J. C. FOGARTY.

PROCESS OF AND MACHINE FOR MAKING PAPER.

APPLICATION FILED DEC. 18, 1911.

1,119,816.

Patented Dec. 8, 1914.

2 SHEETS—SHEET 1.

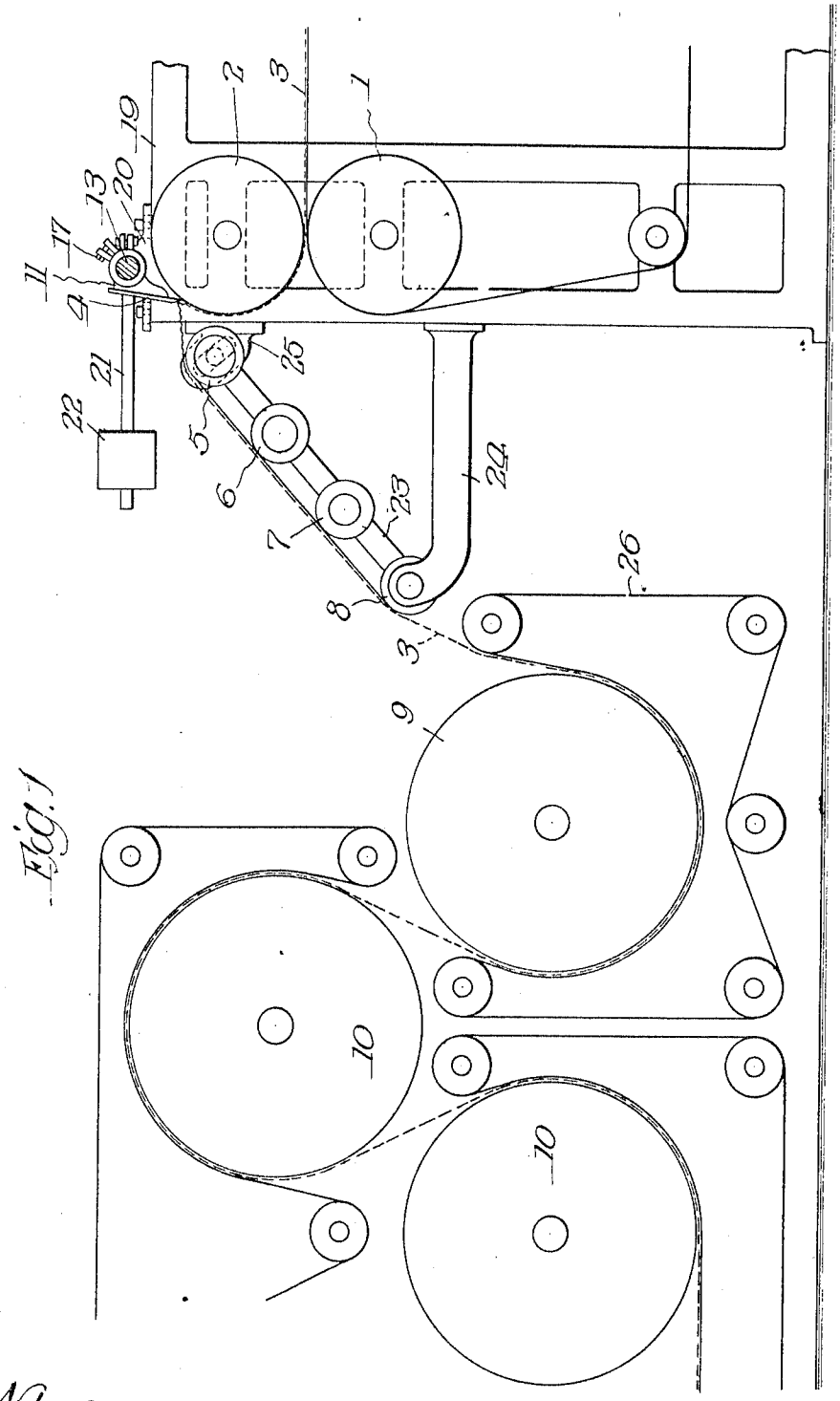


Fig. 1

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2 SHEETS—SHEET 2.

Fig. 2.

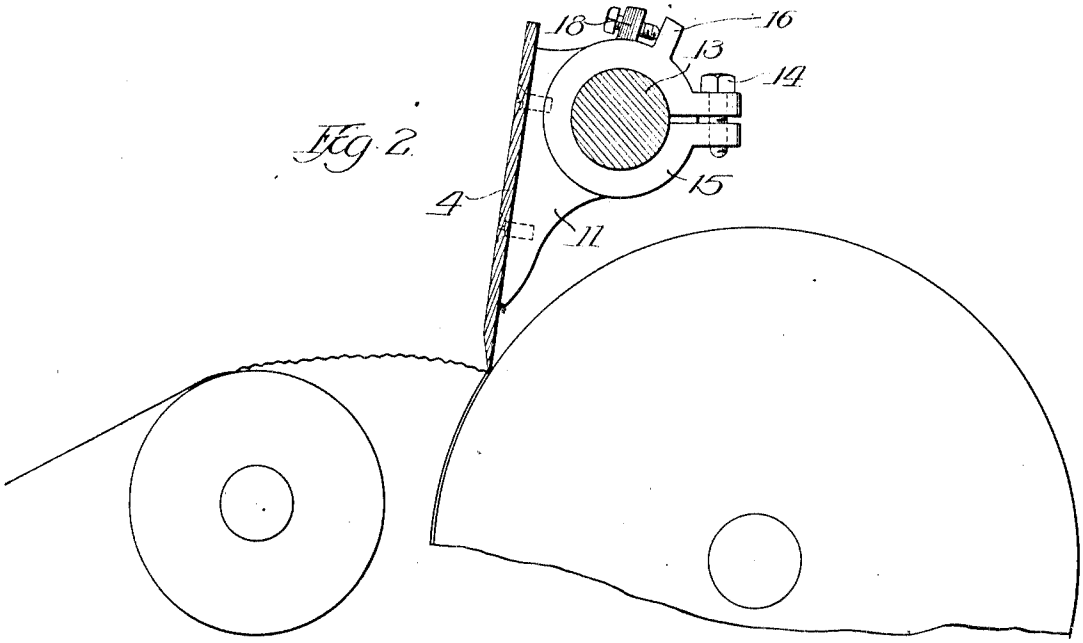
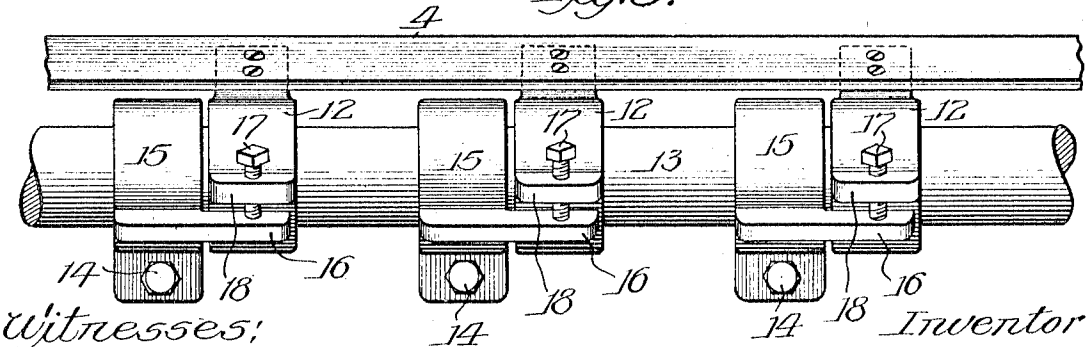


Fig. 3.



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UNITED STATES PATENT OFFICE.

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PROCESS OF AND MACHINE FOR MAKING PAPER.

1,119,816. Specification of Letters Patent. Patented Dec. 8, 1914.

Application filed December 18, 1911. Serial No. 666,371.

To all whom it may concern:

Be it known that I, JOHN C. FOGARTY, citizen of the United States, residing at Green Bay, in the county of Brown and State of Wisconsin, have invented a certain new and useful Improvement in Processes of and Machines for Making Paper, of which the following is a full, clear, concise, and exact description.

My invention relates to a process of and machine for making paper, and more particularly to the method and arrangement whereby the film of pulp is transferred from the pulp-sheet forming machine to the drying rolls.

One object of my invention is to increase the capacity and speed of operation of paper making machines, thereby reducing the cost of manufacture.

A further object of my invention is to provide means whereby paper of requisite thickness may be made.

A still further object of my invention is to provide a machine which will make a paper of increased strength and superior quality.

It is well known in the art of making paper doctors are utilized upon the pickup roll for the purpose of preventing the paper from going around the roll and that during the making of the paper it is customary in threading the machine that the workman takes a narrow strip of paper from the pickup roll and leads the same through the paper machine. While one of the operators puts the paper over the paper machine, another operator would gradually increase the width of the paper until it has reached the other edge of the sheet and in the process of manufacture the paper never touches the doctor blade, pulling itself up from the press roll by its own strength.

In the process of manufacturing paper, small lumps of stock or pulp gather, also slime accumulates in the pipes and other foreign substances are apt to get into the stock and water spattering around the wet end of the machine tend to cause the paper to break at some location across the paper machine, sticking to the press roll and tearing the paper and which greatly interrupts the process of manufacturing the paper and decreases the amount of production.

By my process forming the subject matter of the present application, the sharp edge of the doctor is constantly in contact with the press roll and the paper is shaved therefrom, thus preventing the tearing of the paper incident to lumps or foreign matter which might be fed in the stock through the press roll. By this method, I am able to operate the machine at a speed from fifty to seventy-five per cent. higher than with machines commonly in use and secure a non-interrupted production of paper at all times by shaving the same from the press roll, thus producing a paper without any sign of roughness or destruction of fiber.

My invention comprises several features, all of which coöperate to produce the results hereinbefore mentioned. These several features may be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a diagrammatic view in longitudinal, vertical section of a paper making machine embodying my invention; Fig. 2 is an enlarged sectional view of the doctor forming a part of my invention, showing the relation of the doctor to the pick-up roll; Fig. 3 is a fragmentary, plan view of the doctor.

Similar letters of reference refer to similar parts throughout the several views.

The pulp-sheet forming machine may be of the usual or standard construction, and the drawings show the last pair of rolls thereof, namely the blanket roll 1 and the pick-up roll 2. The pulp film 3 is removed from the pick-up roll by a doctor, the blade 4 whereof is pressed against the surface of said roll to remove the paper therefrom. The sheet of paper pulp then passes to a series of stretching rolls 5, 6, 7, 8, from whence it is passed to the first drying roll 9, and from thence to the remaining drying rolls 10, 10.

The doctor, which constitutes a sub-combination of my invention, comprises a longitudinal blade 4 mounted upon a series of brackets 11. Each bracket 11 is provided with a collar 12 which is loose upon a shaft 13, said bracket being thus capable of being turned about the shaft in order to secure a desired adjustment of the knife 4, as will presently be described. Fixed upon the shaft 13 adjacent each of the collars 12 is a collar 15, said latter collar being fixedly secured to said shaft by a clamping bolt 14.

Extending laterally from each collar 15 is an arm 16 against which bears the end of a set-screw 17 threaded through a radial projection 18 of the collar 12. Each of the collars 12 may thus be adjusted to a greater or less extent by its set-screw 17.

The doctor as a whole is adjustably mounted upon the press-frame 19, in order that its position with respect to the pick-up roll 2 may be adjusted to bring the knife 4 in proper angular relation to said pick-up roll. With this object in view the ends of the shaft are journaled in a bracket 20 which is adjustably secured upon the frame 19, whereby the shaft 13 may be adjusted to a greater or less extent forward of the vertical plane which passes through the axis of the pick-up roll. Secured upon the end of the shaft 13 is an arm 21 which carries a weight 22, whereby the doctor blade is held down in contact with the surface of the pick-up roll. While I preferably employ the arm 21 and the weight 22 for thus holding the blade in contact with the surface of the roll 2, since this provides a convenient means for adjusting the degree of pressure of the blade, it is obvious that other suitable means may be substituted therefor.

It is essential that the edge of the blade 4 should, throughout its length, be in close engagement with the circumference of the roll 2, or otherwise the paper may be torn, especially if the paper contains a hole therein which would tend to prevent the release of the wet film from the roll. Even if the knife is so adjusted, before the machine is started up, as to bring the knife-edge throughout its length in engagement with the roll, the heat developed by the running of the machine is likely to produce a slight irregularity in the pressure of the knife-blade against the roll. Therefore, after the machine is run for a sufficient time to bring the same up to normal working conditions, the engagement of the knife-edge is adjusted by the set-screws 17, thus so adjusting the blade that throughout its length it bears equally upon the surface of the roll.

The thickening of the paper film as it leaves the press roll is dependent upon the angular relation that the forward or working face of the knife bears to the circumference of the pick-up roll. The more nearly this working face of the blade is tangential to the surface of the roll, the less is the thickening of the paper. The more nearly the working surface of the blade is perpendicular to a tangent drawn at the point of contact of the blade with the roll, that is the more nearly it is radial to the roll, the greater is the tendency of the wet paper pulp to bunch or thicken as it comes in contact with the knife blade in the act of being removed thereby. The desired relation of the working surface of the knife to the roll may be obtained by using a knife having its forward lower end suitably beveled to provide a sharp or chisel-like knife edge. The blade is so presented to the pick-up roll that only the sharp or chisel-like edge of the blade bears upon said roll. Moreover the results given by any particular blade may be more or less modified by adjusting the position of the doctor with respect to the roll, that is, by adjusting the bracket 20 forward or backward, and thereby changing the angular position of the blade 4 with respect to the surface of the roll.

The several stretching rolls 5, 6, 7, 8 are mounted upon a swinging arm 23 which is pivoted at its lower end on a bracket 24. The upper end of the arm 23 is adjustable in a slot carried in a bracket 25, whereby the first roll 5 may be adjusted in proper position to receive the paper pulp as it is removed from the pick-up roll. The several stretching rolls being mounted on the common arm 24 are always maintained in proper alinement with each other whatever may be the adjustment of the arm 23. The sheet of pulp is preferably carried over the top of each of said stretching rolls, the wet sheet adhering to the roll sufficiently to produce the friction necessary to feed the sheet.

The speed of the stretching rolls is changeable in order that the several rolls may be set to revolve at the same speed or at successively higher speeds. By causing the first stretching roll 5 to run at a slower surface speed than the pick-up roll 2, tearing or injury to the sheet is avoided. By causing each of the stretching rolls to turn at the same speed, and all at a slower surface speed than the pick-up roll 2, the greatest amount of thickening may be given to the finished sheet. By causing the stretching rolls to run at successively increasing speeds, any crape produced by the doctor blade may be gradually taken out and may be partly or wholly removed as desired.

Even if the final product is to be a thin sheet of paper, it is desirable that the paper film be thickened to a certain extent as it is removed from the pick-up roll. Such thickening of the paper at this point minimizes the danger of tearing the sheet as it is removed from the press roll. It also closes up any small holes or breaks in the paper, producing a more coherent film from which a stronger and superior quality of paper can be made. By properly regulating the speed of the successive stretching rolls, and preferably also of the first drying roll, the paper film which has been thickened as it is removed from the press roll, can, if desired, be gradually thinned down again, and a paper be produced having any required thickness.

To assist the stretching rolls in pulling out any crape that may have been given to the pulp sheet, the first drying roll 9 is arranged so that it may be driven at a different speed from the remainder of the drying rolls 10. For this reason the first drying roll 9 is provided with a separate blanket 26. The course of the paper sheet 3 is shown by the dotted lines which lies between the blanket rolls and the drying rolls.

My invention thus provides suitable means by which the film of pulp is removed from the pick-up roll in an unbroken sheet. It also provides means whereby the pulp sheet may be removed as a comparatively thin sheet with a smooth surface or whereby it may be greatly thickened as it is taken from the pick-up roll, thus providing means whereby the film of paper after passing the film-forming machine may be given any desired thickness before it reaches the driers.

My invention thus provides, in a single machine, means whereby paper, after leaving the film-forming machine, may be given any desired thickness and may be craped to any desired extent or made free from crape as may be desired. Moreover the process of thickening or craping the pulp strengthens the wet pulp. Also the means provided for transferring the wet pulp from the film-forming machine to the driers minimizes the danger of the sheet tearing or breaking at this point and hence there is little necessity for stopping the machine for repairs.

In actual practice it has been found that a machine embodying my invention produces a better grade of paper than a similar machine operated in the usual manner and that the output of the machine is practically doubled by reason of the fact that there is comparatively little stoppage in the operation of the machine due to tearing of the sheet.

What I claim is:

1. A process of making paper of requisite thickness direct from a pulp film, consisting in feeding the pulp film to the pickup roll of a paper machine and causing a sharp edged blade to contact with the surface of the pickup roll and continuously peel the film therefrom.

2. A process of making paper of requisite thickness direct from a pulp film, consisting in feeding the pulp film to the pickup roll of a paper machine and causing a sharp edged blade to contact with the surface of the pickup roll at varying angles thereto, thus causing the fibers of the film to back up, thickening the film and continuously peel the latter from the roll, thus preventing the paper from being torn by lumps or foreign matter.

3. In a paper making machine, the combination with a press roll, of a doctor comprising a rotatable shaft having a scraping blade adjustably secured thereto, said blade having a knife edge, said shaft being mounted in advance of the axial center of said press roll, means for holding said shaft in position to cause said knife edge of the blade to bear on the surface of said press roll, and means for adjusting said shaft with respect to said press roll to vary the angle of contact of said blade with said press roll.

4. The combination with the press roll of a paper making machine, of a doctor comprising a shaft, a series of brackets each independently and adjustably mounted on said shaft, and a blade mounted upon said brackets.

5. The combination with the press roll of a paper making machine, of a doctor comprising a shaft, a series of brackets having collars loosely surrounding said shaft, a series of collars fixed to said shaft adjacent said first mentioned series of collars, set-screws mounted in one of said series of collars and engaging with the other of said series of collars, whereby said brackets may be independently adjusted on said shaft, and a doctor blade mounted upon the free ends of said brackets.

In witness whereof, I, hereunto subscribe my name this 15″ day of December, A. D., 1911.

JOHN C. FOGARTY.

Witnesses:
V. H. Larsen,
A. E. Cofrin.