THE SEA-RAFTS OF THE NORTHWEST.

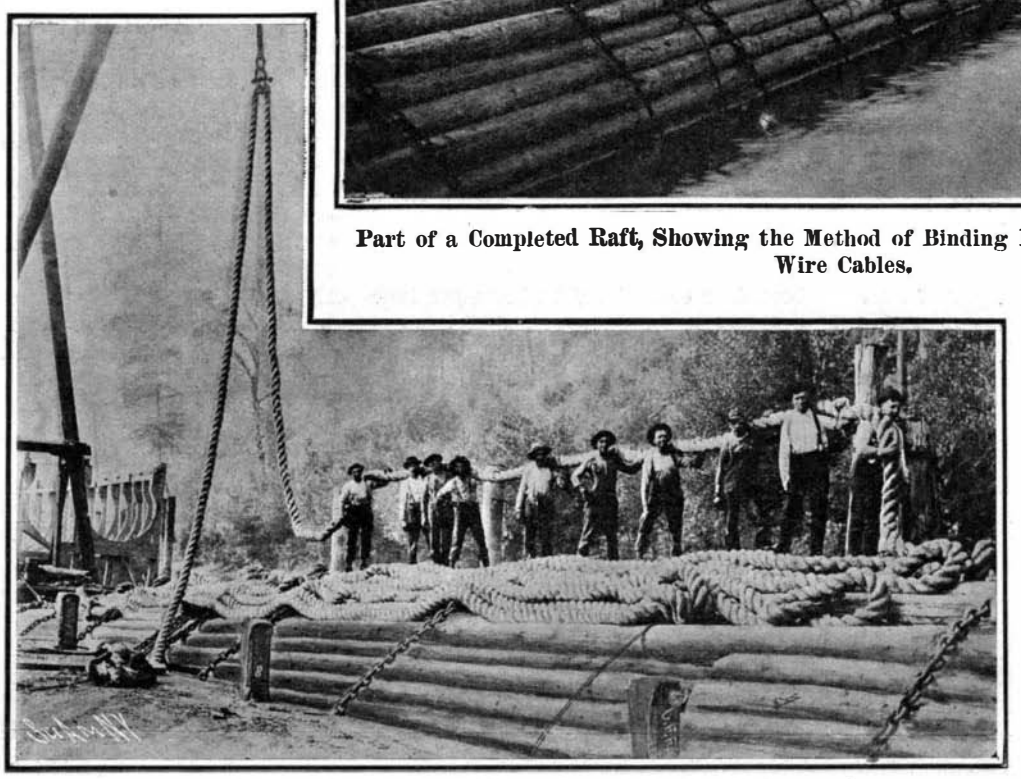
BY DAY ALLEN WILLEY.

In addition to the square timbers, planking, and boards cut for buildings, bridges, and other purposes in Washington and Oregon annually, a very large quantity of material for piling and telephone and telegraph poles is secured from the forests in the Puget Sound country and along the Columbia River. Until recently most of this timber was transported to market in sailing vessels and steam barges, as it is used principally in central and southern California.

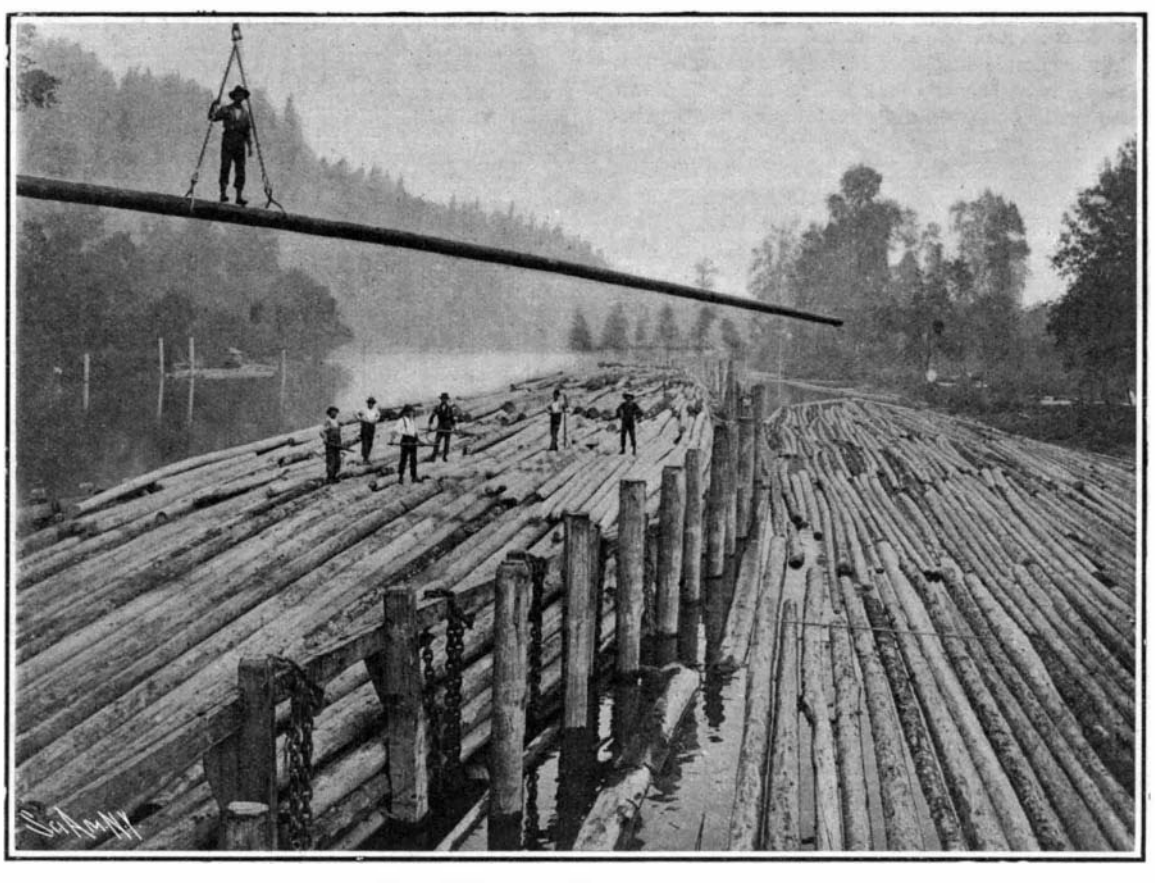
The cost of transportation by steam and sailing vessel, and the limited capacity of even the largest craft for this kind of freight, caused some of the companies engaged in getting out poles and piling to design what are called in the Northwest sea rafts. As the accompanying illustrations show, these rafts are of truly enormous dimensions, and in shape closely resemble a cigar, tapering to a point at both ends, thence gradually enlarging to the greatest diameter at the center. While the sea rafts are of varying sizes, the smallest usually contain at least 5,000 pieces of timber, ranging from 80 to 110 feet in length and from 8 inches to nearly 2 feet in diameter at the butt. Consequently, some of the rafts made in this peculiar fashion are nearly as long as the largest transatlantic liners, measuring no less than 650 feet from end to end. So compactly are the poles arranged, however, that the greatest diameter is not over 60 feet; but, as the photographs show, the enormous weight of the wood forces a raft down in the water until the highest portion is rarely over ten feet above the surface. To fasten such a raft so that it will withstand the force of the seas to which it is exposed in the trip down the coast from the Columbia River or Puget Sound to San Francisco and the southern California coast, no little engineering skill is required. As the cigar shape offers less resistance to the force of the waves than any other, this has been adopted. In order to pile the timber in this form, a huge skeleton or shipway, as it would be nautically termed, is constructed. This is practically a cradle, which is moored in the water adjacent to the boom where the raft timber is confined. By means of a boom derrick of suitable dimensions and power, the poles and piling are lifted from the boom singly and placed in the proper position in the cradle. They are so adjusted as to overlap each other, the plan followed being somewhat similar to that in laying a brick wall, the end of each stick being placed opposite the center of the one adjacent to it. While to a novice the raft looks as if it were made up of timber thrown in without any order, every pole is carefully placed in position. Sometimes the work of filling the cradle occupies several months. After completion the raft is wrapped with iron chains lashed around it at intervals ranging from 12 to 20 feet apart. These chains are composed of 1½-inch links, and the ends are toggled together after the chains have been stretched taut by a hand or steam windlass. To prevent the chains from slipping, iron staples are driven through the links into the outside poles. In addition to the chains, however, "side lines," as they are called, consisting of wire rope are stretched around the raft between the chain sections, so that when the wrapping is completed, the mass of logs is bound together very securely. When the wrapping is finished, the raft is ready for launching. The cradle in which it has been formed consists of two sections held together at the bottom by bolts. To each bolt is attached a rope; and when the raft is ready to be floated, it is necessary only to pull on these ropes. The bolts then slip back in their sockets, and the two sections of the cradle fall apart, ready to be towed away by tugboats. In building the raft, however, two 2-inch chains are stretched lengthwise from end to end through the center. One of these is bolted to a sort of bulkhead at one end, consisting of a band of iron, which is fitted around the projecting ends of the outer pieces. The other chain, called the "towing chain," is connected at the forward end with the towing hawser, and secured inside the raft by lateral chains which extend also from side to side, being fastened to those which encircle the raft. In this way the towing strain is well distributed, and is not borne merely by the bow end. To move this unwieldy bulk, two powerful steamers are usually employed at sea, one for pulling directly ahead, and the other to aid in keeping the raft in the right course, especially in rough weather. But a comparatively small portion of the surface is exposed to the seas. Otherwise it would be impossible to transport the timber in this form. On the other hand, the depth in the water allows only a very slow rate of speed to be maintained. The average time required between the Columbia River and San Francisco, for example, is from ten to fifteen days according to the weather, although the distance is only about 750 miles.

The Columbia River rafts are put together at a town called Stella, which is located in the lumber country about forty miles from the mouth of the river. These rafts are the largest which have yet been transported down the coast. One which was sent to San

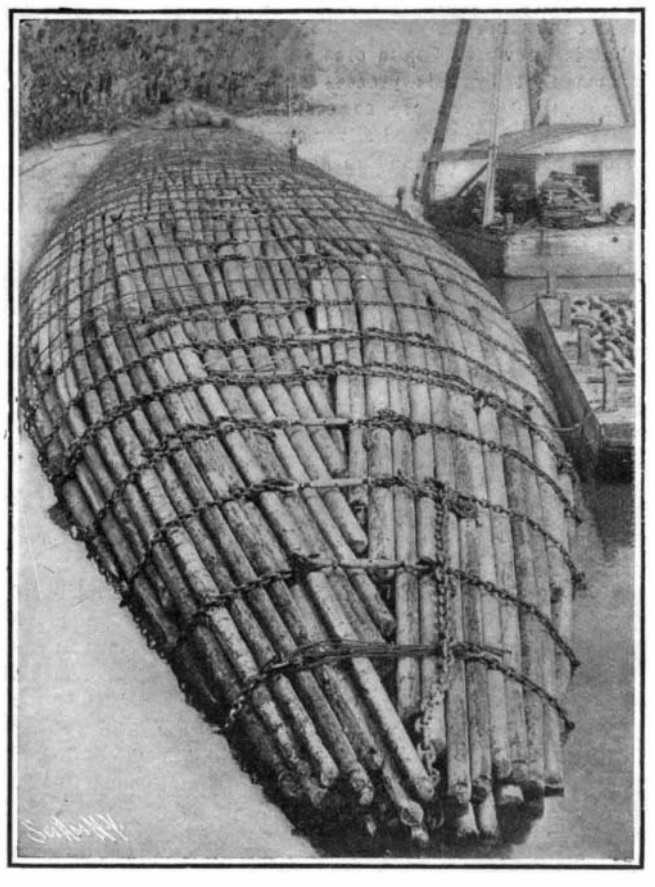
Part of a Completed Raft, Showing the Method of Binding It Together with Chains and Wire Cables.



Coiling the Towing Cable on Top of the Sea-Raft.



Building a Big Sea-Raft on the Lower River.



Columbia River Sea-Raft.

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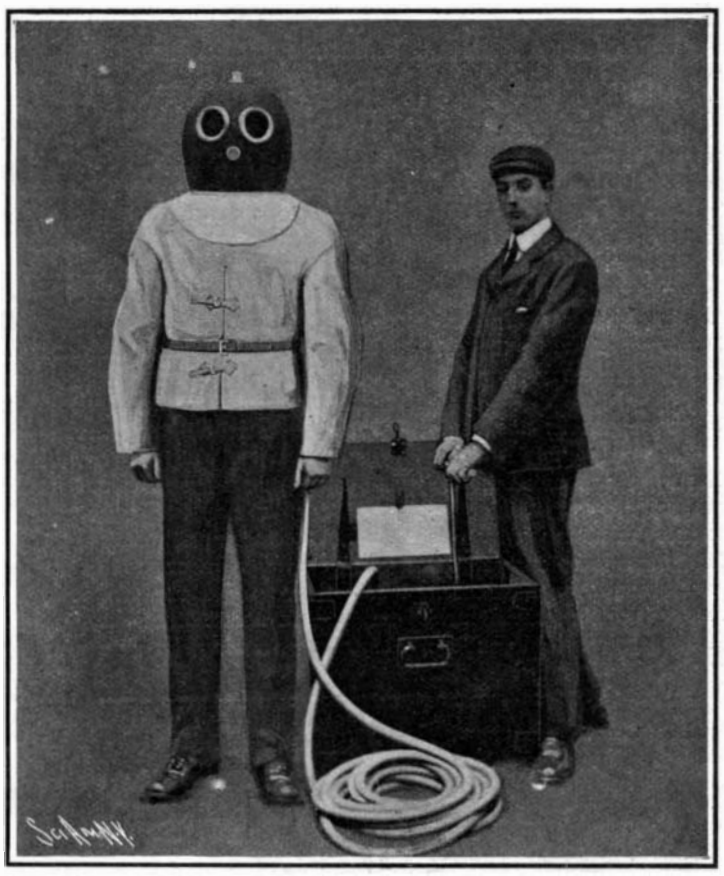
Francisco contained no less than 800,000 linear feet of lumber, to be used for wharf piling. If the piles which it contained were stretched in a row, they would actually extend a distance of nearly fifteen miles. The majority of these rafts have been safely taken to their destinations, although one or two have gone to pieces. Where such accidents have occurred, the mass of timber has covered the ocean for a distance of many miles, and has formed a very dangerous menace to navigation. For this reason an effort has been made by other transportation companies to have a law passed in the States of Washington and Oregon, preventing the building of the sea rafts, on the ground that they are a menace to navigation. Thus far the agitators of this movement have been unsuccessful.

BREATHING MASKS AND HELMETS.

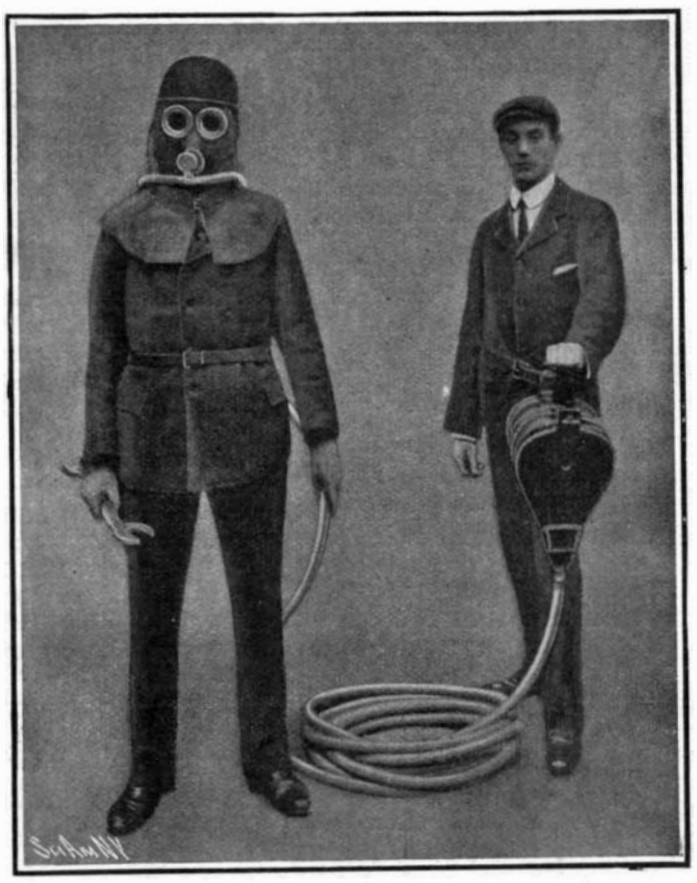
BY W. G. FITZ-GERALD.

One of the most interesting and curious of all industries is the manufacture of smoke helmets, smoke jackets, artificial respirators, and self-contained breathing apparatus generally, such as are used in mines of all kinds, collieries, gas and chemical works, fire brigades, sewerage works, ships' coal bunkers, the ammonia chambers of refrigerating factories, steel works, breweries, well-sinking plants, and other industrial concerns.

The curious gear is intended to supply the user with factitious but perfectly respirable air, more or less independent of any connection with the outer atmosphere, for about four hours at a stretch. Some varieties, like the Fleuss-Davis patent, have no air pipe or other connections with the base of operations, so that for exploring and rescue work in mines, etc., its scope of usefulness is practically unlimited. The wearer, with his cylinder of compressed oxygen, is perfectly safe in the most deadly gases, and can walk any



Helmet and Jacket Combined; the Tube is Supported by the Belt to Avoid Dragging Upon the Helmet.



The "Complete Mask" Type of Breathing Apparatus of Vulcanized Rubber.

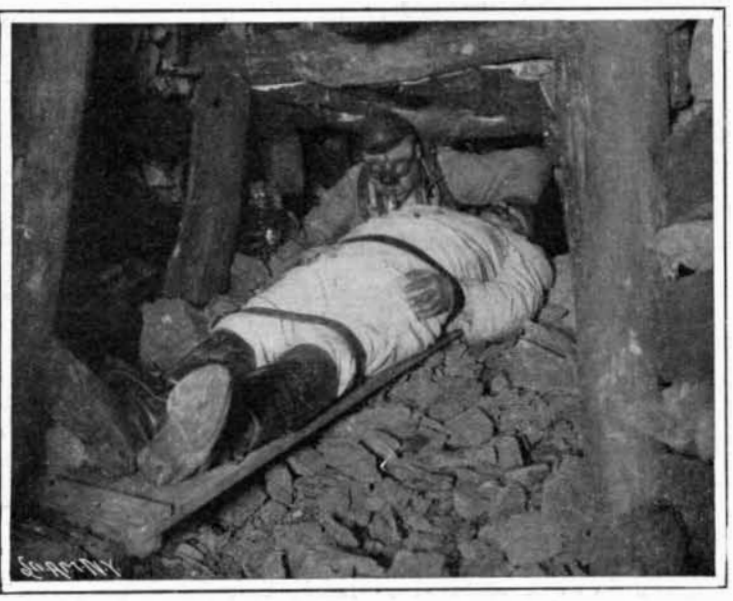
Breathing Device for Use in Coal Mines.

Reviving a Victim Overcome by Poisonous Gas by Means of Supplementary Oxygen Supply.

Type of Helmets Used in German Fire Departments.

Passing an Unconscious Miner Through a Heading Out Into the Open Air.

Penetrating to the Scene of a Disaster in a Coal Mine.



Taking a Victim of a Mine Accident to the Surface, Strapped Upon a Stretcher.

BREATHING MASKS AND HELMETS.