

B. D. COPPAGE.
BALANCED ROLL FOR PAPER MAKING MACHINES.
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1,172,947.

Patented Feb. 22, 1916.

Fig. 1.

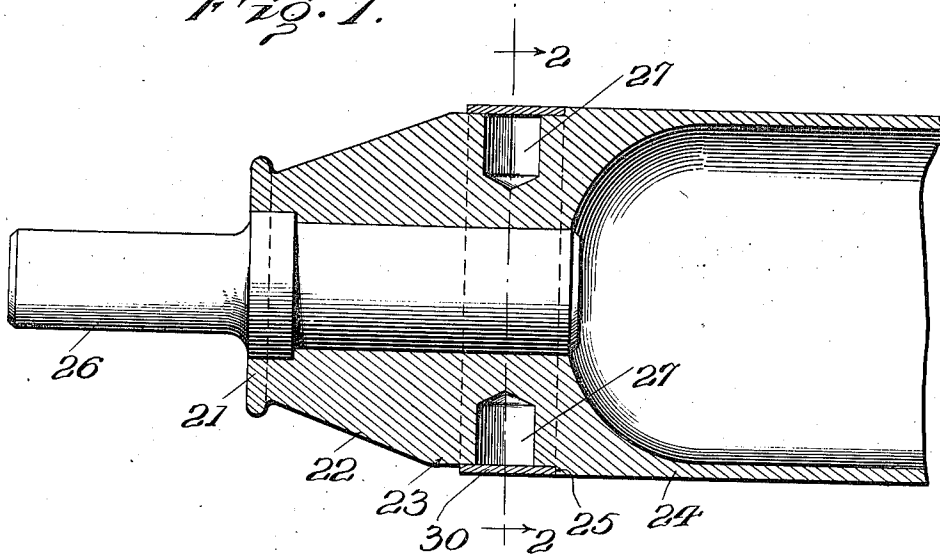
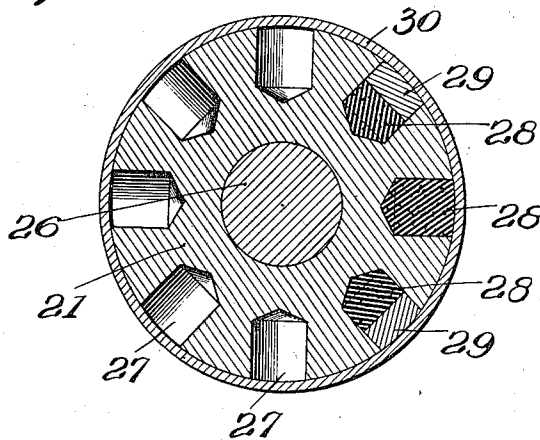


Fig. 2.



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BALANCED ROLL FOR PAPER-MAKING MACHINES.

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Specification of Letters Patent.

Patented Feb. 22, 1916.

Original application filed June 17, 1914, Serial No. 845,698. Divided and this application filed September 7, 1915. Serial No. 49,293.

To all whom it may concern:

Be it known that I, BENJAMIN DENVER COPPAGE, a citizen of the United States, residing in Wilmington, Delaware, (whose post-office address is No. 14 Willard street, Wilmington, Delaware,) have invented a new and useful Improvement in Balanced Rolls for Paper-Making Machines, which invention is fully set forth in the following specification.

This invention relates to the balancing of the rotating parts of machinery which it is desirable and necessary, for full efficiency, to operate in running balance. Although, conceived especially with reference to the balancing of so-called "winder-rolls", well known in paper-making machinery, the invention may be utilized in the balancing of other rolls, wheels and rotating parts.

The object of the present invention is to provide a structure of roll, wheel or other rotatable machine element, which readily and efficiently admits of the accurate addition thereto of weight in such amount and at such point or points as may be necessary to the production of accurate running balance.

The structure of roll and weight-adding means of the invention may be most readily explained and understood by reference to the accompanying drawing illustrative of one mechanical expression of the invention as applied to winder-rolls of a paper-making machine, and wherein:—

Figure 1 is a longitudinal sectional view through such a roll; and, Fig. 2 is a transverse sectional view on line 2—2 of Fig. 1.

The winder-roll, shown in the drawing, is of similar construction at both ends, only one end being illustrated. It is made of a cylindrical hollow iron casting 21 tapered at each end at 22 and having adjacent such tapered end portion a peripheral portion 23 of somewhat less diameter than the main peripheral portion 24 of the casing, there being formed a shoulder 25 at the juncture of the surfaces 23 and 24. At each end of the roll the thickened end wall is axially bored out to receive a pintle or axle 26 secured in place by being driven into the bore, either hydraulically or by blows. A succession of equidistant symmetrically disposed cavities 27 are bored radially into the cylindrical portion 23 at each end of the roll, and the cavities are adapted to re-

ceive the weight-adding means in such amount and location as may be necessary to put the roll in running balance, the weight-adding means being placed in one or more cavities at one or both ends of the roll as may be necessary. The roll constructed to this point is then put in a balance-testing machine—the Norton running balance indicating machine for example—which indicates whether there is a lack of balance and at what side, or end, or point on the peripheral surface the roll is out of balance. In this connection, it is important to bear in mind the difference between static balance and running balance. It has been common in paper-making machines to provide means for obtaining static balance which gives the roll a perfect balance while standing still. On the other hand, a roll in perfect static balance may be, at the same time, badly out of running balance. To get static balance in a roll which needs weight at one side, the balancing weight may be applied at the other side irrespectively at either end. Thus if a roll is heavy on one side at one end, static balance may be attained by applying additional weight on the other side at the opposite end. But the addition of weight in this manner would throw the roll further out of running balance, as centrifugal action would in such case tend to twist both ends of the roll off its longitudinal axis. Hence, with a roll heavy on one side at one end, to obtain running balance the additional weight must be applied at the opposite side of the same end. If the heavy spot to be balanced happens to be at the middle of the roll, then to attain running balance, weight in similar and proper amounts must be added on the opposite side of the roll at both ends. If the heavy spot is nearer one end than the other, then the weight must be distributed between the ends inversely of the distance; that is, proportionately less weight would be added at the end farther from the spot to be balanced than at the end nearer to said spot.

An operator testing a roll with a machine, such as the Norton machine mentioned, by the insertion and removal of temporary weights of known value in one or more of the cavities, finally ascertains just what weight must be added in a particular cavity or cavities to give a true running balance.

Having registered an indication of this in any suitable way—as by data on slips of paper slipped into the particular cavities 27 where weight is to be added—the roll is then passed on to another operator who is to make the permanent additions of weight and close the ends of the roll. This second operator is provided with metal plugs 28, preferably lead, all of approximately the diameter of the cavities 27, but of various weight, such as one ounce, one-half ounce, one-quarter ounce; and said operator inserts such disks into one or more of the cavities in accordance with the indications given by the first operator.

In Fig. 2, one of the cavities 27 is illustrated as having been completely filled with weight 28 and two other cavities as having been partially filled with weight 28. Preferably this weight is introduced in the form of plugs or lozenges of lead fitting closely in the cavities and expanded therein to tightly engage the cavity walls to prevent shifting of the weight. Where a cavity is only partially filled with the weight-adding means, such as lead, it is preferable to add a filling of light material, such as wood 29, over the lead to guard against any shifting of the latter by centrifugal action. The proper amount of weight-adding means having been introduced into one or more of the cavities, a cover in the form of steel ring 30 is driven or shrunk onto the cylindrical portion 23 at each end of the roll into engagement with the shoulder 25, said ring being of such width as to cover and close the outer ends of the cavities 27 and of such thickness as to bring its outer peripheral surface flush with the surface of the main peripheral portion 24 of the surface of the roll.

This application constitutes a division of my pending application for balanced rolls for paper-making machines, filed June 17th, 1914, Serial No. 845,698.

What is claimed is:—

1. A rotatable machine element, adapted to be balanced, having near each end a series of predeterminedly and regularly spaced radial weight-receiving apertures.

2. A rotatable machine element, adapted to be balanced, having near each end a series of predeterminedly and regularly spaced radial weight-receiving apertures extending inward from the periphery.

3. A rotatable machine element, adapted to be balanced, having near each end a series of predeterminedly and regularly spaced radial weight-receiving apertures extending inward from the periphery, weights in the said apertures, and means for securing the weights in place.

4. A rotatable machine element, adapted to be balanced, having near each end a series of predeterminedly and regularly spaced radial weight-receiving apertures extending

inward from the periphery, weights in the said apertures, and means for covering the ends of the apertures and adapted to secure the weights in place.

5. A rotatable machine element, adapted to be balanced, having near each end a series of predeterminedly and regularly spaced radial weight-receiving apertures extending inward from the periphery, weights in the said apertures, and bands extending around the elements near the ends respectively to cover the said apertures and adapted to secure the weights in place.

6. A rotatable machine element, adapted to be balanced, having near each end a section with a diameter less than that of the body of the element and having a series of predeterminedly and regularly spaced radial weight-receiving apertures in each of the said sections, weights in the said apertures, and bands extending around the said sections respectively to cover the said apertures and adapted to secure the weights in place, the outer surfaces of the bands being flush with the outer surface of the body of the element.

7. A rotatable machine element, adapted to be balanced, having near each end a series of predeterminedly and regularly spaced apertures, a plurality of aperture-filling means having differing weight-values and each located in an aperture and shaped to fit and entirely fill it, and means for covering the ends of the apertures and adapted to secure the aperture-filling means in place.

8. A rotatable machine element, adapted to be balanced, having near each end a series of predeterminedly and regularly spaced weight-receiving apertures, a plurality of weights each positioned in an aperture and shaped to fit the walls thereof, fillers each positioned in an aperture and shaped to fit the walls thereof and cooperate with a weight to entirely fill the aperture, and means for covering the ends of the apertures and adapted to secure the weights and fillers in place.

9. A rotatable machine element, adapted to be balanced, having near each end a series of predeterminedly and regularly spaced weight-receiving apertures, a plurality of weights having different lengths and each positioned in an aperture and shaped to fit the walls thereof, fillers each positioned in an aperture and shaped to fit the walls thereof and cooperate with a weight to entirely fill the aperture, and means for covering the ends of the apertures and adapted to secure the weights and fillers in place.

10. A rotatable machine element, adapted to be balanced, having near each end a series of predeterminedly and regularly spaced weight-receiving apertures, a plurality of weights having different lengths and positioned in an aperture and each shaped to

fit the walls thereof, each longer weight entirely filling its aperture, fillers each positioned in an aperture and shaped to fit the falls thereof and cooperate with a shorter weight to entirely fill the aperture, and means for covering the ends of the apertures and adapted to secure the weights and fillers in place.

11. A rotatable machine element, adapted to be balanced, having near each end a series of predeterminedly and regularly spaced radial apertures extending inward from the periphery, a plurality of aperture-filling means having differing weight-values and each positioned in an aperture and shaped to fit and entirely fill it, and means for covering the ends of the apertures and adapted to secure the aperture-filling means in place.

12. A rotatable machine element, adapted

to be balanced, having near each end a series of predeterminedly and regularly spaced radial weight-receiving apertures extending inward from the periphery, a plurality of weights each positioned in an aperture and shaped to fit the walls thereof, fillers each positioned in an aperture and shaped to fit the walls thereof and cooperate with a weight to entirely fill the aperture, and means for covering the ends of the apertures and adapted to secure the weights and fillers in place.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

BENJAMIN DENVER COPPAGE.

Witnesses:

EDWARD MARTIN,
H. J. FEENEY.