

A GREAT AIR COMPRESSOR AT THE FAIR.

Our illustration represents a plant employed by the World's Fair Commissioners to supply compressed air to exhibitors requiring air power. It is itself an exhibit by the Ingersoll-Sergeant Drill Company, of New York, and was continuously in operation throughout the Fair, furnishing compressed air to the Baldwin Locomotive Works, the Westinghouse Air Brake Companies, and others who exhibited their locomotives, air brakes, and other machinery in full operation by means of compressed air. This compressor is the crowning work of many years' experience of the company in this line, and embodies a great many improved features, the excellence of which has been attested in their widely extended practice. The plant consists of a cross compound Corliss condensing engine, cylinders 18 and 34 inches, having a stroke of 42 inches. The two air cylinders are each 18½ inch bore and 42 inch stroke, driven direct from the piston rods of the engine. The free air, before admission to the cylinder, is taken from the point most favorable as to dryness, freedom from dust, lowness of temperature, etc., and is admitted to the air cylinder through a tube which also acts as a piston guide rod. The air inlet valves are large wrought iron rings, which open and close by the momentum caused by the movement of the piston, giving a large area of inlet with but a small throw of the valve, and reducing clearance loss to a minimum.

The cooling is effected by a new form of water jacket, the construction of the air cylinders admitting a complete jacketing of the heads and discharge valves, thus presenting a large cooling surface to the compressor at the end of each stroke where the air is hottest. By means of a new unloading device a uniform pressure is maintained in the receiver, and a uniform speed of the engine, by connections with a discharge valve on each end of the air cylinder, a weighted safety valve being connected with the receiver. When the air pressure gets above the desired point the valve lifts and the air is exhausted from behind the discharge valves, thus letting the compressed air at full receiver pressure into the cylinders at both ends and preventing the air cylinders from doing any work. The pistons in the cylinders move in equilibrium as the air passes from one end of the cylinder to the other through the discharge valves, the governor keeping the speed uniform, and there being no surplus air blown off from the receiver. A slight reduction of pressure in the receiver releases the discharge valves, when the air rushes in, the governor puts on more steam, and the work of compressing air goes on.

In the designing of these compressors and engines excellent taste has been shown, and all steam pipes are put below the floor, while the feet of the cylinders are covered, giving the whole plant a neat and uniform appearance. The ends of the cylinders, cylinder heads and steam chests, with all the turned parts about the valve motion and connecting rod, are beautifully polished.

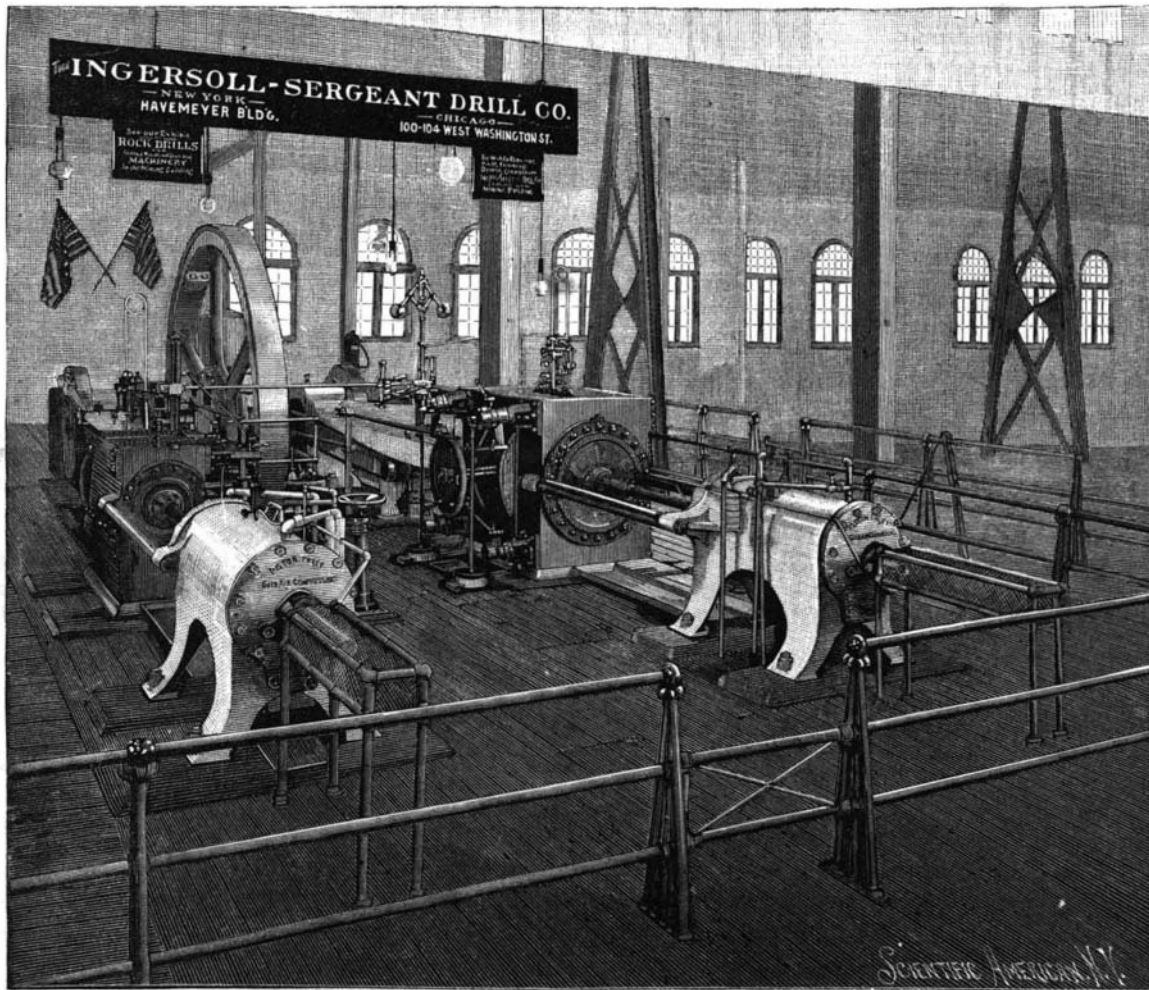
This compressor has received the award from the World's Fair judges, and has been sold to a foreign gold mining company, to be exported as soon as the Exposition closes.

The Great Playa de Oro Placer Fields.

It is altogether probable, says the *Mining and Scientific Press*, that the coming year will witness the consummation of a placer mining project in South America by American capitalists that fairly rivals the largest schemes ever projected by California hydraulic miners, and that in its ultimate fruition is expected to exceed in dimensions and results the largest single similar enterprise undertaken anywhere in the world. The Playa de Oro placer fields in Ecuador are believed to be the richest and most extensive new properties yet discovered, and the work of development has been undertaken by an investment and in a manner that indicates both the good faith of the owners and their thorough conviction of the value of the placers.

The Playa de Oro property is about 11 miles distant

from the town of Concepcion, as the river flows, and is on the Santiago River, a large and rapid stream flowing through the estate in a westerly direction to the Pacific. It is from 500 to 800 feet above sea level. The property forms a parallelogram, comprises 20,000 acres, and is joined by the Uimba estate on the north and the Cayapas River on the south. Gold-bearing beds cover the whole extent of the property, but only the gravel banks of a thickness of from 30 to 80 feet it is proposed to work. From the separate reports of the several engineers who have made personal survey and examination of the gravel beds, the following statements are taken: The gravel banks are exposed everywhere along the banks of the river; in the numerous cuts made by the natives in their efforts at mining, which is their only means of subsistence; along the gulches (quebradas); and everywhere that the soil, which averages about four feet in thickness, has been removed. The auriferous gravel beds average about 50 feet in thickness and only in one place was the bed found but 15 feet thick, while in many places it is 80 feet. The gravel is auriferous throughout, the presence of a small percentage of clay having prevented the bulk of the gold sinking to the bedrock, a soft formation, apparently of marine origin. The elevation of this bedrock above the outletting streams varies from 20 to 100 feet, insuring everywhere ample dump for tailings. As the gravel here contains no pipe clay, hard cement or large boulders, it can be broken down and washed with a moderate head of water. No bedrock tunnels, derricks or powder blasting will here be required.



THE WORLD'S COLUMBIAN EXPOSITION—THE INGERSOLL-SERGEANT DRILL CO.'S AIR COMPRESSOR.

A cut in the Medio Mundo bank, near the town of Playa de Oro, has been worked back some 300 yards from the river through gravel 45 feet thick, exposing the bedrock for that distance. It shows a good grade for sluices and dumps, its elevation being 50 feet above bedrock, and washed by natives in their crude way yielded 97½ cents gold. Other washings of single cubic yards yielded various amounts. But the most satisfactory test has been made within the past six weeks under direction of Engineer Lord. Eighteen cubic yards were measured, worked and washed through sluices in exactly the same manner as it is proposed to develop the placers. The yield was 35 cents per cubic yard.

Rains in Ecuador are constant, and the water supply is enormous. At the town of Playa de Oro the Santiago River (500 feet wide) averages 300,000 miners' inches of water of 2,160 cubic feet each in 24 hours, or 7,500 cubic feet per second. The water for the mines will be taken from a branch of the Santiago (Rio Francklyn) at a sufficient elevation to give a large head. The river at the point where the initial canal will be built is 330 feet above bedrock at the placers.

The extent of the gravel beds is prodigious. The property covers about 60 square miles, and it is roughly estimated that there are about 1,600,000,000 cubic yards of gravel between bedrock and the grass roots. If there is an average gold value of 38 cents per cubic yard, the value of the deposit is \$600,000,000! It is thought that several million dollars per year can be secured if the banks are worked at the capacity of the

hydraulic appliances proposed to be put in. These figures stagger belief, but they seem to be justified. It is estimated that gold can be secured at an average of three cents per cubic yard. There will be no trouble about the disposal of the debris. There are on the ground, or purchased and about to be shipped, six miles of iron piping and four giants. One of these latter is 9 inch, which indicates pretty clearly that the company propose to wash out a great deal of gravel.

The Use of Copper Among the American Indians.

An article by R. L. Packard in the *American Antiquarian* says that careful investigation seems to show that at the time of the discovery of America copper was used by the North American Indians only as a precious metal and for ornamental purposes, and had not reached the stage of industrial use, as it had among the Aztecs in Mexico. There is, moreover, no evidence to show that the northern Indians had any knowledge of ore working or smelting, and it is almost certain that all the copper they possessed was found in the metallic or native state. There is nothing to show that they were aware of the existence of copper ore as a source of metal. No remains of smelting places, or slag, or other indications of metallurgical operations have yet been found. The quantity of copper which the Indians possessed at the time of the discovery, although the metal was diffused over a very wide territory, was very small as compared with stone. This is shown by the relatively small proportion of copper implements

in the principal collections, as at the Smithsonian Institution and others. The larger numbers are found in Wisconsin, and this is accounted for by the fact that Wisconsin is directly south of the Keweenaw district in Michigan, where the largest beds of native copper occur. In these beds the copper shows as such in the rock, and the ancient miners had only to follow down a promising outcrop showing metal for a few feet, and hammer away the rock from the copper to secure the latter. When they came upon a large mass they were compelled to abandon it after hammering off projecting pieces, because they had no tools for cutting it up and removing it. Several instances of this sort have been found. The ancient mines were not real mines, not being underground workings, but merely shallow pits or trenches, and sometimes excavations in the face of a cliff. At the time modern mining began they had become mere depressions in the ground. All these workings when examined contained stone hammers

or mauls, a few wooden shovels, remains of wooden bowls for baking, birch bark baskets, and some spear or lance heads and other articles of copper.

Wire Tramways.

This forms the subject of a study and investigation with which the Societe Industrielle de l'Est, in France, has charged two of its members, one of whom, Professor Thiery, lately forestalled the definite report by a lecture delivered at Nancy. He concluded by giving the cost of transport on eight wire lines, the mean of which, 57 centimes per ton per kilometer, or 17 cts. per ton per mile, happens to be exactly that of the wire tramway lately erected between Custines and Marbache for carrying ore to the Pont-a-Mousson blast furnaces.

In addition to the low cost of transportation, Professor Thiery enumerated the following economical advantages of wire tramways: They are independent of the land on which they are erected, and which may be hired instead of bought, and cultivated like adjoining portions; there is sufficient height for tipping to dump; they may be established on any land where roads or railways would be impossible, notwithstanding natural obstacles; they will work in any weather, not being interrupted by snowstorms or floods; the loading and unloading is effected in a very simple and practical manner; they may be worked by untrained laborers; and, lastly, the energy stored up in descending may be utilized for ascending, which is not the case with other means of communication.