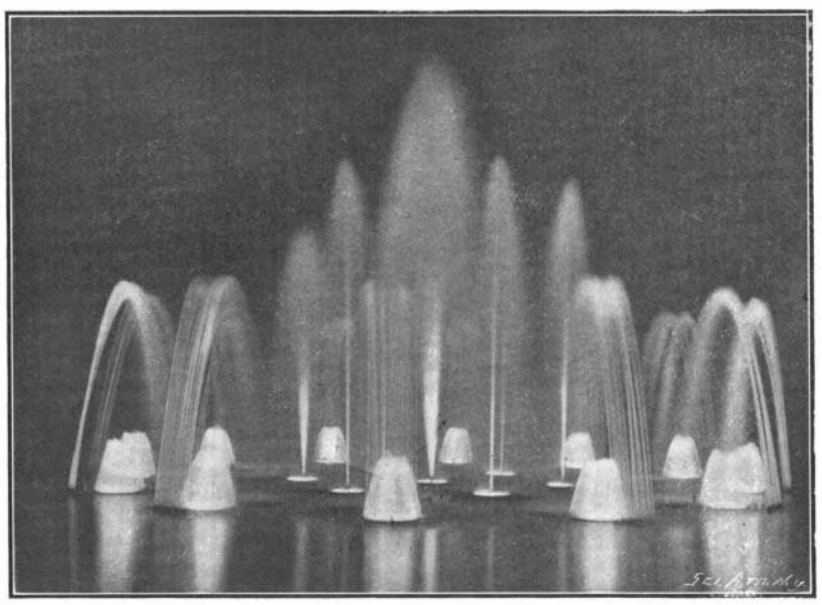
ELECTRICALLY ILLUMINATED FOUNTAINS.

Of late years the electric illumination of fountains has been carried to such a point that the best of them form a spectacular display, which will continue for two hours before the series of designs which can be formed is exhausted. A fountain was recently erected in Philadelphia, which shows over fifty different designs illuminated in various colors by the system of illumination employed. As an amusement feature, these displays have proved very attractive, and city authorities as well as owners of private parks have gone to considerable expense in securing them. In Prospect Park, Brooklyn, a fountain is in operation, which cost $25,000.

In planning the electric fountains, the basin to contain the water is constructed of stone or concrete in the usual manner, except that portions of the bottom are covered with glass. The electrical apparatus is usually located in a chamber beneath it. The chamber is connected with the surface by an underground passage, which is also used as a conduit for the electric cables. The wires of the cables connect with a stand, or switchboard, containing a series of electric buttons, and extend to lamps of both the arc and incandescent type, placed in the various pipes or funnels, through which the water is forced. The lamps are protected from the water by panes of colored or clear glass, some of them being covered with a set of movable panes which can be swung or whirled by the use of compressed air. Arc lights are utilized for the general illumination, and their rays are intensified by movable reflectors, so that beams can be thrown upon the upper or lower part of the water and at any angle desired. The buttons are colored to represent the tint desired in the illumination. For instance, the operator presses a red button when he wishes to introduce light through the red glass, a yellow button when it is desired to give a yellowish hue, and a green button when it is desired to give a green tint, etc. The designs in water are created by the shapes of the pipes through which it is thrown into the air, and by the arrangement of the holes in them. A conduit supplying a one-inch stream may have its nozzle pierced with holes in the shape of a star, an umbrella, or open to form a single jet, as desired. If its stream is to be thrown vertically into the air the pipe is, of course, placed in a vertical position. If it is to form an angle, the position is varied accordingly. As the larger fountains may have several hundred pipes arranged in various positions in the basin, an idea can be gained of the combinations. The water is conducted from the reservoir or pumping station to the fountain by underground conduits in the usual manner. Valves are set in the conduits and in the smaller pipes, and are connected with the operating chamber in such a manner that each is controlled merely by the pull of a lever. The set of levers is arranged somewhat similar to the apparatus in a railroad block signal station. In planning the display, the piping and wiring are, of course, installed to allow the use of single jets and combinations, and the introduction of colored illumination, as desired. This must all be arranged in advance, as the pipes and wire cables are generally inclosed in concrete, or other waterproof material, after being connected with the various funnels and jets beneath the basin.

Such is the simplicity of operation that only two men are required—one to work the levers, and the other the buttons. A small window of thick glass allows them to note the water formation from their stand in the underground chamber. When the time for the display arrives, the electrician takes his place at the switchboard, and gives his orders to his assistant. The latter pulls the lever he indicates. As soon as the column of water appears, the electrician illuminates it by pressing a button on the switchboard. If it is a single jet, it is allowed to play for two or three minutes; then several others are added by another pull of the lever. It remains illuminated by the white light until the electrician presses another button and the tint is changed. Different effects are produced in the same manner. As already stated, the combinations which can be arranged are really remarkable in their extent. The Brooklyn and Philadelphia fountains, which were designed by Mr. F. W. Darlington, of Philadelphia, display umbrellas, various flowers, sheaves of wheat, globes of liquid, and spiral columns which writhe in the air like snakes. At Willow Grove Park, Philadelphia, the arrangement is such that a cascade can be formed in the shape of a fan extended. This constitutes a background, or curtain, on which colored pictures are thrown by means of a stereopticon, giving a novel, yet beautiful, effect.

The quantity of water required varies from a few thousand gallons an hour to as high as 100,000 gallons in the larger fountains. A pressure of from 125 to 150 pounds to the inch is required for the more elaborate displays, and usually the supply is forced to the fountain by a powerful steam or electric pump. There is no necessity for waste, as the water can be forced back to the pumping station or reservoir and used over and over if desired. An electric current of 500 volts is usually sufficient for the illumination. For the larger fountains it is sometimes generated in an individual station, but when they are set up in pleasure grounds owned by street railway companies, or in cities where the municipal authorities have their own electric light plant, the current can be carried from the central station by means of the cable system.



ELECTRIC FOUNTAIN EFFECTS.

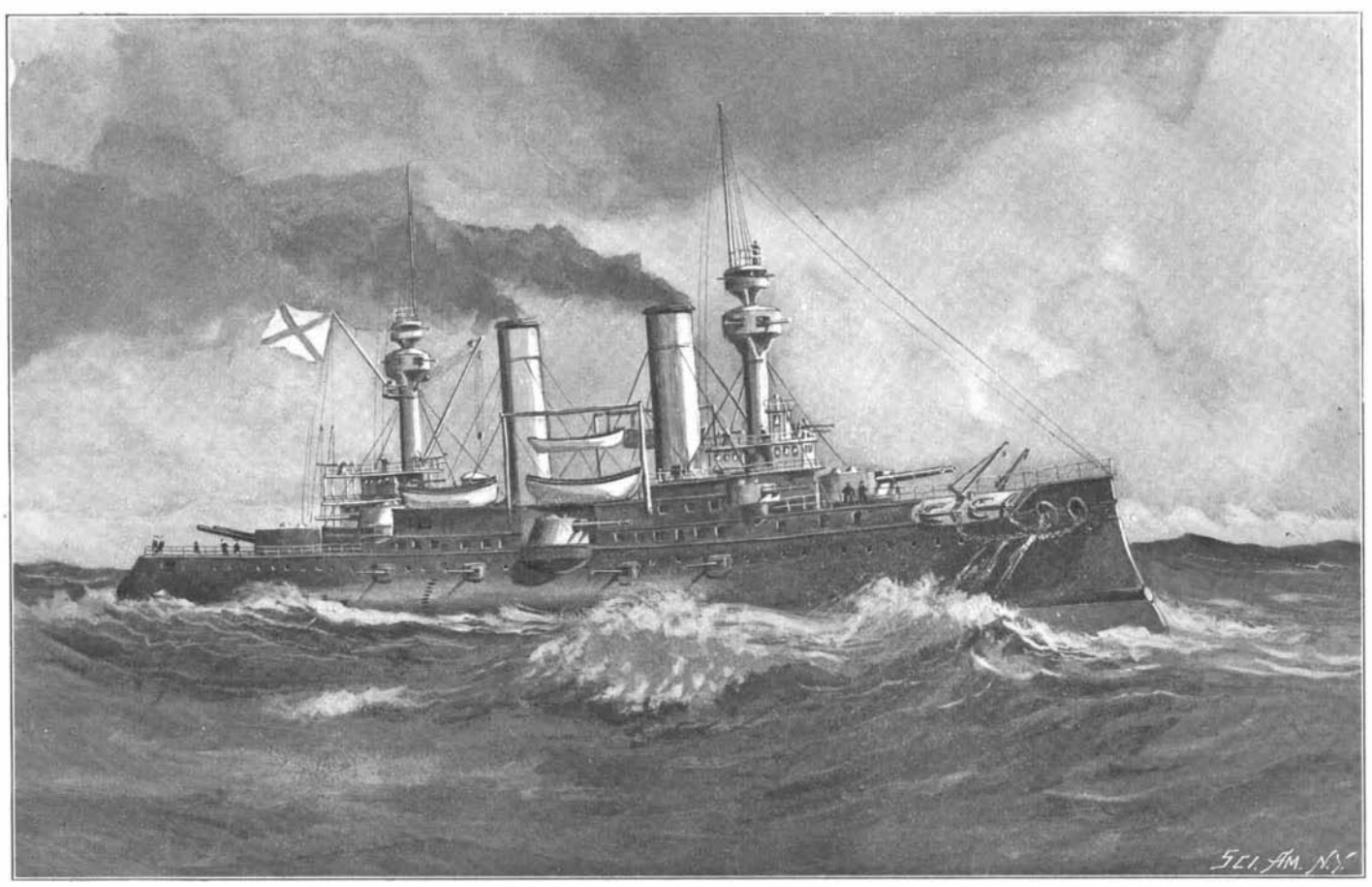
THE NEW RUSSIAN BATTLESHIP "CZAREVITCH" AS SHE WILL APPEAR WHEN COMPLETED FOR SEA.

The sudden effort at expansion in which the Russian navy is just now engaged has led to orders for the building of new battleships and cruisers being distributed in a large number of different places and countries. Like America, France has come in for her share in this business, and one of the most important warships now under construction for the Russian navy in that country is the "Czarevitch," which is being built at the well-known yard at La Seyne, near Toulon, belonging to the Forges et Chantiers de la Mediterranée.

This ship, when complete, will be a big armor-clad of 13,000 tons displacement, bids fair to be a very formidable ship of war, and has that somewhat "ferocious" appearance for which French battleships are conspicuous. Her masts, heavy, castelated, and bristling with guns; her tumble-home sides; her high superstructure and numerous "tourelles," or turrets, all contribute to impress the onlooker with the idea of war-like power. This appearance, like others, is, however, not infrequently somewhat deceptive, but in the present case cannot be considered so, as both in offensive and defensive equipment the "Czarevitch" is extremely well provided.

Her armament consists of four 12-inch guns, twelve 5.9-inch rapid-firing guns, twenty 12-pounders, twenty -pounders, six 1-pounders, and a couple of 2-pounders, or sixty-four guns in all, equaling the number carried in the old sailing battleships of the early part of the century. Her defensive armor is of considerable area. In the first place, she has a complete belt of armor having a maximum thickness of 9 inches, and upper and lower armored decks, while all her heavier guns are placed in barbette turrets, the heavier of which, containing the four guns forming her principal armament, are 11 inches thick in the turrets, and 10 inches in the barbettes. The hoods of the six turrets containing the twelve rapid-firers of her secondary armament are 6 inches in thickness on barbettes of 5-inch plating.

The "Czarevitch" is provided with



NEW RUSSIAN BATTLESHIP "CZAREVITCH."

Displacement, 13,000 tons. **Speed,** 18 knots. **Armor:** Belt, 9 inches; gun positions, 10 and 11 inches for main battery, 5 and 6 inches for secondary battery. **Armament:** Four 12-inch; twelve 6-inch rapid-fire guns; twenty 3-inch; twenty 3-pounders and 8 smaller guns. **Torpedo Tubes,** six. **Complement,** 700. **Date,** 1901.

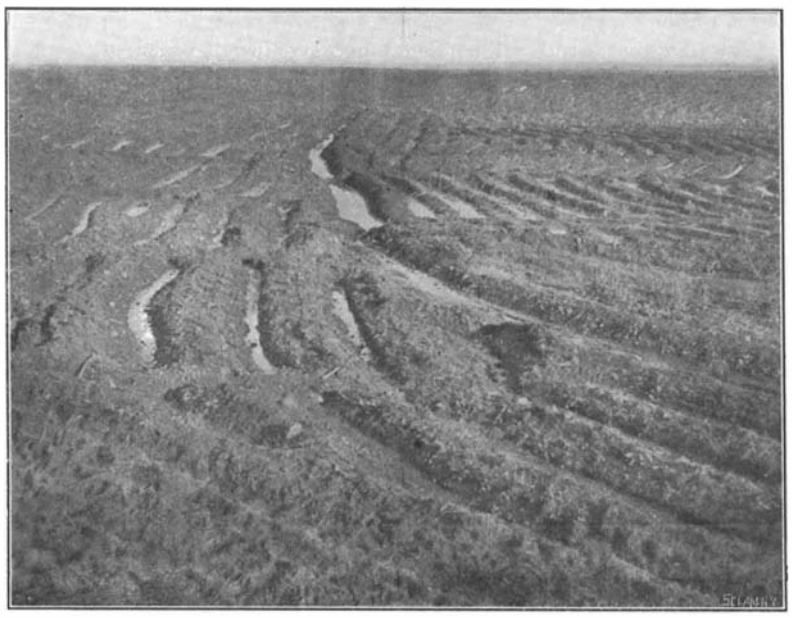
six torpedo-tubes, of which two are below water, the remainder being situated at bow, stern, and on either broadside. The new battleship will be a twin-screw vessel, and is estimated to attain a speed of 18 knots an hour. Belleville boilers, twenty in number, are to be fitted, and will supply steam for two sets of four-cylinder triple-expansion engines, working up to 16,300 horse power. The "Czarevitch" will be fitted with six electric projectors and a complete installation of electric lighting. Electricity, too, will supply the motive power for revolving the turrets and other purposes for which local machinery is required. She is to be fitted as a flagship, and will carry a crew of 700 men.

A SUGAR CANE REAPER WANTED IN HAWAII.

The Hawaiian Sugar Planters' Association have a most important problem to solve, namely, the invention and designing of a reaper for sugar cane in plantation fields. They have set about the problem in an eminently practical manner, offering prizes which aggregate $8,500. A prize—or reward, as the Association terms it—of $2,000 is offered for the best practical design of a machine for reaping the cane. This competition will close on the 30th of June, 1901. The design selected is to become the property of the Association, who may cause the machine to be manufactured for actual trial. A further prize, or reward, of $5,000 is offered for the best working machine that will actually reap cane in the field in a practical manner. This part of the competition will close on December 31, 1901. Should the machine built from the accepted design participate in the actual trials and be successful, the inventor will receive $3,000 in addition to the $2,000 which he has already received in the first part of the competition. If the competition is won by a machine not manufactured by the Association, it will be purchased from the inventor by the Association at the cost price delivered in Honolulu. A further prize of $1,500 is offered for the best design of an apparatus to transport the cane to and load it in railway cars. This competition closes on the 30th of June, 1901. Competitors are required to submit drawings of the machine as a whole, together with full detail-drawings, and only a description where the design is called for. In the second part of the competition, where a machine is called for, competitors will be required to furnish the machines to be experimented with in the field by the board of judges. Should the Hawaiian Sugar Planters' Association accept a design of machine, the payment of the reward will be equivalent to the purchase of all patent rights to such design or machine in the Hawaiian Islands. All communications should be addressed to the secretary of the Association at Honolulu. In order to enable inventors to gain some idea of the practical nature of this problem, we have secured some photographs taken specially to show the conditions which prevail in sugar cane plantations in the islands. The photographs are taken on an irrigated estate, and the figures may be considered as the average.

The canes grow in furrows, 30 feet long and 5 feet apart, center to center. They follow the land contour, and for this reason are sometimes straight and very often curved. At the end of each 30-foot furrow is a water-course 18 inches wide, which supplies one set of furrows. These water-courses are from 50 feet to several hundred feet in length, depending upon the contour of the land. They draw their supply of water from what are termed "level ditches," so called because of their very slight flow. They are from 4 to 5 feet wide and 1½ feet deep, and run through the fields at convenient distances to supply the water-courses. For the operation of any reaper these ditches would be temporarily bridged.

From the furrow-bottoms the canes emerge irregularly. They range in number from 100 to 160 canes per 30-foot furrow, and when ripe are from 14 feet to 20 feet long, with an average stalk diameter of 1.60 inches. The weight of cut cane runs from 70 tons to 105 tons per acre, with an average of 86 tons. They contain 11 per cent to 12 per cent of fiber.



SUGAR CANE FIELD JUST PLANTED, SHOWING FURROWS AND WATERCOURSES.

CANE CUTTERS AT WORK ALONG LINE CUT OUT FOR TRACK.

The canes do not stand upright. Owing to their own weight, they lie along the ground for three-fourths of their length, with a perpendicular upturn for the remaining fourth, surmounted by the green leaves, or "top." After emerging from the soil, they reach out in all directions, forming a sort of mat of interlacing canes below these fairly upright tops. It will, therefore, be noticed that, with furrows 5 feet apart, the canes of above lengths will lie across two furrows, provided their growth be in that direction. The top to be removed consists of a portion of soft cane low in saccharine matter, of green leaves attached at their bases to the stalk, and of unformed leaves in process of growth. Any reaper must of necessity cut canes off where they emerge from the soil and cut off tops in a satisfactory manner.

Concerning the loading device, the illustrations show the condition of the canes. The canes when cut are laid upon the field on top of the loose leaves and tops. This mat of leaves is several inches thick. Canes are cut in lengths about 5 feet long. As far as possible, they are laid straight; owing, however, to the curving of cane stalks, they are frequently laid irregularly. Portable tracks are placed in the fields, running generally parallel to one another, from 150 to 250 feet apart. Cars are run on these tracks in trains of about forty in number, and placed to suit. The car bottom is 2 feet from the ground; its length is 11 feet, and breadth 6 feet. It is assumed that canes on the ground will have to be placed on the conveyer of loader by hand. Any machine for cutting or loading should be operated by either horse power, gasoline, or electricity. Any engine deriving its power from coal or wood, which would either drop cinders or throw sparks, cannot be used in a cane field.

The quantity of cane loaded per day at this particular plantation averages 1,150 tons. For season of 1902 this will be doubled. From this it will be gathered that competitors should design substantial machines, capable of handling cane in large quantities.

It is hoped that American inventors will not be backward in devising an acceptable reaper and loader. We already lead the world in agricultural machinery, and we shall probably continue to do so.

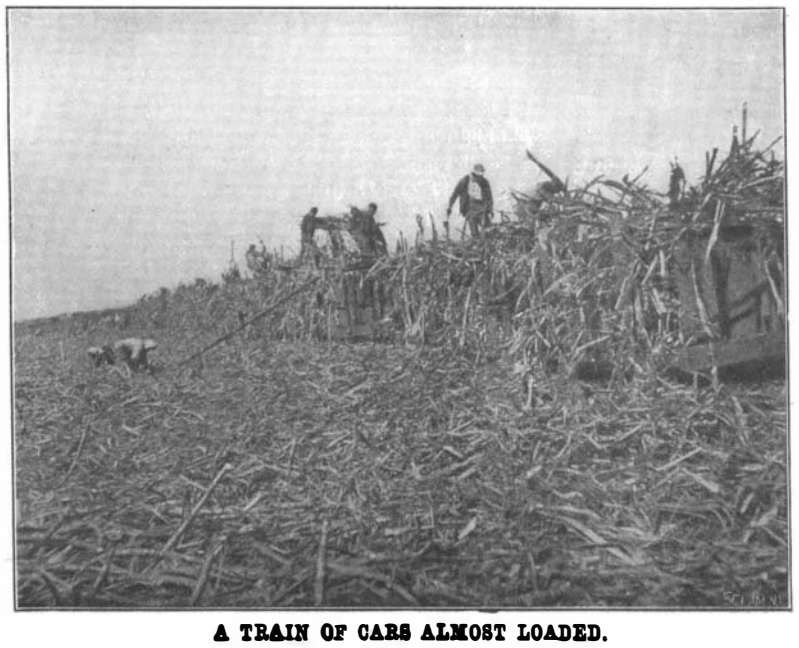
The Becquerel Rays.

A new technical journal, Kirchhoff's Technische Blätter, to be issued within a few days, will contain an interesting article concerning the latest rays.

In 1895, a French chemist discovered rays emanating from the element uranium, which possessed properties similar to the Roentgen rays. They were called Becquerel rays, after their discoverer. But while the discovery of Roentgen aroused great interest in the whole civilized world, leading to radical changes in medical diagnosis, the Becquerel rays were only employed in a very limited way in physical laboratories, and an assertion by the French scientist, Demarcays, that they were not emitted from uranium, but from a new element, made no impression.

Recent experiments by the Berlin High School of Technology have proven this assertion—that a new element is responsible for the Becquerel rays—and the interesting fact has been observed that these rays render almost every transparent substance luminous in the darkness.

These rays make it possible to tell genuine diamonds from artificial ones in the dark. This will prove of great practical importance in testing. The experiments have also resulted in obtaining, for the first time, larger quantities of the new element, which has demonstrated that rays emanating from a larger quantity make the air such a conductor of electricity that it is hoped this property can be utilized in wireless telegraphy. Experiments for this purpose are being made in the Berlin institution, but the deepest secrecy



A TRAIN OF CARS ALMOST LOADED.

LOADING CARS ON THE TEMPORARY TRACK.