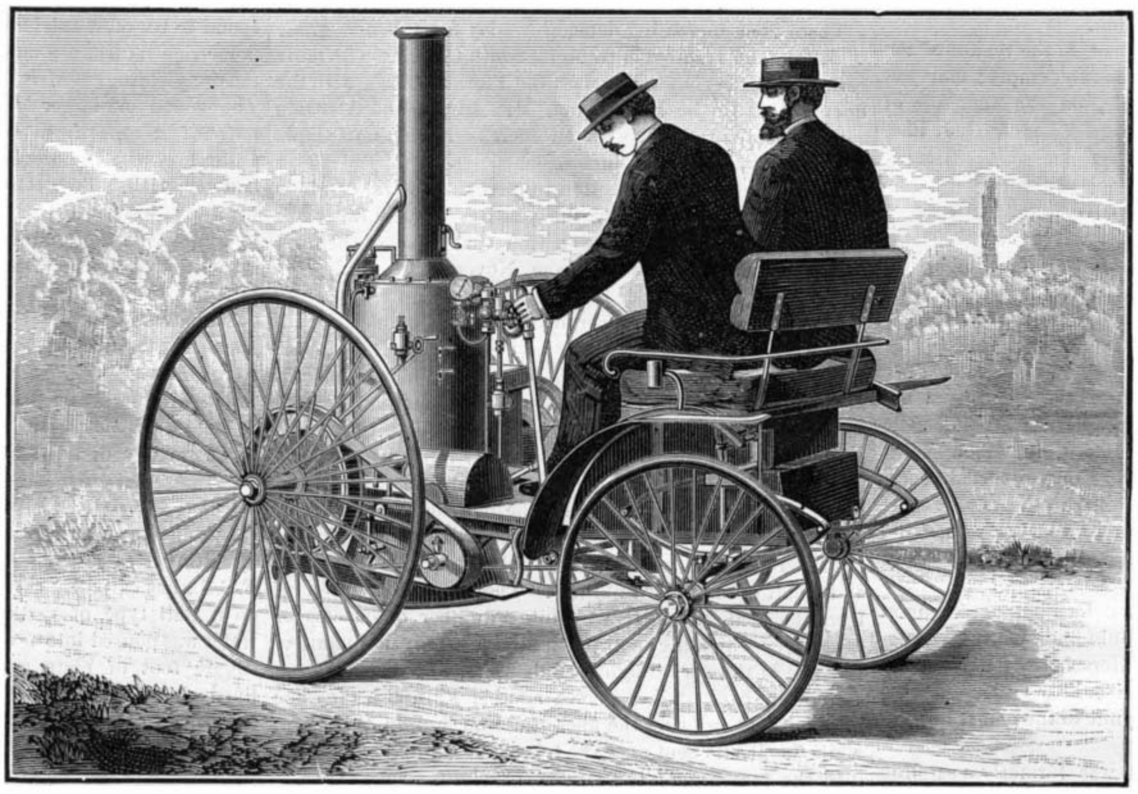
A NEW STEAM CARRIAGE.

A few weeks ago an experiment was made on Grande Armee 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.



A NEW STEAM CARRIAGE.

The carriage is actuated by two independent oscillating motors. The diameter of the cylinders is 2¾ inches, and the stroke of the piston 4 inches. The number of revolutions for a velocity of 2½ 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, 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 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 axle to axle, 5¼ 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, 2½ 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 1,034 pounds.

The carriage makes very little noise; it operates without 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 2½ 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.*

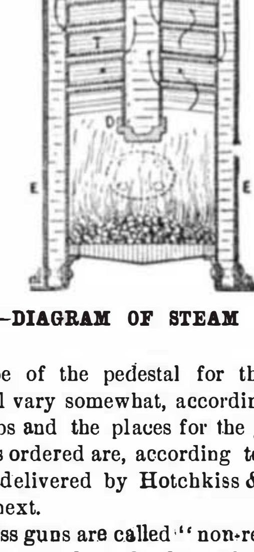


Fig. 2.—DIAGRAM OF STEAM CARRIAGE.

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.

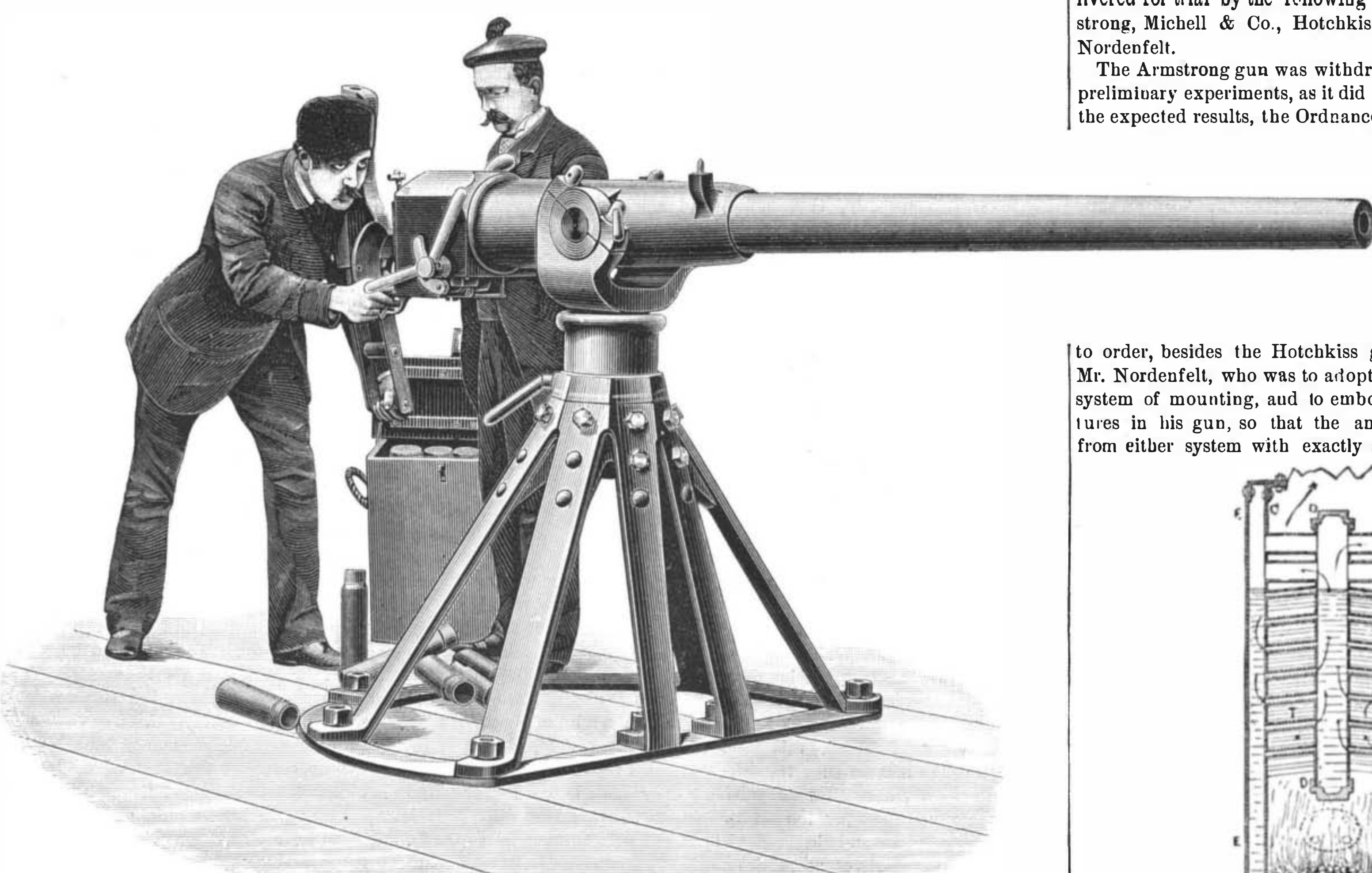
9 The recoil to be reduced to the lowest limits, and the gun to return after recoil to the firing position.

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.



IMPROVED HOTCHKISS RAPID SIX POUNDER GUN.

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 perceptible recoil, although the guns in reality have a definite amount of movement at the departure of the projectile, sufficient to relieve the mountings of undue shock.

In all cases, except for the larger calibers for boat service and for the field, these guns are laid by means of a stock, or shoulder piece, bearing against the left shoulder (as in the Hotchkiss revolving cannon) and a pistol grip with trigger, which the gunner grasps with his right hand. He fires the moment his sights bear upon the object aimed at, by pulling the trigger, so that it will be seen that this gun has the general characteristics of the Hotchkiss mounting, viz.:

1. The gun is mounted on a pivot and trained direct by the shoulder without the aid of any elevating or directing mechanism; thus enabling it to be pointed easily and rapidly from moving and rolling vessels against swiftly moving objects.

2. The sighting and firing are effected by a single man, as clearly indicated in the perspective view upon the opposite page.

The gun is made of Whitworth's fluid-pressed steel, oil tempered. The body consists of a tube and a jacket carrying the breech and the trunnions, so that the longitudinal and transverse strains are divided. The jacket is shrunk over the tube, and to prevent any slipping they are locked together by a screwed collar, carrying the fore sight. The gun is exactly balanced in the trunnions,

The breech action belongs to the class of guns with a breech block sliding vertically through a mortise, and actuated by a lever, the movement of which opens the breech, extracts the fired cartridge case, and cocks the hammer for the next shot. The action is composed of the following parts, viz., the wedge, with its stop-screw for limiting the run; crank and crank handle, for moving the wedge up and down; firing hammer and its rocking shaft; main spring, trigger sear, trigger spring and trigger, and the extractor.

A STATISTICIAN, Dr. Farr, we believe it was, recently stated that if one could watch the march of 1,000,000 people through life, the following would be observable: Nearly 150,000 would die the first year, 53,000 the second year, 28,000 the third year, and less than 4,000 in the thirteenth. At the end of forty-five years 500,000 have died. At the end of sixty years 370,000 would be still living; at the end of eighty years, 97,000; at eighty-five, 31,000; and at ninety-five years there would be 223; at the end of 108 years there will be one survivor.

MESSRS. RENARD AND KREBS' ELECTRIC BALLOON.

The problem of steering balloons, which was for a long time regarded as visionary, has made great progress in recent years, and may now be considered as solved. Captains Renard and Krebs have the honor of being the first to successfully accomplish this, and therefore merit the gratitude of their contemporaries. But, of whatever interest be their work, we must not forget those who have preceded them, and shown them the path that they should follow. Before speaking of the memorable ascension of Aug. 9, 1884, we think it indispensable to trace the history of the steering of elongated balloons provided with screw propellers.

It was in 1852, thirty-two years ago, that the way was opened by our great engineer Henri Giffard. It was then that a true aerial ship, of elongated form, and provided with a screw and rudder, was for the first time seen to rise into space. This ship was 44 meters in length, and its equatorial diameter was 12 meters. The balloon was surrounded on every side, except beneath and at the ends, with a netting whose extremities united on a stiff wooden bar. At the extremity of this latter there was a triangular sail, movable around a rotary axis, which served as a rudder and keel. At six meters beneath the bar a steam engine mounted upon a wooden frame was suspended along with its accessories. The propeller, which consisted of two large blades, was 3·4 meters in diameter, and made 110 revolutions per minute. Empty, the engine and boiler weighed 150 kilogrammes. Provided with water and coal for starting, they weighed 210 kilogrammes; the accessories to the engine and the supply of coal and wood weighed 420 kilogrammes more.

Henri Giffard had then no financial resources. He agreed to make his first ascent on a certain day at the Paris Hippodrome. On the 24th of September, 1852, the balloon was inflated with illuminating gas, and Giffard ascended all alone to the sharp whistling of his engine. The wind was very strong that day, and the inventor could not think of stemming the aerial current, but the different maneuvers were effected with the completest success. The action of the rudder made itself felt very plainly, thus proving that the aerial ship had a very appreciable velocity. At an altitude of 1,500 meters, Giffard met slower currents, and found it possible at moments to keep head to the wind. The future inventor of the injector had performed an experiment which caused him to be called by a celebrated writer of the time "the Fulton of aerial navigation."

Giffard's efforts, which were renewed by him in 1855, were followed by the fine experiment executed by Mr. Dupuy de Lome, on the 2d of February, 1872. This gentleman's balloon was 36 meters in length, and about 15 in equatorial diameter. It had a capacity of 3,500 cubic meters, and was inflated with pure hydrogen. The propelling screw was 6 meters in diameter, and was actuated by seven men in the car. The motor was assuredly insufficient, but De Lome, under the influence of his screw, nevertheless obtained an appreciable deviation from the line of the wind, and ascertained that his aerial ship had a velocity 8 kilometers per hour.

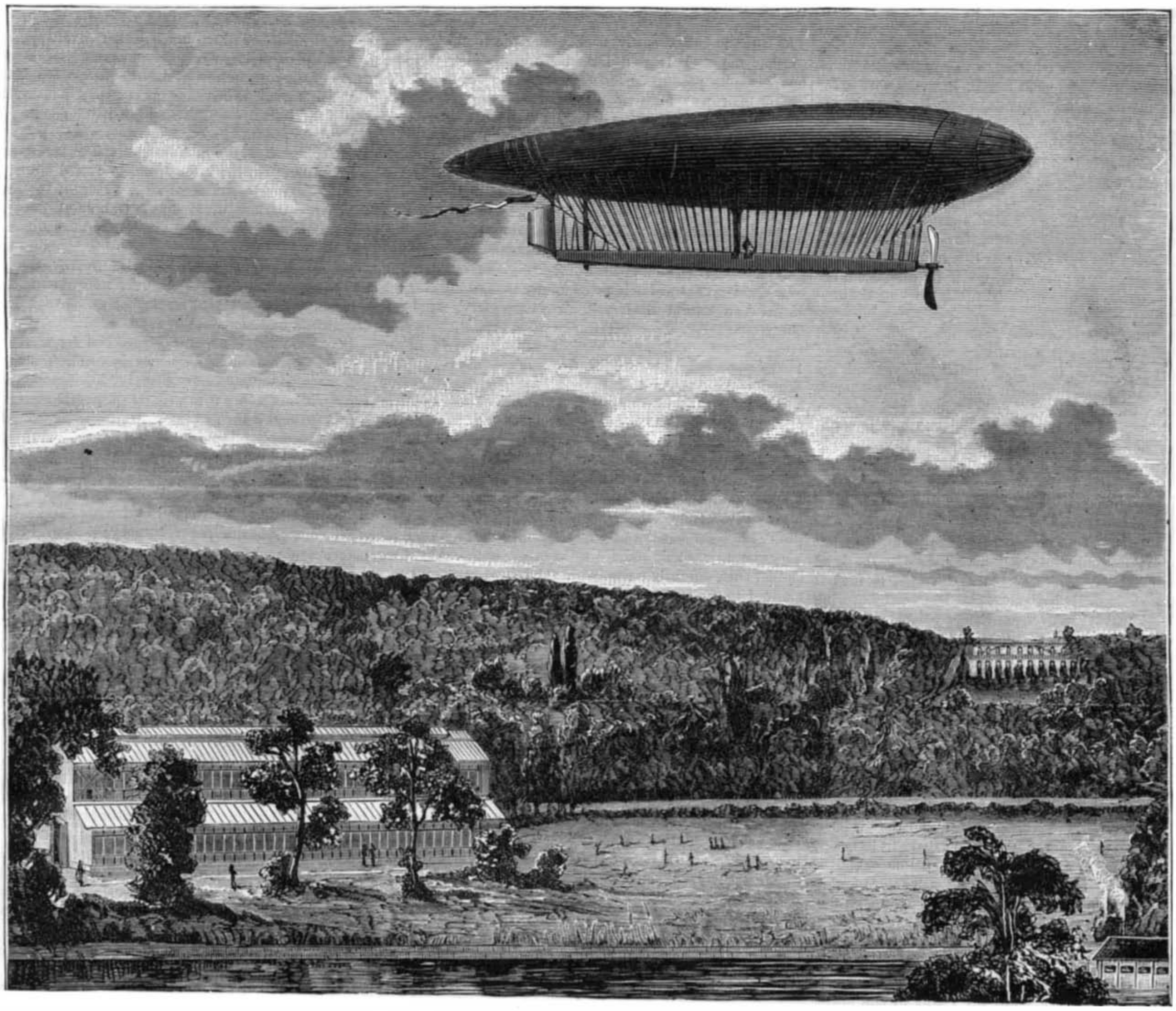
What had been wanting up to this time was a motor that was truly adapted to balloons—a light motor that did not necessitate the use of fire, and that should lose no weight during its operation. As long ago as 1881 Mr. Gaston Tissandier made known the result of his studies and experiments upon the "Applications of Electricity to Aerial Navigation." In a note presented to the Academy Aug. 1, 1881, he expresses himself thus:

"The recent improvements made in dynamo-electric machines have given me the idea of employing them for the directing of balloons, concurrently with secondary batteries, which, although of relatively light weight, store up a large amount of energy.

"Such a motor, connected with a propelling screw, offers advantages over all others, from an aerostatic standpoint. It operates without any fire, and thus prevents all danger from that element under a mass of hydrogen. It has a constant weight, and does not give out products of combustion which continuously unballast the balloon and tend to make it rise in the air. It is easily set running by the simple contact of a commutator.

"I have had a small elongated balloon made, which terminates in two points and is 3·5 meters in length by 1·3 meters in diameter at the center. This balloon has a capacity of about 2,200 liters. Inflated with pure hydrogen, it has an excess of ascensional power of two kilogrammes.

"The balloon is provided with a small Siemens dynamo-machine weighing 220 grammes, whose shaft is connected, through the intermedium of a gearing, with a very light, two-bladed helix, 0·4 meter in diameter. This little motor is fixed to the lower part of the balloon, with a secondary battery weighing 1·3 kilogrammes. The screw, under such circumstances, revolves at the rate of 6½ revolutions per second, acts as a propeller, and gives the balloon in still air a velocity of 1 meter per second for more than forty min-



MESSRS. RENARD & KREBS' ELECTRIC BALLOON.