Sept. 25, 1962 K. P. BILLNER 3,055,694

VACUUM LIFTER

Filed May 15, 1961

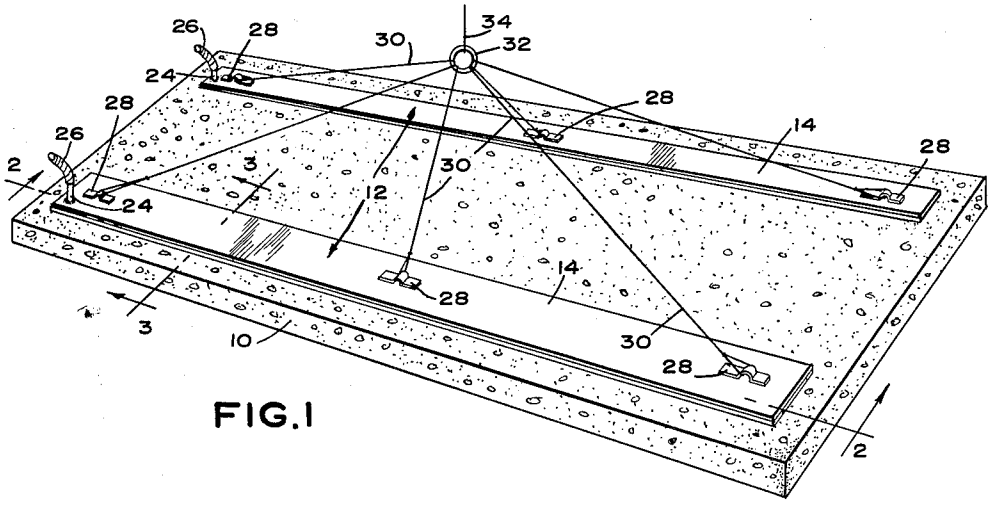


FIG. 1

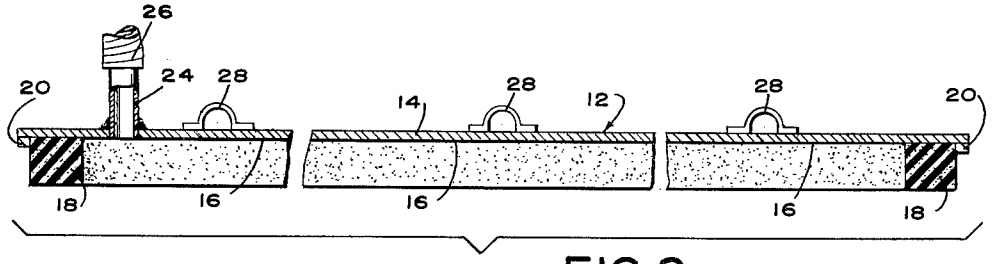


FIG. 2

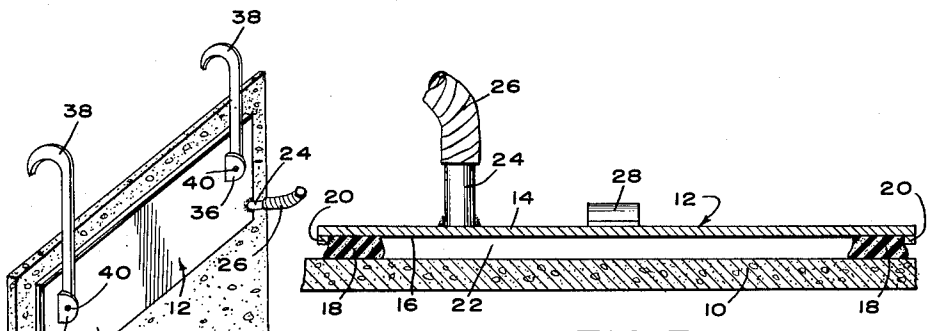


FIG. 3

FIG. 4

INVENTOR

KARL P. BILLNER

BY Raymond W. Cotton

ATTORNEY

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VACUUM LIFTER

Karl P. Billner, Philadelphia, Pa., assignor to Billner Vacuum Concrete, S.A., Philadelphia, Pa., a corporation of Panama

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This invention relates to a vacuum lifter which is intended primarily for the handling of precast concrete elements such as wall sections having substantial surface areas relative to their thicknesses, but applicable to loads of any other type.

In the past it has been more or less conventional to render such lifters substantially rigid, relying upon their load engaging gaskets to achieve the necessary conformation of the lifter to the load to obtain a preliminary seal.

Inasmuch as such known devices have performed inadequately where the surface of the load has been other than substantially plane, in accordance with the present invention, it is proposed that the backing plate from which the lifter is constructed be relatively thin as compared with its surface area so as to assure its conformability to loads departing appreciably from a plane.

It is accordingly among the objects of the present invention to provide a vacuum lifter comprising a metal plate of substantially uniform thickness and of such large area relative to its thickness as to impart such flexibility that it will conform to a surface of a load to which it is applied, a compressible resilient gasket peripherally secured to one surface of the plate and defining therewith a chamber having an open end for engagement with a load, a tension element flexibly attached to a surface of the plate remote from the open end, and a nipple secured to the plate in communication with the chamber for the removal of air from the chamber. The gasket is preferably composed of sponge rubber so that it will actually be compressible to a fraction of its initial thickness upon the application of vacuum. The tension element for lifting the lifter and its load may be secured to the plate by means of an eye or by means of a hinged element if desired.

A more complete understanding of the invention will follow from a description of the accompanying drawings wherein:

FIG. 1 is a perspective view depicting a pair of vacuum lifters conforming to the present invention applied to a concrete slab and connected by cables to a ring for engagement by a crane hook;

FIG. 2 is a sectional elevation taken along line 2—2 of FIG. 1;

FIG. 3 is a transverse sectional elevation taken along line 3—3 of FIG. 1 showing the gasket in a compressed condition as it would appear after the application of a vacuum pump to remove air from the chamber between the lifter and the load; and

FIG. 4 is a perspective view of a lifter of the type depicted in FIG. 1 having hinged elements connected thereto for the attachment of one or more hooks or cables.

When it is desired to lift a body or slab **10**, as shown in FIG. 1, a suitable number of lifters **12** will be applied to the exposed surface of the slab, the number depending upon the area of the slab and the mass thereof.

Each lifter **12** comprises a plate **14**, preferably made of steel, whose thickness is substantially uniform and small compared with its length, width and area so that

the plate will be relatively flexible, permitting it to conform to load surfaces which are more irregular than those with which vacuum lifters have previously been applicable. To the lower surface **16** of each plate there is adhesively secured in a peripheral fashion a sponge rubber gasket **18** which is resilient and compressible. Suitable locating beads **20** are provided for preventing displacement of the gaskets. By virtue of the inherent flexibility of the plates **14**, when the lifter is lowered into engagement with the surface of a load such as the concrete slab **10**, the gasket **18** will engage the load throughout so that when air is withdrawn from between the chamber **22** defined by the plate **14** and the gaskets **18** and the load, the gaskets will be compressed and the space between the plate **14** and the load **10** will be reduced until such time that external atmospheric pressure will cause the plate to become substantially rigid, adding rigidity to the load and temporarily strengthening it during the handling operation.

A nipple **24** welded to the surface of the plate **14** remote from the load, communicates with the chamber **22** and with a suitable vacuum pump through a hose **26**.

As shown in FIGS. 1, 2 and 3, lifting eyes **28** are welded to the surface of the plate **14** remote from the load to receive the looped end of a cable **30**, the several cables having their opposite ends secured to a ring **32** which will be engaged by a cable **34** or hook carried by a crane or other suitable lifting device.

In the embodiment of the invention depicted in FIG. 4, the construction of the lifter differs only in the provision of lugs **36**, rather than the eyes **28**, to which hooks **38** are flexibly attached by means of pivot pins **40** for cooperation with a crane or other suitable lifting device.

Whereas only two specific forms of the invention have been described with reference to the accompanying drawings, such variations as will suggest themselves to those skilled in the art are contemplated as falling within the scope of the appended claims.

I claim:

1. A vacuum lifter comprising a metal plate of substantially uniform thickness and of such large area relative to its thickness as to impart such flexibility that it will conform to a surface of a load to which it is applied, a compressible resilient gasket peripherally secured to one surface of said plate and defining therewith a chamber having an open end for engagement with a load, tension elements flexibly attached to a surface of said plates at a plurality of points opposite said chamber remote from said open end, and a nipple secured to said plate in communication with said chamber for the removal of air from said chamber.

2. A vacuum lifter according to claim 1 wherein said gasket is composed of sponge rubber.

3. A vacuum lifter according to claim 1 wherein an eye is secured to said plate for attachment of said tension element.

4. A vacuum lifter according to claim 1 wherein a hinged element is secured to said plate for attachment of said tension element.

References Cited in the file of this patent

UNITED STATES PATENTS

1,801,305	Drake	Apr. 21, 1931
2,455,650	Billner	Dec. 7, 1948
2,475,073	Billner	July 5, 1949
2,578,220	Billner	Dec. 11, 1951