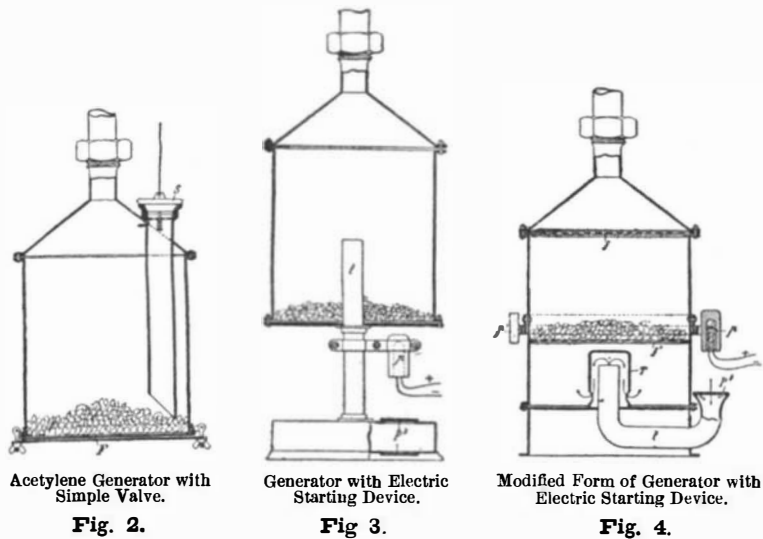


**THE USE OF ACETYLENE IN RAISING SUNKEN VESSELS.**

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



Acetylene Generator with Simple Valve.

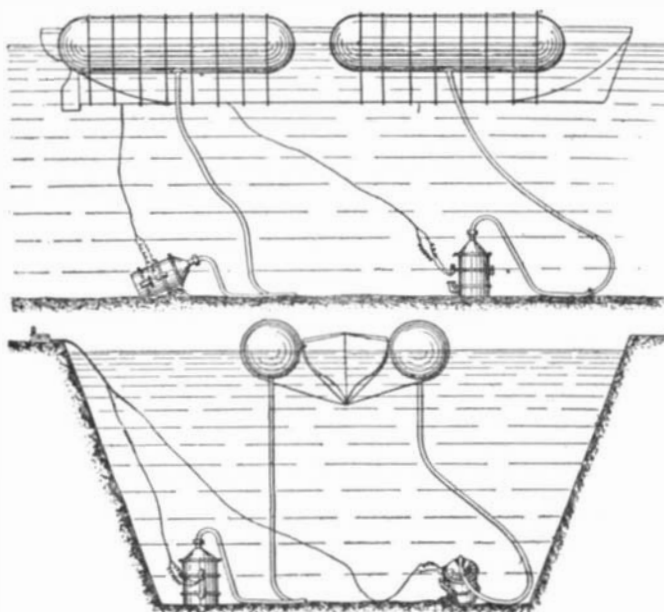
Fig. 2.

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.

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?

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

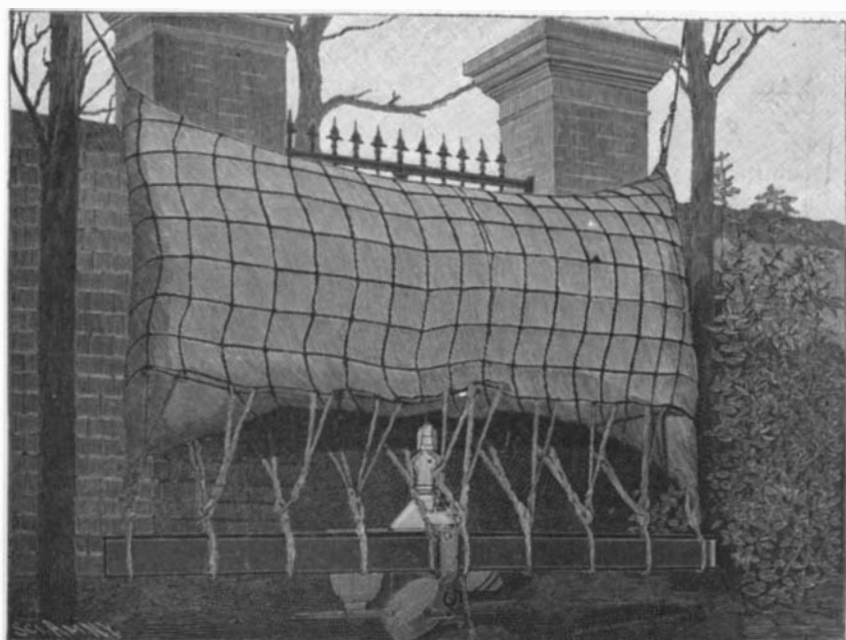


Fig. 1.—RUBBER GAS-BAG CONNECTED WITH ITS GENERATOR.

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*<sup>b</sup>, 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*<sup>r</sup>, is also used. The lead plate, *p*<sup>b</sup>, is pierced, as before, by the discharge to admit water to the carbide.

**The Prevention of Dust in Mines.**

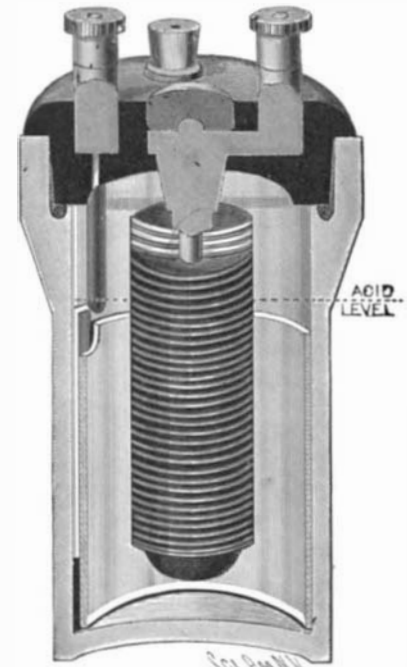
The appalling results of explosions and the dangers of dust in mines and other places being recognized, and extended knowledge having been gained by recent experiments and observations, the highest importance may be attached to the prevention of accumulation and methods devised for decreasing the danger. 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 sets 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.

## Science Notes.

A whale has been found with a harpoon in its body which, by its mark, showed that it must have been hurled at the whale at least thirty-six years ago.

Germany is keenly alive to the necessity of a knowledge of the languages of the countries in which they foresee advantages for trade. German commercial schools have asked the Russian Ministry of Finance to aid them in procuring teachers of the Russian language.

The Union Pacific Railway Company is providing its offices in large cities with a mutoscope for displaying some of the interesting points along the Overland route. Six sets of views have been provided, one of them being the Overland Limited going at a speed of a mile a minute.

Monte Baldo, between Lake Garda and the valley of the Adige, in Italy, was once the center of volcanic action, but in the early part of the present century this activity had apparently ceased. Last March, however, an indistinct rumbling was heard in the mountains which seem to come from the interior of the mountain. Deep fissures formed on the crest, whence hot steam is still ejected from time to time, which melts all the snow in the neighborhood. The indications are very similar to the preliminary symptoms which preceded the terrible eruption of Mount Tarawera in New Zealand, some thirteen years ago.

The new Memorial Hall, at the United States Military Academy, at West Point, on the Hudson River, is a gift of Brevet-Major-General George W. Cullum, and is a receptacle of statues, busts, mural tablets, and portraits of distinguished officers and graduates of the academy. The building was built from designs by McKim, Meade and White, and the cost was \$250,000. It stands facing the main parade, upon the high bluff overhanging the Hudson River. As a military memorial and museum, it is, as a building and as regards its purpose, without a rival in this country. It is to be made the repository of the most important memorabilia of our wars, as well as a monument to the commanders who have graduated from this school of war, and who have served with the highest distinction in the armies of the United States in every conflict from 1812 to the present day.

Senator Chandler has offered an amendment to the Naval Appropriation Bill providing for civilian control of the Naval Observatory. This is in accordance with the recommendation of many American men of science who consider that this important institution should not be under the control of naval authorities. It is proposed to have as a permanent astronomical force an astronomical director, first, second, third and fourth astronomers, each having an assistant, together with such computers and other employees as are now authorized. A director of The Nautical Almanac would also be appointed. It provides for a board of visitors without compensation, composed of six astronomers and three citizens, who shall annually investigate the institution, and upon whose recommendations vacancies in the staff shall be filled.

It is stated that German surgeons have discovered that the delicate membrane which lies inside of an egg-shell will answer as well as bits of skin from a human being to start healing over by granulation, in open wounds which would not otherwise heal. The discovery was used for the first time in this country on a patient in the Seney Hospital in Brooklyn, and the trial of it has been most successful. The surgeons have long known that healing by granulation requires in a weak patient some point or points around which the granulation can cluster and grow. For this purpose they have had to rely upon bits of human skin taken from some person who was willing to submit to the painful process of having these bits cut out. In the present instance the surgeons remembered the German discovery and, getting some fresh eggs, tried the lining membrane of the shell, with the result that it proved to be a perfect substitute.

Some interesting experiments have been carried on in the University of Genoa, with the view of observing the temperature of the animal body during fasting, and the rate of assimilation of carbohydrates. The experiment demonstrated the ability of sugar to raise the temperature of an animal when it has fallen during fasting. When sugar was administered it caused a rapid rise of temperature during the first ten or fifteen minutes, and in one or two hours the temperature will reach a maximum which will be sustained for a period of time depending upon the amount of sugar. This effect is said to be most marked after a long fast, when the temperature is the lowest. Bread has a somewhat opposite effect, as the sugar is more readily assimilated by a starving animal. After bread is given, the temperature will rise, but more slowly than with sugar, and the rise is most rapid with animals whose period of starvation is short and whose temperature is not too low. Prof. Masso states that with sugar he has succeeded in restoring the vitality of dogs which were in a serious condition of hypothermia, while the administration of albumen to others failed to save their lives.

## The Electrical Illumination at the Pan-American Exposition.

The electrical illumination at the Pan-American Exposition of 1901 will probably be the most notable achievement in this line in the annals of electrical engineering, in this country, to say the least. The Court of Fountains, which has an area of 850,000 square feet, will be brilliantly lighted without the aid of a single arc light. One hundred thousand incandescent lamps of 8 and 16 candle power will be used, resulting in an illumination highly diffused, and with no intense points of brilliancy—in fact, light without shadows will thus be obtained. The electrical tower which was illustrated in the last week's issue of the SUPPLEMENT will form the center of a beautiful vista. It is 300 feet high and is surrounded by harmonious colonnades. In front and facing the Court of Fountains is a niche 70 feet high and 30 feet wide. There will be an extensive water display in this niche, consisting of individual drops of water subjected to elaborate electrical effects. Each drop will, as it were, become a prism permeated with color. Surrounding the electrical tower is a basin 90,000 square feet in area. In front of the niche will be an illuminated cascade, the waters of which finally flow into the basin, where there will be numerous pieces of allegorical statuary rising from the water.

Designs are also being developed for electric fountains to embellish the interior courts of several buildings; also for the illumination of the Grand Canal over its course of several miles. Floating attractions will form a point of interest on the great lake called the "Gala" Water.

## A WINDOW MIRROR.

Our illustration represents a simple contrivance, invented by Mr. Oscar Hillstrom, Sedgwick and Lind Aves., New York city, by means of which it is possible



THE HILLSTROM WINDOW MIRROR.

to observe what is passing in the street without opening the window.

The device is a reflector made in the form of a pyramid, the four sides of which are lozenge-shaped mirrors. The reflector is supported at the side of a window by means of an arm, which can be fitted either in a socket formed on a web extending across the base of the reflector, or in registering openings formed in the web and in the apex of the pyramid.

If the arm be inserted in the socket of the web, the reflector is held so as to enable one to see objects or persons at each side of the window, as well as above and below the window. In Fig. 2 the reflector is shown placed in a vertical position, by passing the upper end of the supporting arm through the openings in the web and apex. When the device is thus arranged objects above the window can be seen. The reflector can be placed with its apex pointing down, merely by reversing it from the position shown in Fig. 2. When the contrivance is thus mounted, objects below the window are reflected into the room. If the device be arranged as first described, the opening in the apex is closed by a rubber stopper, which serves as a fender to prevent the breaking of the mirrors or of the window-pane.

The reflector, it is evident, can be used in armories and towers, the grided windows of which are so narrow that it is usually impossible to see objects at either side.

A HORSE race in Venice seems to be an absurdity for the only horses she possesses are the bronze ones in front of her great Basilica of St. Mark's. Venice is, however, to have a race meeting this year and a considerable sum has been raised. A race course is being laid out on the Campo di Marte, the old drill ground near the railroad station. It will be the first horse race Venice has ever seen.

## Engineering Notes.

The London and Northwestern Railroad Company has just completed its four thousandth locomotive at the works at Crewe, and it will be sent to Paris to the Exposition.

A writer in a Russian journal estimates that to reach the level of other European countries, Russia would have to construct 53,000 additional miles of railroads, not including Siberia, in order to have the length of its railways commensurate with the population.

Three Prussian officers have made a quick trip from Berlin to Prague in a balloon. They left at 2 o'clock in the afternoon and came down at 5 o'clock, having risen to an altitude of 10,000 feet during a part of the journey. The distance between the two cities is covered by an express train in seven hours.

The Ferris wheel which was one of the great attractions at the Chicago Exposition, and which was re-erected at Wrightwood Avenue and North Clark Street, Chicago, is to be removed. It is estimated that the cost of the removal will be \$30,000 and if a bid is not made in a short time the receiver of the company will be compelled to sell it as scrap iron and steel.

In view of the increased cost of traffic through the advanced prices in coal and iron, the railway companies of England have decided to raise the excursion fares during the ensuing holiday season. Fares up to five shillings will be advanced by three pence over that sum, and up to ten shillings by six pence, and on fares over that amount, by one shilling. The new scale will apply to both day and half-day trips, and also to tickets for longer periods issued at holiday rates.

The Scottish Paper Makers' Association offers a prize of \$500 for (A) the best study of the lye obtained in boiling Esparto grass and a quantitative analysis of this lye; (B) best practicable process of separating and preserving in some useful form the waste material obtained in the manufacture of Esparto products (Esparto lye, fiber containing drain water, lime residue); (C) commercially practicable method of utilizing the recovered material. Communications are to be addressed to G. Munro Thomson, W.S., 123 George Street, Edinburgh. The competition closes July 1, 1900.

Notwithstanding the fact that a truck carrying a new cable for the Metropolitan Street Railway Company, (N. Y.), had wheels with tires 8 inches wide, the truck got stuck on the car tracks at Fourteenth Street and Fifth Avenue recently. It was drawn by thirty horses and the cable weighed 52 tons. The horses were arranged in two strings of seven spans each, and two large Normans were attached to the wagon pole in the ordinary fashion. The truck finally succeeded in continuing its journey. Loosely laid paving stones were either jammed into the earth or pulverized and in many places the grooves were left in the street.

Flexible metallic hose is recommended in preference to india-rubber hose for mining purposes. The hose is formed of a metal band rolled up like a screw thread, the specially profiled edges of the band engaging in one another so as to form a continuous joint; and a cord of india-rubber or asbestos depending upon the use to which the hose is to be put, is entirely enclosed by the metal and fills up the space between the edges, making a continuous tight joint, while the metal pipe has considerable flexibility. Galvanized steel and phosphor-bronze are chiefly used, and pipes are made for any pressure up to 3,000 pounds. Careless handling is apt to cause leakage, but this is counteracted by making the hose double, the winding of the inside and outside portion being in contrary directions.

A novel scheme for impounding debris in the Yuba River, in California, has been worked out, mainly by Assistant Engineer Hubert Vischer, says The New York Evening Post. The problem of governing vast quantities of eroded detritus in torrential streams was practically new, the California papers claim, about the only former attempt in this line being at the headwaters of the Rhine, where denudation of soil made trouble for Swiss peasants like that sought to be remedied in California. In the Yuba the coarse material is to be held by long and comparatively low dams at different points, but the most novel feature is that to take the fine sediment out of the water. There is to be a settling-basin three miles long into which the river will all flow at ordinary stages. If the water poured out in a stream at the lower end, the currents would prevent much settling. So Mr. Vischer has devised a scheme to make the water percolate through eight pyramidal structures of logs, planks, cement and cracks. The water will flow through a great number of half-inch (or less) slits from all sides of the pyramids, which are to have seventy-foot bases and are to be strung across the basin. The flow can thus be regulated and currents avoided. This basin is calculated to hold 14,000,000 cubic yards of fine sediment, and can be enlarged to hold 50,000,000 cubic yards more. The estimated cost of the work is \$800,000, and \$500,000 of State and national money has been available since 1896, awaiting a practical solution of the problem.