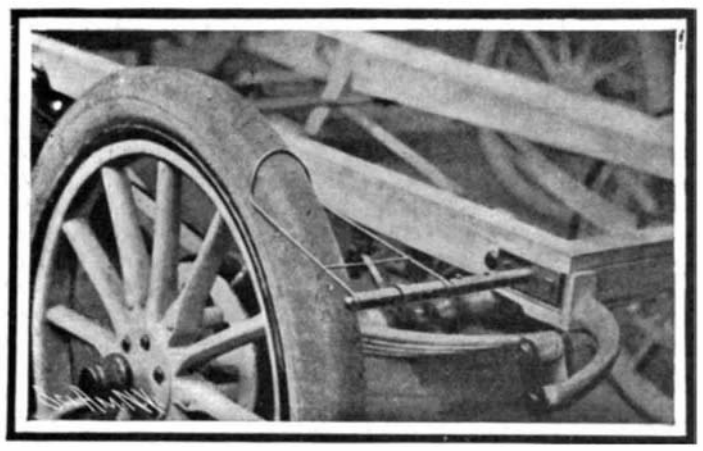
DEVICE FOR PULLING TACKS AND NAILS FROM PNEUMATIC TIRES.

The accompanying illustration shows a useful little device for aiding in protecting automobile and carriage tires from puncture. The idea underlying the construction of the device is to withdraw a tack or nail immediately after it is picked up by the tire, and



NAIL-PULLING DEVICE FOR PNEUMATIC TIRES.

before it has had time, during several revolutions of the wheel, to become deeply imbedded. A wire frame, bent to conform to the contour of the tire, is supported upon a suitable bracket mounted on the chassis. A small, flat spring presses the wire frame lightly but firmly against the tire, with the result that when a nail or tack sticking in the tire strikes it, such nail or tack is likely to be quickly pulled out before it has done serious damage. The device is very useful to automobilists for protecting their tires from puncture.

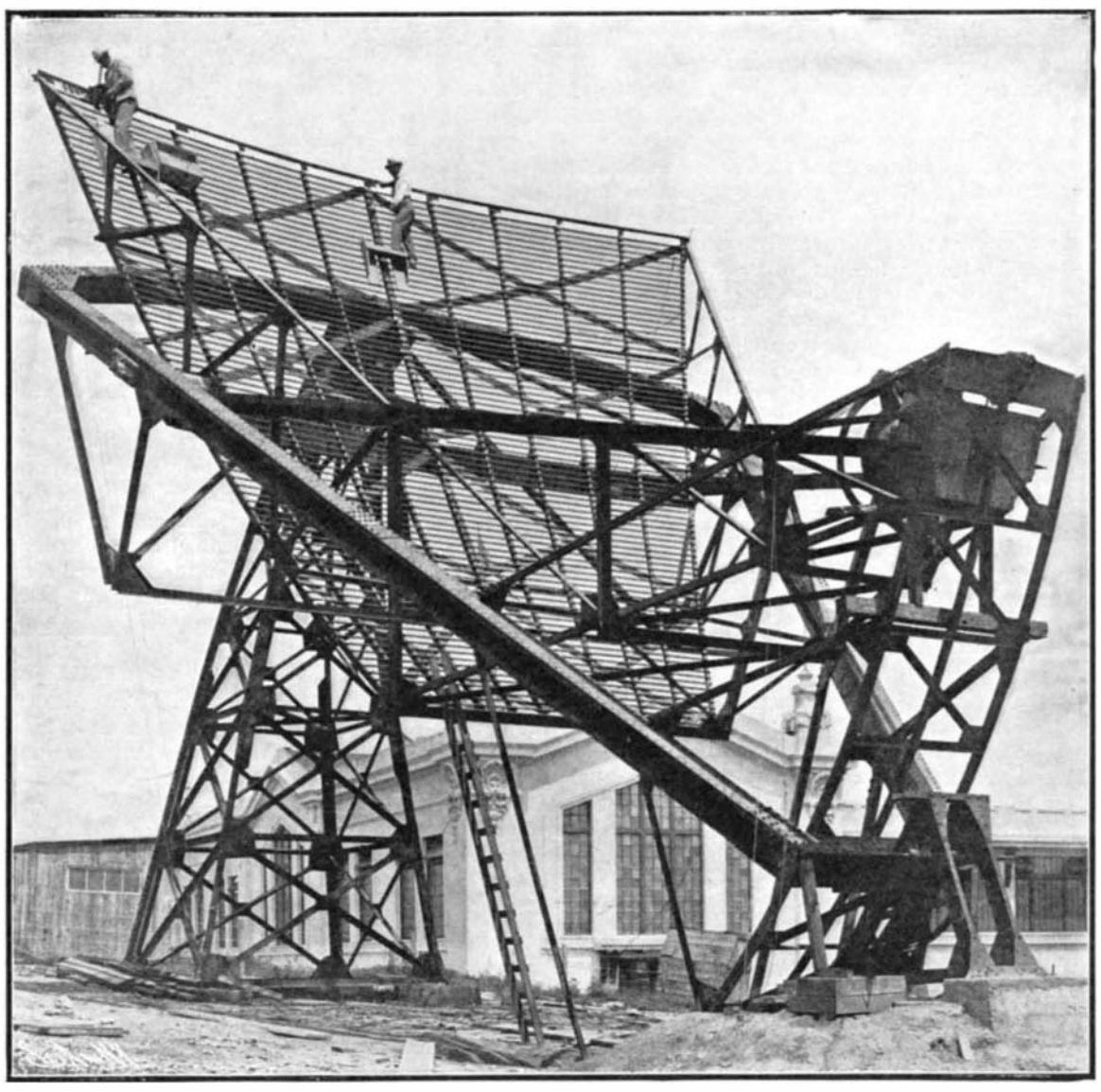
A SOLAR REDUCING FURNACE.

BY THE ST. LOUIS CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

Not far from the Horticultural Building there stands a massive framed steel structure, which, during its erection, was the subject of much speculative comment among visitors to the fair. It was designed and erected by Prof. M. A. Gomes Himalaya, and its object is to obtain extraordinarily high temperatures by utilizing the reflected heat of the sun. Its object, indeed, is the direct opposite to that of the low-temperature exhibit of the British Royal Commission, which is to be found at the opposite end of the grounds. The inventor hopes to secure temperatures far beyond any that have yet been recorded; these temperatures to be utilized inside of a reducing furnace for experimental purposes. It is expected that temperatures even higher than those obtained in the electrical furnace will be secured. According to Prof. Himalaya 3,500 deg. C. is the highest recorded temperature, this having been actually measured by Prof. Violle. This is the normal temperature of the ebullition of carbon, just as 100 deg. C. is the normal temperature of the ebullition of water.

The structure consists of a massive A-frame, the apex of the frame being supported axially near the ground level, and the base supported axially at its center on a stiff latticed column. Within this frame and capable of adjustment at right angles to its axis is a second latticed frame, at one end of which is a large reflector, and at the other end, in the focus of the reflector, a steel crucible or box in which the substance to be reduced is placed. The top of the reflector is 42 feet above the ground. The width along the top edge is about 35 feet, the depth along each side is 35 feet, and the width across the base is 18 feet.

The reflector is built up of 6,170 elementary reflectors, each of which measures 122 millimeters by 100 millimeters. These reflectors are arranged side by side in parallel rows, being attached by threaded standards to a series of parallel angle irons, which run horizontally across the frame from side to side. The rays from these reflectors all converge to the one steel crucible furnace set in their common focus, and Prof. Himalaya is perfectly satisfied that he will secure temperatures higher than 3,500 deg. C. This is the fourth apparatus of the kind that he has built, although none of the predecessors have been so ambitious. The first was erected at Paris in 1900, the second at Lisbon in 1902. With the Lisbon apparatus, which was much smaller than the one at St. Louis, a temperature of 2,000 deg. C. was obtained.



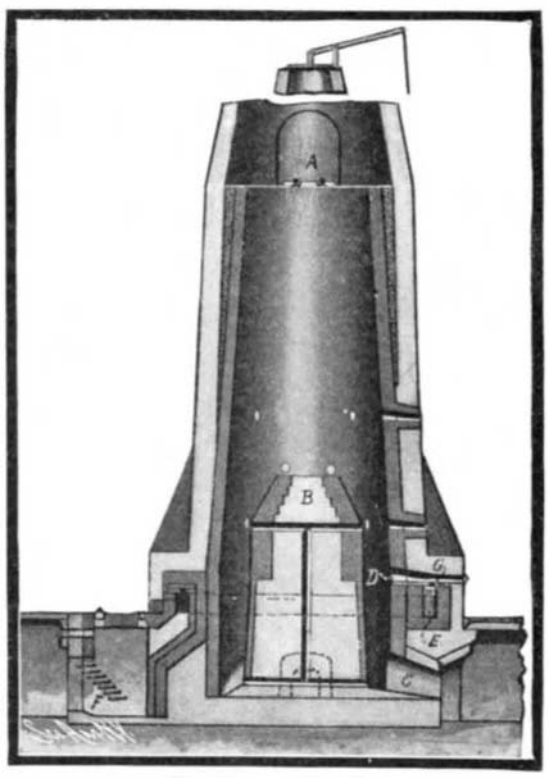
CHEMICAL FURNACE FOR OBTAINING HIGH TEMPERATURES BY CONCENTRATING THE REFLECTED RAYS OF THE SUN.

A New Alloy.

Details have now been published of the new metal alloy which has been discovered by two Tuscan engineers named Travaglian and Fabiani, and been duly patented. The new metal is called by the discoverers "radium argentiferum," and is composed of copper, iron, and infinitesimal portions of silver, radium, and phosphorus, though the fundamental secret of the invention lies in the phosphorus. The principal advantages of this alloy are claimed to be greater strength than steel, freedom from oxidation, while it is a better conductor than copper, and can be manufactured in large quantities at one-tenth of the cost of bronze. The discovery was mainly the result of an accident. The inventors had made ceaseless experiments at a cost of $20,000, and were practically impoverished, when Travaglian, exasperated by the delay in the fusing of the metal after hours of boiling, threw a two-franc piece into the crucible. His impetuosity solved the problem, for the addition of the silver in the coin brought about the desired fusion.

IMPROVED LIME KILN.

An improved lime kiln has recently been invented, which allows of continuous working, and also is so arranged that the burning of the limestone may be shut off for a time without requiring that the fires be drawn in the furnaces. The stack of the lime kiln is lined with firebrick, and in the upper portion is provided with charging doors for the introduction of the limestone. In the accompanying engraving, which shows a section of the kiln, one of these doors is indicated at *A*, and the top of the stack is closed by a cover. The cover may be raised to discharge the gases by drawing the cord shown, which extends to the ground. In the lower portion of the stack is a central distributer, *B*, which forms with the wall of the kiln an annular passage. The upper portion of the passage is the burning chamber, and the lower portion constitutes the cooling chamber. Air passages extend through the distributer, as shown, for regulating the heat in the stack. The cooling chamber is provided with a number of outlets, *C*, through which the burnt lime may be discharged. The burning chamber is connected by means of a number of gas entrances, *D*, with an annular gas conduit, *E*, formed in the wall of the kiln. This conduit communicates with a number of gas-generating furnaces, *F*. In operation the gas generated passes into the burning chamber, to burn therein and thus reduce the limestone to produce lime. The lime gradually settles downward into the cooling chamber, from which it may be removed through the openings, *C*. In the meantime lime can be continually fed into the upper end of the stack. In case it is desired to stop the burning of the lime in any portion of the kiln, the gas is cut off from the corresponding gas entrance by means of a valve, preferably a fire-



IMPROVED LIME KILN.

brick, *G*, which closes communication between the gas entrance and the conduit, *E*. If it is desired to stop the burning completely for a day, or a few days, without drawing the fires on the grates, it is only necessary to close all the valves, thus preventing the draft from passing up through the grates and causing the fuel thereon to burn slowly without generating much gas. A number of peepholes are provided in the sides of the kiln, to permit inspecting progress of the burning, and to allow of introducing stirring rods in case the material becomes choked in the stack. Mr. D. H. Gibson, of Seattle, Wash., Box 1516, is the inventor of this improved lime kiln.

Wire-Wound Wooden Pipe.

Last April the Canadian Pipe Company installed a new plant for the manufacture of wire-wound wooden pipe, since which time between thirty and forty carloads of pipe have been shipped to the Northwest Territories, Manitoba, and Vancouver Island, and other orders are on hand which will be filled within a very short time. It is claimed that this pipe is superior, for water-supply purposes, to iron pipe and can be furnished at less than half the price. Besides this, it is much lighter to handle and is not so liable to burst upon freezing as pipe made of iron. Large quantities of this pipe are being put into use by mill owners and mining engineers in lieu of flumes, as its use results in the saving of water and repair. This new industry seems to have a good future before it.

Although iron pyrites and copper pyrites are difficult to distinguish underground by candle light they are separated visually by the use of the bluish-white flame of magnesium wire or the acetylene light.