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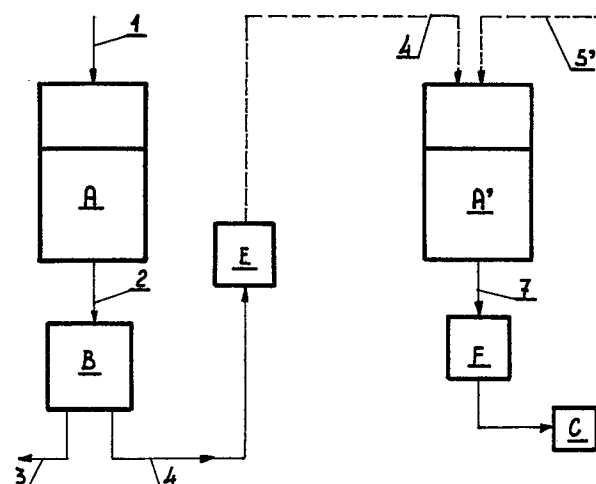
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⑤④ **Process and installation for regenerating ion exchange resins in sugar juice processing.**

⑤⑦ Process and installation for regeneration of ion exchange resins (A') during the alkali-magnesium process with diluted and heated molasses (4) and with fresh reagent containing magnesium ions (5). The ion chloride polluted effluents are so eliminated, the magnesium cations in the molasses (F) are decreased and fresh reagent consumption is reduced.



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Process and installation for regeneration of ion exchange resins during the alkali-magnesium process through molasses regeneration obtained from this process, enriched with fresh regenerating salts .

- 5 It is well known that sugar mills use ion exchange resins, capable of partially replacing the most molassigenic cations, such Sodium and Potassium by one less molassigenic cation, like Magnesium, to increase the saccharose content. This procedure is currently employed by
10 using a cation resin, like Amberlite IR 122 S, in the form of Magnesium, by percolation of a Magnesium Chloride solution through the resin (the Quentin Process as resulting from a German Patent DP 974408).

Subsequently the cations, as for example Sodium and/or
15 Potassium, are replaced by the Magnesium cations (known Quentin process) by letting the sugar juice containing the highest molassigenic cations percolate on the ion exchange resin in the above mentioned form.

When the resins are depleted, they must be regenerated
20 and, with the aforesaid procedure, this regeneration is currently obtained by percolation of a Magnesium Chloride solution which triggers the exchange and the substitution of the Magnesium by Sodium and/or Potassium, resulting in great quantities of Chloride ions in the ef-

fluents.

This high concentration rate of Chloride ions in the effluents is a great drawback, since the permissible limit stated by the anti-pollution Laws is exceeded, while it is impossible, for obvious economic reasons, to eliminate this concentration chemically from the effluents. Thus the effluents must be kept in large basins and drained little by little, but they shall represent a pollution source.

- 10 A second drawback lies in current sugar juice treatment with resins in the Alkali-magnesium process. This juice, after treatment, is further processed for sugar recovery, the final product, molasses, has an indicative content of approximately 80% of Magnesium ion released
- 15 during the ion exchange. This high Magnesium content prevents the traditional conversion or utilisation of molasses which, as is known, is a high energy product. The procedure regarding this invention greatly reduces, or eliminates, the aforesaid drawbacks since the chloride ions containing polluting effluents are totally
- 20 eliminated thus obtaining molasses having a low magnesium content with the advantage of noticeably reducing the consumption of the fresh regenerating product such as Magnesium Chloride.
- 25 According to the procedure of this invention, the regeneration of the depleted resins is achieved through percolation of the molasses derived from treatment of the previous sugar juice with resins and containing, as has been stated before, a high percentage of Magnesium, provided a proper amount of fresh reagent is added to the
- 30 molasses.

This process is earmarked by the fact that in order to regenerate the ion exchanging resins such as Amberlite IR 122 S in the form of Magnesium, the molasses obtained after crystallization of the juices previously treated
5 with these resins is percolated since the molasses contains for indicatory purposes, about 80% of the magnesium required to regenerate the resin in the required form, i.e. in the form of Magnesium.

It is however necessary to add an amount of fresh reagent such as Magnesium Chloride to this molasses at the
10 ratio, for indicatory purposes, of about 20%, to reach the total Magnesium ion ratio for regeneration.

This molasses with its additives will yield the magnesium cation to the resin, acquiring Sodium and/or Potassium cations during percolation on the ion exchange resin. At this stage, the ion exchange resins are ready
15 to start another cycle and the effluent molasses will keep less Magnesium cations and thus be for more suitable for subsequent traditional transformations or for
20 normal usage.

For informative purposes, the enclosed drawing shows a block diagram of the processing and regenerative system of the ion exchange resins in the Alkali-magnesium process according to the currently known (Quentin) process and the one according to this patent.
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Figure 1 shows in a block diagram the sugar juice processing with alkali-magnesium exchange resins.

Figure 2 shows in a block diagram the resin regeneration as currently achieved.

30 Figure 3 shows in a block diagram the sugar juice treatment with alkali-magnesium exchange resins and subse-

quent regeneration according to this patent.

With reference to Figure 1, the sugar juice 1 to be purified penetrates and percolates in the resin column. Here the alkali-magnesium exchange takes place i.e. the

5 Sodium and/or Potassium ions pass on to the resin while the Magnesium ions pass on to juice. The processed juice 2 undergoes various subsequent treatments B (vacuum panning, crystallization, centrifugation, etc.) until crystallized sugar 3 and molasses 4 are obtained, subje

10 cted to further transformations or uses C.

As already stated, this molasses has a high Magnesium content.

Regeneration of resin (see Figure 2) is obtained by percolating the regenerated fresh product 5, such as Magnesium Chloride, in the depleted A' column in order to

15 obtain the alkali-magnesium ion exchange and to regenerate the resins with magnesium ions, while the effluents 6, with a highly polluting chloride content are discharged in the tanks D.

20 In the procedure and installation covered by the patent as shown in Figure 3, the molasses obtained from the treatment of the juices is heated and is diluted in E and thus enters as regenerating agent the depleted column A' in^{which} additives with a suitable percentage of fresh re-

25 generative agents 5 have been added. The molasses and the fresh regenerating agent lose their magnesium ions to the resin while being enriched with Sodium and/or Potassium ions.

The effluent molasses after concentration in F can be

30 subjected to further treatments or utilization C, facilitated by the lower magnesium content.

Methodical washing operations are obviously necessary between ion exchange treatments and regeneration and viceversa to prevent mixing of the fluids.

Obviously, this patent is also valid if the exemplified
5 magnesium cation is replaced by any other cation apt to take the place of the more molassigenic cations of the sugar juices to obtain high sugar and molasses extractions of low purity.

Claims

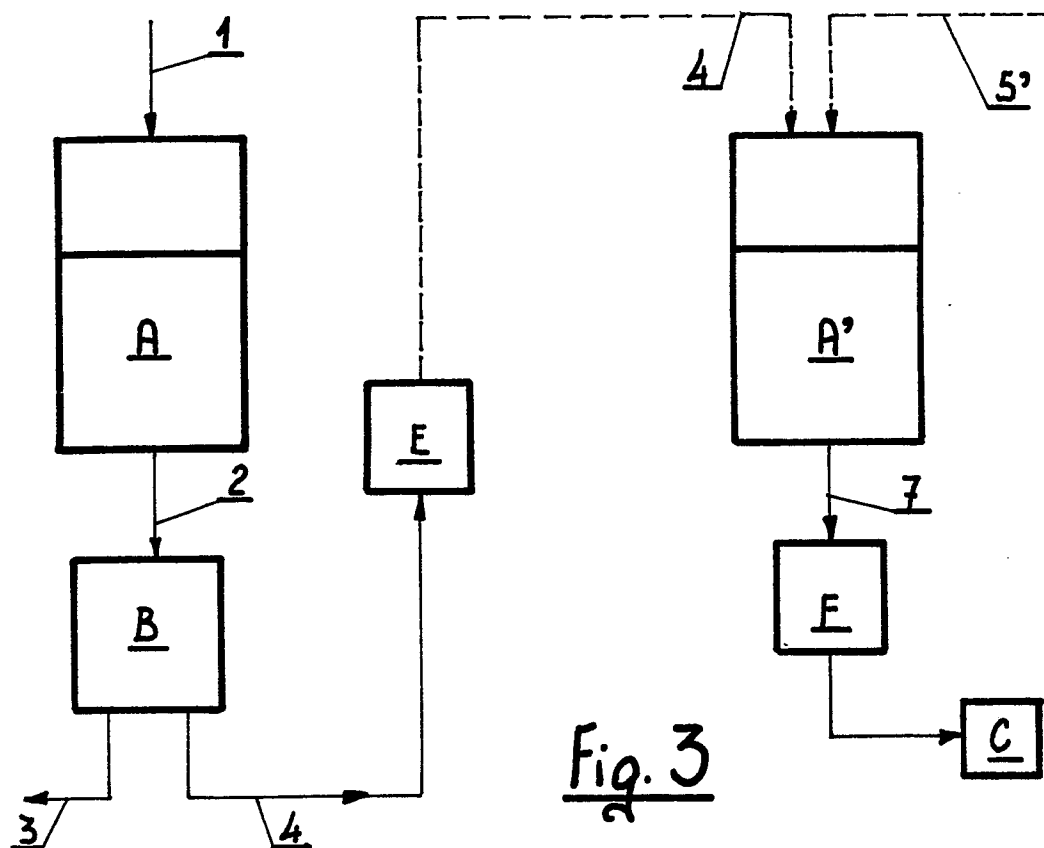
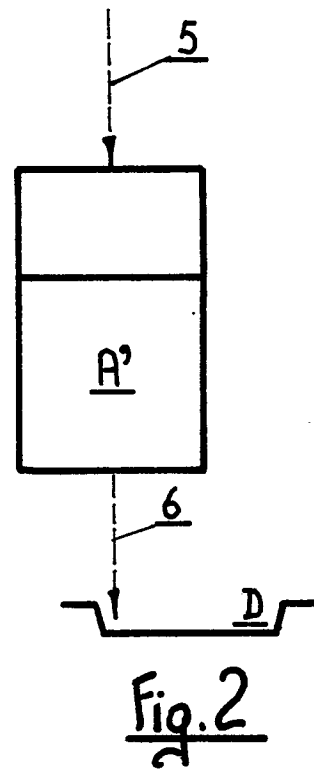
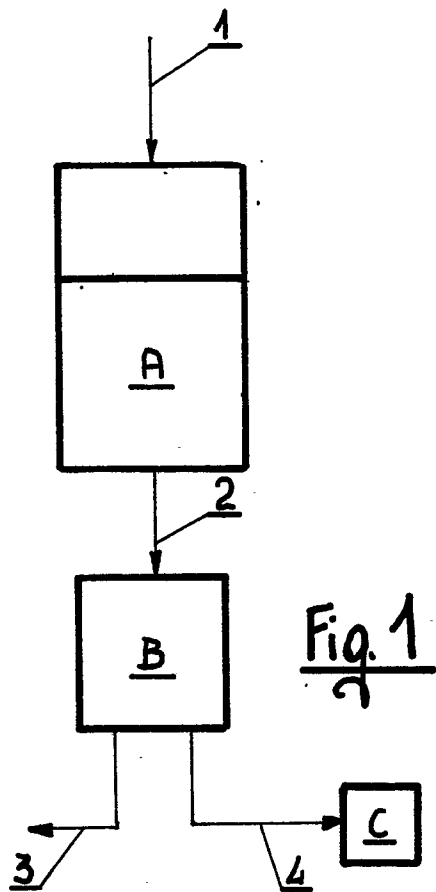
1. Procedure for the regeneration of ion exchange resins where these resins treat, through alkali-magnesium exchange, sugar juices yielding molasses as a final product
5 with a high magnesium content, while the resins are depleted due to the enrichment of Sodium and/or Potassium ions with Magnesium loss, characterized by the fact that regeneration of the resin occurs through percolation of the molasses containing magnesium ions with fresh reagent additives containing magnesium ions such as Magnesium Chloride, causing ion exchange and regenerating the
10 resins with Magnesium ion, while the Sodium and/or Potassium ions return to the molasses for the purpose of eliminating the effluents polluted by the chloride ions so
15 that the molasses can be recovered and can be easily used and also to reduce fresh reagent consumption.
2. Procedure, as described under claim 1, characterized by the fact that the molasses used as a regenerating agent contains, for indicatory purposes, about 80% of
20 Magnesium ions needed for resin regeneration.
3. Procedure as described under claim 1 and 2, characterized by the fact that the fresh reagent, such as Magnesium Chloride, is added to the molasses in the quantity of about 20%, mentioned for indicatory purposes, in order to reach the total amount of Magnesium ions needed
25 for resin regeneration.
4. Procedure as described under claim 1, characterized by the fact that the molasses before the regeneration is properly diluted and heated, while it is properly
30 concentrated after the regeneration process.
5. Procedure as described under claim 1, characterized

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by the fact that between ion exchange treatment and regeneration and vice-versa, methodical washing operations are contemplated so as to prevent the fluids from mixing.

6. Installation for the regeneration of ion exchange
5 resins, according to the needs of the procedure as described under claim 1 and subsequent claims.

7. Procedure and equipment as briefly described and illustrated schematically for exemplifying purposes, in the enclosed drawing, including the variations which may be
10 required in individual cases to reach the above mentioned purposes.





European Patent
Office

EUROPEAN SEARCH REPORT

0016992
Application number

EP 80 10 1128

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	F. SCHNEIDER: "Technologie des Zuckers", 1968, Verlag M. & H. Schaper, pages 616-618 and 639 Hannover, DE. --		C 13 D 3/14
A	US - A - 3 591 415 (J. ZIEVERS et al.)		
A	DE - A - 1 567 261 (CENTROPA HANDELSGESELLSCHAFT)		
A	INTERNATIONAL SUGAR JOURNAL, vol. 80, no. 957, September 1978, page 279 Y. LE HENAFF et al.: "New deliming process for sugar juices without chemical regenerant of effluent" & IND. ALIM. AGRIC., 1977, 94, 725-729 (French) ----		TECHNICAL FIELDS SEARCHED (Int.Cl. ³) C 13 D 3/14 B 01 J 49/00
			CATEGORY OF CITED DOCUMENTS X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
☒ The present search report has been drawn up for all claims			& member of the same patent family, corresponding document
Place of search The Hague		Date of completion of the search 23-06-1980	Examiner DESMEDT