if, therefore, the engine we calculated of 9½ tons total weight carries 4,540 pounds of water it would require 550 pounds of steam at the commencement of each journey. According to the facilities provided for charging the reservoirs the time required between the arrival of a locomotive and the departure of its train varies between twenty and thirty minutes; if, therefore, a train is to start every five minutes from four to six engines will always be in the boiler house for charging. Adding to a journey of forty-five minutes, twenty-five minutes for charging, we have seventy minutes as the total time employed, and if trains are to run every five minutes, fourteen locomotives will be required, of which nine are running while five are being charged. Since these engines would probably be worked five days out of six, only three more engines would be required, and a reserve of three more would complete a plant of twenty locomotives for a constant service. If this service is carried on with the locomotives we have been several times referring to, of 9½ tons weight, we should require three boilers of 720 square feet of heating surface, each to supply twelve engines every hour. The stationary plant should, however, of course, have one standing boiler, and consist of four boilers of this size.

This system of fireless engines was first introduced by Dr. Lamm, of New Orleans, in 1872, and the first engines were started on this principle in 1874. Dr. Lamm, however, died soon afterward. M. Lion Francq, of Paris, built an engine on this principle in 1874–75, in which he introduced numerous improvements, and in the following year a series of careful trials were made with these engines. At present M. Lion Francq is manager of the Compagnie Continentale d'Exploitation des Locomotives sans Foyer in Paris, and this company is working the system of fireless locomotives.

The Hohenzollern Locomotive Works, at Düsseldorf, are at present building a large number of fireless locomotives and plant for Java, and an interesting series of comparative trials is now being carried out on an experimental line near to these works between fireless and ordinary locomotives.

The fireless locomotives are being fed from one of the stationary boilers built for Java, and run the whole distance for which they are afterwards intended, drawing behind them the proper train weight. These trials afford an excellent opportunity for all interested in light and cheap steam tramway traffic to compare the fireless with the old system.—*Engineering.*

Aconite in Dysentery.

Dr. Owen reports the results of one hundred and fifty-one cases of *acute dysentery treated with aconite.* He was induced to look about for another treatment than the conventional one with ipecac, on account of the nausea which often attends the latter, and which often drives hospital patients, especially, to rebel against a repetition of the dose. Dr. Owen gave the tincture of the British pharmacopœia, which is of one-sixth the strength of Fleming's tincture. He gave one minim every fifteen minutes for the first two hours; after that, one minim every hour. This would make thirty minims in twenty-four hours. Dr. Owen feels that his experience in one hundred and fifty-one cases justifies him in speaking quite positively in favor of the treatment. In his paper he gives a very good analysis of his results.—*N. Y. Med. Journ.*

Quick Work at an English Colliery.

A note was made recently of an example of rapid raising of coal at an American colliery. The following, which is regarded in England as a remarkable instance of expeditious work, will serve for comparison: Pit No. 3, Newlands, near Baillieston, Braehead Collieries, is 120 fathoms deep. The engines are coupled horizontal, 18 inch cylinders, 4 feet 6 inch stroke, and the quantity of tubs drawn from the shaft for one shift was 1,865. The cages are double, holding two tubs abreast. For one hour's winding during the day there were drawn 240 tubs, giving an average for drawing, changing, etc., of 30 seconds for each "tow." The above quantity is coal only, so that including rubbish, etc., drawn during the shift, there were considerably over 1,900 tubs brought to the bank. The average output is about 1,600 tubs per day.

Waterproof Paper.

According to the *Journ. Soc. of Arts*, a strong, impervious parchment-paper is obtained by thoroughly washing woolen or cotton fabrics, so as to remove gum, starch, and other foreign bodies, then to immerse them in a bath containing a small quantity of paper pulp. The latter is made to penetrate the fabric by being passed between rollers. Thus prepared, it is afterwards dipped into sulphuric acid of suitable concentration, and then repeatedly washed in a bath of aqueous ammonia until every trace of acid has been removed. Finally, it is pressed between rollers to remove the excess of liquid, dried between two other rollers which are covered with felt, and lastly calendered.

Washington Monument.

Washington monument now exceeds 300 feet in height, and is rising at the rate of about a foot a day. The workmen are protected by a strong netting which surrounds the top of the monument. Already the net has saved the life of one workman, who was blown from his place by a gust of wind.

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(Illustrated articles are marked with an asterisk.)

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THE SCIENTIFIC AMERICAN SUPPLEMENT,

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Price 10 cents For sale by all newsdealers.

THE JEANNETTE EXPEDITION.—LIEUTENANT DANENHOWER'S LECTURE.

Lieutenant J. W. Danenhower, of the unfortunate exploring expedition in the Jeannette, has prepared a course of lectures on the experiences and results of the expedition, illustrated by large and carefully prepared charts of the regions traversed. His first lecture, delivered in the Brooklyn Academy of Music, October 3, was quite successful.

The dangers of the expedition began when Wrangell Land was sighted, September 6 1879, and the Jeannette entered the ice fields. The sun disappeared September 9, and soon after the vessel was caught in the ice field, which did not relax its grasp until the following June, and then only to allow the vessel to sink. The Arctic night was very dark between the hours of eight and ten of our mornings, but at other times was clear except during storms. The auroras were not so bright as the lecturer had seen at home. Among the displays were auroral curtains and arches.

The absence of icebergs in the part of the Arctic Sea traversed by the Jeannette was specially noticeable. The ice which covered the sea in all directions was true polar ice, the frozen salt water of the sea, which grows from eight to ten feet in thickness in a single winter, and when broken up by the winds and currents becomes tumbled and heaped as "pack ice." The chief amusement during the winter was hunting seals and bears. The bears of that region were not at all formidable, the largest killed weighing about 1,100 pounds. During the first year the crew had bear's meat twice a week, but preferred pork and beans. The diet of civilized life, as afforded by canned meats and vegetables, was not only more acceptable to all, but more wholesome than bear's meat and seal's blubber. The only trouble with the canned provisions was the bad material of the cans. The tin contained lead, and several of the men were poisoned by the tin dissolved by the food stuff in the cans. The summer season proved less comfortable than winter, owing to chilling fogs and the general dampness of the ship.

The sinking of the Jeannette was vividly described. The retreat of boats to the Siberian shore began on the anniversary of the Battle of Bunker Hill, June 17. After Bennett Island was sighted the party were fifteen days going twenty-five miles to reach it. The retreating party was scattered by the separation of the boats in the gale and increasing darkness of September 12. Of the delta of the Lena, Lieutenant Danenhower said that instead of nine mouths, as laid down on the charts, there were really 100 rivers flowing north and cutting up the region into sand banks and mud flats.

ACCIDENT WITH ELECTRIC LIGHT WIRES.

The first fatal accident with electric light wires in this city occurred October 4, the victim being an experienced line man in the employ of the Brush Electric Light Company. He was engaged in splicing a "live" wire to increase its length so that it could be transferred to another and higher pole. To do this without interrupting the current the splice had to be inserted as a loop around the point to be cut; and in making the loop connections the insulating material of the wire had to be scraped away to secure contact of the naked wires. The rule of such work is to complete one connection before beginning the other, and to complete both connections before cutting the wire, exercising meantime the utmost care to avoid touching the wires so as to allow any portion of the body to be brought into the circuit of the electric current or any part of it. By some slip or other unexplained mishap, the line man failed to properly observe these precautions, and the failure cost him his life. He was caught by the wires in such a way that he did not fall to the ground, though he was unconscious from the moment he received the shock. The fact that he did not die instantly is thought to prove only part of the current passed through his body. The palms of both hands were burned. The wire from which the fatal shock was received was carrying electricity for forty lights of 2,000 candle power each.

FIREPROOF UPPER WORKS FOR STEAMERS.

The need of incombustible upper works for river steamers is once more made emphatic by the burning of a magnificent passenger boat with heavy loss of life. Early in the morning of September 30, the Robert E. Lee, one of the finest and fastest of the large steamers plying on the Mississippi River, was destroyed by fire about twenty-five miles below Vicksburg, Miss. The origin of the fire is not known. It was first observed by the engineer, who instantly warned the pilot. The boat was headed for the shore, against which she was driven with such force as to be firmly fastened. All in the forward part of the vessel quickly escaped; of those aft of the fire twenty or more were lost; the rest were picked up by passing boats. Great credit is given to the pilot, John Stout, who, though surrounded by fire, remained at the wheel, and to the engineer, William S. Perkins, who stood at his post until the pilot announced that the boat was ashore. So rapid was the fire that it was impossible for the passengers or officers to save anything but the clothes they had on. Clerk Bell, who gave the warning, was followed by the fire so rapidly that he escaped with great difficulty. The vessel burned, he said, "like gunpowder."

The R. E. Lee was a side wheeler, of 1,479 tons burden; length, 315 feet; beam, 48 feet; with storage capacity for 9,000 bales of cotton. She had 9 steel boilers, each 32 feet long and 42 inches in diameter, 40 inch cylinder, and 10 feet