its edges being ground by about ½ mm and thus form conical rims. This reduces markedly chipping of the windows which may occur under pressure. The window, plugs J, D and E are made of Bofors steel ROP 21 (1 % C, 5.5 % Cr, 1.1 % Mo and 0.2 % V) hardened to about 56 Rockwell C. The O-rings are made of nitrile rubber of hardness 70 IHR.

OPTICAL CELLS

The liquid to be investigated is enclosed in a cylindrical Pyrex or quartz cell having an optically flat bottom and two, oppositely placed, optically flat windows. Depending on requirements the windows are 15 mm or 2 mm apart and, if necessary, a quartz spacer may reduce the optical path to about 0.1 mm. A specially designed holder keeps the cell rigidly in the required position.

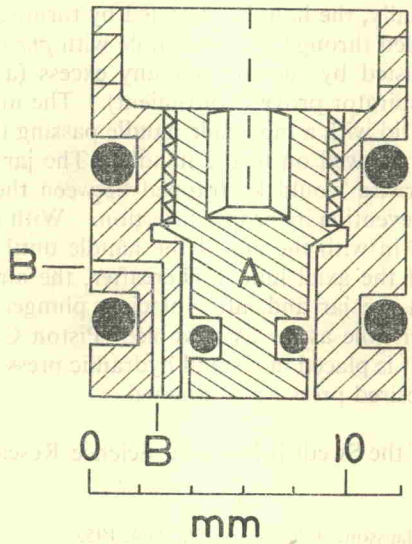

FIG. 2. An O-ring plug for the optical cell

The optical cell, after being filled with the solution, is closed by an O-ring sealed steel plug composed of two parts, as shown in fig. 2, to facilitate opening of the cell. Each part is fitted with O-rings, both their material and hardness being chosen according to the nature of the investigated solution. On placing the outer parts together, some liquid from the cell is first squeezed through a tiny channel, as shown in the figure, into the space between the outer O-rings. At the same time its level rises in the inner hole. Thereafter, the inner part is screwed in and, as soon as its O-ring seals the liquid, further screwing in presses the whole plug slightly up. Thus the solution is tightly sealed in the cell and air bubbles are absent.

The tiny channel is of great importance. In its absence, glycerol may suddenly leak through the outer O-ring and accumulate at high pressure between the O-rings. when the critical pressure is reached. The liquid then bursts the cell during decompression. The channel equalizes the pressure inside the cell and in the space between the O-rings and thus prevents its destruction. Hence, only one O-ring (the outer) is used for sealing, the other serves to provide mechanical guidance. If necessary, two such pistons can be placed, one above the other, for protection of the solution which may be destroyed by its contact with glycerol wetting the cell wall.

ASSEMBLING OF THE HIGH-PRESSURE VESSEL

The following procedure is adopted in assembling the high-pressure vessel. Each side window, enclosed in its holder with plug J screwed in, is inserted into the horizontal well through the appropriate hole (F_2 or F_3). With the aid of a special key the windows are manually positioned so that the O-rings of plugs J enter the narrower part of the well. Thereafter, the holes F_2 and F_3 are plugged by fully turning in screws K.

The optical cell, after being filled with the solution and sealed by its plug, is inserted into its holder. The bottom window in its enclosure H, with the third plug J attached to it, is pressed against the cell holder thus pushing the cell into its proper position. The whole unit, mounted on a special cylindrical vice, is passed through hole F_1 into the narrow part of the axial well and by manual adjustment the correct position of the cell is ascertained. Finally, the hole F_1 is sealed by turning in screw L.

The vessel is now filled through its upper hole with *purum* grade glycerol and the level of the liquid adjusted by sucking out any excess (a specially mounted tube connected to a water aspirator proved convenient). The unit is placed in a vacuum jar which is closed by a lid with a moveable handle passing through its centre, plug E having been previously screwed on to the handle. The jar is evacuated in order to remove air which otherwise would be trapped between the glycerol and the tight-fitting piston thereby preventing its proper insertion. With the air removed, the plug E can easily be pressed in with the aid of the handle until its O-rings are squeezed into the narrow part of the axial hole. Thereafter, the air is allowed to enter, the vessel is removed from the jar and, after placing plunger D in the well, screw B is turned into the upper hole as far as possible. Piston C is now inserted into the bore of screw B, the unit is placed in a small hydraulic press (30 tons) and the content compressed until the desired pressure is attained.

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