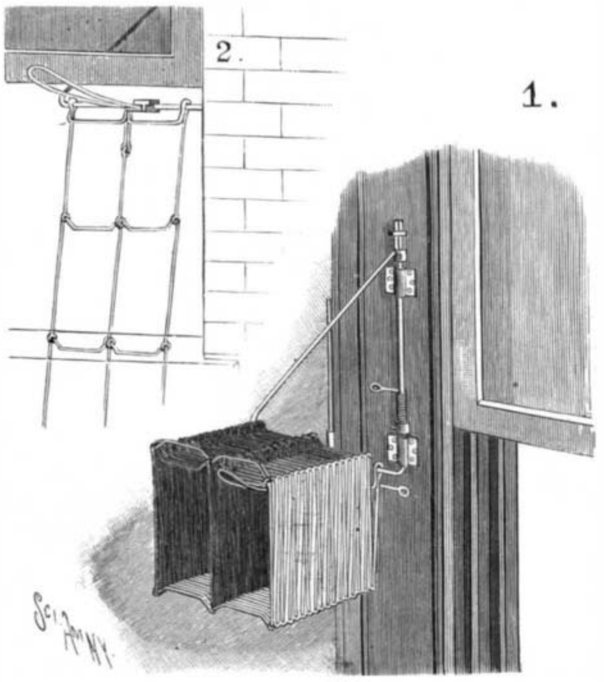
A SELF-LAUNCHING FIRE-LADDER.

Our illustrations picture a very ingenious and inexpensive fire-ladder, invented by Mr. Theron N. Parker, of 226 North Ninth Street, Brooklyn, New York city, which ladder is so arranged that by releasing a retaining device, it will be automatically thrown out of an open window into the street.

Held in bearings at the side of the window, well above the head of a person, is a bracket in the form of a right-angled triangle. The base of this triangular bracket carries a steel loop which supports the folded steel ladder, made in any desired length. In order to reinforce the loop, and to hold it in substantially horizontal position, a vertical brace is employed, extending upwardly behind and in contact with the hypotenuse of the triangle. The vertical member of the triangular bracket, journaled in the bearings, is surrounded by a powerful coiled spring, the upper end of which is extended laterally to form a stop, which limits the inward motion of the bracket. A fastening device which can be released by a pull-cord, lever, or electric push-button is provided for the base of the bracket.



THE LADDER FOLDED AND LAUNCHED.

When the fastening device is released, the strong steel spring instantly swings the bracket through a semicircle to the open window, with such speed that the momentum acquired launches the fire-ladder into the street, so that it hangs as shown in our illustration.

Not the least interesting feature of this simple device is the construction of the ladder. It will be observed that side runs are employed, between which, rungs extend, having offset portions serving as footholds. So compact is this ladder, that a length equivalent to five stories can be packed in less than a cubic foot of space. The ladder is light; for it weighs but two pounds to the story. It is strong; for the severe tests to which it has been subjected have shown that it is capable of supporting a weight of one thousand pounds with perfect safety, and without any possibility of entangling. When the ladder is launched by means of the push-button or lever, a strong, trustworthy escape is formed for each floor in the line of the windows—an escape by which firemen, if necessary, can ascend to any floor. The bracket, it is evident, can be quickly placed in position on any window.

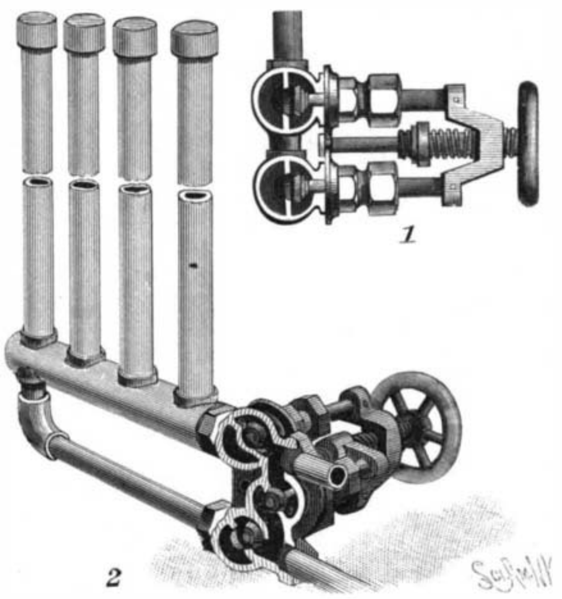
THERE is a project for another subway in Boston, to connect under Washington Street with the present subway, and the one to East Boston, on which work was started a few weeks ago, has been laid aside for a year at least, says The Western Electrician. The matter has been the subject of many petitions and much remonstrance, and the committee on metropolitan affairs in the legislature voted to refer the bill to the next General Court.

AN IMPROVED VALVE FOR STEAM RADIATORS.

An invention has been patented by Mr. Timothy S. Martin, of Butte, Mont., which provides a simple valve mechanism particularly adapted for use on radiators through which exhaust steam is passed, and designed to reduce back pressure against the engine. Fig. 1 is a central sectional elevation of the invention with parts broken away. Fig. 2 is a perspective view, also with parts broken away.

The radiator is constructed with the usual upright tubes connected with upper and lower horizontal circulating-tubes. At the end of the circulating-tubes, a valve casing is located, comprising two chambers, which can be connected with the steam-supply. A central apertured partition separates the chambers. The casing has also two outer chambers and two outer apertured partitions, one between each outer chamber and the adjacent chamber connected with the steam supply. A central valve is arranged to open and close the aperture in the central partition; and two lateral valves are arranged to close the apertures in the outer partitions. A cross-head connects the outer valves and has a screw-threaded aperture. A head connected with the central valve has an aperture with a screw-thread of a direction opposite to that of the cross-head, the two threaded apertures being alined axially. A valve-operating shaft is mounted to turn in the casing, but is held against longitudinal movement, and is provided with screw-threads of opposite directions engaging the oppositely threaded apertures of the heads.

When the center valve is closed, the outer valves are opened (Fig. 1), so that the steam enters one of the circulating-pipes, passes through the outer chamber and open partitions to the radiator and returns through the other circulating pipe. If the center valve be opened by turning the shaft previously mentioned, the inlets to the radiator will be closed, and steam will not enter the radiator. It is evident that under these conditions the steam will not encounter a solid, closed valve, as in the customary construction, but will pass through the valve-casing and back to the boiler, thereby obviating the back pressure usually caused by cutting off the steam at the radiator.



THE MARTIN RADIATOR VALVE.

EXAMINATION OF THE DRINKING WATER OF BROOKLYN, NEW YORK.

The advances in sanitary science in the past few years are nowhere more marked than in water examination. The splendid work done by the Massachusetts State Board of Health has been followed by the installation of laboratories in most of our American cities for the examination of the water furnished by the municipality. It is naturally understood that departments of water supply should be responsible for the quality, as well as the quantity, of water furnished. This demands a constant knowledge of the sanitary condition of the water supply, which can be attained only by frequent analyses and inspection.

The water supply of Brooklyn is complicated, and the need of a laboratory was apparent to the Department of Water Supply for several years. In 1897, Mr. George C. Whipple, Associate Member of the American Society of Civil Engineers and author of several works upon sanitary water supply and examination, was appointed biologist and director. The old gate-house on the Mount Prospect reservoir was found to have ample accommodations, and it was remodeled to meet the peculiar conditions of a chemical and biological laboratory. In the SUPPLEMENT for the current week there is a very full paper upon the Mount Prospect laboratory, presented by Mr. Whipple before the Brooklyn Engineers' Club. It deals with the collection of samples and with the work carried on, and to this article we refer our readers who desire more extended information on the subject.

The laboratory occupies the upper portion of the building and is divided into three rooms. One room is known as the general laboratory, the second the biological laboratory, and the third the chemical laboratory. In the basement is a physical laboratory, storeroom, etc., and there is a sub-basement suitable for bacteriological work during hot weather. The laboratories are equipped with the latest apparatus known to science, including ice chests for the storage of culture media, incubators, sterilizers, balances, desiccators, steam baths, stills for ammonia distillation, Sedgwick-Rafter filters, a combustion furnace, a Mahler bomb-calorimeter, etc. The laboratory force consists of one biologist and director, one chemist, one assistant chemist and three assistants. The routine work consists of the regular examination of the samples of water received from all parts of the watershed and distribution system, i. e., from the driven wells, streams, ponds, aqueducts, reservoirs, etc. The complicated and varied character of the water supply requires the examination of an unusually large number of samples, and it is safe to say that no water supply in this country is examined more thoroughly and minutely than that of Brooklyn.


THE CHEMICAL LABORATORY OF THE MOUNT PROSPECT LABORATORY FOR THE BIOLOGICAL AND CHEMICAL ANALYSIS OF BROOKLYN'S DRINKING WATER.

The regular routine includes the bacteriological examination of three samples of water from the Ridgewood pumping station and from a tap in the city collected daily; a complete physical, chemical and biological examination of nine samples from the distribution system collected weekly; the physical, biological and partial chemical examination of twenty-four samples from the supply ponds collected weekly, with complete chemical analyses monthly; the complete examination of nineteen samples from driven wells collected monthly; and the complete examination of twenty-one samples from the private water supply companies of Brooklyn and from the water supply of the Borough of Queens collected quarterly. Many extra samples are taken at various times and places as occasion requires.

The samples of water from the watershed are collected in the forenoon during the early part of each week, and are sent to the laboratory by express. The samples are collected in large bottles for chemical analyses, and in small sterilized bottles for bacteriological examination. The bottles for the bacteria samples hold two ounces, and they are sterilized each time before use. The stoppers are covered with pieces of tinfoil, and each bottle is then placed in a screw-capped tin box just large enough to receive it. The bacteria samples are shipped in portable ice boxes. There is an outer box with asbestos packing and a copper lining, and an inner copper tray divided into compartments to hold the tin boxes just mentioned, and between the outer boxes and the tray is a large space for ice. The boxes hold sufficient ice to last eight hours in hot weather.

The samples are almost invariably received in good condition. When the samples reach the laboratory, each is given a serial number and entered in an index book. The physical examination of water includes the temperature of the sample at the time of collection, the amount of sediment, and the turbidity after standing twelve hours, the color and the odor.

The sanitary chemical analysis ordinarily includes the determination of nitrogen as albuminoid ammonia, free ammonia, nitrites and nitrates; total residue on evaporation, loss on ignition, chlorine, iron and hardness. In addition to these the following determinations are sometimes made: Oxygen consumed, alkalinity, incrusting constituents, dissolved oxygen, carbonic acid, etc.

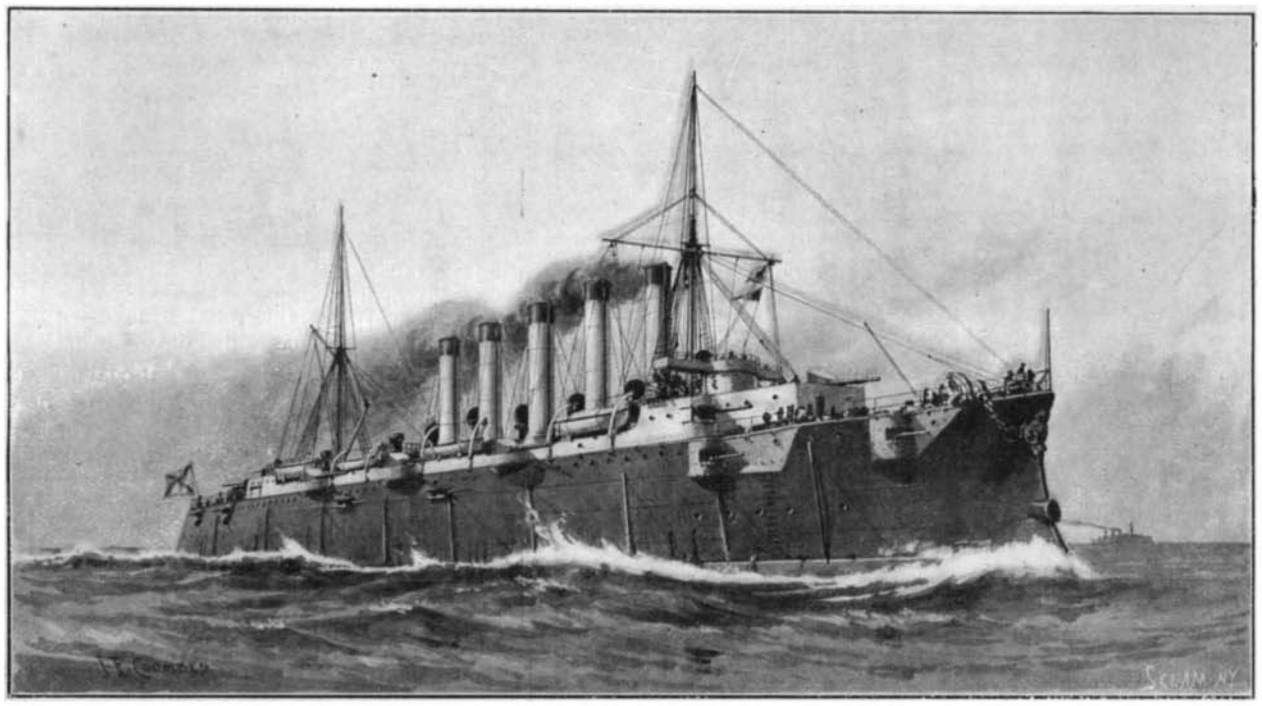
Microscopical examination of the water determines the number and kind of microscopic organisms present, together with the amount of amorphous matter. The bacteriological examination consists of the determination of the number of bacteria present in the sample of water and a qualitative test for the presence of bacillus coli communis.

The miscellaneous work in the laboratory includes the analysis of coal, lubricating oil, boiler scales, boiler compounds, cements, deposits from driven wells, etc. These are all problems of engineering chemistry, and the most important part of this work is the analysis of coal. Most of the experimental work that has been carried out in the laboratory has been in connection with problems pertaining to the condition of the water supply; but, in addition to this, considerable attention has been given to the study of methods of water analysis and to other subjects of scientific interest. Probably the most important work of this kind was the ascertaining of the normal chlorine for the watershed of the Brooklyn water supply, and the observations have been extended over the whole of Long Island. Samples were collected from seventy-seven sources and from the results of their examination, a map of normal chlorine for the island has been prepared. This map shows that except at the east end of the island, and except near the coast, the normal chlorine is below six parts per million. The results which have been obtained by the establishment of this laboratory would warrant other cities in opening similar laboratories.

"LAWN tennis elbow" is one of the modern complaints, and appears to be associated with a certain stroke used by expert players. It is sometimes caused by a sudden strain or long-continued overstrain.

TWO NOTABLE HIGH-SPEED FOREIGN CRUISERS.

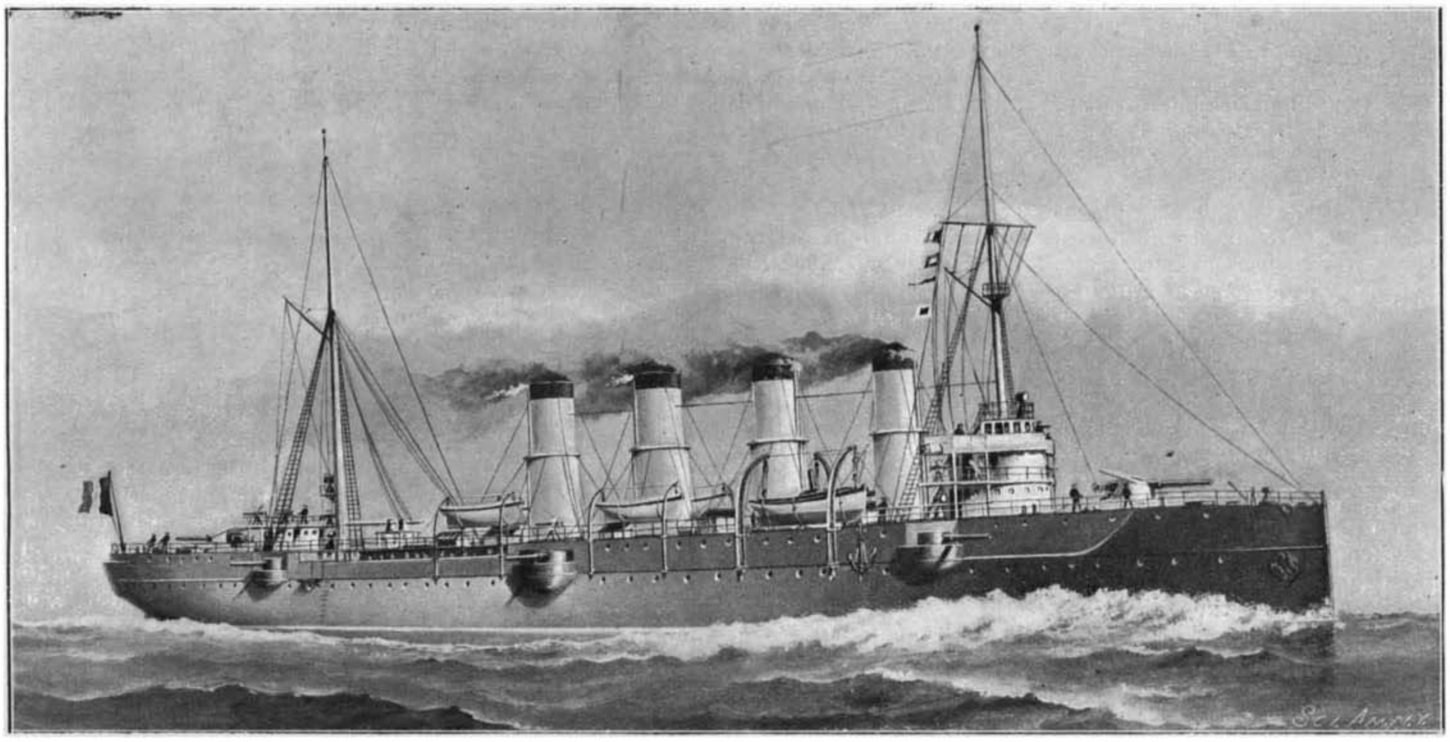
It is now many years since our famous high-speed cruisers, "Minneapolis" and "Columbia," startled the naval world by the then unprecedented speed which they achieved on their trial runs. The "Columbia," it will be remembered, maintained on her trial an average speed of 22·8 knots an hour, while the "Minneapolis" was officially credited with an average of 23·07 knots an hour. Nothing of the kind had hitherto been accomplished by vessels of the size and sea-going ability of these ships, and it is a fact that to accomplish these results considerable sacrifices were made in their offensive and defensive qualities. The armament was light, and the protection was confined to an armored deck. Contemporary vessels of the "Minneapolis" and "Columbia" that carried heavy armament and were protected with a belt at the water line, such, for instance, as the "New York" and "Brooklyn," only secured these advantages by a sacrifice of speed.



RUSSIAN, 23 KNOT, PROTECTED CRUISER, "ASKOLD."

Displacement, 6,000 tons. **Speed,** 23 knots. **Maximum Coal Supply,** 1,000 tons. **Armor:** Deck, 3 inches; gun positions, 3 inches and 5 inches. **Armament:** Twelve 6-inch rapid-fire; twelve 3-inch rapid-fire; eight 3-pounders; two 1-pounders; two machine guns. **Torpedo Tubes,** six. **Complement,** 500. **Date of Completion,** 1900.

Improvements in the materials of construction, the introduction of tubular boilers, and the construction of engines suited to a high speed of revolution, have enabled designers to provide heavily armored vessels with a speed which was altogether impossible at the time the "Minneapolis" and "Brooklyn" were built, with the result that it is getting to be quite the fashion to provide even the armored cruisers with sufficient power to drive them at speeds of from 22 to 24 knots an hour.



FRENCH, 23 KNOT, PROTECTED CRUISER, "CHATEAURENAULT."

Displacement, 8,018 tons. **Speed,** 23 knots. **Maximum Coal Supply,** 2,100 tons. **Armor:** Deck, 2¾ inches horizontal, 4 inches on slopes; gun positions, 2¾ inches. **Armament:** Two 6·5-inch rapid-fire guns; six 5·5-inch rapid-fire guns; ten 3-pounders and five 1-pounders. **Complement,** 625. **Date of Completion,** 1900.

We present illustrations of two of the latest of the high-speed cruisers that have been built in European yards. Both of them are required by contract to achieve a speed of 23 knots an hour. One of them, the "Chateaurenault," has had her trials, and has easily exceeded 23 knots an hour, the speed on certain stretches of the trial course reaching within a fraction of 25 knots per hour.

I. "Askold."—The "Askold" is one of the four protected cruisers which are being built for the Russian navy in foreign shipyards. One of these, the "Waryag," has been constructed at the Cramp shipyard, Philadelphia, and is now undergoing her trials. Two others, the "Bogatyr" and the "Boyarin," have been built respectively at Stettin and Copenhagen, while the "Askold" is nearing completion at the Germania yard, Kiel. All four vessels are to have a speed of 23 knots an hour, and carry the same armament, although there will be a difference in the matter of its disposition. The "Askold" has a displacement of 6,000 tons on a draught of 20 feet 4 inches. She is 426 feet 6 inches in length, 49 feet 3 inches in beam, her normal coal supply is 710 tons, while her bunker capacity is 1,000 tons.

It will be noticed that the ratio of beam to length in the "Askold" is about 1 to 9; a most exceptional proportion for a warship, and one that is only found in fast steamers of the merchant marine, and in small fighting craft of the torpedo boat and destroyer type. In this respect the "Askold" differs materially from the other three vessels of her class, the "Waryag," for instance, having a beam of 52 feet and a length of 420 feet, or about 1 to 8. In consequence of her finer lines the "Askold" is 500 tons less in displacement than her sister ships, the "Waryag" displacing 6,500 tons and the "Askold" 6,000 tons.

Her armament is identical with that of the "Waryag," although it is somewhat differently disposed. It consists of twelve 5·9-inch guns, of which six will be mounted in sponsons, three on each broadside on the main deck, while four will be mounted in recessed ports on the same deck, two forward and two aft. Of the other two guns, one will be mounted on the quarter deck and one will be mounted on the superstructure deck, above the forecastle, and well toward the bow. All of the above guns will be of the rapid-fire type. The "Askold" will also carry a dozen 3-inch rapid-fire guns, four forward, four aft, and four amidships on the gun deck; eight 3-pounders, two 1-pounders and two automatic machine guns. She will also be provided with six torpedo tubes, two of which will be submerged. The protective deck will be 3 inches in thickness, and the principal gun positions will be protected by 5-inch to 3-inch nickel steel.

It must be confessed that the "Askold" has a very striking appearance, and is suggestive of an overgrown torpedo boat destroyer more than of a first-class cruiser. This is due in part to her possession of no less than five tall smokestacks, a number which has never before been placed on a warship. Her boilers will be of the water-tube type, and will supply steam to three sets of triple-expansion engines, driving three propellers, a system which was adopted with success in