

United States Patent

Garst et al.

[15] 3,680,165
[45] Aug. 1, 1972

[54] TANK CLEANING APPARATUS

[72] Inventors: Orville L. Garst, Petersburg, Mich.;
Roman S. Miller, Archbold, Ohio

[73] Assignee: G & M Industries, Inc., Archbold,
Ohio

[22] Filed: June 21, 1971

[21] Appl. No.: 154,882

[52] U.S. Cl. 15/56, 15/70
[51] Int. Cl. A46b 13/02
[58] Field of Search 15/21 R, 21 D, 21 E, 21 C,
15/56, 57, 58, 65, 70, 73, 88, 101; 118/242,
232, 321

[56]

References Cited

UNITED STATES PATENTS

2,613,634 10/1952 Johns et al. 15/58 X
2,685,096 8/1954 Kaye 15/56

FOREIGN PATENTS OR APPLICATIONS

714,270 8/1954 Great Britain 15/56

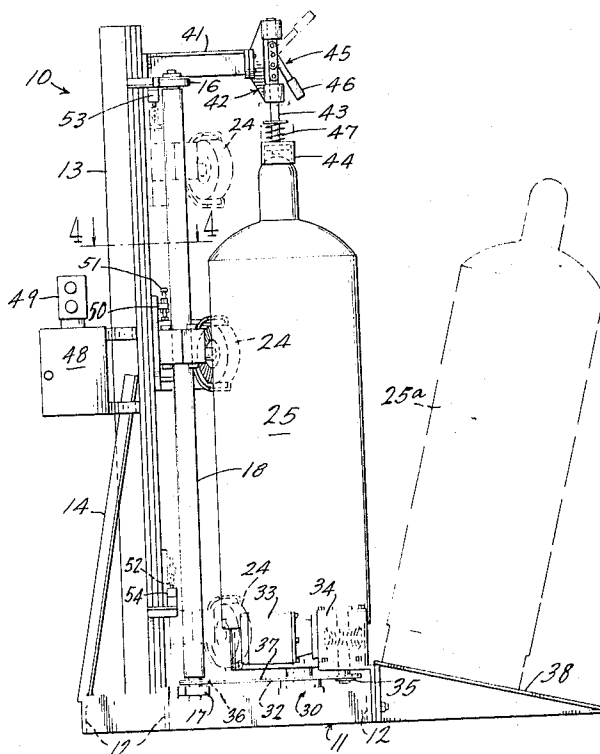
Primary Examiner—Edward L. Roberts
Attorney—Owen & Owen

[57]

ABSTRACT

The invention is a tank cleaning apparatus. A rotary brush is mounted on a vertically traveling carriage and is biased against the periphery of a tank being cleaned. The tank is supported on a rotating platform and held in place by an upper releasable clamp.

9 Claims, 5 Drawing Figures



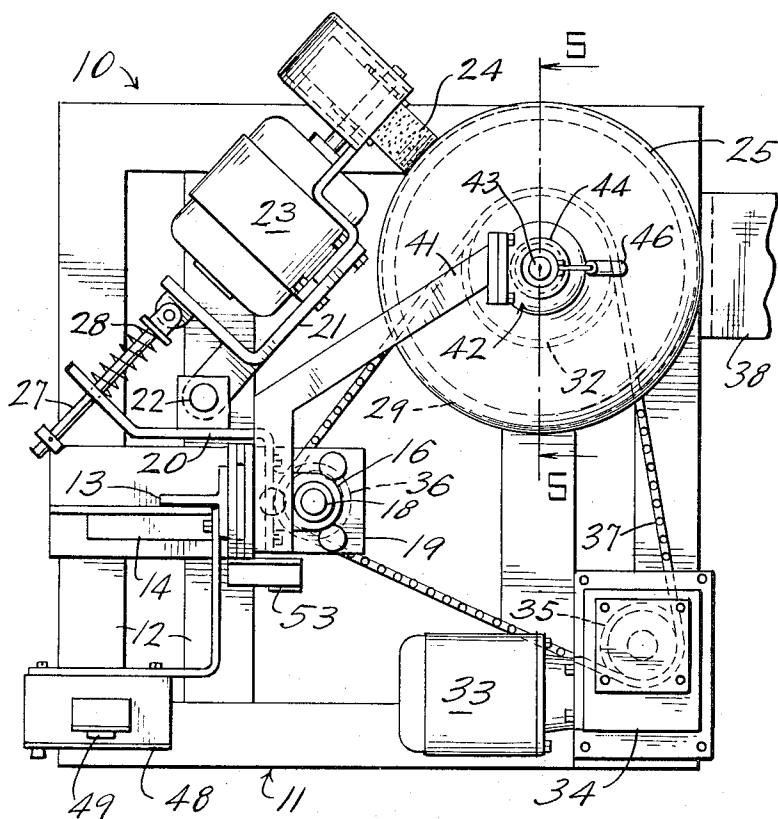


FIG-3-

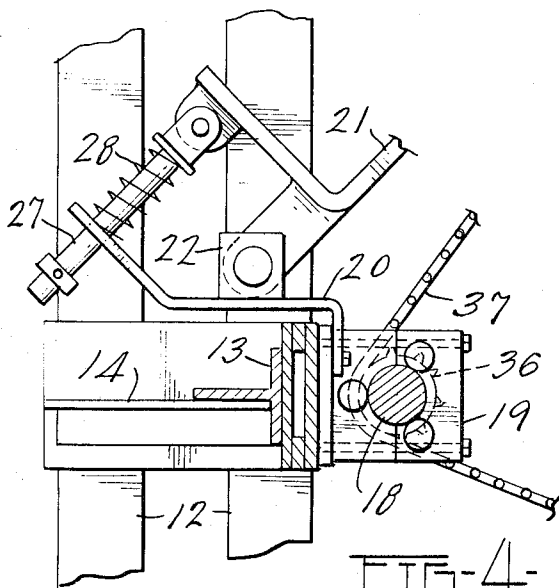


FIG-4-

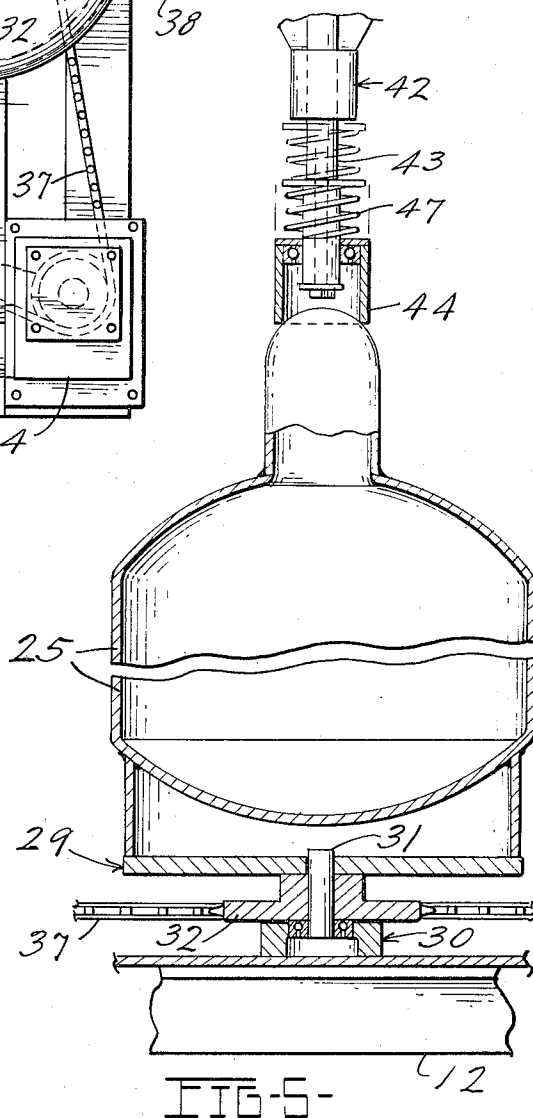


FIG-5-

INVENTORS:
ORVILLE L. GARST,
ROMAN S. MILLER.

BY

Owen & Owen

ATT'YS.

TANK CLEANING APPARATUS

BACKGROUND OF THE INVENTION

It is often necessary to clean the exterior surfaces of, for examples, L.P. gas cylinders, oxygen tanks and acetylene tanks. The exterior surfaces of such tanks or cylinders must be cleaned periodically to remove paint buildup and foreign material prior to refinishing. Often, the cleaning takes place during a periodic inspection and testing of the tank seams.

Gas cylinder cleaning apparatus is known in the art. For example, Kaye U.S. Pat. No. 2,685,096 discloses apparatus including a large enclosure, a body brush, and a bottom brush.

More commonly, gas cylinders are cleaned by using hand wire brushing.

The use of "shot blasting" in which shot is projected against the exterior of tanks to remove paint and foreign material has also been utilized by the prior art. Still another alternative utilized in the art are chain flail devices.

SUMMARY OF THE INVENTION

The present invention relates to a tank cleaning machine suitable for cleaning the exterior surface of gas cylinders or tanks.

The tank cleaning machine, according to the present invention, includes a base and a vertical member extending upwardly from the base. A rotatable platform is positioned on the base and a vertical rotating shaft is positioned adjacent the vertical member. A motor adjacent the base drives both the platform and the vertical shaft. A traveling carriage, more specifically a traveling cam unit, is positioned on the shaft and carries an arm which mounts a rotating brush. Means are provided for biasing the rotary brush against the periphery of a tank which is positioned on the platform.

It is the primary object of the present invention to provide an improved tank cleaning machine for the cleaning of the exterior surface of gas cylinders and the like.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of a tank cleaning apparatus, according to the present invention, showing by dashed lines the removal of a gas cylinder from the machine;

FIG. 2 is a side view, 90° removed from the view shown in FIG. 1;

FIG. 3 is a top view, shown on an enlarged scale, of the tank cleaning apparatus shown in FIG. 1;

FIG. 4 is a fragmentary, sectional view taken along the line 4—4 of FIG. 1 and shown on an enlarged scale; and

FIG. 5 is a fragmentary, sectional view taken along the line 5—5 of FIG. 3 and shown on a slightly enlarged scale.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1-3, a tank cleaning machine, according to the present invention, is generally indicated by the reference number 10. The tank cleaning machine 10 has a base 11 which includes structural steel members 12 which are welded together. A vertical member 13 extends upwardly from the base 11. In the

present embodiment, a cross brace 14 extends between the vertical member 13 and the base 11 to give additional support.

Referring to FIGS. 1 and 2, an upper pillow block 16 and a lower pillow block 17 are mounted on the vertical member 13. The upper and lower pillow blocks 16 and 17 rotatably mount a vertical shaft 18. The vertical shaft 18 is part of a traveling carriage mechanism which also includes a cam unit 19 mounted for movement on the vertical shaft 18. When the vertical shaft 18 rotates in a first direction, the cam unit 19 is moved upwardly. Similarly, when the direction of rotation of the vertical shaft 18 is reversed, the cam unit 19 is moved downwardly. The cam unit 19 is known in the art and is further identified as a Rohlix linear actuator. Of course, other types of traveling carriages may be utilized.

Referring to FIG. 4, a bracket 20 is mounted on and travels with the cam unit 19. An arm 21 is connected by a hinge 22 to the bracket 20. Referring to FIG. 3, the arm 21 mounts an electric motor 23, which in turn drives a rotary brush 24. The rotary brush 24 engages the exterior periphery of a gas cylinder 25 which is being cleaned.

A pivotally mounted rod 27 (see FIG. 3) extends between the arm 21 and the bracket 20. A spring 28 is positioned on the rod 27 between the bracket 20 and the arm 21. The spring 28 urges the rotary brush 24 against the periphery of the gas cylinder 25.

Referring to FIG. 5, the base 11 rotatably mounts a platform 29 which in turn supports the gas cylinder 25. The platform mounting includes a bearing assembly 30, a shaft 31 attached to the bearing assembly 30 and to the platform 29, and a sprocket 32 which is keyed or otherwise affixed to the shaft 31.

A reversible electric motor 33 is mounted on the base 11 and has its discharge shaft connected to a gear reduction box 34, which is mounted on the base 11 adjacent the motor 33. The gear reduction box 34 has a drive sprocket 35. In the present embodiment, both the platform 29 and the vertical shaft 18 are driven by the motor 33. The vertical shaft 18 has a sprocket 36 keyed to its lower end. A drive chain 37 is mounted on the drive sprocket 35, the platform sprocket 32 and the vertical shaft sprocket 36. By way of example in the present embodiment, the electric motor 33 is a one-quarter horsepower 1,725 rpm motor. The gear reduction box 34 reduces the speed of the drive sprocket 35 to 30 rpm. Similarly, the sprockets 32 and 36 are of diameters resulting in a speed for the platform 29 of 18 rpm and a speed of 30 rpm for the vertical shaft 18. It has been found that these relative speeds enable the rotary brush 24 to adequately clean the gas cylinder 25. Again by way of example, the electric motor 23 mounted on the arm 21 is a one horsepower motor operated at 3450 rpm.

In the present embodiment, a ramp 38 is connected to the base 11 (see FIG. 1). The ramp 38 is used in placing cylinders upon the platform 29 and in removing clean cylinders from such platform. A gas cylinder 25a is indicated in dashed lines in FIG. 1 and is illustrative of the use of the ramp 38.

Referring to FIGS. 1 and 2, an upper arm 41 is connected to the vertical member 13 at its upper end. A clamping assembly 42 is mounted on the outer end of the arm 41. The clamping assembly 42 includes a verti-

cally movable shaft 43 having a centering and holding cap 44. The cap 44 is aligned with the platform 29. As shown in FIG. 2, the cap 44 engages the upper end of the gas cylinder 25.

Toggle linkage 45, including a toggle handle 46, is connected to the shaft 43. Movement of the handle 46 and the linkage 45 results in a vertical movement of the shaft 43. When the handle 46 is in the solid line position shown in FIG. 1, the centering and holding cap 44 clamps the gas cylinder 25 into a correct cleaning position. To remove the cylinder 25, the handle 46 is moved upwardly to the dashed line position which raises the centering and holding cap 44 to the dashed line position shown in FIG. 1, thereby releasing the cylinder 25. A spring 47 urges the centering and holding cap 44 towards its upper or released position.

A control panel 48 having a manually operated "on-off" switch box 49 is mounted on the vertical member 13. A control arm 50 extends horizontally outward from the cam unit 19. A pair of vertically adjustable mechanical contacts 51 and 52 are mounted on the control arm 50. The mechanical contact 51 is in vertical alignment with a microswitch or limit switch 53 which is mounted on the vertical member 13 adjacent the upper end of the vertical shaft 18. In a similar manner, a microswitch or limit switch 54 is in vertical alignment with the mechanical contact 52 and is mounted on a lower portion of the vertical member 13.

During a typical cleaning operation, the gas cylinder 25 is first moved into position upon the rotatable platform 29. The toggle handle 46 is moved downwardly to clamp the centering and holding cap 44 into position on the upper end of the gas cylinder. At this time, the cam unit 19 and rotary brush 24 is at one end or the other of its travel. Assuming that the cam unit 19 is at its lowermost position, the switch 49 is manually actuated which turns on the electric motors 23 and 33. At this time, the rotary brush 24 is at the position 24a shown by dashed lines in FIG. 1. The platform 29 begins to rotate and the cam unit 19 begins to move upwardly along the rotating vertical shaft 18. The rotary brush 24 is biased against the periphery of the gas cylinder 25. As the gas cylinder 25 rotates, the high speed rotary brush 24 cleans the paint and foreign matter from the exterior of the gas cylinder. After a period of 4 to 5 minutes, the cam unit 19 reaches an upper position. The rotary brush 24 is at the upper position indicated by the dashed line position 24b shown in FIG. 1. At this time, the contact 51 engages the limit switch 53 which opens the electrical circuits to both the motors 23 and 33. The toggle handle 46 is moved upwardly releasing the centering and holding cap 44. The clean cylinder 25 is removed from the platform 29 by rolling it down the ramp 38. A new cylinder 25 is repositioned upon the platform 29 and the cap 44 is again placed in its down position. The operator energizes the switch 49 which closes the electrical circuit to the brush motor 23. Simultaneously, a reverse polarity circuit is closed to the lower electric motor 33 and the drive chain 37 begins to operate in a reverse direction. Reversal of the direction of the rotation of the vertical shaft 18 causes the cam unit 19 to move downwardly. Again the new cylinder 25 is cleaned as the rotary brush 24 moves downwardly. When the rotary brush 24 reaches the dashed line position 24a, shown in FIG. 1,

the mechanical contact 52 strikes the limit switch 54 which opens the electrical circuits to both the motors 23 and 33. At this time, the cylinder is removed and the above operation repeated. It has been found that the tank cleaning machine 10, constructed according to the present invention, provides a fast and efficient means of cleaning tanks and cylinders.

What we claim is:

1. Tank cleaning apparatus comprising, in combination, a rotatable platform for supporting a tank to be cleaned, means for rotating said platform, a rotary brush positioned adjacent the periphery of such tank, means for biasing said rotary brush against the periphery of such tank, means for rotating said rotary brush, and means for vertically moving said brush.

2. Tank cleaning apparatus, according to claim 1, including a base and a vertical member attached to said base, said platform being mounted for rotation on said base.

3. Tank cleaning apparatus, according to claim 2, wherein said means for vertically moving said brush comprises a traveling carriage including a vertical shaft mounted for rotation adjacent said vertical member and a cam unit mounted for movement along said vertical shaft, said rotary brush being operatively connected to said cam unit, wherein rotation of said shaft in one direction moves said rotary brush upwardly and rotation of said shaft in the opposite direction moves said rotary brush downwardly.

4. Tank cleaning apparatus, according to claim 3, including control means for reversing the direction of rotation of said shaft when said rotary brush reaches a predetermined point in its vertical travel.

5. Tank cleaning apparatus, according to claim 4, wherein said means for rotating said platform includes a reversible electric motor mounted on said base, said electric motor being effective to drive said platform and said vertical shaft.

6. Tank cleaning apparatus, according to claim 3, wherein said means for biasing said rotary brush against the periphery of such tank includes a bracket mounted on said cam unit for movement therewith, an arm hinged to said bracket, said rotary brush being mounted on said arm, and a spring mounted between said arm and said bracket, said spring urging said rotary brush against the periphery of such tank.

7. Tank cleaning apparatus, according to claim 6, wherein said means for rotating said brush includes an electric motor mounted on said arm.

8. Tank cleaning apparatus, according to claim 2, including means for releasably holding the upper end of such tank, said holding means including an arm extending outwardly from said vertical member, and a vertically movable clamp mounted on said arm.

9. Tank cleaning apparatus comprising, in combination, a base, a vertical member extending upwardly from said base, a vertical shaft mounted for rotation around a vertical axis positioned adjacent said vertical member, a cam unit positioned for vertical movement on said shaft, an arm attached to said vertical member adjacent its upper end, a tank holding means mounted on said arm, a rotatable platform mounted on said base below said tank holding means, said platform and said holding means being effective to hold a tank to be cleaned, motor means for rotating said platform and

5

6

said vertical shaft, a bracket operatively connected to said cam unit and mounted for vertical movement therewith, a rotary brush mounted on said bracket, means for rotating said rotary brush and means for biasing said rotary brush against the periphery of such tank.

* * * * *

10

15

20

25

30

35

40

45

50

55

60

65