

THE NEW VICKERS-MAXIM AUTOMATIC RIFLE-CALIBER GUN.

BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

The attention of European naval and military authorities has recently been centered in the new automatic rifle-caliber gun that has been designed by Messrs. Vickers, Sons & Maxim, Limited, and by whose courtesy we are enabled to describe and illustrate the many important improvements that have been embodied in this arm. It will be seen that fundamentally the principle and design are the same as the famous light Maxim gun, the main difference being that a reduction of 33 per cent in the weight of the weapon has been effected by the extensive utilization of high-class steel and aluminium, as a substitute for the gun metal hitherto employed. Moreover, a great improvement in the firing accuracy has been insured by means of a new-pattern muzzle attachment, the purpose of which practically eliminates the accumulation of fouling, and enables the gun to be fired continuously without losing any time in cleaning out the barrel, as is essential in the original weapon.

The water jacket is made of thin corrugated steel tubing, whereby great girder strength combined with lightness is procured, in addition to the provision of a larger cooling area. The trunnion block is made of steel, and has the advantage of being much lighter in weight; while the same fact applies to the end cap. The feed and handle block are made of high-class aluminium alloy with the working parts of steel as in the original gun. The trigger bar is made of steel, and is of a much improved pattern, making it impossible for any debris to remain in front of the hand sear, so that it is absolutely impossible for the gun to be fired accidentally without actually pressing the trigger lever.

The gun is entirely automatic in its action, and is fed automatically with cartridges from a belt, and the firing being controlled at will by means of pressure applied to the trigger lever at the rear. The weapon consists of two essential features—the recoiling and the non-recoiling parts. The automatic operation is insured by two forces—the explosion of the charge, which forces the recoiling portion backward, and a strong spring known as the fuze spring, which carries it forward.

The recoiling portion includes the barrel and the firing mechanism, which move to and fro upon guides attached to the frame, the requisite motion being imparted by the recoil, the energy of which is stored up and regulated by means of the fuze spring. The functions of the mechanism or lock are to receive the live cartridge from the belt, introduce it into the chamber of the gun, fire it, and then eject the empty shell.

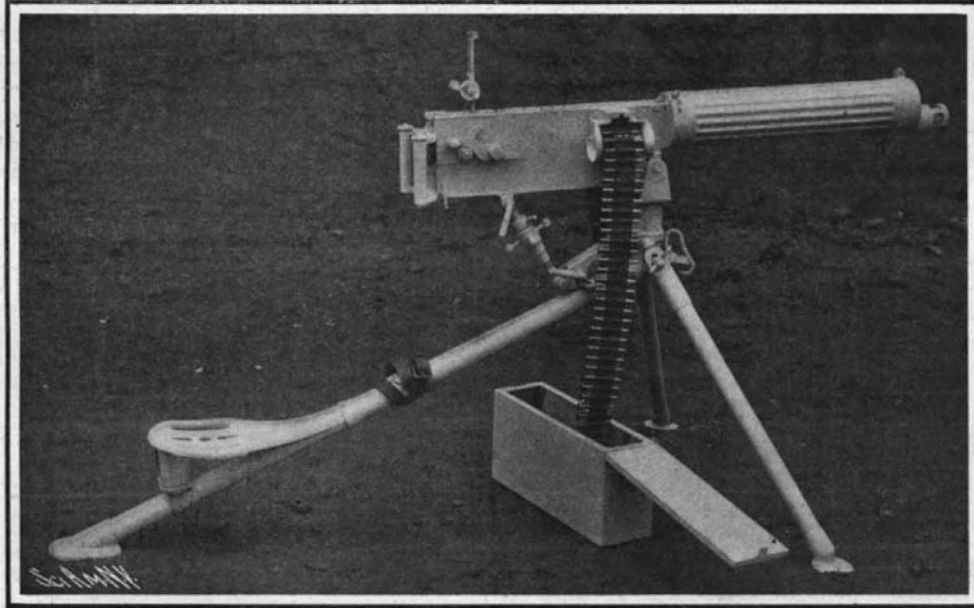
The side levers are so constructed that when the lock is assembled, they cover the axis pins for the tumbler and hand sear, so that they cannot be shaken out. The advantage of this arrangement is that the necessity for securing the pins with wire is overcome. The side levers are not pivoted on studs to the sides of the frame, but are secured on an axis pin which passes through the frame and the longitudinal slot in the firing pin. There is a bayonet joint for attaching the side levers to the connecting rod, while an adjusting nut is placed on this connecting rod, so that the distance between the face of the extractor and the barrel may be adjusted.

The extractor levers, by means of a connecting pin, form one single piece, and are supported by bearings at the bottom on the lock frame. These levers support the extractor during the whole period of action, and at the same time limit its downward motion. The main spring is simply held in position by a recess formed in the lock frame without the aid of a pin. The extractor itself is only slightly different from that in the original gun, the lower lugs of the lever having been removed and the tail spring dovetailed in.

The recoiling parts are mounted inside the non-recoiling section, and are comprised of the barrel, the two recoil plates which carry the lock, and the crank. In order to protect the barrel, which is made of high

tensile steel, from rust, it is coated with copper. The breech end is formed in the shape of a block having a stud on either side, called the barrel trunnion, and by means of which the barrel is attached to the recoil plates.

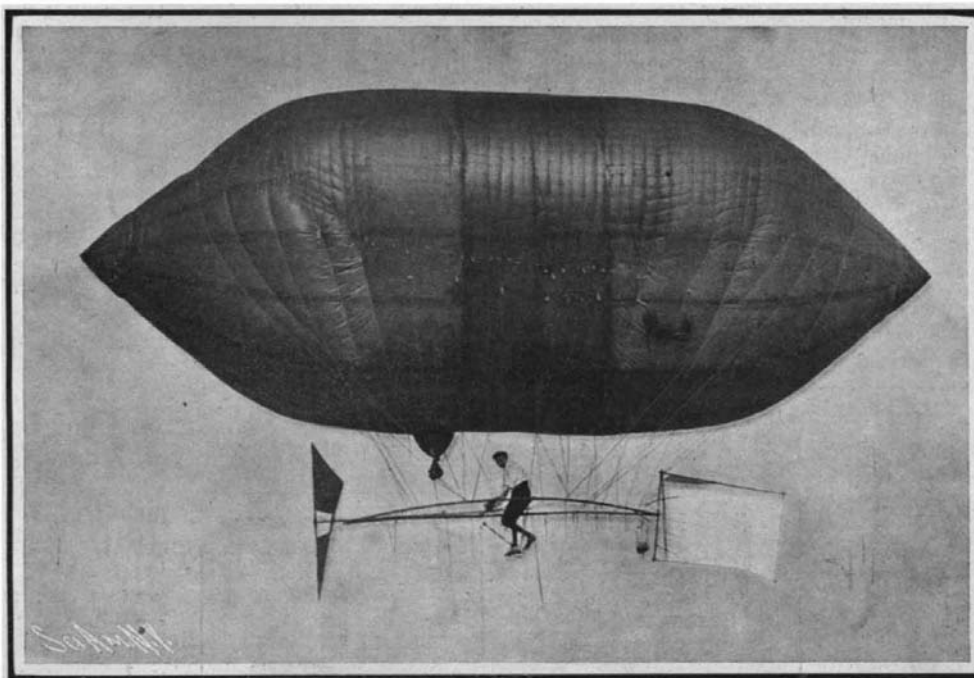
The crank is fitted on the right with a handle, the lower surface of which bears on the roller and is of special curved form. It is fitted with a fuze, to which are attached two links which connect it to the fuze spring, the remainder of the crank being within the breech casing. The action of the recoil causes



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the fuze spring to extend and wind the links, which are attached to it, about the fuze, so that when the crank handle is immediately forward, the fuze spring is not only extended about one inch by the recoil of the barrel, but is further extended by the winding of the links on the fuze. Immediately the recoil action is expended, the fuze spring pulls the recoiling portion back into the firing position. This movement unwinds the links from the fuze, so that the crank handle flies back and strikes the check lever, which is so constructed that, when the crank handle reaches the stop, it is prevented from rebounding.

The non-recoiling portion comprises the frame and outer casing, including the water jacket which surrounds the barrel. The jacket is made of steel, and holds about seven pints of water for cooling the barrel during firing, being fitted with a valve to permit the steam thus generated to escape. The ejector tube is placed under the water jacket, and being fitted with a spring, prevents the shells from falling back into the gun during firing. When the jacket is filled with water, about 2,000 rounds may be fired at short intervals without replenishing the water supply. At the



THE "SKY CYCLE" BUILT AND NAVIGATED BY A FIFTEEN-YEAR-OLD BOY.

maximum firing capacity, the water commences to boil after about 700 rounds have been discharged.

The gun is supplied with cartridges from a belt placed in an ammunition box on the right-hand side of the gun. The loaded belt is introduced into the gun by means of the feed-block, and as it passes through the cartridges are withdrawn by the action of the mechanism. On the top of the feed-block is a slide, which is made to move laterally by means of the cranked lever. Two pawls are fitted to this slide, held up by a spring. At each forward movement of

the barrel these pawls push the belt one step to the left, placing a cartridge in position ready to be gripped by the extractor. On the under side of the feed-block are two retaining pawls actuated by a spring, which prevent the belt from slipping back; however, these pawls can be released by hand if it is necessary to withdraw the belt.

The muzzle attachment, which constitutes a prominent feature of this weapon, rendering greater accuracy in firing, consists of a disk clamped to the muzzle of the barrel, and a perforated sleeve which is connected to the barrel gland by a kind of bayonet joint, comprising a series of segmental lugs, which enables the sleeve to be rapidly and easily removed. The front part of the sleeve is concave, and the disk is cup-shaped, coming almost up to the front part of the sleeve when the barrel is fully home. In firing, the gases escaping from the muzzle are deflected by the cup-shaped disk, forcing the barrel to the rear after each discharge, and eliminating to a great extent much of the fouling accumulation.

The action of the gun is as follows: The gun is loaded, i. e. one cartridge is in the barrel, and another is in the belt in the feed-block immediately over the cartridge chamber. By pressing the trigger lever, the cartridge in the barrel is fired, and through the explosion the recoiling portion moves backward, the crank is rotated sufficiently to extract the empty case from the barrel, and a fresh cartridge from the belt fed into the feed-block. During the backward movement of the mechanism, the extractor drops down, bringing the cartridge in line with the chamber and the empty shell in line with the ejecting tube. The rotation of the crank unlocks the breech, draws the mechanism away from the barrel, and cocks the main spring. The mechanism returns, pushing a fresh cartridge into the barrel and the empty shell into the ejecting tube. Then, when the breech is closed, the extractor is moved upward, its grooves engaging with the next cartridge in the belt, and leaves the empty shell in the ejecting tube. By simply pressing the trigger lever, the gun will fire as long as any cartridges remain in the belt.

By the substitution of gun metal by aluminium and high-class steel, the weight of this weapon has been reduced to 40.5 pounds, whereas the standard automatic rifle-caliber Maxim gun weighs 60 pounds, representing a saving in weight of 19.5 pounds.

For use with this gun, a light tripod has been designed, the weights of all the component parts having been kept as low as possible consistent with stability during firing. Steel tubing is used for the front legs, there being at the upper end of each a longitudinal slot for attachment to the stud on the pivot, while a spiked shoe at the lower end prevents it from digging into the ground. When folded up, the front legs of the tripod lie alongside the rear leg, and are secured together with a strap. The rear leg is also a steel tube, the top end fitting into a socket at the rear of the pivot, with the lower end carrying a flat shoe to prevent it from sinking into the ground. There is a bracket and a collar on this rear leg for attaching the seat. The latter slips into the collar, and is secured to the seat bracket by two bolts. Thin steel plate is used for the seat, flanged and pressed into shape. To facilitate carrying the tripod, there is a longitudinal slot cut out at each side to form handles. Extensive trials with this mounting have shown, that notwithstanding its light weight, 29.5 pounds, as compared with the weight of the former type of tripod—49 pounds—great steadiness is obtained during firing. The appreciable economy that has been effected in the complete weight of this new weapon, which is only 70 pounds as compared with the 109 pounds of the standard service arm, insures greater mobility, and renders it highly serviceable both for naval and military operations.

A HOME-MADE AIRSHIP.

BY H. G. MOORE

Inspired by the aeronautic exhibition at the St. Louis Exposition, Cromwell Dixon, a 15-year-old lad