

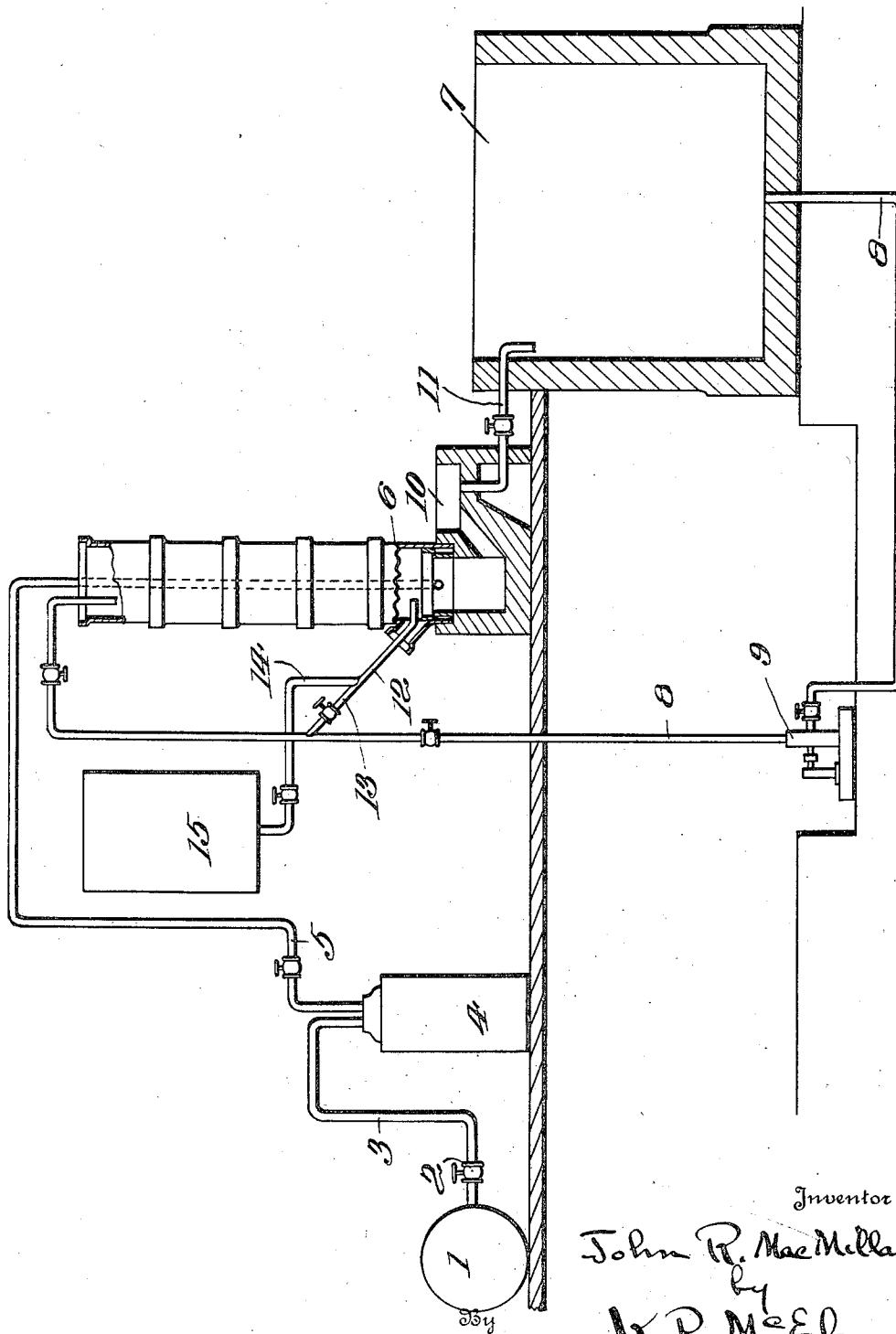
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MAKING BLEACHING LIQUOR AND APPARATUS THEREFOR

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MAKING BLEACHING LIQUOR AND APPARATUS THEREFOR.

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To all whom it may concern:

Be it known that I, JOHN R. MACMILLAN, a citizen of the United States, residing at the village of La Salle, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Making Bleaching Liquor and Apparatus Therefor, of which the following is a specification.

10 This invention relates to making bleaching liquor; and it comprises a method of making bleaching liquor with the aid of commercial chlorin wherein a charge of alkaline liquid (usually milk of lime) is
15 circulated in closed circuit against a countercurrent flow of chlorin gas introduced at one point until the desired amount of chlorin is taken up, additional alkaline liquid being supplied to said flow at the
20 point of introduction of the chlorin, this addition being particularly in the later stages of the operation; and it also comprises vertical tower-like means for contacting chlorin in upward flow against an alkaline liquid in downward flow, a source of
25 chlorin, a connection therefrom to said vertical device at a low point, means for circulating the alkaline liquid in closed circuit downward through said vertical device and to and from a storage tank and
30 special means for introducing alkaline liquid into the vertical device at a point adjacent the point of introduction of chlorin; all as more fully hereinafter set forth and
35 as claimed.

In paper and pulp mills, plants handling textiles, etc., much bleaching is done with the aid of commercial liquid chlorin bought in tanks or tank cars and converted into
40 bleaching liquor by the user. In preparing the liquor, a certain amount of chlorin is supplied to an alkaline liquid, usually milk of lime, although caustic soda solutions, etc., are sometimes used; the amount of chlorin
45 being so proportioned to the alkali present as to leave the reaction mixture somewhat alkaline at the end. The chlorin unites with the alkali by a well known reaction to form hypochlorite and chlorid. The action is not
50 instantaneous, absorption and reaction requiring a certain time for completion and to secure a liquor representing substantially the full bleaching power of the chlorin used, much attention to detail is necessary.
55 In practice, chlorin gas is led from the tank

or container of liquid chlorin past a suitable reducing valve and into the base of a tower-like reaction chamber. Sometimes vaporizing devices are located between the tank and the reaction chamber. Through
60 this tower a body of alkaline liquid, usually milk of lime, is repeatedly passed with the aid of a circulating pump, the liquid passing downward in countercurrent to the chlorin. Liquid passes from the base of the
65 tower to a receiving tank whence it is sent back to the top of the tower by the pump. The strength of the alkaline liquid employed varies considerably with the use to which the bleaching liquor is to be put and
70 with the user. Sometimes it is a 5 per cent solution and suspension of calcium hydroxid (50 grams per liter). The chlorination of the batch of liquor is continued until it has taken up as much chlorin as may be
75 desired. The liquor is always left a little alkaline for the sake of stability; with milk of lime, introduction of chlorin is discontinued when the liquor still contains a little suspended undissolved calcium hydrate.
80 At first, when the milk of lime is fresh and highly alkaline, the incoming chlorin is rapidly taken up without loss of bleaching power by undesirable side reactions—formation of chlorate, etc.; but as the operation
85 goes on, the velocity of reaction of the liquor with chlorin of course diminishes rapidly. For mechanical reasons, however, it is not readily feasible to vary the flow of chlorin from the tank to the tower to any
90 great extent in accordance with the varying needs of the batch of liquor; it is easier to work with about the same chlorin flow from first to last. For similar reasons it is also
95 inconvenient to vary the speed of the pump circulating the liquor. And a given flow of gas which is readily taken up in the first stages of the operation with a given speed of flow of liquor, is apt to create local acidity at the point of introduction in later
100 stages of operation. Development of acidity is attended by waste of bleaching power in the formation of chlorate, etc., by side reactions and it is the object of the present invention to do away with it.
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In the present invention the described usual method of making bleaching liquor from tank chlorin and alkali is varied somewhat. In addition to circulating alkaline liquor through a tower in counterflow to
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gaseous chlorin, there is supplied a small additional flow of an alkaline liquor led into the reaction chamber at a point adjacent to the point of introduction of the chlorin gas, thereby suppressing local development of acidity. The alkaline liquid so introduced at this point may be a portion of the unsaturated liquor circulating in the closed circuit, this portion being bypassed and going to the bottom of the tower instead of to its top; or it may be a special flow of alkaline liquid—a portion of the main batch of liquid being reserved and employed for this purpose.

In the accompanying illustration I have shown, more or less diagrammatically, an organization of apparatus elements within the present invention and susceptible of employment in the performance of the described process. In this showing, the figure is a view, partly in central vertical section and partly in elevation, of a suitable plant for the present purposes.

Element 1 is a chlorin tank from which liquid chlorin is led past reducing valve 2 through pipe line 3 to a suitable chlorin evaporator 4, adapted to give chlorin gas. The gas passes by line 5 to suitable tower-like reaction chamber 6 at a point near the base. This reaction chamber may be of any usual type or construction and be internally provided with the usual packings or other devices for promoting good contact of liquid and gas. A batch of alkaline liquor (milk of lime) contained in receiving tank 7 is passed by pipe 8 and circulating pump 9 to a point near the top of the tower, thence downward therethrough to overflow 10 (which forms a chlorin seal, preventing escape of gas) whence it passes by line 11 back to the receiving tank for recirculation. In operating this system, which, as so far described, is of the usual type, in the present invention a little additional alkaline liquor is introduced into the tower near its base by valved line 12. This introduced alkaline liquor may come either from the circulating line (8) by valved connection 13, or may come by valved connection 14 from a special tank 15 in which is kept a reserved portion of the batch of alkali.

As stated, a development of acidity, with undesired side reactions wasting bleaching power, is apt to occur at the point of chlorin introduction in the agitated liquid passing through the tower. And this may happen almost from the beginning if the liquid is warm and if the two flows of gas and of liquid be not properly proportioned. Ordinarily, however, with care in operation no great loss is apt to happen until the alkalinity becomes reduced below a certain point; say, below about 0.5 per cent, or 5 grams per liter (in terms of calcium hydroxid).

And while the introduction of extra alkali, under the present invention, may begin at any time in the operation as a useful safeguard, I regard it as particularly valuable in the later stages when the alkalinity of the circulating liquor has been reduced somewhat. For this purpose I may divert some of the liquid from the main flow passed to the top of the tower; that is, some of the liquid from the receiving tank (which is always alkaline) is passed directly to the point of chlorin introduction instead of reaching it in counterflow to upward going gas. Or I may use some fresh, that is, unchlorinated, alkali solution reserved for that purpose. In so doing, the batch of alkaline liquid is divided into two portions, a major portion and a minor portion, the former being circulated, as described, in continuous cyclic circulation, while the minor portion is delivered at the base of the tower. This introduction may begin at whatever time in the operation is considered expedient, and the quantity reserved as the minor portion varied correspondingly. Sometimes it is desirable that the alkaline liquid introduced at this point should amount to about 10 per cent of the total volume of the liquid passing through the tower. A supply at this point of 10 per cent of the flow as fresh milk of lime carrying, say, 50 grams calcium hydroxid per liter is equivalent to doubling the speed of the circulating pump, so far as obviating acidity is concerned.

What I claim is:—

1. In the manufacture of bleaching liquor from an alkaline liquid and chlorin by passing chlorin into a vertical reaction tower upwards against a downwardly passing cycle flow of alkaline liquid, the process which comprises supplying an additional flow of an alkaline liquid to said cycle flow at a point near the point of introduction of the chlorin.

2. A process such as is claimed in claim 1 wherein the total quantity of alkaline liquid is divided into a major portion and a minor portion, the former being kept in the described cycle flow, while the minor portion is introduced at a point near the point of introduction of the chlorin.

3. In an apparatus for making bleaching liquor, a source of chlorin gas, a vertical reaction tower, chlorin connections near its base, a receiving tank for alkaline liquor, means for circulating the liquor to the top of the tower and back to the tank and a connection for delivering additional alkaline liquor to the tower near the point of chlorin introduction.

In testimony whereof, I have hereunto affixed my signature.

JOHN R. MacMILLAN.