

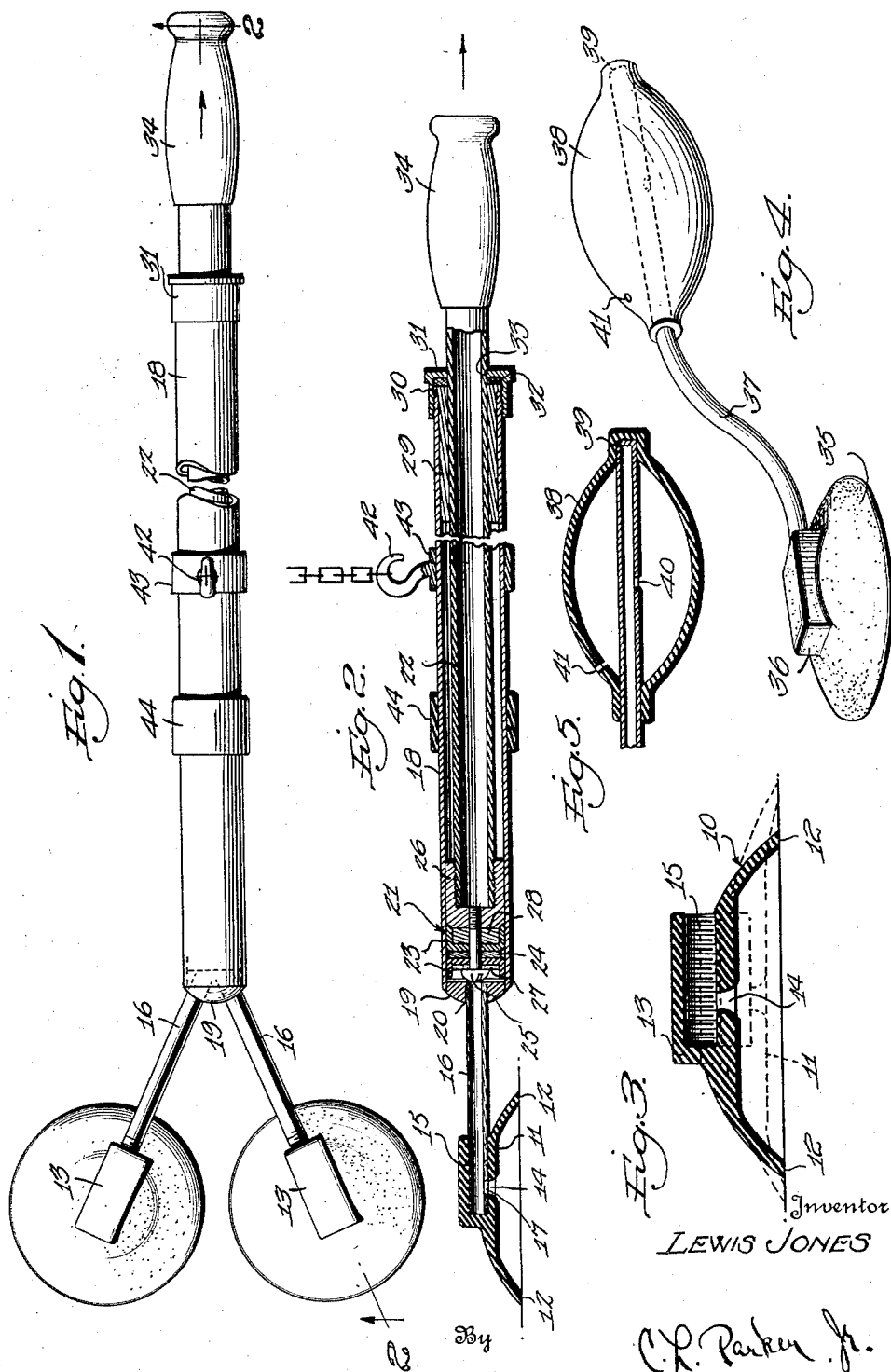
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VACUUM PUNCH PRESS FEEDER

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VACUUM PUNCH-PRESS FEEDER

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This invention relates to vacuum lifters, and more particularly to such a device which is adapted for use in picking up sheet material such as glass, sheet metal, and other non-porous material.

The handling of sheet metal usually is accomplished manually and the sheets are fed to punch and forming presses by hand, endangering the workman's hands by contact with the rough edges of the sheet and further endangering him by exposing his hands and arms to the action of the press while placing the sheet thereunder.

An object of the present invention is the provision of a vacuum lifter which will pick up the sheet, enable it to be placed under the press and release it without the necessity of the operator exposing his hands or arms to the action of the press and also preventing laceration of the hands or fingers by contact with the rough edges of the sheet.

Another object is to provide a vacuum lifter in the nature of a suction cup having an elongated handle connected to the cup to permit the operator to readily carry the sheet without his hands coming in contact therewith.

A further object is to provide novel means operable from the handle for creating a vacuum within the cup when the device is employed to lift a sheet.

A further object is to provide novel means for releasing the vacuum within the cup when it is desired to drop the sheet.

A further object is to provide a suction cup having an upwardly extending horizontally elongated portion, provided with an opening communicating with the interior of the cup, said portion being provided with a longitudinally, internally threaded opening adapted to receive the end of a tube connected to a vacuum generator, whereby when it is desired to create a vacuum within the cup the air may be drawn out of the cup through the tube.

A further object is to utilize a suction pump in the handle of the device to create and release a vacuum within the cup, whereby the device may be easily operated by the workman without his hands coming into contact with the sheet to be carried.

Other objects and advantages of the invention will become apparent during the course of the following description.

In the drawings I have shown several embodiments of my invention. In this showing:

Figure 1 is a plan view of the device showing a pair of vacuum cups,

Figure 2 is a sectional view taken substantially on line 2—2 of Figure 1,

Figure 3 is an enlarged vertical sectional view through one of the cups,

Figure 4 is a perspective view of a modified form of the invention, and

Figure 5 is a vertical sectional view through the bulb of the device shown in Figure 4.

Referring to the drawings the numeral 10 designates a vacuum cup as a whole, which is preferably formed of molded rubber or similar resilient material and is of an inverted cup shape to provide an interior space 11. The edge portion of the cup is preferably flattened as at 12 whereby the cup is adapted to seat perfectly against the surface of a sheet to be lifted. The cup is provided with an upwardly extending horizontally elongated portion 13, preferably formed integral therewith, and this portion is provided with an opening 14 communicating with the space 11. The extended portion 13 is also provided with a longitudinal internally threaded opening 15 extending a substantial distance through the portion 13 and communicating with the opening 14.

As shown in Figure 2, a tube 16 formed of metal or other suitable material, is adapted to have one extremity threaded into the opening 15 and this tube is provided with an opening 17 adapted to align with the opening 14, when the tube is threaded into position. An air-tight connection is thus formed between the tube and the cup. The opposite extremity of the tube is adapted to be threaded into the vacuum generator whereby when it is desired to create a vacuum within the cup, the air therein may be drawn from the cup through the tube 16.

The vacuum generator illustrated in Figures 1 and 2 is formed with an elongated cylinder 18 adapted to be closed at one extremity

by means of a plug 19 threaded therein and provided with a central aperture 20 into which one extremity of the tube 16 is threaded as will be understood.

5 A plunger or piston indicated as a whole by the numeral 21 is adapted to be reciprocated in the cylinder 18 and as clearly shown in Figure 2, this plunger is actuated by a rod 22 secured thereto and extending outwardly
10 of the cylinder 18.

Any suitable type of plunger may be employed and in the present instance the plunger comprises a pair of oppositely disposed cups 23, preferably formed of leather or other
15 suitable material, spaced apart by a washer 24, and adapted to be secured to the rod 22 by means of a bolt 25 passing through the cups and washer and being threaded into the guide member 26, the latter being threaded
20 onto the extremity of the rod 22. The cups 23 and the guide member 26 are adapted to lightly engage the inner wall of the cylinder and suitable washers 27 and 28 are arranged between the cups 23, the head of the bolt and
25 the guide member respectively.

Adjacent the opposite extremity of the cylinder an elongated sleeve 29 provided with an outstanding annular flange 30, is adapted to be arranged between the cylinder wall and the
30 rod 22, and a suitable cap 31 is threaded onto the cylinder to close the end thereof. As shown the outer periphery of the flange 30 is substantially even with the outer surface of the cylinder and suitable packing 32 is
35 arranged between the flange and the cap 31 to prevent leakage of lubricating fluid at this point.

The cap 31 is provided with a central aperture 33 through which the rod 22 is adapted
40 to slide when moved longitudinally of the cylinder, and a hand grip 34, formed of rubber or other suitable material is secured preferably on the end of the rod.

In Figures 4 and 5, I have shown a modified form of the invention. The cup 35 and
45 projection 36 is similar to cup 10 and projection 13 and need not be described in detail. The tube 37 is similar to the tube 16 and is connected to the cup in the same manner.
50 This tube extends through a bulb 38, preferably formed of rubber or other suitable material, and an extended portion 39 is formed on the bulb to receive the end of the tube. An opening 40 is provided in the portion of the
55 tube extending within the bulb, as will be apparent, and if desired the bulb may be provided with a small opening 41, the purpose of which will be explained.

If desired the device may be supported for
60 suspension and in Figures 1 and 2, I have provided a hook 42 suitably secured to a band 43, formed of rubber or other suitable material, and adapted to be placed around the cylinder at any convenient location, as will be under-
65 stood.

I have also shown a balancing member 44, which comprises preferably a rubber band surrounding the cylinder at a convenient point. The outer surface of this band and the rim of the cup are adapted to be arranged
70 in the same horizontal plane to enable the operator to pick up relatively long sheets of metal without danger of breaking the vacuum before desired.

The operation of the device is believed to be apparent. When it is desired to remove a sheet of metal from its pile to the press, the operator grasps the hand grip 34 with one hand, and places the other hand around the cylinder. The cup is then firmly placed on
75 the sheet to be lifted and the plunger is pulled away from the cup, thus drawing the air out of the cup and creating a vacuum therein, whereby the sheet may be lifted and placed in any desired location.

The sleeve 29 acts as a guide member for the rod to guard against possible lateral movement thereof and also acts as a stop member to limit the outward movement of
80 the plunger, as will be apparent.

When it is desired to drop the sheet the vacuum may be released by moving the plunger in the direction of the cup, thus forcing air into the latter. In Figure 1, I have illustrated a pair of cup members equidistantly
85 spaced from the end of the cylinder. For medium weight sheets of metal it is desirable to use the invention with only one vacuum cup which would be arranged in alignment with the cylinder, but for heavy sheets it has
90 been found preferable to use two vacuum cups, so spaced that the sheet may be readily balanced.

The device illustrated in Figures 4 and 5 is for use with relatively light sheets of metal
95 and the operation is as follows:

The bulb is squeezed to force out as much air as possible and the cup is placed in position on the sheet to be lifted. The bulb is then
100 allowed to expand and in doing so will draw the air out of the cup, thus creating a vacuum which will enable the sheet to be easily lifted. To break the vacuum with this form of the invention it is only necessary to squeeze the bulb again and force air into the cup.

It has been found in actual practice that workmen will sometimes create a vacuum within the cup 35 by pressing on the cup with the hands and forcing the air into the bulb. The opening 41 is provided in the bulb to
105 allow this air to escape.

It is believed to be apparent that I have provided a device which will enable the ready removal of sheet metal or like material without injury to the hands of the operator and
110 that with the device a sheet of metal may be easily fed to a press without exposing the operator's hands or arms to injury.

It is to be understood that the forms of the invention herewith shown and described are
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to be taken as preferred embodiments of the same and that various changes in the shape, size and arrangements of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. A device for lifting and carrying sheet material comprising a pair of spaced suction cups engageable with the surface of said material, a cylinder connected to each of said cups, means arranged within said cylinder for creating a vacuum in said cups, and means carried by said cylinder and engageable with the surface of said material at a point spaced from the engagement points of said cups with said material whereby said cups and said means provide substantially a three point engagement for said device with said material to prevent accidental release of the vacuum.

2. A device for lifting and carrying sheet material comprising a suction cup engageable with the surface of said material, a cylinder connected to said cup, means arranged within said cylinder for creating a vacuum in said cup, and an annular balancing member arranged on said cylinder and engageable with the surface of said material at a point spaced from the engagement point of said cup with said material, the engagement points of said cup and said balancing member being in a plane substantially parallel to the plane of the surface of said material.

In testimony whereof I affix my signature.
LEWIS JONES.