A NEW PROJECTILE FORCE.

BY THOMAS M. MESCHIN, D.C.L., F.S.A., OF THE INNER TEMPLE, BARRISTER.

Water may be decomposed into its constituent elements, oxygen and hydrogen gases, either by voltaic electricity, by common electricity, by magneto-electricity, or by thermo-electricity.

1st. BY VOLTAIC ELECTRICITY.—When the electrodes of a voltaic battery are brought near each other, in acidulated water, or, in other words when water is made part of a galvanic circuit, so that the current of electricity passes through it, decomposition ensues—its constituent elements, oxygen and hydrogen gas, are evolved at the electrodes.

2nd. BY FRICTIONAL ELECTRICITY.—Water may also be decomposed by passing a succession of discharges of common electricity through it. This was accomplished as early as 1789, by Messrs. Dieman Paetz and Von Troostwych. Professor Faraday and Mr. Goodman have also succeeded in obtaining true electro-polar decomposition of water by the action of frictional electricity.

3rd. BY MAGNETO ELECTRICITY.—Water can also be decomposed by a magneto-electric apparatus, for if it be made part of the circuit, as often as the circuit is completed, a current of electricity passes through the water, and the gases are thereby evolved.

4th. THERMO-ELECTRICITY.—Water is very easily decomposed by a thermo-electric pile, the electrolysing action of which is maintained by keeping the ends of the bars of which the pile is composed, the one at a high and the other at a low temperature.

The different forms of electricity known under the above names, may be used either separately or simultaneously for the decomposition of the water in the gas generator.

When this evolution of the gases takes place in a close vessel, or gas generator, a gradually augmenting compression necessarily results, which does not affect the evolution of the gases in the slightest degree. An exceedingly high pressure may thus be obtained in the gas generator or close vessel. Dr. Daniel raised it to the enormous tension of 56 atmospheres, or 840 lbs. on the square inch.

In the "Philosophical Transactions of the Royal Society, 1839," vol. 129, p. 93, 94, Professor Daniel thus describes an experiment:—"The evolution of gas, which was measured at short intervals, took place with perfect regularity, and did not appear to be in the slightest degree affected by the gradually increasing compression. In four and a half minutes, when 19 cubic inches had been collected, the compression tube burst with a loud explosion, and the fragments, which were very small, were scattered all over the laboratory. If we were to calculate that 19 cubic inches were compressed into three tenths of an inch space unoccupied by the liquid, this would be a compression of 63 into 1, and the pressure would amount to 940 lbs. on the square inch; but if we reckon, as was probably the case, that two cubic inches of the gases were kept down by the solvent power of the liquid at this high pressure, then the compression would have amounted to 56 into 1, and the pressure to 840 lbs. on the square inch."

Electric Gas Gun.

The gases evolved at a high pressure from the decomposition of water by electricity, constitute a projectile force of very great intensity. By using them in the same way that air is employed in an air-gun, the greatest conceivable force may be impressed upon a projectile, a force, apparently, only limited by the strength of the materials of which the gas-generator is composed. Gunpowder is itself only a highly inflamable mixture, which, on being ignited, is rapidly converted into gases at a high pressure, and the gases in the electric-gas-gun would act upon the projectile in precisely the same way as the gas resulting from the ignition of gunpowder acts upon a similar projectile in an ordinary cannon; thus the force of gunpowder and that of these gases are analogous.

As to the form of an electric gas gun, it is similar to a breech-loading cannon. Attached to the breech is a reservoir, or gas generator, in which water is converted into the gases at such high pressure as the officer in command may deem requisite. There is a communication between the gas-generator and the barrel or chase of the weapon, which can be opened or closed at pleasure, but which, if not closed before, will close of its own accord, when the full charge of the weapon has passed into the barrel. This is accomplished either by a slightly conical piston or spigot, acting in a small hole through the barrel of the weapon, so placed that when a shot has passed over the point where it is situated, the gases press upon this piston or spigot (which is kept down by a spring,) and raising it by their pressure, it acts by suitable mechanical contrivance upon the apparatus for closing the communication; or by making the shot, when it passes over a certain point in the bore, complete and break an electric circuit, which acts by suitable machinery upon the apparatus for closing the communication.

An apparatus for closing this communication is so constructed, that when it is completely closed, and not by any probability till then, several electric sparks are passed through the gases in the barrel, which result in their explosion, and the discharge of the weapon, for I should have mentioned that these gases are endowed with a second element of force—they may be combined by an electric or other spark; or the gases may be exploded as gunpowder by the percussion of ordinary detonating powder. In combining they expand to fifteen times their volume. When the shot has, by passing from the breech to the muzzle, attained the uniformly accelerated velocity due to the high pressure of the gases, and is on the point of leaving the weapon, if the gases be then exploded the explosion will impress a force upon the shot equal to fifteen times the pressure of the gases. The small portion of pure water, which is formed by the combination of the gases, is condensed like dew on every part of the bore, and serves to lubricate the weapon, or, according to the temperature of the barrel, remains in the form of vapour, and is driven out by the succeeding discharge—the barrel never needs cleaning. At the breach there is an aperture through which the shot is introduced into the barrel with great rapidity after each discharge, by means of a very simple piece of mechanism. The aperture has its edges bevelled outwards to insure the fitting of the piece that fills it up when the shot is