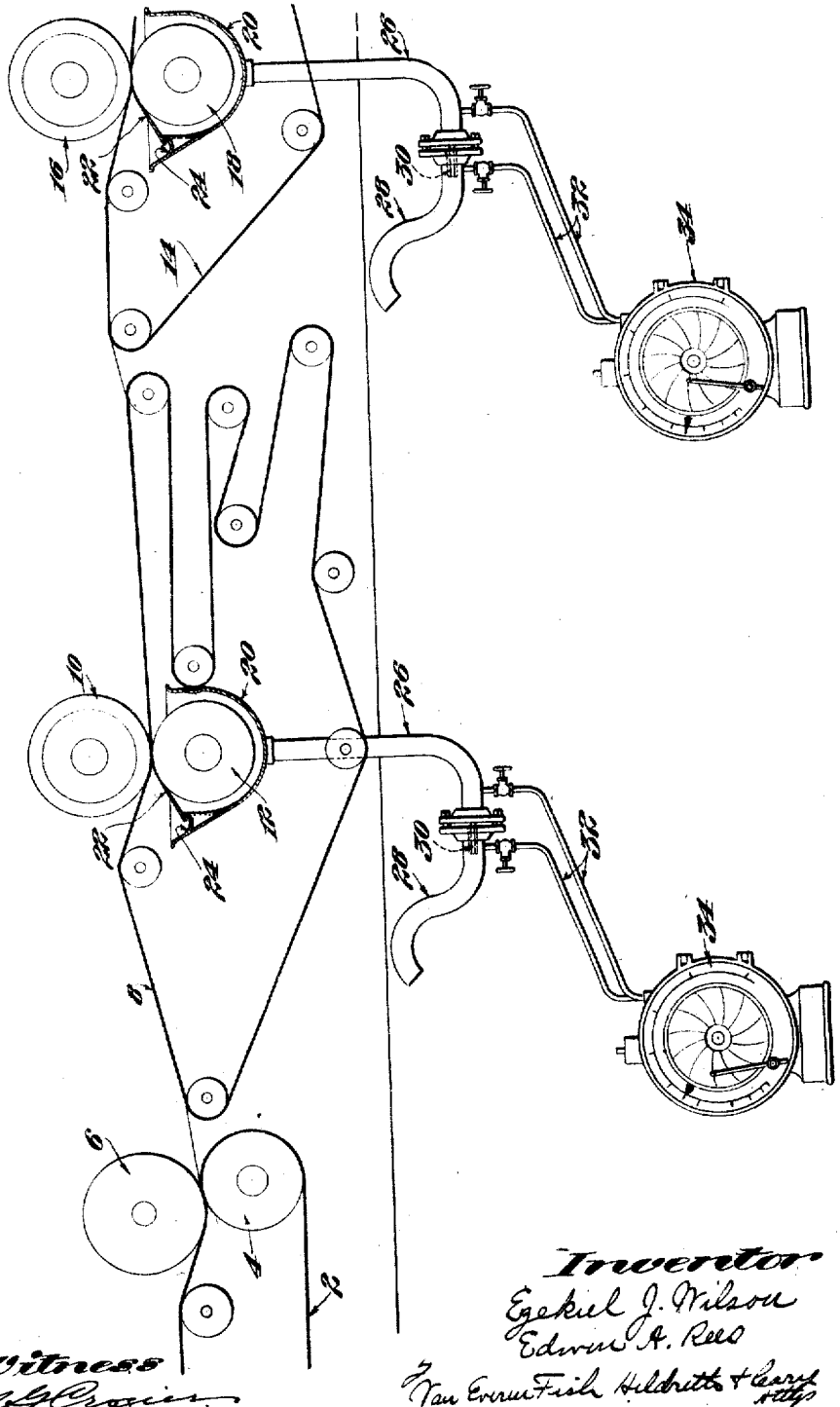
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PAPER MAKING MACHINE

Filed April 12, 1923



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UNITED STATES PATENT OFFICE.

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PAPER-MAKING MACHINE.

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To all whom it may concern:

Be it known that we, EZEKIEL J. WILSON and EDWIN A. REES, citizens of the United States, residing at East Greenbush, in the county of Rensselaer, and Albany, in the county of Albany, respectively, and State of New York, have invented certain new and useful Improvements in Paper-Making Machines; and we 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.

The invention relates to paper making machines.

In these machines the web of paper stock is formed on the Fourdrinier wire at the delivery end of which are located the couch rolls for removing a part of the water and pressing the stock into compact web form. From the couch rolls the web passes successively between the pressure rolls and felt of a series of presses, each of which in turn removes a part of the water remaining in the web and from the last press the web passes to the heated cylinders of the dryers.

Experience has shown that the cost of removing moisture from the paper stock by the dryers is some thirty times the cost of removing the same amount of moisture from the stock by pressure applied by the couch rolls or by the rolls and felts of the presses. It is important, therefore, that the devices for removing water from the stock before it reaches the dryers and particularly the presses be maintained in proper condition to most efficiently remove the maximum amount of water, or that amount which experience shows will secure the most efficient and economical cooperation between the moisture removing mechanisms of the machine.

The present invention enables any or all of the water removing devices of the paper making machine to be maintained in condition for the most efficient operation, and this result is secured by the provision of means for measuring the water being extracted by the water removing devices at any given point or at each of a plurality of points in the travel of the wet paper stock through the machine. The provision of means for measuring the water being extracted by the pressure rolls and felt of a given press not only enables the press to be maintained in condition for most efficient operation but also enables the user of a machine to determine the efficient life of the felts, and also the character of felt which may be most economically used in the manufacture of a given product. In case there is a material and maintained decrease in the amount of water being removed, which will occur when the felt is no longer operating at maximum or economical efficiency, the means for measuring the amount of water being removed will indicate this fact to the operator so that the continued and uneconomical use of a worn out felt may be avoided. By comparison of the amounts of water removed by felts of different character when operating at maximum efficiency in connection with a comparison of the life of the felts the user may determine what character of felt is most economical, for instance, whether it is more economical to use a comparatively light or a comparatively heavy felt, or a felt of one design as compared with another. In other words, the invention enables the user of the machine to determine the condition and equipment of the water removing devices requisite for uniformly economical operation and to approximately maintain such condition and equipment.

Any suitable means for measuring the water being removed from the wet stock by the water removing devices may be utilized although it is preferred to thus measure this water by causing it to pass through a flow nozzle, which is connected to operate a recording flow meter, since this means may be readily installed in applying the invention to existing machines and when installed will accurately measure and record the water being extracted from the paper stock by any given mechanism.

The invention will be readily understood from the accompanying drawings which illustrate diagrammatically the application of the preferred form of the invention to two of the presses of a Fourdrinier paper machine.

In the drawing the Fourdrinier wire upon which the wet paper stock is formed into a web is indicated at 2, the lower couch roll about which the wire passes is indicated at 4 and the upper felt jacketed couch roll which removes a part of the water from the stock

and presses it into compact web form is indicated at 6. The continuous web of wet paper stock formed on the wire passes from the couch rolls onto the endless felt 8 of the first press by which it is carried between the upper and lower press rolls 10 and 12, where it is squeezed between the upper roll and the felt and a further part of the water is removed therefrom. From the first press the paper stock passes onto the felt 14 of the second press, by which it is carried between the upper and lower press rolls 16 and 18 where a still further part of the water is removed by compression of the stock between the felt and upper press roll. In like manner the web passes successively through whatever series of presses may be incorporated in the machine and from the last press passes to the heated drying and calendering rolls of the dryer.

In applying the present invention to a machine such as above indicated means is provided for measuring the water being removed by any one or more of the mechanisms which remove successive portions of the water from the wet stock in its travel to the heated cylinders of the dryer. In the construction indicated in the drawings means is shown for measuring the water removed by the first and for measuring the water removed by the second of the presses, it being understood that similar means may be utilized in connection with the other presses, with the couch roll, or with other mechanisms which remove water from the wet stock during its passage through the machine. In the construction illustrated the water removed from the paper stock by the felt and pressure rolls of the first press is collected in a trough 20 underlying the lower roll and provided with a doctor blade 22 engaging the lower roll 12 near the bight of the rolls and delivering the water removed at this point into an auxiliary inclined trough 24 from which it passes into the trough 20. The water collected in the trough 20 passes down through a pipe 26 leading from one end of the trough and this pipe is provided below the bottom of the trough with a horizontal portion 28 within which a flow nozzle 30 is located. The end of the pipe beyond the flow nozzle is bent upward and has its discharge end arranged above the horizontal portion so that a head of water is maintained in the pipe and a flow of water through the nozzle dependent upon the amount being removed from the wet paper stock by the cooperation of the felt and press rolls. The flow nozzle is connected by pipes 32 with a flow meter 34 of usual construction which is operated by the flow of water through the flow nozzle and indicates and records the rate of flow and consequently the amount of water being removed by the press. The amount of water being removed by the second press is measured and recorded by a mechanism which is the same as that applied to the first press.

During the operation of the machine the amount of water being removed by each press will be indicated and recorded on the time chart of the corresponding meter and will inform the operator whether each press is operating to uniformly remove the amount of water requisite for its most efficient operation and whether the amount of water being removed by each press bears that relation to the amount of water being removed by the other presses which continued use of the invention may have demonstrated will secure the most economical results. The meters will also indicate to the operator when a felt becomes so worn that it can no longer be economically retained in the press so that continued use of the felt after it has ceased to operate efficiently may be avoided.

While the invention has been illustrated and described with special reference to its application to the presses it will be understood, as heretofore indicated, that it is not confined to these mechanisms for squeezing water from the paper stock but may be applied to other water removing mechanisms of a paper making machine.

What is claimed is:

1. In a paper making machine the combination with devices acting on the paper stock at a point in its travel to remove water therefrom of means for measuring the water being removed.

2. In a paper making machine the combination with devices acting on the paper stock at a plurality of points in its travel through the machine to remove water therefrom of means for measuring the water being removed at each point.

3. In a paper making machine the combination with mechanism for squeezing water from the paper stock at a point in its travel through the machine of means for measuring the water removed from the stock by said mechanism.

4. In a paper making machine the combination with mechanism for removing water from the paper stock comprising a layer of felt and a pressure roll between which the stock is squeezed of means for measuring the water being removed by said mechanism.

5. In a paper making machine the combination with press rolls and an endless felt for carrying the paper stock between the rolls of means for measuring the water being removed from the stock by the press rolls and felt.

6. In a paper making machine the combination with devices acting on the paper stock to remove water therefrom, means for

collecting the water, a flow nozzle through which the water is caused to pass, and a flow meter connected to be operated by the flow of water through the nozzle.

7. In a paper making machine the combination with devices acting on the paper stock to remove water therefrom of a trough for collecting the water, a discharge pipe leading from the trough, a flow nozzle in the pipe, means for maintaining a head of water at the nozzle, and a flow meter connected to be operated by the flow of water through the nozzle.

8. In a paper making machine for combination with press rolls and an endless felt for carrying the paper stock between the rolls of a trough for collecting the water removed by the rolls and felt, a discharge pipe having a portion in which a head of water is maintained, a flow nozzle in said portion, and a flow meter connected to be operated by the flow of water through the nozzle.

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