SCIENTIFIC AMERICAN

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ELECTRICALLY OPERATED WATER SUPPLY PLANT, DE KALB, ILL.

For the water supply of De Kalb, Ill., a city of 3,000 inhabitants, the water has, until recently, been raised from a well close to a stand pipe, by means of steam pumps, requiring the usual services of an engineer and attendant. When an electric system of lighting was inaugurated in the city, a proposition was accepted by the authorities to have the pumps run by the surplus current from the electric plant, and this system was completed and put in operation in February last. Our illustrations, sketched from the works, show the manner in which this is accomplished. The smaller view at the top shows the former steam pump, boiler, coal house, and stand pipe. One of the dynamos in use at the electric plant fills the lower smaller view, while the Gould triplex pumps and motors are shown in the large general interior of the new pump house.

The water is raised from a well which is 900 feet deep, the water level being 65 feet from the surface of the ground, by a motor and lift pump, to a small supply reservoir just outside the pump house; from this reservoir it is taken by two large size Gould triplex pumps, and forced to the mains and stand pipe, the latter being 18 feet in diameter, power being obtained from electric motors of high running speed, and geared down, as clearly shown in our view.

The electrical plant is supplied with one double, upright direct-attached 150 horse power 50 kilowatt engine and dynamo, shown in lower small view, and two horizontal belt engines and dynamos, 100 horse power combined, 25 kilowatt. The Edison three-wire system is used, and the connection to the pump house is over a 0000 copper conductor.

The requirements were for a constant level of water

THE DE KALB, ILL., ELECTRIC PUMPS.

of 85 feet in the stand pipe, with an increased pressure in the mains in an emergency of fire, the increase of pressure being obtained by use of an automatic closing valve at the stand pipe, when a fire pressure was required. An ordinary pressure of 40 pounds is maintained in the mains for domestic service, and in case of fire the pressure is raised to 125 pounds.

The pump house shown is fully one-half mile from the electric plant, and the pumps are controlled entirely by means of a switch at the electric power house. The system has been found to meet all the requirements.

Corn Stalks and Cocoanut Husks.

In view of the great rapidity with which the modern rapid-fire guns can deliver shells, it has been felt for some time that, in addition to watertight subdivisions in war ships, other means of preventing any inflow of water should be used. The most favored method of accomplishing this result has been to fit a coffer dam, or double skin, for some distance above and below the water line, the space between being about three feet thick and filled with material which would expand and keep out water when a shot passed through. The material that was adopted in the United States navy for this purpose in 1892, called cellulose, is obtained from the husks of cocoanuts, being a brown, powdery substance, very light, and admitting of a good deal of compression. It was first used in France, and has been more or less used by various other foreign nations.

A Philadelphia inventor has recently brought to the attention of the Navy Department a new cellulose, composed of the pith of cornstalks which is granulated by machinery. Secretary Herbert has determined to thoroughly investigate the new substance, and a board of experts was appointed a few weeks ago to conduct experiments. This board had duplicate coffer dams constructed, measuring six feet square and three feet thick, one packed with cocoa fiber and the other with cornstalk cellulose. A six and an eight inch shell were fired into each. Water was then forced into the dams under pressure. The water failed to penetrate the Marsden or American cellulose dam, but oozed through the cocoa product in a short time.

The English battle ship Inflexible is protected by coffer dams filled with a mixture of cork and oakum, which aggregates in weight 143 tons. With the French cocoa cellulose this weight would be reduced to 43 tons, while the American corn product would not weigh over 25 tons and furnish, it is claimed, more reliable protection.

Photography in Natural Colors.

A. and L. Lumiere point out that the indirect method of photographing in natural colors has not received a proper practical application, because of the difficulty experienced in selecting the colors and in preparing and superposing the monochromes. They recommend the use of orange, green and violet screens for preparing three series of negatives presenting a maximum of sensibility to the rays which the respective screens allow to pass. Specimens of photographs so prepared were exhibited before the Paris Academy of Sciences. The printing and superposition of the monochromes have been successfully accomplished by employing bichromated gelatine to which are added substances insoluble under certain conditions. If, for example, 5 per cent of ammonium bichromate and 5 to 10 per cent of silver bromide in the form of emulsion be added to a 10 per cent solution of gelatine, and the preparation be spread in a thin layer upon a plate of glass, a surface is obtained which can be exposed under a negative and will reproduce the picture by the action of light. After exposure the plate is washed with cold water, and the portion of the film acted upon by light, being rendered insoluble, remains and serves to print the image from on the application of suitable colors. The sliver bromide, which, by the way, may be replaced by other insoluble precipitates, is easily removed by the action of sodium hyposulphite, and proofs can then be printed from the plate in any color, showing all the graduations of tint present in the negative. Polychrome prints may be obtained by receiving on the same plate monochrome red, yellow and blue images successively, by means of three corresponding negatives, and isolating each image from the preceding one by an impervious layer of collodion. By employing dyes of greater or less concentration or by simple decoloration with water, variation in the relative intensity of the monochromes is readily obtained.—Comp. Rend.

THE proprietors of the New York Recorder recently offered a prize for a relay bicycle race from Chicago to New York, distance by road about 1,000 miles. The race was finished on the 8th inst., time 64 hours 57 minutes and 30 seconds. A crowd of 10,000 persons gathered at the Metropolitan Bicycle Academy, corner 60th Street and Boulevard, New York, to witness the coming in of the two riders, the red and the blue. The finish took place at 1:57 A. M., when the red rider came in about an hour ahead of the blue.

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 1017.

For the Week Ending June 29, 1895.

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THE CELEBRATION IN GERMANY.

The ship canal recently opened across the northern peninsula of Germany was celebrated with rejoicings and festivities by the people of that great empire. On the invitation of the Emperor the representatives of the leading foreign governments took part; England, France, Russia and Italy sent some of their greatest war ships. The naval pageant was very grand. It is gratifying to know that the United States was represented by four such noble vessels as the Columbia, the New York, the San Francisco and the Marblehead. Report says the American ships presented a more attractive appearance and excited more interest than any of the assembled fleets, due, no doubt, to the white color of our ships, their clean and graceful lines.

The new canal, while it is a work of high importance to Germany as a means of defense in time of war, and of special commercial advantage in time of peace to her, to England and other nations of Northern Europe, is likely to be of little utility for ships of the United States. Seldom, probably, will American vessels have occasion to use the canal. Yet a stranger might have supposed, from the ringing cheers and enthusiastic demonstrations of the populace, as the Marblehead came into view and passed from town to town, bearing the star spangled banner through the windings of the canal, that Germany considered the Americans as holding the greatest interests, next to themselves, in the success and operations of the new waterway. Doubtless it was the presence of the glorious old flag, the symbol of free institutions, under which so many Germans, so many of their own kindred, live and prosper, under which so many of them have fought and died, that roused their feelings and caused their acclamations. Next to the emblem of the Fatherland, no ensign is so dear to the German heart as the flag of the American Union.

TEMPERATURES OF LAKES.

Mr. Desmond Fitz Gerald, at the annual meeting of the American Society of Civil Engineers at Nantasket, June 18 to 22, read an interesting paper on the temperature of lakes, based on experiments made by him during the past five years. The author deduced from his observations that in lakes and ponds less than 25 feet in depth the temperature at the bottom does not differ materially from that at the surface. In deeper bodies of water, however, the conditions are quite different. Experiments made on Lake Cochituate, the base of the Boston water supply, showed that when the surface is frozen during the winter the temperature at the bottom is usually 39·2 degrees. The strata of water lie in the order of their densities, and the temperature decreases gradually until within a few feet of the surface, when it suddenly falls to a point just above freezing. The disposition of the strata is not disturbed after the forming of the ice until the spring thaws. By April 1, the surface water has become warmed to the same temperature as that at the bottom, and, as the whole body is in more or less unstable equilibrium, the winds and currents are sufficient to produce circulation from top to bottom. This continues until the first of May, when the surface temperature has risen about five degrees above that of the bottom. The consequent difference in density prevents further circulation, and, while the warming of the surface continues, the temperature of the bottom remains stationary until the middle of November.

During this period the summer stagnation takes place. The lower layers of the water gradually collect all the organic matter from the upper layers, and decay continues until there is no more oxygen left to support it. At the same time the water grows darker and more impure until by October it is usually offensive to the smell and has a dull yellow color. About November 1 the temperature of the bottom begins to rise, until by the middle of the month it has increased from 20° to 30°, at which point it equals that of the surface.

The temperature of the whole mass then falls at nearly the same rate during a second period of circulation until the surface freezes and stratification again takes place. During the November circulation, and again in the spring to a less extent, all the impure water at the bottom is brought to the surface and the infusoria and diatoms spring into life in great numbers, owing to the union of the organic matter from the bottom with the oxygen in the surface water.

Block Island Ship Canal and Harbor.

The new canal connecting Great Salt Pond, on Block Island, with the ocean, has been practically completed by the Hartford Dredging Company. The canal makes an entrance with one of the finest land-locked harbors along the Atlantic coast. The width is 400 feet and the depth 14 feet. The distance excavated from water to water is 600 feet. Inside the lake the excavation extends 200 feet, and outside the ocean entrance has been deepened for 400 feet, making a total of 1,200 feet. The breakwater is 600 feet long. This year $50,000 has been appropriated for the work, and last year $25,000.