HEATING BODIES TO A HIGH TEMPERATURE IN A COMPRESSED GAS.

How difficult it is in a laboratory to heat a body to a high temperature in a compressed gas is well known. An apparatus that I constructed several years ago permits of raising bodies to a temperature bordering on that of the melting point of platinum while in a gaseous atmosphere whose nature and pressure may be varied at will.

This apparatus (Fig. 2) consists of a block of steel, A,

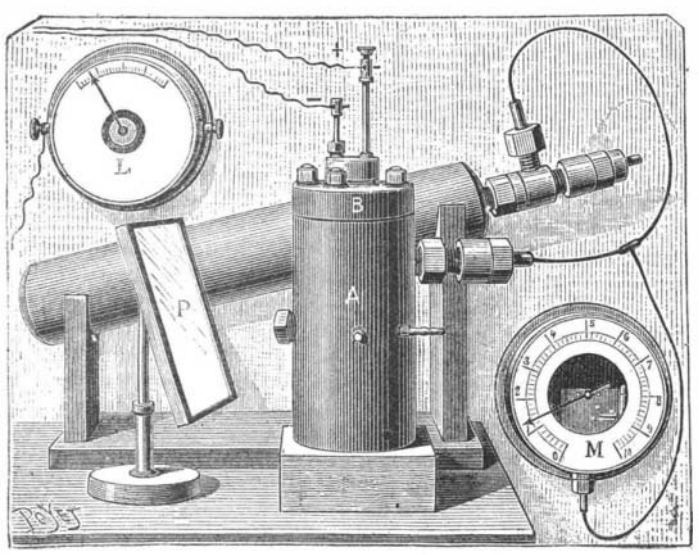

Fig. 1.—MR. CAILLETET'S APPARATUS.

A, steel block with cylindrical opening, and its cap, B (see detail, Fig. 2). P, mirror for showing the reaction. M, manometer. L, amperemeter.

in which there is a cylindrical aperture of a capacity of about eight fluid ounces, forming a sort of test tube which may be closed by a metallic cap, B, provided with a screw. Two copper rods are fixed to this movable piece, one of which, C, is insulated, while the other, D, is connected directly with the metal. To the extremity of these two rods are fixed, according to the needs of the experiment, either a piece of platinum hollowed out in the form of a crucible, or a platinum wire helix, a sort of muffle that receives the body to be experimented upon, and that is raised to the desired temperature through the passage of an electric current. Two or three accumulators suffice for these experiments. A fragment of gold placed in the spiral melts therein in a few instants. When it is desired to keep up the temperature for a long time, the exhausted accumulators are replaced by others under charge, through the simple movement of a commutator. In this way, advantage may be taken of the high temperature developed by the electric arc. In this case, we arrange two carbon rods, one of which is movable and fixed to the extremity of a screw, D, and is maneuvered from the exterior, so as to put it in communication with the other rod, E, which is insulated and has the form of a crucible.

The block of steel contains an orifice, F, which is connected by a metallic capillary tube with the reservoir that contains the compressed gas.

By using an inclined mirror, P, the phases of the experiment can be watched through the thick glass window, G.

Finally, by means of a screw cock, H, the gases contained in the apparatus may be collected, in case it is desired to analyze them.

The gas to be used in the experiments is compressed in advance in a receiver, by means of a mercurial piston pump. It is easy, too, to employ the carbonic and sulphurous acids furnished by commerce. A metallic pressure gauge fixed to the apparatus demonstrates that the pressure of the gases strongly depresses the temperature of the bodies that are heated by the electric current. Thus, the current that ordinarily melts platinum produces nothing more than a dark red heat when the pressure is sufficiently high. I have been able to attenuate the cause of the cooling by placing the body under experiment in a small glass test tube, which opposes the movement of the gases, and which is not represented in the figure. With this apparatus, I have repeated Hall's classical experiment on carbonate of lime. A fragment of chalk heated in the platinum helix sensibly diminishes in bulk, and is converted into a hard yellow-brown body, which slowly dissolves in acids and gives off carbonic acid gas. As was long ago demonstrated by our confrere, Mr. Debray, Iceland spar can be raised to a high temperature in carbonic acid without alteration and without a loss of transparency. I have found, too, that clear calc spar converted into lime on the surface by the action of heat at the ordinary pressure, takes back the lost carbonic acid, but does not resume its former transparency. I have not been able to fuse spar in the conditions of my experiments.

Upon the whole, the apparatus that I have the honor to make known, and which I have used for several years, in experiments upon the electric light under pressure—researches that I have undertaken with Mr. Violle in his laboratory at the Normal School—will, I hope, render numerous services to chemists as well as to mineralogists.—*L. Cailletet.*

Chloride of Nitrogen.

A striking new experiment, exhibiting the terribly explosive nature of chloride of nitrogen, is described, says *Nature*, by Prof. Victor Meyer in the current number of the *Berichte*. A few drops of the yellow chloride were prepared in the usual manner by inverting an exceptionally thin flask filled with chlorine gas in a leaden dish containing a solution of ammonium chloride. Instead, however, of gently agitating the apparatus so as to cause the drops to fall into a smaller leaden capsule placed beneath the mouth of the flask, they were allowed to float freely upon the surface. The whole apparatus was then inclosed in a cover box fitted with stout plate glass sides, through the top of which was passed a bent pipette, turning up below just under the mouth of the flask and connected outside with a dropping funnel containing chloride of ammonium solution and a few drops

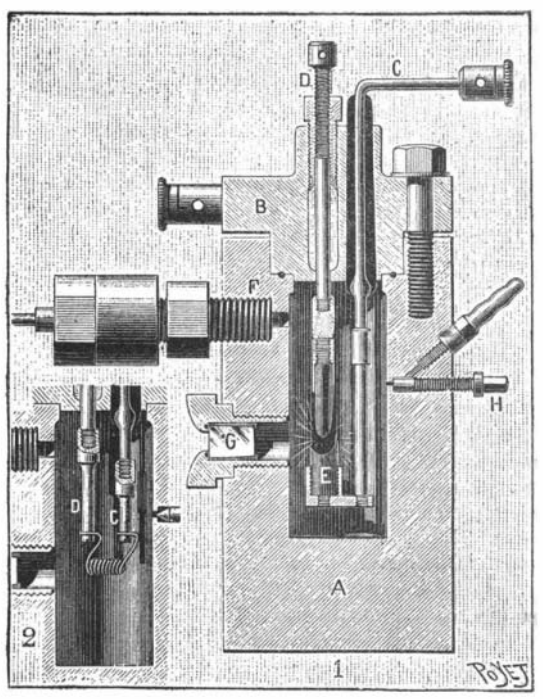

Fig. 2.—SECTION OF THE APPARATUS. EXPLANATORY FIGURE.

1. Arrangement for obtaining electric arc; the insulated carbon is cut in form of a crucible. 2. Arrangement with spiral platinum wire.

of turpentine. When sufficient chloride of nitrogen had collected, the tap of the funnel was carefully turned, so as to allow a little turpentine to slowly rise in the flask. After a moment or two it reached the surface and mingled with the chloride of nitrogen, causing a brilliant flash of light and a loud explosion, which Prof. Meyer likens to a thunder clap, so much more powerful is the detonation in a confined space. The flask, of course, was shattered, not into powder, but into tolerably large fragments. The plate glass box, however, even after many repetitions of the experiment, remained intact, a small door on the side away from the observers having been left ajar so as to prevent any notable increase of pressure. Curiously, the chloride of nitrogen never entirely exploded. A part remained in the distorted leaden dish and maintained an incessant fusillade for more than a minute.

A CHEAP ARTISTIC HOUSE.*

* The dwelling house illustrated above is unique in design, cheap to construct, and from the floor plans and description which appeared in the ARCHITECT AND BUILDERS EDITION OF THE SCIENTIFIC AMERICAN of May, 1887, it is throughout a very convenient and well arranged house, fitted with all the best modern appliances. Copies of the SCIENTIFIC AMERICAN, ARCHITECTS AND BUILDERS EDITION, containing the plan views and further description of the house, may be had for 25 cents, at the office of this paper.

SYRINGING of the ears is sometimes provocative of coma, probably, as Dr. Middlemass Hunt explains it, owing to a nervous reflex starting either from the terminations of the auditory nerve in the semicircular canals and labyrinth or from the tympanic plexus.