When the jar is discharged this state of strain is suddenly relieved, and the pent up energy appears in the discharge.

When a glass fibre is twisted and then released it is found that it does not immediately return to its original state, but having nearly regained its original condition in the first rebound it afterwards returns only very slowly, so that a very long time elapses before the glass is in exactly the same condition as it was before the strain. Other (imperfectly elastic) substances exhibit similar phenomena in a more or less marked degree. The same behaviour appears in the discharge of the Leyden jar. The glass does not at once return to its original condition, and restore in the first discharge the whole of the energy employed in charging the jar. But if, after the first discharge, the jar be left for a time, it will be found possible to obtain a second discharge (much smaller than the first) from it, and after another interval a third discharge, and so on, the discharges becoming successively feebler. This phenomenon is known as the "*residual charge*" of the Leyden jar.

All dielectrics do not allow of the transmission of electric force with equal facility. Thus, if two balls be charged so that they repel one another with a force of one dyne when separated by one centimetre in air, and if the balls be then placed in paraffin oil, the force between them will be considerably less than one dyne when they are at the same distance apart, and to obtain a repulsion of one dyne at a distance of one centimetre in paraffin oil the charges must be considerably increased. Hence, if we were to determine the unit of electricity by finding the amount which would repel an equal amount at a distance of one centimetre with a force of one dyne, and were to repeat our experiments in different media, each different dielectric would furnish a different unit, that obtained in air (or vacuum) being the least.

Since the forces between charges of electricity depend on the medium through which they act, it follows that the quantity of electricity required to raise a conductor to unit potential will depend on the nature of the dielectric which separates it from other conductors in the neighbourhood.

DEF. The ratio of the capacity of a condenser having any given substance for its dielectric to that of an otherwise precisely equal condenser having air for its dielectric is called the specific inductive capacity of the substance.

The letters S. I. C. are sometimes employed as an abbreviation for specific inductive capacity.

The measurement of the specific inductive capacity of a dielectric is a very difficult operation on account of the complications introduced by the phenomenon of "risual charge." The difficulty is greatest in substances which, like glass, are of very complex chemical constitution. To reduce as far as possible the errors arising from this cause attempts have been made to measure the capacities of condensers when they are charged and discharged successively many thousands of times in a second.

A NEW ILLUMINANT.—Lieutenant Dick, of the Russian army, is said to have discovered a new illuminating substance which is capable of imparting luminous properties to objects to which it is applied. It is in the form of a powder, and of three colours—green, yellow, and violet, the latter being the most powerful. Water in a glass vessel is by this means converted into an illuminating fluid. In a lecture recently delivered by the inventor at the Nicolai Engineering Academy, at St. Petersburg, he explained the application of the substance to military and industrial mining operations. The illuminating power lasts for eight hours, and the powder must then be renewed. The German Government is said to have been lately making experiments with Lieutenant Dick's invention.

PANCLASTITE.—(*Sc. Am.*)

The new explosives known as panclastite, which have attracted so much attention from engineers and chemists, from a group which has no connection with any other known explosives. They are possessd of peculiar properties and power, and merit a description. The combustive element of this new section of explosive bodies, which is the discovery of Mr. Eugene Turpin, is peroxide of nitrogen. The combustible body may be formed of different substances, such as sulphide of carbon, petroleum touene and xylene, benzoles, and vegetable and animal oils. Each of these substances gives a different explosive endowed with special properties. Another group is formed of a mixture of peroxide of nitrogen with nitrobenzine. This latter groupe gives products great stability. In fact, the combustible being already nitrated to saturation by nitric acid, the peroxide of nitrogen has no action upon it, and intervenes, merely as a combustive, by its simple admixture, to render it explosive. These compounds are specially adapted for military purposes.

In principle, panclastite for industrial purposes consists of two liquids, one soluble in the other, which are inert taken separately, but which it is only necessary to mix together to at once obtain, without any other operation, an explosive that is more powerful and more instantaneous than nitroglycerine.

Certain mixtures thus obtained resist shocks better in the liquid state than any other known explosives, even ordinary mining powder. Ordinary power explodes under the shock of an iron weight of six kilogrammes falling from a height of half a meter. Gun cotton and other products of the same section explode under the fall of the same weight from a height of a quarter of a meter. Seventy-five per cent dynamite explodes under the same weight falling 0.15 meter, and dynamite gum explodes under a fall of from 0.20 to 0.25 meter Pur nitroglycerine explodes under a fall of 9.10 to 0.15 meter. Panclastite in a liquid state does not explode under the shock of the same weight falling *four meters*. All these experiments were made under exactly the same conditions by means of apparatus constructed by Mr. Turpin, and one of which is shown in Fig. 1.

Certain compounds of panclastite are non-inflammable, while others are more or less inflammable, but never detonate throught fire alone, in an open vessel. All the inflammable compounds burn quietly in the open air. It requires a preliminary explosion to bring about one of panclastite, such, for instance, as that of a primer charged with fulmite of mercury. Certain of the compounds burn so quickly and with so brilliant a flame that Mr. Turpin has been led to devise a portable apparatus for optical telegraphy at night, in which the material is used as an illuminating agent. Panclastite, considered as an explosive, enjoys the peculiar and valuable property that its sensitiveness and power may be varied at will. All the experiments with it have been made with the mixture that is least sensitive in a liquid state.

But its sensitiveness may be made such that a hermetically closed vessel filled with the mixture will explode under its own weight in falling from a height of from one to two meters upon hard ground. One the contrary, the sensitiveness may be made so slight as to make it impossible to explode it under the influence of a primer charged with 3 grammes of fulminate of mercury. Finally, as with nitroglycerine, panclastite may be united with an active porous substance, such as powder, vandanite, etc. In such a case, it again loses its sensitiveness to shock.

When dynamite and panclastite are caused to explode in the open air upon leaden cylinders, it is found that the effects produced by panclastite are infinitely superior to those obtained with a larger quantity dynamite.

Fig. 2 shows the arrangement befoe the explosion. A is the leaden cylinder, B is a bottle plaeed upon it and containing the explosive, and C is the priming and fuse. Here the bottle represented as containing 10 grammes of panclastite.