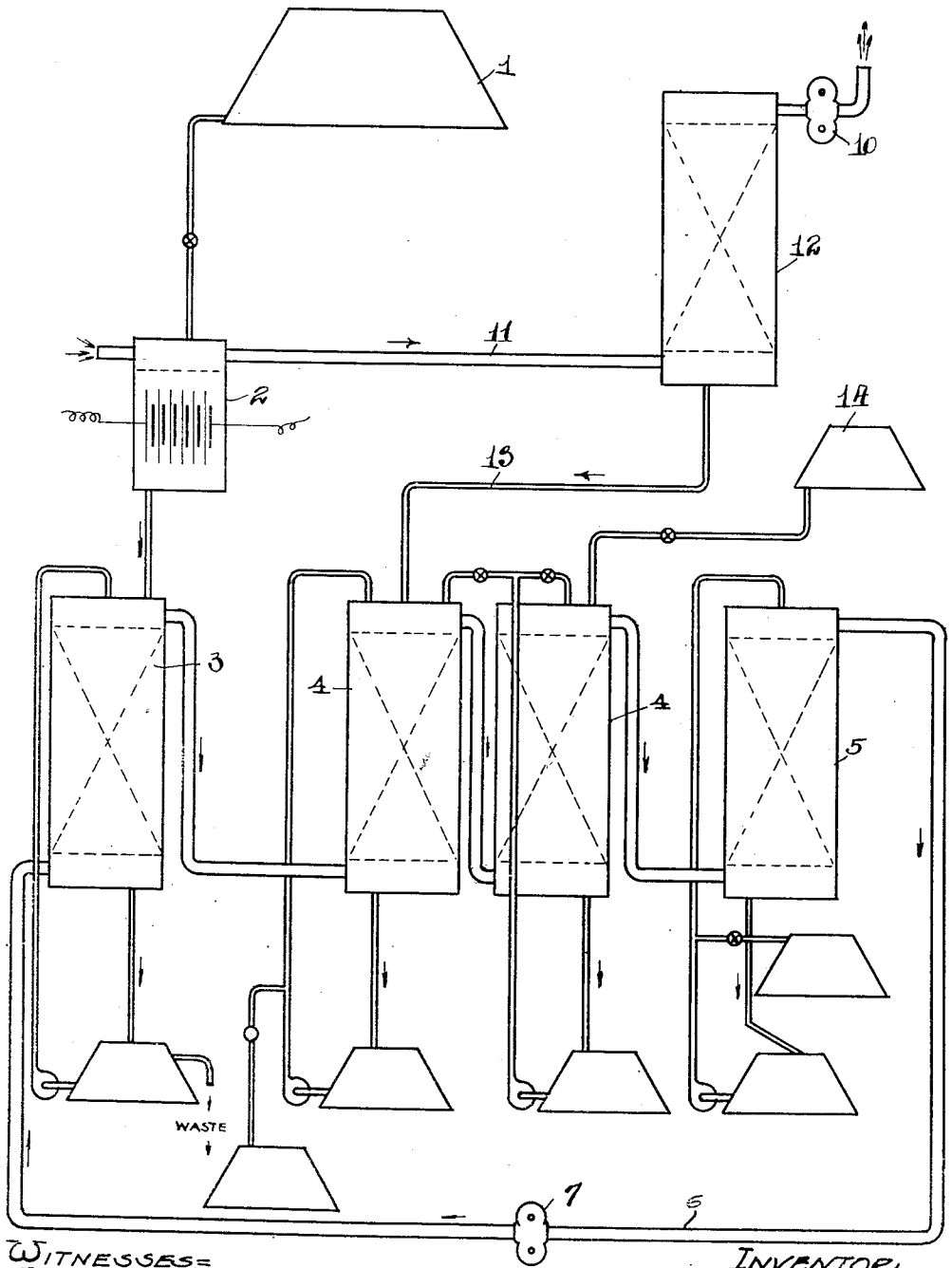
H. H. DOW.

METHOD OF EXTRACTING BROMIN AND APPARATUS FOR USE THEREIN.

APPLICATION FILED JUNE 7, 1916. RENEWED AUG. 14, 1920.

1,376,610. **Patented May 3, 1921.**



WITNESSES=
O. M. Kappler
Thos H Fay

INVENTOR
HERBERT H. DOW
BY Fay, Oberlin & Fay
ATTORNEYS.

UNITED STATES PATENT OFFICE.

HERBERT H. DOW, OF MIDLAND, MICHIGAN, ASSIGNOR TO THE DOW CHEMICAL COMPANY, OF MIDLAND, MICHIGAN, A CORPORATION OF MICHIGAN.

METHOD OF EXTRACTING BROMIN AND APPARATUS FOR USE THEREIN.

1,376,610. Specification of Letters Patent. Patented May 3, 1921.

Application filed June 7, 1916, Serial No. 102,238. Renewed August 14, 1920. Serial No. 403,514.

To all whom it may concern:

Be it known that I, HERBERT H. Dow, a citizen of the United States, and a resident of Midland, county of Midland, and State of Michigan, have invented a new and useful Improvement in Methods of Extracting Bromin and Apparatus for Use Therein, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

In practically utilizing the process of extracting bromin from natural brine, or bittern waters, described in U. S. Letters Patent Re. 11,232, issued to me April 12, 1892, the freeing of the bromin from its chemical combinations in the brine has been preferably accomplished electrolytically. Where the brine is thus treated to set the bromin free, it has been found more or less dangerous to conduct the succeeding steps of the extraction process in a closed circuit, as specifically set forth in said patent. In other words, the electrolytic action not only sets free bromin, but also, at the same time, of necessity, considerable quantities of hydrogen gas, and incidentally some chlorin, even where the electric current is gaged to equal less than the bromin content.

The hydrogen carried over into the circulating system, where the latter is a closed one, is apt to produce in the presence of bromin, an explosive mixture which may seriously damage the apparatus, or have even more harmful results. Accordingly, where electrolysis has been utilized as the oxidizing agency, it has always been the practice not to return the air used in blowing out the bromin but to discharge it into the atmosphere after it has passed through the absorber, where the bromin is finally taken up. This method, of course, has its objections, among them being the likelihood that some bromin will escape from the absorbing tower and be wasted, as well as the loss in efficiency, especially in cold weather, due to constantly drawing in fresh air at a temperature lower than that of the brine, whereas better results could be secured if the air as it escapes from the absorber, could be used over again, having as it would, approximately the same temperature as the brine.

The object of the present invention is to enable the use of a closed circuit for the air used in blowing out the absorbed gases, where the bromin is freed electrolytically, just as well as where its oxidation is accomplished by the means described in my aforesaid patent. At the same time I am enabled to provide a supplemental source of bromid for use in the purifying stage, all as will be fully set forth in the following description and annexed claim.

The annexed drawing and the following description set forth in detail one mode of carrying out the invention, such disclosed mode, however, constituting but one of various ways in which the principle of the invention may be used.

In said annexed drawing, the single figure there appearing represents diagrammatically a form of apparatus suitable for use in carrying out my present improved process.

It will be understood that for the purpose of the present description, the apparatus is shown in its simplest form, eliminating various features which, in practice, may be found desirable, including certain of those shown and described in my Letters Patent, No. 714,160, dated November 25, 1902, and covering improvements in my original apparatus and process.

As illustrated, the apparatus comprises a suitable reservoir 1 for the brine, from which such brine is adapted to be fed directly to a suitable electrolytic cell 2, wherein the oxidizing step is carried out, as previously described. From this electrolytic cell the brine is then conveyed to a blow-out tower 3, whence it is discharged to waste after being relieved of its content of freed bromin and other gases, including chlorin. The air, with these gases, is then conducted through a series of purifying towers 4, of usual construction, two being shown for the purpose of illustration, and finally through an absorbing tower 5, where the bromin, after the gas is purified, is absorbed by a suitable reducing agent, such as iron, with the formation of ferric bromid.

The air circuit through said towers 3, 4 and 5 is closed by means of a duct 6, in which is interposed a suction fan 7, of suitable design, whereby the circulation through the system is maintained, the air drawn off the top of absorption tower 5, being returned to the base of blow-out tower 3.

Connected with the upper portion of the electrolytic cell 2 by a line 11, is a suction fan 10, whereby any gases that are produced incidentally to the treatment of the brine in such cell, and are not absorbed in the brine, may be withdrawn, along with a considerable volume of air that is drawn into and over the cell being admitted thereto through a corresponding opening at the opposite side as indicated by the direction arrows. Such gases will consist principally of hydrogen, and along therewith, some chlorin and a very little bromin, which may not have been absorbed by the brine when freed. Interposed in turn in the suction line 11 is a tower 12 of familiar construction, containing iron or like reducing agent, which is adapted to take up the chlorin and bromin which may be thus carried along from the cell with the freed hydrogen, thereby producing iron chlorid and bromid.

These incidental products are conducted to one of the purifying towers 4, preferably the one nearest to blow-out tower 3, by means of a duct 13, and serve to decrease by so much the demand made on the independent supply of bromid for purifying purposes stored in the tank 14.

Other means of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism and process herein disclosed, providing the means or steps stated by the following claim or the equivalent of such stated means or steps be employed.

I therefore particularly point out and distinctly claim as my invention:—

In a process of extracting bromin from a natural brine, the steps which consist in treating such brine electrolytically; drawing off any gases thus produced, which are not absorbed in the brine, by drawing air through the electrolytic apparatus; and then recovering the absorbed gases from such brine.

Signed by me, this 3rd day of June, 1916.

HERBERT H. DOW.

Attested by—
CARL E. BARNES,
JNO. F. OBERLIN.