Oct. 26, 1926. 1,604,591

S. B. MERRY

CLOSURE EXPANDER

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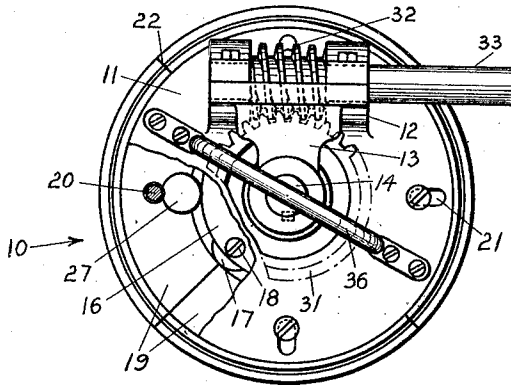

Fig. 1

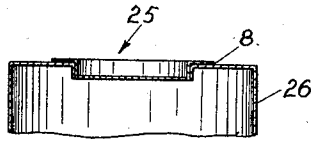

Fig. 5

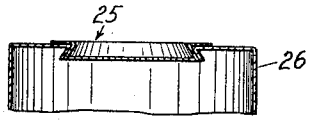

Fig. 6

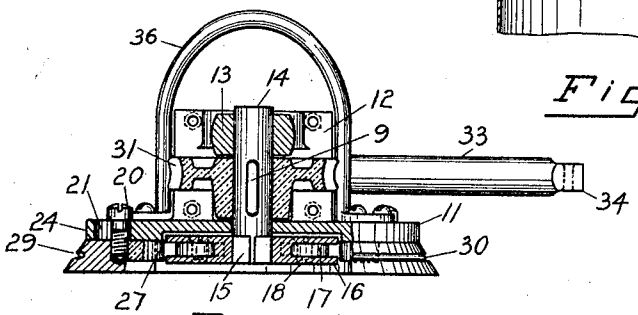

Fig. 2

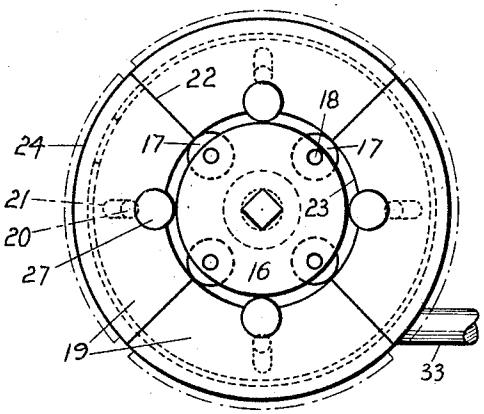

Fig. 3

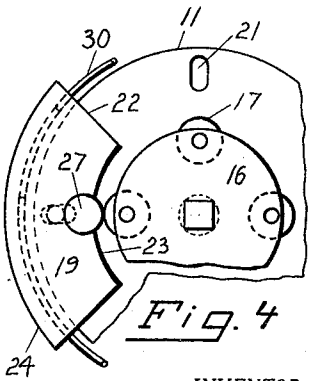

Fig. 4

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UNITED STATES PATENT OFFICE.

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CLOSURE EXPANDER.

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My invention relates to tools adapted to be used for expanding closures or covers for sheet metal barrels or similar containers in which various materials are shipped.

In some tools of this class rollers are employed, and handles are so arranged as to force the rollers outward, at least one of them so that, by a circular sweep of the handles, the rollers will bite into the metal and thereby expand the side walls of the covers and the container walls with which the covers contact in order to effect a seal for the opening of the container. This method, however, has the disadvantage that, if the metal is of uneven hardness or thickness, one roller will bite deeper into the metal than the others and thereby either cause the cover to turn or prevent complete turning of the tool for the effective sealing of the container, which may thus be rendered useless for further service and for that reason discarded. A considerable waste of material is thus entailed, and a considerable amount of labor is expended without profitable result.

Other devices accomplish the expansion of the cover wall by dies, which are moved outward by a lever and turned to different positions by a handle so as to swage the side wall of the cover until a seal for the container is gradually effected. This method requires a number of re-positionings of the tool before a seal is made, and is too slow to be economically practical.

The principal object of my invention is to provide a number of rollers in a rotatable member mounted on a disk, and to slidably secure a number of segments to the disk outside of the member, and to provide each segment with a projecting element adapted to contact with the rollers so as to cause the segments to move outward to closure-expanding position when the member is rotated. By this construction the peripheral expansion of the closure wall and the contacting container wall is accomplished evenly and virtually simultaneously at all points and in a minimum space of time.

Another object is to provide means for easily turning the aforementioned member, so that very little exertion will be required in order to accomplish the expanding operation.

I attain the above objects by my novel device, and other objects and advantages of the invention will appear in the subjoined description of the accompanying sheet of drawings, in which:

Figure 1 is a plan of my improved closure expander with a portion broken away, showing a movable segment and a roller to force the same outwardly;

Fig. 2 is a side elevation of Fig. 1 with a portion shown in section on the center line;

Fig. 3 is a bottom plan of the invention showing the segments in normal position in full lines and in expanded position in dot-and-dash lines;

Fig. 4 is a similar but partial plan of Fig. 3, showing in particular a segment moved to its outermost position by one of the rollers;

Fig. 5 shows in vertical mid-section, but drawn to a small scale, a cover positioned initially in the head or top of a barrel or container; and

Fig. 6 is a view similar to Fig. 5 but with the cover and head as expanded by my invention, forming a sealed closure for the container.

Adverting to the drawing and figures thereof, I indicate in general by the numeral 10 my invention of a closure expander per se.

In the closure expander I provide a disk 11, which has on one of its side faces a bearing bracket 12 provided with an overhanging arm 13. Rotatably mounted in the disk 11 and the arm 13 is a shaft 14 which extends a distance beyond the face of the disk opposite to the bracket 12 and is squared at its extremity, as at 15. A member 16, which has centrally a square opening, is fixed on the square end 15, the disk 11 preferably being recessed so that the member is set partly into the disk and adapted to rotate therein, as shown in Fig. 2. The member 16 is reel-shaped and has equidistantly arranged therein a number of rollers 17 rotatably mounted on suitable screws 18, which are screwed into holes near to and equidistant from the periphery of the member 16, so that the rollers extend beyond the member, as is clearly shown in Figs. 1, 3 and 4. In this instance the number of rollers is shown to be four, but it is understood that any other number best suitable for the application of my invention may be employed.

Outside of the member 16 are circular seg-

ments 19 slidably secured to the disk 11 by bolts 20, which extend through elongated slots 21 in the disk. The segments are equal in number to the rollers 17, and the slots 21 extend radially and are arranged equidistantly from each other adjacent to, and equidistant from the periphery of the disk, the arrangement being such that the side edges 22 of adjoining segments contact with each other, and the inner peripheries 23 of the segments contact with the rollers 17, while the joined outer peripheries 24 of the segments virtually form a circle, the joined segments being of a diameter adapted to fit loosely within a closure 25 for a container 26. In each segment an element 27 in the shape of a round disk is forced into a bore formed at the inner edge of the segment, and the bolt 20, which holds the segment slidably secured to the disk 11 is partially threaded into the element at its circumference and thereby further secures the element to the segment and prevents it from turning therein (see Figs. 1 and 2), so that the elements 27 are thus virtually integral with their respective segments 19 and project therefrom toward the member 16. The elements are seated directly in the circular path of the rollers 17, so that the elements are thereby adapted to contact with the rollers for causing the segments to move outward to closure-expanding position when the member 16 is rotated. Each of the segments 19 is preferably frusto-conical in shape at its outer periphery 24 and extends beyond the disk periphery, as is most clearly shown in Fig. 2, and the periphery 24 is further provided with a groove 29 for seating therein a parted annular spring 30 of wire, which is adapted to move the segments inward from the closure expanding position when the member 16 is rotated so that the rollers 17 are moved away from the elements 27 and out of contact therewith.

Between the bracket arm 13 and the disk 11 is secured upon the shaft 14, as by a key 9, a worm gear 31 in mesh with a worm 32 having a shaft 33 rotatably mounted on the side of the bearing bracket 12 and in right-angled relation to the shaft 14 and extends at one end beyond the disk 11 and is squared at its extremity, as shown at 34, in order to receive thereon a handle 35 for the manual operation of the closure-expander 10. Another handle 36 is secured to the disk 11 for the operator's convenience in handling the device.

The operation of the closure expander is as follows: The closure 25, which before expansion may be of the form shown in Fig. 5, is put into the opening of the container 26, with or without a gasket 8 between the container and the flange of the closure. The expander is then placed in the closure, the worm 32 is turned by the handle 35 and communicates motion to the worm gear 31 and thereby causes the member 16 to rotate, the rollers 17 in the member riding along the inner peripheries 23 of the segments 19 until they reach the elements 27, which they will force outward and therewith also the segments until they reach the outermost position, shown in dot-and-dash lines in Fig. 3 and indicated by full-line position of one segment in Fig. 4. In the latter figure is shown how a segment is moved to the outermost position when its element is in radial alignment with a roller and the member 16. When the segments have been moved to this position, the closure wall and the contacting container wall are expanded, as shown in Fig. 6, and, as a result of the expansion, a tight seal has then been formed for the container. In order to release the expander 10 from the closure-expanding position, it is only necessary to manipulate the handle 35 and thereby to rotate the member 16 so that the rollers 17 are moved away from the elements 27. The annular spring 30 in the grooves 29 will then automatically return the segments to their non-expanding position and thereby allow the operator to withdraw the expander from the closure 25.

From the foregoing description it is clear that by means of the worm gearing a minimum of effort is required for application of a great power in order to effect the expansion of a closure quickly and easily. It is also obvious that the seal effected by my expander will be free from kinks, since the segments act simultaneously and expand the closure uniformly at all points.

I claim:

1. In a closure expander, a disk; a central member rotatably mounted on the disk; a plurality of rollers secured to the member; a plurality of segments slidably secured to the disk outside of the member; means contacting with the rollers for causing the segments to move outward to closure-expanding position when the member is rotated; and means for rotating said member.

2. A round closure expander comprising at least three assembled segments of a disk adapted for insertion within the closure, and cam means concentric with said disk and rotatable about its center for simultaneously forcing said segments apart to expand the closure equally throughout its periphery.

3. In a closure expander, a disk having at one side a bearing bracket integral therewith; a shaft rotatably mounted in the disk and the bracket; a worm gear secured to the shaft between the bracket and the disk; a worm engaging the worm gear and having a shaft rotatably mounted in the bracket and extending at one side of the bracket; a member secured to the shaft at the side of the disk opposite to the bracket; rollers secured to the member and extending be-

yond the periphery thereof; segments slidably secured to the disk outside of the member, said segments having circular outer peripheries; and an element integral with each segment and projecting therefrom toward the member, said elements being adapted to contact with the rollers for causing the segments to move outward to closure-expanding position when the member is rotated by the turning of the worm shaft.

4. In a closure expander, a disk having at one side a bearing bracket integral therewith; a shaft rotatably mounted in the disk and the bracket; a worm gear secured to the shaft between the bracket and the disk; a worm engaging the worm gear and having a shaft rotatably mounted in the bracket and extending at one side of the bracket; a member secured to the shaft at the side of the disk opposite to the bracket; rollers secured to the member and extending beyond the periphery thereof; segments slidably secured to the disk outside of the member, said segments having grooved, circular outer peripheries; an element integral with each segment and projecting therefrom toward the member, said elements being adapted to contact with the rollers for causing the segments to move outward to closure-expanding position when the member is rotated by the turning of the worm shaft; and an annular spring in the grooves of the segments for moving the segments inward from the closure-expanding position when the member is rotated by the turning of the worm shaft so that the rollers are moved away from said elements.

5. In a closure expander, a disk having at one side a bearing bracket integral therewith: a shaft rotatably mounted in the disk and the bracket; a worm gear secured to the shaft between the bracket and the disk; a worm engaging the worm gear and having a shaft rotatably mounted in the bracket and extending at one side of the bracket; a member secured to the shaft at the side of the disk opposite to the bracket; rollers secured to the member and extending beyond the periphery thereof; segments slidably secured to the disk outside of the member, each of the segments being frusto-conical in shape at its outer periphery and extending beyond the disk periphery; and an element integral with each segment and projecting therefrom toward the member, said elements being adapted to contact with the rollers for causing the segments to move outward to closure-expanding position when the member is rotated by the turning of the worm shaft.

6. In a closure expander, a disk having at one side a bearing bracket integral therewith; a shaft rotatably mounted in the disk and the bracket; a worm gear secured to the shaft between the bracket and the disk; a worm engaging the worm gear and having a shaft rotatably mounted in the bracket and extending at one side of the bracket; a member secured to the shaft at the side of the disk opposite to the bracket; rollers secured to the member and extending beyond the periphery thereof; segments slidably secured to the disk outside of the member, each of the segments being frusto-conical in shape at its outer periphery and provided with a groove therein, and the periphery of the segment extending beyond the disk periphery; an element integral with each segment and projecting therefrom toward the member, said elements being adapted to contact with the rollers for causing the segments to move outward to closure-expanding position when the member is rotated by the turning of the worm shaft; and an annular spring in the grooves of the segments for moving the segments inward from the closure-expanding position when the member is rotated by the turning of the worm shaft so that the rollers are moved away from said elements.

In testimony whereof I affix my signature.

SEWARD B. MERRY.