May 22, 1956 A. M. BARROSO 2,746,535

APPARATUS FOR CLEANING THE EVAPORATORS USED IN THE SUGAR INDUSTRY

Filed Aug. 12, 1954 3 Sheets-Sheet 1

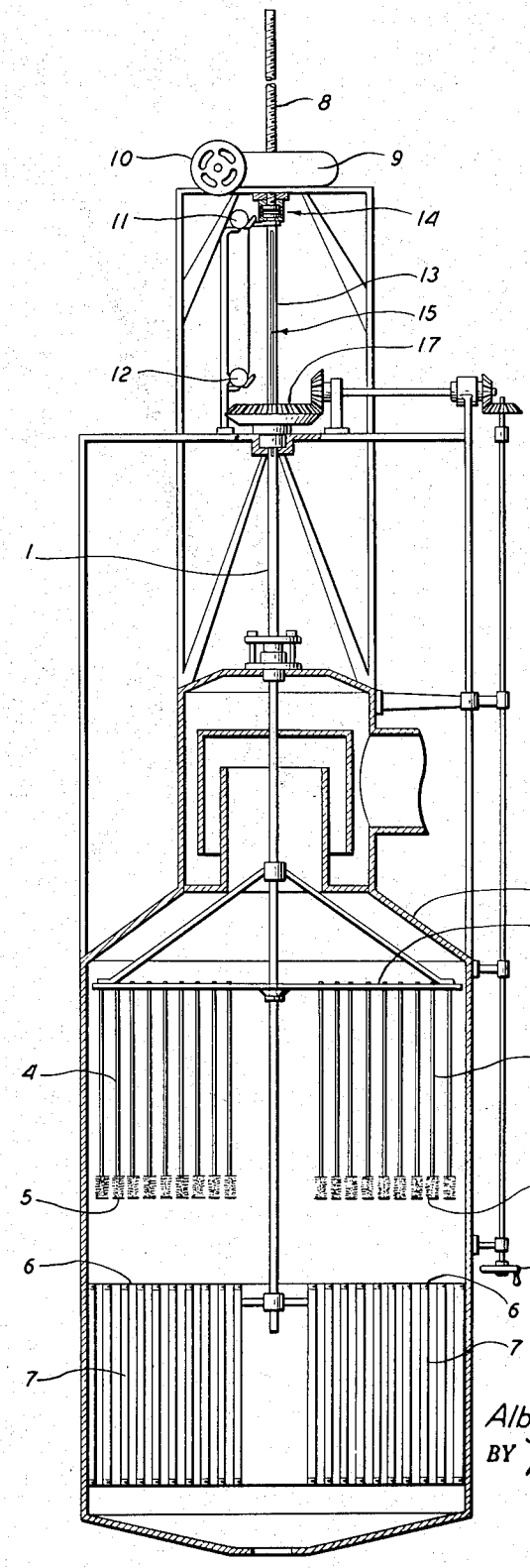


FIG. 1

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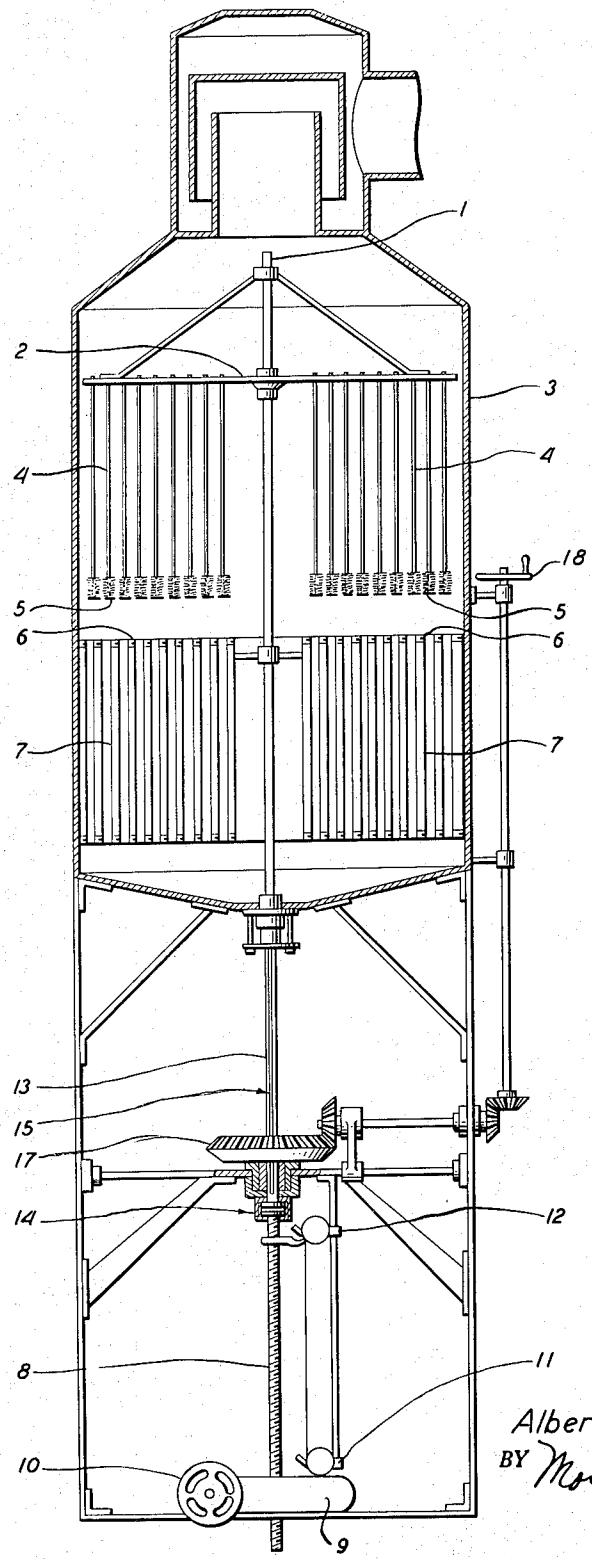


FIG. 2

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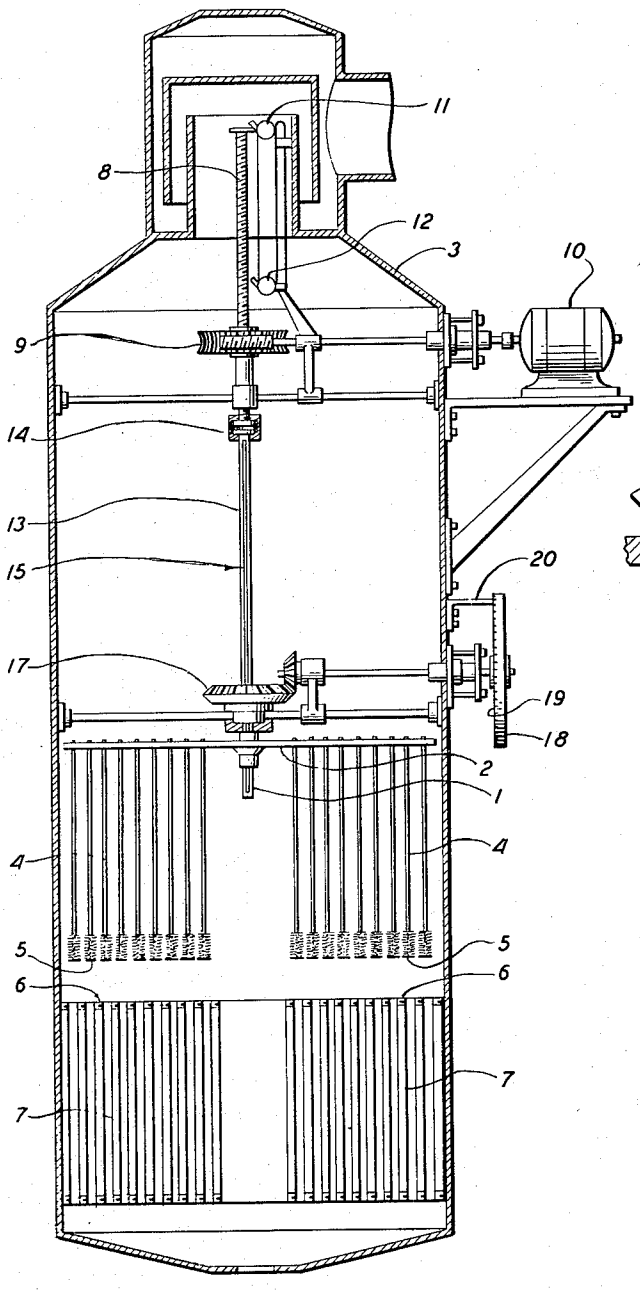


FIG. 3

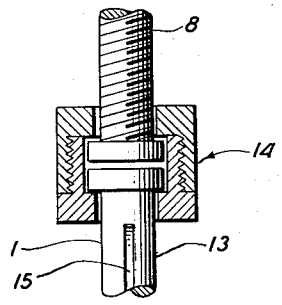


FIG. 4

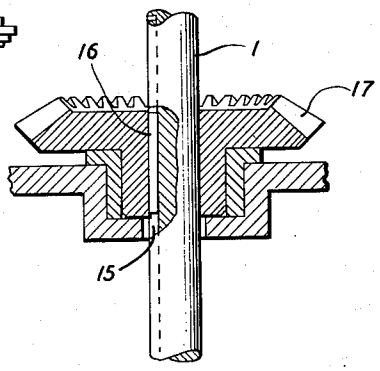


FIG. 5

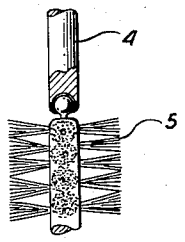


FIG. 6

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2,746,535

APPARATUS FOR CLEANING THE EVAPORATORS USED IN THE SUGAR INDUSTRY

Alberto Morin Barroso, Havana, Cuba

Application August 12, 1954, Serial No. 449,423

Claims priority, application Cuba January 13, 1954

4 Claims. (Cl. 159—1)

This invention relates to a new and useful apparatus for cleaning the evaporators used in the sugar industry.

One of the principal objects of this invention is to provide a device whereby the tubes of the evaporators such as are used in the sugar industry can be always maintained perfectly clean.

Another very important object of the invention is to provide a mechanical cleaning device by the use of which the necessity of employing chemical substances in cleaning the aforementioned tubes of the evaporators is eliminated and which also serves to prevent the formation of scale and incrustations.

Other objects and advantages of the present invention will be apparent to those skilled in the art who may read the following description in connection with the annexed drawings in which similar elements or parts are designated by similar reference characters.

For the attainment of the above mentioned objects, my invention consists of the new construction and arrangement which will be described later and specifically designated in the claims; it being understood that the precise form of the invention here described and illustrated may be varied or modified, provided the essential elements of the same, as described in the claims be maintained.

In the drawings, which represent the preferred embodiment of the invention:

Fig. 1 is a front elevation of the device incorporated in an evaporator (the latter being shown in section) the device being placed in the upper portion of the evaporator.

Fig. 2 is a similar view but with the device installed in the lower portion of the evaporator.

Fig. 3 is similar to Figs. 1 and 2, but with the entire device installed within the evaporator.

Fig. 4 is a detail view of the manner in which a threaded portion of a vertical shaft of the device is coupled to an unthreaded shaft portion.

Fig. 5 is a detail view of the mounting of a bevel gear on the unthreaded portion of the vertical shaft.

Fig. 6 is a detail view of the union or joint between a cleaning element and a supporting rod.

This device is to be attached in any suitable manner to the evaporators used in the sugar industry or to any similar apparatus to which it can be adapted for the above named purpose. As seen in the drawings, the driving mechanism of the device may be installed above, below or within the evaporator.

The cleaning device consists essentially of a central vertical shaft 1 on which is mounted a cross arm 2, entirely within the evaporator body 3, the two opposite portions of said cross arm 2 being of the same size and form. Each of the cross arm portions have depending from it a multiplicity of rods 4, to the lower ends of which are joined brushes 5 or any other suitable cleaning elements. The joint or union between each of the cleaning elements 5 and rod 4 is preferably as illustrated in Fig. 6 so that when cleaning elements penetrate into tubes 6 they may

have the necessary lateral movements to perform the cleaning operation in a substantially perfect manner.

Shaft 1 has a threaded portion 8 which is screwed through a threaded perforation passing vertically through the center of a gear wheel, said perforation being also threaded, and the teeth on the outer periphery of said wheel being engaged by an endless screw or worm, as best seen in Fig. 3. The combination of gear and screw form a speed reducing mechanism driven by motor 10 (see Fig. 3). Said gear wheel is held against vertical movement and when rotated imparts vertical movement to section 8 and thereby to the entire shaft 1, thus forcing rods 4, to which cleaning elements 5 are attached, to enter or leave tubes 6 as desired.

The threaded portion 8 of shaft 1 has a predetermined length in accordance with the stroke required of shaft 1, the device being also furnished with two automatic interrupters 11 and 12 for reversing the direction in which shaft 1 is moving, up or down in order to control the withdrawal or entrance of the cleaning elements into tubes 6.

The operation of the motor 10 and of interrupters 11 and 12 is entirely conventional. Thus, as an example, motor 10 may be an electric motor, as shown, of the reversible type, and interrupters 11 and 12 may be micro-switches. It will be apparent, without an extended showing in the drawing, that by employing appropriate circuit elements in conjunction with motor 10 and interrupters 11 and 12, it is possible to reverse action of motor 10 whenever any suitable actuating member carried by worm 8 closes either of the interrupter switches 11 or 12.

As stated before, shaft 1 consists of a threaded portion 8 and a portion 13 without threads, this latter portion facilitating the rotation of the shaft when it is desired to have cleaning elements 5 engage another series of tubes 6; in order to be able to do this threaded portion 8 is coupled to portion 13 in such a manner that shaft 1 can be raised or lowered and rotated simultaneously or independently.

Fig. 4 illustrates how both portions of shaft 1 are coupled together by slotted element 14 which facilitates raising or lowering the entire shaft while permitting the unthreaded portion 13 to rotate. The portion 13 of shaft 1 is formed with a longitudinal slot or groove 15 which is engaged by a flange or key 16 on bevel gear 17 (Fig. 5), the latter being actuated by hand wheel 18.

The hand wheel 18 may be furnished with a scale 19 and a stop 20 to control the rotation of shaft 1 in accordance with the series of tubes 6 to be cleaned, this being illustrated in Fig. 3 only.

It is obvious that what has been described and represented graphically is merely illustrative and is not to be construed as limiting the invention, the scope of which is that indicated in the annexed claims.

What I claim is:

1. In an evaporator of the type described, cleaning apparatus comprising a first shaft and a second shaft, means mounting said shafts upon said evaporator with said shafts in axial alignment, said mounting means including means coupling the proximate ends of said shafts so as to permit said shafts to turn freely relative to each other and so as substantially to prevent axial movement of said shafts relative to each other, a plurality of cleaning elements, means mounting said cleaning elements upon said first shaft, means for moving said second shaft axially in either direction, and means for turning said first shaft so as to vary the turned position of said cleaning elements.

2. In an evaporator of the type described, said evaporator including a cylindrical, vertically extending casing and a plurality of open-ended, vertically extending tubes arranged symmetrically with respect to axis of said casing; cleaning apparatus comprising a first shaft, a second

shaft, means mounting said shafts upon said casing with said shafts extending axially, said mounting means including means coupling the proximate ends of said shafts so that said shafts are freely turnable relative to each other and so that said shafts are substantially axially immovable relative to each other, a cross-arm mounted upon said first shaft and extending diametrically with respect thereto, a plurality of rods depending from said cross-arm, brushes respectively swivelly mounted upon the lower ends of said rods, each of said rods being aligned with a respective tube in various turned positions of said first shaft, means for turning said shaft to said various turned positions thereof, and means for raising and lowering said second shaft, said brushes being positioned and adapted to be extended into said tubes when said second shaft is lowered, and to be raised clearingly above said tubes when said second shaft is raised.

3. Apparatus in accordance with claim 2, said means

for turning said first shaft including a bevel gear axially slidably mounted upon said first shaft, said first shaft having an axially extending key slot on the outer surface thereof, said bevel gear having a key projecting from its bore slidably into said key slot.

4. Apparatus according to claim 2, said brushes being coupled to said rods by ball and socket joints.

References Cited in the file of this patent

UNITED STATES PATENTS

810,996	Suzuki	Jan. 30, 1906
1,694,371	Burdick	Dec. 11, 1928
2,186,077	Noyes	Jan. 9, 1940

FOREIGN PATENTS

21,745	Germany	May 2, 1883
304,570	Great Britain	Jan. 24, 1929