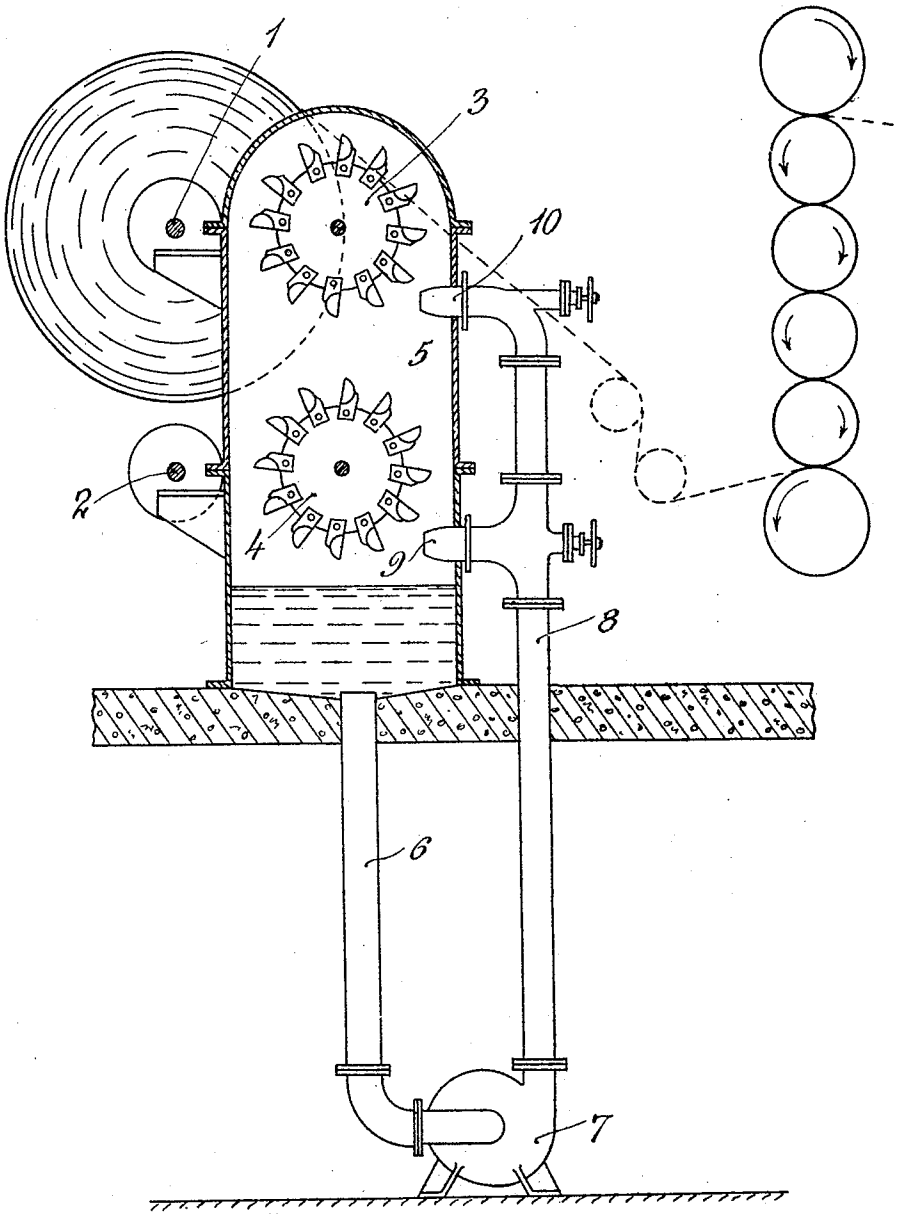
B. E. FOUGNER.

DRIVING DEVICE FOR ROLLING UP ENDLESS PAPER AND THE LIKE.

APPLICATION FILED NOV. 22, 1919.

**1,404,284.** **Patented Jan. 24, 1922.**




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# UNITED STATES PATENT OFFICE.

BJÖRN EILIF FOUGNER, OF FREDRIKSHALD, NORWAY.

## DRIVING DEVICE FOR ROLLING UP ENDLESS PAPER AND THE LIKE.

1,404,284. Specification of Letters Patent. Patented Jan. 24, 1922.

Application filed November 22, 1919. Serial No. 340,011.

*To all whom it may concern:*

Be it known that I, BJÖRN EILIF FOUGNER, a subject of the King of Norway, residing at Fredrikshald, Norway, have invented certain new and useful Improvements in a Driving Device for Rolling Up Endless Paper and the like; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

The devices for rolling up paper on paper machines have to be driven with varying velocity of rotation as the circumferential velocity of the paper roll has to be constant.

Further in order to obtain a satisfactory rolling up of the paper it is necessary that the roll keeps the paper under a steady tension decreasing gradually as the diameter of the roll increases. For driving the rolling up devices there is generally used a friction arrangement comprising a belt pulley or the like which is running on its shaft with a slip varying according to the diameter of the roll or the belt of which has a correspondingly varying slip with relation to the pulley.

The driving power of a device of this kind depends on the friction pressure which is regulated by hand, so as to increase with increasing diameter of the roll.

The driving arrangements of this type cause however a large waste of power which is transferred into heat in the friction arrangement, said heat being liable to damage the belts and cause an increased consumption of leather and lubricating material.

A number of electrical driving devices for rolling up arrangements have been proposed, but said electrical devices require a very complicated automatic regulation of the motor in accordance with the increasing diameter and decreasing velocity of rotation of the paper roll.

According to the present invention the rolling up device is driven by means of a motor of the kind, the moment of torsion of which increases with decreasing velocity of rotation. As an example of a motor of this kind may be mentioned an action water-air, gas- or steam driven turbine, and applicant has found that a fluid turbine for constant pressure of fluid gives the best results.

The turbine shaft is connected positively by means of gears to the shaft of the roller or drum, and the rotation of the roller therefore takes place without the irregularities usual in friction driven devices.

With increasing diameter of the paper roll, i. e., with decreasing velocity of rotation the moment of torsion of the turbine increases steadily and thereby keeps the paper under a suitable tension without any kind of regulation, the same amount of fluid being supplied to the turbine during the whole process of rolling up.

If frequent and important variations of the circumferential velocity are required for instance from 0 up to 200 m. per minute it may happen that the tension on the paper will be too high with small velocities and too low with high velocities. This may easily be avoided by regulating the velocity of rotation and the power of the turbine by the usual means for instance with Pelton turbines by means of a screen or deflector which may be controlled from the governor of the paper machine or by regulating the velocity of the pump and thereby the pressure of the fluid.

It is an important advantage of the invention that the device automatically adapts itself for thick and thin paper, as thin paper is produced with higher velocity and is accordingly put under lower tension than thick paper which is produced slower and also can stand more tension without breaking.

As it will be understood each roll or drum should be provided with an independent driving turbine, but all turbines may be supplied with pressure fluid from a common pump or pressure tank.

On the drawing is diagrammatically illustrated an arrangement according to the invention.

1 is the upper and 2 the lower roller shaft which are driven by the turbine wheels 3, 4 by means of a suitable gear transmission which is not illustrated on the drawing.

The turbine wheels 3, 4 are placed in a common casing from the bottom of which the fluid is conducted through pipe 6 to centrifugal pump 7, which pumps the water up through another pipe 8 to the mouthpieces 9, 10 for the two turbine wheels.

Claims.

1. In a continuous paper making machine, the combination of a paper receiving

spindle and a jet turbine motor for driving the paper receiving spindle only, said motor having its rotor connected to the paper receiving spindle and adapted to rotate under constant pressure of the fluid jet in such manner that the steadily increasing moment of torsion of the turbine due to the constantly increasing diameter of the paper roll causes a corresponding steady decrease in the speed of rotation of the paper roll and the paper to be kept under suitable tension automatically and without regulation of the turbine.

2. In a continuous paper making machine, the combination of a paper receiving spindle and a jet turbine motor for driving the paper receiving spindle only, said motor having its rotor connected to the paper receiving spindle and adapted to rotate under constant pressure of the fluid jet in such manner that the steadily increasing moment of torsion of the turbine due to the constantly increasing diameter of the paper roll causes a corresponding steady decrease in the speed of rotation of the paper roll and the paper to be kept under suitable tension automatically and without regulation of the turbine and means to control the fluid jet.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

BJÖRN EILIF FOUGNER.

Witnesses:
A. W. HEDENSCHEIN,
ROBERT H. FRAZIER.