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H. L. HASWELL

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WINDING MACHINE

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Fig. 2.

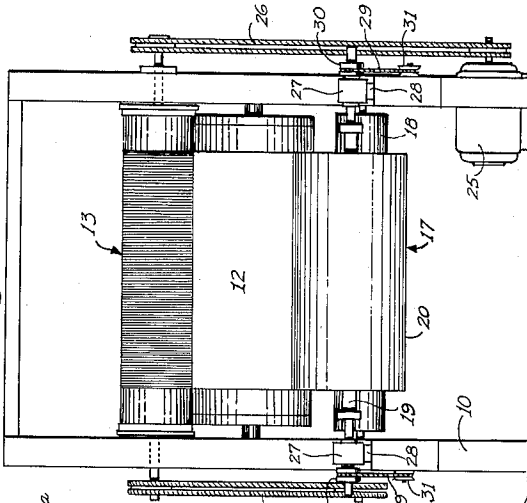


Fig. 4.

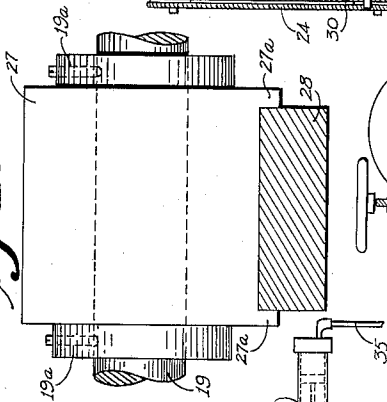


Fig. 3.

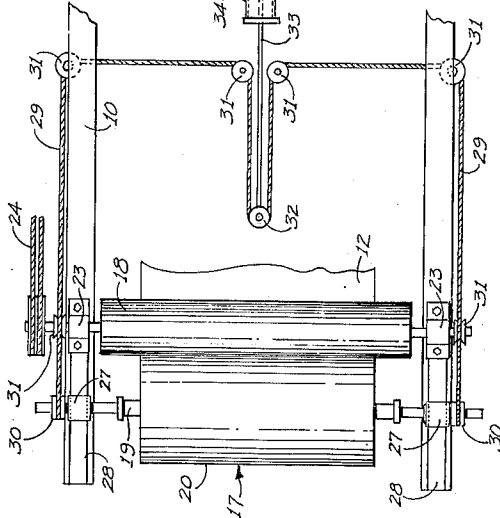
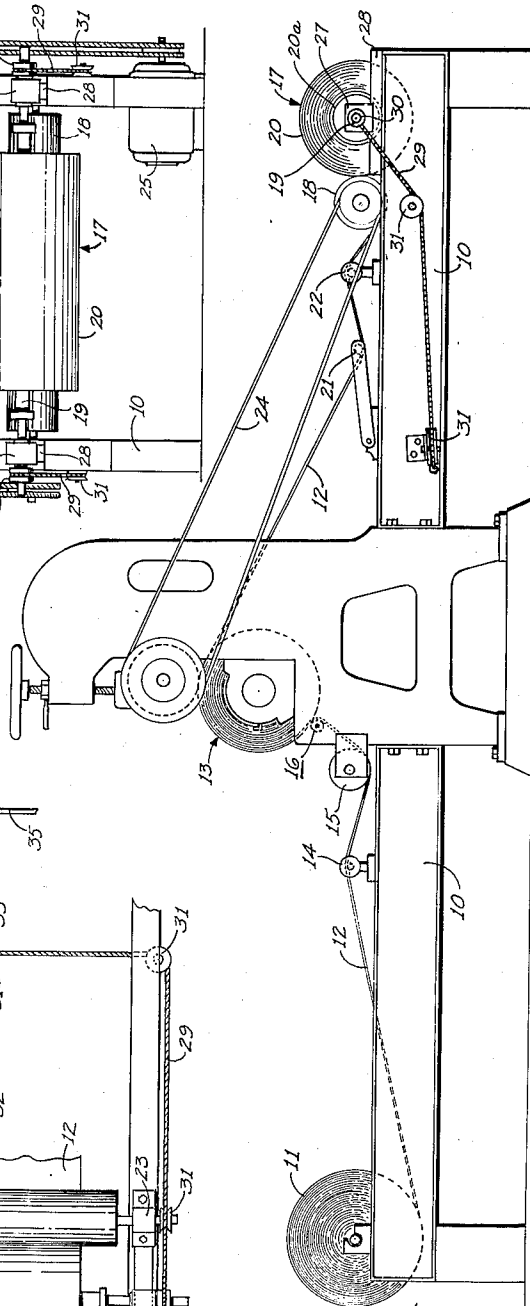


Fig. 1.



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WINDING MACHINE

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3 Claims. (Cl. 242—65)

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This invention relates to winding machines adapted for rewinding paper webs and the like, and more specifically to an improved arrangement for receiving the rolls of material wound by said machines.

Winding machines commonly comprise a driving roll and a winding mandrel adapted to receive a roll of paper wound by the machine and arranged to move from and support the paper roll in peripheral contact with the driving roll so that the paper roll is rotated by the driving roll to effect winding. To maintain effective peripheral contact between the paper roll being wound and the driving roll, the winding mandrel is conventionally mounted so that the paper rests on top of the driving roll during winding and the weight of the paper roll is thus employed to maintain contact with the driving roll.

An important difficulty encountered with an arrangement of this sort is that uniform winding is not obtained because the weight of the paper roll increases substantially as the roll grows in size during winding and the pressure against the driving roll consequently varies widely. There have been previous proposals for overcoming this difficulty by supplementary weighting mechanisms to maintain a more or less uniform weight on the driving roll, or by employing special mountings for the winding mandrel so as to shift the position of the paper roll during winding to lessen the downward component of its weight on the driving roll in relation to the increasing weight of the roll as it grows in size. These prior proposals, however, have characteristically required the association of objectionably complicated auxiliary mechanisms with winding machines.

According to the present invention, the above mentioned difficulty is overcome by an improved arrangement for receiving the wound paper rolls which simplifies the construction of winding machines, and which also facilitates the removal of the paper rolls after winding. Generally described, the present invention contemplates an arrangement of the winding mandrel for horizontal displacement so that the paper roll is positioned during winding without any of its weight resting on the driving roll, and the provision of means for weighting the winding mandrel against horizontal displacement from the driving roll so as to maintain effective peripheral contact between the paper roll being wound and the driving roll. This arrangement obviates any necessity for compensating for the increasing weight of the paper roll during winding, and

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allows the use of a simple weighting mechanism for maintaining peripheral contact between the paper roll and the driving roll.

An embodiment of the present invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a side elevation of a machine for ribbing or embossing paper and incorporating a rewinding unit constructed in accordance with the present invention;

Fig. 2 is a corresponding right end view;

Fig. 3 is a fragmentary plan view illustrating a preferred type of weighting mechanism for the rewinding unit; and,

Fig. 4 is an elevation of one of the bearing members.

Referring first to Fig. 1 of the drawing, the invention is shown embodied in an otherwise conventional type of ribbing or embossing machine. As illustrated, this machine comprises a suitable supporting frame 10 arranged to carry a supply roll 11 at one end from which the paper web 12 is unwound for processing at a ribbing or embossing unit indicated generally at 13. The paper web 12 is directed from the supply roll 11 to the ribbing unit 13 over a spreader bar or the like as at 14, and around idler rolls 15 and 16. As indicated above, these elements of the equipment are conventional and form no part of the invention.

The rewinding unit of the present invention is indicated generally at 17 comprising a driving roll 18 and a winding mandrel 19 adapted to support the rewound paper roll 20 on a winding core 20a in the usual manner. The paper web 12 is led to the rewinding unit 17 from the ribbing unit 13 past a pivoted slack bar 21 and over a second spreader bar 22 to the driving roll 18.

The driving roll 18 is journaled in suitable bearings 23 carried by supporting frame 10 and is driven through a belt and pulley connection 24 from the ribbing unit 13, which is in turn driven from an electric motor 25 through a belt and pulley connection 26. The slack bar 21 provides an adjustment to compensate for the variation in speed between the rewinding unit 17 and ribbing unit 13, and may be synchronized if desired with a variable speed drive (not shown) for driving roll 18 so as to vary the speed of roll 18 automatically to compensate for any irregularity in speed between units. Also, the slack bar 21 may be arranged to disconnect the supply circuit to motor 25 if the paper web 12 should break and allow slack bar 21 to drop. Such arrangements are well known in the art so that it is not con-

sidered necessary to illustrate or describe them in detail here.

As previously mentioned, the driving roll 18 is associated with the winding mandrel 19 to effect rewinding of the paper web 12. The winding mandrel 19 is adapted to receive the paper web 12 in roll form on core 20a, and to move away from the driving roll 18 and support the resulting paper roll 20 in peripheral contact with driving roll 18 to effect winding. According to the present invention, the movement of winding mandrel 19 from driving roll 18 is effected by horizontal displacement so that none of the weight of paper roll 20 rests directly on driving roll 18.

The horizontal displacement of winding mandrel 19 is provided for through bearing members 27, forming journal supports for mandrel 19, which are carried by horizontal guideways 28 mounted on supporting frame 10. Positioning collars 19a are fixed on winding mandrel 19 by set screws as shown on either side of bearing members 27 to prevent sidewise movement of winding mandrel 19 in bearing members 27. Also, the bearing members 27 are formed with flange portions 27a on their lower surfaces which are spaced to fit over guideways 28 and locate the bearing members against sidewise movement on the guideways. Otherwise, the bearing members 27 may take any form providing a suitable bearing support for winding mandrel 19 and presenting a smooth bottom surface for contact with guideways 28, although it will be convenient, as mentioned below, to adapt the bearing members 27 in size so that they will pass through the core 20a for paper roll 20 and thus facilitate removal of winding mandrel 19 upon completion of the winding operation.

As illustrated, the guideways 28 comprise flat plates which may be machined to a smooth surface to permit easy displacement of the superimposed bearing members 27. With smooth contacting surfaces of bearing members 27 and guideways 28 associated in this manner, the frictional resistance to displacement of bearing members 27 on guideways 28 is very small and can be rendered negligible by lubrication of guideways 28. As a result, the force required for horizontal displacement of winding mandrel 19 from driving roll 18 is not substantially affected by the weight of paper roll 20, and by weighting winding mandrel 19 suitably against horizontal displacement the paper roll 20 can be maintained in peripheral contact with driving roll 18 under substantially uniform pressure throughout the winding operation.

Any convenient means may be used for weighting the winding mandrel 19 against horizontal displacement. A preferred arrangement as shown in the drawing, particularly Fig. 3, utilizes air pressure which has the advantage of being easily adjustable. According to the arrangement illustrated, a weighting cable 29 is secured on carrier rings 30 which are mounted on winding mandrel 19 and in which mandrel 19 may rotate freely. The carrier rings 30 may be fitted with ball bearing inserts (not shown) to facilitate rotation of mandrel 19, and in any event are free to be slipped on and off the ends of mandrel 19.

The weighting cable 29 runs in a continuous length between carrier rings 30 over a series of directing pulleys 31 and a pressure pulley 32 which is connected to the piston rod 33 of an air cylinder 34 supplied with air pressure from a suitable supply line as indicated at 35. By regu-

lating the air pressure admitted to cylinder 34 in any conventional manner (not shown), tension can be established through pressure pulley 32 on weighting cable 29 to weight winding mandrel 19 against horizontal displacement. As mentioned above, an air system of this sort has the advantage of being readily adjustable to weight the winding mandrel 19 at any desired level.

The winding operation may thus be carried out according to the present invention with the paper roll 20 maintained in peripheral contact with driving roll 18 under an even pressure with consequent uniformity in winding tension. Also, the present invention provides a rewinding unit of simplified construction, and one from which the wound paper rolls are easily removed. In connection with this latter feature it will be noted that the wound paper rolls are supported at a low level so that they are disposed for easy removal to a material handling skid or the like. In removing a wound paper roll 20, the pressure at air cylinder 34 is released to release the tension on weighting cable 29, and the carrier rings 30 are slipped off of winding mandrel 19 so that paper roll 20 can be lifted from the machine. When the paper roll 20 has thus been removed from the machine, the winding mandrel 19 is withdrawn, and with the bearing members 27 adapted in size to pass through the core 20a, as described above, mandrel 19 may be withdrawn with the bearing members 27 attached. The winding mandrel 19 is then fitted with a new core 20a and replaced so that it is supported on guideways 28 by bearing members 27 as before, and the carrier rings 30 are slipped in place so that the winding mandrel can be weighted again for winding a succeeding roll.

While the present invention has been illustrated and described above as incorporated in a machine for ribbing or embossing a paper web, the invention is applicable generally to rewinding operations and may be used in other connections such as in slitting machines and the like. This general application is contemplated by the appended claims.

I claim:

1. A winding machine comprising a frame, a driving roll journaled in said frame, a winding mandrel, bearing members forming journal supports for said winding mandrel, horizontal guideways on said frame supporting said bearing members for horizontal displacement, and a weighting cable of continuous length trained directly from both ends of said winding mandrel and tensioned under a constant pressure applied to said cable at a single point intermediate its ends for weighting said winding mandrel against horizontal displacement and thereby maintaining material wound on said winding mandrel in even peripheral contact with said driving roll.

2. A winding machine as defined in claim 1 and further characterized in that said weighting cable is tensioned by a single fluid pressure means.

3. In a paper winding machine, the combination with a driving roll for winding a paper web, and a winding mandrel having a portion of enlarged diameter for supporting a core to receive a roll of paper wound by said machine and smaller diameter journal portions extending at each end thereof, of bearing members fixed on said journal portion, said bearing members being formed in a size contained within the diameter of said core supporting portion of the winding mandrel whereby cores may be installed on and removed from said winding mandrel over said bearing members,

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horizontal guideways supporting said bearing members for horizontal displacement, and a weighting cable of continuous length trained from both ends of said winding mandrel and tensioned under a constant pressure applied to said cable at a single point intermediate its ends for weighting said winding mandrel against horizontal displacement and thereby maintaining paper wound on said winding mandrel in even peripheral contact with said driving roll.

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