

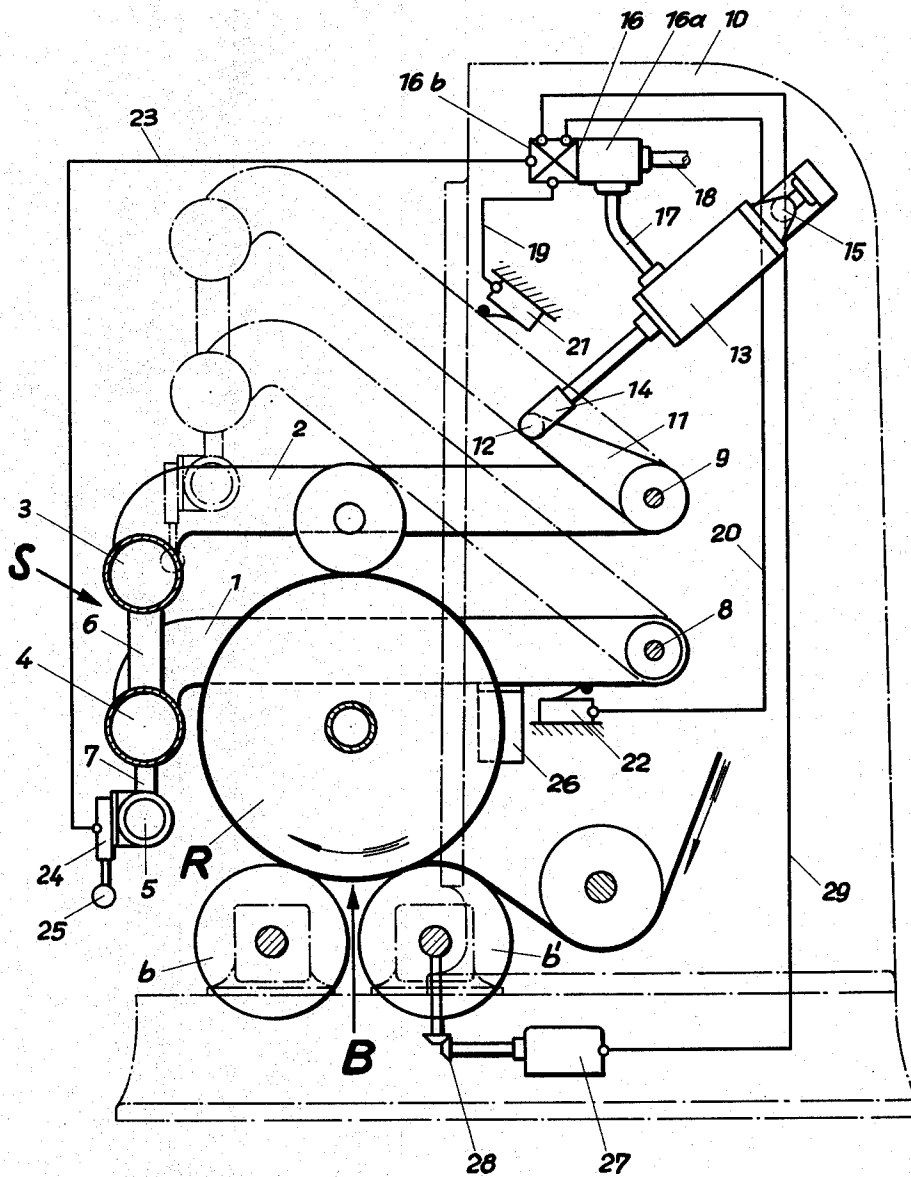
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SAFETY MEANS FOR PAPER WINDING MACHINE

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SAFETY MEANS FOR PAPER WINDING MACHINE

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6 Claims. (Cl. 242-66)

This application is a continuation-in-part of my co-
pending application, Serial No. 182,290, filed March 26,
1962, now abandoned, and entitled, "Safety Means for
Paper Winding Machines."

This invention relates to paper machinery, and more
particularly to safety means for use with machines in
which the paper roll is supported by a roller bed, with
such safety means preventing an unintentional or acciden-
tal dislodging of the paper roll from the roller bed.

In the customary machines for the winding and the
longitudinal cutting of paper webs, there are generally
provided through winding shafts or axles on which are
mounted the sleeves or shells upon which the webs are
wound. The ends of the shafts or axles are carried in
bearing means located on the machine frame. A dis-
lodging of the paper roll from the supporting roller bed
in such an arrangement is possible only when the caps
of bearing means on the frame are opened. However,
the insertion and withdrawal respectively of the winding
shaft or axle requires considerable space, since the same
must be inserted and withdrawn sideways respecting the
wound roll. Furthermore, the handling of a through shaft
or axle presents considerable difficulties due to the great
weight thereof.

A substantial improvement on the above arrangement
has been achieved by the so-called "axle-less winding."
More specifically, the paper web is wound on a shell,
or a group of shells, respectively, and the same is merely
clamped between laterally disposed holding pins. This
arrangement does present the danger that the paper roll
may be lifted or dislodged from the support roller bed
due to forces developed in the winding process at high
speeds, and then be discharged from the machine.

With an increasing roll diameter, constantly increasing
forces develop, and these forces are capable of throwing
the roll from the support roller bed. This is especially
true where the roll is unbalanced, such as when the roll
is out-of-round, and since these machines operate at a
paper speed of 2000 m. per minute, it will be appreciated
that these forces present a serious problem. In actual
practice, there have been numerous cases where the roll
has been thrown from the bed by these forces which
resulted from increasing roll diameter, and in each case
considerable damage was done.

This danger exists particularly with the simultaneous
winding of several paper webs arranged in side by side
relationship upon a plurality of shells which due to the
occurrence of axial pressure, are combined into one rigid
winding body.

To avoid this danger, the present invention broadly com-
prises a safety means including a frame means located
on the service side of the machine operably linked by
lever means to the machine frame for upward and down-
ward movement.

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The frame means, which has a length dimension cor-
responding to the width of the entire paper web, is car-
ried by a system of levers, the levers being disposed in a
fashion of a quadrilateral bell crank linkage with the
components thereof so arranged that the frame means
can assume a vertical position throughout its entire path
of movement. By virtue of this arrangement, an unde-
sirable large outward projection of the frame means during
its upward and downward movement is prevented.

More specifically, the invention includes an axleless shell
on which the paper web is wound, a pair of rollers for
supporting the shell, a safety means associated with the
shell, the safety means comprising at least two vertically
spaced tubes extending horizontally of the machine and
being of such length as to correspond to the width of
the web being wound on the shell, pairs of levers, each
pair of levers being connected at one of their ends to a
tube, means pivotally mounting the other ends of the
pairs of levers to the machine for upward and downward
movement, drive means for moving the levers and tubes
upward and downward, means connecting one of the pairs
of levers to the drive means, switch means determining
the upper and lower limits of the pairs of levers, means
operably connecting the respective switch means to the
drive means for interrupting the drive means when one
of the pairs of levers engages one of the switch means,
feeler means carried by the lowermost tube, further switch
means actuated by the feeler means when the feeler means
contacts an obstacle in the path of movement of the
safety means, means connecting the further switch means
to the drive means for interrupting the drive means, and
further means operably associated with one of the sup-
porting rollers and with the drive means operative for
allowing upward movement of said levers and tubes only
when the rotational speed of the shell drops below a
predetermined speed.

Further objects and advantages of the invention will be-
come more readily apparent from the following detailed
description and annexed drawing, and which drawing illus-
trates diagrammatically the safety means incorporated in
a machine in which the paper roll is supported by two
rollers.

In the drawing it will be noted that paper roll R is
supported by a roller bed B, and a safety means S is oper-
ably associated with the roll R. The roller bed B includes
a pair of rollers *b, b'* which operate at high speed as is
well known in the art. The paper roll is wound on an
axleless shell of the type well known in this field.

The safety means S includes levers 1 and 2 which
are spaced vertically, and a frame means defined by
spaced apart parallel tubes 3, 4, 5 and straps 6, 7 joining
the tubes 3, 4 and 4, 5, respectively. The tubes 3, 4, 5
are of such length as to correspond essentially to the
width of the entire paper web.

The ends of the levers 1, 2 remote from the tubes 4, 3,
are carried by shafts or axles 8, 9, respectively, rotatably
mounted in lateral frame components 10 of the machine.
To move the levers 1, 2 and hence the frame means,
there is provided a piston-cylinder assembly 13 which
is pivoted to the machine, as shown at 15. Piston rod
14 of the assembly 13 is pivotally connected at 12 to a
lever 11 which in turn is rigidly secured to the shaft 9.

It will be seen that when the piston rod 14 is retracted,
the safety means S will be moved from the lower or full

line position to the upper or dot-dash line position and in which latter position, the safety means S is away from the paper roll R. In order to actuate the piston-cylinder assembly 13, there is provided a magnetically controlled valve 16. Control part 16a of the valve communicates with one end of the cylinder via a conduit 17, and with a source of air pressure (not shown) via a conduit 18.

Electrical part 16b of the valve 16 is connected via leads 19 and 20 with upper and lower switch means 21 and 22, respectively, and via lead 23 with switch means 24 associated with feeler components 25 carried by the lower tube 5.

When air is admitted into the cylinder, the piston rod is retracted and through the lever 11, the safety means is moved to the dot-dash line position and engages the upper switch means 21 whereby the valve 16 is closed, and thus interrupts the working stroke of the piston-cylinder assembly. The lower position of the safety means is determined by a stop 26 which serves as a seat for the lever 1, and when the lever 1 engages the lower switch means 22, the valve 16 is closed, thereby interrupting the working stroke of the assembly 13.

The downward movement of the safety means S is interrupted at any position when the feeler components 25 encounter some obstacle, since the switch means 24 is closed, thereby closing the valve 16 and stopping the operation of the piston-cylinder assembly 13. This latter arrangement is particularly important in that the frame means cannot be lowered if the operator or some other obstacle is in the path of movement of the frame means.

A further important safety factor is that the drive for the swinging movement of the safety means S is made so dependent on the drive for the machine that the safety means can only be moved out of its effective range if the rotational speed of the winding roll falls below a certain point. By virtue of this arrangement, the safety means will always be in the safety position if the winding roll has reached such a speed that the roll can be thrown out of the machine.

To accomplish this result, it will be noted that a speed responsive control 27 is mechanically connected as at 28 with the axle of the bed roller b' and via lead 29 with the electrical part 16b of the valve 16. The control 27 is so designed that when the winding roll has attained a certain speed, actuation of the valve 16 is prevented so that at higher rotational speeds, the safety means S cannot be moved out of the zone of the winding roll.

The speed responsive control 27 is a commercially available unit and includes a centrifugal governor connected in series with a small drive. The transmission gearing has the function of assuring the centrifugal force becoming effective even at low r.p.m.'s derived from the bed roller. The centrifugal governor, per se, is of known type, namely spring loaded rocking levers provided with weights at their free ends.

With increasing r.p.m., the levers move outwardly under the influence of the centrifugal force of the weights, and upon reaching a certain r.p.m. activates an electric switch, and via lead 29 to the electrical portion 16b of the valve prevents actuation of the piston-cylinder assembly 13 at higher r.p.m.'s.

The invention is not to be confined to any strict conformity to the showings in the drawings, but changes or modifications can be made therein so long as such changes or modifications mark no material departure from the spirit and scope of the appended claims.

What I claim is:

1. In a paper winding machine, an axleless shell on which a paper web is adapted to be wound, a pair of rollers for supporting said shell, safety means operably associated with said shell for preventing the unintentional dislodgement of said shell from said pair of rollers during high speed winding due to imbalance of said shell, said safety means including at least two vertically spaced

tubes extending horizontally of the machine and being of such length as to correspond to the width of the web being wound on said shell, pairs of levers, each pair of levers being connected at one of their ends to a tube, means pivotally mounting the other ends of said pairs of levers to said machine for upward and downward movement, drive means for moving said levers and tubes upward and downward, means connecting one of said pairs of levers to said drive means, switch means determining the upper and lower limits of said pairs of levers, means operably connecting the respective switch means with said drive means for interrupting said drive means when one of said pairs of levers engages one of said switch means, feeler means carried by the lowermost of said tubes, additional switch means actuated by said feeler means when said feeler means contacts an obstacle in the path of movement of said safety means, and means operably coupling said additional switch means to the drive means for interrupting said drive means.

2. The paper winding machine as claimed in claim 1, including means for preventing upward movement of said levers and tubes upon the rotational speed of the shell exceeding a predetermined speed.

3. In a paper winding machine, an axleless shell on which a paper web is adapted to be wound, a pair of rollers for supporting said shell, safety means operably associated with said shell for preventing the unintentional dislodgement of said shell from said pair of rollers during high speed winding due to unbalance of said shell, said safety means including a frame located on the service side of the machine, means pivotally connecting said frame for upward and downward movement relative to said shell, drive means for moving said frame upward and downward, switch means for determining the upper and lower limits of the frame, means connecting the switch means with the drive means for interrupting the drive means when the frame engages one of the switch means, feeler means depending from the frame means, further switch means actuated by the feeler means when the feeler means contacts an obstacle in the path of movement of the frame, and means connecting the further switch means to the drive means for interrupting the drive means.

4. The paper winding machine as claimed in claim 3, including means operably associated with one of the supporting rollers and with the drive means operative for allowing upward movement of said frame only when the rotational speed of the shell drops below a predetermined speed.

5. In a paper winding machine, an axleless shell on which a paper web is adapted to be wound, a pair of rollers for supporting said shell, safety means operably associated with said shell for preventing the unintentional dislodgement of said shell from said pair of rollers during high speed winding due to unbalance of said shell, said safety means including a frame located on the service side of the machine, means pivotally connecting said frame for upward and downward movement relative to said shell, drive means for moving said frame upward and downward, switch means for determining the upper and lower limits of said frame, means operably connecting said switch means with said drive means for interrupting the drive means when said frame engages one of said switch means, and means for preventing upward movement of said frame upon the rotational speed of the shell exceeding a predetermined speed.

6. In a paper winding machine, an axleless shell on which a paper web is adapted to be wound, a pair of rollers for supporting said shell, safety means operably associated with said shell for preventing the unintentional dislodgement of said shell from said pair of rollers during high speed winding due to unbalance of said shell, said safety means including a frame located on the service side of the machine, means pivotally connecting said

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frame for upward and downward movement relative to said shell, drive means for moving said frame upward and downward, switch means for determining the upper and lower limits of said frame, means operably connecting said switch means with said drive means for interrupting the drive means when said frame engages one of said switch means, and means operably associated with one of the supporting rollers and with the drive means operative for allowing upward movement of said frame only when the rotational speed of the shell drops below a predetermined speed.

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MERVIN STEIN, *Primary Examiner.*