Oct. 13, 1953 L. S. AUGSPURGER ET AL 2,655,397

TANK CLOSURE FASTENER

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Fig. 1

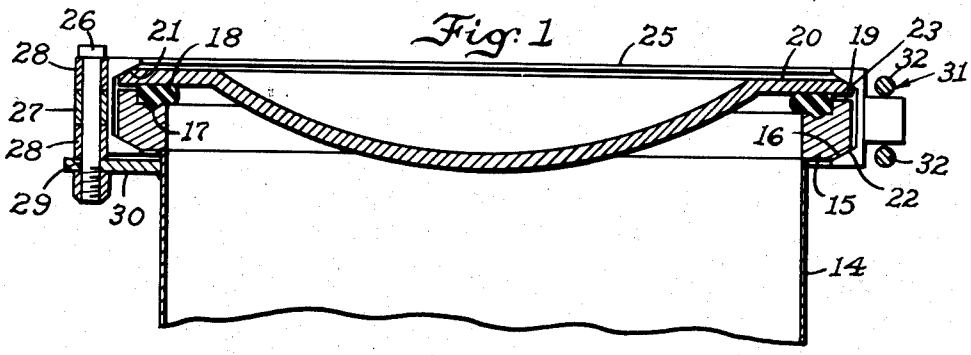


Fig. 2

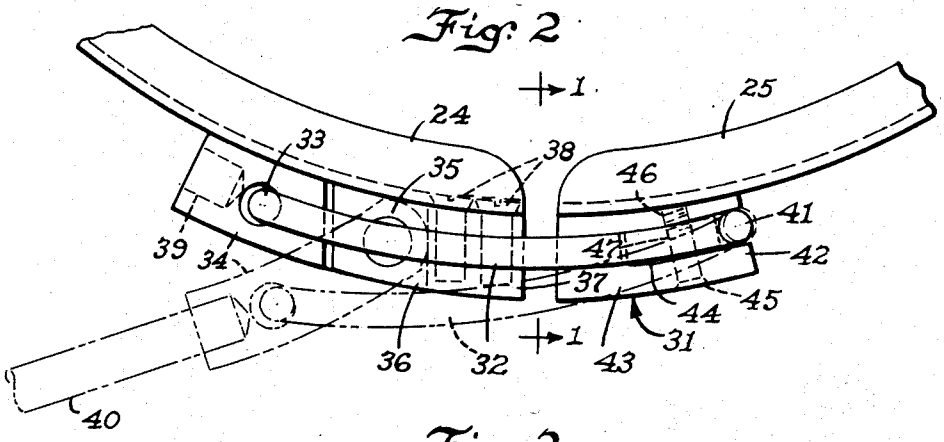


Fig. 3

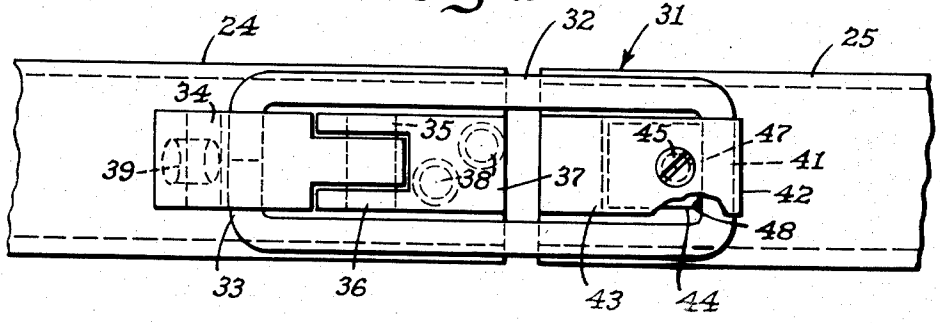


Fig. 4

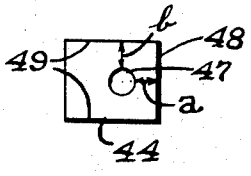
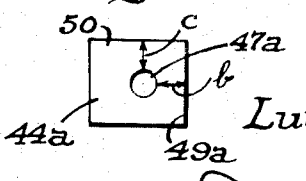


Fig. 5



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Fig. 6

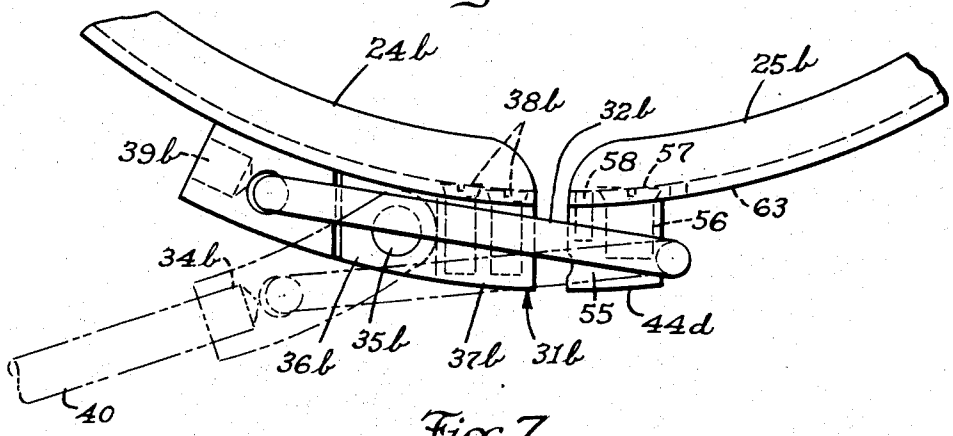


Fig. 7

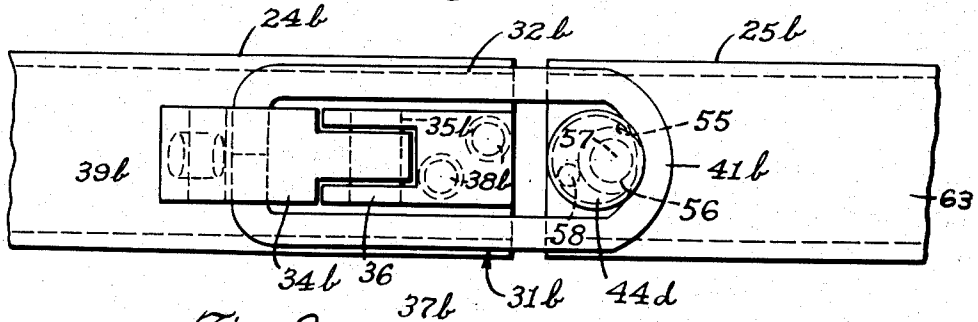
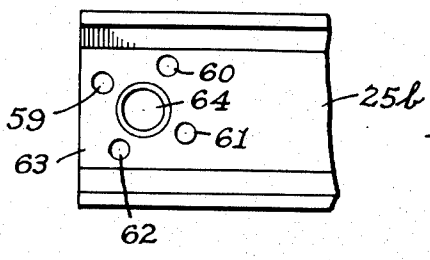


Fig. 8



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TANK CLOSURE FASTENER

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6 Claims. (Cl. 292—256.69)

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This invention relates to closure fasteners generally but is more particularly concerned with ones especially designed and adapted for use on top closures for rental type water softeners.

The principal object of our invention is to provide closure fasteners which, while designed for quick and easy operation, are not too easily operable by children and other unauthorized persons who do not have the special kind of tool used by the service man and required for the operation, the fasteners being, moreover, designed and constructed to be easily adjusted by the service man from time to time as wear on the parts makes that necessary for the maintenance of a good water-tight seal.

The closure fasteners of our invention are designed to be thrown over dead-center in fastening, compressibility of a rubber gasket ring between the cap and tank affording most of the necessary yield in the structures for such operation, and each fastener including an adjustable abutment for the toggle draw-link connected to the manually movable toggle member, whereby a good water-tight seal can be obtained at the time of initial assembly at the factory, regardless of the inevitable irregularities in quantity production of softener tanks, and, later, when the unit is in service, regardless of anticipated wear on the various parts. Two different practical designs of adjustable abutments for the purposes stated are herein disclosed.

The invention is illustrated in the accompanying drawings, in which—

Fig. 1 is a vertical section through the top portion of a rental type water softener equipped with a closure fastener made in accordance with our invention, the latter appearing in section on line 1—1 of Fig. 2;

Fig. 2 is a plan view of the fastening toggle end of the two-piece closure fastener ring or band, indicating the mode of operation by a dotted line position of the two toggle parts;

Fig. 3 is a face view of the structure of Fig. 2;

Fig. 4 is an isolated face view of the adjustable abutment plate used in the closure fastener of Figs. 1 to 3;

Fig. 5 is a view like Fig. 4 of another adjustable abutment plate having a differently located eccentric hole;

Figs. 6 and 7 are views like Figs. 2 and 3 but showing a modified or alternative construction, and

Fig. 8 is an inside face view of the free end of one part of the two-piece closure fastener ring, showing the circumferentially spaced holes which afford four stages of adjustment for the abutment plate.

Similar reference numerals are applied to corresponding parts throughout the views.

Referring first to Figs. 1 to 5, the reference numeral 14 designates a sheet metal tank on the top

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of which is welded a ring 15 having a beveled bottom face 16 exposed on the outside of the tank and having an annular groove 17 to accommodate the compressible rubber gasket ring 18. An upwardly projecting rim 19 on the ring 15 spaced radially outwardly from the groove 17 serves to confine the gasket ring 18. A circular sheet metal cap or lid 20 of the same diameter as ring 15 rests on gasket 18 and has a beveled top face 21, similar to bevel 16 previously mentioned. These two bevels 16 and 21 cooperate with the beveled inner surfaces 22 and 23 on two nearly semi-circular channel-section ring or band members 24 and 25, so that when the band 24—25 thus formed is contracted radially relative to ring 15 and cap 20 the latter is forced down, tightly compressing gasket 18 to form a water-tight seal. The two band members 24 and 25 are pivotally connected at one end by means of a bolt 26 that passes through registering holes in interfitting knuckles 27 and 28 provided on the adjoining ends of the two band members, the bolt 26 passing also through a registering hole 29 in a bracket 30 that is suitably welded onto the upper end of the tank 14 below the ring 15, whereby to support the two-piece band 24—25 on the tank and accordingly facilitate operation of the structure generally. The closure fastener mechanism 31 of my invention is operatively connected with the free ends of the band members 24 and 25 and serves to draw these ends together with an over-center toggle action, the gasket 18 affording most of the necessary yield in the structure to permit such operation.

The closure fastener mechanism 31 comprises a rectangular wire toggle draw link 32 pivoted at one end 33 to a toggle lever 34 intermediate the ends of the latter, one end of the lever 34 being pivoted, as at 35, to the bifurcated end 36 of an attaching plate 37 that may be welded to the web portion of the free end of the band member 24, although screws 38 are indicated, and the other end of the lever 34 having a longitudinally extending hole 39 provided therein, in which the service man can enter one end of an operating lever 40, as indicated in the dotted line position of the lever 34 in Fig. 2. The free end 41 of the link 32 may be entered in the forked end 42 of another attaching plate 43 that is welded, or otherwise suitably secured to the web portion of the other band member 25 at the free end thereof. A rectangular abutment plate 44 is adjustably mounted in the forked end 42 of the plate 43 by means of a screw 45 that is threaded in a hole 46 in the plate 43, but extends freely through a hole 47 provided therefor in the plate 44. The hole 47 is off center, providing a smaller dimension *a* from the hole 47 to the abutment edge 48 and a larger dimension *b* from the hole 47 to either of the opposed abutment edges 49, as clearly appears in Fig. 4. The plate 44 is shown

with its edge 48 abutting the end 41 of the link 32, and it should be obvious from the two positions of the link 32 and lever 34 shown in Fig. 2 that when the lever 34 is swung from the dotted line position past a dead-center position with respect to pivot 35, the band 24—25 is thereby contracted radially to a predetermined extent, usually sufficient to compress the gasket 18 between the ring 15 and plate 20 to make a watertight seal. However, if further contraction of the band 24—25 is necessary, the screw 45 can be removed and the plate 44 turned through ninety degrees (90°) to present either of the edges 49 for abutment with the end portion 41 of link 32. Such adjustment is usually made after the water softener has been in service and there has been some wear on the beveled surfaces 16 and 21 and also some wear and change of shape in the gasket 18. If at the time of original assembling of the softener at the factory a tight enough seal cannot be obtained with the plate 44 in the position shown in Fig. 3 and a tight seal can be obtained only if the plate 44 is turned at right angles to present either of its edges 49 for abutment with the link 32, then a different plate 44*a*, shown in Fig. 5, should be installed, where the dimension *b* from the hole 47*a* to the edge 49*a* corresponds to the dimension *b* in Fig. 4 and a larger dimension *c* is represented between the hole 47*a* and at least one of the edges 50 extending in right angle relation to edge 49*a*, so that the service man can later adjust the plate 44*a* to compensate for wear after the softener has been in service for some time and the need is indicated for greater tightening of the band 24—25 in order to obtain a good watertight seal.

In operation, it should be clear from the foregoing that we have provided an easily and quickly operable closure fastener mechanism, so that a service man will not have to spend too much time removing bags of exhausted mineral from the tank 14 and replacing them with bags of regenerated mineral, and yet there is little or no likelihood of the tank being opened accidentally by children tampering with the toggle mechanism, because the lever 34 cannot be operated without entering in the hole 39 the special tool used by the service man and required for the operation. Furthermore, it takes only a few minutes for the service man to adjust the plate 44 through ninety degrees (90°) if the band 24—25 must be closed a little more tightly in order to effect a good water-tight seal. Of course, if the gasket 18 gets too badly distorted and must be replaced, a gasket of slightly larger cross-section than was originally used would also serve to compensate for whatever slight amount of wear may have occurred in the rest of the closure structure.

The closure fastener mechanism 31*b*, shown in Figs. 6 and 7 is closely related to that of Figs. 2 and 3, link 32*b* corresponding to link 32, lever 34*b* corresponding to lever 34, and so on. However, in this form a cylindrical plate 44*d* takes the place of the rectangular plate 44 of Fig. 4 and has an annular groove 55 in which the arcuate end 41*b* of the link 32*b* is received in any position of rotation of the plate, this plate having an eccentric hole 56 in which a screw 57 is received for fastening the same to the web portion of the band member 25*b* at the free end thereof, and also having a pin 58 projecting therefrom which may be entered in either one of four circumferentially spaced holes 59—62 provided

therefor in the web portion 63 of the band member 25*b*, all at the same radius with respect to the hole 64 in which the screw 57 is entered. The holes 59 are approximately ninety degrees (90°) apart, and there are, therefore, four different positions of assembly of plate 44*d* on band member 25*d*, each spacing the abutment side of the plate 44*d* for link 32*b* differently with respect to the end of the band member 25*b*. The operation of this form is believed to be clear enough from the foregoing description to make further description unnecessary.

It is believed the foregoing description conveys a good understanding of the objects and advantages of our invention. The appended claims have been drawn to cover all legitimate modifications and adaptations.

We claim:

1. In a receptacle, a closure, a fastening band element to surround the receptacle and closure separable at a portion thereof, tightening means for said band element adjacent said portion comprising an elongated, over-center, toggle locking member pivoted at one end to the band element on one side of said separable portion, a toggle draw link pivoted at one end on said locking member intermediate the ends thereof, and adjustable means on said band element on the other side of said separable portion engageable by the other end of said toggle draw link consisting of an abutment plate which in different positions of rotary adjustment permits different degrees of tightening of said band element when the locking member is moved over-center to locking position, said adjustable means including an attaching plate affixed to said band element having a forked end remote from said toggle locking member and adapted to receive the end of said draw link, and said abutment plate being detachably mounted in said forked end on a bolt carried on said attaching plate and entered in an eccentric hole provided therefor in said abutment plate, said bolt being removable to permit assembly of said abutment plate in the forked end of said attaching plate in different positions of rotary adjustment.

2. In a receptacle, a closure, a fastening band element to surround the receptacle and closure separable at a portion thereof, tightening means for said band element adjacent said portion comprising an elongated, over-center, toggle locking member pivoted at one end to the band element on one side of said separable portion, a toggle draw link pivoted at one end on said locking member intermediate the ends thereof, the other end of said draw link having an opening provided therein, and adjustable means on said band element on the other side of said separable portion engageable in the open end of said toggle draw link consisting of an abutment plate which in different positions of rotary adjustment permits different degrees of tightening of said band element when the locking member is moved over-center to locking position, said adjustable means including an attaching plate affixed to said band element having a forked end remote from said toggle locking member and adapted to enter the opening in the end of said draw link, and said abutment plate being detachably mounted in said forked end on a bolt carried on said attaching plate and entered in an eccentric hole provided therefor in said abutment plate, said bolt being removable to permit assembly of said abutment plate in the forked end of said attaching plate in different positions of rotary adjustment.

3. In a receptacle, a closure, a fastening band element to surround the receptacle and closure separable at a portion thereof, tightening means for said band element adjacent said portion comprising an elongated, over-center, toggle locking member pivoted at one end to the band element on one side of said separable portion, a toggle draw link of fixed length pivoted at one end on said locking member intermediate the ends thereof, the other end having a transverse portion, and adjustable means on said band element on the other side of said separable portion engageable with the transverse portion on the latter end of said toggle draw link consisting of an abutment plate of rectangular form having means for fastening the same in fixed relation to said band element in any one of a plurality of different positions of rotary adjustment about an axis located eccentrically thereof, whereby either one of the flat edges thereof may serve as an abutment for the transverse portion on the end of the draw link, said edges in different positions of rotary adjustment providing abutments for the transverse portion on the end of the draw link spaced differently from the separable portion of the band, whereby to provide for different degrees of tightening of said band element when the locking member is moved over-center to locking position.

4. In a receptacle, a closure, a fastening band element to surround the receptacle and closure separable at a portion thereof, tightening means for said band element adjacent said portion comprising an elongated, over-center, toggle locking member pivoted at one end to the band element on one side of said separable portion, a toggle draw link of fixed lengths pivoted at one end on said locking member intermediate the ends thereof, the other end having a transverse portion, and adjustable means on said band element on the other side of said separable portion engageable with the transverse portion on the latter end of said toggle draw link consisting of an abutment plate of generally circular form having a bolt entered through a hole provided therein located eccentrically thereof for fastening the same in fixed relation to said band element in different positions of rotary adjustment, whereby said plate in its different positions of rotary adjustment provides abutments for the transverse portion on the end of the draw link spaced differently from the separable portion of the band, to provide for different degrees of tightening of said band element when the locking member is moved over-center to locking position, said plate having a pin projection that is engageable selectively in any one of a plurality of circumferentially spaced holes provided in said band element on a common radius with respect to a hole provided in said band element for reception of the aforesaid fastening bolt, whereby said plate is positively held against turning relative to said bolt in any one of its different positions of rotary adjustment predetermined by the location of said circumferentially spaced holes.

5. In a receptacle, a closure, a fastening band element to surround the receptacle and closure separable at a portion thereof, tightening means for said band element adjacent said portion comprising an elongated, over-center, toggle locking member pivoted at one end to the band element on one side of said separable portion, a toggle draw link pivoted at one end on said locking member intermediate the ends thereof, and adjustable means on said band element on the other side of said separable portion engageable by the other end of said toggle draw link consisting of a rectangular abutment plate which in different positions of rotary adjustment permits different degrees of tightening of said band element when the locking member is moved over-center to locking position, said adjustable means including an attaching plate affixed to said band element having a forked end remote from said toggle locking member and adapted to receive the end of said draw link, and said abutment plate being detachably mounted in said forked end on a bolt carried on said attaching plate and entered in an eccentric hole provided therefor in said abutment plate, said bolt being removable to permit assembly of said abutment plate in the forked end of said attaching plate in different positions of rotary adjustment, the forked end of said attaching plate being only deep enough to accommodate said abutment plate in either of its positions of rotary adjustment so that rotation except through a small angularity is prohibited when the plate is disposed in the forked end of said attaching plate and the bolt is entered in the eccentric hole.

6. In a receptacle, a closure, a fastening band element to surround the receptacle and closure separable at a portion thereof, tightening means for said band element adjacent said portion comprising an elongated, over-center, toggle locking member pivoted at one end to the band element on one side of said separable portion, a toggle draw link of fixed length pivoted at one end on said locking member intermediate the ends thereof, the other end having a transverse portion, and adjustable means on said band element on the other side of said separable portion engageable with the transverse portion on the latter end of said toggle draw link consisting of an abutment plate of rectangular form having means for fastening the same in fixed relation to said band element in any one of a plurality of different positions of rotary adjustment about an axis located eccentrically thereof, whereby either one of the flat edges thereof may serve as an abutment for the transverse portion on the end of the draw link, said edges in different positions of rotary adjustment providing abutments for the transverse portion on the end of the draw link spaced differently from the separable portion of the band, whereby to provide for different degrees of tightening of said band element when the locking member is moved over-center to locking position, said band element having a recess provided therein to accommodate said abutment plate, the latter being non-rotatable in said recess when secured therein in a selected position of rotary adjustment.

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