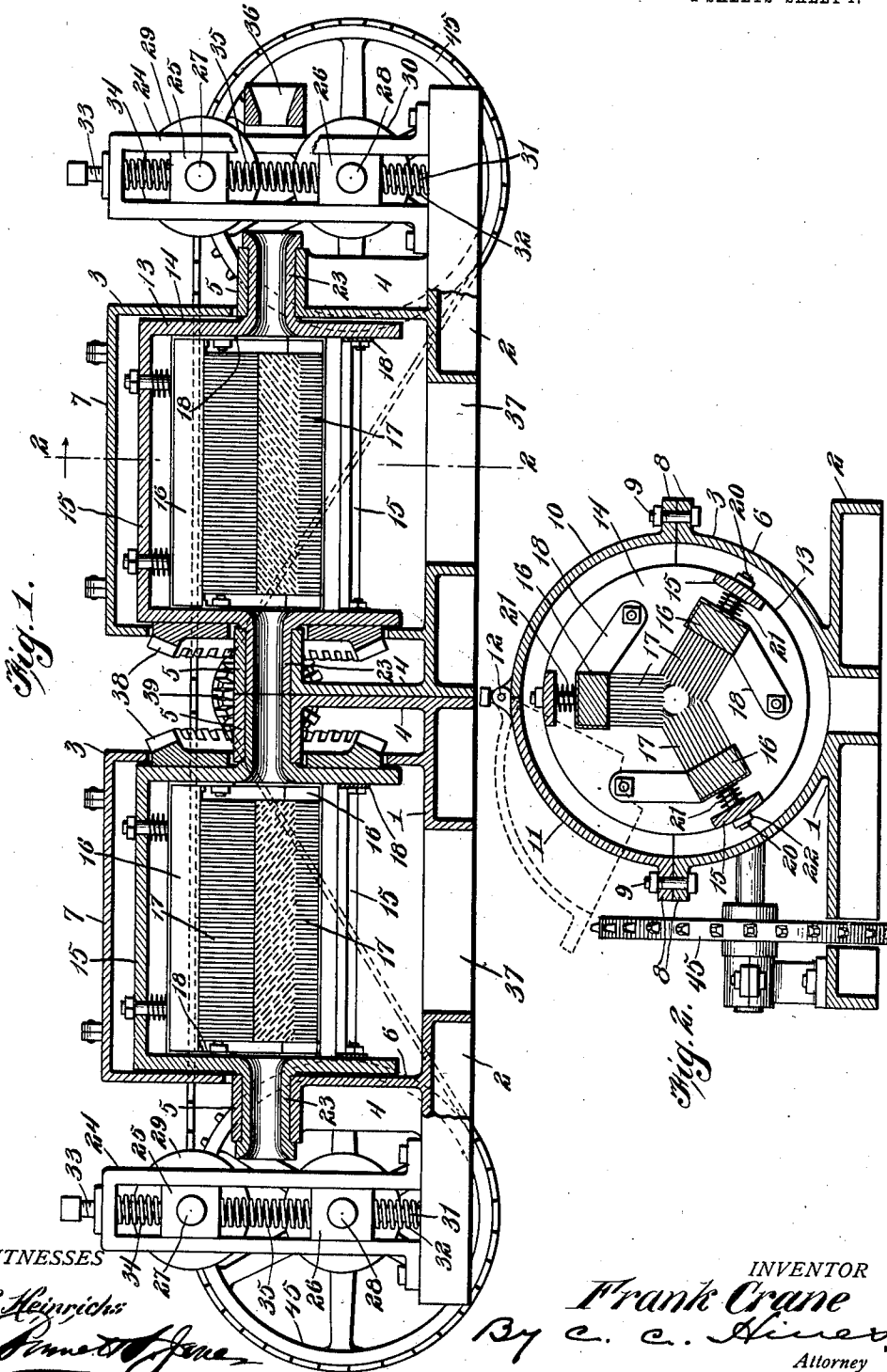


F. CRANE.
TUBE CLEANING AND POLISHING APPARATUS.
APPLICATION FILED JULY 15, 1912.

1,056,403.

Patented Mar. 18, 1913.

2 SHEETS—SHEET 1.



WITNESSES

J. R. Heinrichs
James H. Jones

INVENTOR

Frank Crane

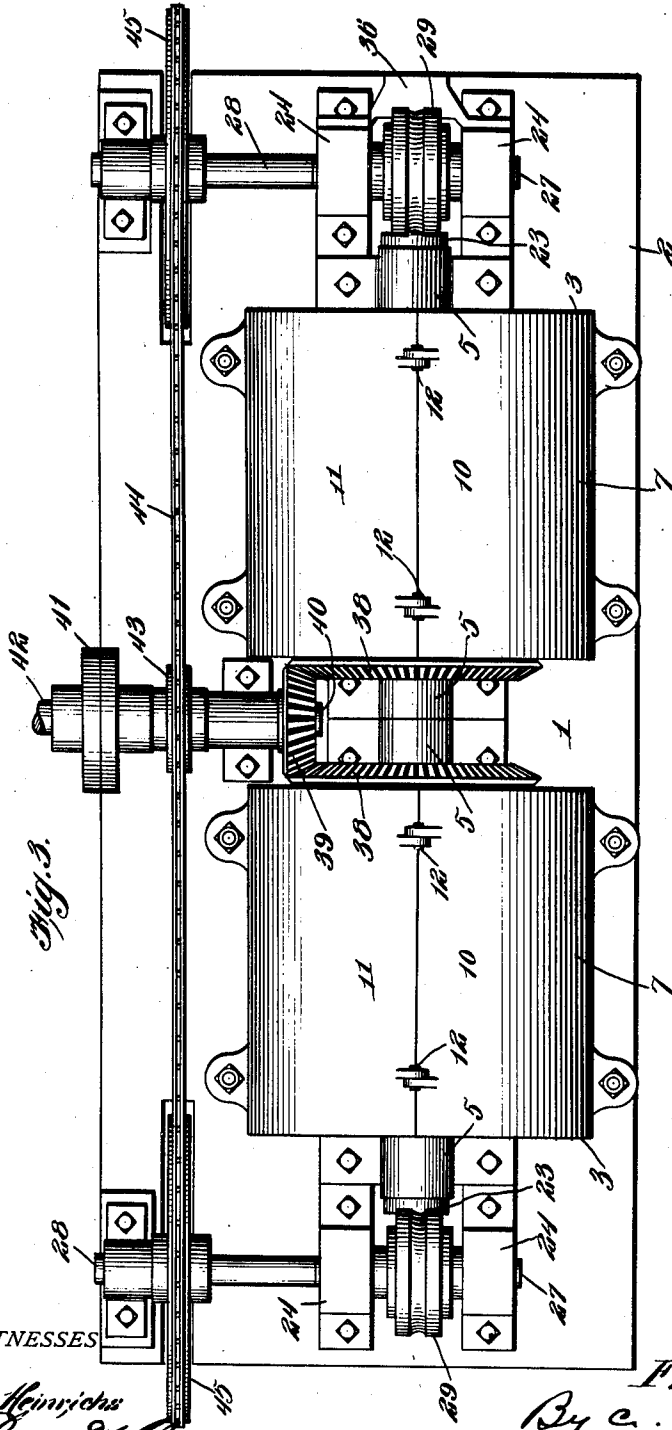
By C. C. Hines
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L. R. Heinrichs
Samuel D. Jones

INVENTOR

Frank Crane

By C. C. Hines,
Attorney

UNITED STATES PATENT OFFICE.

FRANK CRANE, OF FORT COLLINS, COLORADO, ASSIGNOR OF ONE-HALF TO THE GREAT WESTERN SUGAR COMPANY, A CORPORATION OF NEW JERSEY.

TUBE CLEANING AND POLISHING APPARATUS.

1,056,403.

Specification of Letters Patent.

Patented Mar. 18, 1913.

Application filed July 15, 1912. Serial No. 709,490.

To all whom it may concern:

Be it known that I, FRANK CRANE, a citizen of the United States, residing at Fort Collins, in the county of Larimer and State of Colorado, have invented certain new and useful Improvements in Tube Cleaning and Polishing Apparatus, of which the following is a specification.

This invention relates to an apparatus for cleaning and buffing or polishing tubes, and particularly brass evaporator tubes, such as are used in evaporating beet juice in the process of making sugar.

The object of the invention is to provide an apparatus for this purpose which is simple, rapid, reliable and efficient in action, and by means of which all scale and foreign matter may be cleanly removed and the tubes polished to the desired degree.

The invention consists of the features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:—

Figure 1 is a view partly in side elevation and partly in vertical longitudinal section of a tube cleaning and polishing apparatus embodying my invention. Fig. 2 is a vertical transverse section on the line 2—2 of Fig. 1. Fig. 3 is a top plan view of the apparatus. Fig. 4 is a fragmentary detail view of one of the brushes.

Referring to the drawing, 1 designates in general the frame of the apparatus, which may or may not consist, as shown, of two longitudinally alined, transversely divided sections, each including a base 2 supporting a chamber or casing 3, said base sections having pedestals 4 rising therefrom and provided with longitudinally alined bearings 5. Each casing 3 is preferably circular in form and horizontally divided to provide a semicircular base section 6 and a correspondingly shaped top section 7, said sections being provided with flanges 8 for the passage of coupling bolts 9. The upper section 7 is preferably divided in a direction lengthwise of the machine to provide a stationary portion 10 and a movable portion 11 hinged to the stationary portion, as at 12 and constituting a door which may be opened to permit access to the casing and the

cleansing and polishing devices contained therein.

Inclosed within each casing is a rotary drum 13 formed as shown of a pair of end disks or heads 14 and an annular longitudinal series of equidistantly arranged bars 15 connecting said disks or head. These bars are preferably three in number and support a corresponding series of heads 16 each provided with brushes 17 to cleanse and polish the outer surface of the tube under treatment. The brush devices are arranged radially and concentric with the longitudinal axis of the drum, and said brush devices are supported by arms 18 pivotally mounted upon the disks or heads to permit the brush devices to move radially to accommodate themselves accurately to the surface of the tube being acted upon.

Each brush head is provided with a stem 20, and the stems of the respective brush heads project through and are movable in guide openings in the bars 15 and backed by pressure springs 21 which yieldingly maintain the brush devices in operative position, in order that the brush fingers 17 may act with the desired force pressure and accuracy upon the tube. Nuts 22 adjustably engage the stems 20 and bear upon the bars 15, whereby the tension of the springs and pressure of the brush fingers upon the tube may be regulated. As illustrated clearly in Figs. 1 and 4, the brush fingers 17 preferably consist of longitudinal rows of thin metallic strips arranged diagonally to the axis of the cylinder, with the respective rows staggered or arranged in alternation with each other, by which the brush strips are arranged in close relationship for an efficient action while affording ample clearance space for the discharge of the scale and other refuse removed from the surface of the tube.

The disks 14 of the drums are provided with hollow or tubular journals 23 which rotate in the bearings 5 and are arranged in longitudinal alinement to serve as guides for the passage of the tubes through the apparatus and between the sets of brushes. At each end of the machine are slotted up-rights 24 in which are slidably mounted bearing blocks 25 and 26 in which are jour-

naled the ends of shafts 27 and 28 carrying upper and lower grooved feed rollers 29 and 30 made of hard rubber or other suitable material. The lower bearing blocks 5 26 are supported and limited in downward movement by studs 31 and coiled cushioning springs 32, while the upper bearing blocks 25 are limited in upward movement by studs 33 and coiled cushioning springs 10 34 and are yieldingly supported from the blocks 26 by coiled cushioning springs 35. The studs 31 and 33 may be and preferably are in the form of adjustable bolts or screws, by means of which the rolls may be spaced 15 in an obvious manner to regulate the distance therebetween, the springs acting to maintain the rolls in close frictional contact with the tubes, whereby a tube to be cleansed and polished may be positively fed forward 20 through the tubular guides 23 and held from rotation while being acted upon by the revolving pressures. A fixed guide 36 is preferably arranged at the forward end of the apparatus to facilitate the introduction of 25 the tubes, and passages 37 are provided in the base sections 2 for the discharge of the scale and other foreign material removed by the brushes from the tubes.

The inner ends of the casings 3 are provided with openings in which rotate miter 30 gears 38 fixed to the inner ends of the rotary drums, which gears mesh with a gear 39 upon a drive shaft 40, adapted to be connected by a suitable coupling 41 with the 35 shaft 42 of an electric or other motor (not shown) whereby the operative parts of the apparatus are driven. On said shaft 40 is a sprocket wheel 43 engaged by the lower stretch of a drive chain 44 which passes over 40 sprocket wheels 45 on the shafts 28 of the lower rolls 30, whereby said rolls as positively driven for the feeding action of the tubes, the upper rolls 29 acting mainly as pressure devices to hold the tubes in engagement 45 with the rolls 30 and to clamp the tubes against rotary movement.

In operation, the tube to be treated is inserted through the inlet 36 and is gripped by the forward rolls and fed longitudinally 50 through the alined hollow or tubular guide bearings 23. In its passage through the apparatus the tube is first acted upon by the set of brushes in the forward casing and then by the set of brushes in the rear casing and upon 55 its projection through the hollow outer journal of the second or rear drum is gripped and fed outward during the final stage of operation and for discharge by the rear pair of feed rollers. It will be observed that 60 through the construction and arrangement of drive gearing described the front and rear sets of brushes will be revolved in opposite directions, whereby provision is made for a more efficient cleansing and polishing 65 action, as the rear set of brushes will remove

any scale or foreign particles which may escape the front set of brushes and any slight ridges or irregularities of surface which may be formed thereby. A single set of brushes will, however, in many cases be 70 found sufficient, and I therefore do not limit the invention to the use of a plurality of sets of brushes, as any desired number may be employed.

In practice metallic brush fingers are 75 preferably used to give a desired scraping action on the material, and by their described arrangement the efficiency of these brushes is greatly increased. While the invention is primarily designed for cleansing 80 and polishing evaporator tubes, it will, of course, be understood that it may be employed for cleaning and polishing or buffing other kinds of tubes or similar elements.

I claim:—

1. An apparatus of the character described 85 comprising a frame or casing having bearings, a pair of alined rotary drums provided with alined hollow journals rotating in said bearings, means for feeding a tube to be 90 treated longitudinally through the drums and their alined hollow journals, brushes carried by the drums to act upon the feeding tube, and gearing for simultaneously 95 rotating the drums in opposite directions.

2. An apparatus of the character described comprising a frame or casing having bearings, a pair of alined rotary drums provided with alined hollow journals rotating in said 100 bearings and adapted to serve as guides for the longitudinal passage of a tube through the drums, brushes carried by the drums to act upon the tube, sets of yieldingly mounted 105 feed rollers at the outer ends of the drums, gears at the inner ends of the drums, a drive shaft carrying a gear meshing with the aforesaid gears for rotating the drums in opposite directions, and gearing between 110 said shaft and one of the feed rollers of each set.

3. An apparatus of the character described comprising a casing having bearings at the ends thereof, a rotary drum inclosed in said casing and provided with alined hollow 115 journals at its ends rotating in said bearings, brushes arranged within and supported by the drum and grouped about the axis thereof, and means for revolving the drum.

4. An apparatus of the character described 120 comprising a frame or casing having bearings, a drum provided with alined hollow guide journals rotating in said bearings, brushes supported by the drum and grouped 125 about the axis thereof, yieldingly mounted feed rollers operative to feed a tube longitudinally through said journals and between the brushes of the drum, and means for rotating the drum and imparting feed motion to the feed rollers. 130

5. A machine of the character described embodying a frame, drums provided with aligned hollow guide journals rotating in bearings on the frame, sets of cleansing brushes carried by the respective drums and grouped about the axes thereof, sets of feed rollers adjacent to the outer hollow guide journals of the drums, drive gearing at the inner ends of the drums for rotating said drums in opposite directions, and means 10 actuated by said drive gearing for operating the feed rollers.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK CRANE.

Witnesses:

THOS. QUINN,
O. S. BENIKER.