United States Patent

Townsend et al.

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[54] **GLOVE MOUNTING RING DEVICE TO PERMIT OF PERFORMING OPERATIONS IN A SEALED CONTAINER**

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[73] Assignee: **Commissariat A L'Energie Atomique,** Paris, France

[22] Filed: **July 7, 1969**

[21] Appl. No.: **869,982**

Related U.S. Application Data

[62] Division of Ser. No. 655,058, July 21, 1967, Pat. No. 3,541,648.

[30] **Foreign Application Priority Data**

Aug. 1, 1966 France.....6671635
Aug. 1, 1966 France.....6671636

[52] **U.S. Cl.** **312/1,** 29/200, 29/237
[51] **Int. Cl.** **A61g 11/00**

[58] **Field of Search** 312/1; 63/5, 6, 9; 81/3; 29/237, 200; 248/99

[56] **References Cited**

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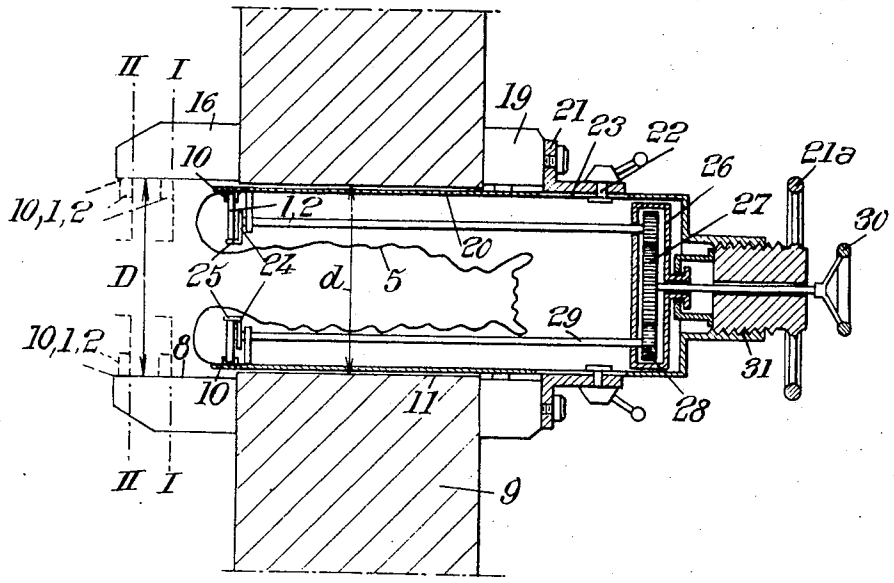
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Primary Examiner—James C. Mitchell
Attorney—William D. Stokes

[57] **ABSTRACT**

For the fixation of a flexible glove intended to permit of performing operations in a sealed container, use is made of a ring made of ring elements hinged to one another and some of which are always located on the outline of the ring, whereas the others can be retracted inside this outline. Expansion of the ring is obtained by pushing in the outward direction the hinges between two ring elements of the second kind. Such a ring is adapted to fit in the expansible gutter-shaped edge of the deformable glove.

7 Claims, 12 Drawing Figures



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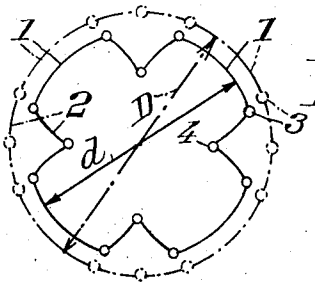


Fig. 1.

Fig. 2.

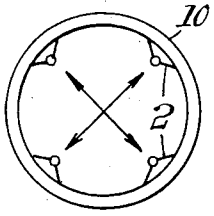


Fig. 3.

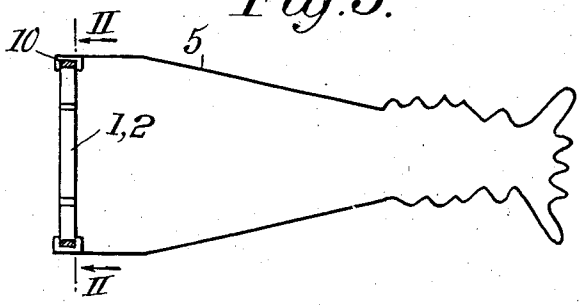


Fig. 4.

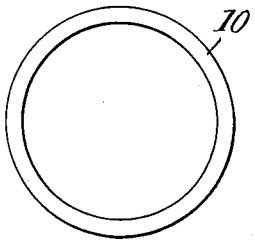


Fig. 5.

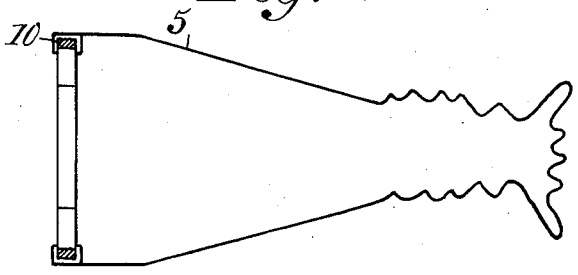


Fig. 6.

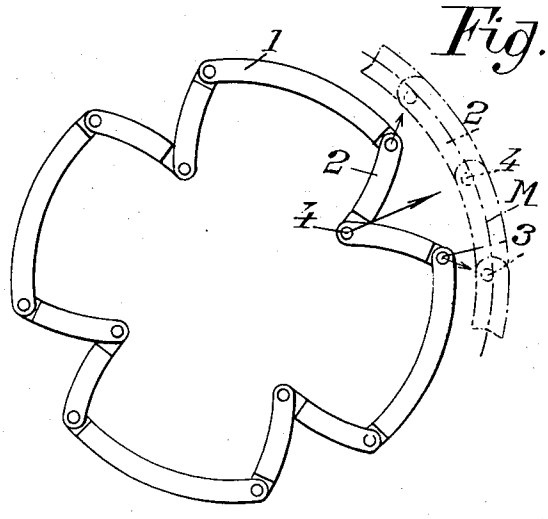


Fig. 7.

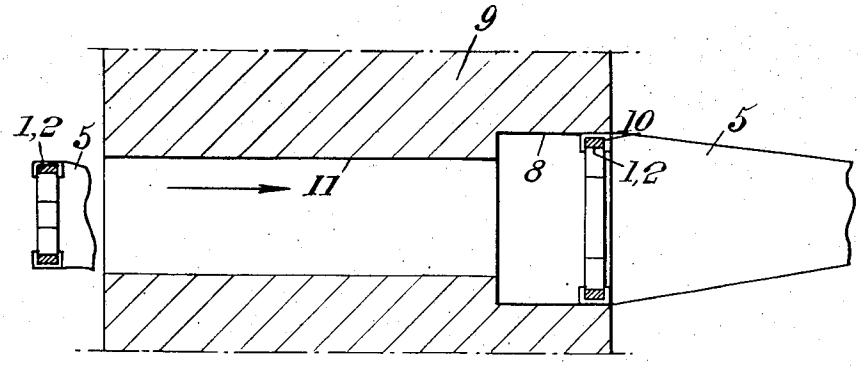


Fig. 8.

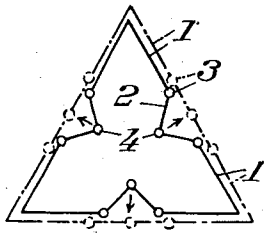


Fig. 9.

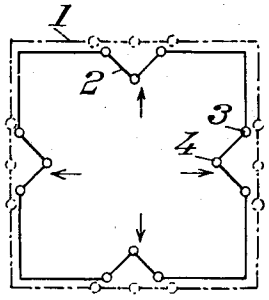


Fig. 10.

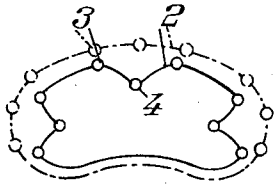


Fig. 11.

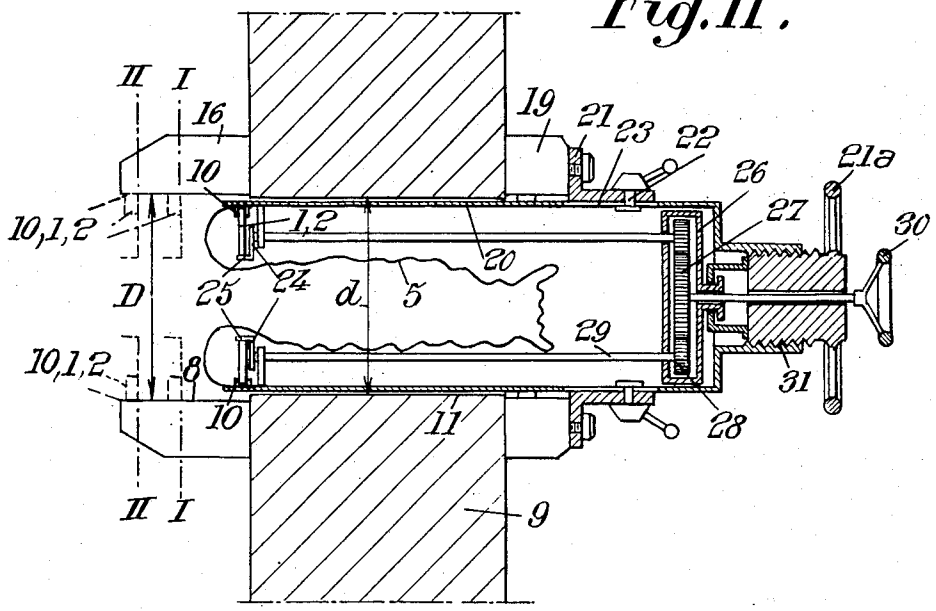
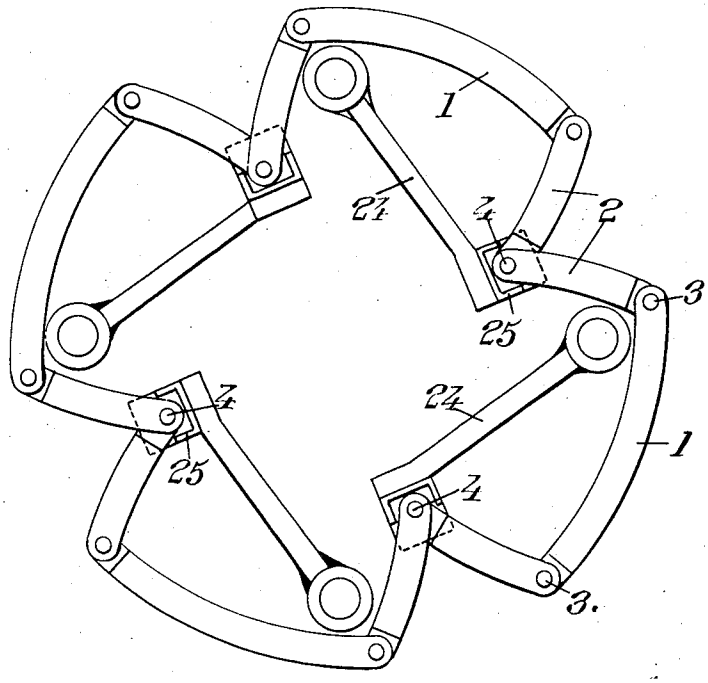

II
I
16
10
10,1,2
D
10,1,2
8
10
II
I
19
21
23
22
26
21a
27
30
1,2
20
25
24
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31
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Fig. 12.


1
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2
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4
24
1
25
4
3

GLOVE MOUNTING RING DEVICE TO PERMIT OF PERFORMING OPERATIONS IN A SEALED CONTAINER

This is a division of application Ser. No. 655,058, filed July 21, 1967, now U.S. Pat. No. 3,541,648, granted Nov. 24, 1970.

The present invention relates to ring devices for securing a glove or the like to the wall of a sealed container through a conduit provided in the wall of said container so as to permit of performing operations in said container.

The invention is concerned in particular with mounting devices of this kind for use in connection with containers for radioactive bodies.

The chief object of this invention is to facilitate the fixation of such a device.

The invention consists chiefly in providing said device with an expansible ring, in particular made of elements hinged to one another, so that it is possible, in the retracted position of the ring, to pass it through a conduit of a cross section smaller than that corresponding to the operative position of the ring. In particular the ring is made of a plurality of hinged elements separated from one another by other elements disposed for instance by pairs, which in the retracted position, maintain the general shape of the device but with a retraction thereof, and which, when the ring has been brought opposite the surface on which it is to bear, can, by deformation toward the outside and jamming, occupy a final position where the outline of the ring expands beyond the cross section of the conduit.

Preferred embodiments of the present invention will be hereinafter described with reference to the appended drawings given merely by way of example and in which,

FIG. 1 diagrammatically shows in plan view, a sealing ring made according to this invention, the solid lines and the dotted lines showing two positions of said ring;

FIGS. 2 and 3 show, respectively in side view seen from the direction of the arrows II—II of FIG. 3 and in diagrammatical axial section, a device according to this invention in the retracted position thereof;

FIGS. 4 and 5 are views similar to FIGS. 2 and 3 respectively, the device being in the expanded position;

FIG. 6 shows, on an enlarged scale, a ring according to this invention, in solid lines in retracted position, and in dotted lines in the expanded position;

FIG. 7 is an axial sectional view of the wall of a container provided with a passage for the device according to this invention;

FIGS. 8, 9 and 10 are views similar to FIG. 1 illustrating three other embodiments of the invention, respectively;

FIG. 11 is a diagrammatic sectional view illustrating an apparatus for fitting in position a glove mounting device according to this invention; and

FIG. 12 shows an expansible ring to be used with the apparatus of FIG. 11.

The invention is concerned with the introduction into a sealed container of a ring having in its operative position a diameter greater than the cross section diameter of the passage through which the device is to be introduced into the container.

In the embodiment illustrated by FIGS. 1 to 7, the ring consists of a plurality of elements in the shape of circular segments, some of these elements, to wit 1, being always located at the periphery and the others, to wit 2, being pivoted about axes 3 and 4 so that they can be retracted inwardly.

FIG. 1 shows that, in the retracted position, where axes 4 are located on the inside of the periphery, the whole has a diameter *d* smaller than the diameter D of the ring when elements 2 are pivoted outwardly and occupy the position shown in dotted lines in FIG. 1.

As shown by FIG. 6, axes 3 and 4 may be offset to the inside of the mean line M of elements 1 and 2, which ensures an easier jamming of said elements 1 and 2.

FIG. 7 shows how the expansible edge 10 of glove 5, fitted on expansible ring 1, 2 is applied against surface 8.

In FIGS. 2 and 3, ring 1,2 and the edge of glove 5 are shown in retracted position, whereas FIGS. 4, 5 and 7 show the expanded position of said parts.

FIG. 7 shows the introduction of system 1,2,5 through a passage 11 of the container wall 9 the cross section of which is smaller than the cross section of the chamber against the inner surface 8 of which glove 5 is to be fixed.

Thus the setting of system 1,2,5 can be performed from the outside of the container, whereas it is generally necessary to have the sealed container opened for this purpose, which involves risks of contamination and high expenses.

Ring 1,2 may be made of a metal or another suitable material. It may possibly be made of a plastic material or covered with a plastic material.

It should be well understood that the term "ring" has been used in its broader meaning and designates any bounding structure which is endless but not necessarily circular. For instance, FIGS. 8, 9 and 10 show respectively, a triangular ring, a square ring and a rounded elongated ring.

The introduction of the ring into the sealed container through passage 11, is advantageously performed by means of an apparatus such as illustrated by FIGS. 11 and 12.

Glove 5 is to be fixed on the inner surface 8 of a housing consisting of an annular projection 16 the diameter D of which is greater than the diameter *d* of introduction passage 11. Ring 1,2 serves, in its active position, to apply the edge 10 of said glove 5 tightly against the inner surface 8 of projection 16.

Ring 1,2 in its retracted position shown by FIG. 12, is introduced through passage 11 into annular projection 16, after which pivot pins 4 are to be moved outwardly so as to expand the circle formed by the whole of elements 1 and 2.

For this purpose use is made of an apparatus secured to an annular projection 19 (FIG. 11) fixed with respect to the wall 9 of the container on the outside thereof. By means of such an apparatus, it is possible to fix ring 1,2 in projection 16 and also, if necessary, to substitute a new glove 5 for an old one.

This apparatus comprises

on the one hand, a tubular body 20 slidable in a sleeve 21 adapted to be secured to projection 19, said sleeve comprising fixation lugs 22 cooperating with slots 23 provided in body 20 for adjusting it into the desired position, and

on the other hand, in this tubular body 20, arms 24 adapted to act at 25 on pivot pins 4, said arms being

controlled by a mechanism movable axially in tubular body **20**.

This mechanism comprises a casing **26**, the axial displacement of which is obtained by the screwing of a threaded plug **31** in body **20**, this plug being actuated by a first hand-wheel **21***a*. In this casing **26** there is provided a set of pinions **27**, **28** for actuating shafts **29**, these pinions being controlled by means of a hand-wheel **30**.

This apparatus works as follows:

Ring **1,2** in retracted position, engaged in the edge **10** of glove **5**, is set in position in tubular body **20**.

This tubular body is engaged into the corresponding passage **11** of the container wall **9**. It is fixed in annular projection **19** by sleeve **21** and its position is adjusted by lugs **22** cooperating with slots **23** of body **20**.

Hand-wheel **21***a* is rotated in one direction to bring system **1,2,10** into plane I—I.

Hand-wheel **30** is rotated in one direction to expand system **1,2,10** and apply it against the inner surface of projection **16**.

Hand-wheel **21***a* is further rotated in the same direction to bring system **1,2,10** into the position, corresponding to plane II—II, that it must occupy finally. This movement may drive off a precedingly used system **1,2,10**, which is thus dropped into the inside of the container.

Hand-wheel **30** is then rotated in a direction opposed to the preceding one so as to pivot arms **24,25** inwardly, thus disengaging them from ring **1,2** which is now expanded and jammed in position.

Hand-wheel **21***a* is then rotated in the direction opposed to the preceding one to bring arms **24,25** into the position shown in solid lines in FIG. **11**.

Sleeve **21** is then detached from projection **19** and tubular body **20** pulled off from passage **11**. Glove **5** is then pushed into the container.

The system above described has many advantages among which the following ones may be cited :

it permits an easier manipulation, in particular when passage **11** is of small cross section ;

it is no longer necessary to open the container ;

the glove **5** may be fitted in position without opening the sealed container.

In a general manner, while the above description discloses preferred embodiments of the invention, it should be well understood that said invention is not limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the present invention as comprehended within the scope of the appended claims.

What we claim is:

1. An apparatus for use with a closed container having a wall provided with a passage extending therethrough, said passage section greater than that of the remainder of said passage, an apparatus for performing operations inside said container which comprises, in combination:

a ring type device having two series of elements each element being hinged at its ends to two adjacent elements to form a closed chain, the second series of elements being inserted, in hinged pairs, respectively in each of the gaps between consecutive elements in the first series, the assembly being such that when the device is in an expanded position within a conduit the second series of elements forms a prolongation of the elements of the first series to form a substantially continuous ring bearing against the wall of said conduit, and the hinged pairs of the second series of elements jam in this expanded position, while in a retracted position of the device, the elements of the second series between said gaps are folded and are retracted to the inside of the chain so that the diameter of the device is reduced to permit fitting and removal of the device into and from the conduit,

a flexible glove, and

an expansible continuous annular part forming the edge of said glove adapted to fit against the inner wall of said housing, said annular part being gutter-shaped to accomodate the outer surface of said ring.

2. An apparatus for attaching a flexible tubing segment to the interior of a conduit comprising, in combination, an expandable ring and means for expanding said ring, said means for expanding said ring comprising:

a tubular body adapted to fit in said conduit,

means for securing said body in said conduit,

a casing slidable in said tubular body toward and away from the inside of said container,

means rotatable in said tubular body for causing said casing to slide therein,

a central pinion coaxially rotatable in said casing,

a plurality of pinions in mesh with said central pinion around the periphery thereof,

a hand-wheel coaxial with said central pinion and fixed thereto,

a plurality of shafts parallel to the axis of said tubular body respectively coaxial with said peripheral pinions and fixed thereto, and

arms fixed to said shafts and operatively connected to said expandable ring to force said expandable ring into its expanded position engaging said flexible glove with the inner wall of said housing when said pinions are rotated by said hand-wheel.

3. An apparatus for attaching a flexible tubing segment to the interior of a conduit comprising, in combination, an expandable ring, and means for expanding said ring, said ring comprising, in combination:

a first set of ring elements respectively shaped to form non-contiguous portions of either of two closed rings, and

a second set of ring elements forming groups each interposed by hinging between two successive ring elements of the first set, each of said groups consisting of at least two ring elements hinged together, the elements of each of said groups being shaped and dimensioned to jam together when they are unfolded and to form, in said unfolded position, extensions of the ring elements of the first set between which they are located, the whole of the ring elements of said first and second sets then forming a continuous ring, the ring elements of the first set forming portions of a non-continuous ring located inside said continuous ring when the ring elements of the second set are pivoted inwardly with respect to the ring elements of the first set,

said ring constructed and arranged to fit inside said flexible tubing segment when in a first, contracted,

position and to jam an annular section of said flexible tubing segment outward and into contact with said conduit when in a second expanded position.

4. An apparatus according to claim 3 wherein said groups of elements are hinged together about pivot axes located on the inside of the mean line of said ring elements.

5. The apparatus of claim 3, wherein said means for expanding said ring is supported by a casing slidably mounted in a tubular body fitting in said conduit.

6. An apparatus for attaching a flexible tubing segment to the interior of a conduit comprising:

a first set of ring elements respectively shaped to form non-contiguous portions of either of two closed rings and,

a second set of ring elements forming groups each interposed by hinging between two successive ring elements of the first set, each of said groups consisting of at least two ring elements hinged together, the elements of each of said groups being shaped and dimensioned to jam together when they are unfolded and to form, in said unfolded position, extensions of the ring elements of the first set between which they are located, the whole of the ring elements of said first and second sets then forming a continuous ring, the ring elements of the first set forming portions of a non-continuous ring located inside said continuous ring when the ring elements of the second set are pivoted inwardly with respect to the ring elements of the first set,

a plurality of pivot arms constructed and arranged to engage each of said groups of said second set of ring elements and force each of said groups outwardly when rotated,

means to impart rotative motion to said pivot arms,

said apparatus constructed and arranged to fit inside said flexible tubing segment contained within said conduit when in a first contracted position and to jam an annular section of said flexible tubing when said pivot arms are rotated forcing said second set of ring elements outwardly.

7. The apparatus of claim 6 wherein said means for imparting rotative motion to said pivot arms comprises,

a tubular body adapted to fit in said conduit,

means for securing said body in said conduit,

a casing slidable in said tubular body toward and away from the inside of said container,

means rotatable in said tubular body for causing said casing to slide therein,

a central pinion coaxially rotatable in said casing,

a plurality of pinions in mesh with said central pinion around the periphery thereof,

a hand-wheel coaxial with said central pinion and fixed thereto,

a plurality of shafts parallel to the axis of said tubular body respectively coaxial with said peripheral pinions and fixed thereto, and

arms fixed to said shafts and operatively connected to said expandable ring to force said expandable ring into its expanded position engaging said flexible glove with the inner wall of said housing when said pinions are rotated by said hand-wheel.

* * * * *