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Brovoll

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[54] **TENSIONING APPARATUS FOR BLANKET AND WIRES IN PAPER MACHINES**

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[51] **Int. Cl.** **F16h 7/18,** D21f 7/00

[58] **Field of Search** ..... 162/273, 274, 257; 210/400, 401, DIG. 3; 74/241, 242.11 C

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[57] **ABSTRACT**

A tension roll bearing at each end of the tension roll, in a tensioning apparatus for blanket and wires, is pivotally mounted on a carriage by an arm, so that the tension roll can be pivoted for tensioning or slacking of the blanket/wire. A bellows is connected between the bearing/arm of the tension roll and the carriage, the bellows being maintained at below a determined air pressure. On the arm/bearing, and on the carriage, cooperating switch members are arranged for starting and stopping a screw spindle motor in accordance with the pivotal movement of the tension roll bearing to return the bearing of the arm/tension roll to normal position, whereby the adjusted tension in the blanket/wire is regained.

3 Claims, 3 Drawing Figures

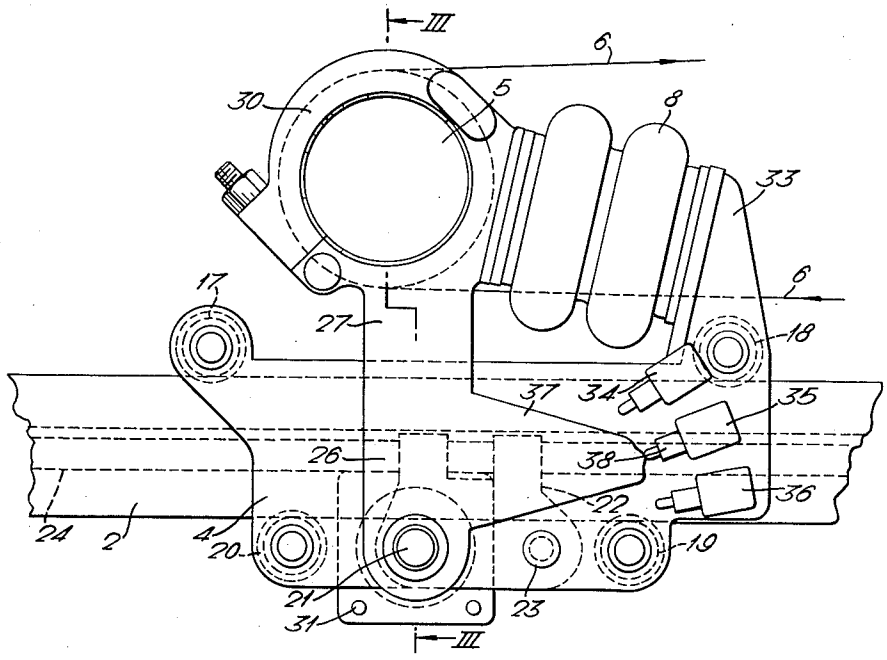
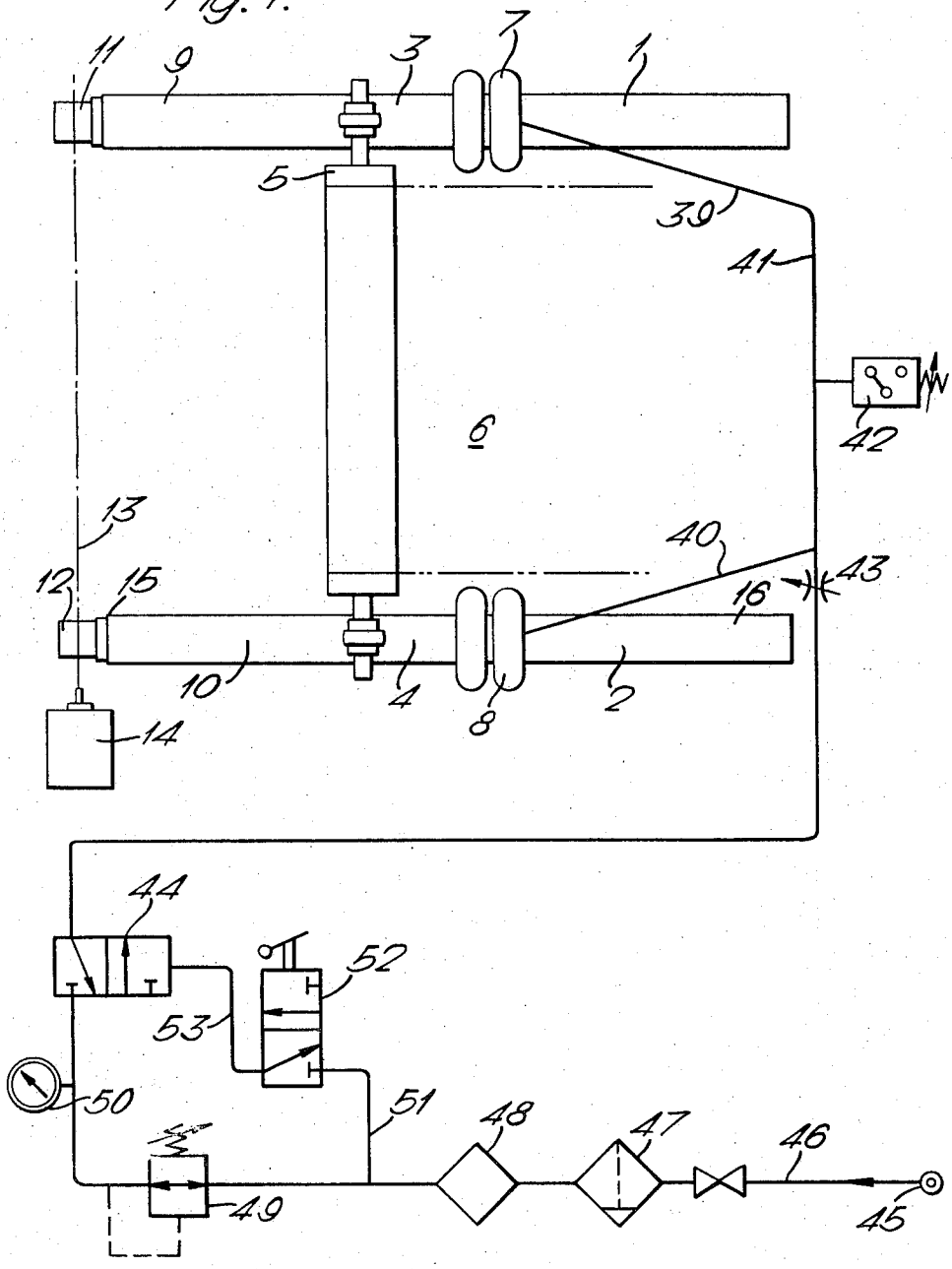


Fig. 1.


11
9
3
7
1
5
30
41
6
42
13
40
12
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4
8
2
14
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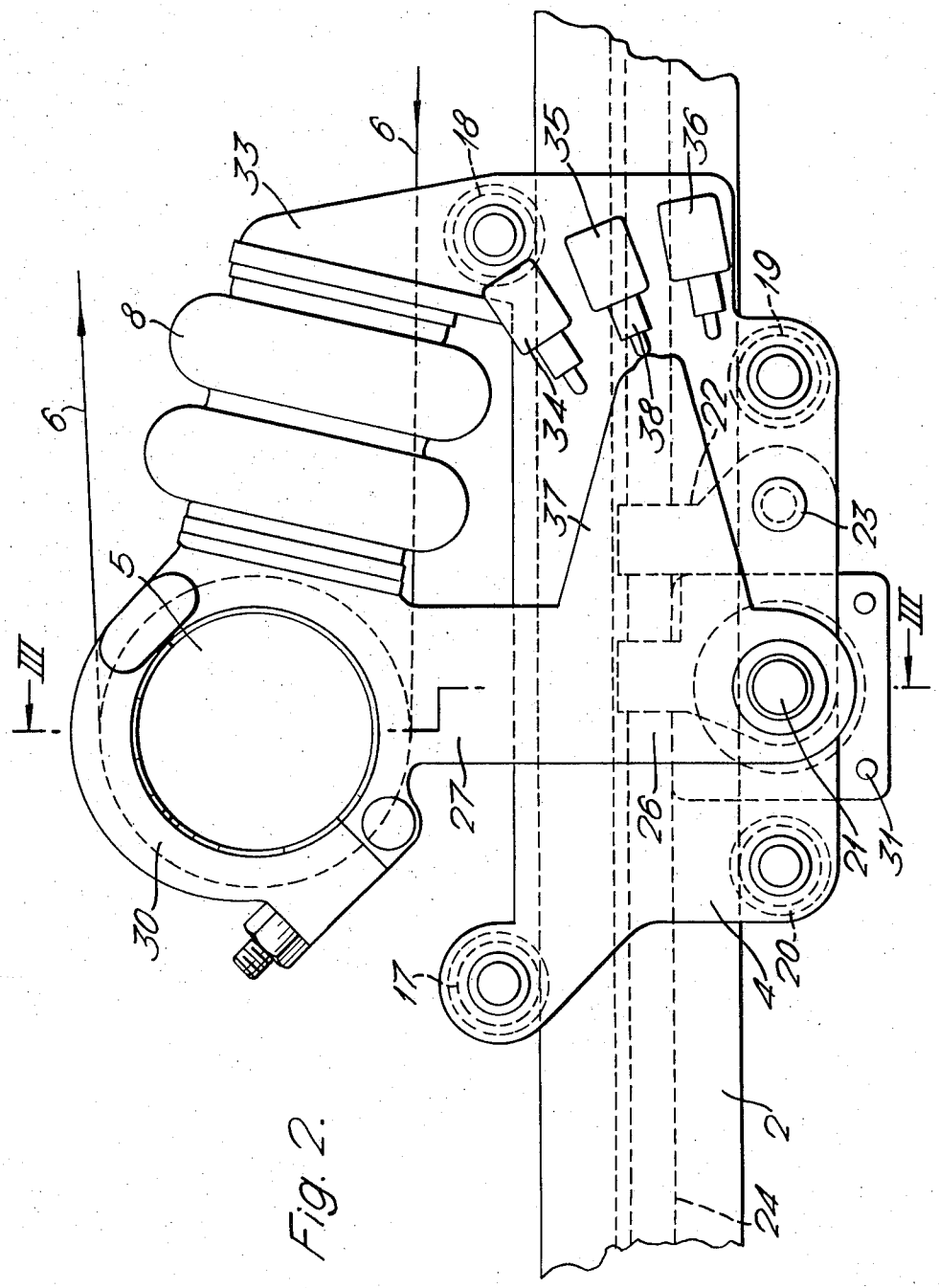
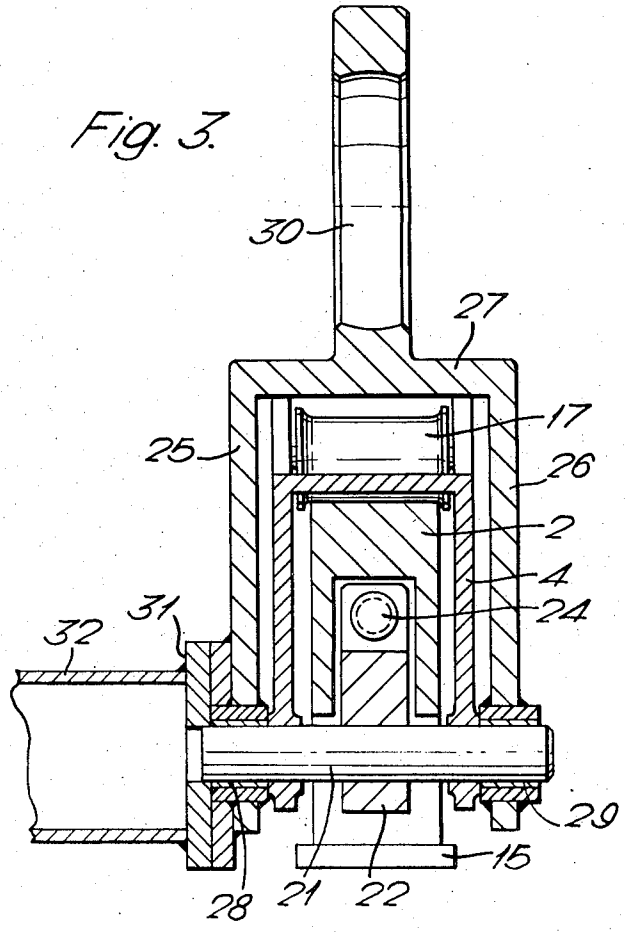


Fig. 2.

Fig. 3.



TENSIONING APPARATUS FOR BLANKET AND WIRES IN PAPER MACHINES

The present invention relates to tensioning apparatus for blanket and wires in paper machines, for example, in the pressing and drying zones. In particular, the invention relates to an improvement in a tensioning apparatus, where a tension roll is rotatably mounted at each end in a carriage on a guide path, for example, by means of a screw spindle, so that the tension roll may be driven reciprocally in the longitudinal direction of the blanket/wire, for equalizing slack or tension in the blanket/wire.

With such apparatus, the tension roll carriages are driven either manually, i.e. by manual rotation of the screw spindle which is engaged by nuts to the carriage, or by means of, for example, an electromotor which preferably drives both screw spindles simultaneously.

The object of the invention is to improve a tensioning apparatus of the above said type so that it is possible to achieve automatic adjustment of the tension roll. When the blanket contracts, for example, the tension roll follows, and the originally adjusted tension in the blanket is retained. The reverse is obviously the case on stretching, i.e. slacking of the blanket.

According to the invention, an improvement in a tension apparatus of the type mentioned hereinbefore is provided and the improvement is characterized in that the tension roll bearing at each end of the tension roll is pivotally mounted on the carriage by means of an arm, so that the tension roll can be pivoted for tensioning or slacking of the blanket/wire, in that a bellows is connected between the bearing/arm of the tension roll and the carriage, said bellows being maintained at below a determined air pressure, and in that on the arm/bearing, and on the carriage, cooperating switch members are arranged for starting and stopping the screw spindle motor in accordance with the pivotal movement of the tension roll bearing to return the bearing of the arm/tension roll to normal position, whereby the adjusted tension in the blanket/wire is regained. When the blanket stretches, for example, the bellows causes the tension roll to pivot in a direction lengthwise of the blanket. The cooperating switch members on the arm/bearing and on the carriage are thereby actuated so that the screw spindle motor is started. The screw spindles are then rotated in a direction which causes the carriages to be driven in the same direction as the tension roll has pivoted. The tension roll will then gradually pivot back and the switch members will cause the screw spindle motor to stop as soon as the arm/bearing has reached normal position. The adjusted tension in the blanket is thus regained. If the blanket contracts, the reverse procedure is undertaken, i.e. the tension roll pivots in a direction lengthwise of the blanket and towards the action of the bellows. The air pressure in the bellows is maintained at a constant value. The switch members then cause the screw spindle motor to start, this time in the other direction, the carriages thereby follow and the tension rill pivots back to its normal position. The adjusted tension in the blanket will thus be regained.

In accordance with the invention, the improvement can be effected such that an operating nose is arranged on the arm and that three end switches are arranged on the carriage, said switches on pivoting of the arm, being actuated by the operating nose, the central end switch being arranged such that it is actuated when the arm is in normal position and thereby causes the screw spindle motor to stop, the other two end switches, on action by the operating nose, causing the screw spindle motor to start in respective directions.

Advantageously, the two bellows can be connected to a common compressed air conduit which is connected to a pressure switch.

The invention is further explained hereinbelow with reference to the drawings.

FIG. **1** is a diagrammatic view of a tensioning apparatus with pneumatic coupling diagram.

FIG. **2** is a side view of a carriage with appurtenant equipment.

FIG. **3** is a section along the line III—III in FIG. **2**.

The tensioning apparatus, as illustrated in FIG. **1**, consists mainly of two guide members **1** and **2** upon which run respective carriages **3** and **4**. A tension roll **5** is mounted in the carriages **3** and **4**. The bellows **7** and **8**, essential to the invention, are indicated particularly in FIG. **1**. The blanket **6** is laid around the tension roll **5**. Respective screw spindles **9** and **10** are provided in each guide member **1** and **2**. The screw spindles are driven by means of suitable gear boxes **11**, **12** and an intermediate shaft **13**, by an electromotor **14**. The screw spindles **9** and **10** are engaged by nuts to the respective carriages **3** and **4**. Before a further explanation of the mode of operation of the tensioning apparatus is given, a more detailed description of the carriage **4** is set forth hereinbelow. The carriage **3** is an identical embodiment.

The guide members **1** and **2** are, as is seen from FIGS. **2** and **3**, formed as an inverted U-beam mounted on bases at each end. This mounting is indicated in FIG. **1** by **15** and **16** respectively. The carriage **4** is also an inverted U-shape in cross-section and may be driven on the guide members, for example member **2** by means of four rollers **17**, **18**, **19** and **20**. In the carriage **4**, a shaft **21** is mounted beneath the guide, member **2**. A nut member **22** is mounted on the shaft **21** and is maintained in correct position in the carriage **4** by means of a pin **23** which extends between the two side walls in carriage **4**. The nut member **22** has two upward projections which are provided with aligned, threaded bores. The screw spindle **24** is screwed into the said threaded bores. When the screw spindle **24** rotates, the nut member **22** moves with respect to the screw spindle, and the carriage **4** also moves thereby on the guide member **2**.

The shaft **21** is extended to a certain distance on either side of the carriage **4** and, on the projecting ends of the shaft **21**, the legs **25**, **26** of a forked arm **27** are rotatably mounted by means of bearings **28**, **29**. The arm **27** is formed at the top thereof as a tension roll bearing **30** for the tension roll **5**. The bearing is of a type known per se and is not described further herein. The inner leg **25** in the forked arm **27** is connected, by means of screws **31**, to a transverse pipe element **32** which constitutes a lightweight but rigid connection between the respective arms mounted on the respective carriage **3** and **4**.

A bracket **33** is arranged in one end of the carriage **4**, on the right-hand side of FIG. **2**. Between the said bracket **33** and the tension roll bearing **30**, a bellows **8**, known per se, is mounted. The bellows is subjected to a constant air pressure in a manner further explained hereinbelow. Three end switches **34**, **35** and **36** are mounted on the side of the carriage **4**. On the outer leg **26** of the arm **27** a projecting part **37** is provided termi-

nating in an operating nose **38.** The end switches **34, 35** and **36** are connected such that, when the operating nose **38** as illustrated in FIG. **2,** actuates the end switch **35,** the electromotor **14** which drives the screw spindles **9** and **10** is without current. That is to say that the carriages **3** and **4** are stationary on respective guide members **1** and **2.** When, on pivoting of the bearing **30** towards the left-hand side of FIG. **2,** the operating nose actuates the end switch **34,** the electromotor **14** transmits current and switches over so that it rotates the screw spindles **9, 10** in a direction such that the carriages **3, 4** move towards the left-hand side of FIG. **2.** The arm **27** and the bearing **30** then pivot towards the right-hand side until the operating nose **38** actuates the end switch **35,** cutting the current to the motor **14,** and the carriages stop. The foresaid pivotal movement of the bearing **30** takes place if, for example, the blanket **6** should stretch; the air pressure in the bellows **8** then causing the bearing **30** to pivot towards the left-hand side of FIG. **2.** If, for example, the blanket **6** contracts, the blanket pulls the tension roller **5,** and thereby the bearing **30** with it, towards the right and towards the action of the constant air pressure in the bellows **8.** The operating nose **38** will then release the end switch **35** and actuate end switch **36.** Current is thereby supplied to the motor **14** which is switched over so that the screw spindles are rotated in a direction to move the carriages **3** and **4** towards the right. The bearing **30** then pivots towards the left, until the operating nose **38** is in contact with the end switch **35,** the current to the motor **14** being thereby switched off.

In both the above described cases the system causes automatic correction of tension or slack in the blanket **6** in that the carriages **3, 4** are moved in the direction necessary. In this manner, the tensioning apparatus ensures at all times the maintenance of the pre-adjusted tension desired in the blanket **6.** The electric connecting system used is of an elementary type and is not further described, therefore. The pneumatic system used for maintaining the air pressure in the bellows **7** and **8** is illustrated in FIG. **1.** The bellows **7** and **8** are, by means of conduits **39, 40,** connected to a common conduit **41.** The conduit **41** is connected in turn to a pressure switch **42.** The conduit **41** leads to a choke valve **43** and the conduit leads further to a main valve **44.** The source of air pressure is indicated by **45** in FIG. **1.** From the source of air pressure, a conduit **46** leads to an air filter **47** and lubricating apparatus **48** and pressure regulator **49** and from there to the main valve **44.** Between the pressure regulator **49** and the main valve **44,** a manometer **50** is inserted. Between the lubricating apparatus **48** and the pressure regulator **49** a conduit **51** branches which leads to a control valve **52.** From there a conduit **53** leads to the main valve **44.** From the main valve, the conduit **41** leads, as previously stated, through the coke valve **43** to the two branch conduits **39** and **40.**

The screw spindle operation of the carriages **3, 4** is illustrated only as an example, it being possible to drive the carriages by means of other known apparatus, such as chain or cable operation, rack and pinion operation or hydraulic operation.

Having described my invention, I claim:

1. A web tensioning device comprising guide means, carriage means mounted for movement on said guide means, a tensioning roll for a said web, arms carrying said tensioning roll, means mounting said arms on the carriage means for pivotal movement about an axis parallel to the axis of the tensioning roll, fluid pressure means acting between said arms and said carriage means to swing said arms in a direction to tension the web, switch means having cooperating switch members on a said arms and on the carriage means for actuation upon predetermined pivotal movement of said arms, and means responsive to actuation of said switch means to move said carriage means on said guide means in a direction to restore said arms to a predetermined position relative to said carriage means, said arms having an operating nose thereon, said switch means comprising three end switches mounted on said carriage means for contact with said nose upon pivoting of said arms, a central one of said three switches deactuating said carriage moving means when said predetermined position of said arms relative to said carriage means is reached, and the other two switches actuating said carriage moving means for movement in respectively opposite directions on said guide means.

2. A device as claimed in claim **1,** said fluid pressure means comprising a bellows.

3. A device as claimed in claim **1,** said guide means comprising two guide members parallel to each other, said carriage means comprising two interconnected carriages one on each said guide member, there being a said arm on each said carriage and a said pressure fluid means individual to each said arm, and a common source of fluid pressure for the two fluid pressure means.

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