window which has been driven through it. figs. 4c and 4d show the principle of the unsupported area, as far as a window (fig. 4c) and a connector (fig. 4d) are concerned. It must be noted that a window can be simply stuck and slightly flattened against the plug. The optical windows have been the subject of a scientific article, written by DEFFET [1943]. With a view to taking observations in the visible spectrum, we recommend the "plexiglas" instead of the glass. A window made of this plastic material is easily executed and easily withstands a pressure of 3 kb.

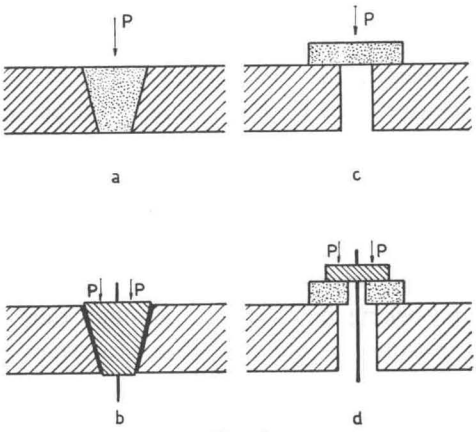

Fig. 4.

The gas compressing technique is so particular, that its brief description should be better given separately. The primary generator may be a shaft or a membrane compressor. The latter delivers a gas, which is kept thoroughly clean; the gas delivered by a shaft compressor and passing through an oil separating cylinder gets sufficiently rid of its oil, so that it can be used for carrying out the usual tests. The gas pressure may be then increased either by means of an oil-mercury-gas separator acting as a mercury pump or by means of an oil-gas separator with mobile piston, acting as a slow moving compressor.

We mention as a reminder the thermal intensifier, which is used in special cases. It simply is a hollow cylinder which is first filled with a gas liquified at a low temperature and then heated until its temperature has reached a higher level.

The devices, which are used for measuring pressures will be enumerated in section 2.

2. The Manometric Devices

The Bourdon gauge with a curved tube is the simpliest and the most frequently used of all the manometers. This type of gauge, if it is of a good make, is reliable but it must be previously calibrated and checked from time to time. It is, however, difficult to get good Bourdon gauges of which the scale exceeds 5 kb. Among the gauges working on the principle of the mechanical deformation, one must still mention the gauge with straight tube and off center hole, which has practically no hysteresis and correctly works up to 10 kb.

The principle of the mechanical deformation or similar principles have been much applied in the course of these last years. The elasticity of a cylindrical or hemispherical wall, submitted to a pressure on one of its faces is made advantage of. The strain of the other face is detected by a sensitive device, generally an electric resistance strain gauge. This sort of pressure gauge is called a "pressure transducer" with a scale remote-reading device. Unfortunately, it requires an expensive amplification. By the way, let us mention that the transducers utilizing the piezo-electric property of the quartz and working by crushing, although they can follow quick variations of the pressure, are not suitable for carrying out static measurements, because the quartz never keeps its electric charge a long time.

The electric resistance gauge with manganine wire, largely used by BRIDGMAN [1949] has been carefully studied by MICHELS and LENSSEN [1934]. The manganine is an alloy, the average composition of which is : copper 80%, manganese 5%, nickel 10% and iron 5%. A manganine wire, coiled and suitably stabilized, has an electric resistance which is pratically a linear function of the hydrostatic pressure, it is submitted to. The specific variation being small, the temperature effects must be eliminated by compensation and a very accurate measuring bridge has to be made use of. Such a manometric coil is suitable for remote-reading very high pressures. Other alloys were tried with less or more success. An alloy, which has been studied by DARLING and NEWHALL [1953] and contains 98% gold and 2% chromium seems to be promising.

The sole manometer of which the systematic errors may be sufficiently well corrected is the mercury column. It is the best standard manometer and actually still the sole manometer of this kind, although great efforts have been made, with a view to making the pressure balance, a standard rival manometer. A mercury column can hardly exceed a height of 25 meters, because the frame-work, supporting it, becomes more and more complicated and because the temperature can no more be said to be uniform along a