Her dimensions are 140 feet over all; beam, 33 feet; draft, light 4½ feet, loaded, 7½ feet; beam of pontoon (amidships), 10 feet; depth of hold, 10 feet. In each pontoon is a compound surface condensing engine, with two cranks set at 90 degrees, the stroke being 14 inches, and the cylinders 12 and 24 inches in diameter. As auxiliary apparatus the vessel carries a circulating pumping engine, condenser, air pump, two feed pumps, two injectors, a fire and bilge pump, two ventilating engines, besides gearing controlling the cargo compartment doors. The vessel has a speed of eight miles an hour. Her capacity is 400 tons of ashes.

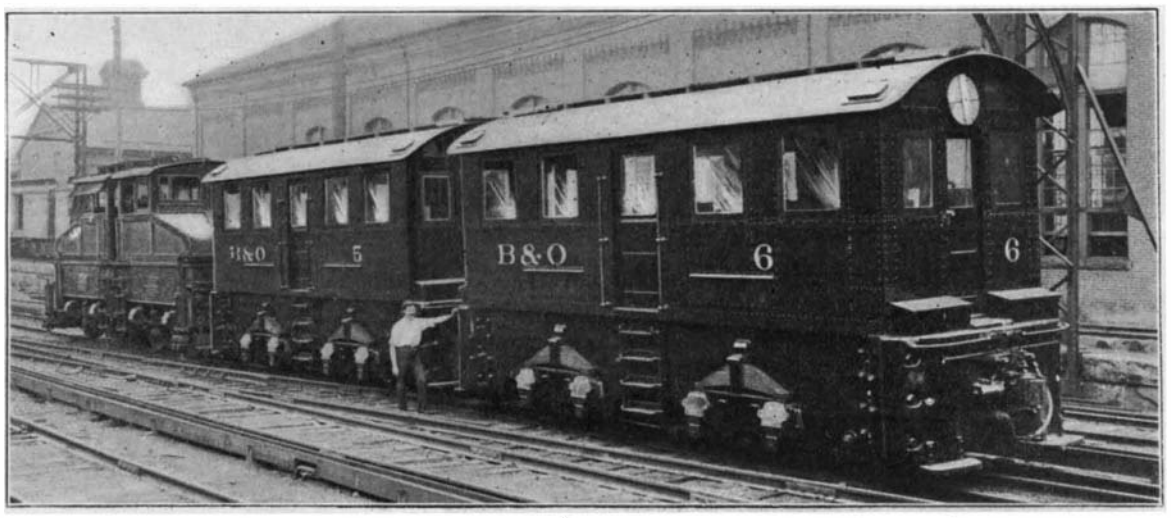
Commissioner Waring had adopted the plan of selling the manure street sweepings for use as a fertilizer. The termination of his commissionership and his untimely death unfortunately prevented him from carrying out this plan personally. Commissioner Woodbury has, however, realized to a great extent Col. Waring's idea, and is now selling 1,600 sacks daily to the Long Island division of the Pennsylvania Railroad for the grassing of cuts on the south side of Long Island.

Brief mention has previously been made to the filling in of land about Riker's Island with the ashes of the city. It is largely due to the present administration that in this manner land has been formed which in value more than offsets the cost of handling the filling material, and which has filled the city's pockets with thousands of dollars. In an empty crib inclosing 63½ acres, ashes have been dumped at the rate of 100,000 cubic yards per month. By this scheme the city has acquired land worth $630,000 at an expense considerably less than would have been entailed had the same material been towed out to sea and there dumped.

A HEAVY ELECTRIC LOCOMOTIVE.

The most powerful electric locomotive in the world has just been built by the General Electric Company at Schenectady, for the Baltimore & Ohio, for use in the tunnel at Baltimore. It will handle all the freight traffic of the Baltimore & Ohio which passes through Baltimore, and will operate over the same section as the present electrical locomotives built by the General Electric Company, and which have been in successful operation for the past eight years.

The specifications called for an electric locomotive capable of handling a 1,500-ton train, including the steam locomotive, but excluding the electric locomotive on a maximum grade of 1½ per cent at 10 miles per hour, with corresponding higher speed on lighter grades. This required a weight of approximately 160 tons on the drivers for purposes of adhesion, and it was decided that the most practicable scheme was to build an articulated locomotive consisting of two complete 80-ton units, operated together as one locomotive by means of the Sprague-General Electric multiple unit control system.



THE OLD AND NEW ELECTRIC LOCOMOTIVES OF THE BALTIMORE & OHIO RAILROAD.

The section of the road to be operated runs from Camden Street Station, through the tunnel, to the summit of the grade outside the tunnel, a distance of 3½ miles. Under practical operating conditions the motors have sufficient capacity to maintain this service hourly, running loaded up the grade and returning light.

The whole locomotive consists of eight G. E. 65 motors, four on each section. These motors have a capacity of 225 horse power each, making a total capacity of 1,800 horse power. The main body of the truck frame consists of a rectangular framework of cast steel built up of four pieces, two side frames and two end frames, made strong and heavy. The parts are machined at the ends and securely fitted and bolted together, forming a strong and rigid structure capable of withstanding the most severe shocks without injury. The end pieces form the buffer beams, and to these a suitable standard draft gear of approved design is attached.

The journal boxes slide in machined jaws in the side frames protected by wearing shoes. The truck frames are supported at four points on equalizers. Each equalizer rests on a pair of half elliptic springs, the ends of which are supported on top of the journal boxes through suitable wearing plates. The journal boxes are made quite similar to standard car journal boxes, the parts, however, being made larger and stronger. The brasses can be easily removed, and by dropping down the wearing shoes it is possible to remove a complete journal box without removing the wheels and axles or other parts of the truck. In order that the locomotive may round curves easily, the axles are given considerable lateral movement in the journal boxes, reducing the effective rigid wheel base.

The steel-tired spoke wheels have tires 2⅞ inches thick, with M. C. B. standard tread and flange, and are securely held in place by approved fastenings. The axles are made of forged steel, machined all over, with 6-inch by 12-inch journals, 8-inch diameter wheel fit, and 7½-inch diameter motor bearings. The cab is large and roomy, with the floor resting on the truck frame. The lining floor is made of 1¾-inch hard pine, tongued and grooved, the upper floor of hard pine ⅞ inch thick, tongued and grooved, and laid in the opposite direction from the lining floor. The sides and roof of the cab are made of sheet steel. On each side there is an entrance door, and at each end there is an additional door, which permits of ready communication between sections when coupled together. Large windows afford an unobstructed view in all directions.

The controlling apparatus, consisting of master controller, engineer's valves, etc., is in duplicate, a complete set being located in diagonally opposite corners of each cab so that the engineer can stand in the front end of the locomotive when running in either direction.

Each section of the locomotive is equipped with a bell and whistle, two locomotive headlights, air-brake apparatus, including two engineer's valves and air gages, the necessary brake cylinders, foundation brake gear, air reservoirs, couplers, draft gear, and pneumatic track sanders. The control system is so arranged that each section may be operated independently, or two or more sections coupled together.

The Pennsylvania Railway Tunnels in New York.

The plans for the construction of the Pennsylvania Railway tunnels under the North and East rivers have been decided upon. The North River tunnel will comprise two single cast-iron tubes entering the city at the foot of West Thirty-second Street and running underneath that street. The shield process will be used in its construction. In order to insure safety, the tunnel will be provided with two concrete sidewalks on a level with the car windows, the object being to provide exit for the passengers in case of accident. The warning given by the recent Paris disaster has not been ignored. The plans include a lighting current separate from that which operates the cars. Numerous hydrants and hose nozzles will be provided in case of fire. The East River tunnel will be similar in construction to the North River tunnel, but will carry four tubes.

New Balloon Experiments of Count Zeppelin.

According to the Swiss journals, a new activity reigns at Manzell, on the eastern shore of Lake Constance, which has become celebrated from the airship trials of Count Zeppelin. It appears that the aeronaut, whose emulation is awakened by the results of the recent airship trials, has decided to begin a new series of experiments. It will be remembered that after making several trips over the lake with his immense balloon, he was obliged to abandon the experiments for lack of funds. Count Zeppelin is firmly persuaded that the dirgible balloon will soon enter the domain of practice, and is now to renew the trials which have already cost such a large outlay.

The danger from electricity, particularly for the fireman in directing a stream of water upon an object carrying electric current, was the subject of an article in a recent issue of Energie, of Berlin, recording the results of a number of tests. A man wearing wet shoes and standing on a wet plank flooring, threw a jet of water on an electrified plate. At 500 volts and an aperture of 0.74 inch in the nozzle, he felt the current at a distance of 2¾ feet, and with an aperture of about 2 inches could not get nearer than about 3¼ feet. Under the same conditions, but with alternating current, he could not stay within 8.2 feet, and at 3,600 volts he had to remain at a distance of 26¼ feet.

The Azure Sky—Its Cause.

BY J. W. DAVIDSON.

Everyone notices the blue color of the sky. It has grown familiar to us by daily observation from childhood, yet few persons realize the great scientific and artistic interest attaching to this beautiful color.

Sir Isaac Newton tried to explain the color in the year 1675, by referring it to the blue colors seen in thin soap bubbles used in his experiments. He thought the air above our heads was filled with small particles of water, which reflect the blue portion of the sun's light falling upon our earth, and thus produce the blue tints of the firmament.

Sir John Herschel explained the color of the sky by Newton's theory, but later writers have proved that in some important respects his theory was wrong.

In 1869 Prof. John Tyndall, the famous British physicist, found that he could produce "sky blue" by experiments in the laboratory.

For this purpose he filled a glass tube about a yard long, and three inches in diameter, with air of one-tenth the ordinary density mixed with nitrite of butyle vapor, which is extremely volatile. Then on passing through the mixture a powerful beam of electric light, in a room otherwise dark, the mixture precipitated a beautiful blue cloud, which in color rivaled the finest Italian sky. Further experiments proved to Tyndall that he had at last discovered the secret of the blue color of the sky, which had puzzled the greatest philosophers of all ages.

Lord Rayleigh, the famous professor of experimental physics at Cambridge, England, and one of King Edward's original twelve members of the new Order of Merit, has investigated Tyndall's theory of the color of the sky by profound mathematical researches extending over many years. He confirms Tyndall's theory that the blue arises from the reflection of sun's light from small particles in the air less than one one-hundred-thousandth of an inch in diameter. Billions and trillions of these atomic particles fill the atmosphere, and by reflecting the blue part of the sun's light give the dome of the heavens a bluish tint.

Some of the particles are water; but most of them are composed of the oxygen and nitrogen which we breathe.

Prof. T. J. J. See, of the United States navy, is one of the American scientists who have studied the subject in another aspect. He has observed the color of the sky in various altitudes in high mountains, and in dry and moist countries, such as Egypt and Greece, and Arizona, and the Mississippi Valley. His conclusion is that the beautiful red colors of sunsets and sunrises so much spoken of by Greek and Roman writers, and so often illustrated in landscape painting, arise from water vapor in the lower layers of our atmosphere, absorbing the blue and transmitting the red light. According to Dr. See, the reddish colors come from that part of our air within five miles of the earth's surface, while the deep blue of the sky arises from reflections of minute particles in the higher parts of our atmosphere. The water vapor does not extend very high, clouds never rising higher than ten miles above the earth. The blue streaks cast by clouds at sunset show that the red arises near the earth, while the blue has its seat very high up. Above our atmosphere the sky has all the blackness of the darkest night.

Prof. See has watched the duration of the blue sky after dark, and found it to continue for about an hour and fifteen minutes, and from this he shows that our atmosphere extends to a height of fully one hundred and thirty miles. Astronomers have usually found the height of the atmosphere by computing the height of meteors, but none ever made the height of the atmosphere over one hundred miles.

The study of the blue color of the sky thus proves also that our atmosphere extends considerably higher than scientists have heretofore supposed.

On our dark days the blue color of the sky is shut out by clouds, and combinations of colors due to reflecting clouds and countless myriads of particles in the ethereal regions high above the earth give the bright light which is so much relished in daily life. The nature of the blue sky so much admired by all mankind since the days of Homer and Job, now fully explained by modern science, still preserves its ancient beauty, and will inspire man's mind through coming ages.

Among the interesting exhibits shown by Arizona at the World's Fair will be an ostrich farm.