like battleships to grow larger, faster, and with more powerful armaments. It seems likely that in the near future the once-dreaded war chariots of antiquity will be revived on a colossal scale. But their weapons of offense will be not merely a few sickles attached to the wheels, but rather a battery of modern guns of terrific power, securely intrenched behind impregnable walls of nickel steel, the entire fearsome fortress being capable of propulsion at the speed of an express train across all but the wildest and most rugged country.

The Germans are already beginning to construct the most ambitious of war-cars as to size and armament, and their evolutions in the field are now largely directed by the war-balloons of the Engineers.

Ehrhardt, of Düsseldorf, has recently exhibited an interesting war automobile at the International Automobile Show held at Berlin.

The war automobile is driven by a 50 to 60-horsepower, four-cylinder gasoline motor, corresponding in the main with the usual Ehrhardt-Decauville construction. The 5-cm. (1.9-inch) quick-firing gun is free to rotate around a support bolted to the frame of the car, on which it is located; it is displaced extremely quickly and readily both in a vertical and horizontal direction, so that it can be directed against military balloons and airships.

The gun is entirely surrounded by an armored casing of nickel steel plate 3.5 mm. (0.137 in.) in thickness, which protects the car driver and crew.

All devices for operating and guiding the car as well as for serving and training the gun are arranged inside the armor. For blocking the car there have been provided, inside the armor casing, four substantial spindles which at a moment's notice are lowered from inside in order to be screwed fast, thus unloading the springs and obtaining a rigid support for the guns. The ammunition stored inside the armature is sufficient for 100 rounds. The weight of the vehicle, inclusive of a staff of five men, is 7,040 pounds. On smooth roads the automobile attains a speed of 29 miles per hour. Forest paths of a gradient of up to 20 per cent are readily traversed.

HOW COMPRESSED AIR RAISED A SUNKEN SHIP. THE REMARKABLE SALVING OF THE STEAMSHIP "BAVARIAN."

To turn a 12,000-ton steamship into a huge steel bubble by pumping her full of compressed air is a recent engineering feat.

The steamship "Bavarian," of the Allan Line, ran on Wye Rock, thirty-eight miles below Quebec, on the night of November 3, 1905, a few minutes before high tide. Almost every method known to wreckers for salving the vessel was tried and found wanting and over $150,000 was spent in these efforts.

Examination had shown that the "Bavarian's" bottom amidships was in a very ragged condition. The holes were so large that it would be hopeless to try to pump the water out. Preparations were accordingly made to treat the holds as caissons, compressed air being used to force the water out through the opening in the bottom.

Work was begun by the North American Wrecking Company on September 7, 1906, and the vessel was floated on November 16, 1906. Everything in regard to the operations was calculated with mathematical accuracy. The calculations for the buoyancy required, and at the points chosen, were most fortunate.

It was necessary to timber solidly between decks above the several compartments that were to be used as caissons. The hatches were closed by plating. Air locks were placed on the compartments which were to be treated as caissons. Every opening in the deck, scuppers, etc., was closed.

When the air was applied the water rapidly receded and workmen were able to stop the rents in the bottom with temporary plating. In some of the holds even, the leaks were not closed, and the vessel was floated without a bottom. Pressure-men, that remarkable class of men who make it their business to work in compressed air, and who are commonly known as "sand hogs," were brought from the Quebec Bridge, the caisson work of which had shortly been completed, or from New York, the superintendent of the work having for many years been engaged in compressed-air work about New York.

A wooden tank of about 200 tons capacity was built directly between the engines, and the weight of the engines (180 tons) was carried by this tank. On the day of flotation about 25 tons of water were left in the tank. As the vessel rose and the engines settled to their old level, blocking was put between the tank and the deck over it, and this water pumped out, the surplus lift of the tank being transferred to the vessel. The heavy tides of the St. Lawrence, although the center of the vessel was flooded, lifted the end of the vessel, and the craft rose and fell with high tide, so that the engines rose and fell on some occasions 14 inches.

Air bags and tested barrels were used in the after bunkers. The boilers were blown out, and air was applied to the forward bunkers, they, too, being treated as caissons.

Several of the holds where the bottom was not so badly destroyed that it was necessary to treat them as caissons were pumped out, 8 and 10-inch centrifugal pumps being used for this purpose.

Owing to bad weather the tugs which had been lying alongside on November 16, the date set for flotation, had dropped down the river to a more sheltered position. As the tide rose the air compressors were set to work and the full power of the plant used in forcing air into the holds of the ships. Suddenly there was a movement in the great vessel as she lifted herself from the rock and a cheer went up from those on board. Five minutes later the "Bavarian" floated clear of Wye Rock in 60 feet of water, and was hauled to her anchors, which had been set off her port bow and quarter. After the first few minutes all apprehension that the vessel might turn turtle or that the air pressure would not hold the water back was dispelled. The "Bavarian" floated on an almost even keel and was shortly after towed by tugs to Quebec. The wrecking operations were under charge of William Wallace Wotherspoon, C.E., superintendent, who had entire charge of the wrecking operations inside the bulwarks of the vessel, and Mr. R. O. King, C.E., who was controlling engineer. Capt. W. Leslie, of Kingston, had charge of all nautical work.

CONTROLLING TORPEDOES BY WIRELESS TELEGRAPHY.

A torpedo-launching apparatus, which is operated by electric waves, has recently been tried in France, on the Mediterranean coast. It consists of two cylinders

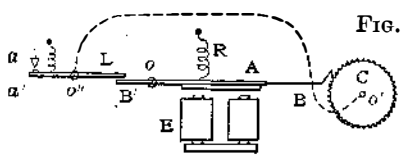

FIG. 1.

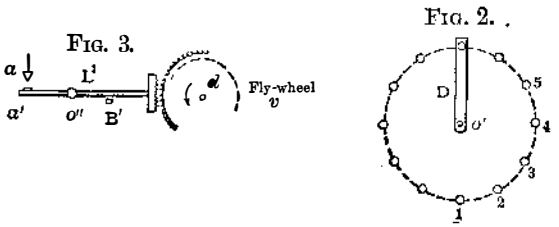

FIG. 3. FIG. 2.

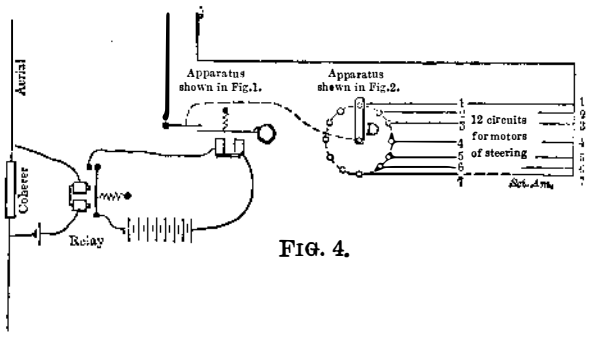

FIG. 4.

CONTROLLING TORPEDOES BY WIRELESS TELEGRAPHY.

placed one above the other, the upper one acting as a float which holds the mast wire, while the lower cylinder contains the torpedo and the launching device. The method of carrying out the maneuvers of the apparatus from a distance by the electric waves has been devised by M. Devaux, who gives the following account of the method. Up to the present the Hertz waves have been utilized generally for operating an electro-magnet, whose armature makes the well-known signals as in the Morse instrument, and this is the method used in wireless telegraphy. However, the movement of the armature can evidently be used to set free the force of another instrument, thus acting as a relay. Up to the present, the devices in use allowed of using one electro-magnet for operating two movements only, corresponding to the up or down position of the armature. To carry out a series of maneuvers which have no connection with each other, it is necessary to have as many electro-magnets as there are operations. This, though complicated, would be possible in the case of wire transmission, but it is not practicable for electric waves, seeing that as yet we are unable to separate the waves so as to have them act on different coherers located at the same point. We proposed the problem of setting in movement from a distance by electric waves, of a series of forces, acting in an order always variable and keeping independent of each other, and we devised a new method for the operating apparatus. This apparatus is used with each of the coherers, and can also be used with a wire-transmission system. In the latter case they need only one wire, using the earth as a return.

The present system consists, first, of a distributing device passing over all the contact points from which start the different operating circuits, and second, a commutating switch which sends the current at the right moment when the distributor has reached the proper circuit. To carry this out, an electro-magnet *E* (Fig. 1) can attract an armature, *A*, which is held back by the spring, *R*, and is pivoted at *O*. This armature is prolonged at each end by the arms, *B* and *B'*. The arm, *A*, provided with a pawl, works upon the ratchet wheel, *C*, which is mounted on the shaft, *O'*, of the distributor. The wheel thus advances one tooth at each attraction of the electro-magnet. At the other end, the arm *B'* strikes each time against the end of the lever, *L*, which is pivoted at *O''* and which works the contacts, *a a'*. Mounted on the shaft, *O'*, of the distributor is an arm, *D* (Fig. 2), whose end works upon a set of contacts 1, 2, 3, etc., and sends current from *O'* into twelve circuits. Each movement of the electro-magnet thus moves the arm around one contact. The electro-magnet is operated by aerial waves, using a coherer, or again by a line wire. In Fig. 3 is seen the second part of the device for shifting the circuits. The arm, *L'*, lies in another plane from the arm *B B'*, and on the forward end it carries a small rack and pinion device which is not seen in Fig. 1. The rack, sliding over the wheel, *d*, engages with it when the lever, *L*, is out of its normal position. In coming back, the rack draws the wheel with it, but as the latter carries a flywheel on the shaft, this gives it a certain inertia and retards the fall of the lever. During the series of attractions of the armature, the contact at *a a'* is thus kept open, and it is only when the armature is stopped and therefore when the distributor arm has come to the proper point, that the contact is closed. The apparatus works as follows: When at rest, the arm, *D*, remains upon contact No. 12, which is a dead point. The lever closes the circuit at *a a'*. We now wish to close circuit No. 7 without interfering with the others. It suffices to send 7 currents or 7 sets of waves with the rhythm $1 = t$. The electro-magnet will work 7 times at this frequency and will make the ratchet wheel, *C*, advance by 7 teeth, whereupon the arm, *D*, comes upon point No. 7. But now the contact at *a a'* has remained open on account of the inertia, as we have seen, of wheel *d*, and it is only closed when the arm, *D*, comes to rest. We thus close circuit No. 7 without operating the others. Again, we may wish to close several circuits at the same time. To do this, the distributor must be free to move without breaking the circuit which has been closed. It suffices that circuits 1, 2, 3...12 be closed by locked relays, and the latter serve to operate the work circuits. These relays are closed and remain so when the current passes, and their opening depends upon a device connected with one of the contact blocks.

In Fig. 4 is shown the apparatus for operation at a distance. It is connected in the place of the usual Morse receiver for aerial telegraphy. We have applied these apparatus to operating torpedoes at sea, and thus need the following maneuvers: 1. Forward run. 2. Back run. 3. Stop of propeller motor. 4. Rudder to right. 5. Rudder to left. 6. Stop of the steering motor. 7. Lighting of the signals at the front. 8. Lighting at rear. 9. Launching of the torpedo. The apparatus uses 12 points, thus having 3 points free. The speed allowed for making a complete round of the distributor is 2 seconds. The nine working circuits closed upon seven locked relays which worked the propeller and steering motors, signal lamps, and launching apparatus. Inside the torpedo is placed a set of Fulmen storage batteries which give a four hours' run. The torpedo is formed of two cylinders of sheet iron with conical ends, connected one above the other. It weighs 6.8 tons. The top cylinder, 30 feet long and 2 feet diameter, serves as a float, and it carries two small masts to which are fixed a receiving wire and a set of signal lamps. The lower cylinder, which is 35 feet long and 3 feet diameter, contains a torpedo launching tube and a Whitehead torpedo, besides the battery, motors, etc. The land post has a mast wire 50 feet long, in fine strands. A distance from 400 to 5,000 feet was covered in the trial. The latter took place in the port of Antibes on the Mediterranean. These tests have proved satisfactory as regards the different maneuvers of the torpedo-launching apparatus from the post on shore.

A Dry Shampoo.

People who are susceptible to colds, and who fear to wet their hair during the winter months, will find a dry shampoo with orris, in connection with brushing and massage, very effective.

Ten cents' worth of powdered orris is amply sufficient for two shampoos. When ready to retire, and after carefully brushing the hair, apply the orris, rubbing it in well with the finger tips, then put on a cap or tie the head up in a towel and allow it to remain over night. The orris will absorb the oil and dirt from the hair and scalp during the night, and can be brushed out in the morning.

Orris is not only an effective shampoo, but a very agreeable one; imparting a distinct yet dainty evanescent odor to the hair. By its use the head and hair can be kept in a perfectly cleanly condition. Frequent airing, brushings, and massagings will add to the beneficial results.