

[54] VACUUM CENTER LIFT

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214/1 BT, 650 SG; 248/362, 363

[56] **References Cited**

UNITED STATES PATENTS

3,195,941 7/1965 Morey 294/64 R

3,423,120 1/1969 Dalglish 294/97
3,005,652 10/1961 Helm 294/64 R

FOREIGN PATENTS OR APPLICATIONS

1,176,816 8/1964 Germany 294/64 R

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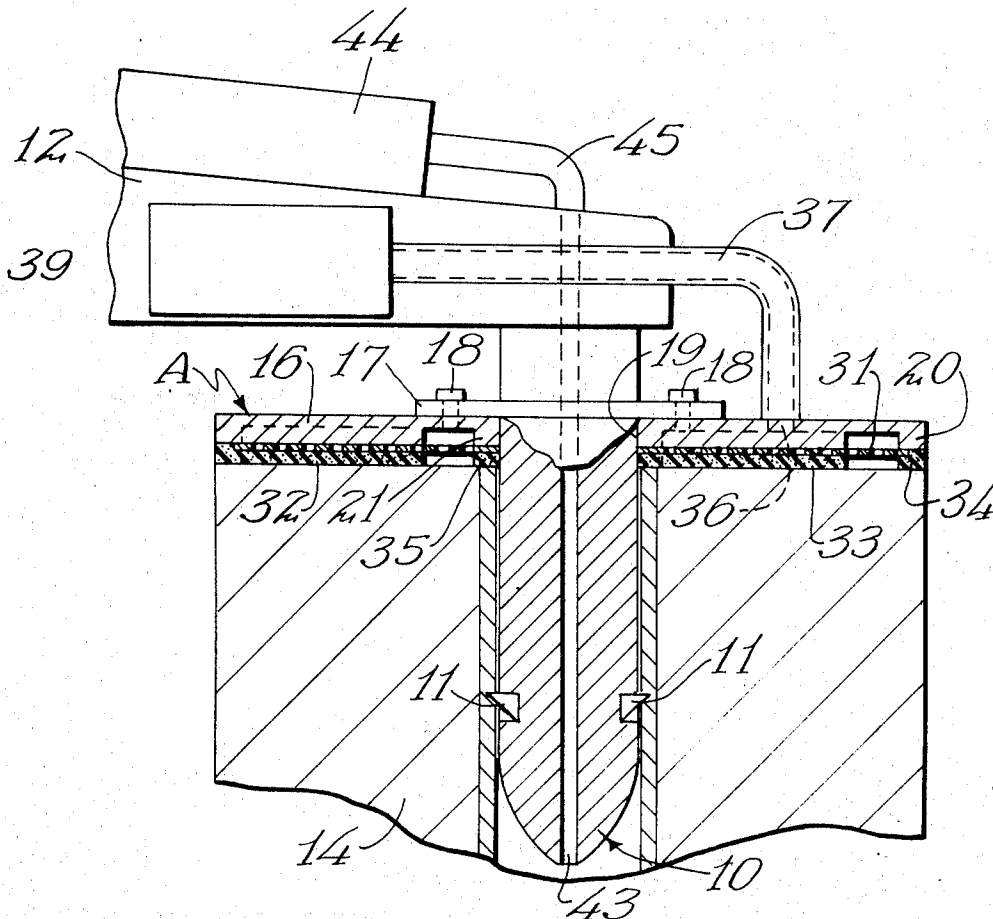
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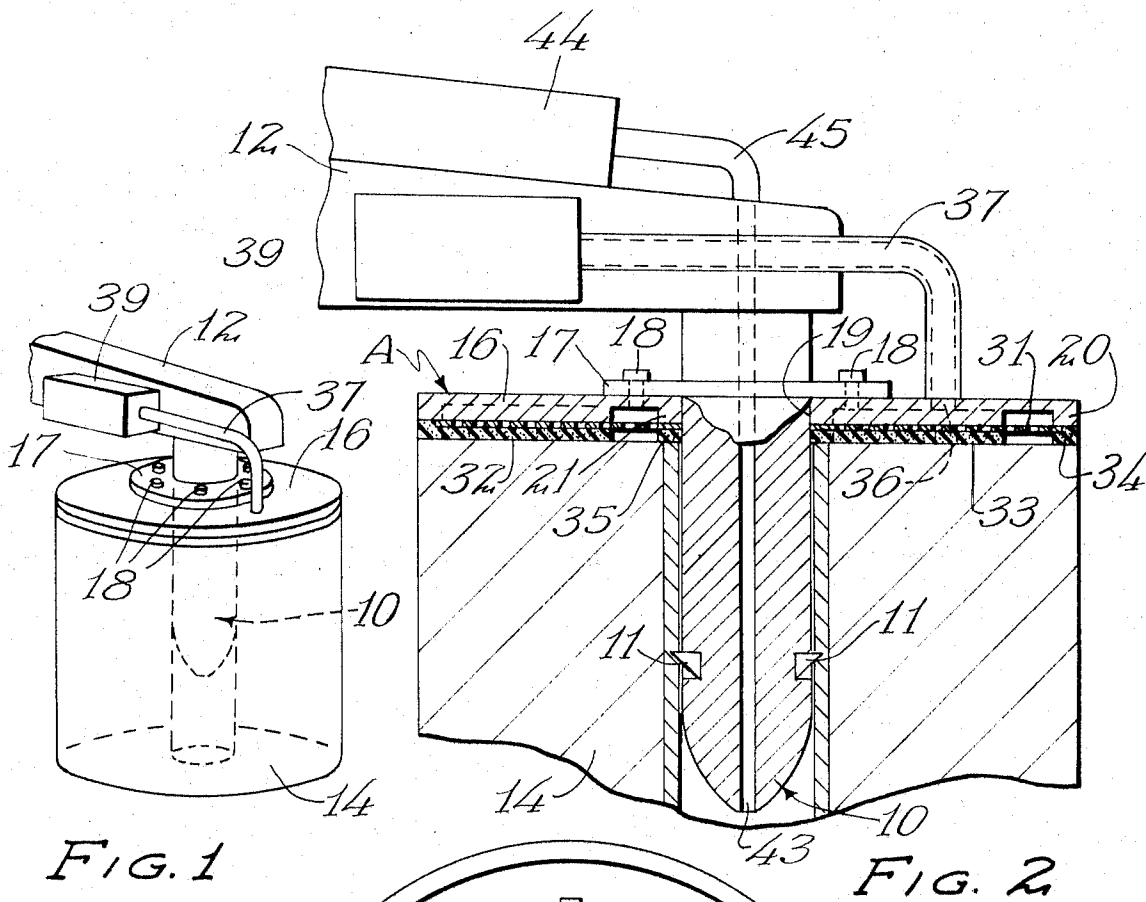
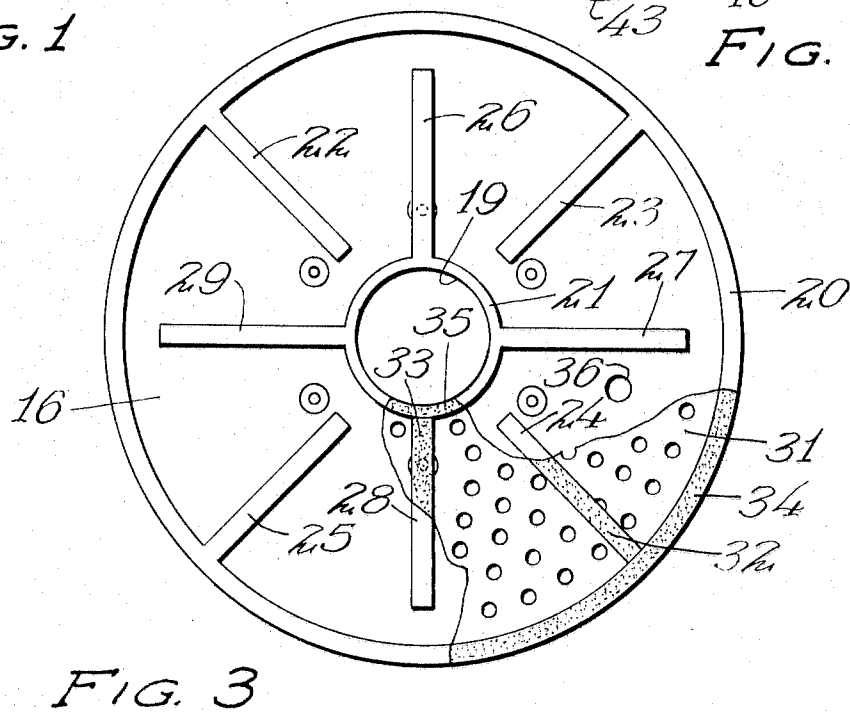
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ABSTRACT

An apparatus for lifting rolls of sheet material comprising a probe with expansible jaws for engaging the center of the roll of material in combination with a vacuum disc which prevents roll of material from telescoping.

6 Claims, 3 Drawing Figures





VACUUM CENTER LIFT

BACKGROUND OF THE INVENTION

In the prior art the handling of rolls of sheet material, especially various grades of light paper and plastic material, has resulted in an incidence of damage to the rather fragile sheets of material on the rolls. To avoid this the rolls have been handled and moved by an expandable probe which is inserted into the center core of the roll. Such a probe is the subject of my issued U.S. Pat. No. 3,423,120 entitled "CENTER LIFE." This probe is provided with a set of expansible jaws so that it can be inserted into the center core of the roll of sheet material and engage the inner walls thereof. An occasional difficulty has been encountered in using this probe alone when the rolls are handled in a vertical position or when turning the rolls with the core of the axis being changed from a horizontal to a vertical position. For example, for various reasons, an occasional roll may be loosely rolled near the center or perhaps this may occur ten or twelve inches out from the center of the roll. When this situation is encountered and the center probe is used in an attempt to lift or turn the roll the sheet material, due to inadequate frictional contact, will have a tendency to slip allowing the roll to telescope and thereby damaging a considerable amount of material. My invention provides an apparatus to eliminate this telescoping as will be described.

SUMMARY OF THE INVENTION

Briefly, my invention employs a center probe lifting mechanism with a vacuum disc mounted on the center probe and connected to a vacuum source. This vacuum disc operates in conjunction with the center probe to hold all the sheets of material on the roll tightly against the vacuum disc so that the telescoping problem never gets started. It may therefore be seen that it is an object of my invention to provide an improved system for handling rolls of sheet material. Further objects and advantages will become apparent upon consideration of the following description and drawings.

The function of the vacuum disc is to withdraw air trapped between individual layers of material on a roll. This is particularly necessary when handling rolls of plastic which have a tendency to trap air within the roll when it is being formed. The vacuum drum acts to create frictional contact between the layers of a roll. Rolled sheet materials, other than plastic, occasionally have loosely rolled areas which cause problems when lifting and turning the rolls. The use of vacuum is obviously helpful in drawing the loose layers of a roll into contact where the friction of one surface with another assists in avoiding damage due to telescoping of the roll. This method of picking up rolls has been found to be so effective that on certain occasions where one roll is stacked on top of another with the center axes of the rolls aligned not one but two rolls may be lifted by my apparatus, even though the probe extends only into the uppermost roll.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view showing vacuum center lift in readiness to use.

FIG. 2 is a side elevational view, partly in section, showing the probe inserted into a roll of sheet material.

FIG. 3 is a bottom plan view of the suction head with a portion of the suction head broken away to show the vacuum disc 16.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1 a center lift probe 10 with expansible jaws 11 is shown. Probe 10 is carried by a support member 12 and a roll of sheet material 14 adapted to lift by being inserted into the center core of roll 14. After insertion of probe 10, expansible jaws 11 are extended to engage the inside walls of the core of roll 14. The detailed construction and operation of the center probe may be understood by reference to the above mentioned patent thereon.

As discussed earlier, a roll of sheet material carried in a vertical position by probe 10 may tend to telescope, that is, the sheets in a loosely rolled area may slide downward off the roll in a telescoping action. To prevent this, my invention incorporates a vacuum disc indicated in general by the letter A and including a back plate 16 mounted to a flange 17 on the probe 10. The vacuum disc A is composed of a back plate 16 with a hole 19 in the center through which the probe 10 extends. The probe flange 17 is bolted with bolts 18 or otherwise secured in face contact with the back plate 16. The back plate 16 is cast with a peripheral flange 20 around its outer marginal edge and a concentric annular flange 21 surrounding the center opening 19. The two flanges 20 and 21 terminate on a common plane. In FIG. 3 are shown eight radial spacing members which are also cast integral with the back plate 16. Four radially extending spacing members 22, 23, 24 and 25 are seen to be inwardly extending extensions of the outer flange 20 and they lie at an angular distance of ninety degree angles apart with respect to one another. It will be noted that these spacing members 22, 23, 24 and 25 stop short of connecting with the inner flange 21. The inner annular flange 21 also has four radially extending spacing members 26, 27, 28 and 29 which are cast integrally with it and these members extend out radially an angular distance of ninety degrees to one another stopping short of connecting with the outer flange 20. The purpose for this arrangement of the spacing members will be described later.

In FIG. 2 and fragmentally shown in FIG. 3 is a foraminous disc 31 which is slightly smaller in diameter than the vacuum disc head flange 20. This disc 31 underlies the flanges 20 and 21 with the spacing members 22 through 29 in face contact therewith. It may be seen that this foraminous disc 31 forms a dispersing diaphragm by being sealed in place with underlying rubber sealing members 32 and 33 which are placed under the disc and directly opposite the flanges 22 through 29 previously described. The outer peripheral sealing member 34 has four radial inwardly extending sealing members 32 underlying the spacing members 22 through 25. The inner peripheral sealing member 35 also has four radial outwardly extending spacing members 33, underlying the flanges 26 through 29 throughout the length of these flanges. The vacuum disc back plate 16 includes a vacuum port 36 which is connected by tubing 37 to a vacuum source 39. The vacuum source 39 may comprise any suitable vacuum pump or other mechanism well known to those skilled in the art and is conveniently mounted on the support member 12.

When the vacuum source is activated, suction is applied through the tubing 37 and the port 36 to the interior spaces of the vacuum disc A, including the spaces between the spacing members 22 to 29 inclusive and between the inner and outer flanges 20 and 21 of the back plate. The foraminous diaphragm 31 causes an equalizing of the suction force throughout the entire area to which it is applied and eliminates an imbalance of suction in the area of the port 36.

When the vacuum disc A is in contact with the end of the roll 14 a closed hollow space is formed between the vacuum disc A and the roll 14 due to the inner and outer sealing members 35 and 34. In order that the suction force is equally applied to the end of the roll 14 within the closed hollow space a distinctive pattern of flow is caused by the location of the radial spacing members 22 to 29 inclusive together with their attached inner and outer flanges 21 and 20. This arrangement eliminates an excessive suction force being exerted in the area of the source of suction namely the port 36. The pattern of suction from the port 36 is first diverted in a clockwise direction toward the inner flange 21 then toward the outer flange 20 and this is repeated consecutively around the suction plate 16. This suction force creates a vacuum pressure in this hollow space of approximately equal force to all areas of the end of the roll to hold the sheets of the roll 14 in face contact by increasing the surface frictional contact of one sheet to the next adjoining sheet thus preventing any tendency of the roll to telescope.

The present invention also permits wrapping of the roll 11 by the prior art technique of enclosing the roll with a light plastic bag. Normally, the air being drawn through the roll tends to assist this wrapping operation by drawing the bag about the roll. However, when the roll is loosely wound, and an excessive amount of air is being drawn through the roll, this residual suction interferes with the wrapping process by pulling the bag closed or against the roll of material. The suction is present over the entire face of the roll and makes the wrapping task very difficult, clumsy, and slow. FIG. 2 shows an embodiment of my invention which overcomes the residual suction problem.

FIG. 2 shows many of the components already discussed with the roll, probe, and suction disc shown in section. Probe 10 is provided with a passageway 43 which is connected to a source of pressurized air 44 by means of a tube 45. Source 44 may be any suitable pump or other apparatus well known to those skilled in the art for supplying a stream of air to passageway 43. Passageway 43 discharges the air at the tip of probe 10 and into the center core of roll 14 so that it may emerge at the lower end of the roll. The discharge of air com-

pensates for the residual suction which would otherwise be present at the bottom of roll 14. As a result, a plastic wrapping bag may be easily slipped over roll 14 while the roll is still held in the air by probe 10 and vacuum disc 16. Thus, it may be seen that my invention provides an improved roll center lift which retains all the sheets on the roll and also permits a wrapping bag to be slipped over the roll.

The vacuum center lift is normally used with rolled sheet material which is sufficiently flexible to frictionally engage between layers when vacuum is applied. However, the device has also been used with heavy rolls of sheet metal. If excessive air is drawn between the layers of material, very effective results have been accomplished by placing a somewhat flexible sheet of plastic, substantially air impervious paper or textile material beneath the roll. This procedure has proven successful in lifting heavy rolls of sheet metal and the like which are difficult to handle with conventional equipment.

I claim:

1. Apparatus for handling rolls of material comprising:

a lifting probe having movable jaw means therein for releasably engaging the inside of the center core of the roll for lifting the roll; and

a vacuum applying means mounted on and extending around said probe in fixed relation thereto and connected to a vacuum source so as to engage the end of the roll of material in conjunction with said probe engaging said center core whereby when the roll is lifted by the probe, the vacuum means will prevent relative movement of the material on the roll.

2. The apparatus of claim 1 in which said vacuum means comprises a generally flat member mounted generally perpendicular around said probe and having circumferential inner and outer rubber seals thereon, said vacuum source being connected to a hole in said generally flat member.

3. The apparatus of claim 2 in which said generally flat member comprises a disc having a plurality of radial spacers thereon.

4. The apparatus of claim 3 in which said disc is mounted to a flange on said probe.

5. The apparatus of claim 1 including a source of pressurized air connected to deliver air to the center core of said roll through said probe.

6. The apparatus of claim 4 including a source of pressurized air connected to deliver air to the center core of said roll through said probe.

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