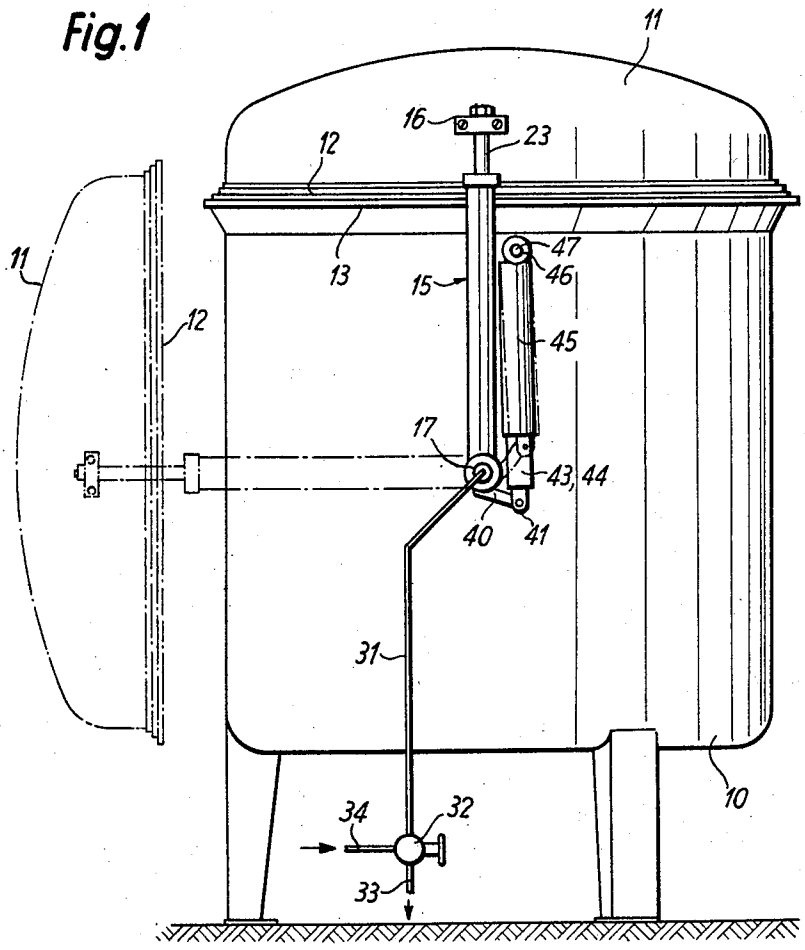
Feb. 2, 1960 W. STENGELE 2,923,430

APPARATUS FOR APPLYING AND LIFTING HEAVY COVERS ON CONTAINERS

Filed Sept. 8, 1958 2 Sheets-Sheet 1

Fig.1



Will STENGELE
INVENTOR

By:
Wenderoth, Lind & Ponack
Attys

Feb. 2, 1960 W. STENGELE 2,923,430

APPARATUS FOR APPLYING AND LIFTING HEAVY COVERS ON CONTAINERS

Filed Sept. 8, 1958 2 Sheets-Sheet 2

Fig.2

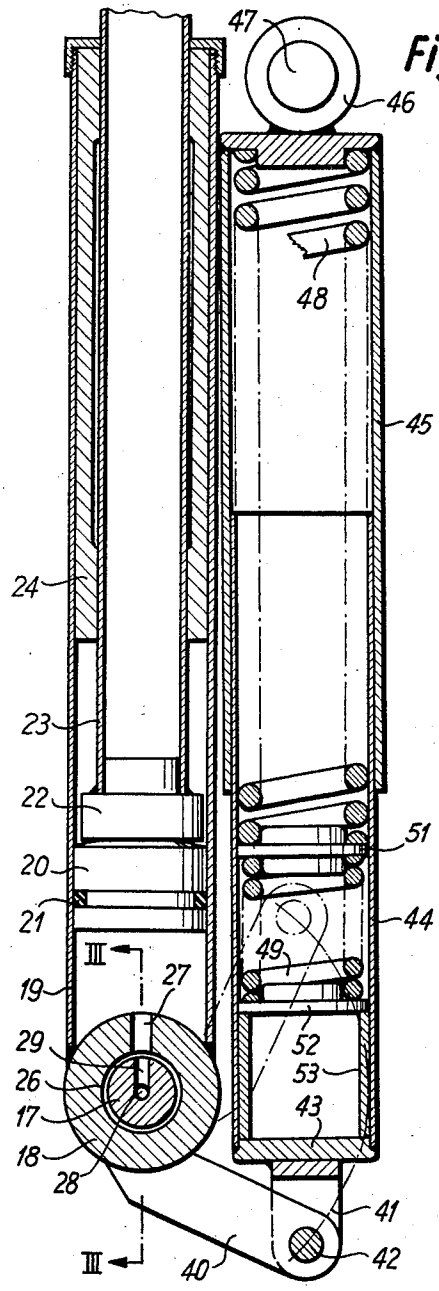


Fig.4

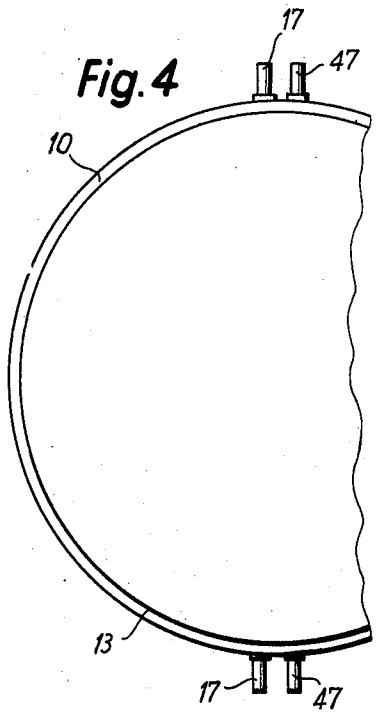
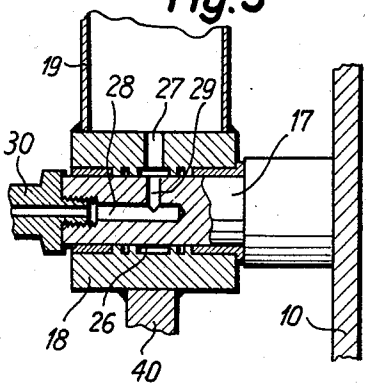


Fig.3



Will STENGELE
INVENTOR

By:
Wenderoth, Lind & Ponack
Attys

United States Patent Office 2,923,430 Patented Feb. 2, 1960

2,923,430

APPARATUS FOR APPLYING AND LIFTING HEAVY COVERS ON CONTAINERS

Willi Stengele, St. Gallen, Switzerland, assignor to Filtrox-Werk A.G., St. Gallen, Switzerland

Application September 8, 1958, Serial No. 759,472

Claims priority, application Switzerland September 12, 1957

3 Claims. (Cl. 220—38)

This invention relates to an apparatus fitted with balancing system for applying and lifting heavy covers on containers.

In contradistinction to existing apparatuses of the type, the one according to the invention is principally characterized in that the container and cover are connected to each other by at least one lifting device, by means of which the cover is mechanically operable with respect to the container in the last part of the movement for applying and in the first part of the movement for lifting off, and that the lifting device is swivably supported on the container and associated with means for balancing the weight to enable pivotal movement of the cover from the opening of the container towards the outside of the container wall and vice-versa.

Further features of the invention will appear from the following description and claims, taken in conjunction with the accompanying drawing, wherein there is shown by way of example one form of embodiment incorporating the invention.

Fig. 1 shows a side view of an apparatus according to the invention, the full lines illustrating the position of the parts with closed cover, and the chain-dotted lines the position of the parts with opened cover;

Fig. 2 shows a vertical section on a larger scale through one lifting device and the associated means for balancing the weight;

Fig. 3 is a sectional view on the line III—III of Fig. 2;

Fig. 4 is a top view of a portion of the container with cover removed and with lifting devices and means for balancing the weight dismantled.

Referring to said annexed drawing, according to Fig. 1, a cylindrical container **10** with vertical axis of symmetry has a cover **11** which, in its closed position, is seated with its closing rim **12** on a circumferential rim **13** extending round the opening of the container **10**. The cover **11** and container **10** are connected to each other by two hydraulic lifting devices located at diagrammatically opposite places thereof. In Fig. 1 there is shown only one of the two identical but laterally inverted lifting devices **15**. The top of each lifting device **15** is bolted to a connecting piece **16** fixed on the side of the cover **11**. The bottom of each lifting device **15** is swivably supported on a fulcrum pin **17** horizontally arranged on the outside of the container wall. The two oppositely disposed fulcrum pins **17** are at the same height.

One of the lifting devices **15** is shown in greater detail in Figs. 2 and 3. The respective pin **17** has rotatably mounted thereon a hub **18** which is welded to a hydraulic cylinder **19** whose symmetrical axis extends radially to the hub **18**. The cylinder **19** has a plunger **20** within it, which is rendered tight against the inner wall thereof by a piston ring **21**. The top end-face of the plunger **20** shown in Fig. 2 is convex and cooperates with a ram **22, 23** which comprises a pressure piece **22** and an adjoining tubular shaft **23**. Said shaft is carried for endwise movement within a sleeve **24** firmly seated within the top portion of the cylinder **19**. The end of the shaft

23 protruding from the cylinder **19** is bolted to the connecting piece **16**.

The hub **18** has an inner circumferential groove **26** communicating with the inner space of the cylinder **19** through a radial bore **27**. The pin **17** has an axial bore **28** machined from its free end, as well as a radial bore **29** connecting the axial bore **28** with the circumferential groove **26** of the hub **18**. The axial bore **28** has a threaded portion into which is screwed an axially bored nipple **30** connected to a pipe **31** (Fig. 1) for the feed and discharge of a pressure medium, say, pressure water. The pipe **31** is connected to a multiway-cock **32** itself connected to a discharge pipe **33** and, via a feed pipe **34**, to a source of pressure (not shown).

The hub **18** of each lifting device **15** has rigid with it an arm **40** which extends substantially radially to the axis of the pin **17** and is pivoted at **42** to a U-shaped stirrup **41**. The latter is fixed to the lower part **43** of a bush **43, 44** arranged for endwise movement in a cylinder **45**. The cylinder **45** at its closed upper end is provided with an eye **46** which embraces a pin **47** attached to the outside of the container wall so as to provide pivotal connection between said cylinder and container. The bush **43, 44** forms a hollow plunger which can slide in the cylinder **45**. Situated partly within the cylinder **45** and partly within the bush **43, 44** are two compression springs **48, 49** with different spring characteristics. One spring **48** rests against the closed end plate of the cylinder **45** and a movable intermediate piece **51**, whereas the other spring **49** bears on the one hand against said intermediate piece and on the other hand against a pressure piece **52**, between which and the bottom part **43** a spacer sleeve **53** is inserted. The members **40—53** are means for balancing the weight of the cover **11** when brought into its open position as shown in chain-dotted lines in Fig. 1. Said means are provided in laterally inverted arrangement on two opposite sides of the container. In the preferred design shown of the means for balancing the weight, the cylinder **19** of the lifting device **15** and the cylinder **45** of the weight-balance run substantially vertical beside each other when the cover **11** is in its closed position.

The action of the described device is as follows:

If the cover **11** has to be lifted from the container **10** by actuating the cock **32**, a pressure medium is at first admitted into the pipe **31** and through the bores **28, 29** and **27** into the cylinders **19** of the two lifting devices **15**. Thereby the plunger **20** of the lifting devices goes up and the cover **11** is moved clear of the circumferential rim **13** of the container by means of the rams **22, 23**, and this takes place fully automatically without any physical exertion of the attendants. Thereupon the two lifting devices **15** can be swivelled about the common longitudinal axis of the fulcrum pins **17**, the cover **11** making a movement from the opening of the container **10** towards the outside of the container wall. The arm **40** of each lifting device thereby moves upwards with the pivot **42**, the bush **43, 44** serving as plunger being pushed more deeply into the cylinder **45** causing at first compression of the spring **49** and then also of the spring **48**. The torque exerted through the springs **48** and **49** upon the hub **18** is substantially equal and opposed to that exerted by the weight of the cover **11** and lifting devices **15** upon the hub **18** so that there is balance. The swinging of the lifting devices **15** and cover **11** may thus be readily carried out by hand. In the full open position of the cover **11**, its closing rim **12** runs substantially in a vertical plane and parallel to the container wall, as shown chain-dotted in Fig. 1. In this position of the cover **11**, the springs **48, 49** are either fully compressed or their force is capable of entirely balancing the weight of the cover **11**. It is therefore not necessary to secure

or support the cover in its open position by any additional means.

For closing the cover **11**, the lifting devices **15** are at first swung into the vertical position, whereby the cover comes to lie over the opening of the container. This movement may be readily carried out by hand, since the previously compressed springs **48**, **49** will release the spring power stored therein to overcome the influence of gravity. Finally, the pressure fluid is permitted to leave the cylinder **19** through the pipe lines **31**, **33** by suitably actuating the cock **32**, whereby the cover **11** descends under gravity and comes to lie upon the circumferential rim of the container **10**. Now the container **10** is closed by the cover **11**.

If necessary, means known per se and not described here in detail may be provided to lock the cover **11** in its closed position on the container **10**.

Instead of a liquid, the lifting devices may also be actuated by a compressed gas, say, compressed air. In another modified form, instead of the springs **48**, **49**, another compressible means, say, a gas may be present in the cylinder **45** to balance the weight.

It is understood that the foregoing detailed description is given merely by way of illustration and that other variations may be made therein without departing from the scope of the appended claims.

What I claim is:

1. Means for removing and replacing a cover on a container comprising two connecting rods extending parallel to one another at two diametrically opposite places upon said container pivotally attached to said container and oscillatable around a common pivot-axis, pressure means for actuating said connecting rods to lift the cover off the container and to set it upon the container in the longitudinal direction of said connecting rods, an arm rigidly connected to each of said connecting rods extending at least approximately radially to said pivot axis, a weight-balancing device connected to said container comprising a cylinder extending in the closure position of said cover at least approximately parallel beside its corresponding connecting rod, a piston in said cylinder and an elastically compressible agent coacting with said piston to facilitate the swinging of said connecting-rods with said cover for opening and closing said container.

2. Means as set forth in claim 1 wherein said elastically compressible agent comprises two helical springs, connected in series each having a different spring characteristic.

3. Means as set forth in claim 1 wherein said two connecting rods are swingable around two pivots which are fastened on the container, said pivots having passages which on one hand are connected to pipe lines for the supplying and outflow of a pressure agent and on the other hand are in connection, in any swing-position of the connecting-rods, with the interior of said lifting devices.

References Cited in the file of this patent

UNITED STATES PATENTS

2,601,566	Soderquist	June 24, 1952
2,639,601	Miller	May 26, 1953

FOREIGN PATENTS

71,579	Netherlands	Jan. 15, 1953