

**THE QUEEN-SCHULTZ CHRONOSCOPE.**

The Queen-Schultz Chronoscope made by the well-known firm of Messrs. Queen and Company, 1010 Chestnut Street, Philadelphia, Penn., is a modification of the chronoscope invented by Captain Schultz of France for the purpose of measuring exceedingly small intervals of time, and especially for measuring the velocity of projectiles while traveling along the barrel of a gun.

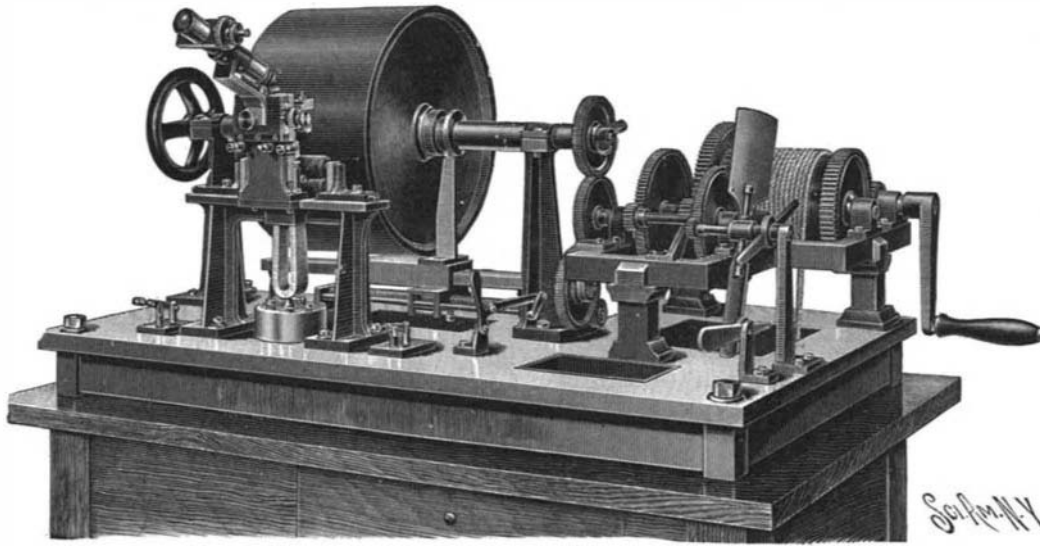
A drum, one meter in circumference, covered with a coating of lamp black is driven by means of a clock-train and weight so as to revolve once per second and at the same time slowly advance longitudinally. In front of the drum, mounted on a support and actuated by two magnets, is a standard tuning-fork, vibrating 250 times a second; on one limb of this fork is a quill which traces a line on the blackened surface of the drum and therefore will record 250 complete vibrations for every revolution of the drum.

A telescope with micrometer is also attached to the tuning-fork and each vibration of fork, traced on the drum in form of a curve, can be subdivided into 1,000 parts, thus allowing readings to be made to  $\frac{1}{250,000}$  of 1 second. On the support with the tuning-fork is a small pointer which traces a straight line on the drum. This pointer has an electrical connection with an accurate chronometer, which at every  $\frac{1}{2}$  second closes the circuit and causes the pointer to make a succession of records on the revolving drum, these marks serving as starting points to count the number of vibrations of the tuning-fork, and to check them up every  $\frac{1}{2}$  second.

In order to measure the velocity of projectiles the gun must be fitted along its bore with special electrical circuit-breakers usually placed 1 foot apart. Each circuit-breaker is so constructed that the current is interrupted as the projectile passes, but is made again before the projectile reaches the next breaker (1 foot further on).

These breakers, with a suitable battery, are all in one circuit with the primary of an induction coil. One terminal of the secondary of the coil is grounded to the frame of the chronoscope, while the other terminal consists of a fine point near the blackened surface of the drum. Therefore, when the primary circuit is opened

by the first circuit-breaker along the bore of the gun, the spark induced in the secondary of the induction-coil jumps from the points to the revolving drum, leaving a distinct mark on the blackened surface. As the next circuit-breaker in the gun is passed, the spark again passes to the drum; and this operation is repeated for every breaker along the gun-bore. Thus on the drum, alongside of the inductions made by the tuning-fork, will be recorded a succession of spots at certain distances from each other. The time elapsing between any two of these spots can be calculated directly from



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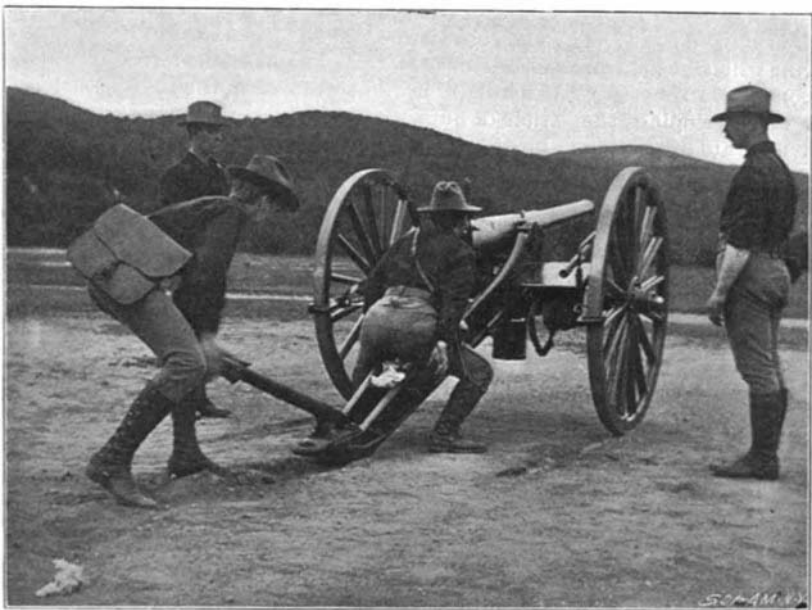
the record which the tuning-fork made, and thus the time (measured to the  $\frac{1}{250,000}$  part of a second) taken by projectile in passing a known distance along the gun-barrel calculated.

**ARTILLERY PRACTICE OF THE NATIONAL GUARD.**

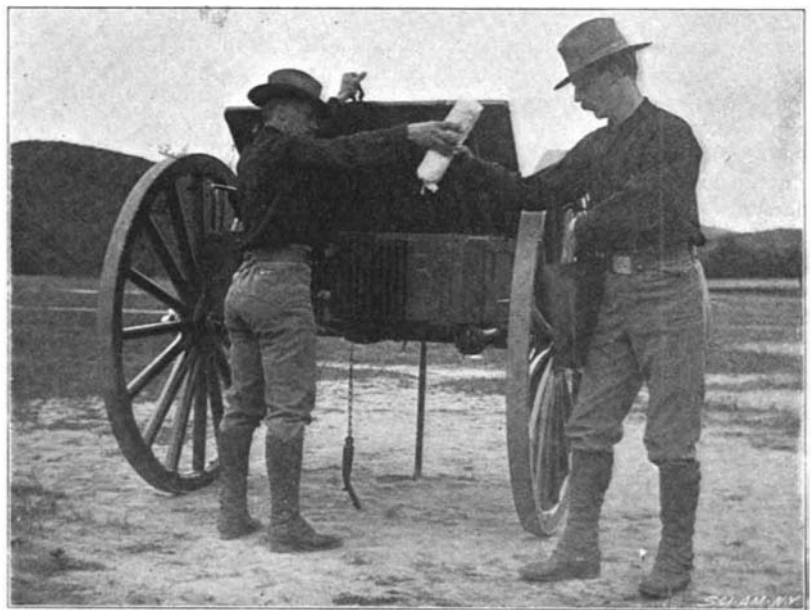
For want of a suitable range it is only within a comparatively recent period that the different batteries comprising the artillery branch of the National Guard of New York State have had an opportunity to perfect themselves in accurate shooting. While the infantry were provided with every possible convenience, such as a rifle range in each armory, and the magnificent grounds at Creedmoor, the artillery were apparently sadly neglected. But this is now changed, and, considering the small amount of practice, the result of the recent contest at the State artillery range at Camp Townsend was most gratifying. In 1896 an impetus

was given to good shooting by the presentation of the "Flanagan Trophy," and it has since been won by each of the three batteries composing the contestants. The "Trophy," as it is familiarly called, is a bronze figure of Napoleon, and, with its pedestal, is about six and a half feet in height. It was donated by Captain Flanagan, of the Second Battery, and the conditions were that it was to be shot for once each year by the First, Second and Sixth Batteries. The battery winning holds the "Trophy" for the term of one year, or until the next contest, and the battery that is three times a winner takes final possession of it. In 1896 it was won by the First Battery, Major Wendel; in 1897 the Sixth Battery, Major Olmstead, took possession of it, while it has now been in the armory of the Second Battery, Major Wilson, for two years, they having won it in 1899 and 1900. No contest took place in 1898, the Spanish war claiming all our attention. The target has, heretofore, been placed at 1,000 yards, but in the last contest the gunners had a chance to test their accuracy to a nicety.

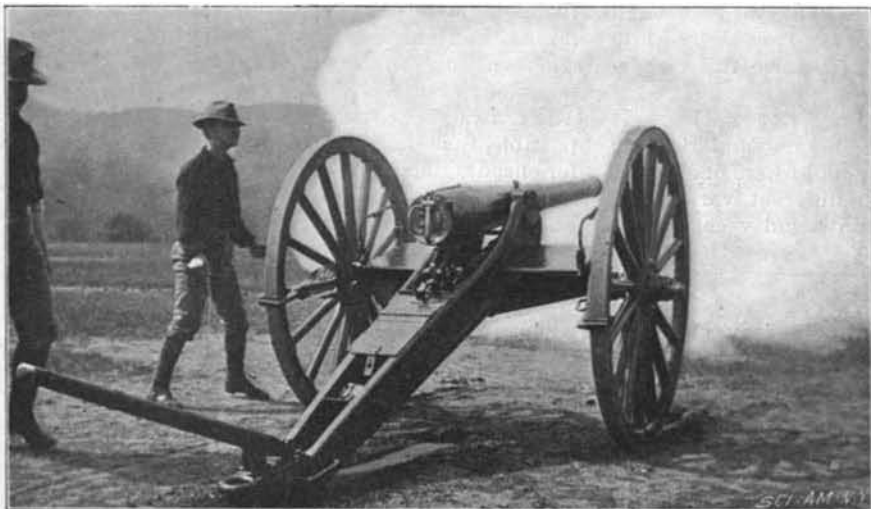
Col. N. B. Thurston, inspector of ordnance on Gen. Roe's staff, was determined to bring out the fine points of artillery shooting, and, therefore, provided a range of 3,100 yards, almost 2 miles. When it is remembered that these men had never before sighted their pieces and fired at anything beyond 1,000 yards, slightly over a half mile, the accuracy displayed was remarkable. Sighting a gun at a black speck on a white patch in the distance and then planting a shell within a few feet of that black speck is no easy matter, and yet it was done repeatedly, one shot demolishing the target, so that it had to be repaired, causing a long wait. The target being so remote, the services of the Signal Corps were called into play, and after each shot a large amount of wigwagging told the result. The guns used are the standard United States 3.2-inch breech-loading rifle, the same gun that is furnished to all the regular light artillery. In the contest each battery uses two guns, and twenty shots are fired in all, ten from each gun. Ten shell and ten shrapnel are used, the shell target having a bull's-eye, while the shrapnel is fired at an unbroken white mark. Target No. 1 is 20 x 12 feet, and No. 2 (shrapnel) measures 40 x 12 feet. In the first instance, a hit consists of the shell going



Sighting a Gun.



Getting a Fresh Charge of Powder.



Gun No. 1, First Battery; Getting the Range.



Second Battery Relaying Gun After Recoil.

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