large number are placed in a glass of milk they convert the glass into a white light the intensity of which lasts several moments.

Another interesting example of a brilliant light I observed in a very small animal, in the San Gabriel Valley. In walking just after nightfall, I noticed, by the path, an intense white light, which was found to be a minute myriapod about a tenth of an inch in length; so small that I had difficulty in picking it up, though the light gleamed brightly. When it was finally secured it was seen that the light was upon the head, while another, half as bright, was seen upon the tail. The head light was extremely beautiful, reminding one of a blazing match, and was continuous.

A number of myriapods are phosphorescent. Geophilus electricus of Europe is a light giver, and often makes a magnificent display, when suddenly uncovered; M. Audoin describing the soil as sprinkled with gold where he disturbed them. One of the most remarkable displays from these insects was observed by Mr. B. E. Brodhurst, who says that the light was so brilliant that he first observed it twenty paces away. It resembled an electric light in its brilliancy, and was produced by two centipedes, and the luminous train they left behind. "The light illumined the entire body of the animal, and seemed to increase its diameter three times. It flashed along both sides of the creature in sections, there being about six from head to tail between which the light played. The light behaved precisely like the electric light, moving, as it were, perpetually in two streams, one each side, and yet lighting up the whole body. The trail extended from one and one-half feet from each centipede over the grass and gravel walk and it had the appearance of illuminating mucous."

It is possible to read by the light of the humble earthworm. One of the most brilliant displays of animal phosphorescence I have observed came from such a source. Its discovery was accidental. In passing through an orange grove one rainy night in Southern California, I kicked aside a large clump of earth, when to all intents and purposes a mass of white molten metal went flying in every direction, affording an unusual display. The cause of the light was a single, possibly two, earthworms, not over two inches in length. The luminous matter was exuding from them and had permeated the surrounding soil, rendering it phosphorescent. The light-emitting mucous came off upon my hands, and the light lasted several seconds, gradually fading away.

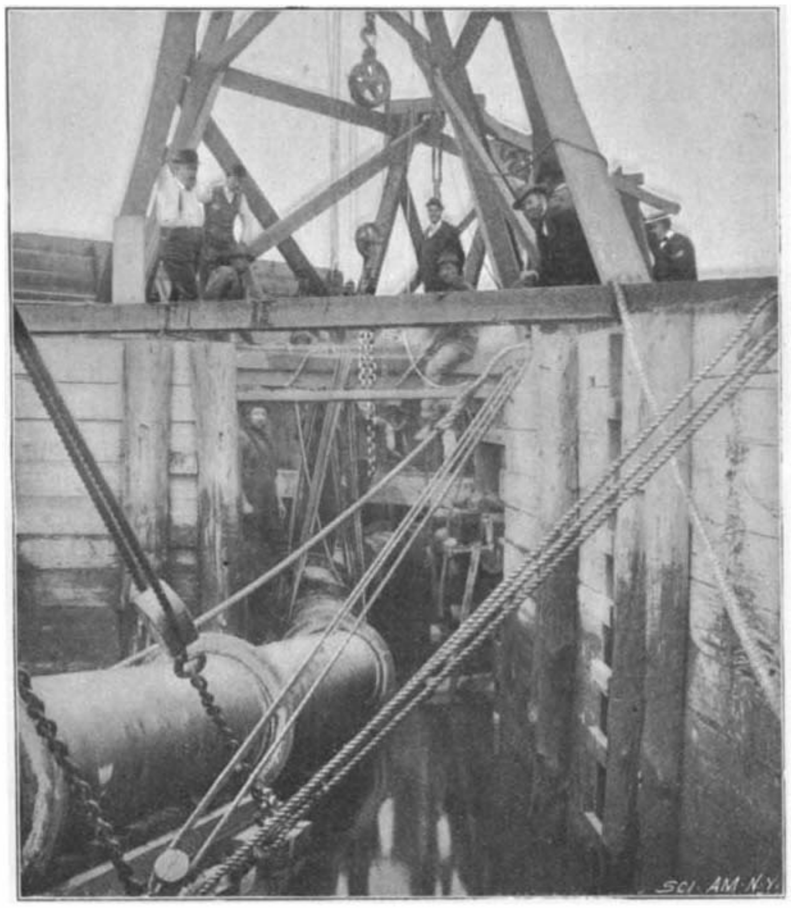
Possibly the most remarkable light ever used for purposes of reading is the beautiful Pyrosoma, a columnar, jelly-like creature, one of the free-swimming Tunicates. They are usually from one to two feet in length and three or four inches across, open at one end. The column is an aggregation of animals, each of which takes in water and expels it by an orifice in the interior; and this volume of water rushing from the open end propels the animal along. Its luminosity is wonderful, its name, fire body, well chosen. To illustrate its intensity, a Portugese sea captain secured 6 of the animals, which he placed in glass jars which were suspended from the ceiling of his cabin. By their own light he wrote a description of their beauties. Bennett, the English naturalist, placed a deep-sea shark, of the genus Isistius, in a jar in his cabin and could easily have read by its light, describing the appearance of the fish as truly ghastly.

THERE are said to be at least 5,207 motor cycles in France, on which the annual tax has been paid.

LAYING A 24-INCH GAS MAIN ACROSS THE HARLEM RIVER.

BY G. H. P. M'VEY.

The work of laying a 24-inch gas main from the Borough of Manhattan to the Borough of the Bronx, across the Harlem River, is about completed. The purpose of this pipe is to supply additional illuminating gas to the Borough of the Bronx from the mains in Manhattan Borough.



METHODS OF JOINING PIPE IN THE MANHATTAN BULKHEAD.

THE LAST LENGTH OF PIPE BEING LOWERED TO POSITION.

METHOD OF JOINING AND LAUNCHING THE FINISHED PIPE.

To complete this undertaking the Consolidated Gas Company arranged with the Seaboard Contracting Company, the latter employing a number of hands and an enormous plant to operate the work.

The plans of the work were designed by Mr. W. H. Bradley, Chief Engineer, and Mr. Colin C. Simpson, the General Superintendent of mains for the gas company. The pipe crosses the river from a point in Manhattan at One Hundred and Thirty-ninth Street to a point at One Hundred and Thirty-eighth Street in the Bronx, north of and adjoining the Madison Avenue bridge.

Preliminary work was commenced in the river last April by cutting away the bulkhead on the westerly or Manhattan shore and by removing about 100 feet of the ice fender pier of the bridge. This was done to enable the dredge and its accompanying dumping scow to operate at this point.

About 50 tons of rock and earth, as well as a mass of timber, had to be removed from the Manhattan bulkhead, which work was done mainly by the divers. This opening in the bulkhead was 60 feet long, 6 feet wide, and from 5 to 25 feet deep. Four-inch yellow pine tongued and grooved sheathing, 25 feet long, was driven, in order to hold up the sides and thus protect the divers while they were at work, and also to prevent the trench from again filling up with silt.

The divers who performed this dangerous duty, besides cutting away the bulkheads and fender pier, had to make the soundings, guide the suction pipe which removed the mud from the submarine trench, and also place the wooden blocking under the pipe where necessary.

To locate the direction of the trench, transit lines were taken from each shore. The trench has a fall of four feet in a hundred from both shores to the center of the river. It is 20 feet wide and from 10 to 20 feet deep, according to the depth of the mud and silt in the bottom of the river. The extreme length of the trench is 750 feet, from which 14,000 cubic yards of mud was dredged.

In course of time this trench will again fill up with the mud and silt deposit, thus affording ample protection to the pipe, which will lie on the hard clayey bed at a depth in the center of the river of 32 feet below mean low water.

Where the surface of the bed is depressed or uneven, heavy 6 by 12 pine timbers from 3 to 10 feet long were laid at right angles to the pipe in order to block and grade it. This latter precaution was taken in order to prevent straining, and also to avoid the formation of a trap or drip into which condensation would flow and settle, thereby choking the easy flow of the gas.

A depression of the pipe has been provided for, however, in the middle of the river, about 35 feet below mean low water mark. At this point a drip-pot has been provided, which takes the place of an ordinary length of pipe. It will hold 180 gallons. From the top of the drip-pot there will extend to the surface a standpipe, by means of which the condensation will be pumped out.

The iron pipe used in this submarine work is known as Ward's flexible joint. Each length is 12 feet long, 24 inches in diameter at the body and 29 inches at the hub or socket. The iron is one inch thick and each length weighs two tons.

Each joint required 250 pounds of lead to calk it. It is the heaviest pipe for its diameter that was ever laid.

There were sixty-five lengths used in crossing the river. The manner of joining the lengths was somewhat novel and was as follows: The first half dozen lengths were joined on blocking in the opening of the crib work on the Manhattan shore. When the blocking was taken away the pipe hung suspended from overhead supports.

The first length was then laid close to the place where it would connect with the land pipe. The next five lengths were then lowered into the water by ropes and chains, while the seventh length and the four following were put together on the scow which had launching ways constructed on it arranged on an inclined plane.

When each section was properly jointed and calked the scow was carefully drawn ahead from under the pipe and the completed lengths allowed to gradually drop to the river bed by means of a movable launching ways suspended from the stern of the scow. As five of the regular lengths were all that could be joined on the scow at one time, the operation of launching each set of lengths was continued until the river was almost crossed. When the Bronx shore was nearly reached the section of the pipe then on the scow was dropped off while the length nearest the shore was held suspended above the river surface by means of the big derrick moored alongside. The lengths of pipe could no longer be joined in the usual manner on the scow for want of room.

The derrick boat and launching scow were then moored to a position on each side of the pipe, bridged together, and the final lengths thus supported and joined by aid of the overhead timbers, and from them easily dropped into the now shallow trench leading to the land pipe on the Bronx shore.

When the complete line of pipe was laid across the river a tension equivalent to 75 tons was brought to bear on the end of the completed pipe, in order to take up whatever looseness there might have been in the joints. This slack amounted to almost a foot after the enormous strain, which lasted over an hour, was withdrawn.

The laying of this pipe and setting the drip in the middle of the river necessitated the temporary closing of both channels of the stream, and in order to obstruct traffic as little as possible this part of the work was performed at night.

The Newport Automobile Races.

The first automobile race meet was held at Aquidneck Park, near Newport, R. I., on September 6, and was one of the most interesting sporting events ever held in New England. It was attended by 9,000 persons, and the cottagers were present in large numbers. As a result of the races, Mr. William K. Vanderbilt, Jr., holds the first championship of America, beating all vehicles with his large French racing machine. The distance for all the races was five miles.

Among those who raced their machines were Col. J. J. Astor, Mr. W. K. Vanderbilt, Jr., Mr. Royal Phelps Carroll, Mr. George I. Scott, and Mr. Peter Cooper Hewitt. In the trial heats for gasolene vehicles, Mr. Vanderbilt's racing machine was pitted against two others. Mr. Vanderbilt had little difficulty in vanquishing his two adversaries, and was three-quarters of the stretch ahead in 8 minutes 53⅛ seconds.

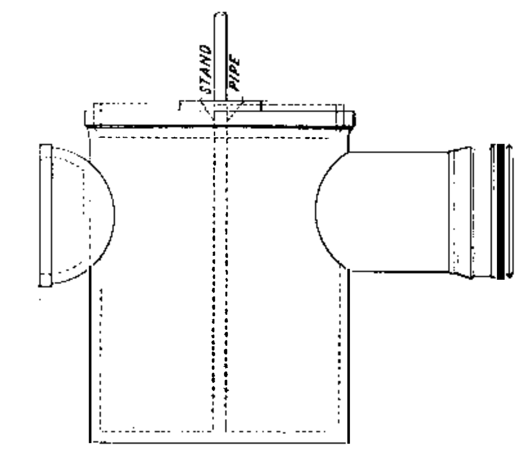
In the first race the first heat was won by Mrs. Herman Oelrichs by default, and the second heat was won by Mr. A. L. Riker, 10:44, who also won the final heat, 13. The second race was given up to tricycles; the first heat was won by Mr. A. K. Skinner, in 10:30½; the second heat was won by Mr. Charles S. Henshaw, in 9:52, and the third heat by Mr. A. K. Skinner, in 9:12. In the third race the contesting vehicles were driven by steam and the first heat was won by Mr. L. T. Davis in 10:45⅛; the second heat by Mr. F. H. McDuffee in 10:56, and the final heat was won by Mr. McDuffee in 10:52.

The fourth race, gasolene vehicles, was won by Mr. William K. Vanderbilt, Jr., in 8:58⅛; the second heat was won by Mr. W. Bishop by default, as already mentioned above, and the final heat was won by Mr. Vanderbilt, the time being 8:53⅛. In the final championship, all the winning vehicles were allowed to compete, and the race was won by Mr. William K. Vanderbilt, Jr., with his gasolene racing machine, his time being 8:54; Mr. A. K. Skinner, tricycle, 9:22, second; Mr. A. L. Riker, electric, 10:28⅛, third. Mr. F. H. McDuffee, with his steam vehicle, did not finish.

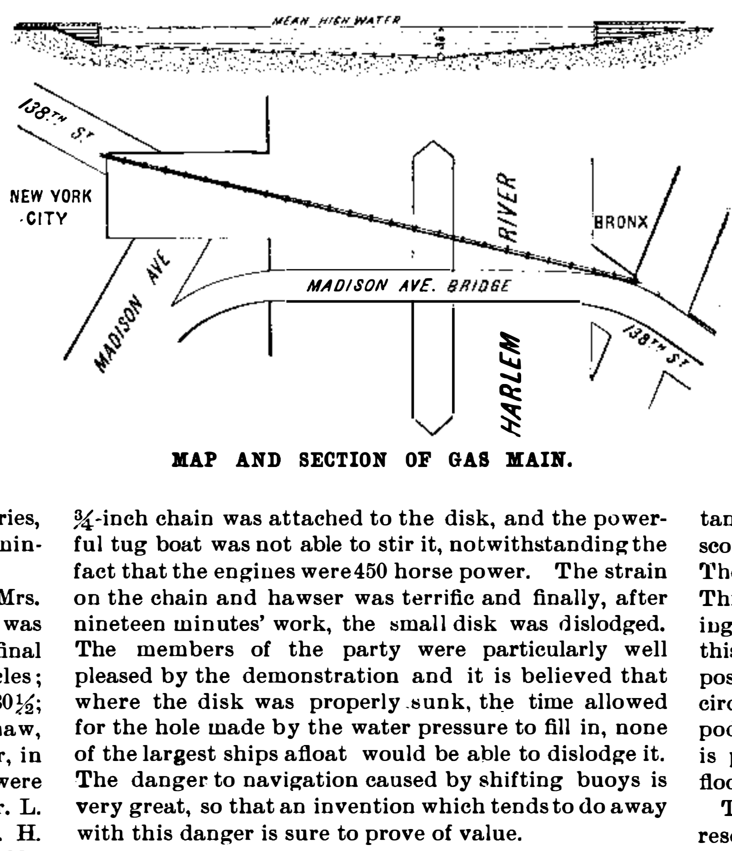
A New Mooring Device.

A public test of the Langston mooring device, invented by F. B. Langston, took place September 6, in the presence of several army and navy officers, as well as representatives of the Lighthouse Board. The inspection party went aboard the tug "Albert H. Ellis," and the inventor described his device, the object of which is primarily to keep buoys and lightships from getting out of position in a storm. It somewhat resembles the familiar mushroom anchor, and is a saucer-like disk of iron, upon the concave side of which are forged lugs, to hold the shackles and ring for attaching the chain. Between the lugs is a hole 1½ inches in diameter, and it is by the direction of a strong stream through this hole, against the bottom of which the convex surface of the saucer rests, that the device can be sunk to any desired depth. The disk which was used was only ten inches in diameter, and it was not contemplated that any conditions could arise which would demand a greater magnitude than 24 inches. The tug steamed out to Ulmer Park; a 5-inch disk was attached to a 2-inch pipe, and lowered into the water. When the disk struck the bottom, which is 11 feet down at this point, a stream of water was sent through the pipe. The disk was sunk 12 feet in the space of five minutes and thirty-eight seconds. The disk was then disengaged by means of an iron pipe, which was lowered down, and a stream of water was again turned on. A hole is made in the bottom, which releases the disk so that it can be easily brought up.

The next test was that of mooring strength, and this was made near the middle of the bay, the depth of the water being 23 feet. The 10-inch disk was again used and was lowered to a depth of 10 feet, the time required being thirteen minutes and two seconds. A buoy was then attached to the disk and the party returned for luncheon. In an hour the vessel steamed back and a ¾-inch chain was attached to the disk, and the powerful tug boat was not able to stir it, notwithstanding the fact that the engines were 450 horse power. The strain on the chain and hawser was terrific and finally, after nineteen minutes' work, the small disk was dislodged. The members of the party were particularly well pleased by the demonstration and it is believed that where the disk was properly sunk, the time allowed for the hole made by the water pressure to fill in, none of the largest ships afloat would be able to dislodge it. The danger to navigation caused by shifting buoys is very great, so that an invention which tends to do away with this danger is sure to prove of value.



DRIP POT TO GATHER WATER OF CONDENSATION.



MAP AND SECTION OF GAS MAIN.

Opening of an Andrée Buoy.

At a recent meeting of the Academy of Science at Stockholm, and in the presence of Arctic explorers Nordensckiöld, Nathorst and others, the Andrée buoy, which was recently found near Iceland, was opened. The buoy bore the inscription "Andrée's Polar Expedition, No. 3, 1896." Though it had lost its original color, it was quite undamaged, owing to the defective construction of the screw of the upper portion of the buoy; the latter could become unscrewed very easily by the waves or by pressure from the ice. The buoy could not have fallen either on land or on ice, as the under portion, which is copper, bore no indentation as the result of such a fall. This is the first Andrée buoy which has been picked up with its upper screw and copper shell in their proper condition. These have hitherto been missing.

THE Richmond Locomotive Works has received its third order for locomotives from the Finland Street Railways.

An Exhibition of Fire-Saving Apparatus at Berlin.

An exhibition of fire-preventing and fire-saving arrangements will be held in Berlin during the months of June and July, 1901, on the place where the military exercises are held at Moabit, and application for space must be made by the 1st of October, 1900. Only articles which answer the purpose of the exhibition will be accepted, and they will be taken only after examination by the managing committee. State premiums, prizes, and medals will be given. The rules of the exposition seem rather severe and arbitrary, but it will undoubtedly afford an excellent opportunity for American inventors to exploit their devices, and the medals and premiums will certainly prove of value. The general plan includes:

1. Organization of the fire brigade, dealing with clothing and equipment of fire brigades, horse equipment, dwellings for the firemen, apparatus extinguishers, escapes, apparatus for illuminating the way to and at the scene of fire. Chemical fire extinguishing means and machinery. Water supply and firearms.
2. Assistance in case of necessity and danger. Ambulance corps. Relieving persons and animals and transporting the same in cases of accident. Danger caused by water.
3. Extra professional work. Cleaning streets. Watering streets.
4. Fire-protecting means. Fireproof building constructions. Lightning conductors. Heating apparatus. Chimney sweeping. Fire-protecting apparatus for dwellings, schools, hospitals, churches, factories, storehouses, mining and electrical plants, theaters, etc., also insurance against fire.
5. Organization for the benefit of brigades.
6. Subjects of instruction, art, and literature,

New Form of Foucault Pendulum.

In a paper read before the Académie des Sciences, M. Alphonse Berget describes a series of experiments carried out by him with an improved form of Foucault pendulum. Taking as a base the invariability of the plane of the pendulum, Foucault was the first to demonstrate the rotation of the earth by his famous experiment made in 1851; in this he used as a pendulum a long metal wire having at the end a heavy spherical mass. A stylus, fixed under the sphere, strikes two small heaps of sand, placed at the extremities of the course, and the progressive marks on the sand as the pendulum oscillates show the direction and magnitude of the phenomenon. The pendulum of Foucault, it may be remarked, is many feet in length, and rises nearly to the height of the Gothic vault of the Conservatoire des Arts et Metiers, where it is now preserved. M. Berget wished to reproduce the experiment, using a pendulum of but 3 feet in length, and has constructed an instrument by which the rotation of the earth is clearly marked. A cylindrical rod of bronze carries at the end a copper cylinder weighing about 4 pounds; its height upon the rod is made adjustable by a screw-thread. At the upper part of the rod is a knife-edge suspension, very carefully made, upon which the pendulum swings. Underneath the center of the pendulum is fixed a horizontal graduated circle, carrying a slide which is movable around it by a tangent-screw; the slide carries a horizontal microscope, which may be directed to the center or near it. The slide has a vernier by which it reads to 30 seconds. Three strong oak legs support the upper table carrying the suspension; the pendulum rod passes through this, and the lower part, carrying the stylus, takes a position of repose in the central part of the divided circle, which is supported on the lower part of the tripod. All the parts are thus consolidated. The whole is placed upon a monolith pillar, separated from the floor of the laboratory.

The experiments were carried out in the physical research laboratory of the Sorbonne. The circle being made horizontal and its center brought under the stylus, the pendulum is drawn from its position of equilibrium through a very small angle, by binding it with a piece of thread to a screw placed in the plane of symmetry of the microscope. After all oscillation ceases, the microscope is directed upon the stylus, its point coinciding with the center of the cross-wires of the microscope. The thread holding the pendulum is then burned by a flame, and the oscillations commence; it is remarkable that from the second oscillation, or in four seconds after the start, the observer sees the apparent displacement of the image toward the right in the field of the instrument. As the microscope inverts the real position, the stylus is displaced from right to left, as theory indicates. The delicacy of the instrument is thus apparent; it even permits of making quantitative measurements, which correspond closely with the theoretical values. This is done by turning the tangent-screw so as to bring the image back to the center of the cross-hairs at the end of each oscillation. A number of determinations were thus made, which gave for a deviation of 1° the time 6 minutes 5 seconds, which is quite near the true value.