July 1, 1947.

M. GOEHLER ET AL

BEATER FOR DISINTEGRATING PAPER CONTAINING RESIN

Filed Feb. 5, 1945

Fig. 1.

Fig. 2.

INVENTORS
Michael Goehler,
Frank B. Winters,
Eugene F. Davis

BY
Morse & Morse
ATTORNEYS.
This invention relates to improvements in a beater for disintegrating paper containing resin.

In conventional beaters employed for the treatment of stock or stuff in the paper making industry, the brushing action of the revolving rolls accomplishes hydration of the stock. In such beaters low pressure exhaust steam may be introduced into the beater tub adjacent the discharge outlet thereof, for the sole purpose of heating the stock or stuff.

At the present time there is a scarcity of certain types of paper making stocks, but there is available large supplies of waste papers, including those which have been specially treated with melamine resin, and the present invention contemplates the treatment in the improved beater of such stocks. Melamine resin paper "broke" and other specially treated paper are available, but their manipulation, heretofore, in a beater has not been practical nor economical because such materials required an unduly long period of treatment in the beater and were apt to clog the apparatus and deter circulation of the stock.

The present invention contemplates the provision of an improved beater construction for treating stock wherein special stocks of the types herefofore mentioned, and which were previously impractical, may be economically and satisfactorily used.

More particularly, the invention contemplates the provision of an improved beater arrangement for the introduction of saturated or superheated steam at high pressure adjacent the rear or upstream side of the roll between the roll and the back fall, or immediately adjacent the back fall, which jets of steam function to burst and cook the stock, clear the back fall and prevent the formation and matting of stock films therein such as would tend to clog the beater and stop circulation therein, and to increase the stock circulation and turbulence within the beater tub. By virtue of these results special stocks of the types referred to and which could not be herefore economically treated in conventional beaters, may be thoroughly separated and prepared in a relatively short, economical time period, also permitting the production of superior paper because the treatment does not destroy the desirable qualities of the fibers.

A further object of the invention is to provide an improved beater construction for treating difficult stocks wherein which permits operating the beater roll in a position relatively high off the beater bed plate, thereby preventing destruction of or damage to the stock fibers.

A further object of the invention is to provide a beater construction which is very simple and which is adaptable to conventional beaters with a minimum of modification, which is efficient in operation, which enhances the quality of the paper produced, which is economical, time saving, and practical in use, and which is well adapted for the purposes described.

With the above and other objects in view, the invention consists of the improved beater construction for treating stock therein, and all of its parts, combinations and steps, as set forth in the claims, and all equivalents thereof.

In the accompanying drawing illustrating one complete embodiment of the invention and in which the same reference characters indicate the same parts in all of the views:

Fig. 1 is a plan view of the improved beater construction with the tub cover over the rear end removed and with the roll shown in section; and

Fig. 2 is a vertical sectional view taken on line 2—2 of Fig. 1 and with the covers disposed over the roll and the rear end of the tub.

Although the invention is adaptable to various types of beaters, merely by way of illustration there is disclosed a conventional form of beater known as the "Hollander" modified to incorporate the present improvements.

The tub 5 is formed with the usual central longitudinal partition or midboard 6 which defines channels through which the stock travels in continuous circuit. In the channel on one side of the midboard on a horizontal, transverse axis is a revolving beat roll 7. Exteriorly of the tub 5 the beater roll axis or spindle 8 carries fast thereon a pulley 9 or other means, which in practice is in connection with a source of power (not shown). A hand wheel-operated screw 10 is effective, through conventional associated mechanism, to raise and lower the roll spindle 8 to regulate the distance between the periphery of the roll and the bed plate 11 of the tub whereby to control the brushing action of the roll on the stock circulating in the tub.

Within the channel formed on one side of the midboard 6 and rearwardly of the roll 7 is a back fall 12. On its side adjacent the lower peripheral portion of the roll the back fall is shaped to
conform to the curve of the beater roll and then rises to a peak or crest spaced from the roll and drops on its other side in a steep slope. The roll operates to throw the stuff or stock over the crest or highest point of the back fall, thus forcing a head of water with the result that the force of gravity causes the stock to travel away from the roll, around the tub on the other side of the midboard 6, and then back to the roll again. This circulation of the stock continues for a substantial time period, depending upon the type of stock and the treatment in the beater required by the stock.

The essence of the invention is the introduction of saturated or superheated steam at high pressure adjacent the rear or-upstream side of the roll 7 between the latter and the back fall 12, or immediately adjacent the back fall. By referring to the drawing, it will be noted that steam nozzles are indicated by the numerals 13 and 14 respectively. The two nozzles 13 are arranged at right angles to the plane of the upper surface of the back fall and the beater roll, as shown in the drawing to discharge steam adjacent the inner end of the back fall 13 and are extended through the midboard 6, while the nozzles 14 are similarly located on the opposite side of the channel and are adapted to discharge steam adjacent the outer end of the back fall and are extended through the side wall of the tub 5. The nozzles 13 and 14 are connected with main supply conduits 15 and 16 respectively which connect with a source of supply of steam which is saturated or superheated and at high pressure (not shown). The branches from the main supply conduits 15 and 16 to the nozzles 13 and 14 are controlled by hand valves 17. It will thus be seen that the steam discharge nozzles 13 and 14 emit saturated or superheated steam at high pressure adjacent opposite ends of the back fall between the front face of the back fall and the rear peripheral portion of the roll 7.

It may also be desirable to augment the steam supply to the nozzles 13 and 14 by a header 18 extended horizontally through an upper portion of the back fall and connected by a pipe 19 with one of the main supply conduits, as the conduit 15. Passage of steam from the main supply conduit 15 through the branch pipe 18 may be controlled by a hand valve 20. Branching out radially from the header 18 and having their open ends adapted to discharge adjacent surface portions of the back fall are discharge nozzles 21. The arrangement of the nozzles 21 imbedded in the back fall and opened there through is subject to considerable variation depending upon the conditions to be met, but said nozzles 21 discharge steam immediately adjacent surface portions of the crest of the back fall.

The two nozzles 13, 14 and 21 is to discharge saturated or superheated steam at high pressure into the circulating stock and onto surface portions of the equipment. The steam thus emitted serves to burst and cook the stock, increase the circulation and turbulence of the stock, and to clear the back fall against filmimg and matting of the stock thereon whereby clogging of the apparatus and impairment of the stock circulation is prevented. The nozzles 21 imbedded in the back fall are particularly effective in preventing the stock from filmimg and matting on the back fall.

The saturated or superheated steam at high pressure emitted into the apparatus and the stock therein serves, in conjunction with the mechanical manipulation of the stock, to greatly facilitate the wetting and separation of the stock. As a result, the brushing action of the roll 7 is of less consequence than in conventional practice so that the roll 7 may be operated in a position relatively off the bed plate 14. This results in a treatment which saves rather than destroys the fibers of the stock.

The improved beater construction and the method of treating stock therein is highly advantageous from conventional practices utilizing standard beaters. Certain types of stocks are difficult to manipulate in a standard beater following standard treatment of the stock in the beater. In this category are waste papers including those which have been treated with melamine resins. Such mentioned stocks are available for use in paper making and are inexpensive, but heretofore, their treatment in a beater required such an excessive time period as to render their use uneconomical and impractical. As an example, eight or more hours were required to separate, thoroughly prepare and condition such stocks in a conventional beater utilizing conventional treatments therein. As against this, such difficult stocks may be very effectively and thoroughly separated and prepared by the improved beater construction utilizing the treatment with saturated or superheated steam at high pressure, described, in a period of about 1½ hours. The improved beater and method of treatment in connection therewith therefore permits the economical and practical use of the types of difficult stocks, previously mentioned, and which was not heretofore practical or economical. Additionally, the use of stocks of the type described permits the production of a superior paper because the improved beater construction and method of treatment therein insures better and more adequate separation of the stock, at the same time permitting the use of such difficult stocks which, however, have incorporated therein certain desirable ingredients and which basically have exceptionally strong fibers.

The invention is also applicable to sulphate and sulphite pulps and rags, cotton linters and flax pulp and permits the expeditious separation and hydration of the fibers of such stocks.

A beater constructed in accordance with the present invention, insures continuous beater operation without danger of the circulation of the stock therein being deterred and without danger of portions of the equipment becoming clogged or having stock films matted therewith.

The saturated and/or superheated steam introduced into the beater is preferably at a pressure of substantially 150 pounds per square inch.

The improved beater construction and method of treating stock therein is simple, economical and practical, and is well adapted for the purposes set forth.

What is claimed as the invention is:
1. A beater comprising in combination a tub having a channel including a bottom and two side walls, a bed plate in said bottom, a rotatable beater roll above said bed plate, said said beater roll in a position high off the bed plate, a back fall extending across the channel adjacent said beater roll having its upper surface spaced from the beater roll, and two steam discharge nozzles mounted in each of the two side walls in the space between the upper surface of the back fall and the beater roll, said two nozzles being located at different levels in said space and disposed angularly with their
open ends directed towards the upper surface of the back fall, said nozzles being connected to a source of high pressure steam whereby the jets of steam which issue therefrom function to burst and cook the stock, clear the back fall, prevent the formation and matting of stock films thereon and to increase the stock circulation and turbulence within the beater tub.

2. A beater according to claim 1 in which a plurality of additional steam discharge nozzles, adapted to be connected to a source of high pressure steam, are located and imbedded in the upper surface of the back fall on the side adjacent the beater roll.

MICHAEL GOEKLER.
FRANK H. REIMER.
EUGENE F. DAVIS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,595,209</td>
<td>Mitchell</td>
<td>Aug. 10, 1926</td>
</tr>
<tr>
<td>2,394,273</td>
<td>Thomas</td>
<td>Feb. 5, 1946</td>
</tr>
</tbody>
</table>

FOREIGN PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Country</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>548,234</td>
<td>Great Britain</td>
<td>1942</td>
</tr>
<tr>
<td>4,447</td>
<td>Great Britain</td>
<td>1882</td>
</tr>
<tr>
<td>20,131</td>
<td>Germany</td>
<td>Nov. 18, 1882</td>
</tr>
<tr>
<td>388,303</td>
<td>Germany</td>
<td>Jan. 11, 1924</td>
</tr>
</tbody>
</table>

OTHER REFERENCES

Page 34, paragraph 4, column 1, of Paper Trade Journal vol. 117, No. 19, Nov. 4, 1943.
Bulleting No. 9, of Heavy and Paper Chemical Dept. of the American Cyanamid and Chemical Corp., New York, N. Y., Sept. 17, 1943 page 3.