June 29, 1943. E. C. HORTON 2,322,963

WINDSHIELD CLEANER MOTOR

Filed April 2, 1941

FIG. 1.

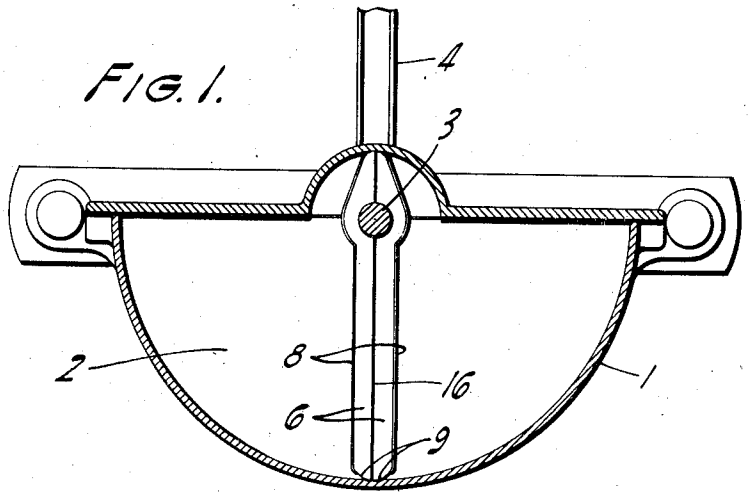
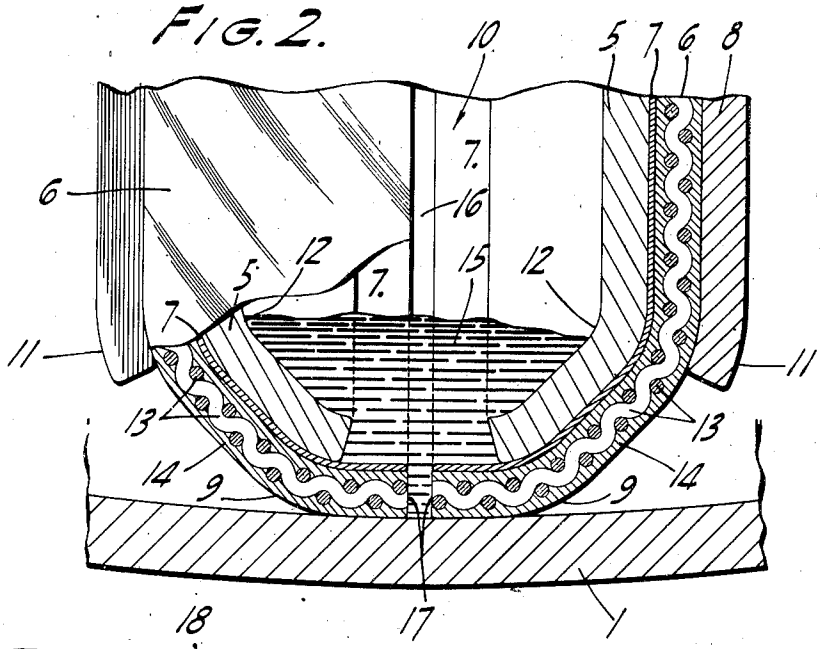


FIG. 2.



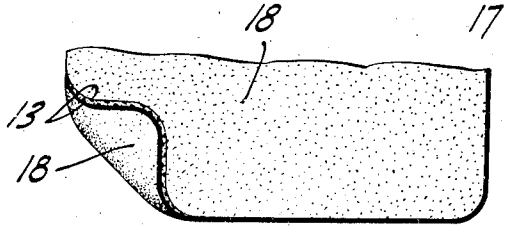


FIG. 3.

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WINDSHIELD CLEANER MOTOR

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4 Claims. (Cl. 309—22)

This invention relates to the windshield cleaner motor art and more particularly to the piston construction and packing of the suction or air operated type in widespread use today. This type of motor comprises generally a segmental shaped motor chamber with a vane or piston operating therein. Cup leather has frequently been used in the packing of the piston element of the motor, but owing to the fact that the leather must be skived exceedingly thin in order to have the leather flanges sufficiently flexible to readily yield to the low pressure difference obtainable by suction and due to surface irregularities and inherent defects frequently found in hide leather, it has been difficult to secure uniformity and commercial satisfaction in the cup leathers. Furthermore, the leather will absorb some of the lubricant, which is supplied originally to the piston and motor chamber, and become chemically affected thereby to impair its proper functioning. This fact, coupled with the non-uniformly skived packing, results in a poorly operating motor. Again, after long periods of idleness the cup leather frequently becomes set and when again placed in operation there is a tendency to score the chamber wall. This is apparent when it is considered that the chambers are usually formed of die cast metal which is soft and easily marked.

The present invention has for its object to provide an improved piston for the windshield cleaner motor which will secure greater efficiency for the motor. Further, the invention has for its object to provide a fabricated packing which will be especially adapted for the die cast metal in that it will slide readily thereover without undue friction.

In the drawing

Fig. 1 is a sectional view through a windshield cleaner motor showing the vane or piston in the motor chamber;

Fig. 2 is an enlarged fragmentary view partly in section showing the make-up of the piston; and

Fig. 3 is a detailed fragmentary view of a cup packing member in plan.

Referring more particularly to the drawing, numeral 1 designates a motor housing formed of die cast metal and having a semi-round chamber 2 with a shaft 3 journaled concentrically therein for actuating a windshield wiper carried by the arm 4 fixed to the outer end of the shaft 3. Being die cast from this molten metal the molded product has its chamber wall highly polished and smoothly finished. Fixed on the shaft within the chamber 2 is a piston of vane construction composed of two sections clampingly embracing the shaft therebetween. Each piston section comprises a body plate 5, a cup packing member 6, an expander plate 7 and a cap plate 8, all nestingly received or arranged in superimposed relation and secured together in a suitable manner with the marginal portions of the cup member constituting packing flanges 9 which ride on the smooth arcuate and side walls of the chamber 2, the side wall engagement extending radially of the chamber and from opposite sides of the shaft. The shaft bearing in the housing 1 is unpacked and therefore air leakage along the shaft through its journal bearings will enter the compartment 10 between the two piston sections and when suction is applied to the chamber 2 at one side or the other of the piston a pressure differential will result which will urge the packing flanges 9 into a leakproof contact with the walls of chamber 2. The expander plates 7 are of very light shim brass or other light resilient material designed to lightly urge the packing flanges into contact with the chamber walls so that the pressure differential when applied will automatically seal the piston against air leakage into the chamber 2 ahead of the piston. The cap plate 8 has its opposite ends conforming in shape to that of the body plate, being deflected at 11 opposite the bend 12 in the body plate to serve to shape the packing flanges, as shown in Fig. 2. This deflected margin 11 affords proper support for the end packing flanges where the travel is greatest.

The cup packing is resistant to lubricant and moisture and comprises a fabric base 13 having the warp and woof threads extending substantially at right angles to one another and bonded by a plastic body 14 of a cellulose nitrate plastic sufficiently soft to impart to the cup packing member a flexibility somewhat similar to that of the usual cup leather body. This plasticizer provides an exceedingly smooth outer surface, devoid of crevices or irregularities. The texture is rubbery but, being smooth and finished, will readily slide on the die cast metal wall of the chamber. The inner surface of the cup packing which is also proofed against moisture or lubricant may be finished in like manner to the outer surface, if desired. The packings are cut from sheet stock and this exposes the threads of the fabric base at the edges of the flanges.

When the motor is assembled at the factory a quantity of lubricant, generally indicated at 15, is inserted in the piston compartment 10 which

finds egress therefrom through the space 16 between the opposed edges of the opposing cups. As the motor is continued in use, especially in a warm climate, the lubricant will gradually find egress through the space 16 between the opposed cups and as it flows over the opposite edges 17 some of this lubricant will be absorbed or held by the exposed threads of the fabric base to be released after the lubricant supply has been exhausted. This will tend to prolong the life of the motor by continuing its lubrication over a greater period of time and will prevent an earlier undue waste of the lubricant. Likewise, some of the lubricant will be retained between the cup packing and the expander plate 7 until the main supply has run dry. This is possible because the plastic body 14 will not absorb the lubricant like the leather packing member. Consequently the surfaces of the plastic cup member will have uniform contact with the smooth die cast chamber wall as lubricated by the grease.

The plastic cup member may have incorporated therein a quantity of graphite 18, indicated by the stippling in Fig. 3, the graphite being incorporated in the plastic body at the time it is applied to the fabric base 13. The graphite will manifest its presence on the surface of the cup packing member in a more or less dull finish, depending upon the amount of graphite employed. With the graphite incorporated the coefficient of friction is reduced to a minimum and the plastic cup packing member will slide more readily over the die cast metal wall of the chamber so that a smaller quantity of the lubricant 15 will be required.

By the use of the fabricated cup packing uniformity in the cup member product is obtained and therefore uniform motor efficiency results. For example, it is possible to hold extremely close dimensional tolerances on the thickness of the fabricated packing within .002 of an inch, plus or minus. The material, being resistant to moisture as well as lubricant, keeps the packing member from swelling and then drying in a misshapen condition. The packing is little affected by extreme temperature changes and is possessed of a low coefficient of friction against the die cast metal. The result is the uniform production of efficient motors.

While the foregoing description has been given in detail it is understood that the cup packing may be otherwise fabricated, utilizing a different plasticizer and a graphite equivalent tending to lower the coefficient of friction for the exceedingly flexible packing flanges 9 which are primarily held in packing fit with the chamber wall by the low actuating fluid pressure, and therefore it is not the intention to thereby limit the scope except as defined in the appended claims.

What is claimed is:

1. A piston for the suction operated motors of windshield cleaners, comprising companion sections embracing a motor shaft therebetween, each section embodying a cup packing member with its marginal packing flanges arranged in proximity to the flanges of the companion section, said cup members defining a compartment in the piston for the reception of a quantity of lubricant, the lubricant adapted to pass out onto the chamber walls across the opposed edges of the marginal packing flanges, said cup packing members being of a material resistant to the lubricant, whereby the escape of the lubricant from the compartment is confined solely to the space separating the edges.

2. A piston for the suction operated motors of windshield cleaners, comprising companion sections embracing a motor shaft therebetween, each section embodying a soft flexible cup packing member with its marginal packing flanges arranged in proximity to the flanges of the companion section, said cup members having its side faces impervious to lubricant and moisture and defining a compartment in the piston for the reception of a quantity of lubricant, the lubricant adapted to pass out onto the chamber walls across the opposed edges of the marginal packing flanges, said cup packing members being sufficiently soft to impart to the marginal packing flanges a degree of flexibility for fluid seal contact with the wall of the motor chamber, the cup packing members having exposed lubricant-absorbing portions in the opposed marginal edges, whereby a quantity of the lubricant passing out over said exposed portions will be retained to prolong the period of lubrication of the packing flanges in their contact with the wall of the motor chamber.

3. A piston for the suction operated motors of windshield cleaners, comprising companion sections embracing a motor shaft therebetween, each section embodying a soft flexible cup packing member with its marginal packing flanges arranged in proximity to the flanges of the companion section, said cup members having side faces impervious to lubricant and moisture and defining a compartment in the piston for the reception of a quantity of lubricant, the lubricant adapted to pass out onto the chamber walls across the opposed edges of the marginal packing flanges, said cup packing members being sufficiently soft to impart to the marginal packing flanges flexibility for fluid seal contact with the wall of the motor chamber, and metallic expander plates superimposed upon the packing flanges, said packing flanges being impervious to the lubricant whereby the lubricant which may collect intermediate the flanges and their expander plates will be retained thereby until free to pass out of the compartment, thereby to prolong the period of lubrication of the packing flanges in their contact with the wall of the motor chamber.

4. A piston for the suction operated motors of windshield cleaners, comprising companion sections embracing a motor shaft therebetween, each section embodying a soft flexible cup packing member with its marginal packing flanges arranged in proximity to the flanges of the companion section, said cup members defining a compartment in the piston for the reception of a quantity of lubricant, the lubricant adapted to pass out onto the chamber walls across the opposed edges of the marginal packing flanges, said cup packing members being sufficiently soft to impart flexibility to the marginal packing flanges and an active surface impervious to lubricant and moisture.

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