

Oct. 3, 1967

F. E. HILTON
TAPE FEEDING MACHINE WITH TENSION
CONTROLLED SUPPLY SPOOL

3,344,740

Filed Dec. 16, 1965

2 Sheets-Sheet 1

FIG. 2

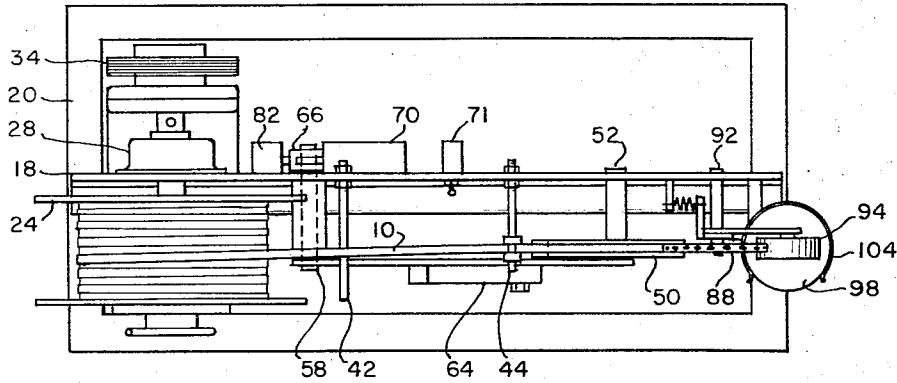


FIG. 1

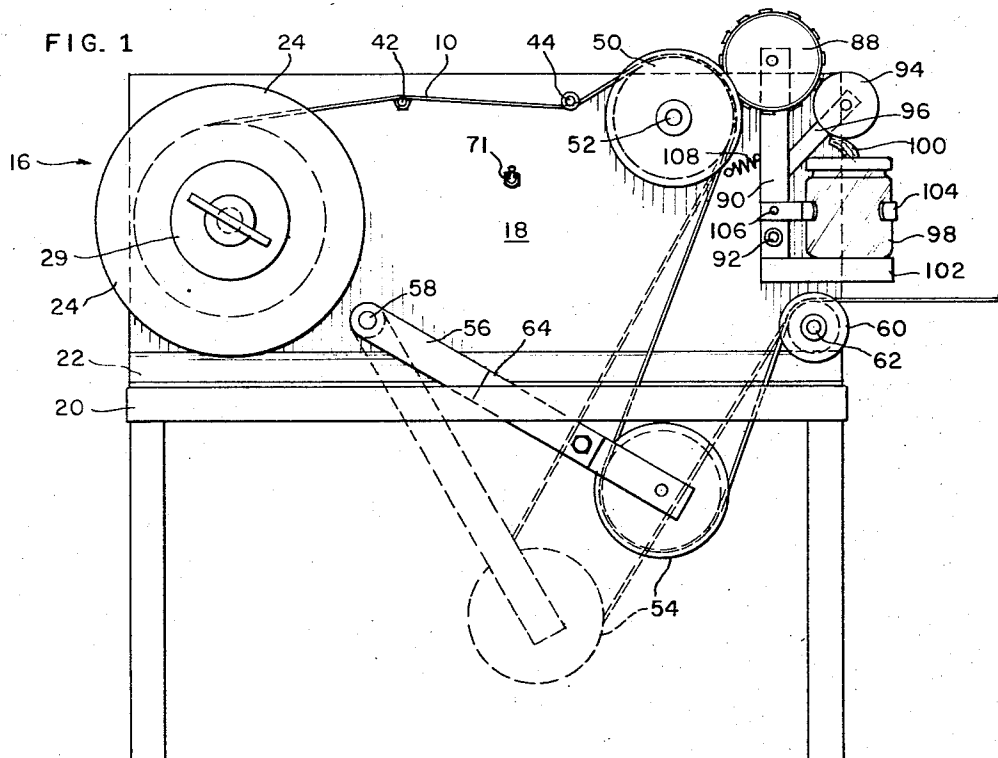
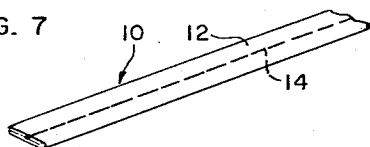


FIG. 7



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FIG. 3

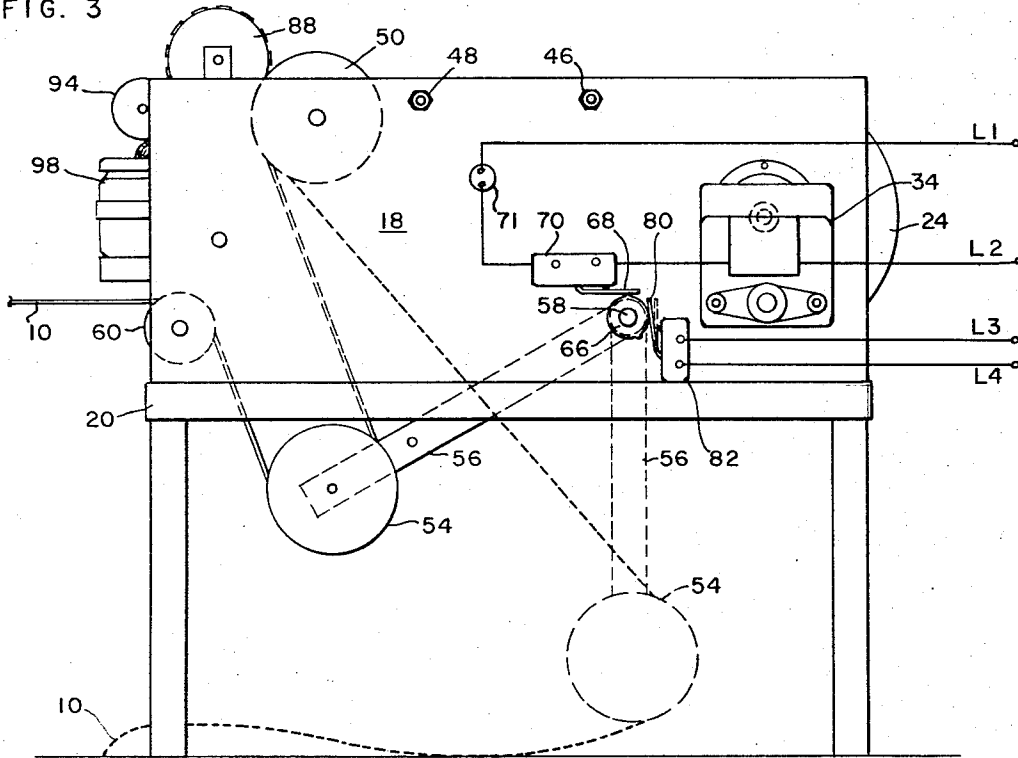
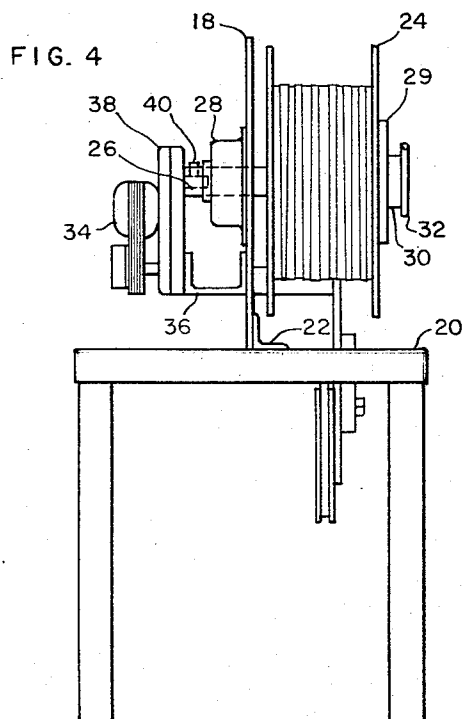


FIG. 4



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TAPE FEEDING MACHINE WITH TENSION CONTROLLED SUPPLY SPOOL

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Filed Dec. 16, 1965, Ser. No. 514,279
2 Claims. (Cl. 101-228)

ABSTRACT OF THE DISCLOSURE

A machine for feeding wire reinforced paper tape, wherein the tape is trained over a first pulley and under a dancer roll that oscillates up and down on the end of a tensioning arm pivotally mounted below the first pulley, a first cam mounted on the tensioning arm for starting and stopping the driving motor in response to variations in tape tension, a second cam mounted on the tensioning arm for stopping the motor when the tape breaks.

This invention relates to a machine for feeding wire reinforced paper tape and like material to other apparatus using the same and, more particularly, to a machine that will maintain such tape under substantially constant tension while feeding it to such using apparatus.

The tape with which the instant invention is concerned is made of a double layer of paper and has a wire core centrally located therein. Lengths of such tape are used to close the necks of polyethylene bags in which food and other products are packaged and to tie produce together in consumer-sized bundles. Most automatic typing apparatus utilizing wire-reinforced paper tape consumes the tape at an uneven rate and operates most effectively when the tape is fed thereto under substantially constant tension.

It is thus a principal object of my invention to provide an improved feeding machine for wire-reinforced paper tape, which will be capable of maintaining the tape at a substantially constant tension as it is consumed by other apparatus.

Still another object is to provide a simple, inexpensive but rugged apparatus for feeding tape under substantially uniform tension.

Other objects and advantages will become apparent as the description proceeds.

In accordance with an illustrated embodiment of the invention the apparatus comprises a supply spool for carrying a supply of the tape and a motor connected in driving relationship with the spool. A first pulley is fixedly mounted forwardly of the supply spool. The tape is trained over the first pulley and under a dancer roll that oscillates up and down on the end of a tensioning arm pivotally mounted below the first pulley. Suitable controls are provided to start the motor and unwind tape from the supply spool when the tension on the tape causes the dancer roll to be raised to a certain level, the motor being stopped when the tension on the tape is reduced so as to permit the dancer roll to be lowered to a second level, the levels being selected to maintain the tape substantially under a predetermined amount of tension.

For a more detailed description of the invention, reference is made to the accompanying drawings, wherein:

FIG. 1 is a front elevational view of the apparatus of the present invention;

FIG. 2 is a top view of the apparatus shown in FIG. 1;

FIG. 3 is a rear elevational view of the apparatus shown in FIG. 1;

FIG. 4 is an end view of the apparatus shown in FIG. 1;

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FIG. 5 is an enlarged view of a portion of the apparatus;

FIG. 6 is a sectional view taken on line 6-6 of FIG. 5; and

FIG. 7 is an enlarged perspective view of a length of the wire-reinforced paper tape utilized by the apparatus of the present invention.

Referring to the drawings, the wire-reinforced paper tape 10 with which the apparatus of the present invention is concerned is shown in FIG. 7. The tape 10 is formed of a double layer of stiff paper 12 and has a soft wire core 14 centrally located therein and passing therethrough. The tape, hence, is readily bendable, although it is relatively stiff longitudinally.

The machine 16 of the present invention, best shown in FIGS. 1-4, is mounted on a supporting plate 18 attached to a table 20 by an angle bracket 22. A reel or supply spool 24 for the tape 10 is rotatably mounted on a shaft 26 received in a bearing 28 mounted on the plate 18, the spool 24 being retained on the shaft 26 by a retaining plate 29, collar 30 and wing nut 32.

A constant speed motor 34 mounted on a bracket 36 provides power for the spool 24 through a high ratio reduction gear 38 keyed to the shaft 26 by a pin 40. The gear 38 is of sufficiently high ratio so that unless the motor 34 is running, the spool 24 cannot rotate.

Two guide pins 42 and 44 are mounted forwardly of the spool 24 and attached to the supporting plate 18 by nuts 46 and 48, respectively. A pulley 50 rotatably mounted on a fixed shaft 52 is positioned forwardly of the guide 44. As the tape 10 is fed from the supply spool 24, it passes over the guide 42 under the guide 44 and thence around the pulley 50. By this means the tape 10 makes the same angle at all times with respect to the pulley 50 regardless of the amount of tape on the spool 24.

A dancer roll or pulley 54 is rotatably mounted on one end of a tensioning arm 56 which is fixedly attached at its other end to a shaft 58 suitably journaled in the supporting plate 18, the pulley 54 being positioned beneath the pulley 50. A final pulley 60 is rotatably mounted on a fixed shaft 62 forwardly of the pulley 54. The tensioning arm 56 has a weight 64 removably attached thereto. After the tape 10 passes over the pulley 50, it passes under the pulley 54 on the tensioning arm 56 and thence over the pulley 60 and to the apparatus which will consume it.

Referring to FIG. 3, a cam 66 is fixedly attached to the shaft 58 on the back of the supporting plate 18 and is adapted to depress a lever 68 and close a normally open switch 70 to complete a circuit through a toggle switch 71, wires L₁, L₂ and the motor 34 when the tension on the tape 10 raises the dancer roll or pulley 54 to a predetermined level. Energizing the motor 34 rotates the spool 24, thereby to feed tape 10 to the consuming apparatus.

If the tape 10 is paid out from the spool 24 faster than it is consumed and the dancer roll or pulley 54 is lowered to the level shown by the dotted lines in FIG. 1, the cam 66 swings away from the switch 70 so that it opens to break the circuit through the motor 34 and stop the same. The high ratio reduction gear 38 then prevents further payout of tape from the spool 24 until the tensioning arm 56 is raised to the position that re-energizes the motor. Under normal operating conditions the tensioning arm 56 oscillates in response to variations in the tape tension between two positions defining the limits of a comparatively small angular range, the dancer roll or pulley 54 moving up and down and the motor 34 being intermittently energized and de-energized. The tape 10 is thus maintained substantially under the desired tension, which is adjustable by suitable changes in the weight 64.

In the event of a breakage in the tape 10, the tension-

ing arm 56 will fall into the extreme vertical position shown by the dotted lines in FIG. 3. When this occurs the cam 66 actuates a lever 80 to open a normally closed switch 82 and interrupt the flow of current through wires L₃ and L₄, thereby to break the circuit through the electric motor (not shown) driving the tape consuming apparatus.

As clearly shown in FIGS. 1, 5 and 6, means are also provided to engage the tape 10 as it passes over the pulley 50 and print a message thereon. Such means desirably comprise a type face 84 supported on a platen 86 on the periphery of a printing roll 88 rotatably attached to an arm 90, which is itself pivotally attached to the supporting plate 18 as at 92. An inking roll 94 mounted on an arm 96 contacts the printing roll 88 and is fed with ink from a container 98 through a wick 100. The container 98 is retained on a horizontal bracket 102 by a clamp 104 attached to the arm 90 as at 106. A spring 108 attached at one end to the plate 18 and at the other end to the arm 90 urges the type face 84 into contact with the tape 10 as the latter passes over the pulley 50. By this means pricing, advertising or other information may be printed on the tape as it is fed by the machine of the present invention to other consuming apparatus.

In the foregoing description, the invention has been described with reference to a certain particular preferred embodiment, although it is to be understood that the specific details shown are merely illustrative and that the invention may be carried out in other ways without departing from the true spirit and scope of the following appended claims.

I claim:

1. Apparatus for feeding wire reinforced paper tape, comprising:

- a supporting plate;
- a supply spool for carrying a supply of said tape rotatably mounted on said supporting plate;
- a motor connected in driving relationship with said spool;
- a first guide means mounted forwardly of said spool and on which said tape is supported;
- a second guide means mounted forwardly of said first guide means and under which said tape passes;
- a first pulley fixedly mounted forwardly of said second guide means and over which said tape is trained;
- a tensioning arm pivotally mounted at one end thereof below said first and second guide means;
- a second pulley rotatably mounted on the other end of said tensioning arm and under which said tape from said first pulley supportingly passes;
- a third pulley fixedly mounted forwardly of said tensioning arm and over which said tape passes on its way to a tape consuming apparatus;
- a first circuit including a normally-open switch adapted on closure to energize said motor and unwind tape from said supply spool, said normally open switch having an operating member;
- a second circuit including a normally-closed switch adapted on opening to de-energize said tape consuming apparatus, said normally-closed switch having an operating member;
- a first cam on said tensioning arm to engage said operating member on said normally-open switch and close the same when the tension on said tape causes said other end of said tensioning arm to be raised to

a first level, said first cam disengaging said operating member on said normally-open switch when the tension on said tape permits said tensioning arm to be lowered to a second level, said first and second levels being selected to hold said tape substantially under a predetermined amount of tension;

a second cam on said tensioning arm to engage said operating member on said normally-closed switch and open the same when said tape breaks and permits said tensioning arm to drop to a vertical position; and

rotatable printing means adapted to engage said tape as it passes over said first pulley and print a message thereon.

2. Apparatus for feeding wire reinforced paper tape, comprising:

- a supply spool for carrying a supply of said tape;
- a motor connected in driving relationship with said spool;
- a first pulley fixedly mounted forward of said supply spool and over which said tape is trained;
- a tensioning arm pivotally mounted at one end thereof;
- a second pulley rotatably mounted on the other end of said tensioning arm and under which said tape from said first pulley supportingly passes on its way to a tape consuming apparatus;
- first circuit means including a normally-open switch adapted on closure to energize said motor and unwind tape from said supply spool, said switch having an operating member;
- first cam means on said tensioning arm to engage said switch operating member and close said switch when the tension on said tape causes said other end of said tensioning arm to be raised to a first level, said first cam means disengaging said switch operating member when said tensioning arm lowers to a second level when the tension on said tape is reduced, said first and second levels being selected to hold said tape substantially under a predetermined amount of tension;
- second circuit means including a normally-closed switch adapted on opening to de-energize said tape consuming apparatus; and
- second cam means on said tensioning arm adapted to open said normally-closed switch when breakage of said tape causes said tensioning arm to drop to a vertical position.

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