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POROSITY TESTER

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Fig. 1.

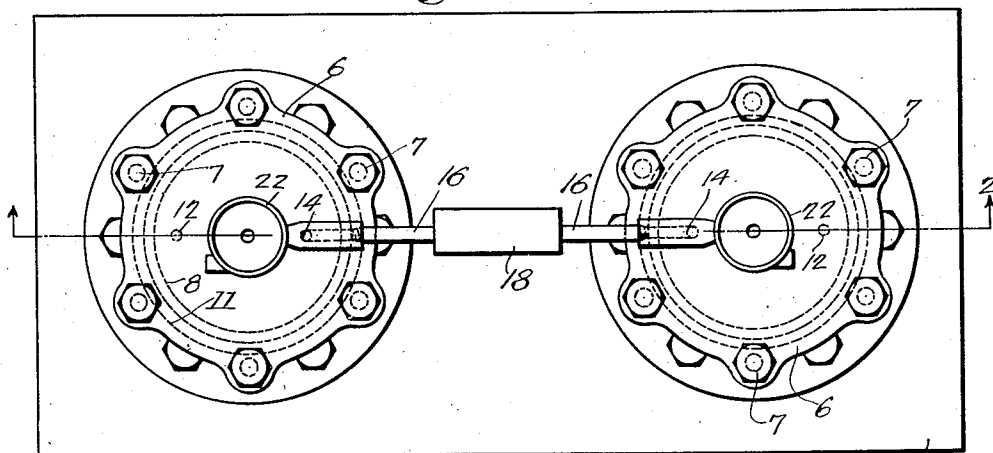
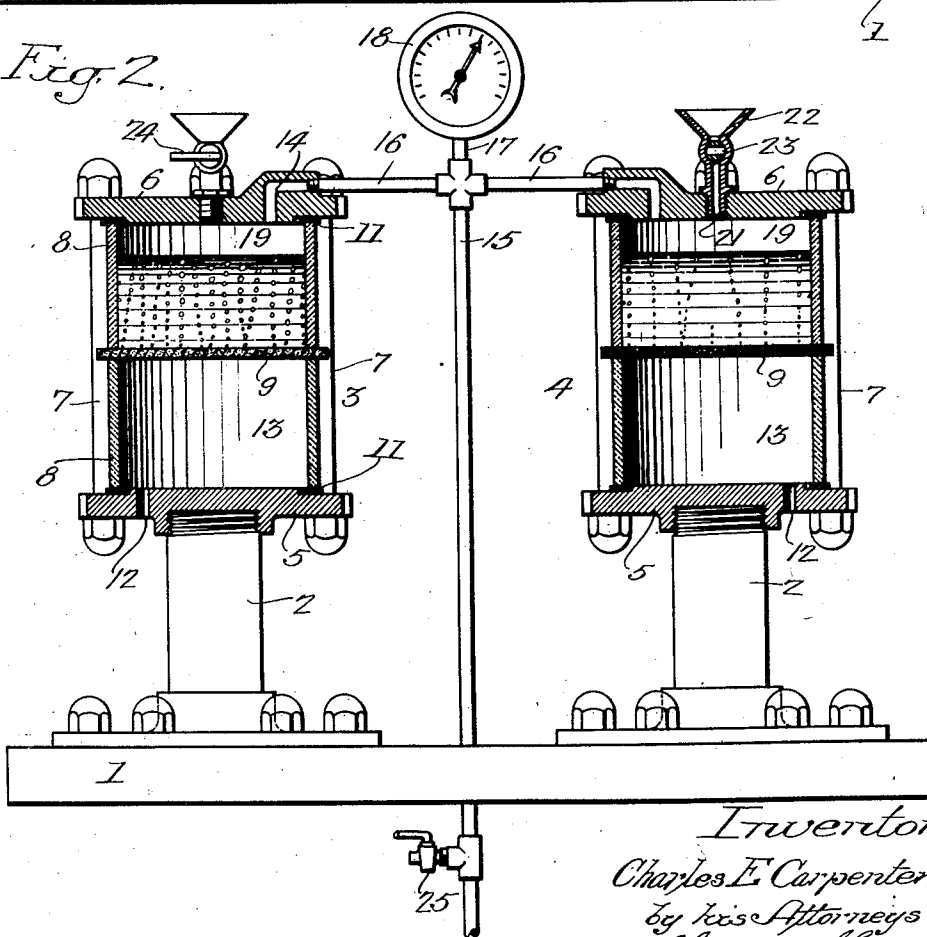


Fig. 2.



UNITED STATES PATENT OFFICE

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POROSITY TESTER

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The principal object of this invention is to provide novel apparatus for demonstrating relative porosities of objects by comparative test, the invention having a particularly valuable application in the determination of the relative porosities of different leathers.

The invention further provides a novel method for determining the porosity characteristics of various objects, and particularly of leather.

To the foregoing ends the invention contemplates the provision of apparatus whereby a visible demonstration of the porosities of one or more objects is afforded.

It has been determined that the efficiency of certain types of power belts is materially and adversely affected by air pockets forming between the belt and the surface of the pulley or pulleys on which the belt operates. Various devices such as perforated pulleys and belts of special design have been developed with a view to overcoming this air-pocketing action. It has been found, however, that belts of certain classes of leather have sufficient inherent porosity to overcome in themselves any tendency for air pocketing as described, and it is primarily to demonstrate the porosity of this type of leather that the apparatus forming the subject of the present invention was devised.

In the attached drawings:

Figure 1 is a plan view of apparatus made in accordance with my invention, and

Fig. 2 is a section on the line 2—2, Fig. 1.

With reference to the drawings, it will be noted that the apparatus may comprise a base member 1 to which are secured two (in the present instance) standards 2, 2, which support in each instance a cylinder structure, 3 and 4 respectively. These cylinders, which may be identical, consist in a preferred form of a base head 5, to which the standard 2 attaches, a top head 6 joined to the head 5 by means of bolts 7, and a pair of cylinder sections 8, 8 of transparent material, preferably glass, confined between the heads 5 and 6 and separated by a test specimen 9. As illustrated, the specimen is clamped between the cylinder sections, which in turn are

clamped and confined between the heads 5 and 6. The joints between the cylinder sections and the respective heads may be sealed by means of suitable washers 11. The interior of each of the cylinders 3 and 4 is thus divided into an upper and a lower chamber, of which the test specimen 9 forms the separating partition, and the upper of the sections 8 of each cylinder with the associated top head 6 forms in effect a hood or bell across the bottom of which the test specimen is secured.

The head 5 in each instance is provided with one or more ports 12 which establish communication between the lower chamber 13 of the cylinders and the atmosphere. The upper head 6 of each cylinder is provided with a port 14 which are connected through a suitable pipe 15 and branch ducts 16, 16 with suitable evacuating apparatus such for example as a vacuum air pump (not shown). The pipe 15 is also connected through an extension 17 with a suitable pressure gauge 18 capable of indicating the vacuum drawn by the pump. The arrangement, as will be apparent, provides for evacuation of the upper chambers 19 under identical conditions. The heads 6 of the cylinders are also in each instance provided with a port 21 in which is secured a funnel element 22 including a valve 23, this valved funnel providing means for introducing a liquid to the chambers 19 of the cylinders, and thereafter closing the intake port for the evacuating operation, as hereinafter set forth. The valve 23 may be manually operated through the medium of a lever 24.

It will be noted further that an air intake cock 25 is provided in the pipe 15 for a purpose hereinafter set forth.

In operation, test specimens of the materials involved in the comparative test are respectively secured, as described, in the cylinders 3 and 4. A suitable liquid is then introduced into the upper chambers 19 of the cylinders through the funnels 22, and the valves 23 are thereafter closed. If desired, the liquid used, which may be water, may be colored or tinted. It is important that the amount of liquid introduced into the cham-

bers 19 shall be insufficient to completely fill the chambers, so that an air space is left above the surface of the liquid. The vacuum apparatus attached to the pipe 15 is now set in operation to evacuate the chambers 19 of their air or gas content, and the valve 25 may be adjusted to maintain the gage pressure at a predetermined desirable maximum. As a result of the evacuation of the chambers 19, there will be a tendency for air to be drawn from the nether chambers 18 of the cylinders 3 and 4 through the test specimens, and such air as passes through the specimens will rise as bubbles through the liquid in the upper chambers 19, and will be visible through the transparent walls of the cylinder. The vacuum conditions of the chambers 19 of the cylinders being identical, it will be apparent that the air bubbles passing through the liquid in the two cylinders will afford an accurate indication of the relative porosities of the test specimens and of the materials which they respectively represent. In the drawings, it will be noted that a larger number of bubbles are shown passing through the specimen in the cylinder 3, the specimen in that cylinder being thereby proven more porous or permeable to the passage of air than the specimen in the cylinder 4. It will be obvious that there may be considerable modification without departure from the essential features of the invention. The device is not limited for example to the use of the two cylinders, although at least two cylinders are desirable where a comparative test is to be conducted. There may be, however, more or less than two, and any number of cylinders may be employed with means for evacuating under identical conditions.

While the device is particularly adapted to demonstrate the porosity characteristics of certain types of leather belting, it is obviously not restricted to such use, and may find useful application for testing other materials.

I claim:

1. A porosity-testing device comprising a transparent upright open-ended cylinder, means for securing a test specimen across the lower end and for sealing the upper end of said cylinder, means whereby liquid may be introduced into the cylinder chamber thus formed, and means for evacuating the chamber of its air or gas content.

2. A porosity-testing device comprising a transparent-walled open-bottomed hood, means for securing a test specimen across the bottom of the hood, means whereby liquid may be introduced into the chamber thus formed, and means for evacuating the chamber of its air or gas content.

3. A porosity-testing device comprising an upright open-ended glass cylinder, means for securing a test specimen across the lower end

of the cylinder, a head closing the upper end of said cylinder, there being a port in said head, and means for connecting said port with evacuating apparatus to empty the cylinder chamber of its air or gas content.

4. A porosity-testing device comprising a pair of transparent-walled open-bottomed hoods, means for securing test specimens across the bottoms of said hoods to constitute respectively the bottom walls of the resulting enclosed chambers, means whereby liquid may be introduced into said chambers, and means for connecting the upper ends of said chambers with evacuating apparatus.

5. In a porosity-testing device, the combination with a transparent-walled open-bottomed hood, of means for securing a test specimen across the bottom of the hood so as to constitute the bottom wall of the resulting enclosed chamber, means for evacuating the chamber of its air or gas content, and a gage associated with said evacuating means for indicating the internal pressure of the chamber.

6. In a porosity-testing device, the combination with a transparent-walled open-bottomed hood, of means for securing a test specimen across the bottom of the hood to constitute the bottom wall of the resulting enclosed chamber, means for connecting the upper portion of said chamber with evacuating apparatus, and means independent of said evacuating apparatus for controlling the pressure within the chamber.

7. In a porosity-testing device, the combination with a plurality of transparent-walled open-bottomed hoods, of means for securing test specimens across the bottoms of the hoods so as to constitute respectively the bottom walls of the resulting enclosed chambers, means whereby liquid may be introduced into said chambers, a common duct communicating with the tops of all the chambers and constituting means for connecting the chambers with evacuating apparatus, a gage connected to the duct and constituting means for indicating the internal pressure within the chambers, said duct having a valve-controlled port communicating with the atmosphere and constituting means for controlling the internal pressures of said chambers.

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