

Feb. 17, 1970

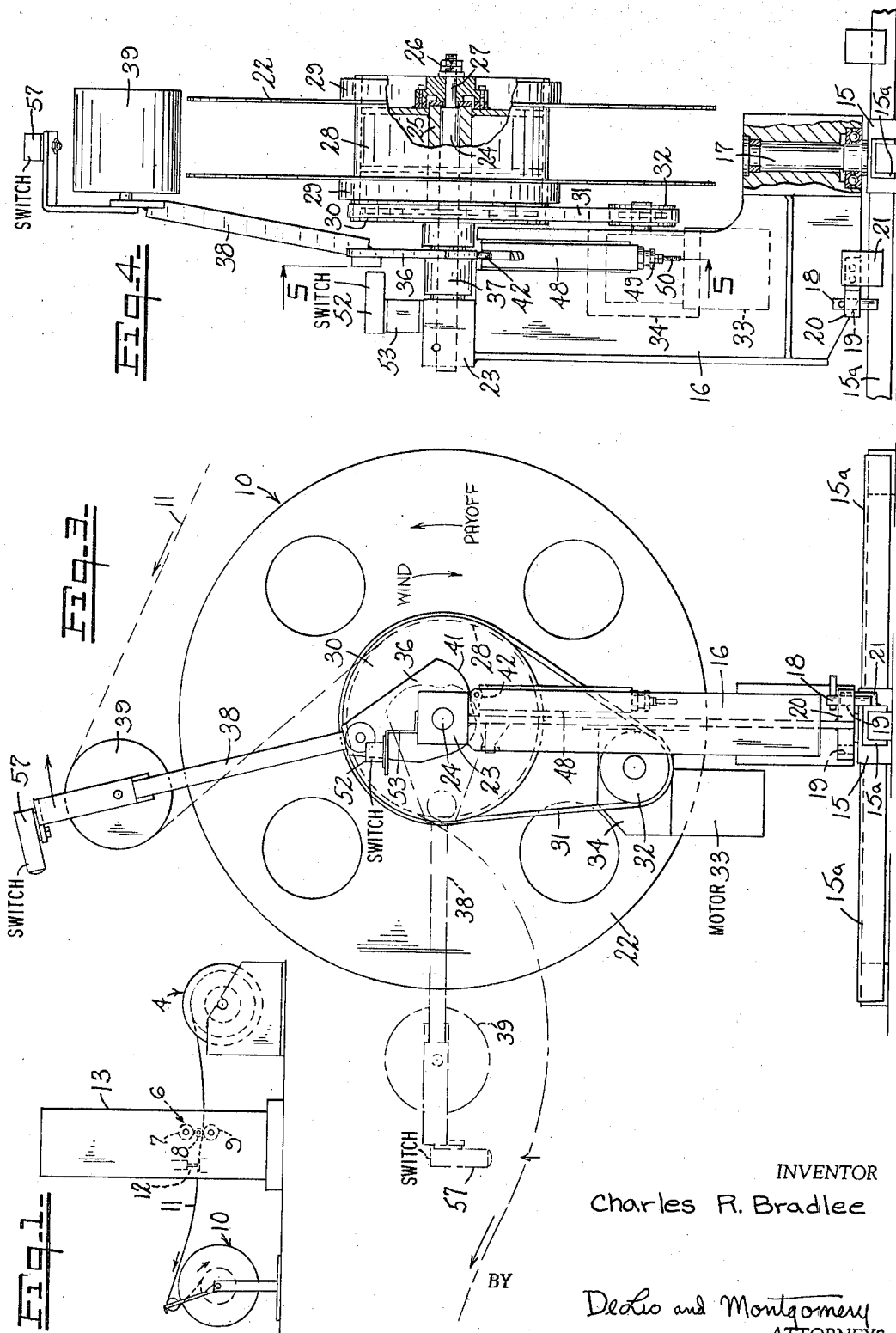
C. R. BRADLEE

3,495,784

REVERSING FEED STAND ASSEMBLY

Filed Jan. 19, 1968

3 Sheets-Sheet 1



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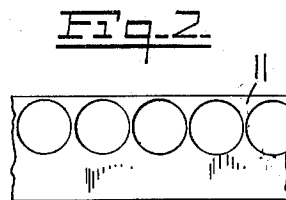
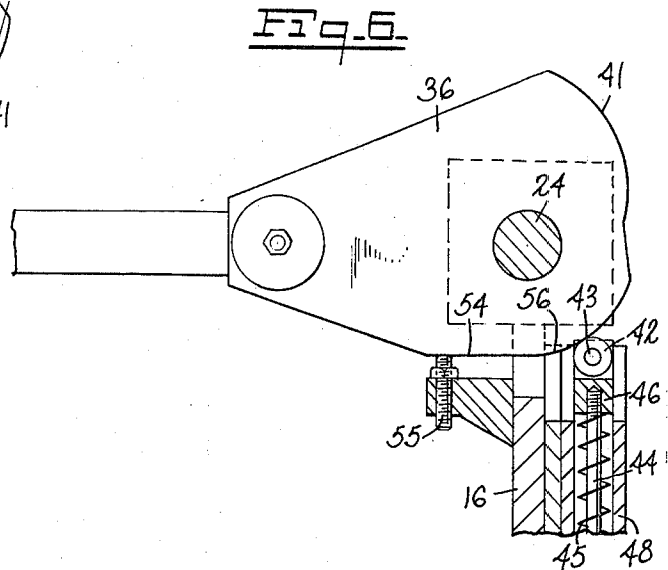
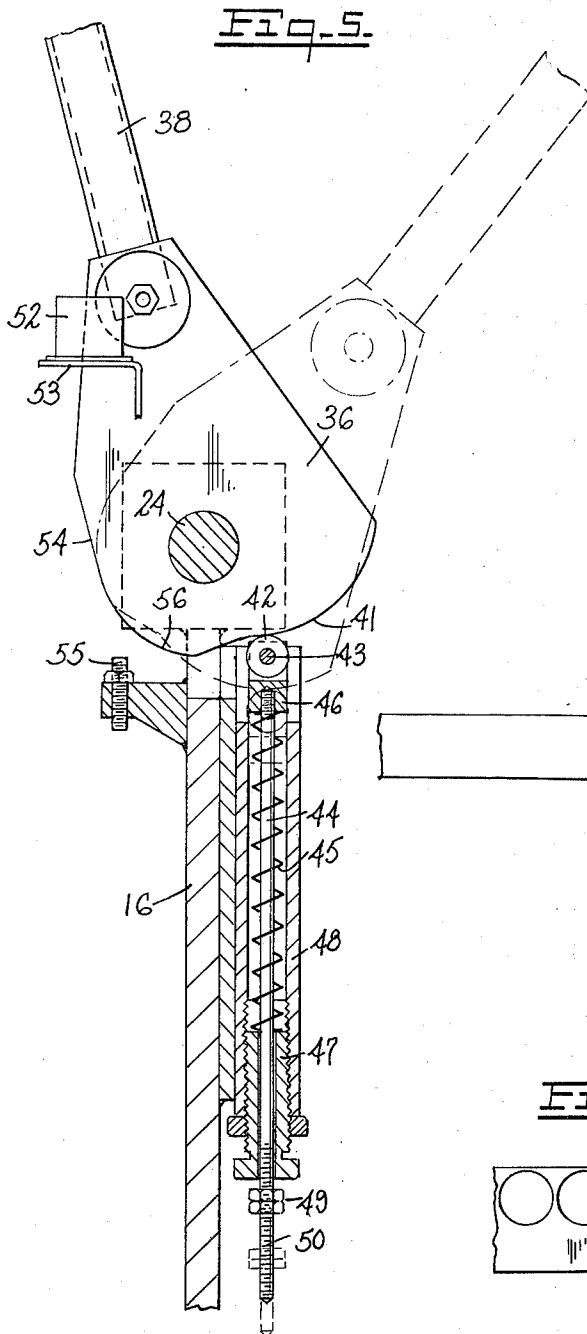
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3 Sheets-Sheet 2



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Fig. 8.

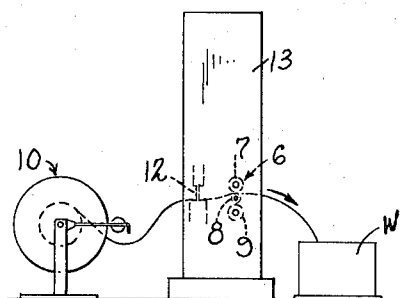
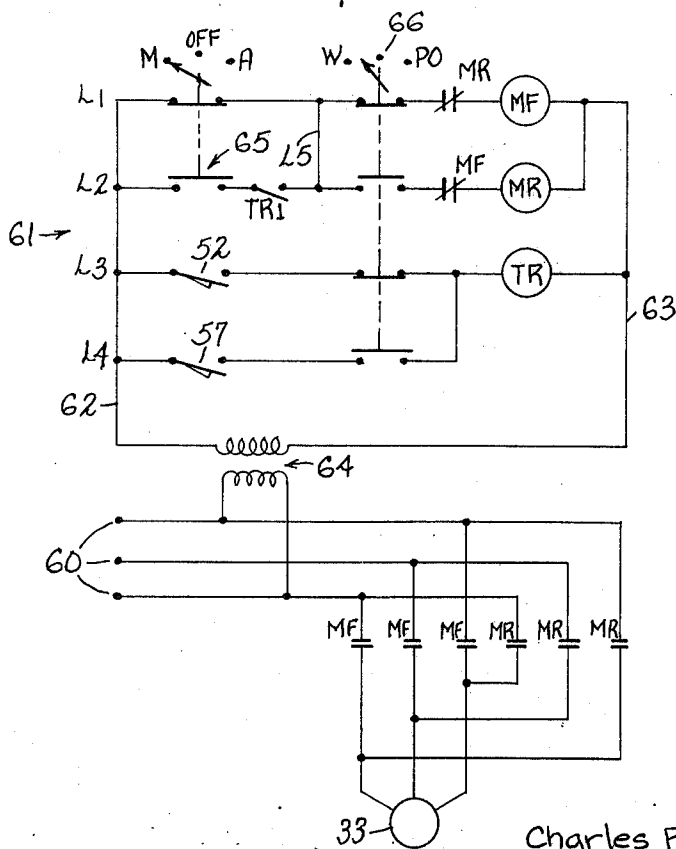


Fig. 7.



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REVERSING FEED STAND ASSEMBLY

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9 Claims

ABSTRACT OF THE DISCLOSURE

This disclosure relates to apparatus for taking up strip material where a single reel is utilized to first take up and then pay out the strip material as required for double passing of this material through a process. The reel is power-driven in both modes of operation. In the take-up mode of operation, the material being taken up is first passed around a pulley carried on a biased arm and as the tension in the material increases, it rotates the arm which actuates a switch to interrupt the reel drive means. In the second or pay-out mode of operation, the same arm is rotated to a different position so that as slack in the material decreases as it is being pulled into the process equipment, the drive means is energized to pay off material from the reel until a desired degree of slack is again achieved in the paid-off line.

This invention relates to apparatus for accumulating and paying off strip material, and more particularly relates to a power-driven reel adapted to operate in either one of two modes.

The present invention provides a reeling assembly for taking up and paying off material which includes new and improved means for providing tension during take-up or slack during pay-off of the strip material and automatically actuating the reel drive means intermittently to take up or dispense the material with the required tension or slack therein. In addition, the reel is arranged to realign the strip taken up after the first pass so that a second pass will present the correct edge of the strip to the tools.

Such apparatus is useful in conjunction with presses known as eyelet machines which blank material from a metal strip and form the same onto articles on a progressive station machine. In such an instance material in strip form, such as metal, is fed through the machine and blanked on one-half of the strip width and thereafter the strip is fed back in the other direction to blank out on the other side of the strip. The reduction in scrap loss resulting from such double-row blanking or double passing, as it is sometimes referred to, is well known in the metal working industry. In such an environment, one of the critical factors is that the feeding of the strip material is controlled by the processing machine and must be intermittent inasmuch as the tool acting upon the strip is intermittent. Additionally, sufficient slack must be permitted in the strip entering the forming machine so that there are no tensional forces acting on the strip as it is positioned beneath a blanking die.

An object of this invention is to provide a new and improved device for reeling in and paying off strip material intermittently.

Another object of this invention is to provide a new and improved reeling apparatus which is energized when either in the take-up or paying-out mode for operation by the tension in the strip during take-up or slack in the strip during pay-off.

A further object of this invention is to provide a new and improved device for reeling in and paying off strip

material which is being double row blanked and which has the ability to realign the strip as required for the second pass without need to lift or transport the strip to a new location.

The features of the invention which are believed to be novel are particularly set forth and distinctly claimed in the concluding portion of this specification. However, the invention both as to its operation and organization, together with further objects and advantages thereof, may best be appreciated by reference to the following detailed description taken in conjunction with the drawings, in which:

FIG. 1 is a view in elevation representing a device embodying the invention used in conjunction with a progressive forming machine in the take-up mode of operation;

FIG. 2 is a view of a section of strip material which has made the first pass through the forming machine of FIG. 1;

FIG. 3 is an elevation of a reeling apparatus embodying the invention;

FIG. 4 is an elevation of the apparatus of FIG. 3 seen from the right side of FIG. 3;

FIG. 5 is a view partly in section seen in the plane of lines 5—5 of FIG. 4;

FIG. 6 is a view partially cut away of the mechanism of FIG. 5 shown in a different operating position;

FIG. 7 is a schematic diagram illustrating the manner in which the reel drive motor is intermittently operated; and

FIG. 8 is a view similar to FIG. 1 showing the device in the pay-out mode of operation.

Apparatus embodying the invention is generally represented by the reference numeral 10 as shown in FIGS. 1 and 3. Strip material 11 is paid off from a conventional coil pay-off device 4 through a feeding mechanism 6 in the form of intermittently driven rolls 7, 8 and 9, to reel 10. The feeding mechanism may be of any conventional form and the rolls 7, 8 and 9 are merely exemplary. Material 11 is paid off from device 5 by the action of the feeding mechanism 6 to the first station of operation, a punching station 12, in a progressive forming machine, such as an eyelet machine 13. The strip 11, as shown in FIG. 2 is blanked in successive steps at station 12 during its first pass through the forming machine. Subsequently, when the entire reel of material has been paid off device 4 and taken up on reel 10, the material is paid off reel 10 and the other side thereof blanked. On the second pass the material 11 is passed between rollers 6 and 7 as shown in FIG. 1. At this time the remains of the strip 11 may be fed into a waste receptacle W, FIG. 8.

The apparatus 10 as shown in full line in FIG. 3 is adapted to take up the strip 11 thereon after its first pass through machine 13 and will be spoken of as being in the take-up mode of operation. The apparatus comprises a base or platform member 15 having a plurality of radially extending legs 15a. A column 16 extends vertically from base 15. The column 16 is rotatably carried about a shaft 17 on platform 15 and adapted to be rotated 180 degrees and locked in such position by a latching mechanism. The latching mechanism comprises a pin 18 extendable through apertures 19 in plate 20 carried on column 16. Plate 20 abuts the upstanding portion of one of angles 21 and pin 18 drops below the upper surface of one of legs 15a. Column 16 is recessed above shaft 17 to provide clearance for a reel 22. Column 16 has a shaft mounting bracket 23 adjacent the top thereof, through which extends a shaft 24.

Rotatably mounted on shaft 24 is the hub 25 of reel 22. Reel 22 may be removed from shaft 24 by removing

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the nuts 26 and sliding reel 22 from shaft 24. Shaft 24 includes a reduced diameter portion 27 which is threaded to receive the lock nuts 26. Reel 22 further includes drum portion 28 about which material 11 is wound, end supports 29 and a pulley 30. Reel 22 is rotated by means of belt 31 on pulley 30 driven by a pulley 32 on the shaft of a motor 33. Motor 33 is carried on a bracket 34 on column 16.

Rotatably mounted on shaft 24 is a cam positioning member 36 having a hub portion 37. Extending from member 36 is an arm 38 rotatably carrying at the end thereof a drum-like pulley 39.

Positioning member 36 is more clearly shown in FIGS. 4 and 5. Member 36 has a camming surface 41 adapted to be acted upon by a biased roller 42, rotatably carried on a shaft 43 at the end of a rod 44. A compression spring 45 disposed about rod 44 forces a member 46 carrying shaft 43 into contact with surface 41. The lower end of spring 45 bears upon a member 47 which is threaded within channel defining member 48. The bias of spring 45 may be adjusted by the position of member 47, and travel of rod 44 is limited by means of the nuts 49 on the threaded portion 50 of rod 44. A proximity switch 52 is carried on a bracket 53 supported on bracket 23. Switch 52 is closed when arm 38 is in the position shown in full line in FIGS. 3 and 5.

When motor 33 commences to take up material 11 around pulley 39 the tension in strip 11 will rotate arm 38 toward the position shown in broken line in FIG. 5 against the bias of spring 45. When this occurs, switch 52 will open and interrupt operation of motor 33. Then as additional strip is fed toward reel 22, the tension therein will decrease and arm 38 and member 36 will move back towards the full line position shown in FIG. 4 under the bias of spring 45 and roller 42. When this occurs switch 52 will again close and energize motor 33 to take up additional strip material 11.

When the reel is to be operated in the pay-out mode, the arm 38 and member 36 are rotated to the position shown in broken line in FIG. 3, and as more clearly shown in FIG. 6. In this position surface 54 of member 36 contacts an adjustable stopping member in the form of a screw 55. In this position, switch 57 on the end of arm 38 is positioned to sense the position of the strip 11 as it is paid off from reel 22. When the slack decreases, strip 11 will bear against switch 57 which will then energize motor 33 to pay off material. As the material is paid off the slack decreases and switch 57 is opened de-energizing motor 33.

In the manners described, the reel thus intermittently operates to maintain a predetermined amount of slack in the strip being wound on or being paid off from the reel. The switches 52 and 57 may be of any convenient form that serves the desired function.

An electrical circuit for control of the operation of motor 33 is shown in FIG. 7. As shown, motor 33 is a three-phase motor which is energized from terminals 60 connectable to a three-phase source. Motor 33 may be operated in a forward direction which will be considered take-up when relay contacts MF are closed or in a reverse direction which will be considered pay-off when relay contacts MR are closed. A circuit 61 is provided for the controls of motor 33 and generally comprises bus lines 62 and 63 which have a control voltage applied thereacross by a transformer 64 having its primary winding connected to two of terminals 60. Control circuit 61 comprises a selector switch 65 which is of a three-way construction adapted to select a manual operation M, an off position OFF and a position for automatic operation A. Switch 65 is adapted in the manual mode of operation to close contacts in line L1 and when in an automatic mode of operation to close contacts in line L2. Proximity switches 52 and 57 are disposed in lines L3 and L4, respectively, and both are in series with a timing relay TR. Timing relay TR has a contact TR1 in

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line L2 which is closed for a predetermined length of time when relay TR is energized. A directional switch operable to select windup W or pay-out PO modes of operation is adapted to close contacts in lines L1, L2, L3 and L4. Disposed in line L1 is a relay MF which controls contactors MF. In line L2 is a relay MR which controls relays MR. The relays MF and MR dependent upon energization thereof determine the direction of rotation of motor 33.

Assume that the manual mode of operation is selected, then so long as the switch is on the contact M, one of relays MF or MR will be energized dependent upon the position of directional switch 66. In the automatic mode of operation switch 65 closes contacts in line L2 which will then permit relays MF or MR to be energized when timing relay TR becomes energized. In the windup mode of operation, relay TR becomes energized when proximity switch 52 is closed. When relay TR is energized, it picks up its contact TR1 in line L2 and then relay MF is energized through the connection L5 of line L2 to line L1. When relay TR times out it opens its contact TR1 and will de-energize relay MF.

When the pay-out direction is selected and switch 66 moves to the pay-out position, and if proximity switch 57 is closed, relay TR will become energized and pick up its contact TR1, thus allowing reverse relay MR to be energized in line L2. Relays MF and MR control the contacts MF and MR, respectively, to determine the direction of operation of motor 33.

Consider now the operation of the mechanism to take up strip material from the pay-out device 4 as shown in FIG. 1. As the rollers 8 and 9 draw the strip 11 through machine 13, the slack between the machine 13 and reel assembly 10 increases and the arm 38 moves to the position shown in FIG. 3 under the bias of spring 45. At this point, proximity switch 52 is closed and timing relay TR is energized. Relay TR picks up its contact TR1 and relay MF is thus energized through lines L2-L5 and a portion of line L1. When relay MF is energized, it drops out its contact in line L2 and picks up its contact in circuit with the motor to energize motor 33. Motor 33 will now run to take up the strip material on the reel and about pulley or roller 39. This creates tension in the strip 11 which produces clockwise rotation of arm 38 as viewed in FIG. 3 and resulting opening of proximity switch 52. When proximity switch 52 opens, relay TR is de-energized and upon timing out opens its contact TR1 which de-energizes relay MF which, in turn, opens its contacts MF in the motor circuit and de-energizes motor 33. As additional slack is created in the strip 11 between station 12 and the reel assembly 10, arm 38 will rotate in a counterclockwise direction under the bias of spring 45 to again close proximity switch 52 and initiate the operation of motor 33 as previously described.

Assume that the reel assembly 10 in FIG. 1 has wound thereon all of the strip from pay-out device 9 and it is desired to put the strip 11 back through the apparatus 13. In such case reel assembly 10 is rotated 180 degrees and locked in the new position through the locking mechanisms previously described. Then, the arm of reel assembly 10 is moved to its horizontal position as exemplified in FIG. 8 and in FIG. 3 in broken line. The strip material is now threaded between rollers 7 and 8, and may be directed into a refuse receptacle W. The control, by means of switch 66 is then moved to the pay-out mode of operation. The reel assembly is now ready for operation to pay out material to station 12 as the material is drawn by rollers 7 and 8. In reversing the reel assembly, the material is automatically positioned with the unpunched side beneath the punch of station 12.

In the pay-off mode of operation under automatic control the switch 66 is set to the terminal PO so that relay TR may be energized to line L4 when proximity switch 57 is closed. Under this condition of operation the contacts of switch 66 in line L2 are closed.

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The operation of the motor control circuit is then similar to that previously described, the only difference being that relay MR will be energized instead of relay MF.

It may thus be seen that applicant has provided a new and improved material take-up, realignment and pay-off apparatus which may be changed from one mode of operation to the other with great facility. The apparatus embodying the invention further includes new and improved and greatly simplified apparatus for sensing tension or lack of slack in the strips.

Accordingly, the objects of the invention set forth as well as those made apparent from the foregoing disclosure are efficiently attained. While a preferred embodiment of the invention has been set forth for purposes of disclosure, modifications thereto as well as other embodiments which do not depart from the spirit and scope of the invention may occur to others skilled in the art. Accordingly, the appended claims are intended to cover all embodiments of the invention and modifications of the disclosed embodiments which do not depart from the spirit and scope of the invention.

What is claimed is:

1. In combination a reel, means supporting said reel about a rotative axis, an arm rockably mounted about an axis coaxial with the axis of said reel, means at the end of said arm for guiding strip material to said reel, said reel being adapted to take up material over said pulley, drive means for said reel, a switch for energizing said drive means, means biasing said arm toward a position to operate said switch to energize said drive means, said arm being arranged to rotate from said biased position under tension of material being wound on said reel over said guiding means and operate said switch to de-energize said drive means.

2. The combination of claim 1 further including, a base member, a column extending vertically from said base member, said column providing said means for supporting.

3. The combination of claim 2 wherein said column is rotatably mounted to said base about a vertical axis, and means for locking said column in positions essentially 180 degrees apart.

4. The combination of claim 1 further including a base, a column extending from said base, a shaft supported from said column providing said means for supporting said reel, said arm being mounted at one end thereof on said shaft.

5. The combination of claim 1 further including a shaft providing said rotative axis, a support member for said arm rockably mounted to said shaft, said support member having a cam surface adapted to be acted upon by said biasing means.

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6. The combination of claim 5 wherein said cam surface is contoured so that tension in said strip material rotates said arm against said biasing means, and said biasing means urges said support member and said arm to a position to close said switch when tension in the strip material is relieved.

7. The combination of claim 1 wherein said arm is positionable in a generally horizontal position, stop means, said stop means acting to maintain said arm in said generally horizontal position, a second switch carried on the end of said arm and adapted to energize said drive means, said second switch being effective to sense position of the strip material being paid from said reel and energize said drive means to pay material from said reel.

8. In combination a reel, means supporting said reel about a rotative axis, an arm rockably mounted about an axis coaxial with the axis of said reel, a pulley on said arm, said reel being adapted to take up material over said pulley, drive means for said reel, a switch for energizing said drive means, means biasing said arm toward a position to operate said switch to energize said drive means, said arm being arranged to rotate from said biased position under tension of material being wound on said reel and operate said switch to de-energize said drive means, said arm being positionable in a generally horizontal plane, a second switch on said arm adapted to sense when the material paid from said reel reaches a predetermined position, said second switch being effective to energize said drive means to pay material from said reel when said position is reached.

9. A take-up and pay-off reel assembly for strip material comprising a base member, an upright column mounted to said base member for rotational movement thereon, reversible drive means for said reel, a camming member mounted about a shaft coaxial with the axis of said reel, an arm extending from said camming member, a pulley rotatably mounted to said arm, means for maintaining said camming member in a first position, said means also being effective to yieldingly maintain said camming member in a second position, position sensing switches, the first of said switches being carried on said arm and adapted to sense tension in strip material being paid from said reel, the second of said switches being arranged to sense increase in tension in strip being wound onto said reel.

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