FRENCH MILITARY FOLDING BICYCLE.

Both the bicycle and automobile are meeting with favor from the army authorities in Europe. The bicycle has ceased to be considered purely as a means of locomotion for pleasure, and is now regarded as an efficient mount for soldiers. For scouting and the conveyance of dispatches, the bicycle is without a rival, being noiseless, occupying small space and affording a very insignificant target to the rifle fire of the foe. It is reliable, and a bicycle company or division is very mobile. The wheel also affords the enormous advantage over the horse in that it requires no forage supplies.

At the recent maneuvers of the French army the bicycle demonstrated its great value. The wheel which we illustrate was invented by Capt. Gerard, of the French army, and can be folded up and carried on the back. The frame is strengthened by a second tube running parallel with the first, thus giving the machine great rigidity. These two tubes, owing to their considerable diameter, reduce the vibration that plays so great a part in the expenditure of energy by the bicyclist. At the center of the right-hand side of the parallelogram forming the frame, there is a ball joint. Each of the parallel tubes is divided in the center, and the ends, which are beveled, are held in place, when the machine is opened, by coupling sockets. When the ends of the tubes are exposed by loosening the sockets and shoving them back upon the rings, the front part of the bicycle can be folded around onto the rear half, the wheels being superimposed. If desired, the bicycle may be divided into two parts, while the handle bar can be removed from the steering head. A novel form of brake is also provided. The wheel is of such a height that the bicyclist can maintain such a position in the saddle that he can at any moment touch the ground with his feet.

FRENCH MILITARY FOLDING BICYCLE.

OILED ROADBEDS.

BY WALDON FAWCETT.

The plan of making roads dustless by incorporating crude oil into the dust of an ordinary earth road for the purpose of holding the dust down and securing a permanent roadbed has been introduced successfully on highways in various parts of the country, particularly in California, and the same scheme is now being utilized to secure dustless roadbeds on several of the principal railroads of the country. In the case of these steam roads, the officials in most instances made a trial of the dustless process purely as an experiment, and were, at the outset, far from sanguine of success; but the system has proved so satisfactory that it is being rapidly extended, and at the present time there is an aggregate of over one thousand miles of oiled roadbed on the various railroad lines of the United States.

For the operation of oiling a roadbed the sprinkling machinery is attached to an ordinary flat car, and the regular railroad employés are capable with a little instruction of manipulating it satisfactorily. The oil-sprinkling car proper is simply for carrying and manipulating the sprinkler, the oil being stored in ordinary commercial tank cars. Extending the length of the car is a four-inch pipe with provision at either end for making connection by means of rubber hose with the oil supply. The main pipe is connected near the middle of the car with a branch pipe, which in turn carries the oil to three sections of two-inch pipe, which constitute the sprinkling device.

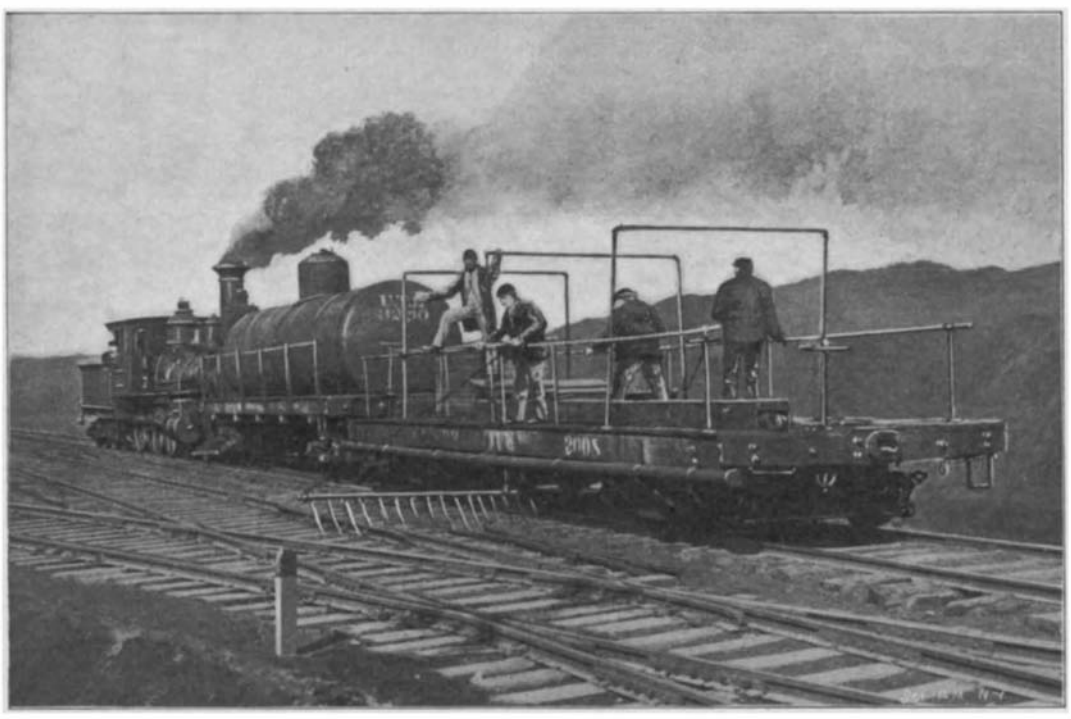
One of the two-inch pipes mentioned is suspended transversely below the car and extends the full length of the cross-ties. Swinging from either side of the car is one of the other sections of two-inch pipe, and when in extended position, they reach out on either side over the slight embankment on which a railroad roadbed is usually placed; whereas when the car is in a cut they reach up the slope on either side to a height of two or three feet. The oil escapes through slits, each about three inches in length by one inch wide, cut in the under sides of the three pipes comprising the sprinkling mechanism.

The side arms of the sprinkler are each supported at the outer end by a chain controlled by a hand wheel, so that they can be readily raised or lowered to conform to the character of the roadbed. Moreover, each side sprinkler is yieldingly held, so that no serious damage is likely to result should it strike an obstruction. To control the flow of oil from each pipe there is provided a two-inch, quick-acting gate valve, worked by a lever, and these are supplemented by globe valves fitted to the main supply pipe at either end of the car, to which there may be attached, should it be found desirable, lengths of rubber hose fitted with hand sprayers. The latter are frequently of service in sprinkling portions of the roadbed beyond the reach of the fixed pipes, and can of course be utilized in the event of the temporary derangement of any of the regular apparatus.

For oiling a roadbed a train is made up of a locomotive, one or possibly two tank cars for carrying the supply of oil, and the sprinkling car proper. With so light a train it is possible for the locomotive to also supply steam or compressed air to aid in ejecting the oil, although this is very seldom necessary. The oiling train usually proceeds at a speed of about four miles an hour, and an average of two thousand gallons of oil a mile is used.

For sprinkling purposes there is now manufactured a special, non-inflammable, and practically odorless oil, which is of an exceedingly high fire test and low gravity, thus virtually eliminating all danger of combustion. Some odor is noticeable after application; but this disappears within a few days. When a stretch of roadbed is oiled for the first time the expense entailed for oil ranges from $32 to $45 a mile, according to the distance the oil must be transported; but subsequent sprinklings do not need to be so thorough, and the annual expense for oil seldom exceeds $16. Of course it is highly essential that no oil come in contact with the rails, and to preclude the possibility of this, shields almost two feet in length are fitted on the sprinkling car above each rail.

The main advantages claimed for oiled roadbeds are found in the reduced expense of track maintenance and the preservation of ballast. The oil destroys all grass, weeds, and vegetation in the ballast; forms a waterproof covering or soft crust, which prevents water from penetrating below the surface, and consequently prevents the loss of ballast by abrasion from rains and floods; prevents frost in the ballast with the consequent "heaving" of the track, and by providing a water-repelling coating preserves the cross-ties. The reduction of



VIEW OF COMPLETE OIL-SPRINKLING TRAIN, SHOWING SIDE SPRINKLER IN ACTION.

BEFORE OILING, SHOWING DUST RAISED BY EXPRESS TRAIN.

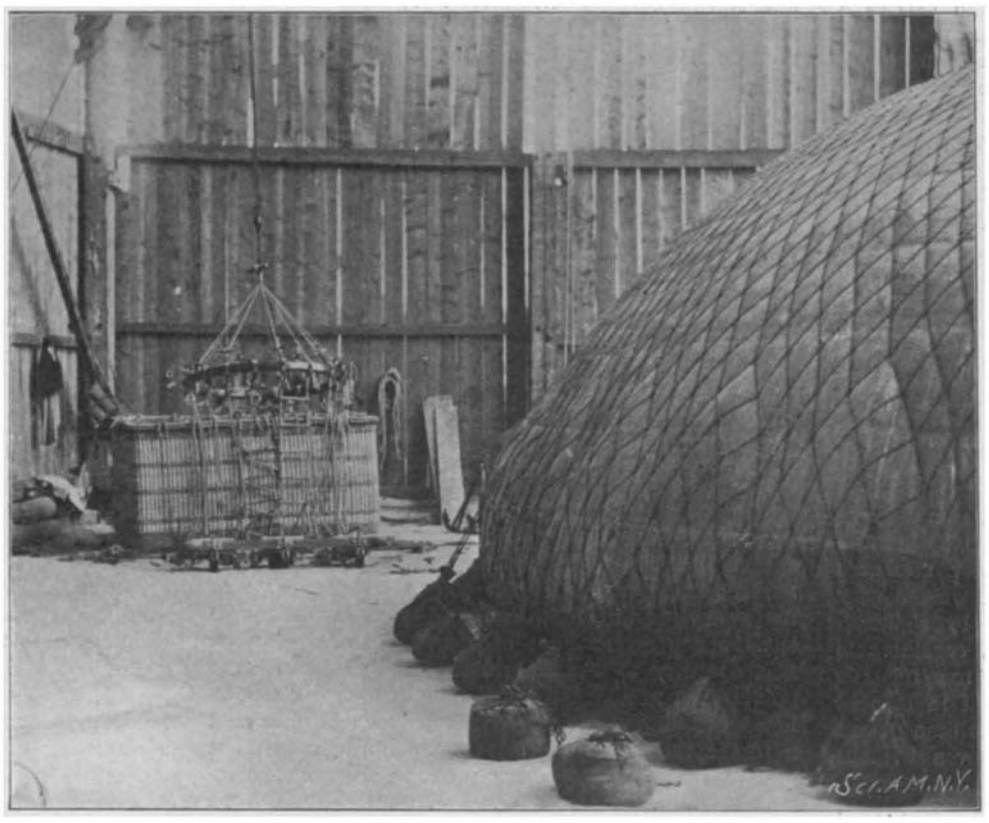
AFTER OILING, SPEED OF TRAIN 60 MILES PER HOUR.

wear on the machinery, a partial elimination of hot boxes, and the saving of the furnishings of cars are incidental qualifications claimed for the new plan.

The most ingenious recent use of oil on highways is its employment to render certain roads in the vicinity of Redlands, California, adapted to the use of automobiles. Under normal conditions the roads in Southern California are not at all suited to the use of horseless vehicles; but so successful has been the oil treatment inaugurated in the vicinity of Redlands, with special reference to the requirements of the motor vehicles, that automobiles have of late become quite common in that section of the State.

In order to enable a comparison between the expense of sprinkling the roadbed of a steam road and that entailed for similar service on ordinary thoroughfares, it may be noted that in California, where the idea of using crude petroleum residuum on roads originated, a contract was some time ago entered into, whereby an incorporated company agreed to care for an immense mileage of roads, putting on three applications of oil during the season, and keeping the roads free from dust from May 1 to December 1 for $204 a mile. In some parts of the Golden Gate State, where oil is not merely used instead of water to keep the dust down, as is the plan of the contracting company above mentioned, but is employed also as an important element in making a permanent roadbed, the oil is poured on at the rate of 150 barrels to a mile, and not infrequently the quantity is in excess of this amount.

In order to make the oil thin and active in movement, it is customary in California to apply the oil hot, the temperature ranging from 200 deg. up. In some instances the oil is obtained directly from the refineries at a temperature ranging from 250 to 300 deg.; while in isolated localities heating plants have been installed, usually consisting of steam coils running through the storage tanks at the supply station. The oil wagons or hauling tanks, each holding about 20 barrels, or 840 gallons, are jacketed to retain the heat. Oil has in some instances retained sufficient heat to be of service at a distance of twelve miles from the heating tank; but as a rule no attempt is made to transfer the heated oil more than six or eight miles.



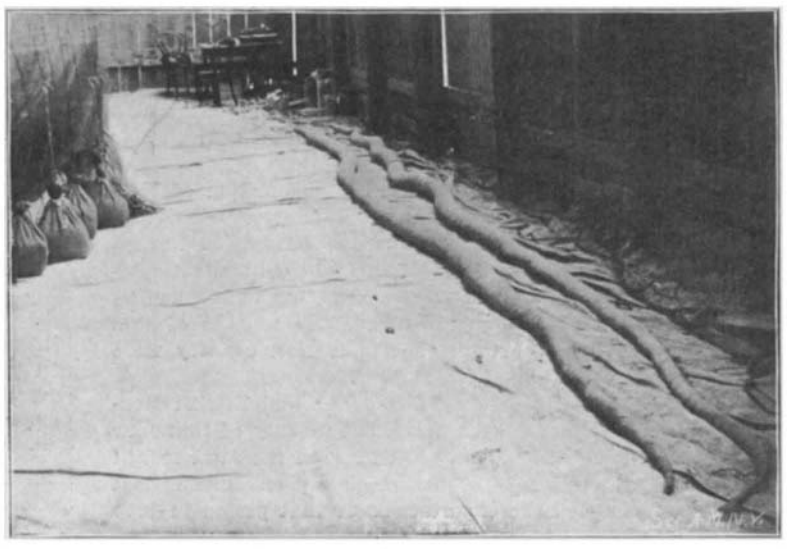
THE BALLOON PARTIALLY INFLATED AND THE BASKET.

COUNT DE LA VAULX'S BALLOON TRIP ACROSS THE MEDITERRANEAN.

BY OUR PARIS CORRESPONDENT.

Count Henri de la Vaulx has attempted to make a balloon trip across the Mediterranean from Toulon to Algeria. A balloon shed was erected on the beach near Toulon, and the trip began October 13.

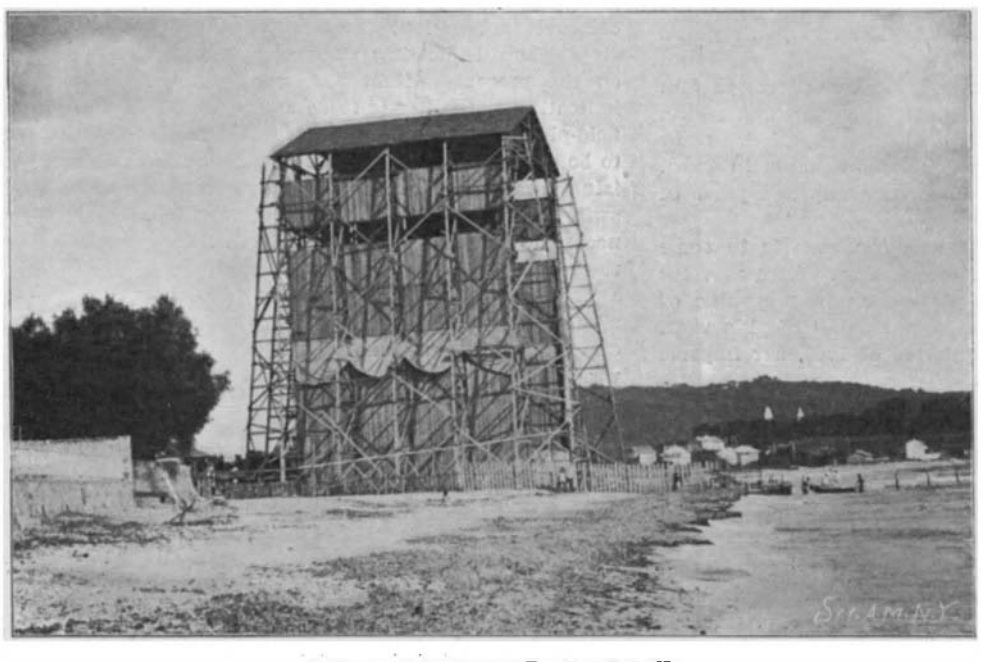
M. Hervé has been working on the problem of steering balloons upon the sea for a number of years. His first experiments were made with the "National," a balloon of 1,500 cubic yards, in 1886, in which he crossed the Channel from Boulogne-sur-Mer to Yarmouth, over a traject of 240 miles. In these experiments he used two flexible floats made of cordage and covered with canvas, of serpentine form, which were suspended by ropes one on each side of the car and followed the undulations of the waves. The height of the balloon was regulated by drawing them more or less out of the water, and he could thus keep the balloon at the desired distance above the sea. The steering device consisted of a kind of floating rudder attached to the balloon by a long rope, and by varying its angle the balloon could be steered to 60 degrees on each side of the wind. These experiments were quite successful, and M. Hervé was able to deflect his balloon toward the west and land at Yarmouth, while the wind was blowing north, and made without accident the long voyage of 24½ hours over the sea. This duration was only surpassed 14 years after by M. Castillon de St. Victor and M. Mallet. In the present trip M. Hervé used the old "serpents" with a third floater made of wood. The serpents are each 30 feet long and 7 inches in diameter at the middle, made of cordage covered with canvas, the whole well water-proofed; each weighs 180 pounds. The wood floater made for this occasion is about 16 feet long and 12 by 18 inches' section, and weighs 1,300 pounds. It is made up of fifteen pieces jointed together so as to give a great flexibility. Like the serpents, it floats on the water and may be wholly or partially raised by a rope. In the recent trip the ropes of the two serpents were attached to the ends of a support above the car, and the large float was hung from the middle.



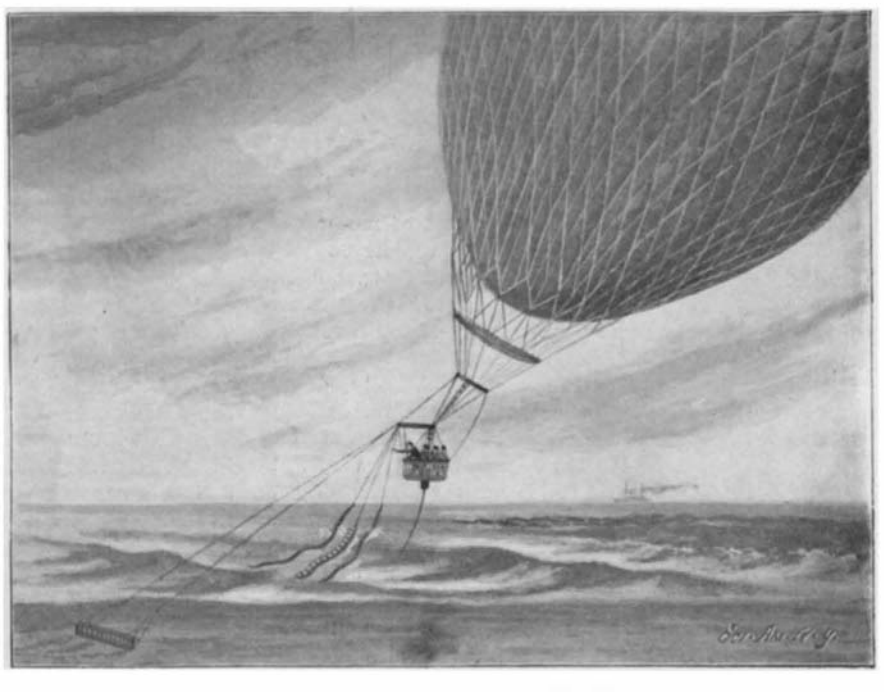
THE "SERPENTS" USED IN STEERING.

The steering device is essentially a kind of floating rudder whose position may be varied from the balloon. Two of these "deviators" will be used, but only one at a time, according to the conditions of the weather. The first of these is of the same type as in the Boulogne-Yarmouth experiment. It consists of a series of concave blades about 2½ feet long and 8 inches wide, held parallel to each other by iron straps. The deviator is attached to the balloon by two ropes, and remains in a nearly horizontal position. When the ropes are of the same length the blades are perpendicular to the direction of the balloon and there is no deviation, but only a certain resistance; but if one of the ropes is shortened the blades take an oblique position and the apparatus diverges rapidly to the right or left, drawing the balloon with it. It possesses an enormous power, owing to the large surface and the concavity of the blades. The whole is arranged so as to fold into a small space when not in use. With this form of deviator it is necessary, in order to change from one direction to the other, to pass through the perpendicular position, or point of maximum resistance. In the case of a strong wind may not be advisable to do this, and a second form has been devised which offers less resistance and is more easily managed. It consists, as the figure shows, of a set of parallel blades joined together to form a solid box or frame, and the blades take a vertical position in the water. A strap at each end carries a rope passing to the balloon. When the ropes are of unequal length the deviator takes an oblique position and gives a steering effect; when the ropes are equal the blades become parallel to the direction of movement and there is no deviation and but little resistance. This instrument is, in fact, a multiple rudder of the simplest form. Both these deviators have been designed to keep at a certain depth below the surface of the water by giving a certain inclination to the curved blades or to the box so as to give a downward pull which compensates for the upward pull of the rope, and this is the same at all speeds, according to the well-known laws of resistance.

The balloon, called the "Méditerranéen," was constructed for the experiment by M. Mallet, and has a diameter of 56 feet and a capacity of 3,800 cubic yards. It was filled on the spot by a hydrogen generator.



THE BALLOON HOUSE AT TOULON.



THE BALLOON ON THE BAY OF BISCAY.