PATENT SPECIFICATION (11) 1 568 868

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(21) Application No. 42178/77 (22) Filed 11 Oct. 1977

(31) Convention Application No. 2 649 289 (32) Filed 29 Oct. 1976 in

(33) Fed. Rep. of Germany (DE)

(44) Complete Specification published 11 June 1980

(51) INT. CL.[3] B65H 19/06 17/12

(52) Index at acceptance B8R 8B5 8DX3 8F2 RW12

(54) ROLL-TRANSFERRING APPARATUS FOR WIDE WEB WINDING MACHINES

(71) We, J. M. VOITH GMBH of St. Poltener Strasse 43, D-7920 Heidenheim West Germany a Company of the German Federal Republic do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement.

The invention relates to roll transferring apparatus for web winding machines, particularly for wide webs, having a web-slitting appliance which slits the web onto a batch of adjacent rolls, a winding-on station with driving rollers, a winding spindle which can be set up on these rollers onto which roll centres are pushed, and a delivery station for the finished rolls.

In known web-winding machines of this type, a paper web arriving from the web-slitting appliance is wound onto cardboard roll centres which are located on the winding spindle. The winding-on of the web is normally effected on two driving rollers which support the great weight of the batch of rolls. After the batch of rolls has reached the desired diameter, the winding spindle is withdrawn and the separate rolls of the batch are trundled away freely from the driving rollers to the delivery station, and are removed from thence. After this the winding spindle loaded with new cardboard centres is inserted between the two bearing rollers. Since the winding spindle in this case does not have to support the weight of the finished rolls, it need not be very rigid.

However, the lack of control of the finished batch of rolls during transfer to the delivery station is a disadvantage of this state of the art, since there is an inherent risk of accidents with so many heavy rolls being trundled about. In addition, this method of roll transfer causes a relatively long interruption of the production process.

An object of the present invention is to achieve a more rapid exchange of a heavy batch of finished rolls for a fresh winding spindle loaded with new centres, and a more precise transfer of the heavy batch of finished rolls from the winding-on station to the delivery station.

According to the invention roll-transferring apparatus of the type discussed above is characterised in that the winding spindle is sufficiently rigid to support the weight of a batch of finished rolls, and in that at either end of the web a double ended lever is provided, mounted in a trunnion or bearing block with its fulcrum positioned between the winding-on station and the delivery station in such a way that when the double ended levers are rotated the finished rolls are swung in a see-saw fashion about the fulcrum from the winding-on station to the delivery station and a fresh spindle loaded with new roll centres is simultaneously swung into the winding-on station.

By using a sufficiently rigid spindle for support, the heavy batch of rolls which is held only at its two end faces can be carried clear and by providing a pair of double ended levers in a suitable mounting, the heavy batch of finished rolls can be guided automatically and precisely during transfer from the winding-on station to the delivery station, whilst a spindle loaded with new roll centres can be brought up simultaneously to the winding-on station.

The invention thus provides roll-transferring apparatus in which the time required for the change-over process is reduced, and in addition the danger of accidents is substantially reduced or eliminated.

Although the use of double ended levers to pivot the rolls during continuous flow unrolling processes, i.e. during continuous operation, is already known in the field of paper making (see German Utility Model

Specification 7 234 187), in this instance it is installed at a different location, and in addition other conditions prevail. In this application a star-type reel-unrolling appliance for receiving and holding rolls of paper in paper treating machines is described. Here a roll of paper, which is held between clamping sleeves, is unwound and, as soon as the diameter of the roll permits, it is rotated through 180° by means of a pair of double ended levers so that a new roll of paper is available for the continuous flow change-over of rolls. An appliance of this kind, however, only relates to the unwinding of ready-cut paper web with a width lying between 1 and 2 m. A multiplicity of adjacent rolls cannot be handled by this appliance. These narrow rolls of paper are not provided with a winding spindle. On the other hand, the apparatus here described relates to the simultaneous production of several rolls of paper of this kind. Here, widths of up to 9 m are involved. Thus, several rolls of paper webs are wound in parallel onto a corresponding number of centres which are suitably stiffened by the winding spindle, arranged contiguously on one axis. The separate further treatment of the individual rolls only takes place after this. The individual rolls of paper can be handled subsequently in the way described in said German Utility Model Specification, for example.

In a further development of this invention provision is made for the winding-on station to be provided with a vertically displaceable winding spindle guide located in the in the trunnion and capable of lifting the finished rolls, each end of the pair of double ended levers being fitted with retaining jaws engaging on the winding spindle next to the clamping head of the winding spindle guide during the roll-transfer process.

With the aid of this vertically displaceable winding spindle guide, once the batch of finished rolls is lifted from its seating on the two bearing rollers and the clamping head has been disengaged, the pair of double ended levers can be engaged and the rolls can then be transferred to the delivery station.

Provision is also made according to the invention for the delivery station to be provided with a lifting table and with a device for inserting and withdrawing the winding spindle, the said device operating in conjunction with the double ended levers.

The finished rolls are removed from the lifting table and a winding spindle loaded with new centres is subsequently inserted in the pair of double ended levers so that this can be offered up to the winding-on station during the next transfer process. The roll-transfer apparatus can be used according to the invention in the same way when the web is not slit into several rolls and only a single wide roll is to be brought from the winding-on station to the delivery station.

According to the invention provision is also made in an advantageous way for the retaining jaws arranged on the ends of the double ended levers to be hydraulically or pneumatically operated.

In the following a constructional example of the invention is described, from which other features of the invention will become apparent.

Figure 1 shows the arrangement of the winding-on and changing. apparatus according to the invention, in side view.

Figure 2 shows the arrangement of the winding-on and changing apparatus according to the invention, in plan view.

In a trunnion bearing block 1 double ended levers 2 are rotatably mounted on a shaft 3 on either side of the winding-on and changing apparatus. The shaft 3 connects the pair of double ended levers 2 to each other. The drive 4 for the rotary movement is not shown in detail. It can be carried out in the normal way, as desired, either electrically, hydraulically or pneumatically, and from one or both sides (4*a*).

The cut paper webs are wound onto cardboard centres 8, inside which a common winding spindle 7 is located, between two driving support rollers 9 and 10. The winding start is shown in dashes in position *a*. When the batch of rolls, consisting of the rolls 11, has reached the desired diameter as shown in dashes in the position *b*, the rolls 11 are lifted by the winding spindle guides 14 a small amount up to the position O_1 so that they move out of the engaging range of the two driving rollers 9 and 10 and into the engaging range of the the retaining jaws 12 which are deployed from below hydraulically by hydraulic devices 13 so as to assist the pair of double ended levers 2 to grip the winding spindle 7 at either end between the two outermost rolls and the winding spindle guide 14 with a clamping head 15. The winding spindle guide is thereby unloaded and the clamping head 15 is drawn back so that the batch of rolls with the winding spindle is held now by the pair of double ended levers 2 and the retaining jaws 12. The rolls 11 are swung by the drive 4 and the shaft 3 around the fulcrum 23 from the winding-on station to the delivery station, onto a lifting table 16, whilst simultaneously a fresh winding spindle 7 loaded with new cardboard centres 8 is transferred to the winding-on station. The retaining jaws 12 must then be retracted. Next the lifting table 16 moves upwards by a small amount as shown in dashes by position *c*, and thus un-

loads the pair of double ended levers 2. The winding spindle 7 can then be drawn out laterally from the batch of rolls by a connecting piece 17 and a carriage 18 of the insertion and withdrawal devices 19. Then the batch of rolls is lowered to the floor with the lifting table 16 so that the rolls 11 can be taken away. After this the lifting table 16 moves into an intermediate position *d*, in which the new cardboard centres 8 are loaded on. The new cardboard centres 8 are then lifted up again into the starting position *c* of the delivery station and are winding spindle 7 is again inserted in the cardboard centres 8 from the side via the connecting piece 17 by means of the carriage 18 of the insertion and withdrawal device 19. After this the winding spindle 7 with the centres 8 is brought into the starting position O_2 of the double ended levers 2. The lifting table 16 moves again into the intermediate position *d*. In this way, after the retaining jaws have been deployed, the spindle 7 with the centres 8 can be swung into the winding-on station simultaneously with the swinging away of the finished rolls 11. There, the clamping head 15 is again inserted in the spindle 7, the retaining jaws 12 are retracted to release the spindle and the spindle guides 14 lower the spindle 7 loaded with cardboard centres 8 into the starting position.

The paper web 20 which was previously cut off by a separating device 21 before the start of the roll-transfer process, and is securely held by a holding and blowing device 22, is now thrown over the new cardboard centres 8 by the initiation of the blowing process, so that the winding-on process can start again.

Instead of raising the finished batch of rolls at the delivery station by means of the lifting table 16 to unload the pair of double ended levers 2, in the same way these levers can also be lowered by a sufficient amount after opening of the retaining jaws 12, so that the spindle 7 can be drawn out sideways.

The roll-swinging device according to the invention can also be used in a similar way with a drum or reel-spool mounting. For this, one more intermediate stage is required because, after the retaining jaws have been deployed for transferring the batch of rolls 11 from the winding-on station to the delivery station, the reel-spool mounting must first be lowered so that when the spindle 7 with new cardboard centres 8 is swung in these will not strike against the reel-spool mounting from below. If the spindle 7 with the new centres 8 is moved upwards into the winding-on station then the reel-spool mounting is lifted again from below and connected to the spindle 7. After this, the retaining jaws 12 can again be retracted and the spindle 7 with the centres 8 can again be lowered into the starting positon *a*.:

WHAT WE CLAIM IS: —

1. Roll-transferring apparatus for web winding machines, particularly for wide webs, having a web-slitting appliance for slitting the web into a batch of rolls, a winding-on station with driving rollers, a winding spindle which can be set up on these rollers and onto which roll centres are pushed, and a delivery station for the finished rolls, characterised in that the winding spindle is sufficiently rigid to support the weight of a batch of finished rolls, and in that at either end of the winding spindle a double ended lever is provided, mounted in a trunnion or bearing lock with its fulcrum position between the winding-on station and the delivery station in such a way that when the double ended levers are rotated the finished rolls are swung in a see-saw fashion about the fulcrum from the winding-on station to the delivery station and a fresh winding spindle loaded with new rolls centres is simultaneously swung into the winding-on station.

2. Apparatus according to Claim 1, characterised in that the winding-on station is provided with a vertically displaceable winding spindle guide located in the trunnion and capable of lifting the finished rolls, each end of each double ended lever being provided with retaining jaws which engage on the winding spindle next to the clamping head of the winding spindle guide during the roll-transfer process.

3. Apparatus according to Claim 1 or Claim 2, characterised in that the delivery station is equipped with a lifting table and with a device for inserting and withdrawing the winding spindle, the said device being operable in conjunction with the double ended levers.

4. Apparatus according to Claim 1, 2 or 3 characterised in that the retaining jaws arranged on either end of each double ended lever are operated hydraulically or pneumatically.

5. Roll-transferring apparatus for web winding machines, particularly for wide webs, constructed, arranged and adapted to operate substantially as hereinbefore described with reference to the accompanying drawings.

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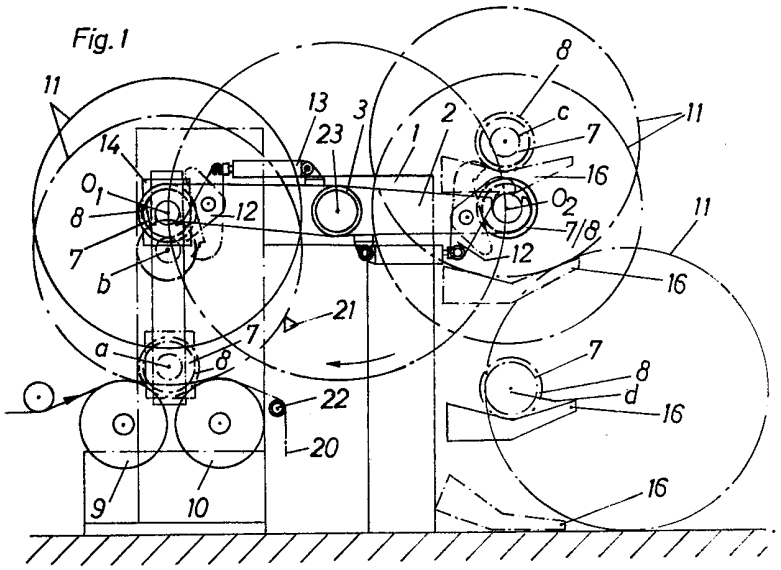
Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1980.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

1568868 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

Fig. 1



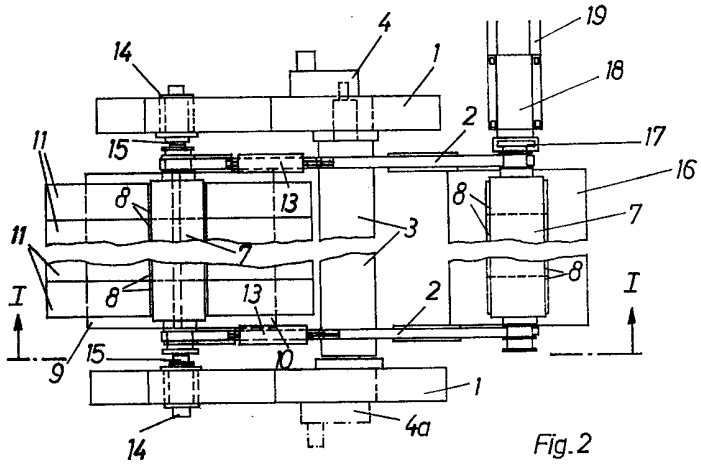


Fig. 2