operated means when a drop wire has remained in fallen position for a predetermined length of time and means for continuing the operation of said power operated means if the wire is restored from fallen position within said time.

5. In a stop motion, the combination of power operated means for advancing yarn, stop motion drop wires engaging the yarn and adapted to fall as the result of broken or slacked yarn, a movable element actuated to measure time by the falling of a drop wire, means for stopping the power operated means after said time measuring element has advanced for a predetermined time from an initial position, and means restoring said time measuring element to said initial position when a wire is raised from fallen position within said predetermined time.

6. In a stop motion, the combination of power operated means for advancing yarn, stop motion drop wires engaging the yarn and adapted to fall as the result of broken or slacked yarn, a movable time measuring element, means for starting the movement of said element upon the falling of a wire to measure a predetermined time interval by advance of the element from an initial position toward a predetermined advanced position, means for stopping the power operated

means when the said element reaches its advanced position and means for restoring said element to its initial position if said fallen wire is raised before the element reaches its advanced position.

7. In a stop motion, the combination of power operated means for advancing yarn, stop motion drop wires engaging the yarn and adapted to fall as the result of broken or slacked yarn, an electric circuit for operating said power operated means, a second circuit adapted, when completed, to interrupt the circuit operating said power operated means, a switch in said second circuit, a time measuring element adapted to advance in a predetermined time interval from a retracted position to an advanced position and to close said switch upon reaching said advanced position, means for starting the movement of said element to measure said interval upon the falling of a drop wire, and means restoring said time measuring element to initial position upon the raising of a wire from fallen position within said predetermined time interval whereby when a wire thereafter falls said power operated means will not be stopped until said predetermined time interval has thereafter elapsed.

8. In a stop motion, the combination of means for advancing yarn, a power source connected to said means to operate the same, stop motion drop wires engaging the yarn and adapted to fall as the result of broken or slacked yarn, a time measuring element movable from an initial position toward a predetermined advanced position to measure a predetermined time interval, means for starting the time measuring movement of said element upon the falling of a wire, means for interrupting said power source to stop the run of yarn when said element reaches its advanced position, means for restoring said element to its initial position if said fallen wire is raised before the element reaches its advanced position, a second movable time measuring element, means for actuating said second element to commence the measurement of another predetermined time interval upon the interruption of said power source and means for maintaining the power source interrupted until said other time interval has been measured by said second element to prevent restarting of the run of yarn during said other interval.

9. In a stop motion, the combination of stop motion drop wires, electrically operated means for advancing yarn, an electric circuit connected to said means for driving the same, a relay adapted, when opened, to interrupt said circuit, a relay circuit for opening said relay, a switch in said relay circuit, a movable time measuring element adapted to advance in a predetermined time interval from a retracted position to an advanced position and to close said switch to complete said relay circuit upon reaching said advanced position, means for starting the movement of said element to measure said time interval upon the falling of a drop wire, means restoring said time-measuring element to initial position upon the raising of a drop wire from fallen position within said predetermined time interval and means for retarding the closing of the said relay upon the opening of said switch whereby to render inoperative the said electrically operated means for a predetermined period of time after the opening of said switch.

10. In a stop motion, the combination of means for advancing yarn, a power source connected to said means to operate the same, means for interrupting said power source to stop the run of yarn automatically as the result of yarn slack or breakage, a time measuring element automatically actuated to commence the measurement of a predetermined time interval upon the interruption of said power source, said element including means for maintaining the power source interrupted while said time interval is being measured by said element to prevent restarting of the run of yarn during said interval.

11. In a stop motion, the combination of power operated means for advancing yarn, stop motion drop wires engaging the yarn and adapted to fall as the result of broken or slacked yarn, an electric circuit adapted when closed to operate said power operated means, a switch in said circuit, and a relay for opening said switch to stop said power operated means automatically as the result of a fallen drop wire, said relay including means for closing said switch at a predetermined time interval after it has been automatically opened.

12. In a stop motion, the combination of means for advancing yarn, a power source connected to said means to operate the same, means for interrupting said power source to stop the run of yarn automatically as the result of yarn slack or breakage, and means for maintaining the power source interrupted during a predetermined time interval thereafter including a time measuring element automatically actuated to commence the measurement of said predetermined time interval upon the interruption of said power source.

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