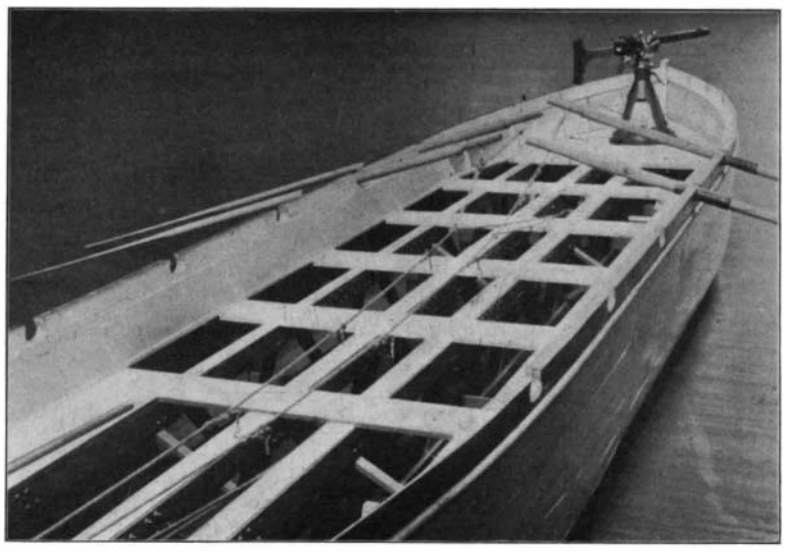
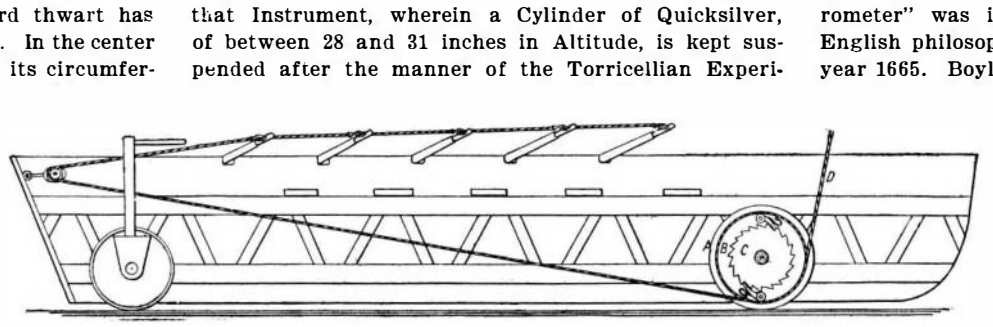
familiar with the river and harbor service would never think of, and all are enthusiastic over its advent as a time saver, a money maker and a relief of the terrible responsibility for the precious lives entrusted to them in heavy weather.

A LAND BOAT FOR ARMORY USE.

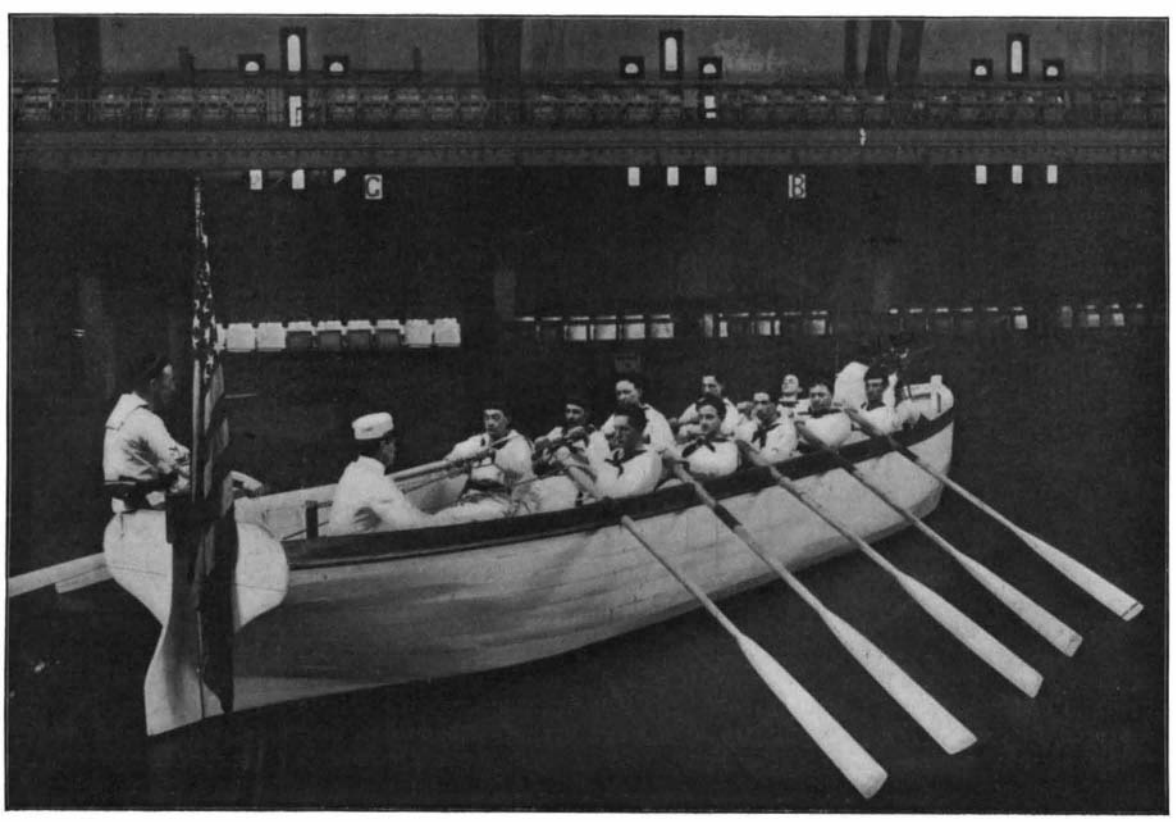
In the exhibition drill given at the Armory of the Thirteenth Regiment, N. G. N. Y., following the review by Lt.-Col. Spicer, U. S. M. C., of a battalion composed of a battery from the Second Battalion, Naval Militia, New York, and Company D of the regiment, a novel form of boat was used. A fort had been constructed around the 8-inch disappearing gun used by the regiment, and a range station was built on the parapet. In the opposite corner of the armory, the bow of a battleship projected out onto the floor. The armory being darkened, a boat appeared from behind the ship and dashed across the floor, containing a landing party, who were to attack and destroy the range station. Being discovered by an alert sentry, a searchlight was turned on and the alarm given. The long roll called the artillerymen to their posts, but before they could locate the attack, the boat had landed its party, the wall had been scaled, and a bomb placed in the station and the boat regained, the dead and wounded being carried off on the shoulders of the survivors. The fire of the sentries during the attack was answered by a one-pounder mounted in the bow of the cutter. After the boat disappeared in the darkness, the battleship was discovered by the searchlight, and its magazine reached by a well-directed shot from the 8-inch gun. The boat, which is modeled on the lines of a regulation navy cutter, is 30 feet long and 6 feet beam, carrying a crew of ten men at the oars, a gun crew forward and a coxswain and commissioned officer aft. It is cut off at the waterline, and all mechanism being inside, the effect is that of a boat gliding through still water, and under the beam of the searchlight, is very realistic. A 2½-inch shaft under the forward thwart has an iron wheel, *A*, keyed to it on either end. In the center is keyed a drum, *C*, with ratchet teeth on its circumference, and engaging these teeth is a pawl carried by a sleeve which turns on the drum. Around the sleeve, and leading clear aft through a snatchblock back to the handles of the oars, is a manila line. When the men give way, the line turns the sleeve, the pawl engages the teeth on the drum, the shaft and with it the wheels turn, and the boat goes ahead. On recovering from the stroke, a line, *D*, leading from the oars forward returns the ratchet to position, and the operation is repeated indefinitely. As far aft as it could be placed without interfering with the lines of the boat, is placed a single wheel, and a rudder post rising from this controls the steering, the whole method of support and steering being similar to an iceboat. The weight of the gun, boat, and crew, amounting to about two tons, is carried by four wooden trusses running fore and aft, two close together and two as near the sides as they could be placed. The thwarts, gunwale, rowlocks, etc., are standard. The hauling line is equipped with snaphooks and the oars with screw-eyes, so the line can be quickly detached from the oars. The men toss, boat the oars, up oars, let fall, give way, etc. just as they would afloat, and the Second Naval Battalion will use the boat for winter indoor instruction in their new armory, foot of 52d Street, Brooklyn. The boat was designed by Lieut. Kingsley L. Martin, commanding the second division of the battalion, and was built under his direction by Chief Gunner's Mate William H. Free.



DETAIL SHOWING ROPES AND OARS.



PROPELLING MECHANISM OF DRILL BOAT.



A LAND BOAT FOR ARMORY DRILL.

The Irish course for the Gordon Bennett motor car race measures 368 miles 765 yards, of which 221 miles are straight road, which will compare favorably with the course of last year in France.

Origin of the Word "Barometer."

The instrument familiar to us all as the barometer, says Henry Carrington Bolton in Science, was first universally known by the name of its inventor as "Torricelli's tube;" de Guericke, the inventor of the air-pump, called his huge water barometer "Semper Vivum," also "Weather Mannikin," with the Latin form "Anemoscopium."

Soon after the year 1665 the words "baroscope" and "barometer" came into general use in England, but the person to whom the credit belongs for originating these terms has not been certainly known; the assertion made by a contributor to the Edinburgh Review for 1812 that "baroscope" was first used by Prof. George Sinclair, of Scotland, in 1668, is an error, for both words occur in the Philosophical Transactions four years earlier. The passage is unsigned and reads thus:

"Modern Philosophers, to avoid Circumlocutions call that Instrument, wherein a Cylinder of Quicksilver, of between 28 and 31 inches in Altitude, is kept suspended after the manner of the Torricellian Experiment, a Barometer or Baroscope, first made publick by that Noble Searcher of Nature, Mr. Boyle, and imployed by him and others to detect all the minut variations in the Pressure and Weight of the Air."

The mention of the words in connection with the name of Robert Boyle has led Mr. Bolton to make a close examination of his voluminous and prolix writings. In Boyle's first publication, "New Experiments Physico-Mechanical touching the Spring and Weight of the Air," dated 1660, the words baroscope and barometer do not occur; he uses the common term "tube," and often writes of the "mercurial cylinder." Nor are these words used by him in his "Defense of the Doctrine touching the Spring and the Weight of the Air . . . against the objections of Franciscus Linus," a paper published in 1662.

Their use by the anonymous writer to the Philosophical Transactions in 1665 has been shown, and the question arises, who was this person who modestly concealed his name? Mr. Bolton believes it was Boyle himself. This eminent man, who was so devoid of personal ambition that he declined a peerage, had a habit of writing about himself and his scientific labors in the third person, and often spoke of himself by fanciful, fictitious names, such as "Philaretus" (in his fragmentary autobiography) and "Carneades" (in the "Sceptical Chymist"). That he should send an unsigned communication to a journal was not surprising, particularly as he had occasion to mention himself.

Be this as it may, my claim that Boyle originated the word barometer does not rest on such slender conjectures as these. One year later than the communication in the Philosophical Transactions, Boyle wrote to this journal (dated April 2, 1666) and said, "barometrical observations" (as for brevity's sake Mr. Bolton calls them), using the personal pronoun this time. Elsewhere in the same paper are found the terms barometer, baroscope, and baroscopical observations.

In his "Continuation of New Experiments Physico-Mechanical," . . . of which the preface is dated 1667, occurs the following phrase: "But though about the barometer (as others have by their imitation allowed me to call the instrument mentioned)." (Boyle's Works, Birch's edition, Vol. III., p. 219, London, 1744.)

This sentence is virtually an admission by Boyle that he had coined the word, since others imitating him had allowed and encouraged him to use the term to designate the tube of Torricelli.

Mr. Bolton concludes, therefore, that the word "barometer" was introduced into our language by the English philosopher, the Hon. Robert Boyle, about the year 1665. Boyle, by the way, was a scholar, and able to use Greek in forming an English word. Examination of Murray's, Skeat's and other standard English dictionaries throws no light on the origin of the word; they merely refer to the Philosophical Transactions and give its obvious etymology.

New York City as a "Spa."

There are, undoubtedly, thousands of residents of upper New York who do not know that there is a water cure or "Spa" conducted within the limits of Central Park. Yet, if the visitor passes through the Seventy-second Street gate on the west side, he will find a number of people walking toward a pavilion not far from the entrance. He will also doubtless be surprised to learn that the majority of these people are acting on the advice of their physicians. Between the hours of five and ten A. M., from five hundred to eight hundred people are served with mineral waters, the greater number visiting the pavilion about half past six. The busiest season is from the first of May until the fifteenth of June. The pavilion was erected in 1867 at the request of numerous physicians who felt that here was an opportunity of combining a mineral water cure with exercise in the open air. The doctors prescribe the kind, strength, temperature and quantity of water, and the amount of exercise to be taken. The attendants follow these instructions with the greatest care. The waters are of two kinds; first the natural mineral waters from all the famous springs at home and abroad, and second mineral waters prepared artificially and scientifically, thus ensuring a definite chemical composition at all times. The double and quadruple Carlsbad seems to be the favorite, and it is mixed with varying proportions of distilled water, and the nat-

ural mineral waters can be heated in silver cups which are placed in racks in small steam kettles. The little tables are very suggestive of Wiesbaden, Homburg or Carlsbad, and the weighing scale is in constant requisition. By a systematic course of the waters, coupled with proper exercise, it is not unusual to decrease the weight in six weeks by thirty-six pounds, in cases of obesity. The pavilion is patronized by some of the best known people in New York who appreciate the privilege of having mineral waters served under proper conditions.

An Electrically Operated Curtain Hoist.

BY FRANK C. PERKINS.

In every college lecture room, as well as many high schools and institutes, the electric stereopticon is frequently employed in connection with the regular day courses of work. It is then necessary to darken the windows by means of shades, as well as to draw down a prepared white screen for illustrative purposes.

A very ingenious electrical hoisting apparatus, for drawing down the shades and the stereopticon screen at the same time by simply pressing a button or turning a switch, has been devised by Charles W. Carman, of Chicago, formerly the professor of physics at the Lewis Institute.

This automatic electrical device makes it possible for the operator at the lantern to open all the opaque shades of the lecture room or laboratory in an instant by a special switch close at hand. The same device raises the screen out of the way, while another daylight demonstration or lecture is taking up a portion of the time. The curtains are all raised or lowered in less than half a minute from the time the switch is closed, and when fully opened or closed the mechanism is automatically cut out of circuit. The operator after manipulating the switch may therefore immediately give his attention to other work.

The drum is connected to the motor through a worm gear and a magnetic clutch. It is a reversible motor, and by means of a double-throw switch is operated in one direction or the other, depending upon whether the curtains are to be raised or lowered. The limit stop provided breaks the circuit through the motor armature and the magnetic clutch, and changes the connections when the curtains are in their extreme position. The magnetic clutch ceases to act and the curtains are held in position while the armature comes to rest after its momentum is overcome.

The stereopticon screen is connected to the drum by a rope, and the various shades about the room are connected by cords through pulleys to the rope, which extends around the room below the windows. A weight is arranged at the end of the rope, which keeps it taut regardless of the action of the curtain rollers. There are two portions on the drum, one of greater diameter than the other, and the curtain roller cords are connected to one and the stereopticon screen rope to the other, so as to provide for the different ranges of travel. The motor used is of the multipolar direct-current type.

Street Railroads for Conveying Freight.

In the busiest centers of Lancashire, especially so far as the cities of Liverpool, Manchester, and Darwen are concerned, an important development in connection with the electric street railroads is to be undertaken. Hitherto, the surface tramways have been exclusively devoted to the carriage of passengers, but they are now to be employed for the conveyance of freight from one point to another. In Lancashire some 400 miles of these street railroads, all operated by electricity, are rapidly approaching completion, and are to be connected, so that freight can be discharged from, and embarked upon, the cars at any point upon the route.

It is intended that the merchandise shall be carried only during the night. Throughout the day the passenger service in these centers is so busy, that to handle freight at the same time would only interrupt and disorganize the passenger traffic, whereas at night, although there is still a demand for passenger transit, neeessarily it is limited, so that freight cars will be able to run quickly and without causing any inconvenience.

The first step toward the inauguration of such a service has been taken by the corporation of the city of Liverpool with its street tramways, by an agreement to connect its system with the docks' surface railroads, thus securing direct access to the quays, warehouse, and vessels, picking up the freight and distributing it without further handling in the various parts of Lancashire where an electric tramway is in operation.

Such a system will considerably facilitate and cheapen the cost of transit of freight from the vessel's side at Liverpool docks to the Lancashire towns, especially Manchester. By the present system of handling the merchandise upon the trunk railroads, in the majority of instances, there are no less than six transshipments of the goods, from the moment they are discharged from the ship to their delivery at their destination. By the surface tramways all this extra labor will be obviated. The trolleys laden with goods will run straight from the docks into the factories, or *vice versa*. The saving in time and labor alone by this system will be enormous, while it will also be fifty per cent cheaper to convey goods by this means than by the ordinary railroads.

GUILLEMINOT HIGH-TENSION AND HIGH-FREQUENCY COILS.

BY EMILE GUARINI.

Dr. Guilleminot recently published the results which he had succeeded in obtaining with an arrangement for the purpose of analyzing the effects of high frequency obtained with ordinary resonators. He prepared a coil or spiral of copper wire of constant pitch. Through the outermost convolution (Fig. 1) the oscillatory current of two Leyden jars was passed. At the center of the spiral, currents of exceedingly feeble intensity were received.

By modifying the pitch of the spiral and rendering

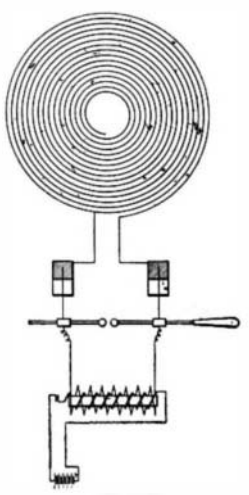


Fig. 1.

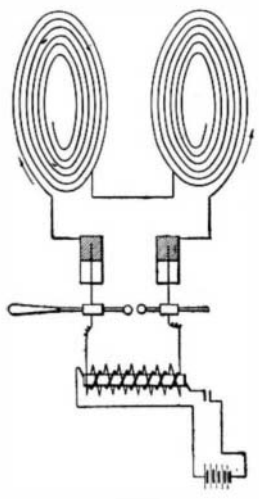


Fig. 2.

it progressively increasing from the center to the periphery, the effects obtained were more marked. The increase of pitch was based on the difference of the length of the spark which passes between the two adjacent points. This increase was 0.003 mm. between convolutions, an induction coil having a spark of 0.35 mm. being employed at 6 amperes to charge the Leyden jars.

Dr. Guilleminot studied the effects obtained with two spirals. The results were remarkable. An enormous field of action was given to the neighboring resonator. Experiments conducted in conjunction with MM. Radiguet and Massiot proved that if a passive spiral be submitted to the influence of an active spiral, entirely different effects, dependent upon the direction in which the convolutions run, are obtained; if two spirals be connected in multiple (Fig. 2) or in tension, the effects are again entirely different, dependent on the direction of the oscillating discharge in the first spiral. From these experiments it follows that in two spirals the same charging effect can be obtained, either by influence due to winding in the same direction, or by proper connection due to symmetrical mounting; and that it is possible to

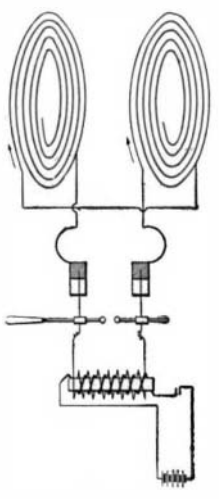


Fig. 3.

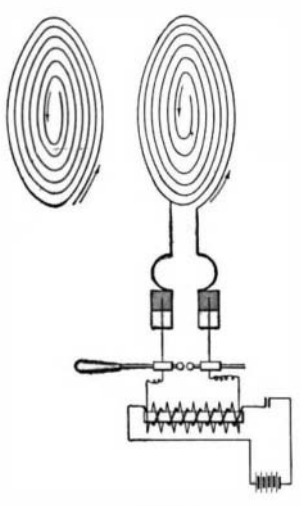


Fig. 4.

obtain a counter-discharge effect either by influence or by proper connection.

Dr. Guilleminot has also ascertained the effect of combined inverse connection and inverse winding. The results obtained are striking. Superb interpolar effects were secured. A body interposed between the two spirals glowed at two sides.

By homologous connection and winding feeble current effects were obtained; a body interposed between these spirals emitted flaming streams.

It will be observed that Dr. Guilleminot's spirals enabled him to obtain two entirely different effects, one monopolar and the other bipolar. The therapeutical value of these coils should not be underestimated. Electric shower baths can be taken, which will doubtless have no slight beneficial effect upon the nerves.

American Gunnery: New Record.

The report that American gunnery is not what it was during the Spanish-American war is tellingly refuted by the accounts which have been received of target practice in the Gulf of Mexico. During the Spanish-American war it was estimated that only three per cent of the shots fired by American gunners hit the enemy's ships. Still, that was considered very good shooting. Tables have been prepared of the recent work done by seven battleships of the North Atlantic fleet. These tables are complete for all ships except the "Kearsarge." The score made by the other six vessels foots up a fine average of 51.5 per cent. The record of prize firing by the British fleet on the Asiatic station shows that the average percentage of hits was 49. Of these English vessels the best performance was that of the "Oceanic" whose record was 68 per cent of hits with a 12-inch gun. The "Alabama" with her 13-inch guns, striking the target 22 times out of 32 times, shows that her record is 67.12 per cent. The "Illinois," a sister ship of the "Alabama," made a record of 53.1. The performance of the older ships was not so creditable. With her 13-inch rifles the "Massachusetts" hit the target only 6 times out of 15; the "Indiana," however, a sister ship of the "Massachusetts," missed the target only 6 times out of 24 shots. What target practice means is strikingly shown by the case of the "Texas." This vessel was only recently placed in commission, so that her men had no experience with target work. Her record was only 39.3 per cent. The records which have been made are remarkable when it is considered that at 1,600 yards a target, viewed through the peephole of a turret, looks no larger than a visiting card held 100 feet from the eye.

Using Aluminium Condensers to Produce "Singing" Arcs.

In an article communicated to the Russian Physico-Chemical Society, W. Mitkiewicz suggests replacing the ordinary high-capacity condensers necessary to produce Duddell's "singing arc" by the much less costly aluminium condenser made up of an aluminium electrode connected with the positive pole immersed in a 7 to 8 per cent sodium bicarbonate solution, and thereby becoming coated with a thin layer of oxide or hydroxide. Two plates of sheet iron of the same dimensions are placed upon the faces of the condenser, from which they are separated by means of thin caoutchouc, so that the distance between the aluminium and each of the iron plates does not exceed 3 millimeters. The whole system is provided with caoutchouc rings, and placed in the vessel containing the solution. The iron plates are, of course, connected with one another by means of a metal wire. The capacity of such a condenser with a working surface of about 5 square dm. was of the order of 100 microfarads. The magnitude of this capacity is due to the extreme thinness of the insulating layer. In order to produce with this device the phenomenon known as a "singing arc," Duddell's arrangement is made use of. After each experiment the electrodes must be taken out of the solution and carefully dried. This condenser may be advantageously used for many other experiments as well, e. g., for all "speaking" arc devices. Full particulars are given of the apparatus employed.

The Current Supplement.

The current SUPPLEMENT, No. 1429, opens with an article on some modern types of Swiss and German bridges, editorially referred to in another part of this issue. The article discusses these bridges both from an engineering and architectural standpoint. The text is illustrated by pictures of several types. The investigation of a garbage crematory is concluded. Some new lightships on the coast of France are described and illustrated. Sir Oliver Lodge's paper on Electrons is continued. An article by Prof. Goodyear on the "Architectural Refinements of St. Mark's, Venice," will be found to contain many a striking bit of information on the architectural beauties of Italy's most famous cathedral. Perhaps the most important subject which is discussed in the current SUPPLEMENT is that of radium and other radio-active substances. The article comes from the pen of William J. Hammer, and is probably the most exhaustive account which has so far been published. Numerous illustrations are given of the marvelous activity of these newly-discovered substances. Serpollet's steam automobile is described in the second installment of the article begun in the last issue.

Ruchomowski, who has achieved no little notoriety by reason of his skill in the fabrication of the tiara of Saitaphernes, seems also to have been the author of other curios which their owners have fondly imagined to be genuine antiques. M. Reitlinger, who thought he owned four valuable antiques, now receives the unpleasant news from Ruchomowski himself that they came from the hand of the Russian craftsman.