Nov. 3, 1931. E. G. LOOMIS 1,830,669

APPARATUS FOR APPLYING TAPE TO CONDUCTORS

Filed Oct. 1, 1930 3 Sheets-Sheet 1

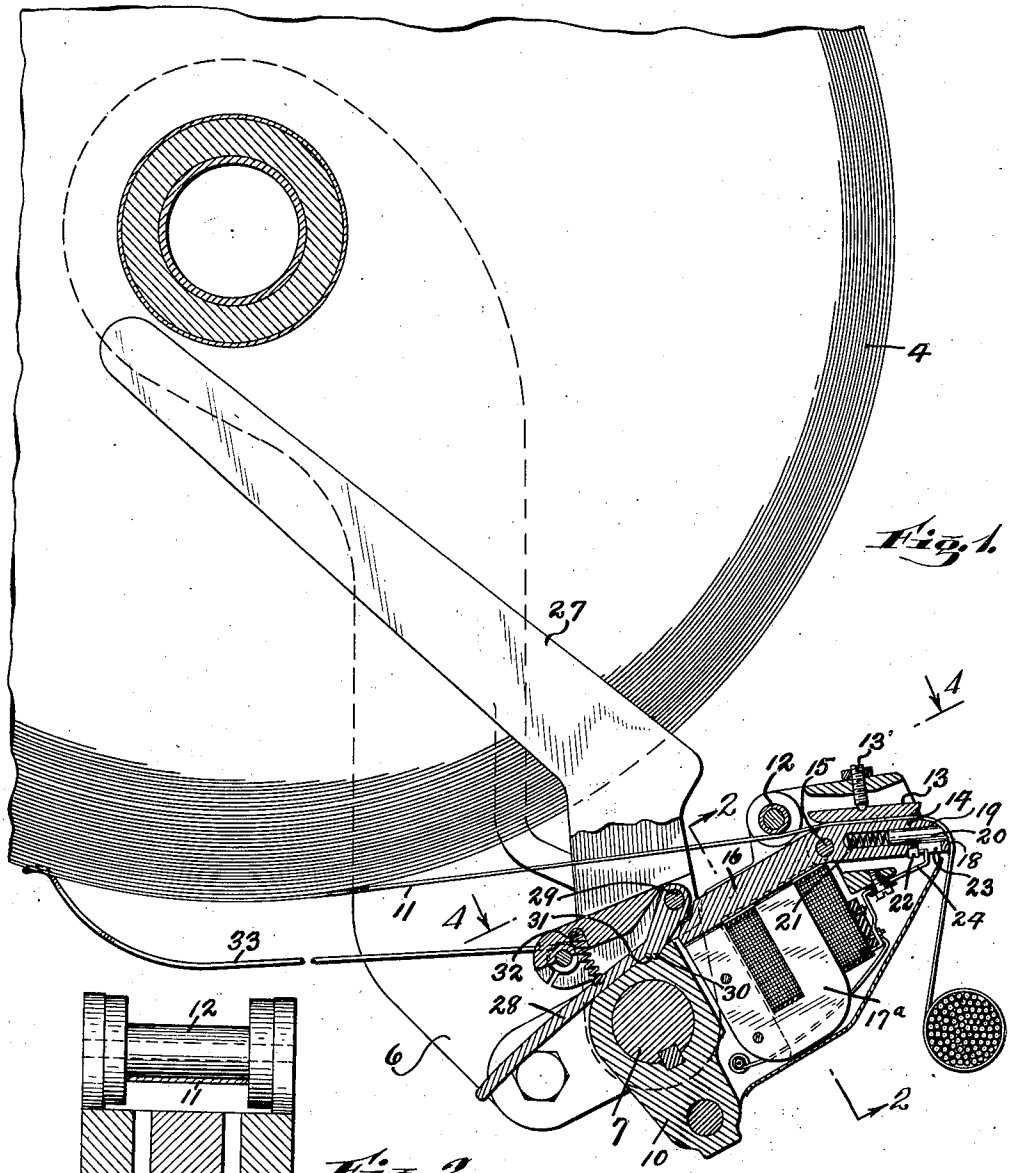


Fig. 1.

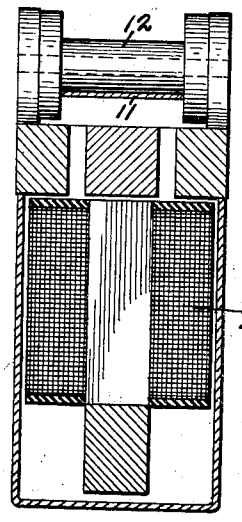


Fig. 2.

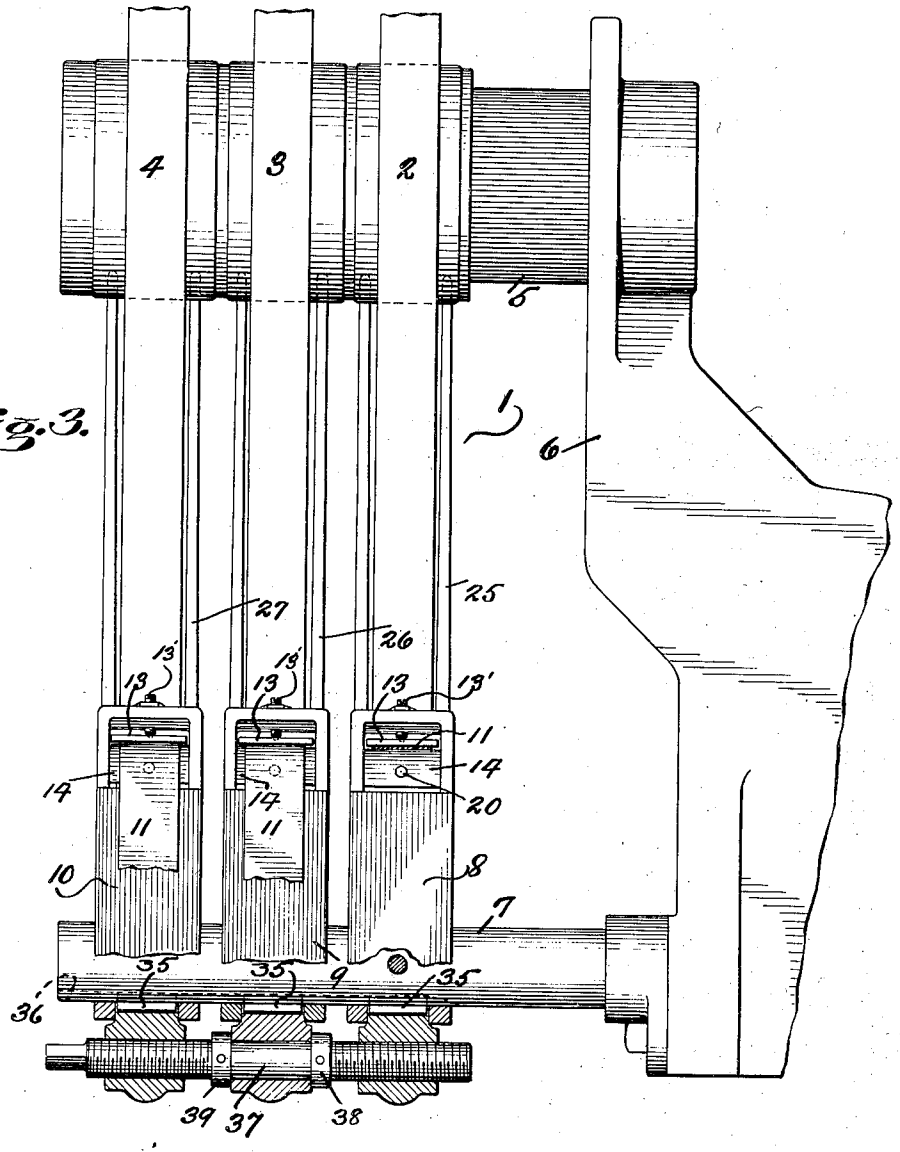
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Fig. 3.



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APPARATUS FOR APPLYING TAPE TO CONDUCTORS

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Fig. 4.

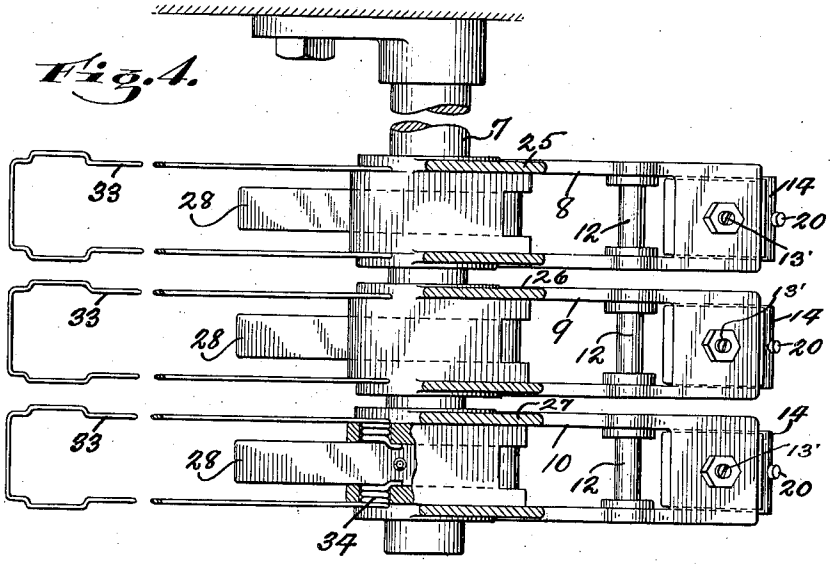
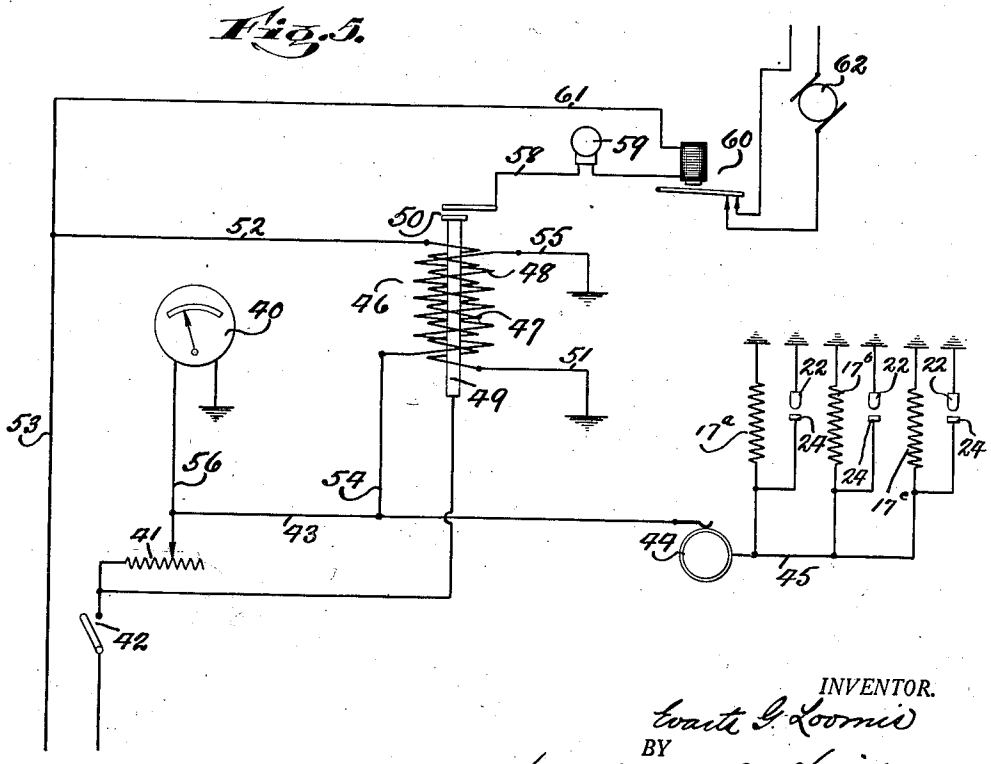


Fig. 5.



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UNITED STATES PATENT OFFICE

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APPARATUS FOR APPLYING TAPE TO CONDUCTORS

Application filed October 1, 1930. Serial No. 485,806.

This invention relates to an improved apparatus for applying tape to conductors in the manufacture of electric cables.

In the manufacture of electric cables of the taped type it is customary to rotate a plurality of taping heads bodily about the forwardly advancing conductor to helically apply the tapes to the conductor. In such machines, however, difficulty has been experienced in applying all the tapes under the proper tension and also in maintaining a constant or uniform tension on the tapes. The result is that skilled operators are required for the operation of the machines and even at best results are unsatisfactory.

One of the objects of the present invention is the provision of a taping apparatus for use in the manufacture of electric cables so constructed and arranged that the tapes will be applied under uniform tension, means being provided also in connection with my improved apparatus whereby the tension on the tape of any head can be determined at all times, an indicator or indicators being provided to indicate the tape tension.

Another object of my invention is the provision of means for stopping the operation of the machine in case of a breakage of any one of the tapes or when any one of the tapes has been used up or comes to an end.

A further object of my invention is the provision of a signal for indicating which of the tapes has been ruptured, it being understood that several rolls of tape are employed in these machines. Heretofore upon the stopping of the machine an investigation of the spools of tape was necessary to ascertain which tape had been ruptured, but with my improved device the signal will indicate just which tape has been ruptured or at least which head carries the ruptured tape.

A still further object of my invention is the provision of a device whch can be adjusted whereby the tapes can be overlapped to any desired extent, or if desired the edges of the tape can be separated or can be made to abut each other, or if desired tapes of various widths may be employed.

Still further objects of my invention will be manifest from the following description and the accompanying drawings.

In the drawings:

Fig. 1 is a fragmentary elevational view of a taping head constructed in accordance with my invention;

Fig. 2 is a sectional view on line 2—2 of Fig. 1;

Fig. 3 is a side view looking from right to left at Fig. 1;

Fig. 4 is a sectional view on line 4—4 of Fig. 1; and

Fig. 5 is a wiring diagram of the electric circuit employed with my improved device.

Reference is made to my co-pending application, Serial No. 485,805, filed Oct. 1, 1930, wherein I have illustrated more in detail a taping machine of the same type as the one to which my present invention is directed, it being believed unnecessary to illustrate or describe the details of the machine herein. It will be seen from the application above referred to that machines of this character comprise a plurality of taping heads each comprising a plurality of units one of which only I have illustrated in the drawings accompanying this application.

This unit designated 1 comprises spools of tape 2, 3 and 4 mounted for rotation on a shaft 5 which is supported by an arm 6. The lower end of the arm 6 carries a fixed spindle 7 on which are mounted three brackets 8, 9 and 10 for each of the spools 2, 3 and 4, respectively.

As the tape 11 leaves the spool it passes under a guide roll 12 and thence between a fixed shoe 13 and a movable shoe 14. The movable shoe 14 is pivoted at 15 and is provided with an extension 16 which forms an armature for electro-magnets 17^a, 17^b and 17^c also carried by the bracket 10. The mag-

nets being energized during the normal operation of the machine will draw the extension 16 downwardly thereby moving the forward end of the shoe 14 into engagement with the fixed shoe 13 whereby tension is applied to the tape passing between the shoes. The fixed shoe 13 can be adjusted by means of a screw 13′ and it will be noted that this screw has a ball point which provides a ball and socket connection between the screw and shoe 13 whereby even contact on the paper passing between the shoes is obtained.

The forward end of the movable shoe 14 has a rounded face 18 over which the tape passes. This face 18 is provided with a bore 19 which receives a pin 20 backed up by a spring 21 whereby the pin is normally held against the tape. This pin 20 carries a stud 22 which is adapted to ride in a slot or guideway 23 in the movable shoe.

An electric contact 24 is carried by the bracket 10 and is in the path of the stud 22 for the purpose of closing an electric circuit as will hereinafter be described.

Each of the brackets 8, 9 and 10 carries a pair of guide arms 25, 26 and 27, respectively. These arms each straddle their respective spools of tape and are mounted on the spindle 7 in such a manner as to be rotated out of operating position when it is desired to replace the spools of tape.

Each of the arms 25, 26 and 27 is held in operative position by means of locking mechanism comprising a latch 28 pivoted at 29 to its respective arm. This latch 28 is provided with a shoulder 30 for engaging a notch 31 in the bracket 10 and is held therein by means of a spring 32. When it is desired to replace a spool of tape the latch is raised out of engaging position whereby any one of the arms 25, 26 or 27 is free to move out of operating position.

Means in the form of U-shaped wires 33 are provided for preventing over-running of the spools. These wires are supported on their respective arms where the ends are formed into helical springs 34 for maintaining the U-shaped end of the wire in frictional engagement with the spool.

As illustrated in Fig. 3 the brackets 9 and 10 are adjustable laterally with respect to each other and to the bracket 8, the bracket 8 being affixed to the spindle by means of a pin or in any other suitable manner.

The brackets 8, 9 and 10 extend downwardly and form bearings for a right and left hand screw 37. The lower ends of the brackets 9 and 10 each have a key 35 which rides in the keyway 36 in the spindle 7. Said screw 37 carries collars 38 and 39 pinned to the shaft on either side of the lower end of the bracket 9 for preventing lateral movement of the screw with respect to the bracket 9.

The bearings carried by brackets 8 and 10 are screw threaded to cooperate with the threaded ends of screw 37, one end being a right hand screw and the other end a left hand screw.

The screw 37 is provided with a square end for receiving a wrench or the like for rotating the same. As the shaft is rotated, it will be obvious that the brackets 9 and 10 will be moved away from the bracket 8, the bracket 10 moving at twice the speed of the bracket 9 whereby the same relative distance or space between the three brackets will be maintained.

As above stated the tension on the tapes is controlled by electro-magnets 17^a, 17^b and 17^c. This tension is indicated on a volt meter or indicator 40 which is calibrated in pounds to register the pull on the tape and can be regulated by means of a rheostat 41, all of which will be described presently.

When the machine is to be stopped upon the rupturing of a tape or when the tape on a spool has been used up, a relay 46 having two coils 47 and 48 of unequal resistance is brought into action, the coil 47 being connected in series with the windings of the tension-applying magnets 17^a, 17^b and 17^c and is wound in the opposite direction to the coil 48, said coil 48 being connected in parallel with the tension-applying magnets, thereby maintaining the magnetic field of the relay 46 in a balanced state until such time as said tension magnets are shorted from the circuit. When this occurs the core 49 is energized and will thereby close a switch 50, the purpose of which will be described presently.

When the machine is set in operation the switch 42 will be closed causing current to flow from one side of the source of supply through the rheostat 41, conductor 43, slip ring 44, conductor 45, to the three magnets 17^a, 17^b and 17^c and thence to ground, to conductor 51, coil 47, conductors 52 and 53 to the other side of the source of supply.

Current is supplied to the coil 48 through the rheostat 41, conductors 43, 54, coil 48, conductor 55 to ground, conductor 51, coil 47 and conductors 52 and 53 to the source of supply, thus maintaining a balanced magnetic field on the core 49. Current also passes through the rheostat 41, conductor 56 to the volt meter or indicator 40, thence through ground, conductor 51, coil 47 and conductors 52 and 53 for the purpose of recording or indicating the current supplied to the tension magnets 17^a, 17^b and 17^c which, as previously explained, is calibrated in pounds.

In the event any tape breaks or the tape on the spool comes to an end, the spring 21 will force the pin 20 outward, bringing the stud 22 into engagement with the contact 24 thereby shorting the circuit through the tension magnets through coil 47, allowing greater current to pass through the coil 47 thus unbalancing the magnetic field on the

core 49 and closing the switch 50, causing current to flow through conductor 58, lamp 59, relay 60, conductors 61 and 53 to the source of supply. This circuit just described will illuminate the lamp 59 to indicate that a tape has either been ruptured or used up on the particular head where the signal is indicated and will also energize the relay 60 to break the circuit to the driving motor 62.

It will be obvious from the foregoing description that I have provided an electrically controlled mechanism for regulating the tension on the tape and automatically operated means for stopping the machine when the tape has been ruptured or expired as well as a signal to indicate which tape has expired or ruptured, or at least on which head the ruptured or expired tape is or was carried.

It will be understood that I do not desire to be limited to the precise construction herein illustrated and described as various modifications may be made within the scope of my invention.

What I claim is:—

1. In a machine of the class described the combination of a spool of tape adapted to be wound about a cable, a relatively fixed shoe and a cooperating movable electrically controlled shoe adapted to grip the tape to maintain a uniform tension on the same as it is being wound on the cable.

2. In a machine of the class described the combination of a spool of tape adapted to be wound about a cable, and a pair of shoes or clamps one of which is electrically controlled adapted to grip the tape as it passes to the cable being wound to maintain a uniform tension on the tape.

3. In a machine of the class described the combination of a spool of tape adapted to be wound about a cable, electrically controlled clamping means for clamping the tape to maintain a uniform tension on the same as it is being wound on the cable, and means for varying the clamping action of the said clamping means to vary the tension on said tape.

4. In a machine of the class described the combination of a spool of tape adapted to be wound about a cable, electrically controlled means for maintaining a uniform tension on the tape as it is being wound on the cable, and a rheostat for controlling the action of said electrically controlled means for varying the tension on said tape.

5. In a machine of the class described the combination of a spool of tape adapted to be wound about a cable, an electro-magnet for maintaining a uniform tension on the tape as it is being wound on the cable, and a rheostat for controlling the circuit through said electro-magnet for varying the tension on said tape.

6. In a machine for the manufacture of electric cables, the combination of rotatable means for supporting a plurality of spools of tape in operative relation to a conductor to which the tape is to be applied, and electrically controlled clamping means for clamping the tape to control the tension on said tape as the same is applied to the conductor.

7. In a machine of the class described the combination of a motor for driving the machine, a spool of tape adapted to be wound about a cable, an electrically controlled clamp for clamping the tape to maintain a uniform tension on the same as it is being wound on the cable, electrically controlled means comprising a relay for opening the motor circuit, and means in the path of the tape for controlling the circuit of said relay operative upon breaking or ending of the tape to close the circuit of said relay to open the circuit of said motor.

8. In a machine for the manufacture of electric cables, the combination of a rotatable head for supporting a plurality of spools of tape in operative relation to a conductor to which the tape is to be applied, a guide arm straddling each spool, an extension on each arm, a screw threaded oppositely through two of said arms and passing freely through the other, rotation of said screw effecting lateral adjustment of the three arms while maintaining the same relative distance between the three arms.

9. In a machine of the class described, the combination of means for applying tape about a cable conductor, electrically controlled means for maintaining a uniform tension on the tape as it is being applied, and means for indicating the tension in the tape.

10. In a machine of the class described, the combination of a spool of tape adapted to be wound about a cable, a pair of shoes or clamps adapted to grip the tape as it passes to the cable being wound, an electromagnet for controlling one of said shoes, a double wound relay one winding of which is in series with the winding of said electromagnet, a motor for driving the machine, a second relay in series with said motor, a switch in the motor circuit controlled by said second relay, and means controlled by the tape being wound for shorting the one coil of said double wound relay when the tape breaks or has ended to effect a closure of the circuit of the second relay to open the circuit of said motor.

11. In a machine of the class described, the combination of a spool of tape adapted to be wound about a cable, a pair of pivoted clamping shoes adapted to clamp the tape on its way to the conductor being wound, one of said shoes being pivoted intermediate its ends, an electromagnet the armature of which is provided by said pivoted shoe, a double wound relay controlling the circuit of said

electromagnet, a motor for driving the machine also controlled by said double wound relay, a pin adapted to be engaged by the tape as it passes to the conductor being wound, a spring for actuating said pin upon breaking or ending of the tape to short circuit the winding of said electromagnet and to short circuit one winding of said relay to effect an opening of the circuit of said motor.

This specification signed this 10th day of September, 1930.

EVARTS G. LOOMIS.