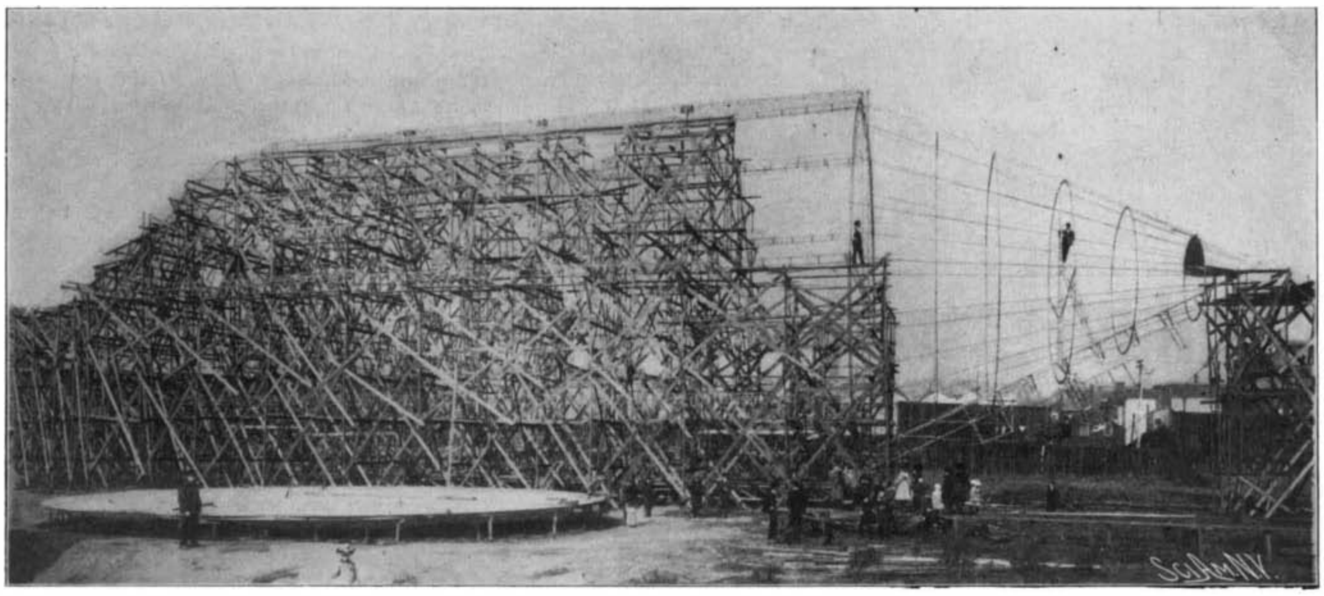
THE STANLEY AIRSHIP.

One of the competing aerostats for the airship prize offered by the St. Louis Louisiana Purchase Exposition will be the Stanley airship. Although not the largest vessel of its kind ever built, the airship will, nevertheless, be noteworthy for its size.

The contrivance will have a total length of 228 feet and will consist of a cylinder 116 feet long, tapering at either end in a cone 56 feet long. The diameter of cylinder is likewise 56 feet. The entire machine will weigh 13,000 pounds, but the lifting capacity of the hydrogen gas with which it will be filled will be 21,000 pounds. Accommodations for thirty passengers with their baggage have been provided. Besides passengers, allowance has also been made for mail matter weighing 1,000 pounds and 1,000 pounds of ballast. The inventor hopes to attain rather fabulous speeds. His best time he thinks will be 130 miles an hour; his worst he places at 70 miles an hour. These speeds are to be obtained with propellers 10 feet in diameter moving at the rate of 800 revolutions per minute. Besides rudders, side planes are to be used for the purpose of keeping the ship in proper longitudinal trim.



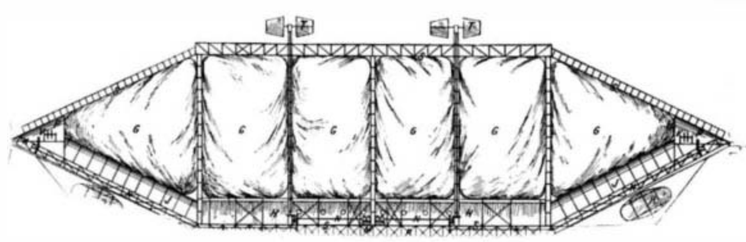
THE FRAME OF THE STANLEY AIRSHIP

The novel features of the airship, according to its inventor, are the manner of propulsion, control over elevation, ability to descend at will, and adjustable propeller blades.

The airship is divided longitudinally into two parts by a partition running the full length of the ship 12 feet above the keel. The lower of the two parts thus formed will contain the motive power, machinery, passengers, and freight. The upper part is to be divided into six compartments to contain the hydrogen gas. Each compartment will be provided with an inner skin of silk to prevent leakage of the gas.

The propellers are placed at the apex of each cone. A rudder beneath each cone will guide the ship horizontally; while a series of side planes or side rudders will control the vertical movement. Top propellers are provided for the purpose of controlling the ship in rising and for the purpose of forcing it down when a landing is to be made.

It is said that a model has been built which works satisfactorily. The information which we are able to give is meager, but it is all that can at present be obtained. It remains to be seen whether the inventor's claims will be fulfilled when the airship is completed. J. M. B.

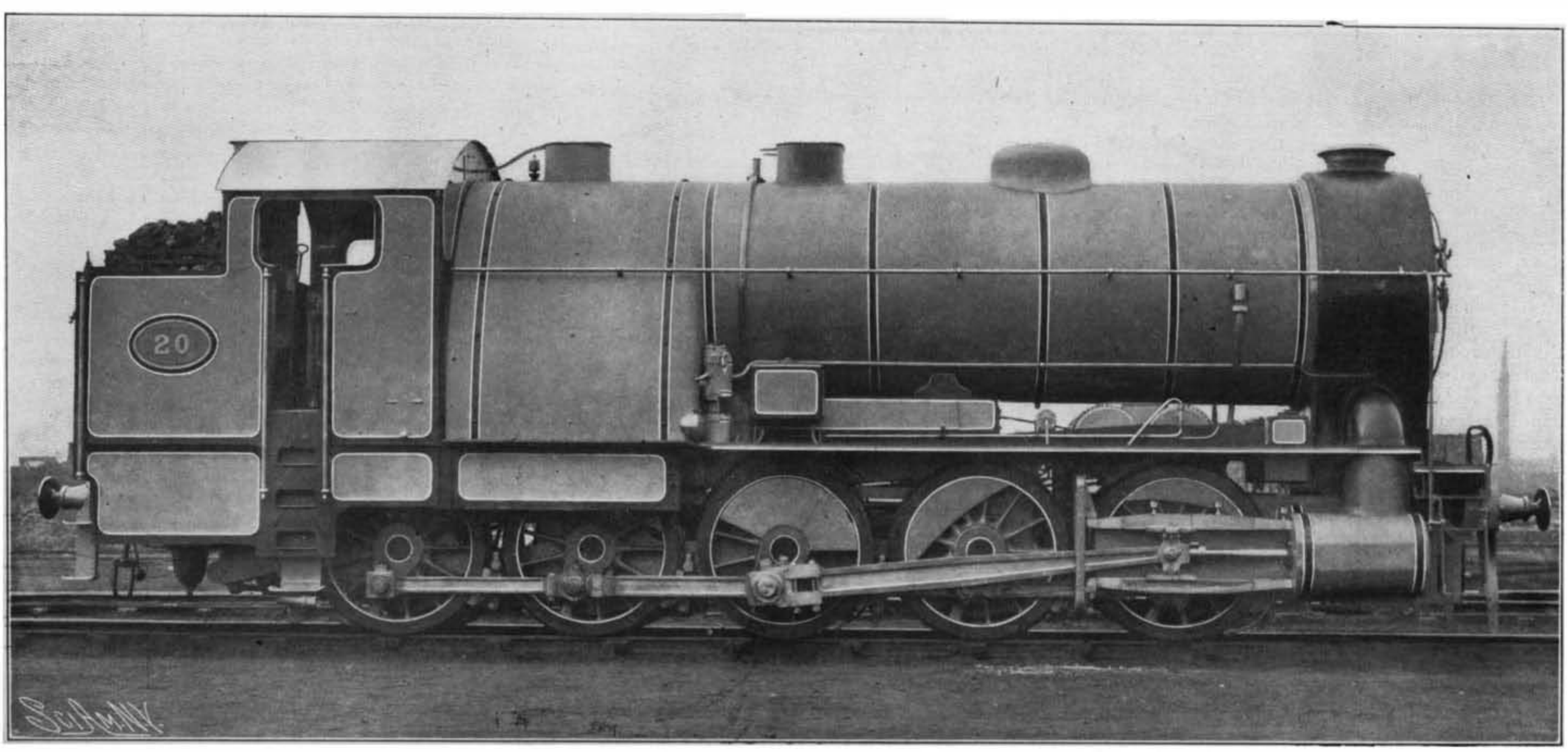


SECTIONAL VIEW OF STANLEY AIRSHIP.

S, shell; *G*, gas bags; *E*, end propellers; *T*, top propellers; *M*, engines; *N*, shafting from engines to propellers; *H*, main hall; *J*, inclined passages to pilot houses; *P*, pilot houses; *R*, rudders; *B*, lower bridge; *V*, steering gear.

POWERFUL ENGLISH ENGINE FOR SUBURBAN TRAFFIC.

The locomotive that is herewith illustrated is certainly the most striking departure that has been made from standard English locomotive practice for many a decade. It was designed by Mr. James Holden, Chief Mechanical Engineer of the Great Eastern Railway, to handle the extremely heavy travel on the suburban lines of the Great Eastern Railway, England. This traffic centers at Liverpool Street and Fenchurch Street stations, London, and the annual travel over the suburban lines served from these stations amounts to 111,000,000 people. Although the Great Eastern Railway has a good record for the number and punctuality of its trains, it has been endeavoring for some time past to accelerate its local service: but on account of the great number of stations on each of the suburban lines, this has been a matter of much difficulty. Thus, on the line running to Enfield there are sixteen stations in a distance of 10 miles, and the inability to make rapid starts with the long and heavy suburban trains has prevented the trains from maintaining a high average speed. The steady increase of the past few years in the number of passengers and in the weight of the trains showed that to cope with the situation some special type of locomotive was necessary, and Mr. Holden broke away from all precedent by designing and building a locomotive which is not only by far the most powerful in Great Britain, but as a matter of fact, has a greater hauling power than the biggest passenger locomotive built in this country, not even excepting the great engine recently turned out by the Baldwin Company for the Chicago & Alton Railway. A fair test of the power of a locomotive is its tractive effort; this in the case of the Baldwin engines is 31,600 pounds, and for the Great Eastern Railway "Decapod," 36,507 pounds. The best acceleration that has hitherto been possible on this suburban service is the attaining of a speed of 20 miles an hour in 30 seconds from the start with a train of fifteen cars weighing 225 long tons. Some years ago the cars were widened, with the result that each train had an increased carrying capacity of nearly 21 per cent. The new "Decapod" is expected to pull a 50 per cent heavier load and attain a speed of 30 miles an hour in 30 seconds from starting, with a train carrying 1,200 people, making a saving of about 10 minutes on the 10½-mile journey and thereby allowing of a more frequent service of trains. The engine is carried on ten wheels, all of which are coupled, the whole weight therefore being available for adhesion. The practical absence of any smokestack is due to the fact that the loading gage in England is between 1 and 2 feet lower than that in this country, and consequently, as the center of the boiler is lifted, the top of the boiler encroaches on the smokestack until, as in the present case, the latter is entirely sunk within the smokebox. The boiler is 5 feet, 3 inches in internal, diameter, and the barrel measures 15 feet, 10⅞ inches in length between the two tube plates. The firebox shell measures 7 feet, 9½ inches in width by 6 feet, 9½ inches in length on the outside. The inside firebox, which is of ⅝-inch copper plate, is 6 feet long by 7 feet wide on the inside. It is stayed by bronze stays 1 inch in diameter. There are 395 steel tubes with a total heating surface of 2,878.3 square feet, and there are 131.7 square feet in the firebox, making a total for the whole boiler of 3,010 square feet, or about double that of the average English locomotive of the present day, and about three times as great as that of the English passenger locomotive of fifteen years ago. The working pressure is 200



Three cylinders 18½ by 24 inches; heating surface, 3,010 square feet; steam pressure, 200 pounds; weight, 87½ tons; tractive effort, 36,507 pounds.

POWERFUL ENGLISH LOCOMOTIVE FOR SUBURBAN TRAFFIC.

pounds to the square inch and the steam is expanded in three high-pressure cylinders, two being outside the frames and one between the frames on the center line of the engine. Each cylinder is 18½ inches in diameter by 24 inches stroke. To avoid having to incline the middle cylinder, a divided connecting rod is used, the leading axle passing through the connecting rod and being slightly bent to enable it to clear. The ten driving wheels, all coupled, are 4 feet 6 inches in diameter, and the rigid wheel-base, which is equally divided, measures 19 feet 8 inches. The length of the engine over all is 37 feet 9 inches, and its total weight is 87½ tons.

This new departure in locomotive practice will be watched with great interest by engineers on both sides of the water. Mr. Holden claims that the fight between steam and electricity as the motive power for suburban traction is not by any means decided, as yet, in favor of electricity. Although we do not agree with him in this, we have no doubt that this engine will show marked power and economy as compared with the lighter engines hauling smaller trains, which it is intended to displace.

ORE FINDING BY ELECTRICITY.

BY HERBERT C. FYFE, LONDON.

The writer has recently been afforded an opportunity of witnessing the new Draft-Williams method of electrical ore finding in operation on actual mineral lodes at the Telacre Mine, Prestatyn, North Wales.

The inventors, Mr. Leo Draft and Mr. Alfred Williams, claim to be able to detect the presence of certain mineral ores invisible to the eye, and during the course of the last few months to have located, traced, and mapped out metalliferous deposits of various natures which were quite invisible to the prospector and undiscoverable by mining engineering.

In many cases mine prospectors have made borings and opened up lodes solely on the strength of the inventors' predictions, and have discovered new and unsuspected sources of mineral ores, which are now being worked at a profit.

It is claimed that by the Draft-Williams method not only can deposits be located, but that the extent and depth of the lode can be determined with an accuracy that is quite impossible with any existing system of prospecting.

Before giving an account of what the system has already accomplished, mention must be made of the instruments employed.

There are two stations, the transmitting and the receiving. At the former there is a battery of 12 volts, giving 4 amperes and 50 watts; a special form of break works in methylated spirits, and is driven by a motor, which is supplied with current by a special local battery and a primary condenser. The current is next led through the primary by an inductor, a special form of induction coil having a large core and very heavy winding on the secondary circuit. The current now passes through a secondary condenser to adjustable series and parallel spark gaps. The electric waves generated by this arrangement are taken to earth by means of two iron spikes driven two to three inches into the ground. At the Telacre Mine there were two circuits, one vertical, the other horizontal. In the former case the wire was taken down the mine shaft close at hand and along the tunnel as far as the fore-breast, a distance of 200 yards; and in the other it was placed some yards away in a line with the tent in which the transmitting set was placed. In both cases one spike was driven into the ground close by the transmitter.

The receiving set comprises two similar iron spikes, driven into the ground to a depth of an inch or two, and connected up to a tripod on which are placed a series parallel and with a transformer and two delicate receivers or resonators. The interrupter breaks contact 700 tines a minute.

By adjusting his earth connections the operator can focus the waves on any field that he may wish to explore; the lines of force travel outward and onward until they reach the iron spikes in the receiving set. When this occurs, the observer can by means of the resonators detect their presence by hearing the noise of the break, or by the sparking across the gaps.

ORE PROSPECTING BY MEANS OF ELECTRICITY.

Now, in a normal condition, i. e., if the ground be of a homogeneous character, the prospector should hear the noises loudest when exactly opposite the center of the base line of the transmitting station.

The existence, however, of a vein or reef containing metal has the tendency of throwing the waves out of normal course, by reason of the fact that it has a different conductivity from the material by which it is surrounded. The prospector must therefore make his earth connections in different places, and shift his position until he can detect the presence of the waves. When directly over the lode, the noise in the resonators will be loudest.

Condenser-discharges from lodes manifest themselves as overtones in the receivers, and at certain spots or nodal points the noise will cease altogether, owing to the influence of the waves.

The condenser discharges can be heard over some lodes when the distance from the inductor is so great that the noise of the break or of the spark gap cannot be heard; thus they form a great assistance to prospecting, helping to determine, not only the position and depth of a mineral deposit, but also, to a great extent, its nature and characteristics.

The area to be energized by the electric waves may be as small as 300 square feet and as large as 30 square miles, and the terminals may be placed hundreds of yards apart.

It is interesting to note that so far back as the year 1830 Fox made some experiments with a galvanometer with a view of attempting to determine the continuation of ore bodies. This method has since been tried on many occasions, but in nearly every case unsuccessfully. Recent variations of this consisted in connecting a current to earth and to watch the swinging of the galvanometer's needle or some equivalent. The idea was that the presence of a mineral lode would decrease the local resistance of the earth, thereby allowing more current to flow through the galvanometer, which would thus indicate the presence of the lode.

Mr. Alfred Williams informed the writer that he had measured over a hundred lodes in Alaska, British Columbia, the United States, Wales, and Cumberland, and had been unable to detect the slightest variation in resistance on the surface.

More delicate instruments than the old galvanometer have been employed in the measurement of earth resistance, and mining engineers and prospectors know only too well the numerous instruments and processes that have been brought before their notice.

With the exception of the dip needle, which is used in prospecting for magnetic ores, no instruments are used by the modern prospector, who trusts to his geological knowledge, his past experience, his maps, and his knowledge of the country.

Prospecting is, of course, a very inexact science, and the mining world, it need hardly be stated, would welcome with open arms a system of ore finding which could be depended upon and which would do something toward lessening the yearly loss entailed in making borings which prove unsuccessful, and in opening up lodes which turn out to be not sufficiently promising to encourage the mine proprietors to continue their working.

In 1899 the inventors commenced experimenting with electrical methods of ore finding, and in 1899 Mr. Williams, in place of a galvanometer or potentiometer, used his body by passing quickly pulsated induced currents from a dry cell and a small coil in series with the earth. By this method the slightest increased intensity in the current flowing by virtue of the decreased resistance of the earth was instantly noticed.

He, however, soon abandoned this method as useless, for reasons characteristic of all earth measurements.

Messrs. Draft and Williams made their first practical experiment with their present system in Seattle, Wash., and San Francisco, Cal. These met with success, and the next trials were made in the southeastern Alaskan archipelago. Coming to England, they have achieved considerable success in prospecting for

DETECTING THE EARTH CURRENTS SENT OUT BY THE TRANSMITTER.