March 12, 1957 K. E. BAUMANN 2,784,997

INFLATABLE GRIPPING MECHANISM

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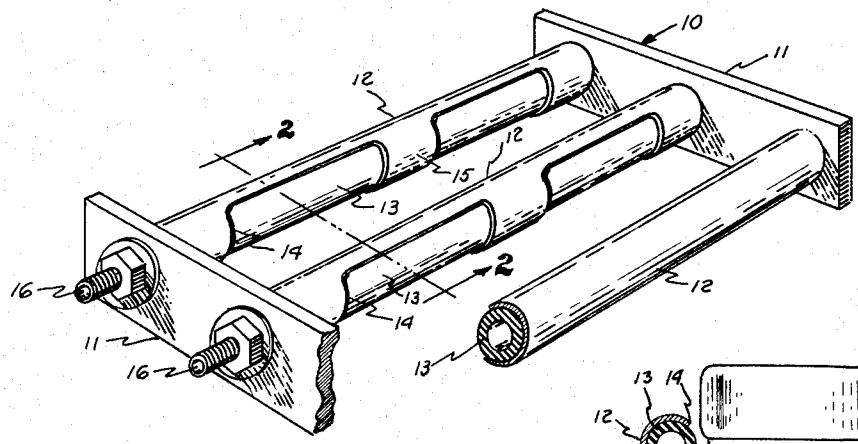


Fig. 1.

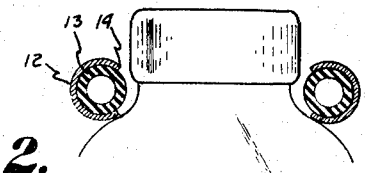


Fig. 2.

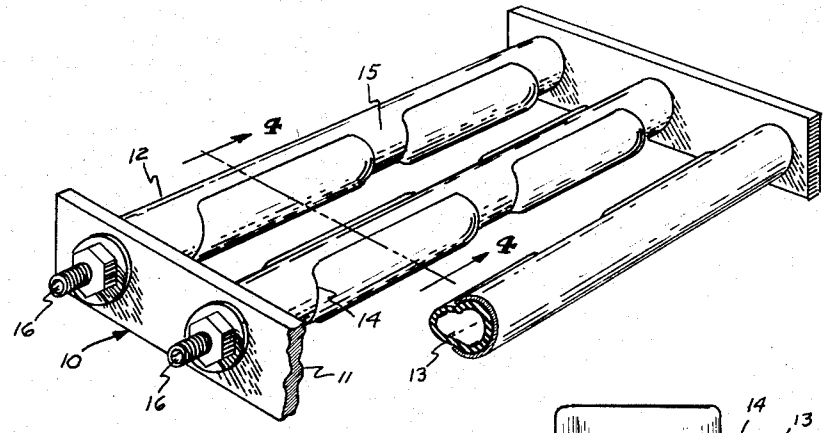


Fig. 3

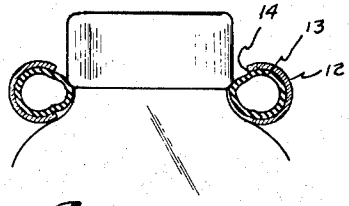


Fig. 4.

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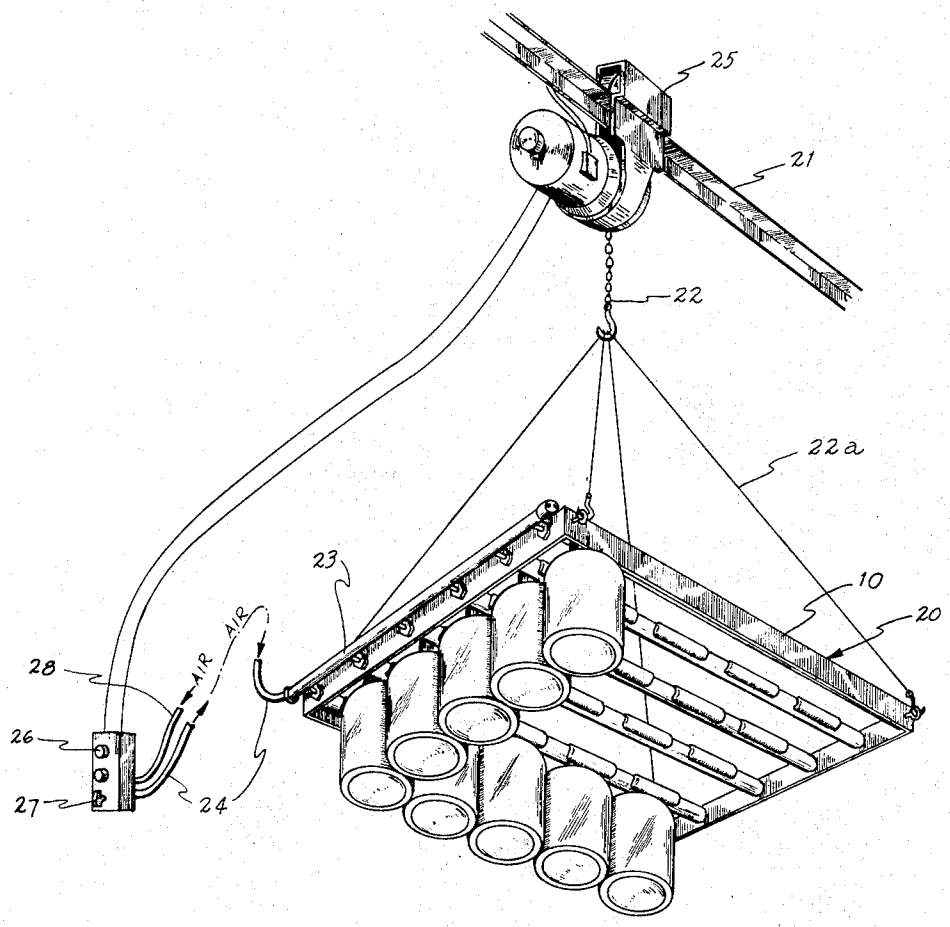


Fig. 5.

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2,784,997

INFLATABLE GRIPPING MECHANISM

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2 Claims. (Cl. 294—88)

This invention relates to a gripping mechanism and, more particularly, to an inflatable gripping mechanism for gripping and transferring a plurality of aligned objects.

The gripping mechanism of my invention finds particular usefulness in gripping a large number of aligned objects, such as bottles. In manufacturing operations where bottles are employed the bottles are usually received in a case from a supplier, so that it is necessary to unload a case of empty bottles when it enters the plant and to reload the case prior to its leaving the plant. Also, during other aspects of bottling it is often necessary to transfer bottles. Despite mechanization that has occurred in the filling and capping of bottles, very little attention has been directed to the transfer of bottles and, especially, the loading and unloading of the bottles. In many instances all of these operations are performed by hand and, where a case contains 24 bottles, it is apparent that such a manual operation is exceedingly wasteful of manpower.

In the past, attempts to eliminate these manual operations have consisted of expedients such as providing a mobile frame having a spaced arrangement of suction cups which engaged and gripped the tops or caps of the bottles, permitting relocation of a group of bottles. Such a device is not only costly to manufacture but requires delicate operation and considerable maintenance, since the vacuum utilized in the suction cups must be brought about by a comparatively expensive vacuum pump and the cups themselves maintained in good order.

Contrasted to the foregoing, the gripping mechanism of my invention is rugged and inexpensive in construction, is not subject to delicate operation since it uses pressure which can be cheaply supplied, if not already available in most manufacturing plants and, because of the arrangement of parts, is not subject to rapid wear and tear.

Essentially, the gripping mechanism of my invention includes a frame having a number of spaced parallel tubular members, with portions of the adjacent side walls of the tubular members removed. Mounted in each of the tubular members is an expandable member which, upon internal pressure, expands through the open side walls of the tubular members, to exert pressure against any object located between the tubular members.

It is, therefore, an object of my invention to provide a new and improved gripping device. Another object is to provide a gripping device which is movably mounted, permitting the gripped objects to be relocated. Yet another object of my invention is to provide a movable gripping mechanism, adapted to relocate a plurality of aligned objects. Other objects and advantages of my invention will be seen as the specification proceeds.

My invention will be explained in conjunction with the accompanying drawing, in which Fig. 1 is a fragmentary perspective view of the gripping mechanism of my invention; Fig. 2 is a partial cross-sectional view taken along the line 2—2 of Fig. 1 and showing, further, a

bottle included between two spaced tubular members; Fig. 3 is a figure similar to Fig. 1, but showing the expandable members in an expanded condition; Fig. 4 is a partial cross-sectional view similar to Fig. 2 taken along the line 4—4 of Fig. 3; and Fig. 5 is a perspective view of the mechanism of my invention shown in an operating environment.

Referring to the drawing, the numeral 10 indicates generally a frame of rectangular construction. In the preferred embodiment, this frame is constructed of metal and includes end pieces 11, to which are perpendicularly attached parallel spaced tubular members 12. One of the pair of end pieces 11 is provided with tapped openings communicating with the interior of tubular members 12, providing thereby a conduit for compressed air which is to be introduced into expandable members 13, which are mounted axially within tubular members 12. Portions of the adjacent side walls of tubular members 12, such as indicated at 14, have been removed to expose a portion of expandable member 13. Rubber tubing has proved to be useful as expandable member 13.

The operation of my invention can be readily understood by comparing Figs. 1 and 3 in which like numerals denote like structures, and which differ only in that in Fig. 3 expandable members 13 are shown in expanded condition. The same operation can be appreciated from comparing Figs. 2 and 4, wherein a bottle is shown included between spaced tubular members 12.

Since my invention is particularly useful in gripping a considerable number of objects such as up to 100 bottles at a single time, an important feature of my invention is the provision of spaced open portions 14 in the adjacent side walls of tubular members 12. Without the presence of restraining webs 15 between open portions 14, in many instances expandable member 13 would extend out of its tubular casing (tubular member 12) when inflated because of the relatively long unsupported length necessary to accommodate the large number of bottles indicated. Webs 15 permit a substantially uniform lateral expansion, insofar as length is concerned, of expandable member 13 so that there is no possibility that bottles would be gripped in the center and not at the ends of a pair of tubular members 12. Webs 15 should be of a width less than the width of the bottle to be gripped, so as to insure positive gripping action at all points along the length of tubular members 12.

It will be readily appreciated by those skilled in the art that my invention is useful in many forms. It can be incorporated into a chain hoist lifting mechanism so as to permit vertical as well as horizontal relocation of gripped objects. Other forms of lifting and moving apparatus can be employed in conjunction with the gripping mechanism of my invention, such as those utilizing compressed air or operating in tracks.

Although not specifically described herein or shown in the drawings, it is to be understood that the gripping mechanism of my invention is equipped with conventional air manifolds, valves, and other specialties for supplying air to expand or contract expandable members 13. For example, nipples 16, extending through end piece 11 and communicating with the interior of expandable member 13, can be connected to a single manifold (not shown) provided with a valve for admitting compressed air thereto and bleeding air therefrom.

For example, Fig. 5 shows a perspective view of my Gripping Mechanism when employed in transferring a plurality of aligned bottles from one location to another, as from a conveyor to a bottle washer. The gripping mechanism assembly, generally designated 20 is supported from an overhead monorail 21 by means of chain 22, which in the embodiment shown is secured by cables 22*a* to the four corners of rectangular frame 10 of mecha-

nism 20. Extending along one end of frame 20 is manifold 23 which is supplied with air through air hose 24. Air hose 24 can also be suspended from monorail pulley 25 which also regulates the elevation of mechanism 20 through chain 22. Electrically driven pulley 25 is regulated by switch 26 which also embodies valve 27 permitting air to enter or be bled from hose 24. The source of compressed air for hose 24 is not shown but could be a compressor connected to air inlet line 28.

It is to be understood that the foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations are to be inferred therefrom.

I claim:

1. A gripping mechanism for a plurality of aligned objects comprising a plurality of parallel rigid tubular members secured together in spaced relation, spaced longitudinal portions of the adjacent walls of said tubular members being removed therefrom, spaced web elements secured to each of said tubular members and overlying

said open portions, a laterally-expandable member mounted in each tubular member adapted to expand through said longitudinal open portions into the space between said tubular members whereby substantially uniform lateral expansion of said expandable member is achieved.

2. The mechanism of claim 1, wherein each of said webs has a width less than the width of one of said objects to be relocated.

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