

How to Keep the Make Shop Free from Steam.

Quentin McGall, of the firm of McGall Brothers, of Orange Valley, has just devised one of the most useful inventions for the hatting trade that can be imagined, and he not only has devised it but he has demonstrated that it will work by practical tests. Every hatter is aware of the difficulty experienced in keeping the sizing department free from fog or condensed steam in the winter months, and many have been the plans devised for obviating the trouble. Hoods with exhaust fans have been placed over the kettles and fans have been placed in ceilings and on the sides to suck out the moisture, but none have been satisfactory, although the hoods over the kettles have worked the best. Since the trouble was caused by the cold air from the outside finding its way into the shop and there being condensed by striking warm moisture-laden air inside, Mr. McGall decided that if the air which came in could be heated it would help the matter. Consequently he had a large steam coil made, four feet square, and placed at one end of the new sizing shop recently put up by the firm. This he incased in a pine box, open at both ends. On the outer end he placed a large steam fan, speeded up to a high point.

When the apparatus was ready for the test the day was one of the coldest of the present season, and a good one to test the plan. The room was full of fog at the time. The effect when the fan was started was almost magical. The steam began to disappear at once, and in a few moments the room was as clear as the outside air and remained so as long as the fan was kept going. When the fan was stopped the steam at once began to accumulate, and in a few minutes the room was as bad as ever. The firm is now arranging to place the device in all their make shops, and other manufacturers have arranged to do the same. The advantages of being able to keep the making departments free from steam are many. The conditions are much healthier, and a better grade of work can be turned out.—*American Hatter*.

THE FONTAINEBLEAU PROVING GROUNDS.

The time when proving grounds were of limited size, and their organization included only a butt and a few epaulements, is already very remote. New conditions have been imposed by the fact of progresses of all kinds realized by artillery. The proving grounds of the present day must necessarily be of great extent and be equipped in such a way that it shall be easily possible to solve most of the problems that are submitted to the art of war. In order to set forth more clearly the economy of such theaters of instruction, it is well to take one example, and we shall, to this effect, select the Fontainebleau proving grounds.

These grounds, directed east and west, occupy in the forest (very near the city) a strip of cleared land, 5.6 kilometers in length by 200 meters in width. Aside from a few hillocks, exercising upon their environs a command of 5 or 6 meters, this strip is quite level. It rises solely by 50 meters at each of its extremities, which are, on the one hand, an eminence called Mail Henri IV., and on the other, a rocky plateau. In artillery practice, the firing is done in the east-west direction, in other words, the pieces are put in battery on the Mail side, and fire their projectiles toward the plateau.

As for the objectives, the arrangement of these is such that they present to the *personnel* charged with the execution of the firing the aspect of a striking reality. They are representations, as faithful as possible, of defensive means or various obstacles—of troops in the act of marching or that have come to a halt; guns in battery or drawn by horses; men on foot or on horseback, and in dispersed order or in mass, etc.

A few details here will not be out of place.

In the way of obstacles, we remark in the proving grounds under consideration various epaulements of

earth and a redan with escarpment wall, magazine shelter and guns in place. The redan is represented at B, in Fig. 2, which shows also a village with its church, A, a hermitage at H, and a certain number of pieces of walls. The village is made of boards. As for the walls figured, they consist of scantlings nailed to laths and painted white. The upper part, painted red, represents the coping, and a rectangle painted yellow, a door, etc. To an observer placed at a distance, the illusion is complete.

The study of the processes of representing troops is just as interesting. A board painted black and cut in such a way as to represent the head and shoulders of a man is held vertically by means of a picket driven into the earth. Here we have a sharpshooter crouching. An alignment of similar silhouettes offers the aspect of a line of infantry upon the knees. Nailed to the coping of a wall, it will give the idea of a series of defenders of the obstacle.

opportune moment, to effect rapid changes of objectives. Now, such changes are obtained by a play of silhouettes arranged in such a way as to appear or disappear as many times as necessary, and that, too, at the will of the instructor. We give here, by way of example, a description of a line of disappearing infantry, represented in the foreground at C, Fig. 2.

The apparatus consists essentially of a large wooden axle supported by wooden bearings and established, perpendicularly to the line of fire, at the bottom of a trench in the form of a flattened V. The object of this arrangement is to protect both the axle and the silhouettes that it controls from the effect of bursting projectiles. The silhouettes consist of a wire frame simulating the human form and over which is stretched a black fabric. Levers are arranged to permit of revolving the axle, and consequently of raising or lowering the silhouettes at will. The maneuver of them is intrusted to men who actuate them by means of an

iron wire cable, C (Fig. 2). The Fontainebleau proving grounds are equipped with eight lines of disappearing infantry, each 20 meters in length. Placed one behind another, they occupy an interval of 1,800 meters, whence it follows that their system, methodically utilized, permits of figuring the marching of a body of infantry gaining ground by successive bounds, and consequently constituting a movable objective. We also find in the proving grounds under consideration special apparatus designed to represent troops on a march and advancing and falling back in a continuous manner. A movable object of this kind (Fig. 2, F) consists of a system of two wheels or drums connected by an axle carrying uprights, to which are nailed horizontally arranged laths. Upon these latter are fixed silhouettes of infantry or cavalry soldiers. The traction, which may be effected in one direction or the other, is done by means of a cable drawn by a team of horses. The travel is about 700 meters. We must express our regret that, for want of space, we cannot here go into the very interesting details of this method of traction.

The installation, maintenance and maneuvering of these different objectives imply the organization of a force of operators. Now, as the maneuvering has to be executed in the course of the execution of the firing, this special force must necessarily be able to have at its disposal a certain number of shelters. Fig. 2 represents, to the left, the shelter formed for the men whose business it is to maneuver the line of disappearing infantry, C. Fig. 1 shows on a larger scale a few details of construction of this structure of security.

Essentially dismountable and of easy installation, a new model of low shelter comprises a full center arch of corrugated iron 1.5 mm. in thickness, composed of three parts riveted together and connected by angle irons; a plate closing the front provided with a sight hole 10 millimeters in height; a plate in the rear barring entrance to the shelter;

a plate assuring the protection of the latter; and, finally, a mask protecting the front. The weight of the iron plates does not, as a whole, exceed 950 kilogrammes.

In order to effect the mounting of the shelter, it is well to proceed as follows: Upon the bottom of an excavation 1.2 meters in depth are established the arch and the front and rear closing plates and the mask. These four elements once in place, a ditch is excavated around the whole, and the earth therefrom serves to cover the arch to a depth of 1.5 meters. On the side of the batteries the shelter must be protected by a mass of earth 3.5 meters in thickness, in which are methodically buried two walls of dry stones. The organization of the Fontainebleau proving grounds includes a dozen shelters of this kind, each of sufficient size to accommodate eight persons.

The schools of instruction in firing would not be a true means of teaching if the troops called upon to take part in them were not, at every instant, informed



TELEPHONING FROM BOSTON TO CHICAGO.

Opening of the American Telephone and Telegraph Company's Telephone Line from Boston to Chicago, by the Governor of Massachusetts, February 7, 1893. The picture shows a group of telephone officials assembled at the Telephone Building, 125 Milk Street, Boston. His Excellency Governor Russell speaking to Chicago; next behind the governor stands Lieut.-Gov. Roger Wolcott; at the right Adj.-Gen. Samuel Dalton.

Three scantlings, 1.33 meters in height, are painted black, and assembled jointly in such a way that the one in the center exceeds the two others by 30 centimeters. Here we have a man upright upon his legs. Let a certain number of these very simple apparatus be juxtaposed, and we shall have a line of infantry standing (Fig. 2, D). If, in distributing sharpshooters over the ground, it is desired to come still nearer the truth, it is necessary, instead of painting the scantlings black, to invest them with old wearing apparel.

Manikins of analogous structure and organization may serve to represent combatants grouped in a special manner, or staff officers, etc. As for the campaign guns, caissons and teams, they are, as well known, figured in conformity with the prescriptions of the committee of artillery of April 22, 1884. Silhouettes of sharpshooters are employed to represent the gunners.

In order to satisfy, in the rules, the exigencies of the service of instruction, it is necessary to be able, at an

as to the results, good or bad, of their firing. It has, therefore, been necessary to organize a rational service of observation. To this effect the sites of the objectives have been numbered from 1 to 30, and small boards carrying numbers distributed as follows have been inserted in the earth: The proving grounds having been divided into three longitudinal zones, the sites numbered from 1 to 10 occupy methodically the left part, the sites numbered from 11 to 20 the middle portion, and the sites from 21 to 30 the right part. The establishment of this system of boards furnishes a sufficient number of datum points and permits of designating all the points of the ground with sufficient accuracy. The observers take their places in stations provided for the purpose, which are: (1) For campaign firing, the low shelters of the western route numbered from 1 to 4; those of Cormier, numbered 2 and 3; and (3) those of Salamandre and Redan; and for siege and place firing, the high shelters of Mont Morillon, Mont Aigu and of the Signal of Cormier. Each observer has assigned to him a transverse band (clearly determined) of the firing field. Thus, for example, the eight lines of disappearing objects pertain to the Cormier post No. 2. The results of the firing, duly observed, are immediately transmitted to the proper person by means of the telephone, for the grounds are provided with a telephone service. Two distinct lines, both starting from the Mail station, run, one of them along the north and the other along the south edge of the forest. These lines connect, between them, all the stations and shelters appropriated to the personnel of the different services—maneuver of the objectives, observation, telephone, and service of security.

A word or two touching the mode of execution of the latter, which is of prime importance: In its essence, such execution is nothing less than easy, considering the exceptional conditions of the grounds in question. The Fontainebleau proving grounds are, in fact, crossed by four frequented roads and a large number of paths. It is, moreover, surrounded with woods.

In order to prevent, as far as possible, all chances of accidents, vedettes and orderlies, as well as sentinels installed in stations, are employed. Charged with the service of surveillance at a great distance, it is the duty of the vedettes to bring pedestrians, horsemen and vehicles upon the roads, which, crossing the grounds, are carefully guarded. These roads are barred by orderlies, whose instructions are to open them only upon the order of the commandant of the firing schools. Posts of surveillance are installed around the grounds, the principal of these being that of the Mail, which occupies a dominant position. In

case the batteries are firing from the foot of the Mail, that is to say, when the zone to be interdicted is maximum, there is a concurrent and simultaneous operation of five posts of security (not including that of the Mail), each having its particular orders, viz.: Three posts of orderlies employed in guarding the Ronde, Orleans and Nemours roads; one post at the Puits du Cormier to watch the center of the field of fire, and one at the Salamandre to watch the back of the grounds. All these posts are connected by telephone and communicate with each other by the aid of sig-

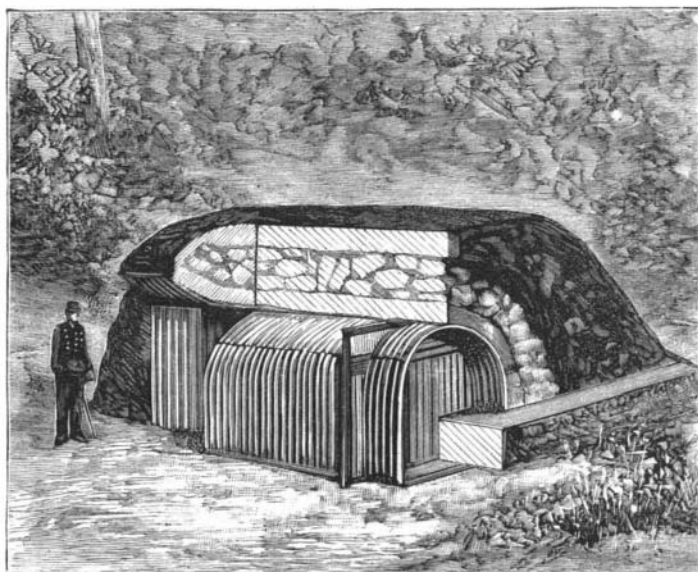


Fig. 1.—A LOW SHELTER OF THE FONTAINEBLEAU PROVING GROUNDS.

nals, consisting of wooden frames covered with white cloth, which, when maneuvered, detach themselves very well from the dark background of forest trees. Moreover, acoustic signals are made when need be by a dozen trumpets. Upon the whole, the Fontainebleau proving grounds are, in a measure, a true stage upon which the low shelters (which are as it were the side scenes of it) permit the commandant of the schools of firing to operate changes of scenery, and even of view, at his will. This officer, in fact, can, at will, move almost all the objects, cause the appearance or disappearance of batteries, lines of infantry and sharpshooters, and represent troops in march, etc. Hence it follows that it is possible for him to give representations of actions of war possessing the stamp of reality.

A director of maneuvers is, for example, able to cause a group of batteries to perform exercises of such a nature as to bring into relief the role that the artillery

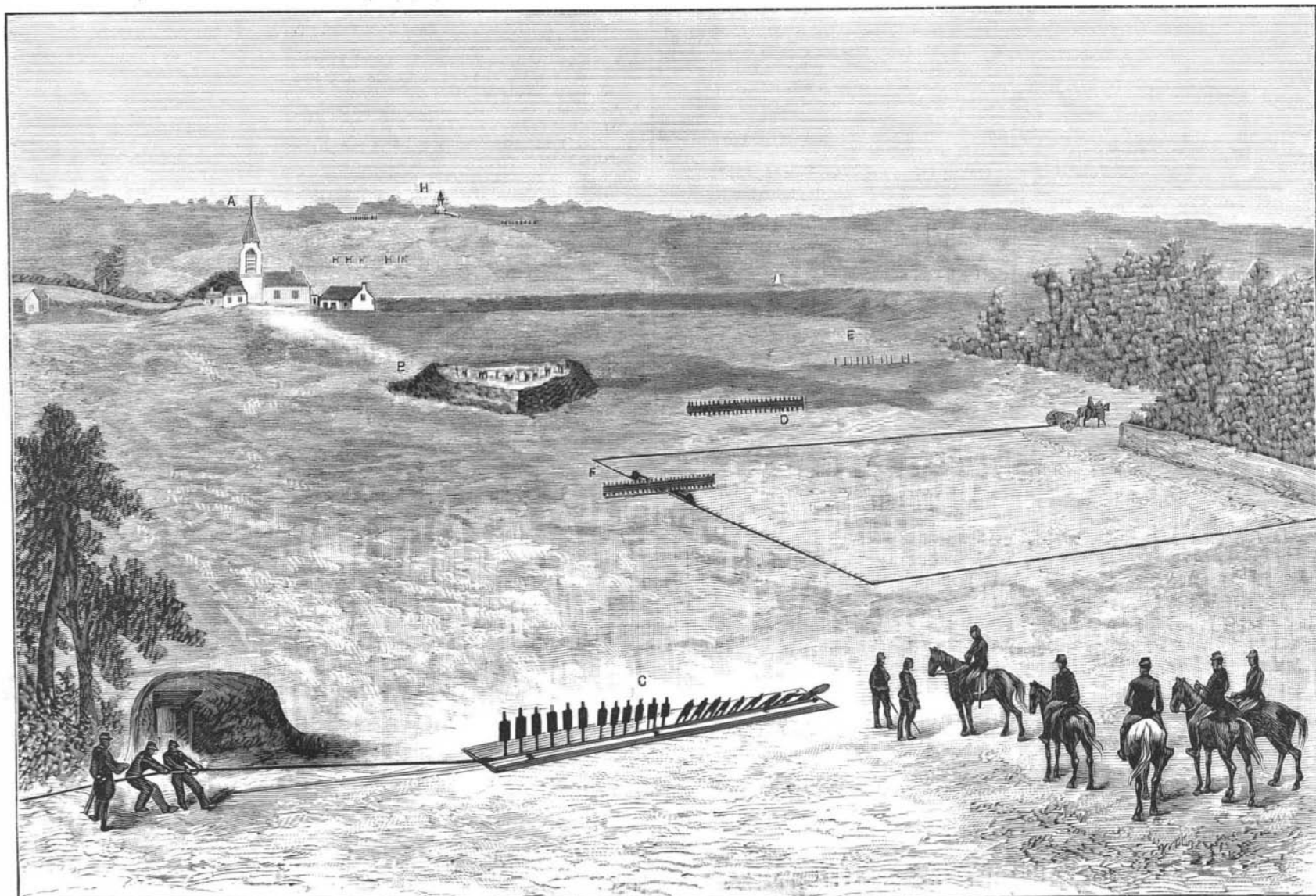
is called upon to play when it is a question of its sustaining an attack and of afterward seconding a defense. The programme of such operations would be, for instance, as follows: The setting in action of a battery of the group (vanguard battery) to fire upon the first infantry troops of the enemy and cause the latter to deploy; the enemy retiring and the infantry having, by supposition, gained ground, the marching forward of the group in order to put itself in battery against a line of the enemy's artillery already in position, and to begin the artillery duel; the enemy's artillery disappearing, the changing of objective in order to fire upon the infantry as well as upon a village supposed to be garrisoned with troops; the taking of position in front of the village by the enemy's artillery, in order to support the attack of the infantry and that of a line of cavalry charging one of the batteries.

Now if the reader will be kind enough to impress his mind with the descriptive details above given, he will be soon convinced that such a programme can be easily carried out upon the perfected proving grounds of Fontainebleau. It is an intelligently equipped stage upon which are produced scenes that one has a right to take for true images of the operations of war. The young student officers of the School of Application who take part in these interesting exercises can but acquire therein correct ideas as well as the precocious experience indispensable to him who wishes to practice the difficult profession of artillerist with distinction.—*La Nature*.

The Silk of Spiders.

In the *Revue des Sciences Naturelles Appliquées* for March, 1892, there is a paper by Rev. P. Camboue on the silk of spiders. After giving a history of the attempts to obtain and use the silk of spiders, he gives some interesting experiments of his own, made on a large orb-weaving spider of Madagascar, *Nephila madagascariensis* Vinson. He finds that the spider furnishes the most silk after she has laid her eggs. From one spider there was obtained in twenty-seven days nearly four thousand meters of silk—over three miles. The silk was of a golden yellow color. He gives the plan of an apparatus for winding the silk, which, however, as he says, is imperfect. Nothing, however, was done as to the raising and keeping of the spiders in large numbers, undoubtedly the most serious question.—*Nathan Banks*.

THE \$3,000,000 which the hat manufacturers of the country have got to hand over to the inventor of the sweat band used on hats affords a striking illustration of the value of genius when it makes a hit.



A. Village. B. Redan. C. Line of disappearing infantry. D. Line of standing infantry. E. Line of sharpshooters. F. Line of movable infantry. H. Hermitage.

Fig. 2.—WESTERN PORTION OF THE FONTAINEBLEAU PROVING GROUNDS.