May 27, 1941. R. J. LIMBERT 2,243,106

LAMP CHANGER

Filed April 2, 1940

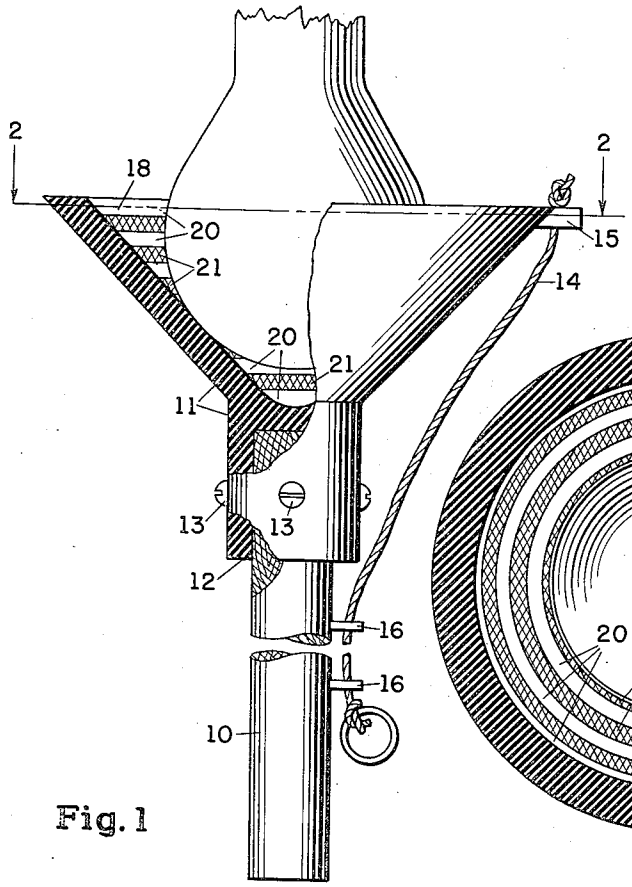


Fig. 1

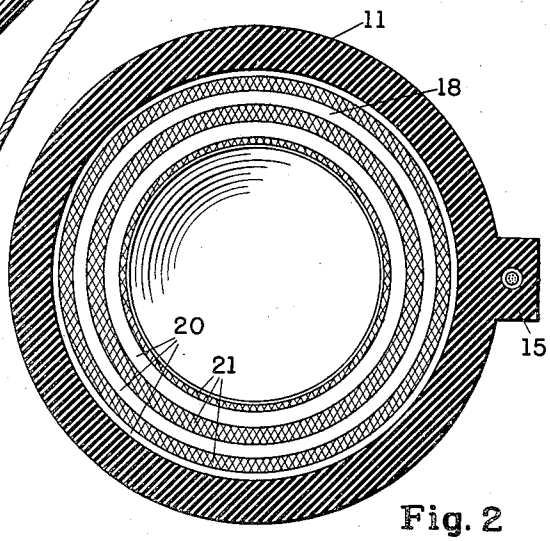


Fig. 2

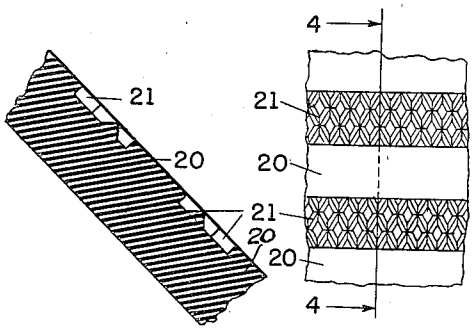


Fig. 4

Fig. 3

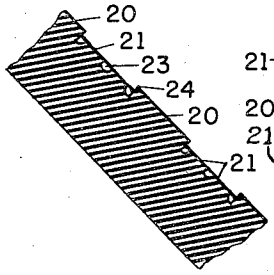


Fig. 6

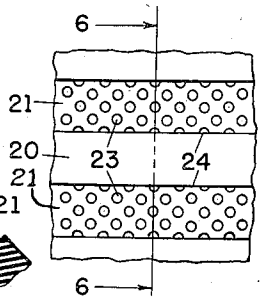


Fig. 5

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LAMP CHANGER

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10 Claims. (Cl. 294—20)

This invention relates to lamp changers and has to do more particularly with lamp changers of the vacuum cup type, and the invention has for its object the provision of an improved device of this character.

Suction cup lamp changers generally comprise a pole, at the upper end of which is a suction type gripping device for taking hold of the lamp bulb which is to be removed or replaced.

It is desirable in this type of apparatus that the suction cup gripping device not only be able to grip and hold a lamp bulb securely, but at the same time the suction cup must be able to produce considerable torsional force on the lamp bulb when the bulb is being removed from a socket. This is particularly true when the lamp changer is used to remove lamp bulbs from sockets which have been exposed to moisture or outdoor weather conditions. In this, and other similar cases, it sometimes requires much turning effort to get the lamp out of the socket. Also when a suction cup and a lamp bulb are first placed together for the purpose of attaching the lamp bulb to the suction cup, it is desirable that the suction cup be of such construction that it will not allow the lamp bulb to slip around in the cup before the process of rarefying the air between the cup and the bulb has progressed sufficiently to hold the bulb. Suction cup lamp changers heretofore manufactured have left much to be desired with reference to their torsional turning ability and their anti-slipping characteristics.

My invention contemplates the provision of an improved suction cup lamp changer.

A further object of my invention is to provide a suction cup for a lamp changer which will allow for a large amount of turning effort being expended on a lamp bulb being held by it.

It is a still further object of my invention to provide a suction cup for use with lamp changers which will not allow a bulb to slip on the suction cup when the bulb is being forced into the suction cup for purpose of rarefication of air between lamp bulb and the cup.

Another object of my invention is to provide an anti-slip suction type gripping device.

In accordance with this invention in one form thereof a suitable suction cup is attached to one end of a pole and is arranged to have a gripping surface consisting of alternately placed smooth surfaces and roughened surfaces.

For a more complete understanding of this invention reference should be had to the accompanying drawing in which:

Figure 1 is an elevation of a suction cup lamp changer embodying my invention, parts being broken away to illustrate certain details of the construction;

Figure 2 is a sectional view of the suction cup shown in Figure 1, taken through the line 2—2 of Figure 1 and looking in the direction of the arrows;

Figure 3 shows an enlarged view of a portion of the gripping surface of the suction cup shown in Figure 1;

Figure 4 shows a cross section taken through the line 4—4 of Figure 3;

Figure 5 shows an enlarged view of a portion of the gripping surface of a suction cup showing a modification of my invention; and

Figure 6 shows a cross section taken through line 6—6 of Figure 5.

Referring to the drawing, this invention has been shown in one form in Figures 1 to 4, inclusive, as applied to a suction cup lamp changer comprising a wooden pole 10 on the upper end of which is mounted a suction cup, shown generally at 11. The suction cup 11 is securely attached to the pole 10 by having a hole 12 into which pole 10 is securely fastened by means of screws 13. Cord 14 is attached to lip 15 and provides a means for releasing the grip of the suction cup 11 whenever this becomes desirable. It will be noted that the cord 14 extends to the bottom of the pole 10 and is held in place by screw eyes 16.

The upper portion of the suction cup 11, which may be made from any suitable flexible material such as high grade rubber, is shown as having a deep gripping cavity 18, which I have chosen to show as being frustro-conical in form. The internal or gripping surface of this cavity 18 comprises alternately placed smooth portions 20 and roughened or recessed portions 21. It will be noted that the smooth surfaces 20, in the illustrated embodiment of my invention, take the form of a multiplicity of smooth concentric rings. The roughened or recessed portions 21, in the illustrated embodiment of my invention takes the form of a multiplicity of knurled rings. I have chosen for the purpose of illustration to show these smooth rings 20 and knurled rings 21 as being alternately placed and as being concentric one with the other.

It is preferable, as shown best in Figure 4, to arrange the smooth surfaces 20 and the rough surfaces 21 in such a manner, that the two types

of surfaces 20 and 21 which are adjacent to one another are not elevated with respect to one another. In fact, in the preferred embodiment of my invention, the knurled surface 21 and the smooth surface 20 will be so positioned that when the finger is run over the internal surface of the suction cup 11, there will be felt no ridge or division in elevation between where the smooth surface 20 ends and where the knurled surface 21 starts, and vice versa. There will, however, preferably be felt a difference between the smooth surface 20 and the recessed surface 21; that is, the smooth surface 20 will feel smooth, and the recessed surface 21 will feel rough.

In Figures 5 and 6 I have illustrated a modified form of my invention in which the roughened or recessed surface 21 is shown as comprising a multiplicity of small concave recesses 23. Also in this embodiment of my invention I have chosen to show a portion of the gripping surface of cavity 18 in which there is a difference in elevation between the smooth surface 20 and the roughened surface 21. In fact, in this embodiment of my invention there will be felt ridges 24 is the finger is passed over the surface of the gripping cavity 18. I have chosen, for purpose of illustration, to show the concave recesses 23 as being hemispherical in shape, although many other forms may successfully be used.

In the operation of this apparatus; if it is desirable to remove a lamp bulb from a socket in an elevated position, the suction cup 11 is elevated to the bulb by means of pole 10. Then the surface of the gripping cavity 18 is placed in contact with the convex portion of the lamp bulb and the pole 10 is pressed toward the bulb until the air which was trapped between the bulb and the bottom of the cavity 18 is partly expelled. This rarefies the air in the bottom of cavity 18, thus causing the suction cup 11 to hold firmly the bulb.

When the cavity 18 is first placed against the bulb it often happens that the axis of the bulb and the axis of the suction cup 11 and pole 10 are not in the same straight line. When the suction cup 11 is forced against the bulb in this "out-of-line" manner there is developed a component of force which tends to slide the suction cup 11 sideways on the surface of the lamp bulb. This component of force, of course, becomes larger with an increase in the "out-of-line" or the angle between the axis of the bulb and the axis of the suction cup 11 and pole 10. In the lamp changer embodying my invention, I have chosen to provide recessed or roughed portions 21 on the gripping surface of cavity 18 of my suction cup 11. These roughened surfaces 21 increase the frictional resistance between the bulb and the suction cup 11 and thus help considerably to overcome any tendency of the suction cup 11 to slide sideways on the lamp bulb. Also the roughened or recessed portions 21 act as auxiliary suction cups and grip the lamp bulb before the main suction cup 11 has a chance to get a good hold on the lamp bulb. Thus it can be seen that my lamp changer is superior to ones heretofore manufactured, in that it will not slip sideways on a lamp bulb when it is pressed against the lamp bulb.

It should be noted at this point that the multiplicity of smooth surfaces 20 shown in the form of rings are placed close enough together so that at least one of them will contact any size lamp bulb placed into cavity 18 and thus insure a good seal for the rarefied air trapped between the bottom of the bulb and the surface of the gripping cavity 18.

Now we will assume that the lamp bulb which is held in a socket has been gripped by my lamp changer and is about to be removed. Due to the flexibility of the rubber from which the suction cup 11 is made, the suction cup 11 will bend sufficiently so that not only smooth surface 20 but also at least one of the roughened surfaces 21 will come in contact with the surface of the bulb. When the pole 10 is turned in a manner so as to unscrew the lamp bulb from the socket the suction cup 11 also turns. The turning of the suction cup 11 turns the lamp bulb, and the turning or torsional effort delivered to the lamp bulb by my special suction cup 11 is greatly increased due to the roughness of the surface 21 which is in contact with the bulb. Two reasons are set forth to explain this. First, the coefficient of friction between the lamp bulb and the suction cup 11 is increased by the roughened portion 21 which contacts the bulb, and second, the small recesses in the recessed or roughened portions 21 act as auxiliary suctions cups and thus increase the adhesion between the bulb and my special suction cup. Tests with my suction cup as compared to other suction cups not having my combination of roughened surfaces 21 and smooth surfaces 20 have borne out the above.

The operation of the embodiment of my invention shown in Figures 5 and 6 is similar to that described for Figures 1 to 4, and is obvious from the above description. The roughened surfaces 21 by means of the concave recesses 23 increase the cup to bulb friction and also act as auxiliary suction cups. At the same time smooth surfaces 20 act to trap the rarefied air confined in the bottom of main gripping cavity 18. The ridges 24 do not materially interfere with the operation of surfaces 20 and 21 because the material of the suction cup 11 is very flexible. In fact, the ridges 24 help to keep the suction cup 11 from slipping sideways on the bulb.

From this it can be seen that my lamp changer is superior in anti-slipping characteristics and in torsional turning ability to suction cup lamp changers heretofore generally used.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. A lamp changer comprising a pole, a suction cup of flexible material attached to one end of said pole, and a gripping surface on said suction cup, said gripping surface comprising rough and smooth surfaces placed alternately.

2. A gripping surface for suction cup lamp changers comprising alternate smooth and rough surfaces, these surfaces being elevated with respect to one another.

3. A lamp changer comprising a pole, a suction cup of flexible material attached to one end of said pole, and a gripping surface on said suction cup, said gripping surface consisting of two different types of rings alternately placed.

4. A gripping surface for suction cup lamp changers comprising smooth portions, and roughened portions placed alternately.

5. A gripping surface for suction cup lamp changers comprising a multiplicity of smooth rings, and a multiplicity of recessed rings.

6. A gripping surface for suction cup lamp changers comprising a multiplicity of concentric smooth rings, and a multiplicity of concentric knurled rings.

7. A gripping surface for suction cup lamp changers comprising a multiplicity of smooth

rings, and a multiplicity of rough rings, said rings being alternately and concentrically placed.

8. A gripping surface for suction cup lamp changers comprising a multiplicity of smooth rings, and a multiplicity of recessed rings, the recesses in said recessed rings consisting of concave spherical depressions.

9. A gripping surface for suction type gripping apparatus comprising a combination of smooth contact surfaces, and roughed anti-slipping surfaces.

10. A lamp changer comprising a pole, a suction cup of flexible material attached to one end of said pole, and a gripping surface on said suction cup, said gripping surface consisting of a multiplicity of smooth rings placed alternately with a multiplicity of recessed rings.

ROLLIN J. LIMBERT.