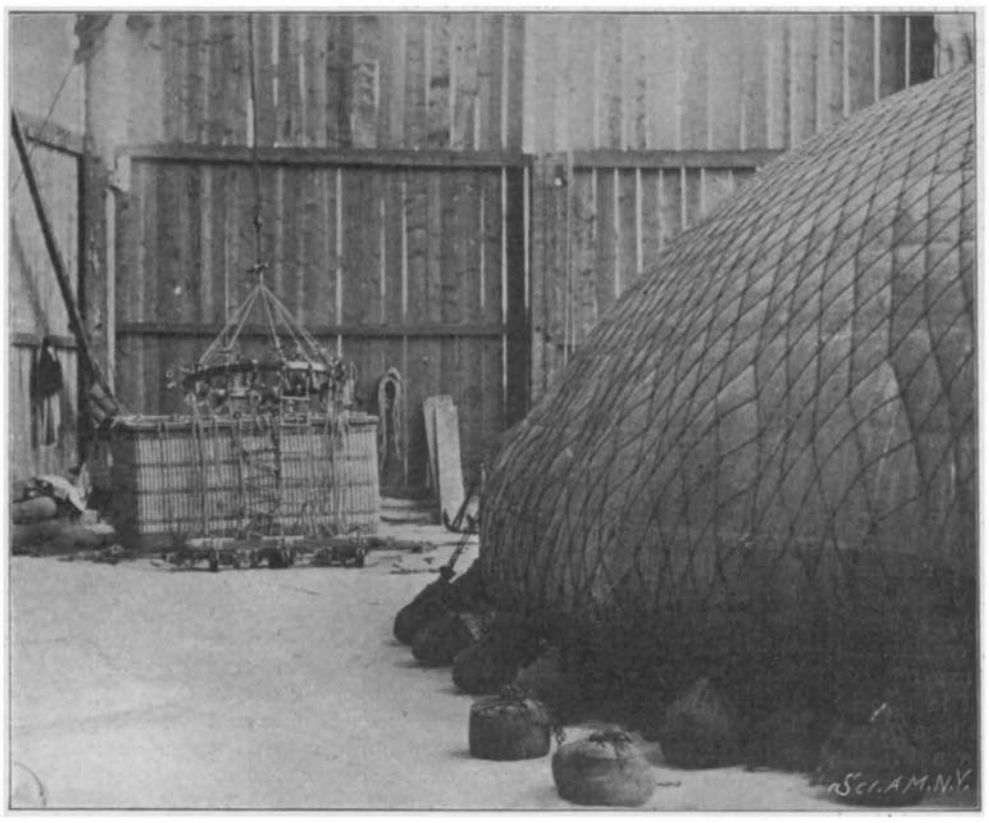
wear on the machinery, a partial elimination of hot boxes, and the saving of the furnishings of cars are incidental qualifications claimed for the new plan.

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.



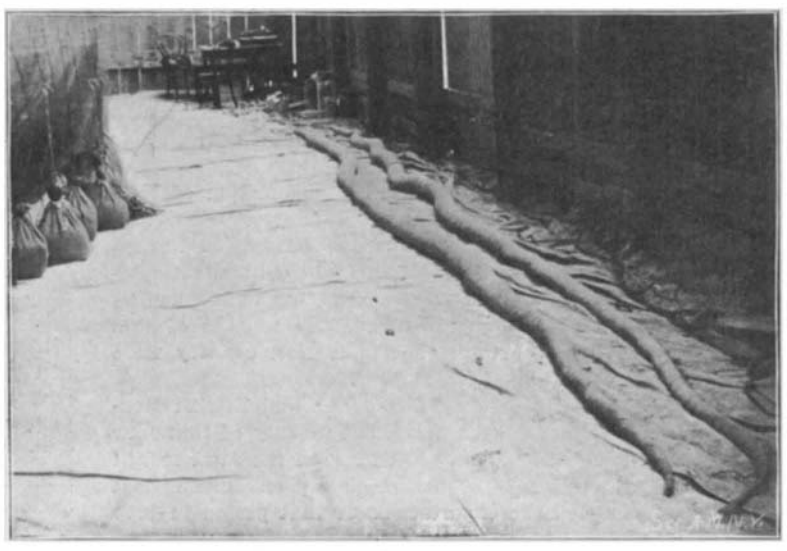
THE BALLOON PARTIALLY INFLATED AND THE BASKET.

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.

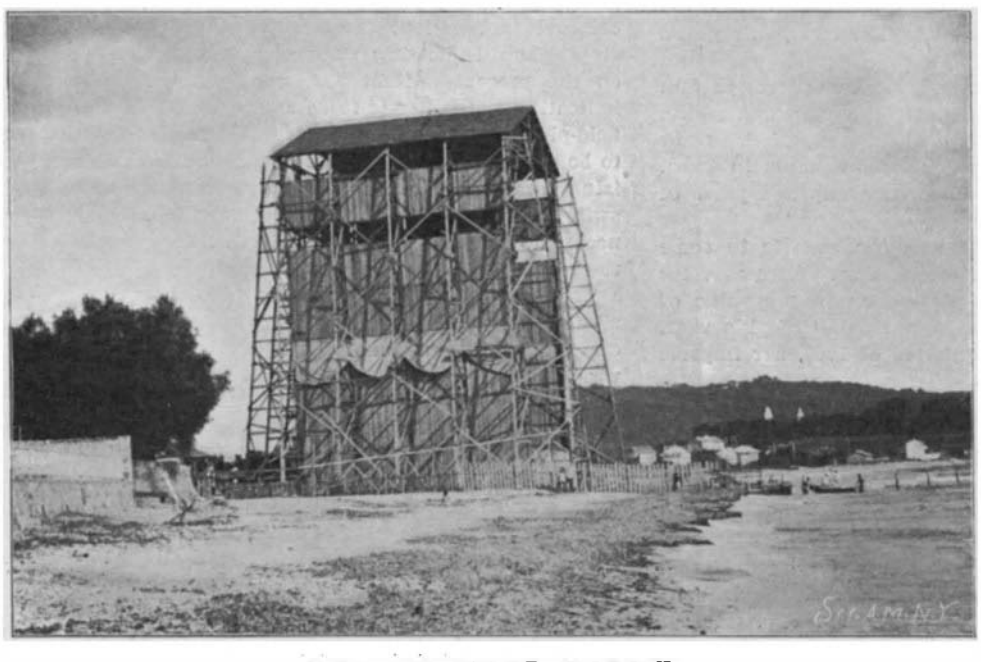
M. Hervé has been working on the problem of steering balloons upon the sea for a number of years. His first experiments were made with the "National," a balloon of 1,500 cubic yards, in 1886, in which he crossed the Channel from Boulogne-sur-Mer to Yarmouth, over a traject of 240 miles. In these experiments 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.



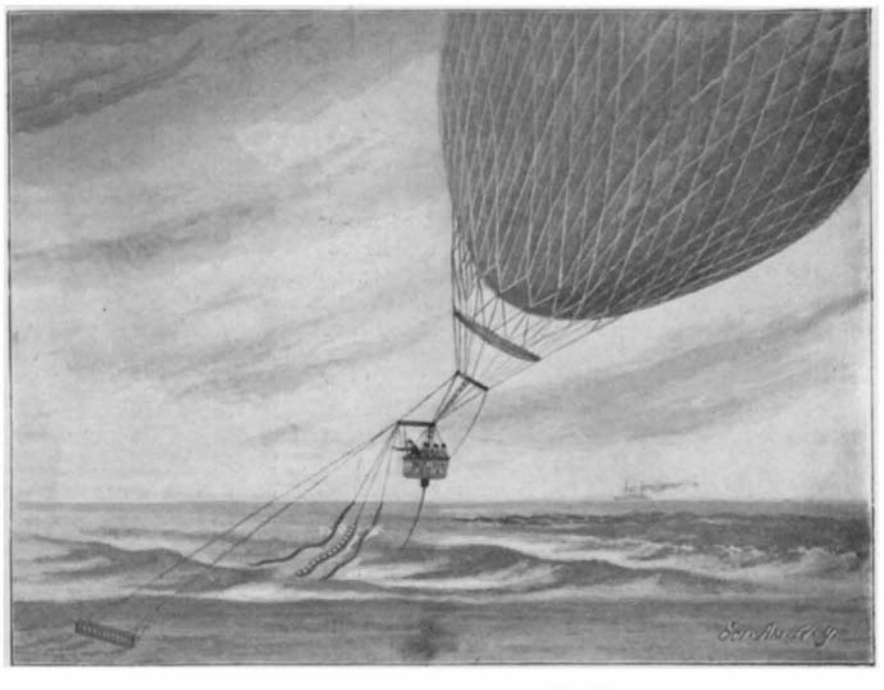
THE "SERPENTS" USED IN STEERING.

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.

The balloon will raise about 7,500 pounds total weight. The suspension of the car has been designed so as to support the floats and steering apparatus. The ropes of the balloon are attached to a horizontal cross-bar, and from this swings the car in one plane. To the cross-bar is attached a wood framework which projects out horizontally on one side and carries a set of pulleys for the maneuvers, over which the ropes pass down into the car. The two serpents hang down from the ends of the frame and the wood floater hangs from the middle. This arrangement will be seen in the figure. A novel feature is the arrangement for using water as ballast. At each side of the frame is suspended a light brass cylinder, which has a tube passing above and another which hangs down into the water. When the air is exhausted by a small pump the water rises in the cylinder. The lower tube may be drawn up by a rope and the cylinder is thus emptied at will and the height of the water is always known. The cylinders are about 4 feet long and 20 inches in diameter, and each contains 40 gallons. The car of the balloon, shown in the engraving, has been designed to give great rigidity and also to accommodate all the different appliances; a set of horizontal projections pass all around the inside and afford a brace as well as a set of shelves. The middle or "deck" of the car is thus left entirely free, as is quite necessary for these maneuvers. The car measures about 6 by 8 feet and 4 feet deep, and weighs only 450 pounds. It is entirely surrounded by a waterproof canvas which is brought up to a considerable height above it, leaving only an opening for the maneuvers. This renders it floatable, but in case of emergency a set of life-preserver bags has been placed all around the inside and it will float even without the canvas.

There were four aeronauts in all, and two were occupied with the maneuvers while the other two slept upon a circular platform of canvas which is stretched across below the balloon. It is intended to keep the balloon about 25 or 30 feet above the sea. It was kept swelled out into spherical shape by an air-bag in the interior which is filled by a horizontal air-fan worked from the car. The balloon carried a number of instruments, some of which are of a novel type, as well as a powerful projector, fed by a primary battery, to light up the apparatus in the sea, also a large signal light and the usual marine signal lamps. A novel feature is the use of acetylene buoys, conical vessels of sheet iron containing carbide of calcium, which when thrown into the sea give a brilliant light and indicate the passage of the balloon as well as afford points of alinement for the route.

The party started from Toulon at 11:30 P. M., October 12, followed by the cruiser "Du Chayla," and carrier pigeons were received a few hours later stating that the balloon was driven by a north-northeastern wind and was traveling at a high speed, the weather being fine and all were well. Unfortunately the enterprise was not to be crowned with success, for on October 15 the cruiser was sighted returning with the balloon and her passengers which she picked up ten miles east of the St. Laurent lighthouse. When Count de la Vaulx landed he stated that the weather had been very bad on the preceding day. A hard east wind drove the balloon toward the coast of Spain and a heavy rain also fell. The balloon had almost reached the Spanish frontier, the St. Laurent light being a small port in the Department of the Eastern Pyrenees. The passengers in the balloon feared that they would be blown ashore, so they decided to abandon the voyage and signaled the cruiser to take them on board. This was done with only slight damage to the balloon and with no injury to the passengers or scientific instruments. The voyage lasted forty-two hours.

A Bank on Wheels.

One of the most brilliant ideas of modern times has just occurred to the local authorities who administer the public moneys of the town of Mezieres, in the Ardennes. The new scheme consists in an "automobile savings bank." The term requires some explanation.

The inventors apply it to a new sort of motor car which they are having built. The vehicle is propelled by electricity and contains four seats, one in front and apart from the others, for the driver. The three places behind are arranged round a revolving table in the middle of the car, one at each side and one at the rear of the vehicle. Writing desks are fitted over each of the three seats and devised in such a way that they can be either folded flat against the sides of the carriage inwardly or opened outwardly. The central table also contains desks, besides book shelves and a small metallic strong box. Such is the new automobile. The use to which the authorities of Mezieres intend to put their invention is as follows:

The car will travel round the country, making stoppages of an hour or so on prearranged days in the different localities of the department. The passengers will be two clerks of the local treasury administration and a cashier. They will carry with them a complete collection of savings bank books, registers and forms, and the third of the above mentioned officials will be empowered to receive moneys. Our readers will have now divined the purpose of the financial authorities of Mezieres. It seems that these gentlemen, assembled in council lately, came to the conclusion that something should be done to encourage thrift among the peasantry of the Ardennes. On the other hand, it was recognized that the saving propensity was already very marked among the country folk. What was needed was that the administration should meet their wants half way. The peasants put by their earnings thriftily enough, but frequently fail to invest them in savings banks because, especially in the busy summer months, they have little time for journeying to the few principal towns where the offices are situated. So the authorities determined upon sending the savings bank to the country folk instead of waiting any longer for the latter to find time to come to the office.

The description of the vehicle which the authorities have had built, according to their own designs, requires no further explanation except to say that the movable desks are intended for use by the public, hence the arrangement by which they can be opened outward over the road. It is reported that the scheme meets with the unqualified approval of the savings bank clerks, whose days hitherto throughout the fine season have been spent in musty offices. But, contrary to what might have been expected, the public does not look upon the innovation with unalloyed delight. Some suspicious persons have spread a rumor that the administrative motor car will not always convey savings bank clerks, but will occasionally bring--more often, perhaps, than would be desirable--that unwelcome visitor, the tax collector.

Increased Cycle Exports.

In view of the steady annual decrease in the exportation of American bicycles from 1897 to 1900, inclusive, recent statistics, indicating a stronger demand abroad for them, are interesting.

The latest official statement on the subject, prepared by the Treasury Department at Washington, gives the amount of the cycle exports up to August 1, 1901. In July the value of wheels shipped to the United Kingdom was $37,140, as against $25,396 in July, 1900. For seven months ending with July, 1901, the total of the cycle exports to that country was $354,196, as compared with $348,223 during a similar period last year.

For the one month named, the exportation of bicycles to France was even more satisfactory than that to England, wheels to the value of $23,030 having been shipped there during July, 1901, as against shipments amounting to only $7,202 in the corresponding month of 1900. For the first seven months of this year, though, the total exports to that country were slightly less than those of 1900.

Cycle exports to Central America and British Honduras have never been large, but in July of this year they exceeded, by about $300, those of the same month last year, and for the period ending on July 31 last they exceeded the exportations of that period in 1900 by nearly $3,000.

A striking increase is noticeable in the shipments to China. In July, 1901, the wheels sent to that country were worth $28,849, whereas, in July, 1900, cycle exports amounted to only $1,914; and in the first seven months of this year the shipments to China represented a value of $41,991, as against $16,294 in 1900.

Although the cycle exports to Africa in July of this year were somewhat less than those of the same month in 1900, the total value of the shipments for the seven months exceeded by almost $20,000 the value of last year's exports for that term, this year's figures being $46,780.

Increases are also recorded in the exports to San Domingo, British Australia, British North America, and the British East Indies, while the statistics show little change in the value of the shipments to Cuba, other islands of the West Indian group and parts of Asia and Oceanica.

It is true that the value of the exports to some other countries continues to decrease. Germany, for example, imported American wheels to the value of $160,866 during the first seven months of this year, whereas, during the same period of 1900, her imports amounted to $303,715.

In South America, also, the sales of wheels made in the United States are not what they should be, and this is conspicuously the case in Argentina and Brazil. In these two countries, as in other parts of South America, bicycles of German make appear just now to be the most popular; but this state of things is due, for the most part, to the activity manifested there by the German cycle agents and the lack of push exhibited by the representatives of American manufacturers.

Taking it all in all, however, Uncle Sam's wheels, in spite of the lively competition in the cycle industry all over the world, are holding their own.

The Snoqualmie Falls Power Plant.

To the cities of Seattle and Tacoma will be carried 20,000 horse power instead of the 8,000 now in use at these places. This will be brought about by the enlargement to double its present capacity of the plant now deriving its power from the Snoqualmie Falls.

Of all power plants in existence, this hydro-electric installation is probably the most interesting. In the last six months it has been visited by engineers from all over the world who testify with high praise to its correct design and the superior excellence of its mechanical operation. With a most varied service that includes electric traction, mill and factory power, as well as ordinary illumination, the entire load of the Snoqualmie system is operated in multiple, and with a regulation of less than 2 per cent.

Two years have passed since the first current from Snoqualmie Falls was carried into Seattle and Tacoma, and in this short time the initial installation has proven too small. The capacity of the plant is to be enlarged to meet the increasing demand for power in these cities. At the Falls, distant 44 miles from Tacoma and 32 miles from Seattle as the crow flies, are installed in a rock-excavated chamber four generating units, each consisting of a water wheel direct-connecting to a 2,000-horse power three-phase alternator. At the same transmission voltage now employed, 30,000 volts, it is proposed to carry 12,000 horse power more into the cities mentioned, making a total output of 20,000 electrical horse power.

The water wheel contract will not be let for 60 days. If an impact wheel is used, there will be a single wheel on each end of each generator shaft, and each wheel will be driven by a single jet of water 14 inches in diameter, the two jets combined being sufficient, under the existing head of 270 feet, to give the requisite power. The two water wheels and the generator between will be built on a single hollow shaft of oil-tempered nickel steel.

The present underground generating station, which is 200 feet long, is to be lengthened out 150 feet up stream to make room for the new installation. A new penstock is to be built which will carry 50 per cent more water than the old one. The transmission that is to parallel the old line will require 125 tons of aluminium wire, and the order for it has already been placed. At Tacoma, a large and commodious brick sandstone sub-station is now being erected. The entire cost of these improvements will be in the neighborhood of $400,000. The work is to be vigorously prosecuted, and it is expected that the first of the new generators will be delivering current into Seattle and Tacoma within the next nine months.

The generating machinery will consist of three 3,000 kilowatt, 4,000 horse power, rotating-field generators of the two-bearing type, generating a three-phase current at 1,100 volts and 7,200 alternations. The speed is to be 100 revolutions per minute. Each generator will require an exciting current of 320 amperes approximately, at 125 volts. For exciting these three generators a 200 kilowatt, eight-pole, direct-current generator of the two-bearing type is to be used. At 175 revolutions per minute it is to deliver under normal load a current of 1,600 amperes at 125 volts.

The current which is generated at 1,100 volts is to be raised to a line potential of 30,000 volts by nine 1,000 kilowatt, oil-insulated, water-cooled transformers. These are to be delta-connected on both the primary and secondary sides. It is estimated that each transformer will weigh 11,000 pounds, and require 500 gallons of oil. The switchboard that is to be installed is to consist of 14 panels of white marble, and is to be of the special type that was furnished for the original installation. Instead of the Niagara type single-phase indicating wattmeter that is now in use on the present switchboard, a poly-phase, long-scale indicating wattmeter is to be used. Where formerly a field-plug switch was used a double-pole field switch is to be employed. The standard equipment of synchronizing lamps is to be replaced by a single-pole plug switch, mounted on the generating panel and connected to a synchroscope, which will be mounted on the multiplying panel.

The increased capacity of the generators will necessitate placing three single-pole main switches, instead of one three-pole main switch. The circuit breakers, which are to be non-automatic, will be on an extension panel above the main instrument panel. A. W. C.

Another Antarctic expedition is being organized in Scotland. The fund for the cost of equipping the vessel has been started by a donation of $25,000. Capt. Bruce, who has had much valuable experience in connection with both Arctic and Antarctic exploration, will command the expedition. It is anticipated that a start will be made in the autumn of next year.