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LIQUID AIR IN HIGH EXPLOSIVES.

It is to be regretted that the extravagant claims which have been made as to the commercial and industrial value of liquid air should have diverted the attention of the public from the highly meritorious industry with which Mr. Tripler has prosecuted his researches, and the really brilliant success which he has achieved. It was no small triumph for a private experimentalist to succeed in making by the gallon what the most skilled scientists had only been able hitherto make by the ounce, and at a stroke to reduce the cost of the new substance a hundred fold. In some of his recent lectures Mr. Tripler has expressed himself as feeling hurt by the vigorous manner in which his statements have been attacked; but he should clearly understand that the criticism which he has evoked has been directed entirely at his theories, and does not throw any doubt upon the value of his work.

In his recent lecture in this city Mr. Tripler exhibited fragments of two pieces of pipe, which showed in a very striking degree the powerful explosive properties of cotton saturated with liquid air as demonstrated recently at his workshop. His assistant had placed a small portion of cotton, thus saturated, in a short length of 2-inch gas pipe, and to prevent the flying fragments from doing any damage, had inclosed the 2-inch within a 6-inch pipe. The liquid air cotton was exploded and the 2-inch pipe (which was not tamped in any way) was torn into small fragments which cut their way cleanly through the outer pipe, giving it a sieve-like appearance. The high explosive qualities here indicated have been proved by actual test in a European coal mine to be comparable in their effect to those of dynamite; but it is not likely that the new explosive will have any commercial value because its extreme volatility renders it imperative that the liquid air shall be used soon after it has been manufactured and immediately after the charge has been tamped in the hole. Unlike dynamite, it cannot be stored for an indefinite period and used at leisure; for with the present methods of transit in felt-covered cans, a 3-gallon can will be completely evaporated in ten hours' time. Even if it were distributed in double-walled holders, with a vacuum space, as in the Dewar receptacles, the complete evaporation would only be a question of two or three days—an insuperable objection to its use in a large variety of operations where blasting is a necessity.

The general subject of high explosives and the relation of liquid air thereto form the subject of an interesting article by a specialist in this line in the current issue of the SCIENTIFIC AMERICAN SUPPLEMENT. It has been written with the object of answering the many inquiries which have arisen regarding one important phase of the liquid air question.

GRUSON ARMOR IN THE UNITED STATES.

It is not unlikely that the well-known chilled cast-iron Gruson armor will in the future be utilized to a limited extent by the United States army in building up the national system of coast defense. It has been used very extensively on the Continent, especially by Germany and Italy, and for the protection of land fortifications it has been found to give results superior to forged steel. As compared with the latter, chilled armor is more massive, many of the plates ranging up to 36 inches in thickness and 50 to 60 tons in weight. For this reason it is never used on battleships; but for land fortifications, where an extra 100 tons or so of weight presents no inconvenience, it forms an ideal armor, being capable of use in masses of such form and weight as will easily defeat the attack of the heaviest artillery. The plates, whether they are to be built up into turrets or casemates, are cast in massive segments, with parabolic surfaces, and they are provided with deep tongues and grooves along their abutting edges by means of which they may be fitted together without the use of bolts or any system of screw fastenings.

The outer face of the plates is chilled to a depth of from two to three inches, and this intense hardness, coupled with the great dead weight and the impossibility of striking a direct blow upon the curved sur-

faces, renders a Gruson turret positively invulnerable. The German artillerymen carried out a series of searching tests, placing shot after shot upon a turret, without being able to disturb its integrity. The system is of course costly, much more so than the earth and concrete protection behind which our coast defense guns are mounted; but there is no question that for a few of the more important and exposed positions, such as those at Sandy Hook or on Romer Shoals (which it is proposed to fortify), the Gruson armor would be found to well repay the cost of its installation. The long-standing proposition to erect the new 16-inch 125-ton gun on Romer Shoals is again to the front, and we think that if the government finally determines on this site it could not do better than mount this powerful weapon in a modern Gruson turret. So mounted it would be practically invulnerable, and its mere moral effect, commanding the channel at close range, would be an invaluable defense to the harbor and city of New York.

THE EAST RIVER TUNNEL.

The development of rapid transit in Greater New York has been greatly stimulated by the passage of the bill authorizing the construction of a railroad tunnel from Brooklyn to the lower end of Manhattan Island, and the bill providing for the removal of the Long Island Railroad tracks from Atlantic Avenue. The present schemes covered by these measures contemplate a through route from an underground terminus in lower New York to connect with the extensive suburban railroad system of Long Island. It is also proposed ultimately to extend the tunnel beneath the Hudson River to connect with the Pennsylvania Railroad terminus in Jersey City.

We have frequently pointed out in the SCIENTIFIC AMERICAN that the difficulties of the rapid transit problem in this city were due to peculiar topographical conditions. Manhattan Island is hemmed in on three sides by a wide stretch of water, which in every direction but one has prevented unbroken railroad communication with the outlying suburbs. The only direct means of exit by a suburban railroad is to the north over the lines of the New York Central system. True it is there is an excellent street car service and a more limited service of elevated cars running from New York to the outlying districts of Brooklyn; but it is not the kind of express service which alone is capable of carrying business men in reasonable time to and from their suburban homes. We doubt whether the new East River bridge will afford the necessary connection for a service of the kind desired, for, while it will form another valuable connection between the street and elevated railway systems of New York and Brooklyn, there has been no proposal to use it for the running of express suburban trains.

The new tunnel, however, by reason of its direct connection with the Long Island Railroad through the depressed tracks on Atlantic Avenue, will afford every facility for running fast trains of several cars each from lower New York to the outlying suburbs of Brooklyn, and it is to be hoped that in determining on the final dimensions of the tunnel, rolling stock, etc., the company, having in mind the phenomenal growth which is in store for any residential districts that may be thrown into easy touch with the business centers of this city, will lay out both the tunnel and its equipment on a most liberal scale.

The depth of the tunnel has been governed by the necessary depth of the future New Jersey extension, which is estimated at 30 feet below the bed of the North River. Beneath the East River the road will be carried in two separate circular tunnels, after plans successfully adopted in the later London underground railways. The diameter of each tube has been placed at 14 feet 6 inches, and hence we infer that cars of special design, smaller than the standard railway coach, are to be used in the tunnel. This would, of course, prevent the running of standard through trains from any part of Long Island to Manhattan Island, and for reasons stated above would indicate a failure on the part of the promoters to realize the possibilities of the tunnel. The difference in cost between the tunnel proposed and one of standard railroad dimensions would not be prohibitive, and would be handsomely repaid in its enlarged usefulness, especially when the New Jersey connection shall have been made.

THE PAN-AMERICAN EXPOSITION.

The Board of Directors of the Pan-American Exposition Company have agreed that the coming Exposition shall be located at the Rumsey Farm on the Niagara frontier in the northern suburbs of the city of Buffalo, and include a part of Delaware Park. Three experts including an architect and a landscape architect made the selection. The proximity of the Rumsey site to a beautiful park and its accessibility are all points in favor of this location. The approach is through some of the most attractive residential districts of the city, and the whole area is within four miles of the City Hall. Arrangements for preparing the site for the Exhibition purposes will be begun at once.

GOLD IN THE PHILIPPINES.

BY THE PHILIPPINE CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

Whether or not a tropical El Dorado will be discovered in our newly-acquired Philippines the future alone can decide; but certain it is that much time and labor will be expended in seeking the gold which the islands are said to contain. Before the outbreak of hostilities, American prospectors had made many trips inland; but the attitude of the natives prevented any systematic exploration of the country. Meager though the information acquired may be, there can be but little doubt that, in the unknown interior of many of the islands and in Luzon in particular, gold lies buried away.

It was the quest for gold and silver which, four hundred years ago, urged Spanish adventurers to begin a great course of discovery and exploration. It seems, therefore, incredible that after having acquired possession of these islands and established here their civilization, these gold-seeking Spaniards should have left undeveloped the natural resources of the territory.

But they never really subdued the natives; and, although they built up their great city of Manila and established trading-stations, their conquest was not extensive. They never subdued even the tribes which inhabit the country bordering the coast. During all the long years of Spanish dominion, from the founding of the first colony to the loss of the islands, the natives constantly rose up in rebellion against their rulers. Hampered by their efforts to bring the insurgent tribes to subjection, it was impossible for the Spaniards to explore the land beyond the beautiful rice fields and tropical groves, in the deep, dark jungles of the interior.

The natives themselves have never extensively engaged in mining; but the little digging which they have done has not been without its good results. In Manila, much gold in the form of jewelry and ornaments skillfully worked by the natives is sold in the shops.

Among many of the tribes of the interior, it is considered sacrilegious to disturb the earth; for which reason they have themselves not dug for gold and have prevented others from so doing. During the last few months they have resisted the encroachment of American gold seekers, because, they said, they feared that the wrath of their gods would fall upon them, if the earth were made to yield its treasures. It may be that there are other reasons; for the natives, although superstitious, are crafty, and would naturally oppose the mining of the noble metals by any save their own people.

Still another reason may be advanced to explain the undeveloped condition of Philippine mineral resources. The friars, who wield so enormous an influence, have always combated every plan which would tend to the enlightenment of the people and the growth of large industries; and especially have they been opposed to the digging of mines, despite the evidence that precious ores exist.

The mining of the natives has been confined to the alluvial deposits of the rivers; for there is not a stream rising in the mountains of Luzon and the other islands which has not its gold-bearing sands and deposits, from which for centuries the larger portion of the precious metals has been obtained.

Hostile though the natives may have been to the advance of explorers, the possibilities of the islands under any other rule than Spain's would, ere this, have been known. Only with much difficulty was it possible to obtain a mining grant from the Spanish officials; and, for a foreigner, the obstacles encountered in obtaining a concession were well nigh insurmountable.

Since the capture of Manila a number of American prospecting parties have been exploring various parts of the islands. Although their work has been greatly retarded by the insurgents, they have, nevertheless, succeeded in locating some very rich veins of gold, which will be worked when peace is established. Even before the outbreak of our war with Spain, a company composed largely of Spanish residents of Manila had undertaken the alluvial mining of gold; but nothing more than the preliminary prospecting was ever accomplished. So promising is the outlook for the future that many of our soldiers, particularly those of our Western States, have expressed a desire to remain in the Philippines in order to engage in mining after the insurgents have been subdued.

Our prospectors have confined their explorations to Luzon; but even on this island, perhaps the most civilized of the entire Philippine group, are regions which have never been trodden by a white man. Some of the other islands, it is said, also contain gold, and on Mindanao it is certain there are valuable deposits. Old miners, who have been in Cripple Creek and in the Klondike, have already arrived in Manila, and form but the advance of an army of gold-seekers, which will invade the country when peace has been established. The present war cannot long continue, nor can it long delay the development of the mineral resources of our eastern possessions.