PULP PRODUCING APPARATUS

Filed Feb. 15, 1939

INVENTOR.
HERBERT R. SIMONDS.
by
his ATTORNEY.
This invention relates to an apparatus for producing fibrous pulp and may be utilized either in an apparatus for reducing raw stock to pulp, such as a beating engine, or in an apparatus for refining previously formed pulp, such as a Jordan engine.

In various types of pulp producing apparatus the stock, either raw stock or unfinished stock, is passed between cooperating members, some of which are rotatable with relation to the other and each of which is provided with a series of spaced reducing elements, such as bars. A beating engine usually comprises a tank, through which the stock is circulated, and a cooperating bed plate and beater roll arranged in the path of the stock and provided with longitudinal bars. A Jordan engine usually comprises a stationary shell, provided internally with longitudinal bars, and a plug rotatable within the shell and provided with longitudinal bars to cooperate with the bars of the shell. In both forms of apparatus the cooperating bars act on the stock with a cutting or drawing action, or both, to effect fiberization, and the stock is advanced by the bars of the rotating member. In the production of certain kinds of pulp of a high quality it is desirable that the fibers be subjected to pressure, which cannot be accomplished with the present type of reducing elements, and one object of the invention is to provide a pulp producing apparatus in which the cooperating members will subject the pulp to pressure, as well as to a cutting or drawing action, thereby producing pulp of a superior quality.

A further object of the invention is to provide such an apparatus in which the cooperating members will so act on the stock as to more satisfactorily advance or feed the same through the apparatus.

A further object of the invention is to provide such an apparatus in which one of the members will be provided with elements movable with relation thereto and cooperating with the bars of the other member to exert the desired pressure on the fibers.

Other objects of the invention may appear as the apparatus is described in detail.

In the accompanying drawing Fig. 1 is a plan view of a portion of a bed plate for a beating engine embodying my invention; and Fig. 2 is a sectional taken on the line 2—2 of Fig. 1 and showing a portion of the beater roll.

As has been above stated a pulp producing apparatus usually comprises two cooperating members, one of which is rotatable with relation to the other and both of which are provided with reducing elements arranged to act upon the stock in such a manner as to effect the desired fiberization thereof, and herein called bars. Ordinarily one of these members is stationary but in some cases the two members may both rotate, in opposite directions.

In the accompanying drawing I have illustrated the invention as embodied in the bed plate 6 of a beating engine but it will be understood that the invention is equally applicable to pulp producing apparatus of other kinds, such as a Jordan engine. The bed plate 6 comprises a plurality of bars 7 rigidly mounted, spaced laterally one from the other and extending lengthwise of the bed plate. The bars are of such width that the upper or working edges of the several bars will provide the bed plate as a whole with an arcuate working surface. Cooperating with this bed plate is a beater roll, a portion of which is shown at 7 and which is provided with bars 8 extending lengthwise thereof and spaced laterally one from the other and adapted to move over the working surface of the bed plate in cooperative relation thereto when the beater roll is rotated. In order that the fibers passing between the beater roll and the bed plate may be subjected to pressure, as well as to a cutting and drawing action, the bed plate has been provided with movable elements arranged to form a part of the working surface of the bed plate and to be actuated by the bars of the beater roll. The movable elements are preferably rotatable so that the surfaces thereof will move with the bars of the beater roll and the fibers passing over the rotatable element will be subjected to heavy pressure. There may be any suitable number of rotatable elements, herein referred to as rollers, but preferably there are two or more rotatable elements separated one from the other by beater bars. In the particular arrangement shown the stock reducing bars of the base plate are arranged in groups, the several groups being spaced one from the other, and rollers 9 are mounted in the spaces between the respective groups of bars for rotation about individual axes. The rollers are so mounted that the upper circumferential portions thereof will lie in and form a part of the arcuate working surface of the bed plate and they are of hard material, preferably metal. As the stock is advanced by the beater roll portions thereof pass between the respective rollers and the corresponding bars of the beater roll and the fibers in these portions of the stock are subjected to pressure and to a drawing action. Thus
the stock is alternately subjected to separating and drawing action between the bars of the bed plate and of the beater roll and to pressure and a drawing action between the rollers and the bars of the beater roll. The rollers and the bars of the beater roll cooperate not only to subject the fibers to pressure but also to positively advance the fibers, thereby tending to withdraw the stock from the pockets between adjacent bars of the beater roll and to prevent the stock from lodging in the spaces and passing over the bed plate, without fiberization. The rollers are provided at their ends with trunnions 16 which are mounted in suitable bearing 17 arranged in a box or tank 12 in which the bed plate is mounted. Inasmuch as the rollers are of considerable length it is usually desirable to provide the same with intermediate supports to prevent the possibility of their sagging under the pressure of the beater roll. For this purpose I have in the present instance provided each roller with one or more reduced portions 13 which serve to divide the same into longitudinal sections, and each of these reduced portions constitutes a journal which is mounted in intermediate bearings 14. Preferably the reduced portions and intermediate bearings of each roller are arranged out of line with the reduced portions and intermediate bearings of the adjacent rolls, so as to prevent portions of the stock from traveling over the bed plate in a straight line above the intermediate bearings and not coming in contact with any of the rolls.

In order to prevent the stock from flooding through the spaces between the sections of the rollers without contacting with the working surfaces thereof each bearing has an upward extending portion 15 which lies close to the path of the working edges of the bars 8 of the beater roll and thus constitutes a dam to retard the flow of stock over the bearing and divert the same from the bearing. In the present arrangement each bearing is provided with a cap 16 on which the upwardly extending portion 15 is formed and that portion is of a width less than the width of the cap to enable ready access to be had to the attaching bolts 17. The bearings for the rollers are vertically adjustable so as to permit the rollers to be adjusted to maintain the same in proper relation to the working edges of the bars of the bed plate and, in the present instance, the bearings are supported upon a plurality of thin blocks or shims 18, the number of which may be varied to cause the rollers to be supported in the desired positions. The bearings are preferably of the oilless type which will operate satisfactorily when submerged in liquid.

The character of the rollers and the manner of mounting the same may vary in different types of apparatus. For example, when applied to a Jordan engine the rollers may be mounted in either the shell or the plug, or both, and will preferably be of a relatively small diameter and the bearings will be of such a character as to enable them to be conveniently mounted in the shell or plug, which are usually of a thickness much less than the thickness of the base plate. While I have shown and described one embodiment of my invention I wish it to be understood that I do not desire to be limited to the details thereof as various modifications may occur to a person skilled in the art.

Having now fully described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A fibrous pulp stock reducing apparatus comprising two members which have cooperating arcuate working surfaces and one of which is rotatable with relation to the other, the working surface of one of said members comprising a plurality of rigidly mounted stock reducing elements having blunt working edges and a pressure roller mounted adjacent said reducing elements on an axis fixed with relation to said member and having a substantially smooth surface, and the working surface of the other of said members comprising a plurality of rigidly mounted stock reducing elements having blunt edges, the arrangement being such that the relative movement of said members will cause the rigid reducing elements of the last mentioned member to cooperate successively with the rigid reducing elements and the pressure roller of the first mentioned member and thus subject the stock alternately to a separating and drawing action and pressure and a drawing action.

2. An apparatus for effecting the fiberization of fibrous pulp stock comprising a stationary member provided with a plurality of laterally spaced stock reducing elements having blunt worked edges arranged in groups and adjacent groups of reducing elements being spaced laterally one from the other, and pressure rollers mounted in the respective spaces between said groups of reducing elements on axes extending longitudinally thereof and fixed with relation to the member having said groups of reducing elements, each roller having a substantially smooth working surface substantially tangential to the arcuate working surface of the member on which it is mounted, the arrangement of said rollers with relation to the reducing elements and the two members being such that the stock advanced by said rotatable member will be subjected alternately to a separating and drawing action between the reducing elements of the two members and to pressure between the rollers on the one member and the reducing elements on the other member.

3. In an apparatus for effecting fiberization of fibrous pulp stock, a stationary member having a plurality of reducing elements rigid therewith and arranged in groups spaced one from the other, and rollers mounted between adjacent groups of reducing members on fixed axes and having substantially smooth working surfaces, said reducing elements and said rollers being arranged to form an arcuate working surface, and a rotatable member having a plurality of reducing elements rigid therewith and arranged to move over the working surface of said stationary member and subject said stock alternately to separating action by said rigid reducing elements of the two members and to pressure between said rollers and the reducing elements of said rotatable member.

4. In an apparatus for effecting the fiberization of fibrous pulp stock, a member comprising a plurality of reducing elements rigid therewith, and a plurality of rollers mounted between said reducing elements.
reducing elements for rotation about axes fixed with relation to said member and having substantially smooth surfaces, said rollers and said reducing elements being arranged to form an arcuate working surface over which the stock moves, each roller having longitudinally spaced portions of reduced diameter dividing the same into sections, the reduced portions of each roller being arranged out of line with the reduced portions of the adjacent rollers, and a bearing for each of said reduced portions, and a second member having a plurality of reducing elements rigid therewith, one of said members being rotatable with relation to the other member and the reducing elements of said second member being arranged to cooperate with the reducing elements and rollers of the first mentioned member to subject said stock alternately to fiber separating action and to pressure, each bearing having a part arranged close to the path of the reducing elements of said second member to retard the flow of stock between the sections of said rollers.

6. A bed plate for an apparatus for reducing fibrous pulp comprising a plurality of groups of bars having their working edges arranged to provide an arcuate working surface, and a plurality of rollers having substantially smooth surfaces and arranged between adjacent groups of bars with portions of their circumferential surfaces in and forming parts of said working surface, each roller being mounted for rotation about an axis fixed with relation to said bars.

HERBERT R. SIMONDS.