

A NEW STEAM CARRIAGE.

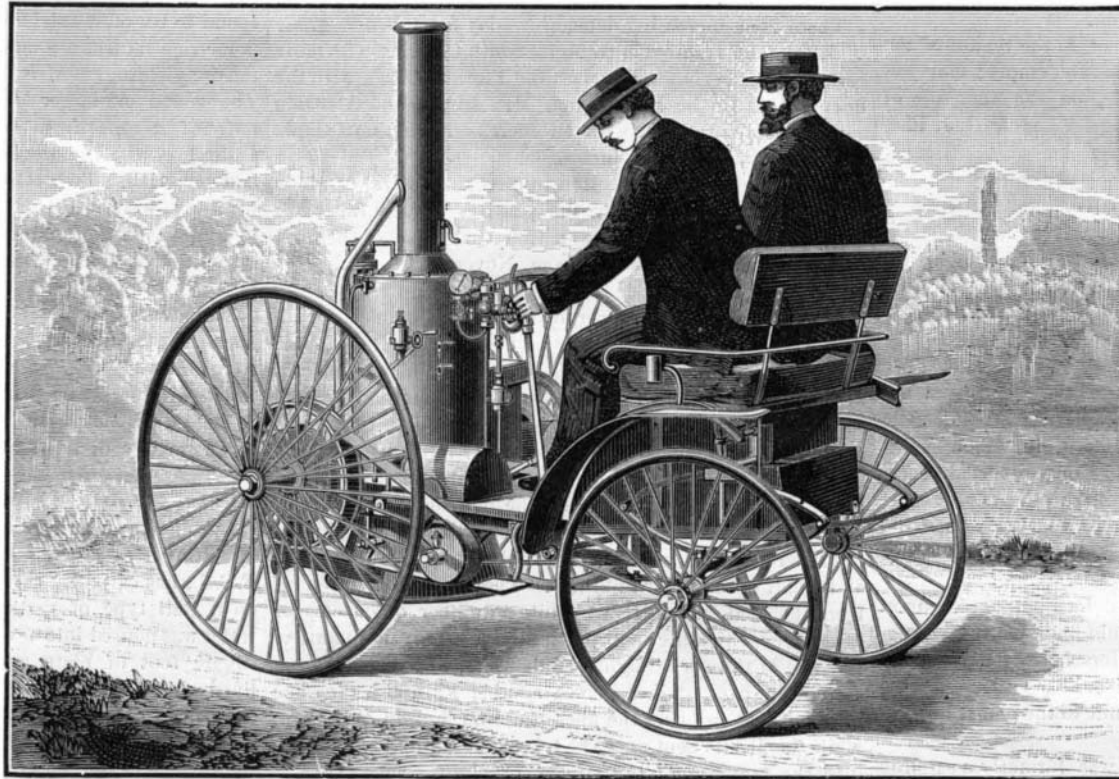
A few weeks ago an experiment was made on Grande Arme Avenue, at Paris, with a steam carriage that greatly excited the curiosity of passers-by. This apparatus, which we figure herewith, and which is the invention of Messrs. Dion, Bouton & Trepardoux, consists of two trains of wheels, which are connected to the frame to which the generator and motor are fixed by means of springs that are double behind and single in front. The entire affair, then, is supported by springs, and the wheels are provided with rubber tires. The hind, steering wheels are loose upon two independent axles, each of which is provided with a crank connected by a rod that receives from the directing lever to the right of the driver a transverse motion from left to right or *vice versa*. The carriage is slowed up or stopped by means of two Prony brakes coupled to a single maneuvering lever placed to the left of the driver and acting upon the two large wheels.

The carriage is actuated by two independent oscillating motors. The diameter of the cylinders is $2\frac{3}{4}$ inches, and the stroke of the piston 4 inches. The number of revolutions for a velocity of $2\frac{1}{2}$ miles per hour is about 450, or 900 piston strokes per minute. The escapement from the motors occurs in a jacket that surrounds the fire box. The steam cools the sides of the latter, becomes superheated, and then enters the smokestack, above the damper, and makes its exit colorless. The water is heated by steam in the reservoir, and enters the boiler nearly at the boiling point.

The generator employed is of a new system, and the arrangement of it is shown in Fig. 2. It consists (1) of a double-shell, E E, C C, that carries all the necessary accessories of a boiler; and (2) of an internal cylinder, D, which is connected with the shell by a number of tubes, T, radiating from it in an inclined position. The water is therefore inclosed between the two cylinders, E and C, in the tubes, T,

double-acting pump, which is actuated directly by a special motor, which takes its steam from the boiler at the normal height of the water level. The carriage can be run with the ash pan open or closed. In the latter case the combustion is quickened by means of two steam blowers that introduce air mixed with steam under the grate. The exact dimensions of the carriage are as follows:

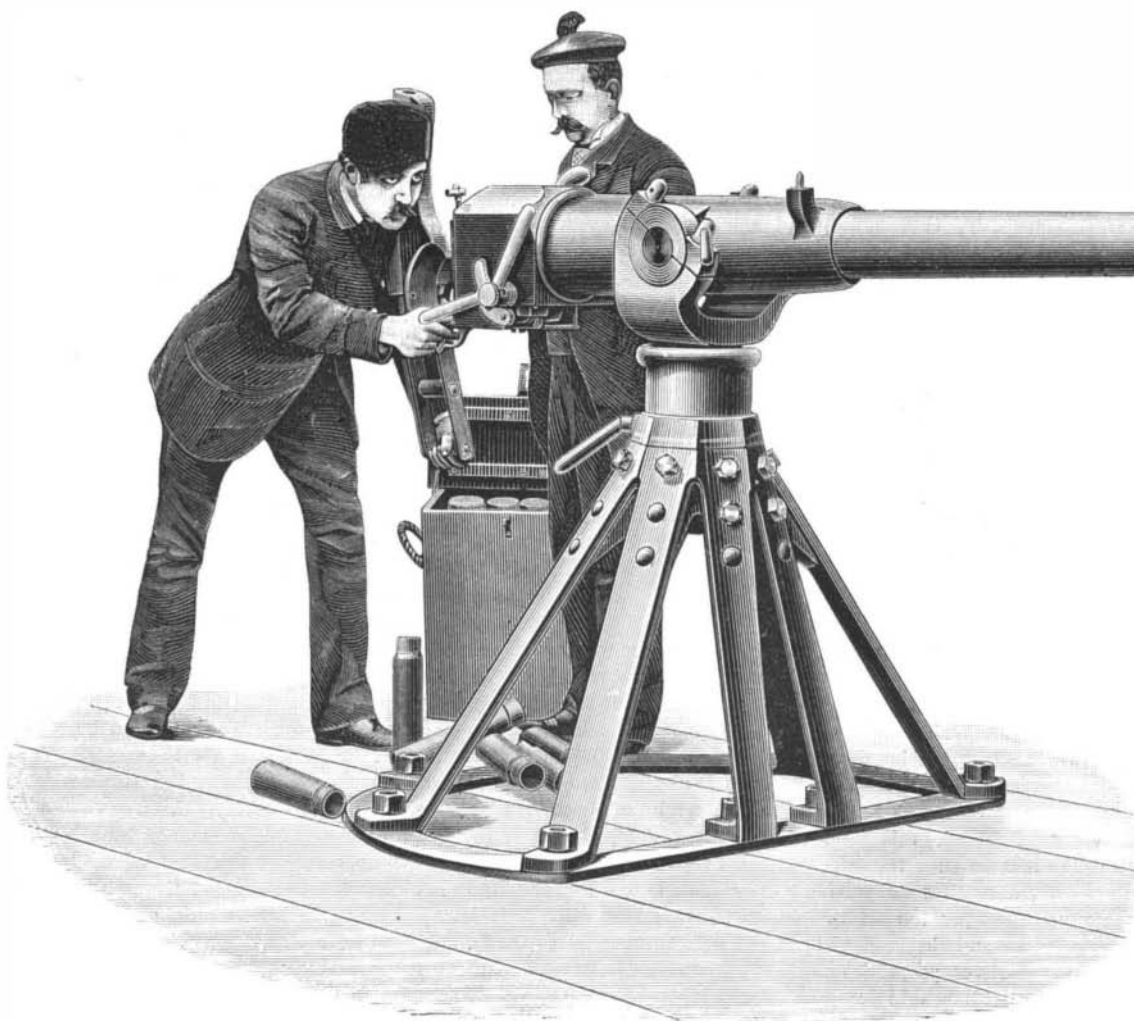
Length of frame, 6 feet; distance between the wheels from



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axle to axle, $5\frac{1}{4}$ feet; height of seat above ground, 35 inches; height of frame above ground, 20 inches; diameter of large wheels, 4 feet; and of small ones, $2\frac{1}{2}$ feet. The carriage, properly so called, weighs 285 pounds; the boiler, fire box, blowers, etc., 395 pounds; the motors, 55 pounds; the feed water, 22 pounds; and the maneuvering apparatus, etc., 33 pounds. With a supply of 18 gallons of water, sufficient for an hour and a half, and 65 pounds of coke, the total weight is 1,084 pounds.

The carriage makes very little noise; it operates without



IMPROVED HOTCHKISS RAPID SIX POUNDER GUN.

and in the vertical cylinder, D. The flames circulate around the cylinders and impinge against the tubes. This arrangement permits of an economical utilization of the fuel and of a rapid circulation in the direction of the arrows. The vaporization reaches about 10 pounds of steam per pound of coke. A self-regulating and constant level feed water is connected with the boiler. The level regulates itself without its ever having to be looked after. This feed water is a

visible escape of steam or smoke; will turn around in a circumference of 8 feet radius; and is capable of reaching, on a good road, a speed of $2\frac{1}{2}$ miles per hour. In our engraving (Fig. 1) the driver is represented at the moment at which he is grasping the starting lever.—*La Nature*.

A POULTRY raiser says that short eggs produce hen chickens and long eggs produce cocks.

IMPROVED HOTCHKISS RAPID SIX POUNDER GUN.

The important order for single barrel machine gun recently given by the British Government to Mr. Hotchkiss, of Bridgeport, Conn., is the result of the competitive trials carried out last year by the Ordnance Committee at Shoeburyness.

In 1881 it was decided by the British war office to invite inventors to supply a new gun for the light armament of the navy, and the following memorandum of conditions to guide manufacturers was issued by the War Office, dated December 29, 1881.

Quick Firing Rifled Breech-loading Gun for Auxiliary Armaments.

1. The gun to be a breech-loader which will range with accuracy to 4,000 yards.
2. The muzzle velocity of the projectile to be not less than 1,800 f. s.
3. The projectile to be shell and steel shot of 6 pounds weight.
4. The projectiles and powder charges to be made up in one cartridge for simultaneous loading.
5. The service of the gun to be capable of being performed by three men.
6. The gun to be able to fire under the above conditions not less than twelve aimed rounds per minute.
7. The mounting to be suitable for either ship or boat service. An alternative mounting to be provided, to enable the gun to be readily mounted for field service.

8. To be capable of readily delivering an all-round fire.
9. The recoil to be reduced to the lowest limits, and the gun to return after recoil to the firing position.
10. The gun to be provided with an easy removable shield, proof against the fire of the Martini-Henry rifle at 100 yards range.
11. The total weight of the gun and ship mounting not to exceed 10 cwt.

In the spring of 1883 three different guns constructed to fulfill, as nearly as possible, the above conditions, were delivered for trial by the following firms: Sir William Armstrong, Michell & Co., Hotchkiss & Co., and Thorstein Nordenfelt.

The Armstrong gun was withdrawn from trial after the preliminary experiments, as it did not give, says *Engineering*, the expected results, the Ordnance Committee recommending the Hotchkiss gun, after a series of very successful experiments at Shoeburyness. There being, however, some diversity of opinion in the navy on the system of training the guns, the Admiralty decided

to order, besides the Hotchkiss gun, a certain number of Mr. Nordenfelt, who was to adopt the Hotchkiss non-recoil system of mounting, and to embody similar ballistical features in his gun, so that the ammunition could be fired from either system with exactly similar ballistical results.

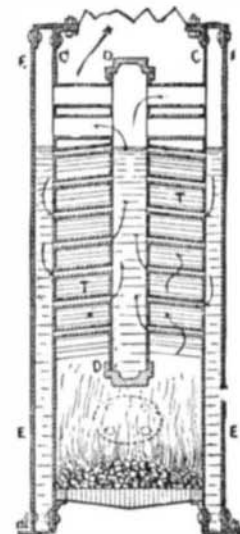


Fig. 2.—DIAGRAM OF STEAM CARRIAGE.

The exact shape of the pedestal for the guns is not yet decided; it will vary somewhat, according to the construction of the ships and the places for the guns. The first 77 Hotchkiss guns ordered are, according to the term of the contract, to be delivered by Hotchkiss & Co. by the beginning of April next.

The Hotchkiss guns are called "non-recoil" because they are generally mounted on fixed elastic pivots and have no