

THE THOMAS AUTO-TRICYCLE.

In Europe, where the motor-carriage industry was first developed and where the purchasing public is more expert in the use of motor-vehicles, the auto-tricycle plays no small part in automobilism. Fully seventy per cent of the self-propelled vehicles in Europe are of the three-wheeled type. American chauffeurs have not been blind to the merits of the tricycle. Each year sees a greater number of tricycles in use. Of the American-made auto-tricycles a typical example is a machine made by the E. R. Thomas Motor Company, of Buffalo, N. Y., which forms the subject of the accompanying illustration, and which compares favorably with the best French cycles.

In this vehicle the gasoline reservoir and carbureter are combined in a single triangular-shaped tank, mounted behind the seat-post. The tank is provided with a tube, the lower end of which carries a flat plate called the deflector, held somewhat above the level of the gasoline. Through this tube and under the plate the atmospheric air passes and evaporates the gasoline which surrounds the edges of the plate. The vapors pass through the throttle and air-mixer valves on top of the carbureter, near the seat-post tube, and are here mixed with the proper quantity of air before entering the engine cylinder.

The crank-case of the engine contains two fly-wheels between which the crank turns. Besides performing its usual function the crank-pin also serves the purpose of holding the two flywheels together, sufficient space being allowed for the free passage of the crank. The left-hand side of the crank case contains the exhaust-cam mechanism. Fastened to the end of the left flywheel axle is a pinion which meshes with a small spur-gear, turned once for every two revolutions of the flywheel. Externally this gear is provided with a cam which acts upon a small shoe having a vertical stem whereby the exhaust poppet is lifted at the right moment.

The pinion performs still another function. Through its center a small shaft passes, terminating in a small cam whereby a spring is moved every second revolution, which spring in turn comes into contact with a platinum-pointed screw. The object of the vibrator thus constituted is to make and break the electric current so as to produce a spark in the combustion-chamber of the engine. Current for the production of the spark is obtained from a four-cell dry battery incased beneath the upper reach-tube. The insulated wires extend from the positive and negative poles through holes in the battery box, twice around the frame. The circuit can be made and broken by a grip on the handle-bar, by means of a key switch or safety switch at the front end of the tricycle, so that the machine cannot be started by any one but the operator. The switch is operated by a small brass plug-key which can be carried in the pocket.

The motor used is of the four-cycle type, the operation of which is too well known to require extended comment. The speed of the tricycle can be controlled either by means of the gas throttle lever on the left hand side of the upper horizontal bar, or by the spark-controller lever placed somewhat in advance of the gas lever on the left-hand side. This second lever moves the vibrator so that the moment of contact is varied as may be desired. When the spark passes early the explosive mixture is ignited at the moment of greatest compression. Hence a more powerful impulse to the piston, and hence greater speed is obtained. When ignition occurs late the piston has already started on its down-stroke and the compression is not at its maximum. Consequently, when the mixture is ignited the explosion is less powerful. When the throttle alone is used to control the speed, the quantity of gas fed to the motor is limited, so that the force of the explosion is reduced or increased at the rider's will.

The transmission gearing consists of a small pinion on the end of the right-hand axle of the flywheel, which pinion meshes with a larger spur-gear inclosed in an oil-tight aluminium case. The spur-gear is centrally secured to the differential-gear. Like the transmission-gearing the differential-gear is inclosed in a case. On the outside of this case is a brake-pulley and a hand-brake controlled from the handle-bar by a lever. The brake mechanism is so powerful that the machine can be stopped within its own length.

The exhaust-gases pass through a chamber or muffler placed beneath the rear cross-tube. By means of the muffler the noise of the exhausted gases is effectively dampened.

A few drops of turpentine poured in closets will keep away moths.

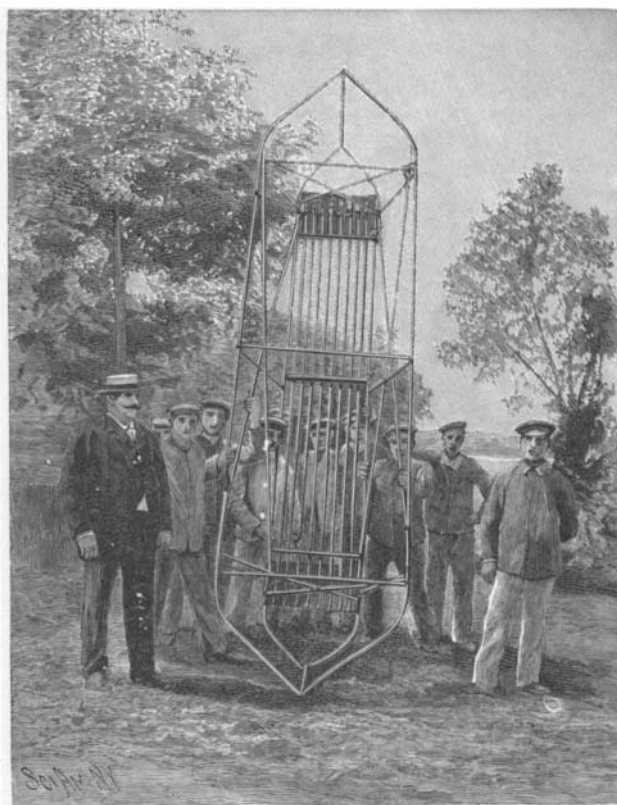
THE LANCE-BOATS OF THE GERMAN CAVALRY.

It has always been a matter of no small difficulty to provide bodies of cavalry with suitable vessels for crossing streams. Only in cases of absolute necessity are the horses driven bodily into the water; for in the

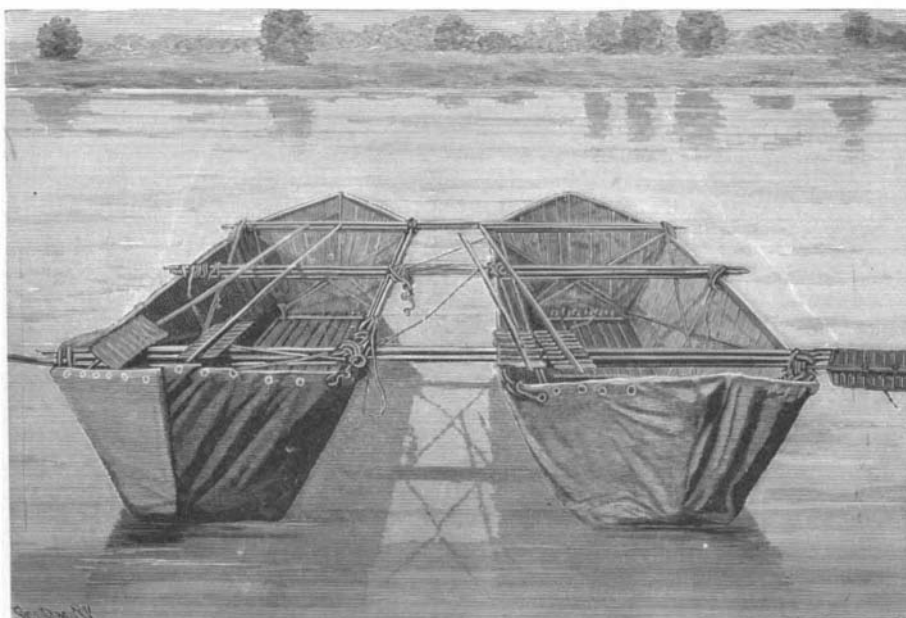


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icy weather of winter and the torrid heat of summer the fording of a river is always accompanied with some danger. It has been the practice of the German War Department to equip each regiment of cavalry with two folding-boats, the value of which has always



BOAT-FRAME OF LANCES AND CONNECTING-MEMBERS.



TWO LANCE-BOATS READY FOR SERVICE.

been rather questionable for the reason that the heavy boat-carrying wagons could follow the main body of men but slowly, and were often enough nowhere to be found when they were actually needed.

The cumbersome folding-boats and their wagons have now been discarded by the German army for a more trustworthy and more easily-carried vessel. The new contrivance is the invention of Herr Adolf Rey and is called a lance-boat for the reason that its frame is built up by means of the lance carried by German troopers. With twelve or sixteen lances six men can build a boat in five minutes; in two minutes they can take that boat apart. In two minutes the frame is spanned with a waterproof piece of canvas, and the boat is ready for service. Lances suitably covered with canvas are used as oars. The oar-blade consists of a strip of canvas 2 feet long and 6 inches broad, upon which slats are sewed. Such a rudder-blade can be readily rolled up and thrust into one's pocket.

The connecting members and locking devices used in assembling the boat-frame, together with the rudder-blades, weigh 20 kilograms (44 pounds); the canvas 12 kilograms (26 pounds); in all, 32 kilograms (72 pounds). By reason of this small weight a single horse can carry the parts of two boats.

The strategical value of the invention is obvious. As we have already remarked, every regiment of cavalry was formerly equipped with its wagon and two folding-boats. While the regiment was trotting along on a good road the wagon had no difficulty in keeping up. But horsemen had often enough to cut across country. It therefore happened that the large wagon, weighing some sixty hundredweight with the boat, could not always follow. Sometimes the wagon would stick fast in boggy soil or mud; sometimes it was upset. Thus it happened that for days, as a general rule, no one in a regiment knew exactly where the boat wagon might be found; and thus it happened that the boats were never at hand when they were most urgently needed. It was practically impossible not only to traverse marshy meadows, but also to cross deep or broad ditches or to follow the small winding paths of a forest. With a horse, on the contrary, carrying the part of two boats, these difficulties disappear. In the quiet, concealed groves which could never be reached with a wagon, a lance-boat can be assembled in a few minutes. The patrols can cross the river at a spot which the enemy would probably consider it impossible for any body of cavalry to ford. Equipped with such boats a mobile squadron thrown into an enemy's country is hampered by nothing. Impassable roads and bridges, which are usually destroyed or rendered impassable by the enemy, can no longer hinder the onward course of the troop.

As we have already remarked, each regiment of German cavalry has been hitherto equipped with one wagon and two folding-boats. The wagon is drawn by six horses, three men acting as drivers, and one officer as a commander. Four men and seven horses are therefore required. The adoption of the lance-boat will dispense with all this unnecessary apparatus. A single horse will now carry the parts of two lance-boats for each squadron. If two folding-boats of the old pattern were to be provided for each squadron, a regiment composed of five squadrons would require the services of twenty men and thirty-five horses. The German cavalry is divided into one hundred regiments. Hence two thousand men and three thousand five hundred horses would be needed to carry along folding-boats. The enormous saving of the lance-boats is therefore evident.

Very quietly experiments have been made with the lance-boats for the past two years. Their success has been such that their adoption has been definitely decided upon. We are indebted to Ueber Land und Meer for the above description.

The Comptroller-General of Patents, Designs, and Trade Marks for Great Britain has issued his report for the year 1900. There were altogether 23,922 applications for patents last year, 16,952 for the registry of designs, and 7,937 for trade marks. There was a marked decrease in the applications for patents from the United Kingdom, while the number of applications from this country showed a great increase. Outside of Great Britain there were 3,184 applications from the United States, 2,651 from Germany, 946 from France, 418 from Austria, 184 from Belgium, 156 from Canada, 150 from Switzerland, 104 from Sweden, and 100 from Italy. No other country contributed as many as 100. The revenue derived from fees for patents amounted to \$1,020,720, an increase upon the returns for 1899.