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3,101,688

APPARATUS FOR RECONDITIONING DRUMS

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2 Sheets-Sheet 1

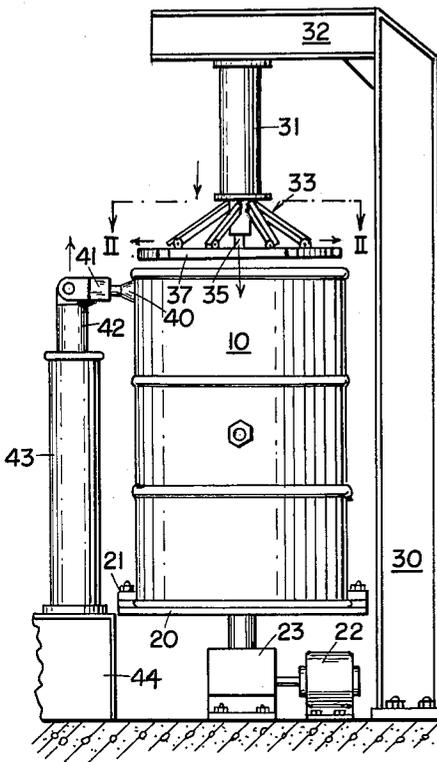


FIG. 1

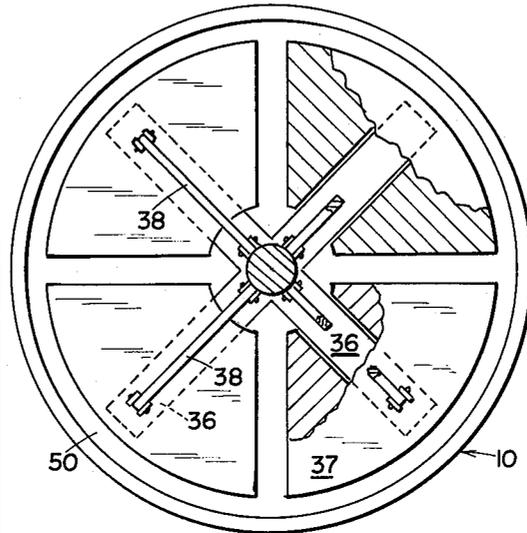


FIG. 2

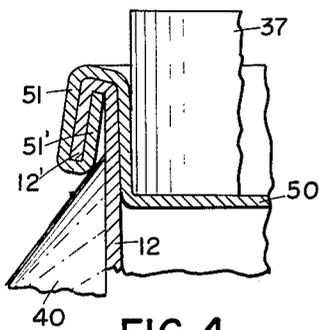


FIG. 4

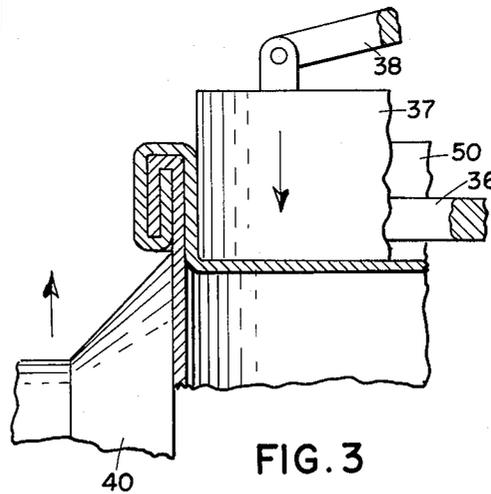


FIG. 3

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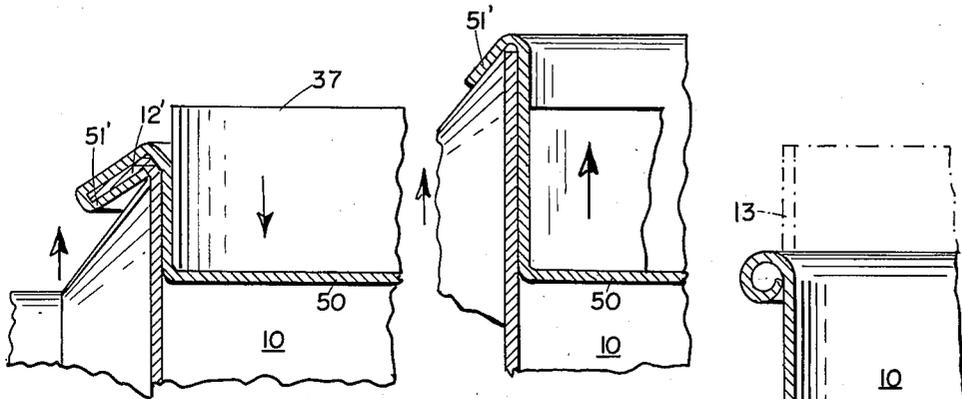


FIG. 5

FIG. 6

FIG. 8

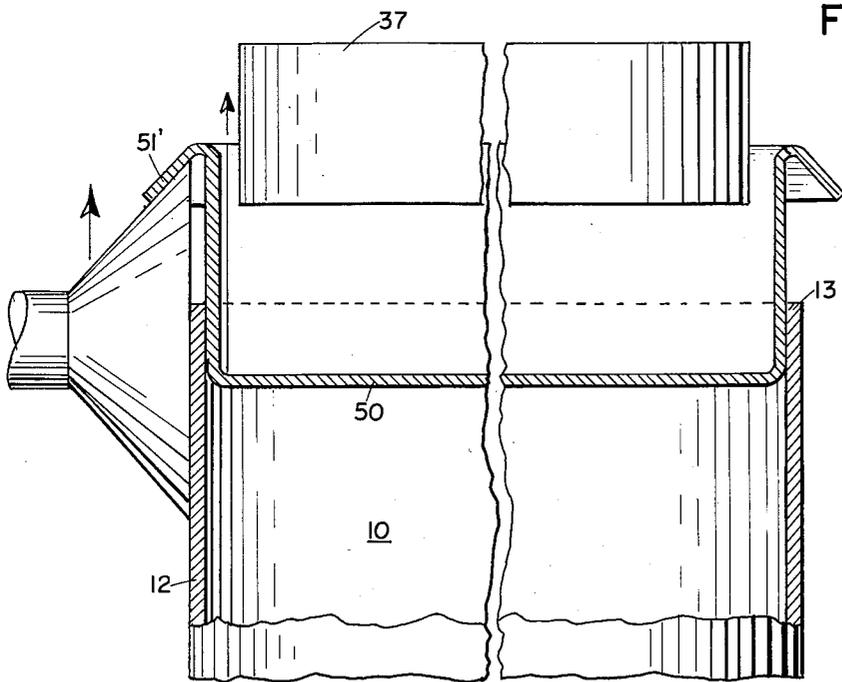


FIG. 7

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APPARATUS FOR RECONDITIONING DRUMS

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3 Claims. (Cl. 113—1)

Our present invention relates to the reconditioning of closed-top drums and, more particularly, to an apparatus for removing the tops of such drums.

Closed-top or tight-head drums (e.g. of the conventional 55-gallon capacity) are generally formed from heavy or light-gauge steel sheet and provided with a cover member, seated in the drum, having a marginal portion folded or crimped under a peripheral flange of the drum body to effect a pressure-tight seal therewith. Heretofore, the reconditioning of such drums usually comprised the step of removing the drum cover either by severing the marginal portion from the body thereof or by cutting through an upper portion or the flange of the drum in order to facilitate treatment of the interior. Thereafter, the drum was either fitted with another tight cover or converted into a conventional open-top drum. The aforementioned shearing processes resulted in drums of irregular and, generally, diminished capacities which were unacceptable for many applications (e.g. serial packaging of bulk materials). Furthermore, such processes often rendered the removed covers unsuitable for re-use.

It is an object of our invention to provide an apparatus for reconditioning closed-top drums while maintaining substantially the original capacity.

We have found that the cover may be removed from a closed-top drum by wedging the crimped marginal portion of the cover away from the drum flange. The marginal portion is progressively unfolded without cracking or substantially weakening by means of a separating tool applied between the marginal portion folded over the drum flange and the body of the drum and, subsequently, between the marginal portion and the flange. An inwardly directed axial pressure applied to the cover, tending to force the latter into the drum body, greatly facilitates the unfolding of the turned-under cover portion. Advantageously, the drum and the tool may be rotated relatively to each other to provide a substantially homogeneous distribution of the wedging forces along the closure bead between drum and cover.

According to a more specific feature of our invention, the pressure upon the head of the drum is derived from a ram which bears on the outer surface thereof and simultaneously serves as a die against which the marginal portion of the cover and/or the flange of the drum are urged by means of the wedging member. The general shape of the cover and of the drum edge will thus be maintained. Both the drum and the cover may, therefore, be readily reconditioned for re-use.

The above and other objects, features and advantages of our invention will become more readily apparent from the following description, reference being made to the accompanying drawing in which:

FIG. 1 is a front-elevational view of a reconditioning apparatus according to the invention;

FIG. 2 is a cross-sectional view taken along line II—II of FIG. 1;

FIG. 3 is a detail view of a portion of FIG. 1 illustrating a first stage in the removal of a cover from a closed-top drum;

FIGS. 4, 5 and 6 are views similar to FIG. 3 illustrating further successive stages in the removal of the cover from the drum;

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FIG. 7 is a view similar to FIG. 3 illustrating the final stage in the removal of the cover; and

FIG. 8 is a partial cross-sectional view of the drum indicating its conversion to an open-top drum.

In the drawing, the drum 10 is carried by a turntable 20 to which it is secured by angularly spaced clamps 21, affixed to turntable 20, which engage the bottom bead 11 of the drum. Turntable 20 is rotatably driven by a motor 22 via a reduction gear 23. An inverted-L frame 30, rigidly secured to the base of the apparatus, carries a hydraulic cylinder 31 depending from its foot 32. The piston or ram 33, vertically displaceable in cylinder 31, is provided with a lost-motion stud 35 to which the equispaced radial rails 36 are affixed. A ram sector 37 is slidably displaceable in a radial direction upon each rail 36 and is hingedly connected to a link member 38 pivoted to piston 33 for motion in a radial plane.

A wedging disc 40, of frusto-conical configuration, is journaled on a horizontal pin 41 which is rigidly and replaceably affixed to the piston 42 of an upright hydraulic cylinder 43. The latter is supported by a platform 44 upon the base.

The cover 50 of the drum 10 is seated within the wall 12 thereof and has a marginal portion 51. The turned-under edge 51' of the marginal portion is crimped under the depending flange of the drum 12' to form a pressure-tight bead.

To remove the top 50 of the drum 10 in accordance with the invention, the drum 10 is secured to the turntable 20 by means of clamps 21 and rotated therewith. Concurrently the piston 33 of cylinder 31 is lowered by automatic or manual hydraulic control means, the ram sectors 37 being urged radially outwardly against the inner wall 52 of cover 50 as well as downwardly, thus tending to force the cover further into the drum 10. The downward pressure of the ram upon the cover 50 tends to urge the edge 51' and flange 12 away from the body of the drum and thereby facilitates the wedging action of disc 40 (FIG. 4) which is forced gradually upwardly between the bead and the body of the drum 10. The ram sectors 37 are of a thickness sufficient to act as a die against which the portion 51 and the flange are straightened as the disc 40 is progressively raised against the drum by its cylinder 43.

As the flange 12' of drum 10 is straightened by the disc 40, the downward pressure of the ram facilitates the entry of the edge of the wedge between the upper edge 13 (formerly the flange 12') of the drum 10 and the flange 51' of cover 50. The ram sectors 37 are then withdrawn (FIG. 7) from engagement with the cover by automatic limit-stop means or by manual action of the operator while the continued pressure of the upwardly moving disc 40 against the flange 51' urges the cover 50 out of the continuously moving drum 10. The edge 13 of the drum may then be rolled as, for example, illustrated in FIG. 8 and provided with a cover (e.g. the cover 50, similarly provided with a rolled edge) which may be secured thereto by means of a closure hoop or ring, well-known in such open-top drum construction. Furthermore, since the cover 50 and the drum 10 are recovered substantially intact, the cover may be replaced on the drum, after a refinishing of its interior, with the aid of drum-sealing machines known per se.

It will be apparent that the apparatus described and illustrated may be modified in many ways considered to be within the spirit and scope of the invention to carry out the aforesaid method. The wedging member may, for example, be a stationary or revolving blade or other separating tool with upwardly pointing wedge-shaped profile while drive means (e.g. lead screws cou-

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pled to the turntable) other than the hydraulic cylinders illustrated may be employed to raise and lower the ram, the wedging member and/or the drum.

We claim:

1. Apparatus for removing a cover from a closed-top drum with a cylindrical body, said cover having a marginal portion turned under a circumferential outer flange of said body and forming a lock seam therewith, comprising pressure means for applying to said cover an axial force tending to urge said cover into said body and including a pressure disk overlying said cover and forming a cylindrical die for radially supporting said flange while bearing radially thereagainst upon upward bending thereof, supporting means for said body, a separating tool of frusto-conical configuration axially displaceable along said body between said marginal portion and said flange and adapted to enter said lock seam to progressively bend said flange outwardly and thence upwardly along said die to open said lock seam, and means for relatively rotating said tool and said body.

2. Apparatus for removing a cover from a closed-top drum with a cylindrical body, said cover having a marginal portion turned under a circumferential outer flange of said body and forming a lock seam therewith, comprising a rotatable support for the end of said body remote from said cover, a holder for a cover-separating tool offset from the axis of rotation of said support, a ram displaceable above said support substantially in line with said axis, a plurality of complementary disc sectors hingedly secured to said ram for radial outward movement, said disc sectors in a normal position defining a circular disc of a radius less than that of said drum and fitting into an outer circular recess formed by said cover, and drive means for progressively elevating said holder while rotating said support and lowering said ram onto the cover of a drum resting on said support whereby downward pressure is exerted upon said cover and said disc sectors are urged outwardly thereon toward the periphery of said recess to support said flange upon upward bending thereof, said tool being of generally frusto-

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conical configuration and adapted to enter said lock seam to progressively bend the flange outwardly and thence upwardly against said sectors.

3. Apparatus for removing a cover from a closed-top drum with a cylindrical body, said cover having a marginal portion turned under a circumferential outer flange of said body and forming a lock seam therewith, comprising a rotatable support for the end of said body remote from said cover, a tool holder offset from the axis of rotation of said support, a cover-separating tool with upwardly pointing wedge-shaped profile mounted on said holder at a location spaced from said axis by a distance substantially equal to the outer radius of said drum, a ram vertically displaceable above said support substantially in line with said axis, a plurality of complementary disc sectors hingedly secured to said ram for radial outward movement, said disc sectors in a normal position defining a circular disc of a radius less than that of said drum and fitting into an outer circular recess formed by said cover, and drive means for progressively elevating said holder while rotating said support and lowering said ram onto the cover of a drum resting on said support whereby downward pressure is exerted upon said cover and said disc sectors are urged outwardly thereon toward the periphery of said recess to support said flange upon upward bending thereof, said tool being of generally frustoconical configuration and adapted to enter said lock seam to progressively bend the flange outwardly and thence upwardly against said sectors.

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