WEB CONTROL METHOD AND APPARATUS

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The present invention relates to web or strand handling machinery and more particularly and specifically to methods and apparatus for controlling and handling webs or strands in the event of their breakage.

The methods and apparatus constituting the present invention are illustrated and described herein in association with printing press equipment of the type commonly utilized in handling paper webs fed from rolls into rotary presses for printing newspapers. However, the disclosure of the present invention as adapted to printing presses is not intended to be a limitation as to the use and adaptability of the methods and apparatus disclosed, but such disclosure is merely an illustrative example of one of numerous advantageous applications of the constructions and principles constituting the present invention.

Therefore there have been provided numerous and varied control devices for webs such as used in printing presses. Predominantly these control devices have been directed toward stopping of the presses, the cutting of the web, and the accommodation of paper wrap-up in the event of web breakage.

In any event, these prior control devices have not eliminated the necessity of press shutdown and rethreading of the web through the press.

While certain prior art devices provide for a partially mechanized method for rethreading presses after a web break, thus reducing the time and labor involved in the therefore manual rethreading operations, there is no prior art control apparatus and method which eliminates all but a momentary press stoppage in order to repair a broken web and return the press to immediate operation.

It is therefore a general object of the present invention to provide control methods and apparatus for handling paper webs in printing presses in the event of web breakage.

It is a primary object of the present invention to provide control methods and apparatus for handling and repairing broken or torn webs with substantially no loss of time in press operation and without the requirement of time and labor consuming press rethreading operations.

Another object of the present invention resides in the provision of control methods and apparatus for handling and repairing broken press webs which eliminate the heretofore required web cutting and wrap-up accommodation apparatus.

A further object of the present invention lies in the provision of control methods and apparatus for effecting handling and repair of broken press webs which eliminate the possibility of the tailing end of a broken web wrapping-up in the press through the provision of means enabling the continued operation of the press with the continuous exertion of normal tension forces on the tailing end of the broken web until it is free of the press rolls.

Still another object of the instant invention is the provision of control methods and apparatus for handling press webs which are automatically actuated and set into operation upon the breakage or tearing of a web.

Yet another object of the present invention is the provision of methods and apparatus which are automatically operated upon breakage of a web to initiate operation effecting a repair of the broken web to permit the continued operation of the press until such time as the press is stopped momentarily to permit a single manual step completing the repair of the broken web, all of the operations in these methods and by this apparatus with the exception of the single manual repair step being fully automatic.

It is an additional object of the present invention to provide methods and apparatus for effecting an automatic repair of a broken web which include a web break detector apparatus operatively connected with a web repair apparatus, said web repair apparatus operating automatically upon initiation by the web break detector apparatus.

Still a further object of the instant invention is the provision of a web repair apparatus and methods of repair incident thereto which may be quickly and easily installed in conjunction with those web break detector systems now in general use.

Still another object of the present invention is the provision of apparatus, the operation of which is automatically initiated by a web break, which will instantaneously and effectively secure one end of a strip of a paper, fabric, plastic or like tape to the trailing or following end of the broken web to permit the tape to be drawn through the press continuously behind the trailing end of the broken web until the web is free of the press roll, and the press is stopped, at which time the tape may be severed from the roll and the severed end secured to the leading end of that portion of the web remaining in the press feed to the rear of the break to enable the remaining portion of the web to be drawn through the press by the tape wherein normal press operation is again resumed.

A more specific object of the present invention includes the provision of a novel apparatus and method for securing the free end of a roll of tape to the trailing end of a broken web so as to insure the secure and firm adhesion of these two members while the tape passes through the press.

Still further specific objects of this invention include the apparatus for mounting a roll of tape in a position wherein additional apparatus can operate to secure the free end of the roll to a broken web, and wherein such tape holding apparatus holds the roll continuously in a tightly wound condition permitting the tape to be withdrawn only upon actuation of the tape securing apparatus.

Lastly, it is an object of the present invention to provide methods and apparatus of the character described which are of relatively simple and inexpensive design, construction and operation, and which are easily and inexpensively adaptable to web and strand handling apparatus of the types presently in use.

These and other objects are accomplished by the constructions and arrangements together with the method steps comprising the present invention, the nature of which are set forth in the following general statement, and a preferred embodiment of which is illustrated in the accompanying drawings.

The nature of the present invention may be stated in general terms as including in conjunction with a web fed press mechanism a strip or a roll of tape supported directly above a roller in the press mechanism, adhesive means on the leading edge of said tape, means for pressing the leading edge of said tape against a web passing over said roller to firmly secure the leading edge of said tape to said web, and a web break detector mechanism in con-
continuous engagement with the web at a point in said press in advance of said tape, and means operable by said web break detector forinitiating the tape roll compression operation for engaging the tape with said web.

The nature of the method steps embodied in the present invention may be stated in general terms as including the detection of a web break, the attachment of the free end of a tape to the trailing end of the broken web, halting the press operation securing the tail end of the tape to the leading edge of the remaining web to the rear of the break and resuming operation of the press to draw the tape and the remaining web through the press.

Referring now to the accompanying drawings in which like designations indicate similar parts throughout the several views:

Fig. 1 is a schematic elevation of the apparatus constituting the present invention;

Fig. 2 is a side elevation of the tape supporting and control mechanism;

Fig. 3 is a front elevation of Fig. 2;

Fig. 4 is a sectional elevation similar to Fig. 3 with the tape roll in a withdrawn position;

Fig. 5 is a perspective view of the tape roll;

Fig. 6 is a top plan view of the leading edge of the tape;

Fig. 7 is a bottom fragmentary view of Fig. 6;

Fig. 8 is a sectional elevation on line 8—8 of Fig. 6;

Fig. 9 is a top plan view of a modified form of the leading edge of the tape;

Fig. 10 is a bottom plan view of Fig. 9;

Fig. 11 is a vertical elevation taken on line 11—11 of Fig. 9.

Referring to Fig. 1 in which there is generally illustrated a typical feed arrangement for a printing press apparatus or like web processing unit wherein a paper web 10 is fed from a roller source 11 over a series of feed rollers 12 into the press or like unit as generally indicated by the arrow 13.

The structural elements constituting the present invention in general include a web break detector apparatus generally designated at 14, a rolled strip of tape 15 supported adjacent the path of web travel into the press unit, and an actuating mechanism generally designated at 16 for moving the roll of tape into contact with the moving web.

The web break detector mechanism consists of a feeler member 17 resiliently urged by suitable apparatus 18 into tensional contact as at 19 with the moving web at a point intermediate the feed rollers 12.

Associated with the feeler 17 is an electrical switch arrangement 20 embodied in the housing of the web break detector mechanism which is connected to a source of electrical current 21 as generally indicated by arrows.

The tape roll 15 and its associated supporting and actuating mechanism 16 are positioned in spaced adjacent manner to the path of web travel at a point along the path of travel to the rear of the break detector apparatus to locate the tape at a point intermediate the break detector apparatus and the press unit. The preferred location of the tape roll 15 and its associated actuating mechanism 16 is immediately adjacent a feed roller 12, as illustrated in Fig. 1, for purposes to be hereinafter made evident.

The tape roll 15 generally consists of an elongated strip of paper, fiber, plastic or like tape rolled or wound concentrically about a spool 22. The spool 22 in turn is slidably inserted upon an axle member 23 to be rotatably supported thereon. The axle 23 is provided with a housing 24 having a pivoted side plate 25 to permit the tape spools to be inserted and removed from the axle. Additionally, that end of the axle over which the spools are inserted is provided with a pivotal ear 26 which is movable to a right angular position, as illustrated in Fig. 4, to lock the spool on the axle. This ear also serves to hold the spool tensionally against the end of a coil spring 27 seated within the housing and circumferentially encompassing the inner end of the axle therein. This tensional mount for the tape spool is sufficient to maintain the spool against accidental unwinding.

The innermost end of the axle 23 extends through the housing and is turned at right angles to be threadedly secured as at 28 to the lower end of a bar member 29 the upper end of which bar members is secured to one end of a straight core 30 of a solenoid construction 31 including a circular coil 32 in which the tape core 30 is electrically reciprocated. The upper end of the solenoid core is secured to a coil spring 33 which normally biases the core in a withdrawn position within the coil when the coil circuit is open.

The coil of the solenoid is electrically connected in series with the switch 20 of the web break detector apparatus and the source of electrical current 21.

The entire assembly of the solenoid 31, the tape housing 24 and the tape roll 15 is supported by a bracket assembly 35 in such a manner as to position the tape roll 15 at a spaced distance away from the web 10 and the feed roller 12 when the solenoid core is biased to a withdrawn position.

Turning to the particular construction of the tape roll 15 as generally indicated in Figs. 5 through 11 it can be seen that the free and leading end portion 36 of the strip of tape 37 is provided with a diamond-shaped opening 38 through the opposed faces of the strip. The outwardly disposed face of the strip 37 is provided over a substantial area, an area in excess of the area of the opening 38, with an adhesive substance 39 to present an adhesive surface outwardly of the roll as well as inwardly of the roll through the opening 38. By this construction the adhesive substance presented inwardly through the opening 38 will adhere to the outer face of the strip on the roll causing the free end 36 of the tape to be retained tightly in concentric continuity with the strip as it is rolled on the spool 22.

By the employment of the diamond-shaped opening 38 in the tape the extent of the adhesive surface at the beginning and the end of the tape "pull off" is advantageously kept small whereby failure of the tape to follow the web is kept to a minimum.

The modified construction as is illustrated in Figs. 9 through 11 discloses an adhesive substance 40 provided on the outer face of the tape strip 37 over a substantial area thereof. One corner of the strip 37 is removed as at 41 to provide an oppositely disposed adhesive surface 42 over a small area of the opposite face of the strip. Preferably the corner is so removed that the distances a and a' are equal and where the tape 37 has a width of about one inch satisfactory results are obtained when the length of a and a' is from about ¼ to ¾ of an inch.

When the apparatus as described herein is assembled for operation it is necessary that the leading end portion of the strip of tape on the tape roll 15 be disposed directly above the web at that point where it passes over the feed roller 12, the tension of the coil spring 27 in the tape roll housing operating to maintain the tape roll in this fixed position.

In operation of the assembled apparatus as described, the electrical circuit from the source 21 is normally maintained in an open circuit condition with the web break detector apparatus. On the occurrence of a break in the web movement of the web break feeler 17 will close the switch 20 thereby energizing the coil 32 of the solenoid 31 projecting or extending the core 30 outwardly and downwardly therefrom.

Extension of the core 30 of the solenoid will move the entire through the open circularly and tape roll downwardly to compress the leading free end portion 36 of the tape against the web as it moves over the feed roller 12, before the severed end reaches the roller, thereby
causing adherence of the adhesive substance on the outer face of the strip of tape to the web over a sufficient area to cause the release of the adhesive substance exposed through the opening in the strip thereby permitting the tape to be drawn from the spool against the slight tension of the coil spring to the print roll.

When the press operation has been halted it is necessary to sever the tape from the roll and to secure the end of the severed tape portion by suitable adhesive or the like to the leading edge of the web remaining behind to the rear of the break therein. When the tape has been secured to the web in this manner then press operation can again be resumed and the remaining web portion will be drawn through the press in proper threading arrangement by the tape and press operation can be continued from this point without the necessity of re-threading.

From the foregoing it is now apparent that new and improved web control methods and apparatus have been provided which satisfy all of the objects and advantages heretofore set forth.

It is also evident that apparatus and methods have been described which are readily adaptable for use in substantially any type of processing equipment into which web or strand material is fed.

It is still further evident that methods and apparatus are provided by the present invention which may be incorporated in web and strand processing units in the path of web or strand travel through the unit at points therein at which web or strand breaks are to be anticipated in the normal operation of the unit.

It is to be understood that the specific details of construction of the instant apparatus as described and shown herein are merely illustrative of the possible constructions and principles inherent in the spirit and scope of the present invention and that other modifications and arrangements for the purpose of accomplishing the same improved functions and results are fully contemplated.

For example while in the preferred form of the invention the strip of tape is wound upon itself to form a roll, it will be evident that the tape may be employed in other forms such as being folded upon itself to form a package having a free end as is well known in the art.

In the foregoing description certain terminology has been used for the sake of brevity and clearness of understanding and no unnecessary limitations are to be implied from this terminology beyond the requirements of the prior art and beyond the scope of the hereinafter appended claims.

Having now described the present invention as it is embodied in structure and method and the advantageous new and useful results obtained thereby, the invention is hereinafter set forth in the appended claims.

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