UNITED STATES PATENT OFFICE.

DUGALD MACEACHRAN, OF GREENOCK, COUNTY OF RENFREW, SCOTLAND.

REFINING, PURIFYING, OR CLARIFYING OF SACCHARINE OR OTHER SUBSTANCES.

SPECIFICATION forming part of Letters Patent No. 276,843, dated May 1, 1883.

Application filed April 4, 1883. (No specimens.) Patented in England June 29, 1882, No. 3,063.

To all whom it may concern:

Be it known that I, DUGALD MACEACHRAN, of Greenock, in the county of Renfrew, North Britain, sugar-refiner, have invented Improvements in the Refining, Purifying, or Clarifying of Saccharine and other Substances, for which I have received Letters Patent of the United Kingdom of Great Britain and Ireland, No. 3,063, dated 29th June, 1882, and for which I am also about to apply for Letters Patent in the Republic of France, Empires of Germany and Austria, and Kingdoms of Belgium and Spain, and in no other countries. The following is a specification of the invention.

This invention, which relates to improvements in the refining, purifying, or clarifying of saccharine or other substances, relates, in the first place, to the employment of manganese protoxide for the purpose of separating in the refining of sugar the organic, mineral, and muscilaginous substances contained in saccharine liquids. The object of this part of the invention is to have the sugar charged with the protoxide of manganese prior to the said saccharine liquid being admitted into the bag-filters, press-filters, or other filters used for passing saccharine liquids through. This object is achieved either by adding the protoxide of manganese to the sugar before it is melted or to the liquid sugar, and it is preferably charged thereinto in the "blow-up," as a matter of convenience in working the process; but the protoxide of manganese may be charged into the sugar at any point of the steps of procedure in sugar-refining prior to the filtering operations. When the saccharine liquids so charged with the protoxide of manganese are within the filter the effect of the filtering operations is to separate and collect the protoxide of manganese together with the organic, mineral, or other matter which the said protoxide of manganese has gathered from the saccharine liquid, so that the saccharine liquid is discharged from the filters in a refined condition. The protoxide of manganese holding the matter which it has separated from the saccharine solutions is while in the filters washed by passing hot water or steam, or hot water and steam, through it, after which it is taken out of the filters and revivified by burning it in such kilns, or equivalent apparatus, such as are or may be used for revivifying charcoal. It is not necessary to wash the protoxide of manganese in the said filters, as it may be removed therefrom together with the impurities which it has separated from the sugar, and washed in any convenient place.

In practicing this invention I find that the quantity of protoxide of manganese required for collecting the impurities from saccharine liquids therein varies according to the amount of impure matter which the liquid contains, and that from one-half per cent., by weight, to six or seven per cent., by weight, of protoxide of manganese is successful in fulfilling the objects of this part of my invention.

In the second place, in lieu of using the protoxide of manganese, as hereinbefore described, the binoxide of manganese or salts of manganese—such as the sulphate of manganese—may be substituted. When using either the binoxide or salts of manganese for the purposes of this invention I use them in the same manner as I have hereinbefore described with reference to the protoxide of manganese, and the percentage of binoxide of manganese or salts of manganese will vary, as I have hereinbefore set forth with respect to the protoxide of manganese.

The binoxide or salts of manganese may be revivified in the manner hereinbefore described with reference to protoxide of manganese, and if the kilns are kept free from the admission of air the revivifying operation causes the impure matter to rot or separate from the binoxide one equivalent of its oxygen, thereby converting the binoxide into protoxide.

The third part of this invention has reference to the decolorization of saccharine liquid after it has been clarified in the manner set forth, or in manner substantially equivalent thereto; and it consists in adding a quantity of lime—say, for example, from one per cent. to twenty per cent. or more, by weight—to the clarified liquid, which is or may be then agitated in the liquor, and afterward precipitated by admitting carbonic-acid gas or sulphurous-acid gas or their equivalents thereinto either separately or mixed. The liquid, after being so treated with lime and the lime precipitated, is drawn off from the vessel wherein it has been so treated, and is or may be thence passed

over charcoal or boiled down at once, as may be desirable.

It is to be understood that with respect to the oxides and salts of manganese, as well as when using lime in the manner and for the purposes hereinbefore set forth, they are employed in a finely-pulverized condition or as dust.

The fourth part of this invention consists in the employment of a settling-tank, or an equivalent vessel, into which the saccharine liquid charged with either of the purifying agents hereinbefore set forth, or with other purifying-agents—such as wood charcoal—is run prior to being passed into the filter-press, bag-filters, or other filters, and the purpose for providing such a tank is to allow any portion of the agent and separated and pure matter which will separate from the liquid spontaneously to settle down upon the bottom of this vessel. The bottom or one or more sides of the vessel is or are provided with one or more roses or their equivalents—preferably at a level in the liquid above that occupied by the matter so separated and thrown down—so that the liquor thus partly freed from its impurities is or may be drawn off through the rose or roses. In place of using the settling-tank as now last described, the saccharine liquid may be passed through a rose or filter-cloth or its equivalent on leaving the blow-up, so that a portion of the impure matter is separated and prevented from passing into the filter-bags, press-filters, or other filters.

Finally, I may remark that the manganese compounds hereinbefore mentioned may be used in admixture with other substances—such, for example, as animal or vegetable charcoal—for the purification of other liquids in the operations of filtration or washing of liquids.

I claim—

1. The mixing of the protoxide of manganese with sugar or saccharine liquids either prior to the said sugar being melted or prior to the saccharine liquids being subjected to filtering operations, substantially as hereinbefore described.

2. The use of the binoxide or salts of manganese mixed with sugar or saccharine liquids either prior to the said sugar being melted or prior to the said saccharine liquids being subjected to filtering operations, substantially as hereinbefore described.

3. The treating saccharine liquids, previously clarified by manganese oxides or salts, with lime, and precipitating the said lime with acid, as hereinbefore set forth.

4. The use of manganese compounds mixed with charcoal for the purpose of purifying liquids other than saccharine liquids in the processes of filtration or washing out impurities from such liquids.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

DUGALD MACEACHRAN.

Witnesses:
ROBERT ADAM GUNN,
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Both of 115 *St. Vincent Street, Glasgow.*