April 11, 1933. T. KÄLLE 1,903,716

MOISTURE INDICATOR FOR PAPER MAKING MACHINES AND PULP COLLECTING MACHINES AND IN SIMILAR APPARATUS

Filed Feb. 9, 1928

Fig. 1

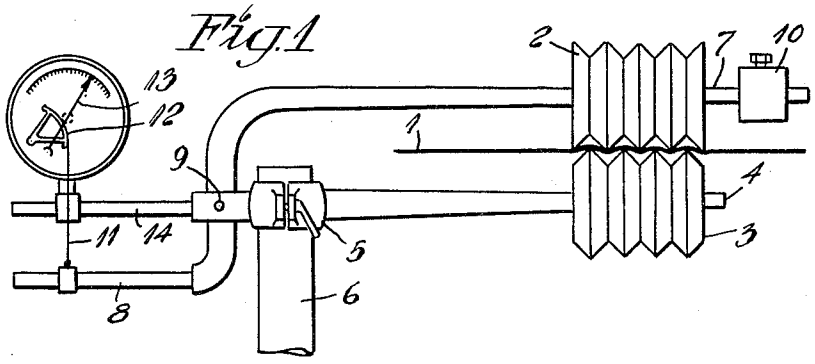


Fig. 2

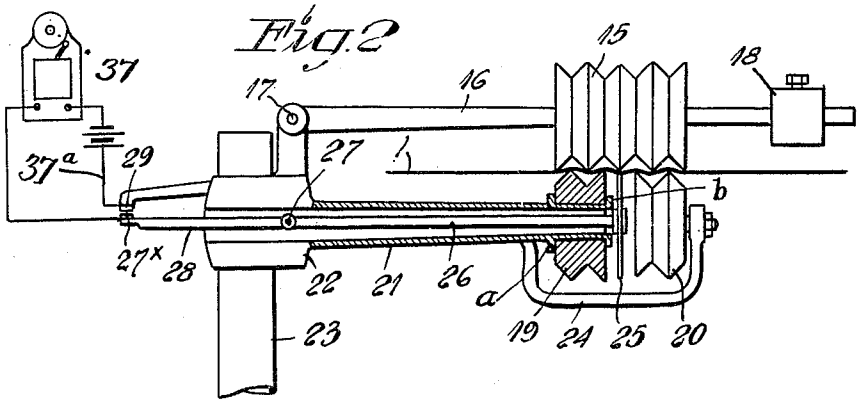
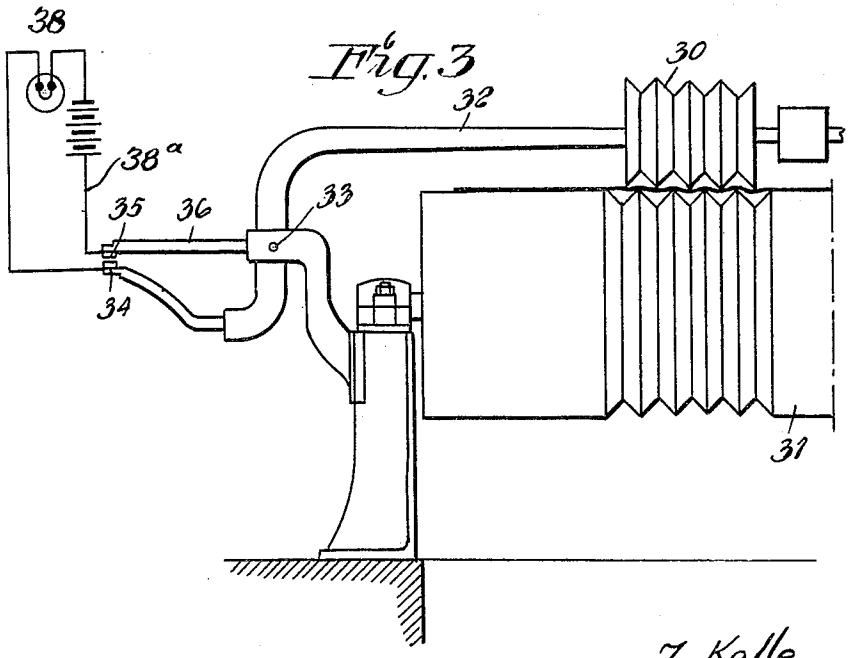


Fig. 3



T. Kalle
INVENTOR

By: Marks & Clerk
Attys.

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UNITED STATES PATENT OFFICE

TORSTEN KÄLLE, OF SAFFLE, SWEDEN

MOISTURE INDICATOR FOR PAPER MAKING MACHINES AND PULP COLLECTING MACHINES AND IN SIMILAR APPARATUS

Application filed February 9, 1928, Serial No. 253,195, and in Sweden April 13, 1927.

This invention relates to an apparatus for indicating and, it may be, recording the degree of moisture of a paper web passing through a paper making machine in a semi-dry or nearly dry condition and also variations of the degree of moisture. The invention is based upon the fact, that a paper web of constant thickness varies in plasticity or in its resistance against bending, folding or similar operation according as the degree of moisture varies, while the web passes between the press rollers and the drying cylinders. For ascertaining the degree of moisture the web therefore, according to this invention, is led between members, which bend the same into one or more folds or corrugations, the depth of which will be dependent on the degree of moisture of the web or the greater or lesser flexibility of the same, the mutual position of the said members being simultaneously indicated by a pointer and a scale, an electric signalling device or the like.

Figs. 1, 2 and 3 in the accompanying drawing show as examples three forms of execution of the invention in side elevations and regarding Fig. 2 partly in section.

1, Fig. 1, is a paper web shown in cross section, immediately behind the last drying cylinder of the paper making machine. 2 and 3 are two rollers provided with grooves and located above and below the paper web respectively and so displaced relatively to one another, that the ridges of the one roller are located opposite to the grooves of the other roller. The lower roller 3 is rotatably mounted on an arm 4, which by means of a contractible ring 5 is fixed to an upright 6. The upper roller 2 is rotatably mounted on the arm 7 of a two armed lever 7, 8, which is swingable on a pin 9, provided on an arm projecting from the ring 5, and in a plane transverse to the paper web and perpendicular to the same. Arm 7 is provided with an adjustable weight 10, by means of which the pressure of the roller 2 on the web 1 may be controlled. An adjustable spring may, evidently, be substituted for the said weight. The second arm 8 of the lever is connected by means of a flexible band 11 or the like to a swingably mounted toothed segment 12, which measures with a pinion provided on the spring actuated spindle of the pointer 13 cooperating with the scale of an indicating apparatus. The said apparatus is carried by a rod 14 projecting from the ring 5. After the releasing of the ring 5 the rollers 2 and 3 may be swung away from the paper web, when wanted.

In the form of execution of the invention shown in Fig. 2 the paper web 1 passes between an upper, grooved roller 15 rotatably mounted on an arm 16 which is pivoted at 17 and loaded by means of an adjustable weight 18, and two rollers 19 and 20, which are journaled on an arm 21 projecting from a ring 22 on an upright 23 and in a fork shaped member 24 provided on the said arm 21. The roller 19 is retained on the arm 21 by means of a flange or collar *a* and a nut *b*. A disc or roller 25 is located between the said rollers 19 and 20 and journaled on an arm 26, which is swingable on a pin 27 in the ring 22. The said arm 26 is swingable in a plane transverse to the paper web 1 and perpendicular to the same. The disc 25 is located right below one of the ridges of the upper roller 15 and is forced upwards by a spring not shown. An electric contact member 27*x* is provided on an extension 28 of the arm 26 and co-operates with a stationary contact member 29 carried by the ring 22.

If the degree of moisture of the paper web 1 becomes greater than wanted, while the web passes through the paper making machine, the web will be bent through a greater distance than before into the grooves of the rollers 2 and 3, Fig. 1, so that roller 2 descends to a position nearer to the roller 3. During this changing of the position of the roller 2 the pointer 13 is shifted and indicates on the scale the greater degree of moisture. The case is the inverse, when the degree of moisture of the paper web decreases. The web then is stiffer and the deformation of the same more difficult, for which reason the web is bent in a less degree between the rollers 2 and 3 and the roller 2 occupies a higher position. The pointer 13 then indicates a lower degree of moisture. The po-

sition of the pointer 13 indicates the relative degree of moisture of the paper web. All variations of the degree of moisture of the web passing between the rollers are thus indicated, so that the degree of moisture necessary for the most effective running of the machine may be ensured. The said variations may be recorded for instance by a pointer being provided with pencil bearing against the indicator paper of a recording drum in the well known manner.

The mode of operating of the apparatus shown in Fig. 2 is analogous to that of the apparatus shown in Fig. 1 with the exception that the greater or less depression of the paper web and the vertical position of the roller 15 dependent thereof results in the disc 25 being shifted through the action of the web. By means of the contact device 27*x*, 29 a signalling apparatus, for instance, an electric bell 37 in a circuit 37*a* may be caused to operate, indicating that the normal degree of moisture has been exceeded.

The invention may, evidently, be modified in many respects without exceeding the limits of the same. Thus in Fig. 3 a grooved roller 30 co-operates with a drying cylinder 31 of the paper making machine provided with grooves. The said roller 30 is carried by a loaded arm 32 pivoted at 33 and provided with a contact member 34, which co-operates with a stationary contact member 35 on an arm 36. The contacts 34 and 35 are in a circuit 38*a* including a lamp 38 which is operated when the regular degree of moisture is exceeded.

The invention may be applied also to pulp collecting machines and similar machines. Regarding the contact device it may be used also for controlling the means which regulates the degree of moisture of paper web.

I claim:

1. In means for indicating the degree of moisture of a travelling web of material the combination of a cylindrical member presenting a grooved surface and rotatably mounted on a stationary support, a shiftable rotatable cylindrical member presenting a grooved surface, said members being located opposite to one another and at opposite sides of the web, the members being so positioned one with respect to the other that the grooves of one are opposite the ridges of the other, means forcing the shiftable member toward the first mentioned member so that the position of the shiftable member is dependent on the moisture of the web, an indicating device, and means for transmitting the motion of the shiftable member to the said device.

2. In means for indicating the degree of moisture of a travelling web of material the combination of a member presenting a grooved surface and mounted on a stationary support, a shiftable member presenting a grooved surface, said members being located opposite to one another and at opposite sides of the web, the members being so positioned one with respect to the other that the grooves of one are opposite the ridges of the other, means forcing the shiftable member toward the first mentioned member so that the position of the shiftable member is dependent on the moisture of the web, an indicating device, and means for transmitting the motion of the shiftable member to the said device.

3. In means for indicating the degree of moisture of a travelling web of material the combination of a member presenting a grooved surface and mounted on a stationary support, a shiftable member presenting a grooved surface, said members being located opposite to one another and at opposite sides of the web, the members being so positioned one with respect to the other, that the grooves of one are opposite the ridges of the other, means forcing the shiftable member toward the first mentioned member, so that the position of the shiftable member is dependent on the moisture of the web, an indicating device, a second shiftable member disposed in proximity to the first mentioned member and located opposite a ridge of the shiftable member first mentioned, and means transmitting the motion of the said second shiftable member to the indicating device.

In testimony whereof I have hereunto affixed my signature.

T. KÄLLE.