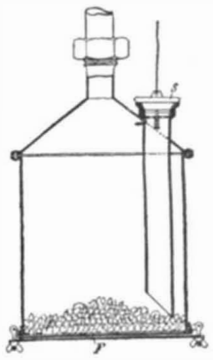
THE USE OF ACETYLENE IN RAISING SUNKEN VESSELS.

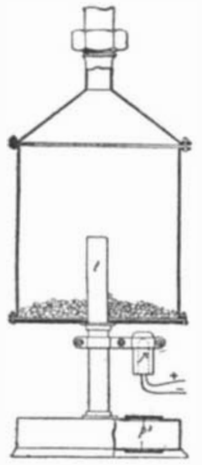
The simplest method of raising sunken vessels consists in using the buoyant force of the air contained in casks hermetically sealed, When, however, the work of floating a ship is unusually arduous and difficult, special apparatus must be employed. Metallic reservoirs then take the place of the casks, which reservoirs are filled with water, submerged, and afterward pumped out and filled with air.

Would it not be a far simpler plan, asks a writer in La Revue Générale de Chimie Pure et Appliquée, to obviate the necessity of employing heavy and bulky liquids to sink the reservoirs, complicated pumping machinery and auxiliary apparatus, and a labyrinth of pipes which increases in intricacy with the depth to which the reservoirs are submerged, by generating the necessary buoyant gas below water?



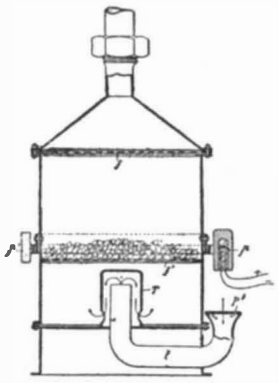
Acetylene Generator with Simple Valve.

Fig. 2.



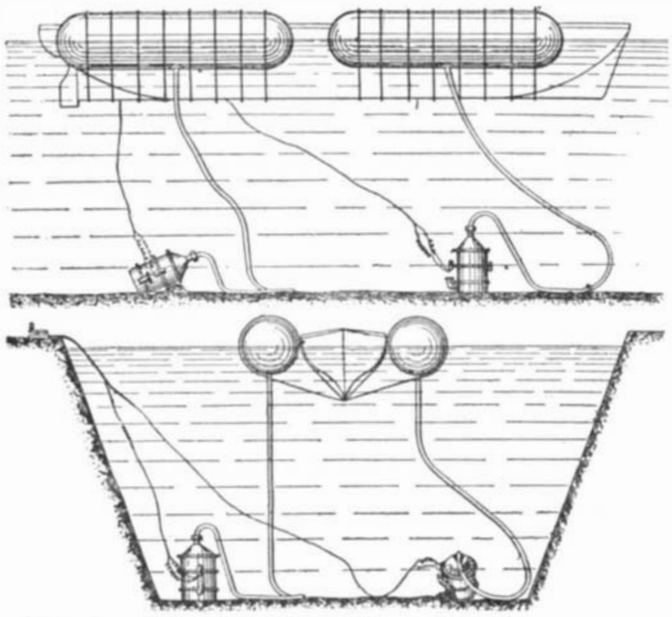
Generator with Electric Starting Device.

Fig 3.



Modified Form of Generator with Electric Starting Device.

Fig. 4.



Figs. 5 and 6.—FLOATING A VESSEL WITH ACETYLENE-GAS BAGS.

When the possibility of manufacturing calcium carbide on a larger scale was assured, experiments in this direction were made by a French engineer, L. Matignon, these have been so successful that a company has been formed for the purpose of using acetylene in raising sunken vessels.

For the casks and reservoirs previously mentioned, stout rubber bags are substituted, which, when not in use, take up but little room. Before submersion they are covered with a netting, from which a bar or beam is suspended. To the bar chains are lashed which run under the bottom of the ship. The bags are connected by means of pipes with acetylene generators.

The generator, illustrated in Fig. 2, was the first form used, but was soon supplanted by a more improved apparatus. This original generator consisted of a sheet-iron tank, *F*, in which the carbide was contained. Water was supplied by means of the valved pipe, *s*. The valve itself was controlled from the surface by means of a cord. The difficulty experienced in operating several generators simultaneously led to the adoption of the system pictured in Fig. 3.

In this apparatus the gas outlet serves also as a means for introducing carbide and for cleaning the interior. When the leaden diaphragm, p^5, has been perforated by the discharge of the electric detonator, *p*, water rushes through the pipe, *t*, and enters the tank.

The detonator consists of a bronze cylinder, recessed to form a cavity, closed at one end. A cartridge is contained in the cavity, composed of paraffined paper and fitted with the terminals of two electric conductors, connected by a fine platinum wire embedded in a small charge of powder. When a current of sufficient strength passes through the conductors, the platinum is heated to incandescence and discharges the powder. Any other electric detonator can be used, but the cartridge described possesses the merit of simplicity. A battery of accumulators or of Leclanché cells is employed to explode a series of ten detonators.

The apparatus, illustrated in Fig. 4, is an improvement on the Matignon device, because it permits the removal of the hydrate of lime and prevents an excessive pressure of gas. An electric detonator, *p*, counterbalanced by a weight, *p'*, is also used. The lead plate, p^5, is pierced, as before, by the discharge to admit water to the carbide.

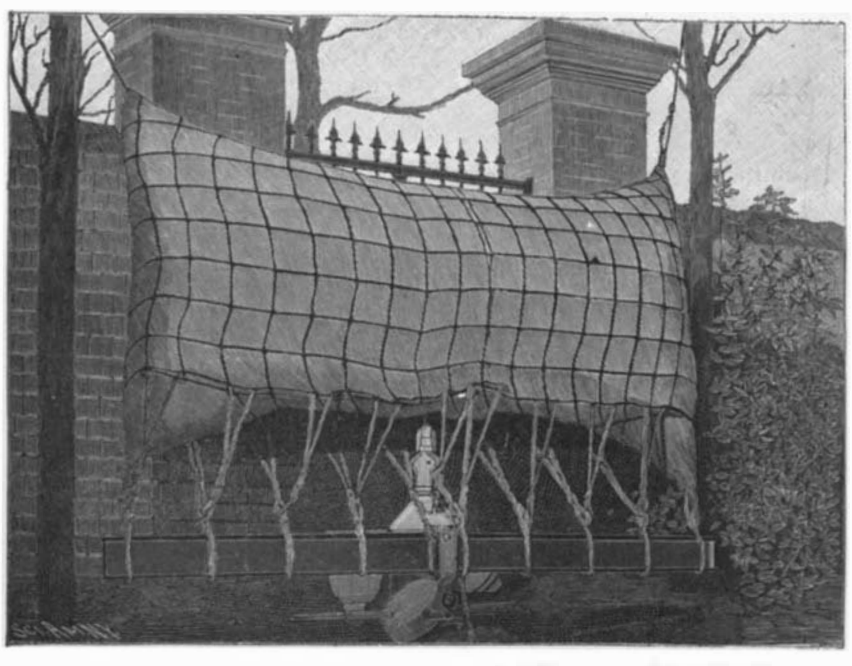


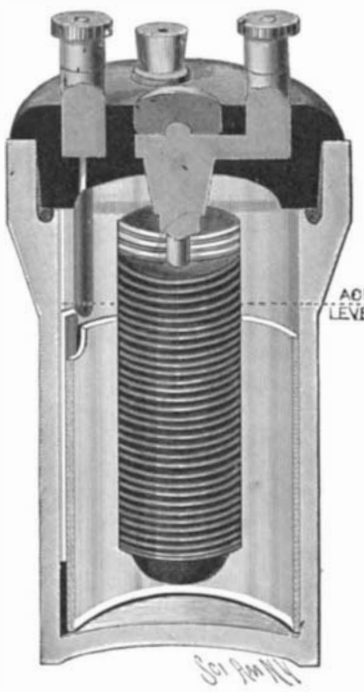
Fig. 1.—RUBBER GAS-BAG CONNECTED WITH ITS GENERATOR.

The Prevention of Dust in Mines.

The appalling results of explosions and the dangers of dust in mines and other places being recognized, and extended knowledge having been gained by recent experiments and observations, the highest importance may be attached to the prevention of accumulation and methods devised for decreasing the danger. It is admitted and proved beyond doubt, where explosions have taken place, that the explosive force and the flame is most destructive in the main galleries where the newly made dust is being continually carried. The results of the experiments show that we must treat mines where the element of dust is found with as much care as a powder magazine. Many attempts have been made to water or damp the dust lying on the roads, walls and chambers in coal mines. An arrangement has been perfected for lightly wetting the coal and dust on the top of each tub as it leaves the siding in the mines where the engine setts run at a high rate of speed against strong currents of air and the same arrangement can be applied to dust at the screens and coal stores, and to pulverized coal to be sent to coke ovens, where explosions and accidents have taken place from dusty coal. A newly devised method for obviating and diminishing the risk of loss from coal-dust explosions was described by R. Harle, in a paper read before the North of England Institute of Mining and Mechanical Engineers, and published in Transactions of the Institution of Mining Engineers. The arrangement consists of means for automatically damping each tub so as to prevent the escape of dust and to moisten it to the same extent as in damp mines. In such mines no trace of dust can be found and few explosions (if any), either from shot-firing or dust have taken place and this safety confirms the theory that damp is effectual in mitigating the effect of coal dust explosions. The apparatus is fixed at the outer end of the siding where the tubs are arranged to start on their journey to the shaft. It consists of a perforated pipe or sprayer and allows water to spray over the area of each tub as it passes under the apparatus. The valve of the sprayer may be actuated by wheels passing over a projection in the rails or by some other part of the tub. It has been found in practice that one pint of water sprayed over each tub is sufficient to moisten the dust and prevent it from rising so that a tank containing about 70 gallons is sufficient to moisten an output of about 150 tons per day.

A NEW STORAGE BATTERY.

A storage-battery has been introduced by the United States Battery Company, of 253 Broadway, Manhattan, New York city, which is remarkable for its high voltage, small weight, and compactness. The battery is of the zinc-lead type, the zinc being made in the form of an amalgamated plate coiled so as to fit snugly against the glass wall of the cell, and the lead element being composed of a great number of spongy, superposed peroxide plates suspended from the insulated and acid-resisting cover of the cell and connected with the positive terminal. The zinc plate is connected with the negative terminal by means of an amalgamated copper rod, offset so as to pass between the plate and the glass wall of the cell. The rod at and above the level of the electrolyte is protected from



A NEW STORAGE BATTERY.

corrosion by a rubber tube. The jar at the top is formed with a shoulder provided with an annular groove filled with adhesive wax, into which the cover is pressed. The cover is thereby perfectly sealed, and is yet readily removable. The construction prevents the creeping of salts over the edge of the cell, a defect common to many batteries in which zinc is used. Current leakage (common to unsealed accumulators) is likewise prevented. Hitherto an electro-motive force higher than two volts per cell has not been regularly reproduced. The cell in question, however, registers 2·65 volts on a full charge and discharges without fluctuation to 2 volts. The discharge can be carried still further without material injury. By connecting the terminals with a direct electric current, using incandescent lamps or other resistance, the cell can be recharged. The rate of charging, it is stated, is proportionately higher than with most accumulators, and the time required considerably shorter. In a 5 ampere-hour cell, the positive element weighs but 6 ounces. The positive and negative elements, together with the electrolyte weigh 17 ounces, giving an efficiency of 12 watt-hours per pound of battery. The makers claim that the cell is the only accumulator which is made so that it can be carried in stock by dealers in a fully charged condition without deterioration. The cell is shipped fully charged; and is placed in active service merely by pouring in the electrolyte.

The Temperature of the Ocean.

Sir John Murray, in his Presidential address before the Geographical Section of the British Association, brought out some interesting facts as to the temperature of the ocean at great depths. The data obtained up to the present time shows that at a depth of 180 meters the temperature of the water remains nearly or quite invariable at all seasons. It is estimated that 92 per cent of the mass of water is at a temperature below 4·4° C. Nearly all the deep water of the Indian Ocean is below 1·7° C., this temperature being about the same for a great part of the South Atlantic and certain parts of the Pacific, but in the North Atlantic and the greater part of the Pacific the temperature is higher. For depths beyond 3,600 meters the mean temperature of the North Atlantic is one degree greater than that of the Indian Ocean and a part of the South Atlantic. The mean temperature of the Pacific has an intermediate value. As the depths of the sea constitute an obscure region where the solar rays cannot penetrate, it follows that vegetable life must be absent upon 93 per cent of the bottom.