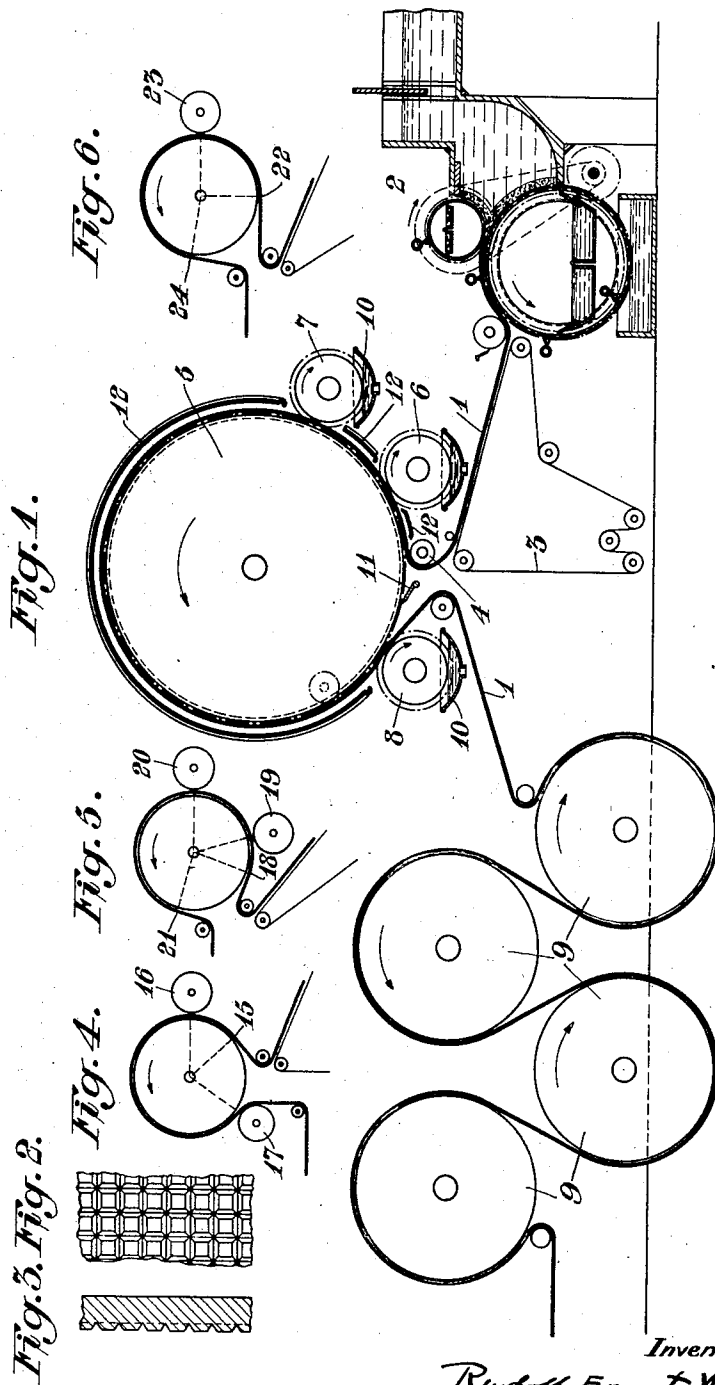


R. E. WAGNER.
 PROCESS OF AND MEANS FOR REMOVING WATER FROM THE PULP SHEET IN THE WOOD PULP
 AND CELLULOSE MANUFACTURE.
 APPLICATION FILED JULY 19, 1917.

1,347,723.

Patented July 27, 1920.



Inventor:

Rudolf Ernest Wagner
 By George Seward Jones, Atty.

UNITED STATES PATENT OFFICE.

RUDOLF ERNST WAGNER, OF KARLSTAD, SWEDEN, ASSIGNOR TO AKTIEBOLAGET
KARLSTADS MEKANISKA VERKSTAD, OF KARLSTAD, SWEDEN.

PROCESS OF AND MEANS FOR REMOVING WATER FROM THE PULP SHEET IN THE
WOOD-PULP AND CELLULOSE MANUFACTURE.

1,347,723.

Specification of Letters Patent.

Patented July 27, 1920.

Application filed July 19, 1917. Serial No. 181,473.

To all whom it may concern:

Be it known that I, RUDOLF ERNST WAGNER, a subject of the King of Sweden, residing at Karlstad, in the Kingdom of Sweden, have invented a new and useful Improvement in Processes of and Means for Removing Water from the Pulp Sheet in the Wood-Pulp and Cellulose Manufacture, of which the following is a specification.

10 In machines for pressing the pulp for removing water from the same in the manufacture of wood-pulp and cellulose, that is to say in the manufacture of the raw product, which machines are not to be compared
15 to paper machines for the manufacture of the finished product, viz., the paper, it has heretofore been customary to facilitate the work of the wet pressing apparatus by passing the pulp sheet or web issuing from the
20 wire-part or water-extractor, within the wet pressing apparatus and before it passes the last wet presses, over a heating cylinder or by admitting steam directly to the pulp sheet, both these measures being based on
25 the observation that on account of the heating the water is more easily driven out of warm pulp than of cold pulp. Both these methods are encumbered with disadvantages, however, mainly due to the fact that
30 while the pulp sheet passes from the heating cylinder to the last pressing apparatus it is cooled again, thus causing a considerable waste of heat, and the heating thus at the same time falling short of its purpose to a
35 certain extent.

The present invention relates to a process of and a means for effecting the removal of water from the pulp sheet by pressing above referred to in a manner so as to avoid such
40 a waste of heat and so as to utilize the heating of the pulp more effectively, the disadvantage and the expense of making the presses and the heating cylinder as separate units within the wet pressing apparatus being avoided simultaneously.

For attaining these purposes the present process consists broadly in this that the pulp sheet is pressed and heated simultaneously in the pressing apparatus proper. In this
50 manner the advantages are obtained that the heat supplied to the pulp sheet is better utilized, that is to say, the losses of heat are decreased, and consequently less heat needs be supplied, and that the adhesion between

the heated roll of the pressing apparatus 55 and the pulp sheet holds together the sheet, and also that the pulp sheet obtains before the last pressing a greater interior compactness so that it may be subjected to considerably higher pressure than what has been
60 possible when pressing according to old methods, and finally, there is no danger of the pulp sheet becoming crushed during the pressing. The process may suitably be carried out in such manner that the heating of
65 the pulp sheet is increased after each pressing of the sheet, which may, for instance, be performed in such manner that the pressing is effected at different points of the heated pulp sheet or web, which points are located at distances from each other which
70 are increased in the direction of movement of the pulp sheet. The means for carrying out this process may consist of press rolls cooperating with a common heated rotary
75 roll for receiving the pulp sheet, preferably in such manner that the heating surface of the said heated roll acting upon the pulp sheet is increased in proportion as the pressing takes place. The means may suitably
80 be arranged in such manner that the press rolls are located at distances from each other and from the points of applying the pulp-sheet to and removing the same from the heated roll, which distances are increased in
85 the direction of movement of the pulp sheet. Each press roll suitably rotates with less peripheral speed than the preceding roll in the direction of movement of the pulp sheet, with a view to the decreased thickness of the
90 pulp sheet owing to the repeated pressing. In order to increase the transmission of heat the surface of the heated roll may be provided with projections, the heated roll being preferably surrounded by protecting
95 devices between the press rolls, which devices prevent or decrease the radiation of heat from the heated pulp sheet.

In the accompanying drawing Figure 1 shows diagrammatically an embodiment of
100 the said means, while Figs. 2 and 3 show a portion of the wall of the heated roll from the side and in section respectively. Figs. 4, 5, and 6 show diagrammatically three different embodiments of the invention.

105 1 denotes the pulp sheet or web issuing from the wire-part or water-extractor 2 which sheet is carried forward by means of

a felt or moving parallel bands 3. The pulp sheet is introduced between a press roll 4 and a heated roll 5, when the sheet sticks to the latter roll. At the rotation of the heated roll 5 the pulp sheet sticking to the same passes between this roll and a number of other press rolls 6, 7, 8 by which the pulp sheet is successively pressed at the same time as it is heated on the roll 5. After having passed the last roll 8 of the pressing apparatus the pulp sheet is either carried to one or several similar pressing apparatus according to this invention, or to drying cylinders 9 for drying, or as wet pulp directly to a cutting machine. The motion of the press rolls may be effected by adjustable transmissions, such as belts and conical pulleys, friction disks with adjustable belt, or the like, and the motion of the heated roll 5 may be effected by means of a suitable driving shaft and gear-wheels and pulleys. The water pressed out by means of the rolls 6, 7, and 8 flows down into and away through troughs 10. For removing the pulp sheet from the heated roll 5, when the sheet has passed the roll 8, there is provided a scraper 11 bearing against the roll 5.

The press rolls 4, 6, 7, 8 are preferably located in such manner that the distance between the same is increased in the direction of movement of the pulp sheet, whereby the heating surface acting upon the pulp sheet is increased in proportion as the pressing takes place. On account of the pressing of the pulp sheet by means of the press rolls, the sheet on the heated roll becomes successively thinner in proportion as it passes the various press rolls, and on account hereof the peripheral speed of the outer surface of the pulp sheet becomes decreased in the same degree. In order to make the peripheral speed of the press rolls to correspond with the peripheral speed of the outer surface of the pulp sheet the press rolls are driven by means of their transmissions in such manner that at a constant speed of the heated roll each press roll rotates with a less peripheral speed than the press roll immediately preceding in the direction of movement of the pulp sheet.

In order to prevent radiation of heat from the pulp sheet on the heated roll 5 there are provided protecting devices between the press rolls 4, 6, 7, 8, said devices consisting for instance of a shield 12.

The transmission of heat from the heated roll 5 to the pulp sheet may be furthered by providing the surface of the roll with projections, as shown in Figs. 2 and 3, said projections having the shape of ribs, ridges, teeth, or the like, which penetrate into the pulp sheet and increase the heating surface.

According to the embodiment shown in Fig. 4 the pulp sheet is applied tangentially to the heated roll at 15 and is pressed by

the press roll 16, after which it is heated during more than half a revolution of the heated roll, until it is again pressed by the press roll 17 where it is removed from the heated roll.

According to Fig. 5 the pulp sheet is applied tangentially to the heated roll at 16 and is then pressed, after a short heating, by the press roll 19, and after heating during about one fourth of a revolution of the heated roll it is again pressed by the press roll 20, after which it is heated during nearly one half of a revolution and is removed at 21.

According to Fig. 6 the pulp sheet is applied tangentially at 22 and is heated during about one fourth of a revolution of the heated roll, after which it is pressed by the press roll 23 and after heating during nearly one half of a revolution of the heated roll it is removed at 24.

With the means above described it is possible to press the pulp sheet in a considerably more efficient manner than by the use of several independent presses with separate intermediate heating cylinders, thus effecting a great saving of steam and simplification of the entire machine, and as regards so called wet pulp, a substantial reduction of the costs of transporting such pulp. As regards costs of building and erecting the pressing means according to the present invention is also considerably less expensive than several presses arranged one after another with special intermediate heating cylinders.

I claim:

1. In a means for removing water from the pulp sheet in the wood-pulp and cellulose manufacture, the combination of a heated rotary roll for receiving the pulp sheet, and press rolls coöperating with the said heated roll and located at distances from one another and from the points of applying the pulp sheet to and removing the same from the heated roll which distances are increased in the direction of movement of the pulp sheet, each press roll being arranged to be driven with less peripheral speed than the press roll immediately preceding in the direction of movement of the pulp sheet in proportion as the thickness of the pulp sheet becomes decreased during the pressing, substantially as and for the purpose set forth.

2. In a means for removing water from the pulp sheet in the wood-pulp and cellulose manufacture, the combination of a heated rotary roll for receiving the pulp sheet, said roll being provided with projections on its outer surface, and press rolls coöperating with the said heated roll and located at distances from one another and from the points of applying the pulp sheet to and removing the same from the heated roll which

distances are increased in the direction of movement of the pulp sheet, substantially as and for the purpose set forth.

3. In apparatus of the class described,
5 a water extractor, a drying cylinder and a heating drum, means for guiding the sheet of pulp as the same issues from said extractor to and in contact with said heating drum, a pressure roll cooperating with said
10 drum for pressing a substantial portion of the water from said pulp sheet during its passage in contact with said drum, and means for thereafter guiding said sheet to said drying cylinder, the feed of said sheet
15 throughout said apparatus being continuous.

4. In the manufacture of sheet pulp or cellulose, the improved process of expelling therefrom a substantial percentage of water after the issuance of the sheet from the

water extractor, which process consists in 20 simultaneously applying heat and pressure to said sheet during the continuous feeding thereof through the combined heating and pressing device.

5. In an apparatus of the class described, 25 a water extractor, a heating drum, means for guiding the sheet of pulp as the same issues from said extractor to and in contact with said heating drum, a pressure roll cooperating with said drum for pressing a 30 substantial portion of the water from said pulp sheet during its passage in contact with said drum, and means for guiding said sheet away from said drum, the feed of said sheet throughout said apparatus being con- 35 tinuous.

RUDOLF ERNST WAGNER.