

TRIPLE EXPANSION ENGINES FOR A TUGBOAT.

The seaboard coal-carrying trade, especially that from the Delaware and Chesapeake to the large Eastern cities, has for a number of years furnished employment to a class of powerful tugs, capable of towing two and sometimes three loaded barges, carrying from 1,000 to 3,000 tons of coal each per trip. Some of these barges are especially constructed of iron for this service, while others may be the hulls of large ships displaced from business in other lines, a large variety of craft being thus employed during particularly busy seasons, their almost constant presence in some portions of Long Island Sound and in the waters in the vicinity of New York City being at all times a noticeable feature. The tugs used in this service must, however, be very powerful and adapted for considerable sea service, while the conditions of the business require their being run with the utmost efficiency possible.

The engines shown in the accompanying illustration are those of a boat of this class, the Triton, built by the Atlantic Works, East Boston, Mass., and owned by Capt. Fred. Luckenbach, of this port. The vessel is a fine representative of a new and staunch type of tug especially adapted for such service, with a length of 130 ft. 10 in., beam 26 ft. 6 in., depth of hold 14 ft. 6 in., and draught 13 ft. 6 in., the hull being of white oak, copper fastened. The engines are of the inverted vertical triple expansion description, with a high pressure cylinder of 15½ in. diameter, intermediate pressure cylinder of 24 in. diameter, and low pressure cylinder of 40 in. diameter, and a thirty inch stroke. The cylinders are of hard-grained cast iron, with the valve faces separate and bolted on. The crossheads are of wrought iron, with journals forged on, and gibs of cast iron, babbitted. The connecting rods are of wrought iron, and the line shaft is of wrought iron, 8½ in. diameter. The piston rods are of mild steel, 3½ in. diameter. The surface condenser forms a part of the framing, and has 950 square feet of cooling surface. Each engine has an independent cut-off, the connection of links to eccentric rods and to valve stem being adjustable, so that each link may be adjusted independently, and a steam reversing gear is provided, operated by a lever in the engine room. The screw is of cast iron, 10 ft. in diameter. The boiler is of the Scotch flue type, 13 ft. 6 in. diameter and 11 ft. 3 in. long, and is built for a working pressure of 156 lb. per square inch. The machinery is all strongly built and well finished. There is no extra work for ornamentation, but every part has the appearance of solidity, and is evidently intended to give a high degree of efficiency. Her indicated horse power on trial was 720. The design of the engines and arrangement of the cylinders, the high pressure being independent from the intermediate, is the design of James T. Boyd, constructing engineer of the Atlantic Works. The Triton is fitted with steam windlass forward and a gipsy aft, furnished by the American Ship Windlass Company, of Providence, R. I.

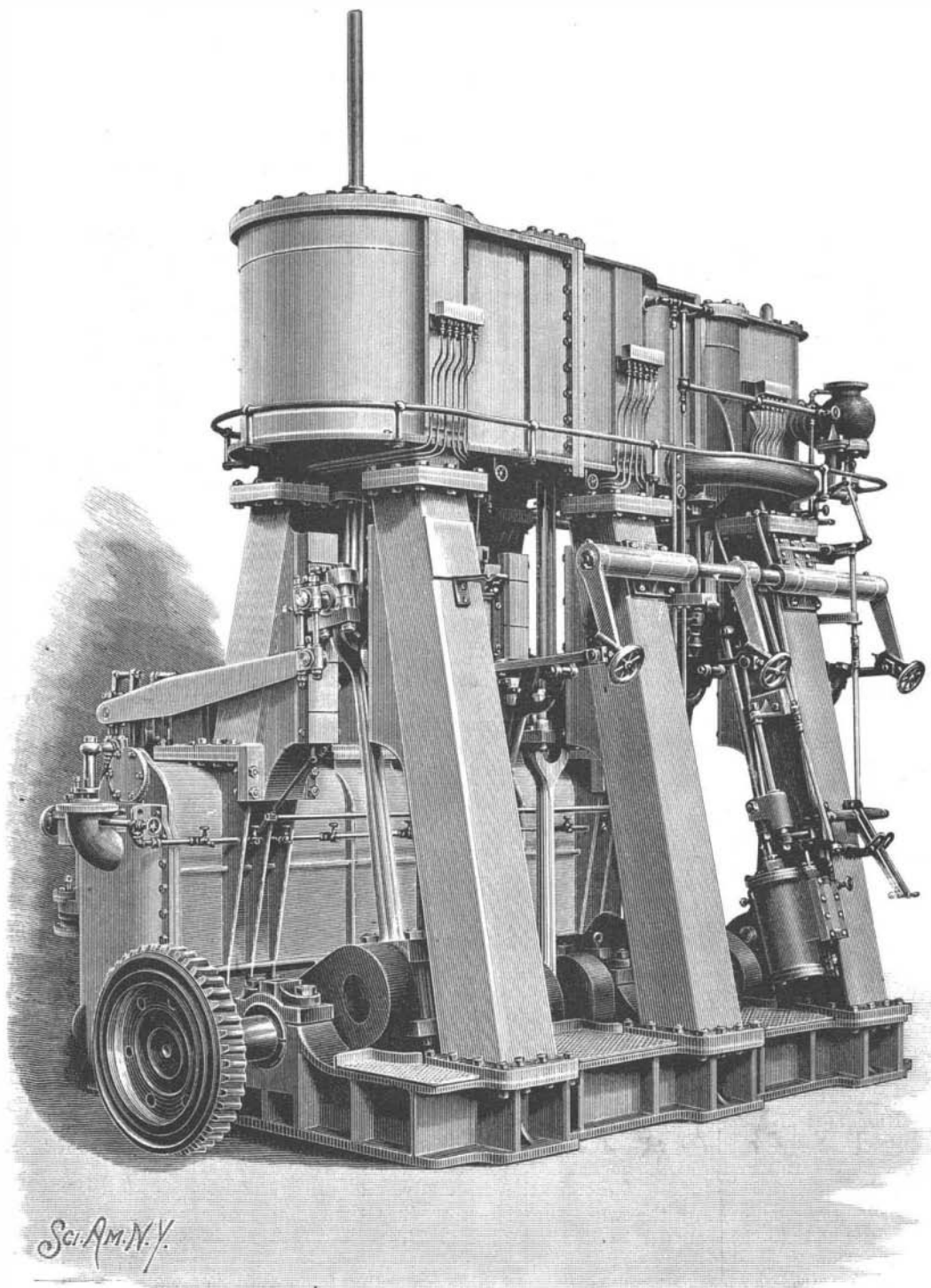
Manipulation of the Nasal Mucous Membrane.

Dr. Von Cederschiold has for some years employed a kind of manipulation, which he considers is of the nature of massage, in various affections of the nasal and pharyngeal mucous membrane. He first tried this kind of treatment on himself while suffering from chronic pharyngeal catarrh following diphtheria, and since then he has had opportunities of using it on a hundred cases in Stockholm. The instrument for the nares consists of a double spiral of silver wire about five inches in length, provided with a small wooden handle at one end and a loop or eye at the other. This loop serves to fasten one end of a strip of batiste—a material of which infants' frocks are made—which is wound round the spiral so as to cover it completely before the process is commenced. The instrument is gently introduced into the nostril, and moved to and fro. For the pharynx a sponge holder is used, carrying a pledget of cotton wool, which, as well as the metal parts, is

carefully covered over with batiste. Gentle but rapid friction movements are made with this over the mucous membrane of the pharynx or naso-pharyngeal space. Not content with manipulating these regions, Dr. Von Cederschiold has actually invaded the interior of the Eustachian tube. For this purpose he employs a spiral similar to that used for the nares, but much finer, fine enough, that is to say, to be introduced into the tube through an ordinary Eustachian catheter.—*Lancet*.

Sixty Ruined Cities in Yucatan.

There are a few more than sixty ruined cities in Yucatan, so far as they have been discovered. Within a radius of one hundred miles from Merida are such magnificent examples as Mayapan, Ake, Chichen-Itza, Kabah, and Labna, but none is more interesting and grand than Uxmal, about seventy-six miles by road travel from Merida. By far the finest building in the city, both from its commanding position on a lofty eminence and the completeness of its preservation, is

**TRIPLE EXPANSION ENGINES FOR THE OCEAN TUG TRITON.**

the Royal Palace, otherwise known as the Casa de Gobernador, in Spanish. It stands on the topmost of three terraces of earth—once, perhaps, faced with stone, but now crumbled, broken, and in a stage of heterogeneous decay. The lowermost and largest is 575 ft. long, the second 545 ft. long, 250 wide, and 25 ft. high, while the third and last is 360 ft. in length, 30 in breadth, and 19 in height, and supports the building, which has front of 322 ft., with a depth of only 39, and a height of but 25 ft. It is entirely of stone, without ornament to a height of about ten feet, where there is a wide cornice, above which the wall is a bewildering maze of sculpture. The roof was flat and once covered with cement, in the opinion of some travelers, but is now covered with tropical plants, trees, and verdure. There are three large doorways through the eastern wall, about eight feet square, giving entrance into a series of apartments, the largest of which is 60 ft. long and 27 deep, divided into two rooms by a thick wall. The ceiling of each room is a triangular arch, capped by flat blocks, at a height of 23 ft. above the floor. The latter, like the walls and jambs of the doorways, is of smooth-faced stones, that may once have been covered with cement.—*Philadelphia Telegraph*.

The Direct Production of Light.

In a paper contributed to the *Revista Maritima*, Signor Giulio Bertolini gives a summary of the remarkable experiments of Professor Hertz on electrical undulations, which were designed to verify the suggested identity of light waves with electrical oscillations of the ether. Faraday thought this might be true; and Maxwell was also led to conclude that electrical action is transmitted through space by means of oscillations of the same order as the luminous waves; the difference between the two phenomena depending only on the difference in the wave lengths. Prof. Hertz's experiments are now declared to have demonstrated: (1) That the medium which intervenes in the phenomena of electrical action is the same as that which is the seat of luminous phenomena; (2) that both species of perturbations are propagated under the same conditions, and with equal velocity; (3) that there is identity of nature between certain electrical and luminous phenomena. Moreover, it is stated that one of the greatest triumphs of Professor Hertz consists in having realized an arrangement whereby the length of the electrical wave is considerably diminished; thus approaching the character of the luminous wave, and shadowing forth a prospect of the direct industrial production of electric light. Indeed, different sources of artificial light can be compared by other than photometrical methods. Thus the lamps may be enclosed in an opaque calorimeter which measures the total energy of radiation, and again in a transparent calorimeter which permits the light radiations to escape. The energy represented by the latter will then be measured by the difference between the two calorimetric determinations. Experiment has given the following results for the ratio of duty of different luminous sources which can be measured in this way as light, the total radiations being taken as unity: Candle, 0.00298; petroleum lamp, 0.00315; gaslight (kind not stated), 0.00317; oil lamp, 0.00442; incandescent electric lamp, 0.06; arc lamp, 0.1. Thus the electric arc lamp, which gives the highest duty of all, wastes nine-tenths of its energy in non-luminous, invisible heat rays. If these rays could only be quickened, they would appear as light; and Professor Hertz is in hopes of being able to do something toward this end by manipulating alternating currents.

Miscellaneous Notes.

The earthquake in Northern California, on January 2, is reported by Prof. Holden, of the Lick Observatory, to have been the most severe experienced in that district since 1868. The ceilings of the observatory were cracked, the plaster falling to the floor. The large equatorial telescope is, however, believed to be uninjured.

The most northerly railroad on the globe is the new railway from Lulea in Sweden, on the Gulf of Bothnia, and Elvegaard in Norway, on the Atlantic, on the fiord of Ofenten, thus cutting the Arctic circle. The new railway will be opened next summer.

Resistance of the Air to a Locomotive.—Experiments on the French railways show that the resistance of the atmosphere to the motion of high-speed trains amounts often to half the total resistance. Two engines, of which the resistance was measured separately and found to be 19.8 pounds per ton at 37 miles per hour, were coupled together and again tried. The resistance fell to 14.3 pounds per ton. The second engine was masked by the first. It may be argued from this that by a suitable adaptation of the front of a locomotive, electrical or otherwise, a saving of from 8 to 10 per cent of the effective power could be made.

Distilled Spirits Consumed in the Arts.

According to the new census report, prepared by Mr. Henry Bower and Mr. Henry Pemberton, Jr., the total quantity of distilled spirits consumed in the arts, manufactures, and medicine in the United States during the twelve months ending December 13, 1889, was 10,976,842 proof gallons.