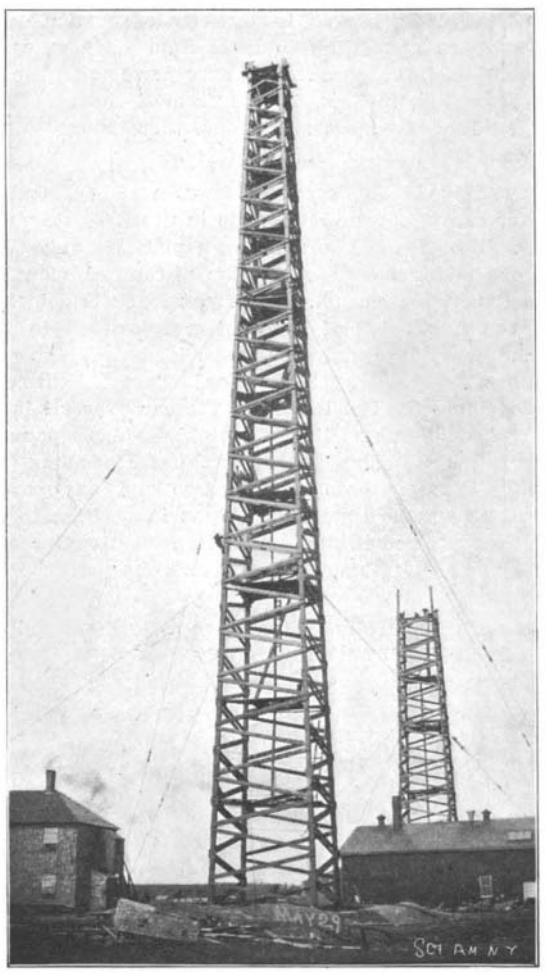
THE NEW MARCONI WIRELESS TELEGRAPH STATION AT CAPE BRETON.

It will be remembered that immediately after the first successful transmission of signals across the ocean by the Marconi wireless system, the work of constructing three stations, two in America and one in England, for the regular transmission of commercial messages. was put in hand. The European station is situated at Poldhu, Cornwall. On this side of the ocean the station used in the original experimental work was erected on a lofty point at the entrance to St. Johns Harbor, Newfoundland, but on account of the opposition of the Anglo-American Telegraph Company, which holds a monopoly of transatlantic telegraphic rights in Newfoundland, Marconi abandoned that site and selected two new locations, one on the easterly coast of Cape Breton, Nova Scotia, and the other at Cape Cod, Massachusetts. The station at Glace Bay, Cape Breton, of which we present a group of illustrations, is located on a promontory of land, whose surface lies about 70 feet above mean high water. The plant consists of four huge towers for carrying the vertical wires, and a group of one-story buildings arranged at the base of the towers, in which are contained the powerful electrical plant which has been specially constructed for the station.

The present article is devoted to a description of the four great towers, which take the place of the familiar single mast that is used where transmission is to be conducted over moderate distances. It will be understood that for the regular transmission of commercial messages over distances measured by the thousand miles a vastly greater capacity is necessary, both in the generation and the reception of the Hertzian waves, than suffices for the ordinary messages over from 50 to 100 miles, of which we have heard so much of late. Hence the truly gigantic proportions of the aerial system which is herewith illustrated. The necessary height for the vertical wires has been attained by the erection of four braced wooden towers, each 215 feet high, at the four corners of a square which measures about 200 feet on a side. Each tower consists of four legs, built up of 3 x 12-inch plank, the legs being braced together on each face of the tower by 3 x 9-inch braces. The planking of which the legs are built is laid up so as to break joints as much as possible and secure the approximate strength of a solid 12x12-inch stick. The legs are spaced 30 feet from center to center at the base and 9 feet from center to center at the top platforms. The foundation of each tower consists of a mass of concrete formed in a hollow square, in which are embedded the 12 x 12-inch sills and the first panels of the lateral bracing. In section this concrete mass is 6 feet in width by 8 feet in depth, the external dimensions of the foundation being 36x36 feet and the internal dimensions 24 x 24 feet.

The experience had with previous attempts to carry a set of lofty aerial wires, more particularly that at Cape Cod, which was wrecked in a heavy gale, proves that the weakest feature in those structures was the system of guy-ropes with which they were held in position. The fall of the Cape Cod structure was due to the parting of the extreme weather guy-ropes, the method of tying the towers adopted having been such that practically the whole strain fell upon a few stays. In the present case the towers are tied in such a way that the stress on each tower will be transmitted directly to its own set of cables, every one of which will be doing useful work. The wires are carried from three points on the towers (the lower and upper third and the summit), all wires having an inclination of 45 degrees. The ropes are all made of the best plow steel, the majority of them being 2½ inches, and a few 3 inches. The method of carrying the aerial wires upon the structure is as follows: Four 3-inch cables are strung from platform to platform at the top of the towers, as shown in the accompanying diagram, and from these cables depend 150 aerial wires. These are drawn together and united in the center of the tower into a single cable, which descends vertically to enter the transmitting and receiving house below. The average length of the aerial wires before they meet in the common central cable is about 140 feet.

During a recent visit of a member of the staff of the SCIENTIFIC AMERICAN to the Cape Breton station Mr. Vyvyan, the engineer in charge of the station, stated that Marconi has ceased to use the coherer and has substituted a receiver of much greater reliability and capacity. It was always difficult to secure an absolutely reliable coherer of the old type, since out of a hundred of these little instruments thirty or forty might be good, thirty would be poor and thirty would



ONE OF THE 215-FOOT TOWERS, SHOWING DETAILS OF CONSTRUCTION.

be absolutely unusable. The new method of receiving adopted by Marconi has a capacity should it be required of several hundred words a minute. This improvement, taken with the great power and capacity of the plant, render it practically certain that, when in the

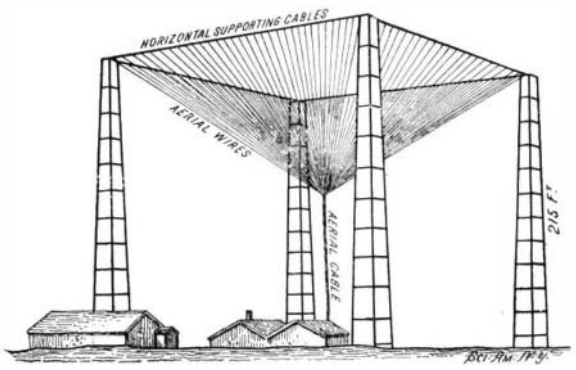
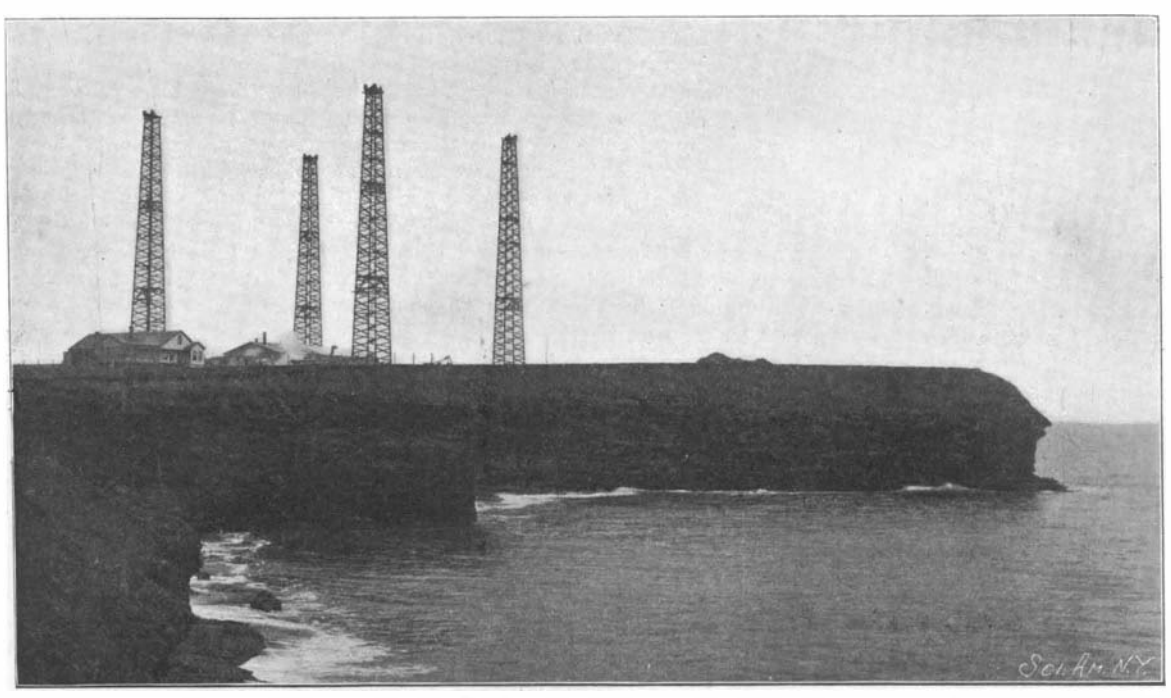


DIAGRAM SHOWING METHOD OF STRINGING THE 150 AERIAL WIRES AT THE MARCONI CAPE BRETON STATION.

course of a few weeks the station is opened, it will prove to be capable of dealing with any class of commercial messages that may be required. Mr. Vyvyan further stated that it would be possible to send and receive messages to and from San Francisco, the earth resistance being very much less than is popularly supposed. The power of the new installation was far greater than would be demanded for transmission to Europe, and it is probable that before the close of the present year messages will be sent direct from Cape Breton or Cape Cod to Cape Town, South Africa.



THE NEW MARCONI WIRELESS TELEGRAPH STATION AT GLACE BAY, CAPE BRETON.

The Edison Portland Cement Plant.

Thomas A. Edison's improved process of manufacturing cement was put to practical use last week, says the Orange Journal, when active operations were begun in the Edison Portland Cement Company's new plant at New Village, near Stewartsville, Pa. Mr. Edison and directors and stockholders of the new company were present when the ponderous machinery was started for the first time. More than 300 men will be employed at the start, and as this force will be gradually increased the industry will mean much to Stewartsville and vicinity.

After conceiving the idea of improving upon the old process and discovering an inexhaustible deposit of cement rock at Stewartsville, Mr. Edison formed a company. This was more than two years ago, and since that time about sixty-six men have been at work constructing the twenty-seven buildings and installing the machinery. The plant, which is one of the largest of its kind in the United States, covers a space half a mile long, and one-quarter of a mile wide. It has thus far cost over a million and a half dollars. The machinery is built for a capacity of 10,000 barrels per day; but the buildings were made to accommodate half that amount at the start, and if the business proves successful the plant will be increased to its fullest capacity in a few years. There are twenty-seven buildings and the roasting-house is separate from the others. All the others are connected by a deep tunnel half a mile long, fifteen feet wide and twenty-five feet deep. The stock-house contains two 600-foot corridors, one above the other, and connected by big flues. There the cement rock will be roasted and prepared for the refining process. From that building starts the tunnel mentioned. The raw material will be conveyed by means of an electric railroad through the tunnel from the stockhouse to the crusher, and thence to the dryer. The tunnel is made of solid rock walls and paved with concrete. The dryer is a simple stone shaft twenty feet square and forty feet high. Inside are a series of drying pans.

The crusher is located in a building four stories high, the two sides being of solid masonry, ten feet thick at the bottom and five at the top. The floors are of steel construction. The machinery is capable of crushing 25,000 barrels of cement rock every twenty-four hours. The rollers have a pressure of 100,000 pounds to the square inch. In order to get results Mr. Edison made use of a discovery by means of which, with the aid of pulleys worked in connection with air compressors, he could get the great pressure directly upon the steel rollers with less than 1000 pounds pressure on the bearings. All the cement rock will be transported through the tunnel as it is moved from one building to another. The raw material is received at the roasting-house and there the cement rock will be roasted and prepared for the secret refining process invented by Edison, and which is expected to revolutionize the cement industry. Before the product is again handled by hand it will automatically travel several miles through the many buildings. One hundred and twenty-five motors are used in the plant. When the last stage of the process is reached the cement will flow into barrels, in a building through which several railroad tracks pass, thus permitting the barrels to be loaded as fast as filled. All the buildings are of steel, covered with corrugated iron and painted black.

The agricultural districts of Gujarat, British India, are experiencing a plague of rats. The rodents have consumed the crops of sowed grains, and have caused much suffering among the inhabitants. In some places the people have dug out the accumulated stores of grain from the rat-holes, and found as much as ten pounds collected in one burrow. So acute has the crisis become that the government offers large rewards for the extermination of the pest. But the object of the government has hitherto been largely defeated owing to the superstitions of the natives, who persist in their original theory that the unusual numbers of rats represented souls

of the departed in the late famine, and refused to make any attempt to exterminate them. This curious apprehension, however, has now to a great extent been overcome and now many thousands of rats have been killed in various sub-divisions, but it is an open question whether anything but the next heavy downpour of rain will bring about any appreciable decrease in numbers. The method adopted by the natives in destroying rats for the reward is somewhat surprising, although simple and apparently efficacious. At night a party goes out with a lantern and armed with bows and arrows. The rats are said to be attracted by the light, and the sportsmen, armed with bows, shoot them as they come within range. It is no difficult matter to discover the animals, since the ground is honeycombed with their burrows, and they teem in their thousands.

Dispensing With Platinum.

The piece of platinum foil which forms part of the outfit of every beginner in chemistry, and of most working chemists, has become so expensive of late that acceptable substitutes are worth considering. Very pure silver is actually superior to platinum for most of the uses to which such pieces of foil are usually put. It must be very pure; the thick sheets used as anodes by electroplaters are pure enough, and of a convenient thickness. Or, any chemist can easily purify his silver and then get a jeweler to melt and roll it.

When used for evaporating solutions to dryness the silver is liable to be attacked by oxidizing acids, but this action can be prevented by the addition of ammonia, which is generally unobjectionable. For fusions, however, the silver is altogether preferable. Being unaffected by alkalies, it can be used with caustic soda, instead of the carbonate, and thus a lower temperature suffices; manganese and chromium fusions are readily performed. The silver is so cheap (a piece an inch square and a sixteenth thick should cost about twenty cents) that thicker, and hence stronger and more durable pieces can be used; with such heavy pieces a strip an eighth of an inch wide may be cut so as to project as a handle, and the assay is thus freed from liability of contamination by material from the tweezers which hold the foil in the flame—generally a great nuisance with platinum.

The platinum wires, also, which are used to hold salts in a flame for spectroscope work, may be replaced by iron—with advantage, for the iron may readily be thrown away if they get mixed or incrusted.—W. P. White, University of Wisconsin.

The Largest Known Tree.

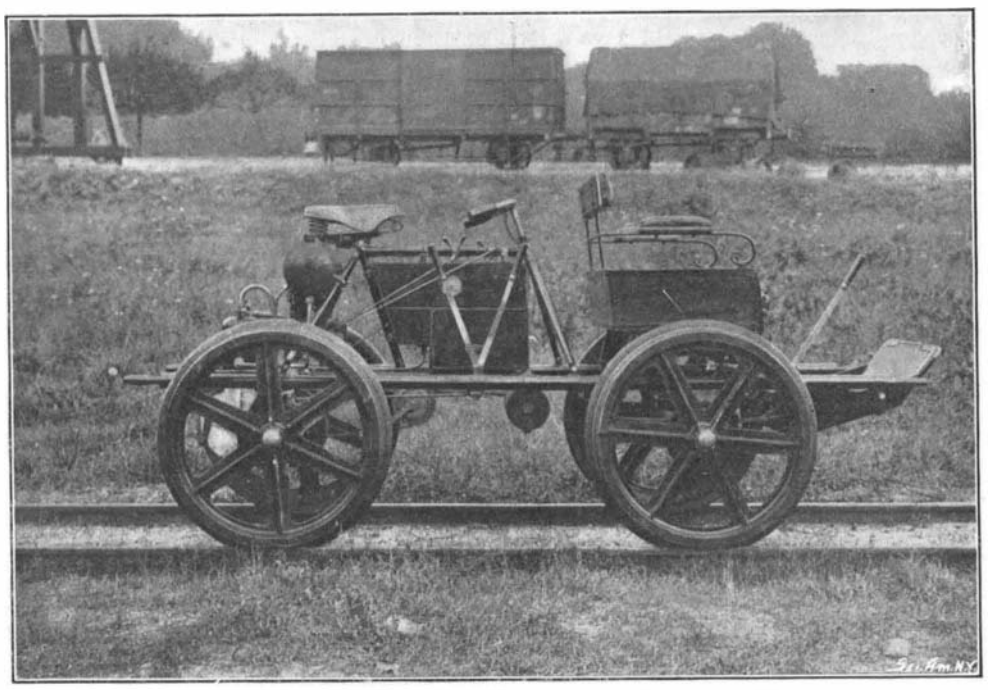
In last week's SCIENTIFIC AMERICAN mention was made, in the article on lumbering in California, of what was considered the largest tree in the world. News now comes from Fresno of the discovery of a tree which probably exceeds in size any that has so far been known. This newly-found tree, measured six feet from the ground, is 154 feet and 8 inches in circumference, from which it follows that it is about 50 feet in diameter. Fortunately the tree stands on the Government Reserve, and will therefore be spared the attack of the insatiable ax.

The Ardennes Automobile Contest.

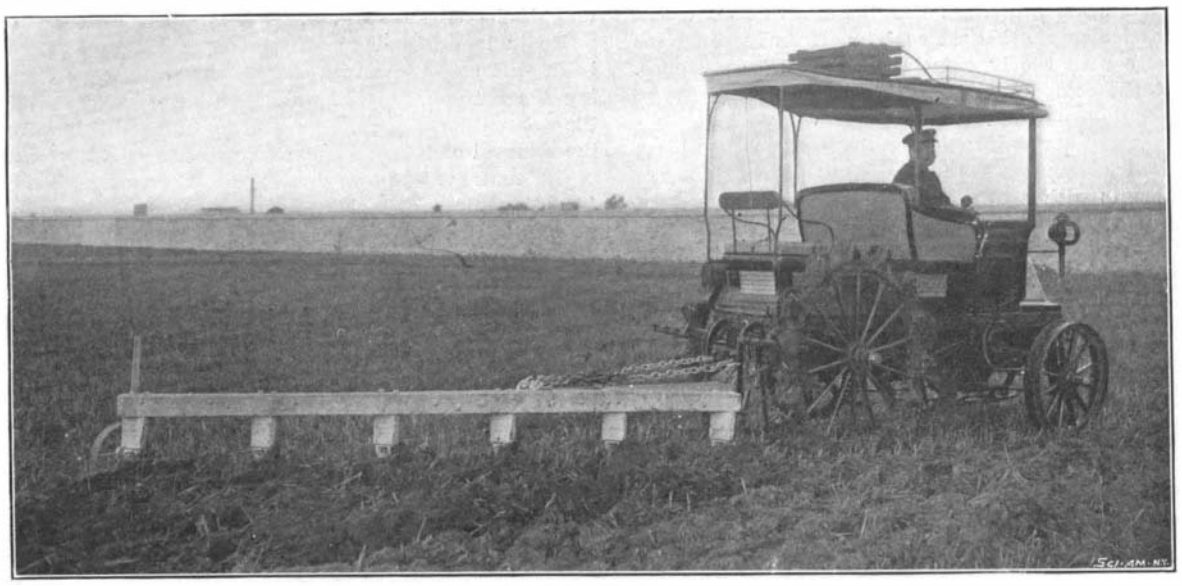
The great Ardennes automobile race was won by an Englishman, Mr. Jarrot, who covered the distance of 318 miles in five hours and fifty-three minutes, or at the rate of 57 miles an hour. The course, more than fifty miles in circumference, had to be circled six times. There were many accidents, but none resulted fatally. Americans will be pleased to learn that Mr. W. K. Vanderbilt, Jr., in a Mors car, finished third. M. Gabriel finished second.

VARIED MODERN USES OF THE AUTOMOBILE.

Apart from its employment as a vehicle of pleasure, the automobile is rapidly entering the sphere of usefulness in the most varied classes of work. The advantages of these machines are being increasingly appreciated and it is only a matter of time when the public will largely discard the horse for labor purposes and adopt the motor vehicle in its place. A most striking example of this competition with the horse will be seen in the accompanying illustration, which shows an automobile drawing a field cultivator. The automobile as shown is provided with wheels especially adapted for traveling over a rough field. The front tires are very broad so as to prevent the wheels from sinking into the soft earth; the rear or driving wheels have tread projections, which insure a good hold and prevent them from slipping. This automobile takes the place of a traction engine, and can be attached to any farming machine desired. Aside from its agricultural uses the vehicle may be jacked up and its wheels replaced by rubber-tired wheels, when it will be found a useful and comfortable conveyance for all purposes. In contrast with this peaceful use to which the automobile is put it will be interesting to note the motor built for war service in South Africa. These machines, here illustrated, were recently awarded first prize in a competition instituted by the British War Office. The Thornycroft Standard, which is essentially a motor truck, is capable of carrying three tons and drawing, further, two tons on a trailing vehicle. It is fitted with a patent central-fire water-tube boiler especially arranged for cleaning the internal surfaces—a most important feature, when, as is frequently the case, hard water only can be obtained. This motor, however, differs from the ordinary type only in the wheels, which are built of solid steel and are somewhat larger in diameter with wider tires. The second vehicle is of an experimental type, especially adapted for use on rough roads and uneven ground, the steering axle being capable of unusually great angle of tilt, while the driving and steering wheels are of a large diameter. The boiler and engine are situated directly over the driving axle, the carrying platform being provided at the fore part of the vehicle. This arrangement gives the wagon great power to get out of holes in soft ground, etc., and enables it to exert its full power as a tractor when it is not itself laden. The boiler and engine are of the same pattern as the Standard motor. It is supplied with a winding drum, and a hundred yards of steel wire. A spring draw-gear is also provided, fitted with the standard military draw hook. The boiler is arranged so that the fire bars can be easily replaced by the liquid fuel burners, which are either of the spraying or vaporizing type, according to the nature of the oil which may be available. A condenser is provided, but it is so arranged that it can be short-circuited or removed without interfering with other parts of the machinery.

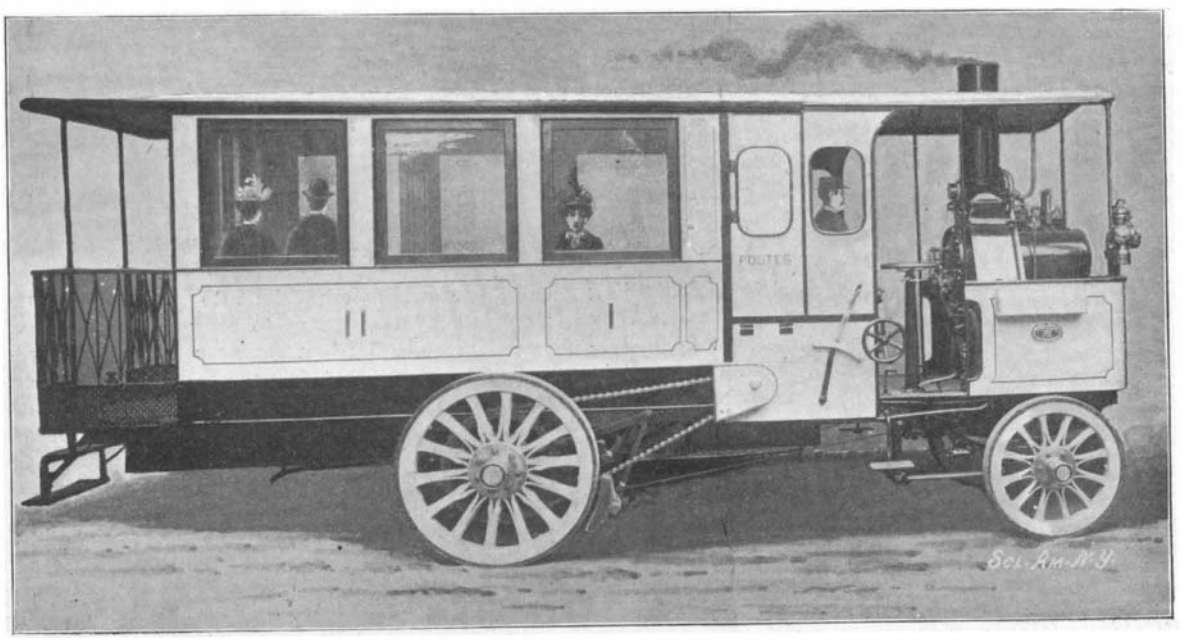


THE AUTOMOBILE AS APPLIED TO RAILROADING.



THE AUTOMOBILE AS USED FOR FIELD CULTIVATION.

Steam vehicles are also being used for passenger service in large cities. We illustrate a steam propelled omnibus of the Turgan-Foy type which is now in use in France. The boiler is placed in front, and the engines, which are horizontal, rest upon the truck-frame under the conductor's bench. Two compound engines are used, and each drives one of the rear wheels directly by chain gearing and the differential is suppressed, giving a decided advantage. The boiler has about 12 square yards of heating surface, with a feed-water heater in the stack and a special superheater in the fire-box, giving a great vaporization and a considerable economy of water. The boiler and its accessories and valves is light, weighing only 1400 pounds. The engines have cylinder diameter of 3.6 and 7 inches, with 6.2-inch stroke, and 600 revolutions per minute. Each will give 20 horse power. A good test of a Turgan-Foy hauling wagon was made at the late military maneuvers in the eastern part of France, where it



TURGAN-FOY STEAM CARRIAGE FOR PASSENGER SERVICE IN CITIES.