pounds; and although the reasons for this limit are not perfectly obvious, yet the fact in itself must carry some weight.

With engines developing more power per unit of weight than any animal, and with high-grade steels capable of withstanding greater unit stresses per pound of weight than any organic material, it seems that we ought certainly to be able to raise this limit of weight until it includes one man and his machine, and perhaps eventually to construct machines of far greater capacity.

New Ethnic Type Found in Menton Grotto.

The grottoes of Baoussé-Roussé, near Menton, are now being explored for prehistoric remains under the direction of the Prince of Monaco. M. de Villeneuve has been carrying on the excavations, which have yielded some interesting finds, especially of fossil human remains. The chief discovery so far has been a human fossil of a new type. The Grotto des Enfants, where the work has been carried on, yielded two skeletons in 1874-5 which are now at Paris, but less than 10 feet of depth was then explored. M. de Villeneuve has gone down to 30 feet before reaching the rock which constitutes the primitive soil. At 21 feet he found a complete skeleton, and 2 feet lower the last burial place, containing two bodies. Among the fauna are the eland, two deer, one of which is of large size (*Cervus canadensis*), bovidæ, equidæ, and others. The most interesting animal is no doubt the *Hyæna spelæa*, whose bones have been found below three human skeletons at about 20 feet depth. Implements and utensils have been found in considerable numbers. Quite at the bottom were rough implements of limestone and pebble, more rarely in flint. According to M. Cartailhac, who assisted in the work, the lower skeletons should be classed as palæolithic, and have a considerable value. The subject found at 21 feet is a man of great height, 6 feet 4 inches, stretched out on a layer of cinders, charcoal, bones, etc., more or less burned, which constituted the seventh habitation. His feet had been protected by stones and a large block, which, in falling, crushed the head, was no doubt destined to protect the latter. The skull has been reconstructed; the facial part is very low and well developed in length. This individual has the characteristics of the race known as Cro-Magnon. Two skeletons were found which present great interest, as they are of the negroid type. These were buried in the eighth habitation. A small ditch was dug to receive them and a kind of trilith formed of two vertical stones and one horizontal covered the two heads. One is an old woman who lies flatwise with the members strongly folded up, while the second is a young man approaching adult age, lying on the back, and his members are also folded. These skeletons are alike in characteristics and represent an ethnic type which has not as yet been encountered in the quaternary layers. They are of small size (the woman 5 feet 5 inches, the man 5 feet 2 inches) and not very robust. The most curious fact is that the facial part of the skull presents a strongly-marked negro type in the lower portions. The nose is somewhat wide and there exists a sub-nasal prognathism as well defined as in the present negroes of Senegal or other regions, and in consequence, a retreating chin. It is thus a striking fact that individuals of the negroid type have been encountered in this locality at a depth of 23 feet.

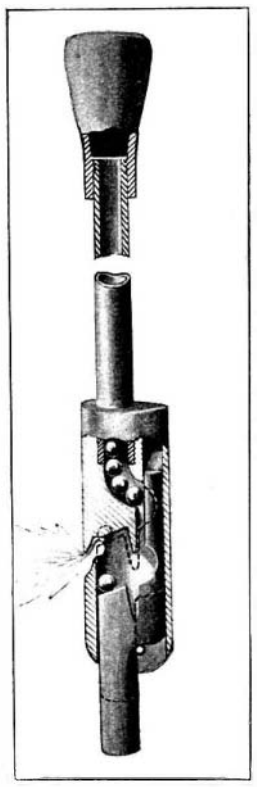
The Current Supplement.

The current SUPPLEMENT, No. 1434, contains a wide variety of instructive articles. Harold J. Shepstone gives an excellent description of the new harbor works at Dover, illustrating what he has to say by many clear pictures. George J. Burch tells something of a new capillary electrometer. Sir Oliver Lodge concludes his discussion on electrons. "Painting by the Acre" is the title of an entertaining article which tells how the great transatlantic liners are kept in trim, and gives one some idea of the difficulty of counteracting the effects of the sea water on ocean steamships. Ever since it was discovered how water could be electrically decomposed, inventors have sought to make use of the discovery for the purpose of utilizing the oxygen and hydrogen liberated. Emile Guarini describes the Garuti process for attaining this result. Prof. Arthur W. Goodspeed's remarkable discovery of new emanations from apparently inactive bodies is fully discussed in a paper from his own pen. Profs. Henri Moissan and James Dewar outline certain experiments on chemical affinity at low temperatures as determined by the reaction of liquid fluorine. Edmund Ledger reviews our present information of the much-discussed canals of Mars.

The largest ferryboat in the world was launched May 23 at the Schichau Shipbuilding Works, at Stettin. The boat is designed to carry whole trains over the Baltic Sea between Warnemuende and Gjedser, providing direct communication with Copenhagen.

A SAFETY MAGAZINE TORPEDO CANE.

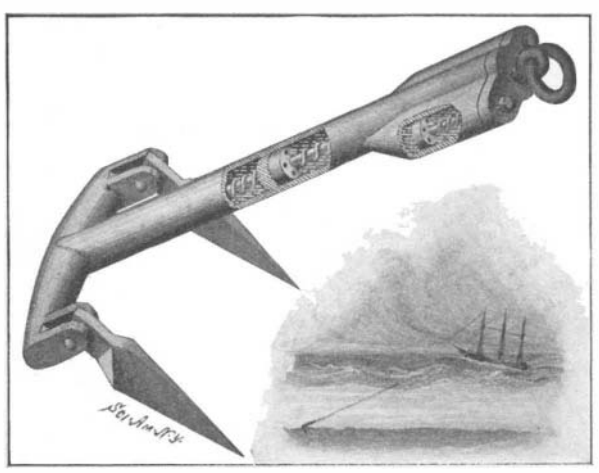
With our national holiday only a week off, the patent just granted to Mr. John H. Rese, of Alleghany, Pa., is of timely interest. The patent covers the invention of a magazine torpedo cane arranged to positively feed the torpedoes out of the magazine and safely explode them in a casing which is so arranged that the flames or burnt products of the exploded charge will be prevented from returning to the magazine and exploding its contents. As shown in our illustration, the main rod of the cane is hollow, and serves as a magazine in which the torpedoes may be stored. At the lower end of the cane a casing is secured, in which a plunger is adapted to slide. The plunger is provided with a recess, which registers with the lower end of the magazine when the plunger is forced up to the position illustrated in dotted lines. The recess is of such size as to receive only one torpedo at a time, which is carried down with the plunger when the latter drops to the normal position, and is permitted to roll out into the explosion chamber. Now, on striking the end of the cane on the ground, the plunger is forced upward into the casing, exploding the torpedo by crushing it against the upper wall of the chamber. The fumes and burnt products of the explosion are blown out through the opening at the side of the chamber, being prevented from passing up to the magazine by a tongue which projects down into a slot in the plunger. At the same time the recess in the plunger is brought into position to receive another torpedo from the magazine. On lifting up the cane, the plunger drops by gravity, carrying this torpedo down to the explosion chamber, where it is exploded on the next blow. The process may be repeated as often as desired, or until the magazine is entirely exhausted.



A SAFETY TORPEDO CANE.

ANCHOR WITH YIELDING CHAIN CONNECTION.

In order to prevent the breaking of anchor chains by sudden shocks or pulls due to the motion of vessels while at anchor, Mr. William A. Duncanson, of Falmouth, Nova Scotia, has invented an anchor having a yielding connection with the chain. The shank of the anchor is tubular, and movable within the shank is a rod to the outer end of which the anchor chain is secured. The hollow shank is divided into two chambers by a center partition. Through this the rod passes and is provided with two perforated pistons, one above the partition and the other at the lower end of the rod. The chambers are filled with oil or similar material not subject to freezing. A crosshead secured to the rod at its outer end is provided with two auxiliary pistons, which operate in cylinders at opposite sides of the main tube. The pistons are normally



ANCHOR WITH YIELDING CHAIN CONNECTION.

held in the positions illustrated by coil springs on the piston rods. In operation the pistons are drawn out by any abnormal pull on the anchor chains. The shock of a sudden pull, however, is absorbed by the cushion of oil against which the pistons are drawn. By perforating the pistons the bearings thereon will be relieved to some extent, for the liquid will pass through these perforations as the pistons move upward. The auxiliary pistons and springs serve to check the continuous draft on the main pistons and springs, that is, when the auxiliary devices are completely compressed, the main devices will not be fully compressed, so that a complete elastic cushion is obtained. The springs on the piston rods serve to restore the pistons to their normal positions upon the slackening of the anchor chain.

Engineering Notes.

The first British use of the Hall signaling apparatus is to be carried out upon the North-Eastern Railroad of Great Britain. Hitherto this system has been tested experimentally only in this country. The section of track upon which the apparatus is to be installed is between Alne and Thirsk, a distance of about 11 miles. In the Hall signaling system the normal position of the semaphore is horizontal, indicating "danger." By means of an electrical appliance fixed to the track the train as it approaches the semaphore lowers the arm of the latter, provided the section in front be clear; but should there still be any wheels on the rails of the section, this operation is automatically rendered impossible. It is proposed to equip the installation with Raven's patent fog-signaling apparatus, and to work the semaphore arms by compressed carbonic acid gas. Each signal post will have a cylinder of gas stored at its base, and the gas is to be conveyed to the semaphore arms by means of an electric device. Should this installation prove reliable and efficient upon this section, it is to be extended throughout the whole system.

The work of towing off the large floating dock for Durban, which was wrecked on the rocks at Mossel Bay, South Africa, during a storm, while on the way out, has proved more difficult than was anticipated, owing to the difficulty in obtaining hawsers sufficiently strong to stand the tremendous strains that have to be exerted. The authorities engaged in salving the structure also found that there was no large vessel sufficiently powerful to accomplish this work, and the battleship "Monarch" was requisitioned for the purpose. By this means the dock was hauled 100 feet seaward, but at this critical point the hawser parted. A fresh hawser specially for the purpose has now been ordered from England. It is to be 3,120 feet in length, consisting of 720 feet of 18-inch Manila cable, with 1,200 feet of 7½-inch steel wire at each end. The dock only requires power and an unbreakable hawser to refloat her, and it is considered that the damage will not be so severe as was at first supposed.

In a recent number of Cassier's Magazine may be found an interesting discussion of the modern use of suspension bridges. From time to time the statement is made that suspension bridges are things of the past, and that cantilever and other structures have superseded them. As an instance a correspondent of one of the New York daily papers recently maintained that "when the problem of really consolidating the city of New York with its great neighboring cities, to the east and west, is really taken in hand, it will not be solved by suspension bridges, typical of the engineering of the early years of the last century, but rather by tunnels or by great steel tubular and girder structures, which will link the railroad systems, as well as the thoroughfares of the cities." As to this, however, it is proper to point out that the old form of suspension bridge is an antiquated, superseded structure in only the same way that all old designs are antiquated and superseded. It is not the principle that is wrong; it is that the details are behind the modern methods of construction. To eliminate the suspension bridge from modern work would be to deprive engineers of a form of construction which has special adaptations and which modern science cannot afford to give up.

A contemporary remarks that a recent computation has placed the total aggregate power of steam turbines in use or under construction or ordered in different parts of the world at over 500,000 horse power. Of this total the major portion is used or to be used for the driving of dynamos, alternators or other electrical machinery, while the next in point of power consumption is marine engines. An item in point is the contract recently given to the British Westinghouse Electric and Manufacturing Company, Ltd., by the Metropolitan District Railway Company, of London, England, for four turbo-alternators. Each of these machines is designed for a normal capacity of 5,500 kilowatts, but will be capable of carrying an overload of 50 per cent, giving for each unit a maximum output of 8,250 kilowatts, or about 11,000 E. horse power. These turbines will be not only the largest steam turbines ever made, but also the most powerful single cylinder engines of any type whatever in the world. Very few multiple cylinder engines existent have greater power. Notwithstanding the enormous power they will develop, the dimensions of these engines are only 29 feet in length by 14 feet wide, by 12 feet high, the overall length of turbine and alternator being 51 feet 9 inches. The steam pressure will be 165 pounds per square inch, and the speed 1,000 r. p. m.

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