

EXPERIMENT ILLUSTRATING DISCHARGE OF ELECTRICITY FROM CLOUDS.

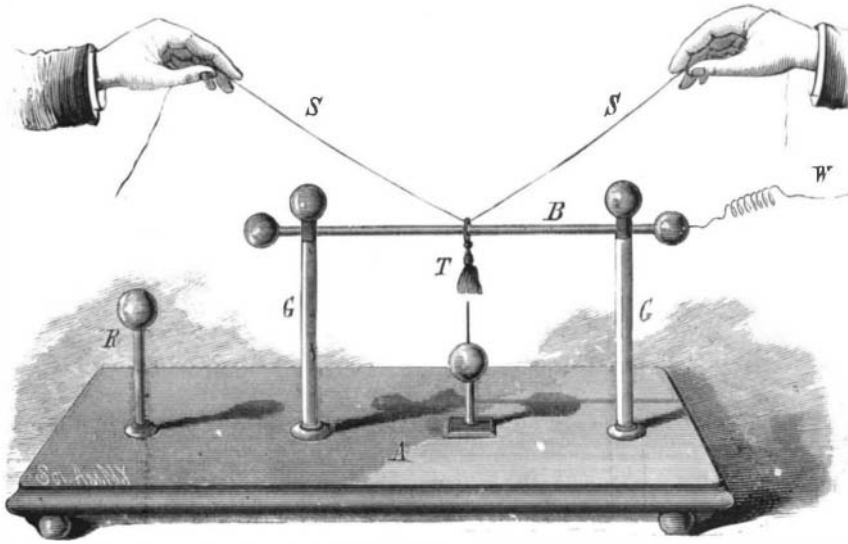
Mr. Loudon gives the following pretty experiment in the *Colliery Guardian*. It illustrates some of the phenomena of thunderstorms:

In the engraving, A is the base of the instrument, made of wood and brass. G G are glass legs supporting an arm of brass, B. The cloud is here represented by the moving tassel, T, pulled backwards and forwards by the strings of silk, S S. O is a ball provided with a point or lightning conductor. This ball is not insulated, that is, not supported by a glass leg. W is a wire leading to an electrical machine. On working the machine electricity is spread over the arm, B. The tassel consequently diverges, owing to each filament being charged with like electricity. On drawing the tassel (cloud) over the lightning conductor, O, an opposite kind is given off at the point and neutralizes the cloud and the leaves or fibers collapse. If we were to wholly detach the tassel and work the machine till we raised a large envelope of electricity around the arm, B, a vivid flash of light (lightning) would pass to uninsulated conductor, R. If the ball, O, was not provided with a point, on moving the electrified tassel along the arm, B, it would not collapse on passing the ball, except that a faint spark was given off. If this spark took place, you have what often happens in nature.

Persons ought never to stand near a tree nor a house, nor even a building provided with lightning conductors, for shelter. My reasons are these: Wood is a poor conductor, masonry worse, and if buildings provided with these conductors are not what they ought to be, they only invite destruction.

The rollers between which the work passes are actuated by reversible worm and cam motions, and the machine has, in addition to these roller feeds, what is known as a top feed motion, suitable for a lighter class of work.

The stitch, as in the ordinary sewing machine, can be adjusted from one eighth inch upward, and the pressure of the rollers on the work passing through the machine can be regulated at the will of the operator. The machine, which



ILLUSTRATING DISCHARGE OF ELECTRICITY FROM CLOUDS.

is driven by steam, has been made for a manufacturing firm in Liverpool.

More Oil Tanks Struck by Lightning.

On the 19th of August the Bradford oil regions, Pa., were visited by a severe thunderstorm which did much damage. Two oil tanks, each holding 25,000 gallons of oil, were struck at Dallas city, six miles from Bradford. Seven

Improved Iron Chains.

A public test of chains, made on the plan of Capt. Chas. A. Chamberlain, by the American Chain Company, of Philadelphia, lately resulted in a signal victory for the improved pattern. Mr. Charles Cramp, Mr. McCloud, Chief of the Testing Bureau of the Pennsylvania Railroad Company, Mr. Holman, Secretary of the Franklin Institute, Mr. Sargeant, of the Pennsylvania Railroad Company, Abram Barker, President of the Wharton Railroad Switch Company, and other prominent gentlemen were present.

The first test was with an ordinary chain, $\frac{5}{8}$ of an inch in diameter, manufactured of iron from the Trenton Iron and Steel Company's works. The chain stood a strain of nearly ten tons, when it snapped at the end. The American Company's chain of the same size and weight stood a strain of $16\frac{1}{2}$ tons before it was broken across the weld. Another test was made with the company's five-eighths chain to see the effect produced by the Admiralty proof test of seven tons strain. The result was that the chain showed but slight evidence of the great pressure. It was then run up to the breaking strain, which is 40 per cent greater, and still no further effect was produced. At another test the chain broke on the side with a strain of $15\frac{3}{4}$ tons. A five-eighths ordinary chain was again produced, and was snapped at the end with a strain of $9\frac{3}{4}$ tons. A one inch ordinary chain was then tested, and stood the severe strain of 29 tons before it showed any signs of separation. The chain of the American Company, however, stood a far greater test, a pressure of 42 tons— $16\frac{3}{4}$ tons more than the Admiralty—being used before a break occurred on the side. The concluding test was the weight of 15 fathoms of one inch ordinary and the same length of the American Company's chain. The former weighed 958 lb., and the new manufacture 990.

The secret of the strength of the new chain lies in the strengthening of the end of the link by taking an equal proportion of thickness from the two straight sides. This, it is claimed, so divides the strength of the link that one portion is no stronger than another, with this difference, that the link does not wear or break easily at the most important part—the end. On the other hand, the ordinary chain is constructed with equal thickness throughout, and it necessarily follows that as the two sides are more powerful than the end, the latter must give way first. The new chain has been tested by the United States Government for the last year in connection with signal buoys, and when taken up recently it was found, says the *Public Ledger*, in such good condition as to warrant the continuation of it in the same service for another year.

Tests for Purity of Water.

In copying our reply to a correspondent in a recent issue of the *SCIENTIFIC AMERICAN* for a simple test for indicating the purity of water, the *Plumber and Sanitary Engineer* adds: "Tannin precipitates albuminoids from drinking water, but it also affects other matters which may be present in wholesome waters. The smell and color of a water constitute the most satisfactory of the ready tests of quality. To detect organic matter by the odor, the water should be warmed to blood heat in a large bottle half filled and corked. It should then be shaken, and if organic matter is present it may be detected in the air with which the water has been thus washed. The color is best seen by looking down at a white reflector through a column of the water contained in a long glass cylinder. A column of pure water should be at hand for comparison. Organic impurity gives shades varying from yellow to brown."

The *London Lancet* also has an article on the "Microscopic Examination of Water," in which the writer claims that the microscope, as at present used, reveals only the coarser forms of animal life, and those only with uncertainty, and that the discovery of the microscopic organisms has hitherto been very much a matter of chance. Patience and skill are even of slight help. Fortunately, however, certain chemical reagents kill these organisms without changing their appearance; osmic

acid is of especial value for this purpose. In the examination of water M. Certes employs a one and a half per cent solution of osmic acid. One cubic centimeter of this solution will suffice for thirty or forty cubic centimeters of water, all animal and vegetable organisms being by it rapidly killed and fixed. In a few minutes, in

SUBMARINE OBSERVATORY AND ELECTRIC LIGHT.

The accompanying engraving, taken from the *Leipziger Illustrirte Zeitung*, illustrates Bazin's submarine observatory and electric light, which has been found to be of the greatest service in examining wrecks, submarine foundations, etc. It was used for the first time in examining the wreck of the Confederate steamer Alabama, which was sunk off the French coast at Cherbourg. The electric light is contained in a heavy cylinder, about $4\frac{1}{2}$ feet high and about 4 feet in diameter, and provided with a heavy plate glass bottom. The lower part of the cylinder contains alum water to counteract the pressure of the sea water, which increases very rapidly as the apparatus is lowered. The upper part of the cylinder contains a powerful electric lamp, the light rays of which pass through the alum water and the plate glass bottom, and lights up the bottom of the sea for a space about 100 feet in diameter.

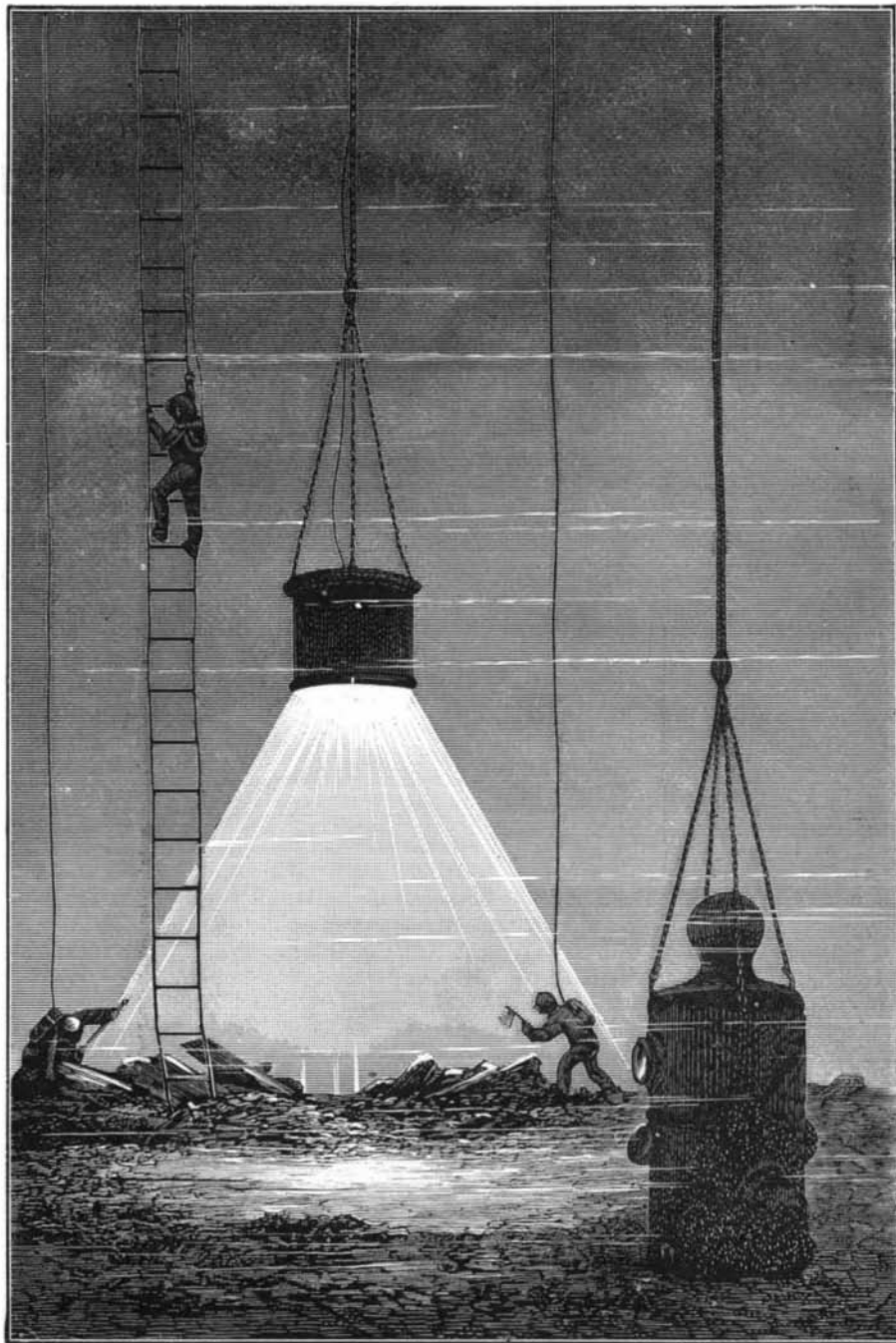
Bazin's observatory, shown in the right hand corner of the engraving, is about 9 feet high and 2 feet in diameter. It is provided with two bull's-eye windows through which the person in the observatory can watch the divers that are at work on the wreck. As the water is an excellent conductor of sound the superintendent can converse with the divers very conveniently.

A person can remain in this observatory for about three quarters of an hour, and if any parts should break or leak he can enter the upper helmet and remain in the same from eight to ten minutes, thus allowing ample time to raise the entire apparatus to the surface.

The Largest Sewing Machine.

The largest sewing machine in the world has lately been finished. It is of the Singer type. The machine weighs over four tons, and is in some respects of new design, uniting much simplicity of construction with great strength of parts. It is adapted for general manufacturing purposes of the heavier sort, although specially made for stitching cotton belting, an article which is just now taking the market as a cheap and serviceable institution for gearing and the ordinary leather belting. The material used is of great strength and toughness, and is sewed together in plies or layers, up to an inch in thickness. The belting in being sewed together is passed through heavy feed rollers some nine inches in diameter and over eight feet in length, getting stretched and pressed in the process. There are two needles at work with two shuttles, and the shuttles can be removed from the bottom without disturbing the overlying plies belting.

smaller tanks, located respectively at Parker City, Edinburgh, Steplersburg, Bullion, and Jefferson City, were also struck and burned. The loss in oil and tanks was about \$100,000. Mr. Morian, telegraph operator, received a severe shock, caused by lightning running into his office on the wires.



SUBMARINE OBSERVATORY AND ELECTRIC LIGHT.