

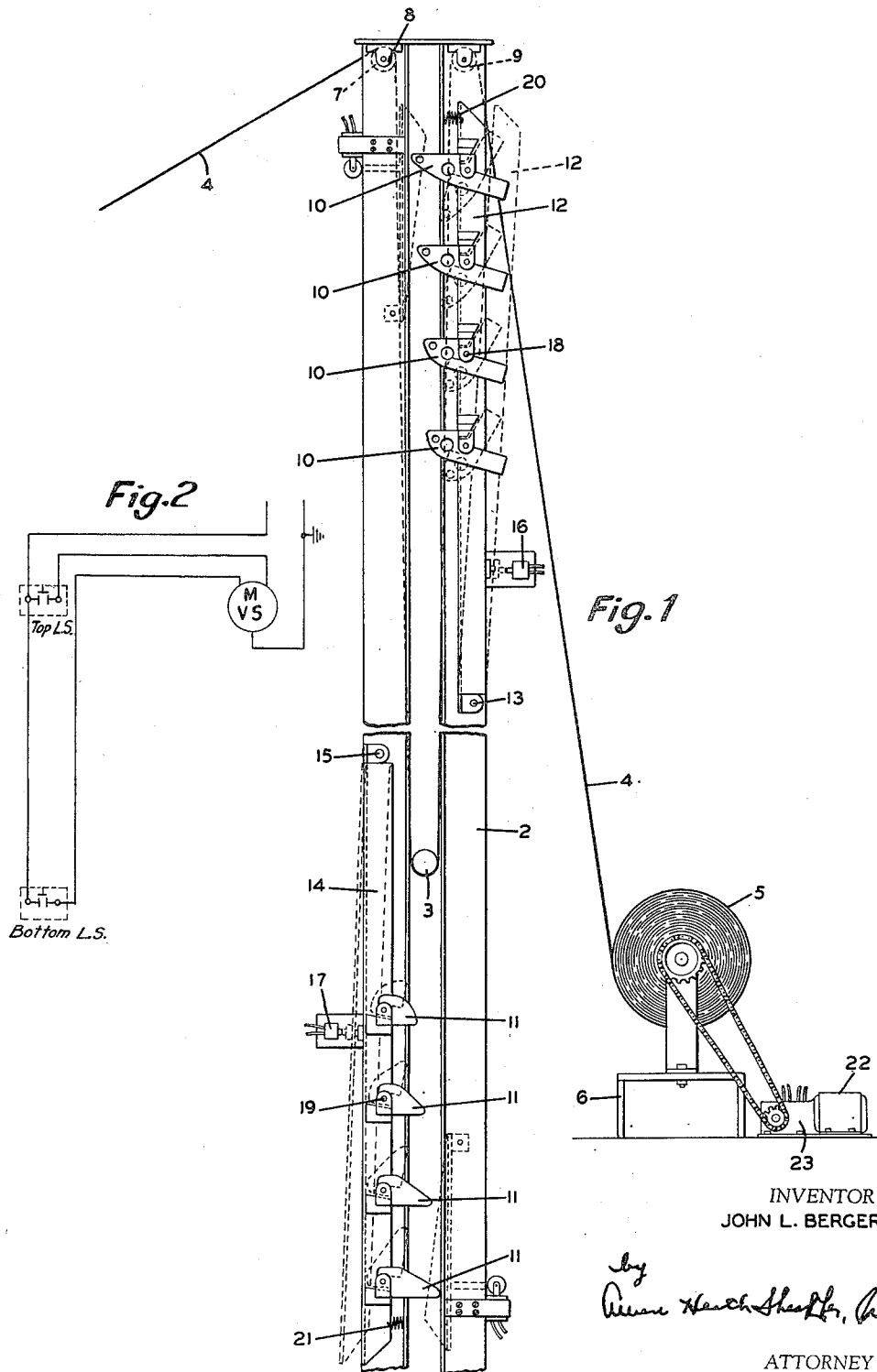
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2,800,326

SPEED REGULATOR

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2,800,326

SPEED REGULATOR

John L. Berger, Columbia, Pa.

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5 Claims. (Cl. 271—2.2)

This invention relates to a control device for regulating the speed of processing operations arranged in tandem, and more particularly for controlling the speed of a sheet-handling device by determining the amount of sheet material available to keep the device operating continuously without the possibility of tearing the sheet of material.

In the processing of sheet material such as floor and wall covering and the like, it has been common practice to run the continuous web of sheet material from one processing operation through a festoon or dip to another processing operation or roll-up device. The purpose of this festoon or dip is to provide a reserve of material so that if the preceding processing device is temporarily halted, the subsequent processing device or roll-up can continue to operate; and if the subsequent processing operation is temporarily halted, the preceding device can continue to operate during the time the subsequent operation is closed down.

In the past, this festoon between tandem processing operations was provided with a dancer roll which rested on the material in the festoon and kept a certain amount of tension on the material. Safety switches are provided at the top and bottom of the structure in which the dancer roll bearings slide so that if the roll is at the top indicating a short festoon, the dancer roll strikes a limit switch, stopping the subsequent processing operation so that the material will not be torn. A second limit switch is provided at the bottom so that when the dancer roll strikes this switch, the preceding manufacturing operation will be halted to prevent feeding an excess amount of material to the device.

The present invention has been developed as an improvement over the prior art system outlined above.

In the present system, there is provided a device for increasing the speed of the subsequent operation when the festoon of sheet material approaches its maximum length and for decreasing the speed of the subsequent processing operation when the festoon approaches its minimum length. Of course, it will be understood that the same arrangement can be utilized to control the speed of the processing operation so that its speed will be diminished when the festoon is long and increased when the festoon is short. The object of this invention is to provide a device whereby the speed of operation will be controlled by the quantity of material available to be supplied to the device.

In order that the invention may be more readily understood, it will be described in connection with the attached drawing in which:

Figure 1 is an elevational view of a device suitable for carrying out my invention; and

Figure 2 is a diagram of the electrical circuit for carrying out the invention.

The numeral 2 designates a pair of upright structural members suitable to serve as a guide for a dancer roll 3 positioned in a festoon of sheet material designated generally at 4. For purposes of illustration, the web of sheet material is wound on a roll 5 on a suitable roll-up stand 6. The roll on the roll-up stand is rotated by any conventional means such as a motor 22. The power from the motor to the roll-up device or processing operation is transmitted through a variable speed drive 23. In the embodiment here under consideration, it is the ratio of this variable speed drive 23 that is changed to meet the demands of the festoon of sheet material.

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In its path of travel from the preceding processing operation, not shown, to the roll-up device 6, the web of sheet material 4 passes over an idler roll 7 located at the top of the structural member 2. The one end of the idler roll 7 is journaled in a bearing 8 secured to the top of the structural member 2. The other end of the roll is similarly journaled in a similar structural member, not shown in this drawing. The material as it leaves the device passes over another idler roll 9 mounted in a like manner on the other member 2. The sheet material between the two idler rolls 7 and 9 hangs in a festoon weighted by a dancer roll 3 positioned in the dip of the festoon. The roll is longer than the width of the sheet material so that the roll extends beyond each edge of the sheet. Located at the top and bottom of the structure 2 are a plurality of control arms which intersect the vertical path of travel of the end of the dancer roll 3. The arms at the top are designated by the numeral 10 and the arms at the bottom are designated by the numeral 11. The arms 10 are mounted on a lever 12 which is hingedly secured to upright 2 at the point 13. The arms 11 are mounted on the lever 14, which is hingedly secured at point 15. It will be noted that the arms 10 and 11 are progressively longer toward the top and bottom of the device. The purpose of this is to insure that the levers 12 and 14 will be moved outwardly about the hinged joints 13 and 15, respectively, the same distance, regardless of which of the four arms is contacted by the roll 3. Each time the levers 12 and 14 move outwardly, they engage a contact switch. The switch for lever 12 is designated by the numeral 16 and the switch for lever 14 is designated by the numeral 17. Both of these switches 16 and 17 operate a motor, not shown, which changes the ratio of the variable speed unit 23.

Each time lever 14 strikes switch 17 the ratio of the variable speed drive operating the roll-up device changes one increment, increasing the speed of the roll-up device. The roll-up device continues to operate at this increased speed until the lever 14 again strikes switch 17, at which time the speed of the roll-up device is increased another increment. If the speed-up occasioned by the lever 14 striking switch 17 by reason of having been actuated by any of the arms 11 is such as to reverse the direction of travel of the dancer roll 3, the roll-up device will continue to operate at this speed during the full upward travel of the dancer roll until the roll contacts the first arm 10, moving lever 12 into engagement with switch 16, reducing the speed of the roll-up device one increment. The arms 10 and 11 are hingedly attached to the levers 12 and 14 so that movement of the dancer roll in one direction will engage the arms and move the lever outwardly; but movement in the other direction will merely rotate the arms 10 and 11 about points 18 and 19 respectively and will not impart any movement to the levers 12 and 14, as the case may be. The arms 10 and 11 are so mounted that they will return to their original position in the path of travel of the dancer roll by reason of their own weight after the dancer roll has passed. The levers 12 and 14 are returned to their normal position by means of springs 20 and 21, respectively. It will be understood, of course, that the arms 10 attached to lever 12 actuate the lever 12 upon the upward movement of the roll 3 and merely rotate about points 18 upon downward movement of the roll 3, while the arms 11 actuate lever 14 upon the downward movement of the roll 3 and merely rotate about points 19 upon upward movement of the roll 3.

In the operation of the device, as the roll 3 strikes the first arm 11 in its downward path of travel, the lever 14 will move outwardly about pivot point 15, striking switch 17. This will speed up the roll-up device one increment. If this is not sufficient and the roll 3 continues its downward path of travel, it will contact the second arm 11,

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moving lever 14 outwardly, again striking switch 17 and speeding up the roll-up device another increment. This operation is repeated for each of the arms 11 until the roller reaches the bottom of its path of travel, at which a limit switch is struck, stopping the preceding operation and allowing the roll-up device to catch up. If, on the other hand, the roll-up device is operating faster than the material is supplied to the device, the roll 3 will move upwardly and will strike the first arm 10 on lever 12, moving lever 12 outwardly until it strikes switch 16. This decreases the speed of the roll-up device one increment. Continued upward movement of the roll 3 will strike the other arms 10 and each arm engaged by the roll 3 decreases the speed of the roll-up device one increment until the roll 3 reaches the top of its path of travel, where it strikes a limit switch which completely stops the roll-up device. If the change of motor speed is sufficient to reverse the direction of travel of the dancer roll after it has moved beyond the arm, the dancer roll will merely rotate the arm about its hinged support on the return of the dancer roll.

In the embodiment above disclosed, each of the levers 12 and 14 is equipped with four arms, 10 and 11 respectively. With this setup, while the dancer roll 3 is moving upwardly, the speed of the roll-up can be decreased in four increments. If the dancer roll is moving down, the speed of the roll-up can be increased by four increments. It will be understood that the invention may be utilized employing a greater number or a lesser number of the arms 10 and 11, depending on the particular operation being performed.

While the invention has been described in connection with the simple roll-up device, it will be understood that the invention can be employed in controlling the speed of operation of a preceding or succeeding manufacturing process.

I claim:

1. In a device for controlling the rate of travel of the web of sheet material, the elements comprising a pair of lateral supports for said web of sheet material; means for moving said web of sheet material over said lateral supports; means for varying the speed of movement of said web; a dancer roll positioned in the festoon of sheet material formed between said lateral supports, said dancer roll moving in a predetermined vertical path of travel; a plurality of projecting contact arms extending into said predetermined path of travel of said dancer roll; a hinged lever on which said contact arms are hingedly mounted; a contact switch so positioned as to be engaged by said lever when the lever is actuated by one of said contact arms in engagement with said dancer roll; and an electric circuit connecting said contact switch with said means for varying the speed of movement of said web.

2. In a device for controlling the rate of travel of a web of sheet material, the elements comprising a pair of lateral supports for said web of sheet material; means for moving said web of sheet material over said lateral supports; means for varying the speed of movement of said web; a dancer roll positioned in the festoon of sheet material formed between said lateral supports, said dancer roll moving in a predetermined vertical path of travel; a separate hinged lever placed at each extremity of said vertical path of travel; a plurality of projecting arms hingedly mounted on each of said levers, said arms projecting into the path of travel of said dancer roll; and control means for increasing or decreasing the rate of travel of the web of sheet material over said lateral supports, said control means being connected electrically with said means for varying the speed of movement of said web, said control means being so positioned as to be actuated by either of said levers when one of said contact arms on that lever is engaged by said dancer roll.

3. In a device for controlling the rate of travel of a web of sheet material, the elements comprising a pair of lateral supports for said web of sheet material; means

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for moving said web of sheet material over said lateral supports to form a festoon between said lateral supports; means for varying the speed of movement of said web; a plurality of projecting arms extending into the path of travel of said festoon; means carried by said festoon to engage said projecting arms; a hinged lever on which said projecting arms are hingedly mounted; a contact switch so positioned as to be engaged by said lever when the lever is actuated by one of said projecting arms in engagement with the engaging means carried by said festoon; and an electric circuit connecting said contact switch with said means for varying the speed of movement of said web.

4. In a device for controlling the rate of travel of a web of sheet material, the elements comprising a pair of lateral supports for said web of sheet material; means for moving said web of sheet material over said lateral supports; means for varying the speed of movement of said web; a dancer roll positioned in the festoon of sheet material formed between said two lateral supports, said dancer roll moving in a predetermined vertical path to travel; a hinged lever positioned at the top of said predetermined vertical path of travel of the dancer roll and a hinged lever positioned at the bottom of said predetermined path of travel of the dancer roll; control means adjacent one lever for increasing the rate of travel of the web of sheet material over said lateral supports and other means adjacent the other lever for decreasing the rate of travel of the web of sheet material over said lateral supports, both of said control means being adapted to be selectively connected electrically with said means for varying the speed of movement of said web; and a plurality of projecting arms hingedly mounted on each lever, said projecting arms being so mounted that movement of the dancer roll in one direction will engage the projecting arms of one lever to move said lever into engagement with the respective control means adjacent said lever whereby the speed of movement of the web of sheet material is increased and movement of the dancer roll in the other direction will engage the projecting arms on the other lever to move said lever into engagement with its respective control means whereby the speed of movement of the web of sheet material is decreased.

5. In a device for controlling the rate of travel of a web of sheet material, the elements comprising a pair of lateral supports for said web of sheet material; means for moving said web of sheet material over said lateral supports to form a festoon of said sheet material between said lateral supports; means for varying the speed of movement of said web; a hinged lever positioned at the top of the path of travel of said festoon and a hinged lever positioned at the bottom of the path of travel of said festoon; control means adjacent one lever for increasing the rate of travel of the web of sheet material over said lateral supports and other control means adjacent the other lever for decreasing the rate of travel of the web of sheet material over said lateral supports, both of said control means being adapted to be selectively connected electrically with said means for varying the speed of movement of said web; a plurality of projecting arms hingedly mounted on each lever; and means carried by said festoon for engaging said arms, said projecting arms being so mounted that movement of the festoon in one direction engages the projecting arms of one lever to move said lever into engagement with the respective control means whereby the speed of movement of the web of sheet material is increased and movement of the festoon in the other direction engages the projecting arms on the other lever to move said lever into engagement with its respective control means whereby the speed of movement of said web is decreased.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,800,326

July 23, 1957

John L. Berger

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the grant, lines 1, 2 and 3, for "John L. Berger, of Columbia, Pennsylvania," read --John L. Berger, of Columbia, Pennsylvania, assignor to Armstrong Cork Company, of Lancaster, Pennsylvania, a corporation of Pennsylvania,-- line 12, for "John L. Berger, his heirs" read --Armstrong Cork Company, its successors--; in the heading to the printed specification, line 3, for "John L. Berger, Columbia, Pa." read --John L. Berger, Columbia, Pa., assignor to Armstrong Cork Company, Lancaster, Pa., a corporation of Pennsylvania--; in the printed specification, column 1, line 24, strike out "the", second occurrence; column 4, line 21, for "path to" read --path of--.

Signed and sealed this 1st day of October 1957.

(SEAL)

Attest:

KARL H. AXLINE

Attesting Officer

ROBERT C. WATSON
Commissioner of Patents