Feb. 27, 1968 N. K. HABERKERN 3,370,800

APPARATUS FOR SWITCHING AUXILIARY WORK PERFORMERS INTO OPERATION WITH TEXTILE MACHINERY

Filed Feb. 11, 1966 4 Sheets-Sheet 1

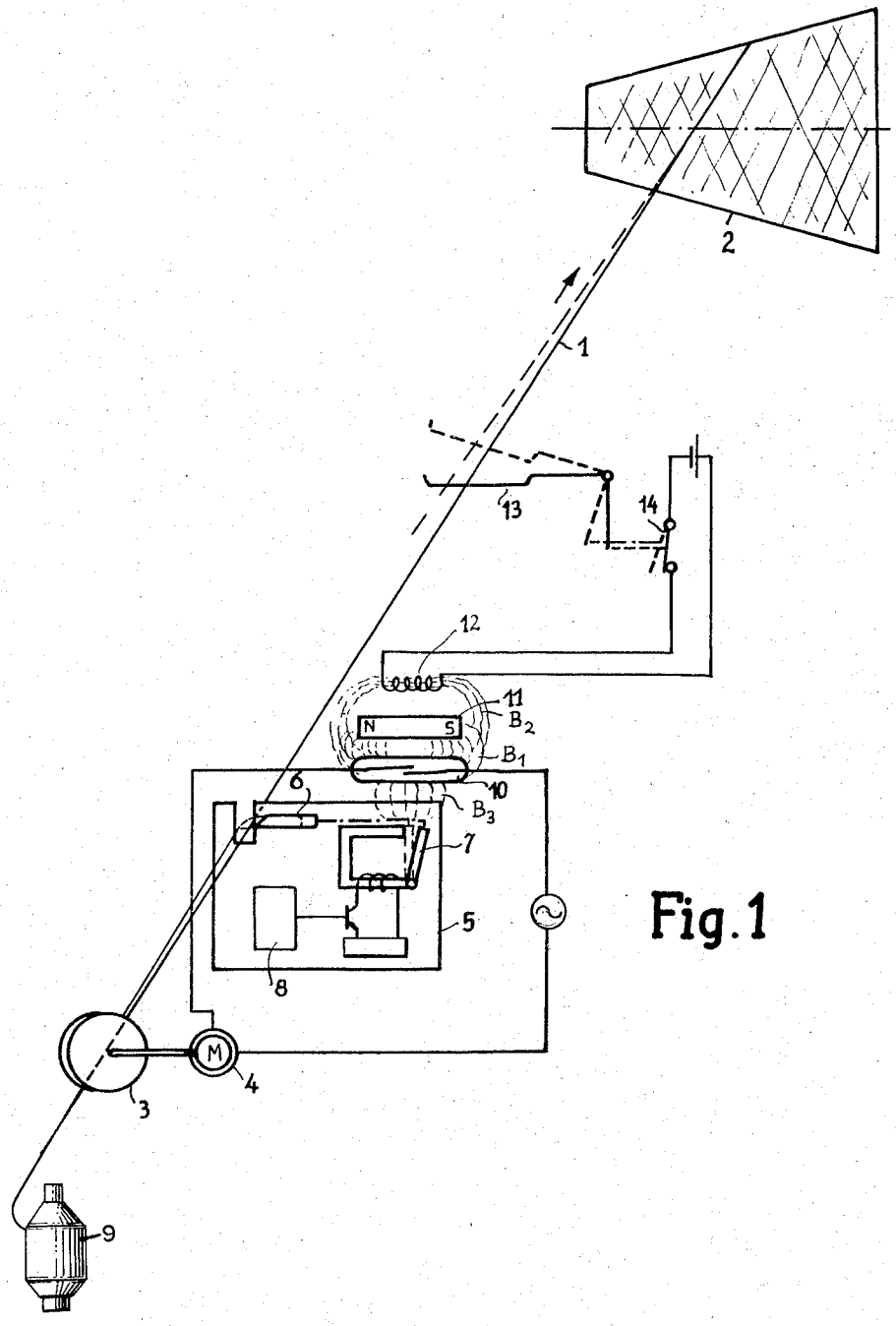

Fig. 1

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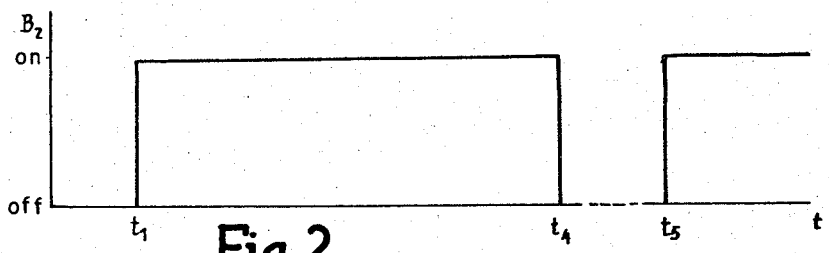

Fig. 2

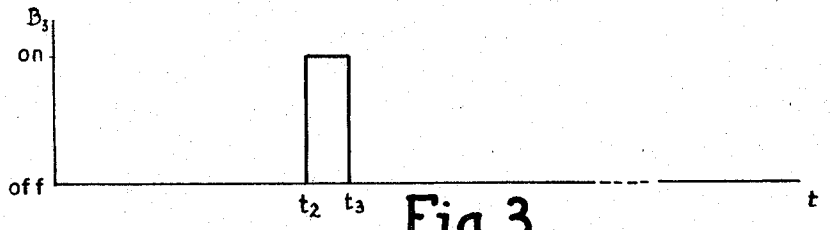

Fig. 3

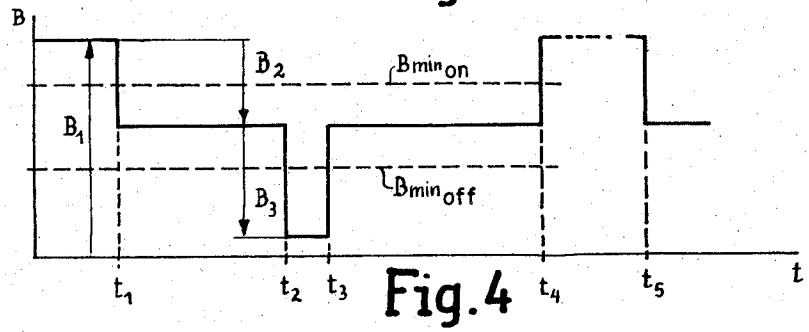

Fig. 4

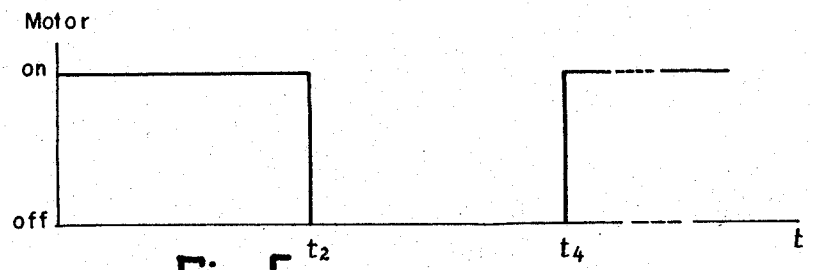

Fig. 5

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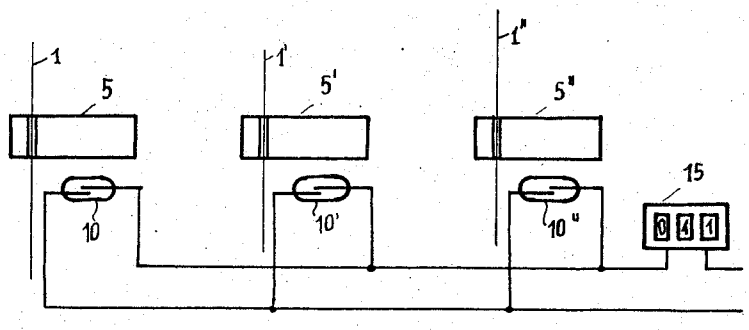

Fig. 6

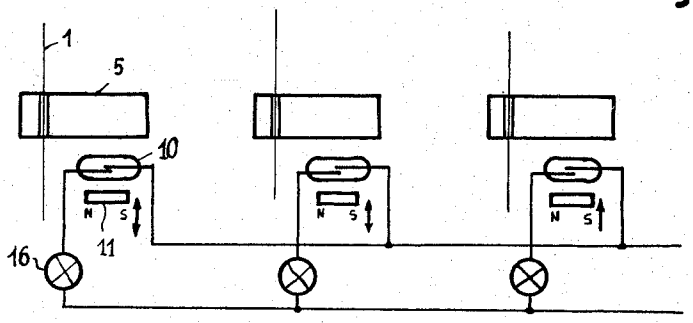

Fig. 7

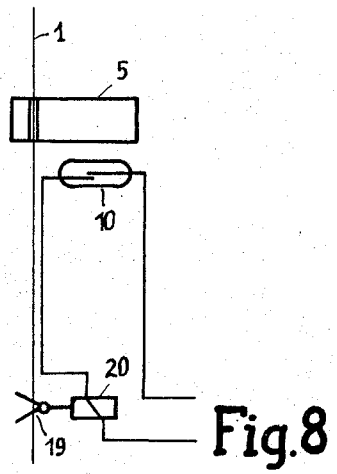

Fig. 8

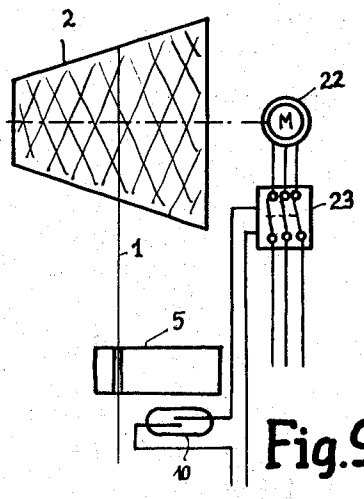

Fig. 9

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APPARATUS FOR SWITCHING AUXILIARY WORK PERFORMERS INTO OPERATION WITH TEXTILE MACHINERY

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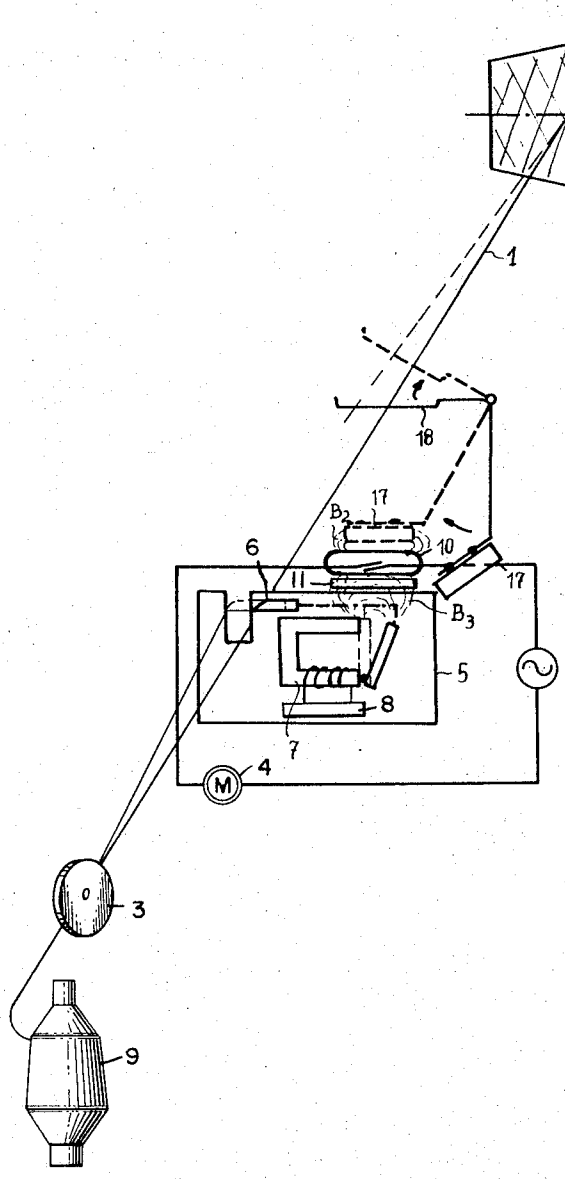

Fig. 10

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APPARATUS FOR SWITCHING AUXILIARY WORK PERFORMERS INTO OPERATION WITH TEXTILE MACHINERY

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Claims priority, application Switzerland, Feb. 19, 1965, 2,363/65
9 Claims. (Cl. 242—36)

ABSTRACT OF THE DISCLOSURE

A switching arrangement is arranged in the spooling machine which is actuated in dependence upon severance of a yarn in the yarn cleaner and deactuated upon upward movement of the yarn feeler. The switching arrangement includes a switch which is mounted outside the yarn cleaner and is magnetically actuated by the yarn cleaner upon severance of a yarn to actuate the yarn brake.

This invention relates to an apparatus for switching auxiliary work performers into operation with textile machinery. More particularly, this invention relates to an apparatus for switching auxiliary work performers into operation with textile spooling machines.

Heretofore, electronic yarn cleaners having electromagnetic yarn cutters have been used to remove blemishes and other defects from yarns during spooling operations by severing the yarns. After severance, the ends of the yarns have been knotted together by automatic knotting devices. However, in order to have the knotting devices operate properly, the yarn end must be maintained in a definite position. Accordingly, yarn brakes have been incorporated to grip one of the yarn ends. These yarn brakes, in order to avoid local wear phenomena by the traveling yarns, have been of the rotational type, such as, spring loaded or weight loaded disc brake plates.

However, it has not been possible to synchronize the position of the knotting devices with the yarn brakes to insure that the knotting devices will be in proper position for the emerging yarn ends upon rotation of the yarn brakes. In order to overcome this, some yarn brakes have been rotated intermittently in order to delay the emergence of the yarns. However, this is disadvantageous since the brake devices have been subjected to damage while the brakes are stationary. Further, since some superficial dust and dirt collects under the influence of friction between the yarn and brake plates of a braking device at the entrance of the brake plates, such dust and dirt becomes collected and transported on the periphery of the brake plates. Thus, after half a revolution of the brake plate, the dust and dirt reach the point where the yarn leaves the brake and can be carried away on the moving yarn such that the yarn becomes loaded with additional impurities.

Other types of auxiliary work performers, for example, motor-driven spool spindles, counting devices, indicating devices or other apparatus can also be switched into the spooling operation.

In general, the electronic yarn cleaners have not been arranged to perform any other switching operations connected indirectly with the cleaning of the yarns. Further, these electronic yarn cleaners have lacked both the ability to supply electrical magnitudes of different kinds and the frequently needed ability to deliver great power.

The present invention avoids these above drawbacks in providing a switching apparatus for actuating auxiliary work-performers on spooling machines and other processing machines of the textile industry dependent on the operation of the electronic yarn-cleaners. The switching

apparatus has at least one magnetically influenced reed switch relay disposed in the zone of the stray field of the electronic yarn-cleaner for actuation by the stray field with contacts that switch in and switch out auxiliary work-performers.

In operation, the current circuits to these auxiliary work-performers become interrupted when the yarn cleaner produces a cutting pulse. This pulse serves to energize an electro-magnet to create a stray field which acts on the magnetically influenced reed switch relay to separate its contacts. The contact of the magnetically influenced reed switch relay is held closed by a permanent magnet and an auxiliary field is used to create a lag between the attracting and falling-off field strengths to lengthen the contact-opening time.

The special advantage of the apparatus in accordance with the invention is that there is complete galvanic separation of the yarn-cleaner and the switching circuits for the auxiliary work-performers. The apparatus can consequently be installed on existing yarn-cleaners.

Accordingly, it is an object of this invention to provide a switching apparatus in a spooling machine for actuation of auxiliary work performers.

It is another object of this invention to provide a yarn cleaner in a spooling machine with means to actuate auxiliary work performers in direct dependence thereon.

It is another object of this invention to provide a yarn cleaner of a spooling machine with a magnetically influenced reed switch relay for the actuation of mechanically separated auxiliary work performers.

It is another object of this invention which provides an electro-magnetic yarn cleaner of a spooling machine without galvanic connections between itself and the auxiliary work performers operably connected therewith.

These and other objects and advantages of the invention will become more apparent from the following detailed description and appended claims taken in conjunction with the accompanying drawings in which:

FIG. 1 diagrammatically shows the principle of the circuit arrangement of a magnetically influenced reed switch relay;

FIGS. 2 to 5 each show a diagram of a pulse as a function of time;

FIG. 6 diagrammatically shows the sequential arrangement of a plurality of reed switch relays for the purpose of counting the total number of pulses;

FIG. 7 diagrammatically shows an arrangement for indicating the non-operative coil locations;

FIG. 8 diagrammatically shows an arrangement for actuating an additional cutting station outside the yarn-cleaner;

FIG. 9 diagrammatically shows an arrangement for stopping the spool spindle upon operation of the yarn-cleaner; and

FIG. 10 shows a modified apparatus of the invention.

Referring to FIG. 1, a yarn **1** is pulled off a spool **9** and is spooled on a cross-spool **2**. The yarn **1** passes through a yarn-brake **3** driven by a motor **4**, an electronic yarn-cleaner **5** having a cutting device **6** actuated by an electro-magnet **7**, and a yarn-feeler **13** that is held in a first position by the yarn against pivoting into a second position as shown by the dotted lines. A switch **14** is operatively connected to the yarn-feeler for actuation thereby.

The electric circuit of the motor **4** contains a magnetically influenced reed switch relay **10**, which is subjected to the influence of at least two magnetic fields. The characteristics of this magnetically influenceable reed switch relay are such that contact is made as an operative contact; that an external magnetic field B_1 is needed to close the contact; and that the field B_1 can be weakened by a weaker magnetic field B_2, which can, for example,

amount to half B_1 while maintaining the contact in closed position. If the magnetic field B_1 is weakened still further by a field strength B_3, then the contact opens. To reclose the contact, a magnetic field of strength B_1 is once more needed.

Initially, a permanent magnet **11**, which produces the field strength B_1 needed to close the contact, acts on the reed switch relay **10**. Because the stray field B_3 of the cutting magnet **7** is too weak to counteract completely the permanent field B_1 of the permanent magnet **11**, and because it acts only very briefly, an auxiliary field B_2 is applied in addition by means of an auxiliary coil **12**. The strength of the field B_2 is such that it weakens the permanent field B_1 but not sufficiently for the contact of the magnetically influenced reed switch relay **10** to be opened. Thus, only when the supplementary stray field B_3 of the electromagnet **7** is energized together with the auxiliary field B_2 do they serve to counteract the permanent field B_1 to such an extent that the magnetically influenced reed switch relay **10** opens causing interruption of the current to the motor **4** and the consequent stopping of the yarn-brake **3**.

Upon passage of a yarn defect through the yarn cleaner **5**, a current pulse is produced by the electronic circuit **8** to cause the cutting device **6** to cut the yarn in two thereby creating the stray field B_3. Thereafter, after a short time lag caused by the inertia of the yarn-feeler **13**, the yarn-feeler **13** pivots upwardly to open the switch **14** of the circuit of the auxiliary coil **12** causing the auxiliary coil to become currentless. Because of this, the field B_1 of the permanent magnet **11** becomes fully effective, and the contact of the magnetically influenced reed switch relay **10** closes again, causing the yarn-brake **3** to rotate. During the period of time from the opening of the relay **10** at the appearance of a cutting pulse and until its closure through the upward pivoting of the yarn-feeler **13**, the yarn-brake is stationary thereby allowing an automatic knotting apparatus to take hold of the yarn end in the region of brake **3**.

FIGS. 2 to 5 explain in diagrammatic form the chronological correlation of the various switch positions, and explain the magnetic fields acting on the magnetically influenced reed switch relay.

FIG. 2 shows the time the switch **14** is switched on, and thus it also shows the duration of the action of the auxiliary field B_2. At the instant t_1 the switch **14** becomes closed, and the auxiliary field B_2 becomes formed.

FIG. 3 shows the duration of the stray field B_3 of the electro-magnet **7**. This field lasts for the interval of time from t_2 to t_3.

FIG. 4 shows the resultant magnetic field strength in the region of the magnetically influenced reed switch relay **10**. The field strength B_1 of the permanent magnet **11** acts in full strength until the instant t_1 when the auxiliary field B_2 becomes built up. The contact is therefore closed, and it also remains closed beyond the instant t_1. At the instant t_2 of the cutting pulse the stray field B_3 acts to supplement the auxiliary field B_2 so that the contact opens. Even after the decay of the cutting pulse the contact remains open because the permanent field B_1 is still weakened by the auxiliary field B_2. It is only at the instant t_4 of the opening of the switch **14** that the permanent field B_1 can act in full strength on the contact of the magnetically influenced reed switch relay **10** to close the contact **10**.

FIG. 5 shows the switching periods of the magnetically influenced reed switch relay **10**. It is in its ON position until the instant t_2, in its OFF position from t_2 to t_4, and in its ON position again beyond t_4. After the yarn ends are knotted together, the yarn-feeler **13** pivots downwardly, thus closing the switch **14** (instant t_5) so that the total field acting on the magnetically influenced reed switch relay **10** becomes decreased again to the vaule B_1-B_2 while awaiting a new cutting pulse.

The use of a magnetically influenced reed switch relay

10 presupposes that the case or shell of the yarn-cleaner is made of magnetically non-conducting material, that is, of non-shielding material. This has the valuable advantage that no galvanic connection at all exists between the yarn-cleaning equipment and the supply for the auxiliary operation, so that this supply can consequently be effected independently of the type of yarn-cleaner used. In addition, the magnitude of the auxiliary performance need not be taken into consideration so that any desired counting or indicating means can be used, for example, to count the number of cutting pulses occurring, or to indicate the location of a yarn break.

FIG. 6 shows a number of yarn-cleaners **5**, **5'**, **5''**, with their associated magnetically influenced reed switch relays **10**, **10'**, **10''**, in whose circuits a counter **15** is set to add a counting pulse for each actuation of one of the yarn-cleaners.

FIG. 7 shows indicating devices, lamps **16**, for example, associated with each yarn-cleaner **5** which light up upon operation of a yarn-cleaner. The extinguishment of the lamps **16** can be done by briefly removing the permanent magnet a distance from the magnetically influenced reed switch relay **10** so that its field is no longer effective. This also opens the reed switch relays.

In an arrangement according to FIG. 8, a second cutting station, along the path of the yarn, is actuated through the intermediary of a reed switch relay **10**. For this purpose the reed switch relay actuates a relay **20** which energizes the cutting apparatus **19** upon opening of the reed switch relay, without the cutting apparatus being directly connected with the yarn-cleaner **5**.

FIG. 9 shows still another arrangement with which the spool spindle **2** is stopped in response to the occurrence of a cutting pulse in the yarn-cleaner **5**, for example, through the switching off of the spool motor **22** by a protector **23**.

Instead of the auxiliary field B_2, which can be switched on and off through the auxiliary coil **12**, the auxiliary field B_2 can also be created through an additional permanent magnet **17**. For example, the spooling machine contains a feeler lever **18**, which swings with a circular or similar motion past and close to the yarn-cleaner **5** (see FIG. 10) upon cutting of a yarn. A permanent magnet **17** is fastened on this feeler-lever **18** in such a way that its field, in going past the yarn-cleaner **5** or in going close to the reed switch relay **10** in its immediate vicinity, acts counter to the field B_1 of the permanent magnet **11** to decrease B_1 to the value needed to actuate the reed switch relay **10** for as long as the feeler-lever **18** is situated in the region of the protective-gas contact. Upon removal of the feeler-lever **18** out of the region of the reed switch relay **10**, then only the full field strength of the permanent magnet **11** acts on the protective-gas contact and holds it closed.

Having thus described the invention, it is not intended that it be so limited as changes may be readily made therein without departing from the scope of the invention. Accordingly, it is intended that the subject matter described above and shown in the drawings be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In combination with an electronic yarn cleaner of a spooling machine having a cutting organ for severing a yarn passing therethrough and a means for producing a stray magnetic field of limited duration activated in response to severance of the yarn passing therethrough and a yarn feeler spaced from said cleaner to detect the tautness of the yarn passing therefrom;

a switching arrangement for switching auxiliary work performers into the circuit of said spooling machine upon severance of a yarn, said switching arrangement including at least one magnetically influenced reed switch relay positioned outside of said electronic yarn cleaner for disposition in said stray magnetic field, a permanent magnet positioned outside of said electronic yarn cleaner imposing a permanent magnetic field of greater strength than said stray magnetic field

on said reed switch relay in opposition to said stray magnetic field, and magnetic field means positioned outside of said electronic yarn cleaner for alternatively imposing an auxiliary magnetic field of less strength than said permanent magnetic field on said reed switch relay in opposition to said permanent magnetic field, said magnetic field means being operatively connected to said yarn feeler for actuation thereby upon detection of a decrease in yarn tautness whereby said relay is opened upon imposition of said magnetic field and said stray field thereon and maintained in open position after decay of said stray magnetic field and is closed upon subsequent decay of said auxiliary magnetic field and maintained in closed position after reimposition of said auxiliary magnetic field.

2. The combination as set forth in claim 1 wherein said magnetic field means includes an electric circuit, an auxiliary coil in said electric circuit for creating said auxiliary magnetic field, and a switch interposed in said circuit for opening and closing said circuit, said switch being connected to said yarn feeler for actuation of said switch in response to the tautness of the yarn detected thereby, said switch being activated after severance of the yarn.

3. The combination as set forth in claim 1 wherein said magnetic field means includes a permanent magnet secured on said feeler for imposing said auxiliary magnetic field on said reed switch relay upon pivoting of said feeler after severance of the yarn.

4. The combination as set forth in claim 1 which further comprises a yarn brake for gripping the severed end of the yarn supply and a motor for driving said yarn brake, said motor being operably connected to said reed switch relay whereby said motor is stopped upon opening of said reed switch relay.

5. The combination as set forth in claim 1 which further comprises a plurality of said electronic yarn cleaners, and a plurality of reed switch relays, each said reed switch relay being operably positioned with respect to one of said yarn cleaners.

6. The combination as set forth in claim 5 which further comprises a counting mechanism operably connected to said reed switch relays.

7. The combination as set forth in claim 5 which further comprises a plurality of lamps, each of said lamps being operably connected to a respective one of said reed switch relays.

8. The combination as set forth in claim 1 which further comprises a second cutting device for severing the yarn at a second station, and a cutter relay for actuating said second cutting device, said cutter relay being operably connected to said reed switch relay whereby said second cutting device is actuated upon opening of said reed switch relay.

9. The combination as set forth in claim 1 which further comprises a spool for taking up the yarn passed through said yarn cleaner, a motor for driving said spool, means for stopping said motor, said means being operably connected to said reed switch relay whereby said means stops said motor upon opening of said reed switch relay.

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