A NEW MOTOR CYCLE.

To equip an ordinary cycle with a motor is attended with considerable difficulty. In many instances the vehicle is unnecessarily encumbered and its appearance spoiled. The most perplexing problem has been to place the motor in the most suitable position. In some cases the motor has been mounted inside the frame, while in others it is carried on the front wheel. Neither of these systems can be said to be satisfactory. A motor-bicycle, however, has now been invented by two Englishmen, Messrs. Perks and Birch, which seems to have completely overcome all obstacles.

By referring to our illustrations it will be observed that the motor is embraced by the back wheel. Thus the engine is placed in direct communication with the driving motion of the cycle. The engine is built as stoutly and yet as lightly as possible, and develops a maximum energy of 2 horse power. The total weight of the complete machine is only 110 pounds.

The cycle and motor contain many unique features and improvements. The back wheel, it will be observed, is devoid of the usual spokes. The rim of the wheel is in reality supported by two strong aluminium wheel flanges. Each wheel side, *s*, is made in one piece, and these pieces when firmly bolted together form a rigid structure. Within these two wheel sides the motor is placed, carried as it were on the hub of the back wheel.

Our first illustration, showing the motor in detail, will more comprehensively explain the construction; the motor being exposed—that is, with one of the aluminium wheel sides removed.

The carbureter, *A*, is of special construction, with a capacity of half a gallon of oil, which is sufficient for a run of approximately fifty miles. It is absolutely automatic in its action. It is filled from the top in the usual manner after removing the screw-cap, *B*. It may be as completely filled as an ordinary bottle, and, owing to the peculiarity of its construction, the engine will continue working at full power so long as any petrol remains. At the bottom of the carbureter is a small tap, *C*, by means of which it may be emptied. This not only keeps the bottom of the carbureter clean, but induces vaporization. Another salient characteristic of this carbureter is that it need never be emptied. There is no danger of the petrol's escaping whether the machine be standing in its normal position or lying flat upon its side, and there is no danger of fire from internal causes.

At the back of the carbureter is the atmospheric adjustment, *D*, consisting of a flat strip of metal on a pivot, which acts as an adjustable lever and can be made to cover one of two holes either entirely or partially. Its normal position is vertical, and except in decided changes of atmosphere, requires but little alteration. When the exigencies demand it, however, adjustment must be made until strong and regular explosions are obtained by moving the lever so as to cover more or less the hole nearer to the side of the carbureter—the other hole need never be covered at all. In frosty, damp, or foggy weather it may be found necessary to reduce the air supply, and occasionally to cover this orifice completely. Experience teaches the rider what is required, but owing to the special method of carburetion it will not be found necessary to alter the adjustment during the course of a journey after it has been once set.

The ignition apparatus, like the carbureter, is automatic in its action. It is entirely self-contained within the wheel. There are no batteries, induction coils, or sparking plugs to trouble the rider. The current is generated by means of the small magneto-electric machine, *R*, fixed to a bracket extending from the crank-case and driven by the revolution of the motor-wheel itself. The current is conveyed from the terminal, *T*, on the magneto-machine to a point on the interrupter guide, *U*, just below the ignition-plug, *L*, by means of a short insulated wire, *V*. Although the magneto-machine itself must not be interfered with or detached, it can be bodily removed for cleaning purposes from the bracket to which it is fixed by detaching the nuts underneath. The vertical interrupting gear receives its interruption motion from the revolving cam, *e*, which actuates the small connecting rod, *f*, thereby giving the oscillating motion to the magneto lever, *S*, and also by means of the formation on its reverse side actuates the vertical interrupter, *W*, and breaks its contact within the valve-chamber at the correct moment for ignition. It can be readily ascertained whether the interrupter is making proper contact by observing that the small roller, *k* (at the end of the interrupter gear) which is struck by the thickened part of the revolving cam, *e*, does not touch the face of the thinner portion. It must be clear of this, and to insure this end an S spring is fitted to the bottom coupling of the vertical insulating block, *j*, so as to bring the roller effectively back to the specified position. If it is necessary to clear or to examine the interrupter gear at any time it can be removed without taking the wheel to pieces. The main insulation is shown at *i*, comprising a good thickness of mica which has been proved to be highly effective. As the automatic parts are not liable to become deranged, very little attention is required. The possibilities of short circuit are very remote, and if any such interruptions should occur they may be easily located.

The most salient feature of this motorcycle, however, is the simplicity of the motor-controlling mechanism. Placed on the left side of the handle-bar is a twisting handle connected with a lever, by which all the several movements of the engine are controlled. When mounting the cycle the lever is brought up as close to the handle as possible. The machine is mounted in the conventional manner, and preliminary impetus is given to the velocipede by pedaling. When the machine is well under way by turning the handle slowly the lever is depressed, which action gradually opens the supply valve and admits the gas to the engine. When the lever has reached the maximum depression the engine is working at full power, so that any intermediate position between the two maximum positions produces any range of power and speed that may be desired.

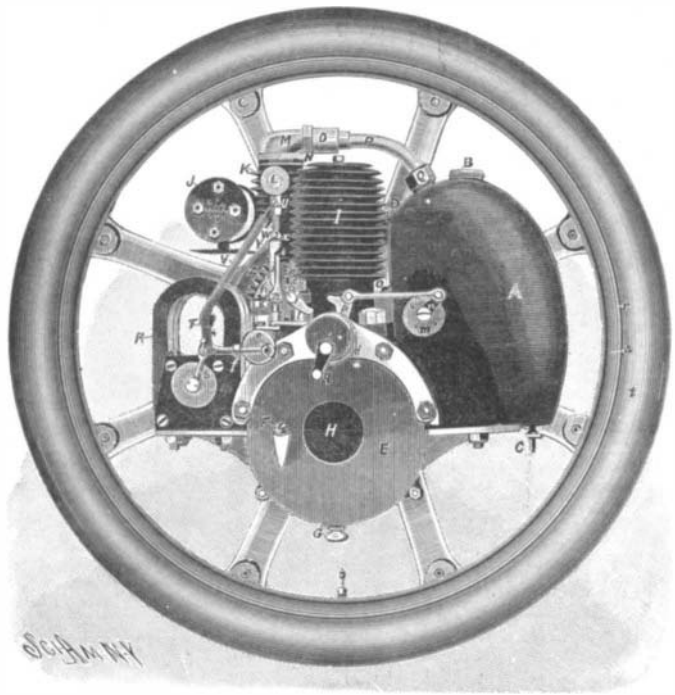

Fig. 1.—INTERIOR OF BACK WHEEL, SHOWING MOTOR.

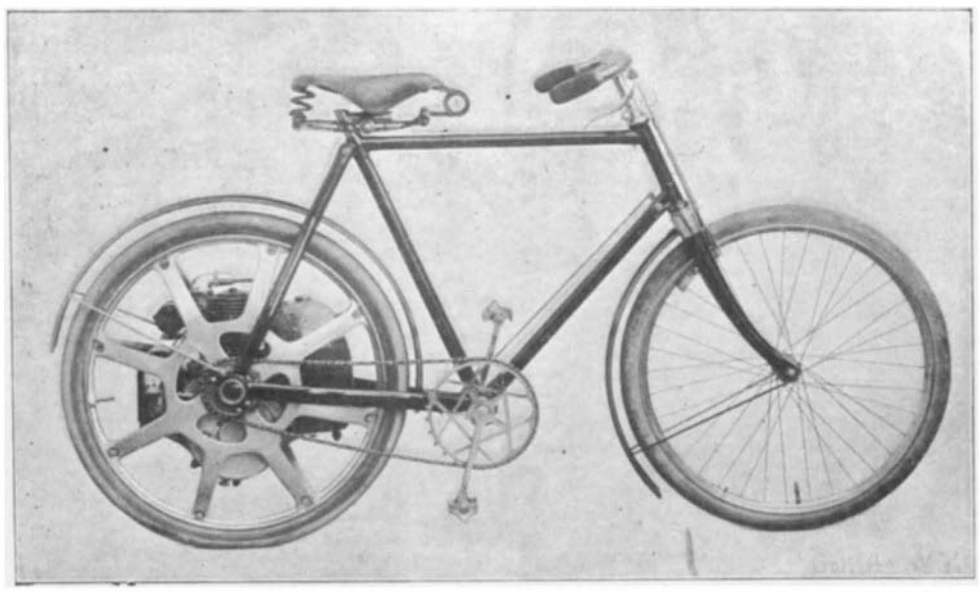

Fig. 2.—A NEW MOTOR CYCLE.

The machine is equipped with a powerful rim brake; and to reduce speed the rider first raises the controlling lever and gradually meanwhile applies the brake, which is actuated from the handle-bar by a lever in the usual way. Care has to be exercised not to apply the brake too suddenly or at any time when the engine is working at full power. The motor frames are built with low brackets, so that when riding over a greasy road or through busy traffic the rider can put either foot to the ground without dismounting.

The machine is supplied with Dunlop tires of the motor type, so that any fear of puncture is remote. Should such an accident occur it can be easily and speedily remedied in the usual manner.

The cycle has been subjected to a series of exacting tests to prove its efficiency and has issued from the ordeals with commendable satisfaction. On one occasion Mr. H. W. Duret, the well-known English automobilist, rode from Coventry to London and back, a total distance of 176 miles, in 18 hours, including stoppages, though the actual time spent in traveling was only 12 hours. It will thus be seen that an average actual traveling speed of about 14½ miles per hour was maintained throughout the journey. The trip was exempt from the slightest accident, and stoppages were made only on one or two occasions for lubricating the mechanism of the cycle.

Strengthening Breakwaters.

An ingenious method of strengthening breakwaters to resist the fury of the equinoctial gales is practised round the coasts of England. Just before the stormy period sets in, huge blocks of masonry are dropped into the sea round the sea ends of the piers and breakwaters, and bonded together with huge sacks of cement. By this means the pier-heads, the most vulnerable points of the structure, are considerably strengthened. To carry out this work a special type of vessel is constructed. At either end of the craft are water-tight compartments, the stern one for the engines, and the fore one for the crew. The rest of the vessel is practically open, and the bottom can be opened or closed at will by huge doors controlled by a lever. Divers first examine the breakwater and signify the points at which it is desirable to strengthen the structure. In the central portion of the vessel is placed a large piece of canvas containing a mixture of cement, beach rubble, and masonry, weighing about 120 tons. The edges of the canvas are drawn together and secured by large stitches. The vessel then steams to the point indicated by the diver, and when over the desired position one of the crew goes to the lever controlling the opening of the doors at the bottom of the vessel, and strikes the pin holding it in position a smart blow. He immediately runs to a place of safety. The huge doors then swing open, and the 120 tons of concrete sink to the bottom. The vessel, thus suddenly lightened, bounces almost out of the water, and when she falls back again a huge column of spray is forced up through the doors to a tremendous height. The doors are then closed, the vessel obtains another load, and the same operation is repeated.

Great Britain Still Leads the Mercantile Marine.

According to Lloyds' Register for 1900 Great Britain still maintains the lead by a considerable majority in the world's mercantile marine. There are 7,930 ships carrying the English flag, while the nearest competitor is Germany, with 1,209 ships. In sailing vessels that country has the lead, with 2,130, as compared with 1,894 of Great Britain, though the aggregate tonnage of the latter exceeds that of that country, neither does the total for England include 1,014 vessels belonging to her colonies. During the year the number of vessels owned in the United Kingdom increased by 3,250,000 tons.

The Current Supplement.

The current SUPPLEMENT, No. 1343, has a number of excellent illustrations and articles. The first page is devoted to the "New 804-Foot Suspension Bridge at Easton, Pa." This bridge is unique in having three towers. The Presidential Address of Joseph W. Swan, F.R.S., at the Glasgow meeting of the British Association, was devoted to the electro-chemical industry. There are two articles on American locomotives abroad. "The Functions of a University," by Prof. W. Ramsay, is a very interesting paper. "Oriental Rug-Weaving" describes curious processes employed in making rugs. The usual Trade Notes and Receipts and Trade Suggestions from United States Consuls are published.

Contents.

(Illustrated articles are marked with an asterisk.)