

**A NEW QUICK-FIRING GUN.**

The really wonderful improvement in the resisting power of light armor of five and six inches thickness, such as covers the waterline and guns of modern cruisers, and the secondary batteries of warships, has emphasized the necessity of providing a gun intermediate in weight and power between the 8-inch breech-loading rifle and the 6-inch rapid-fire gun—a weapon that shall embody something of the armor-penetrating ability of the one with the rapidity of fire of the other. It is certain that the 6-inch gun is incapable of penetrating the best Krupp armor at ordinary fighting ranges even if it happens to strike a blow normal to the surface. On the other hand the long caliber 8-inch gun is more than equal to the task; moreover, the weight of the ammunition of the latter weapon is such as to prevent the attainment of the desired rapidity of fire.

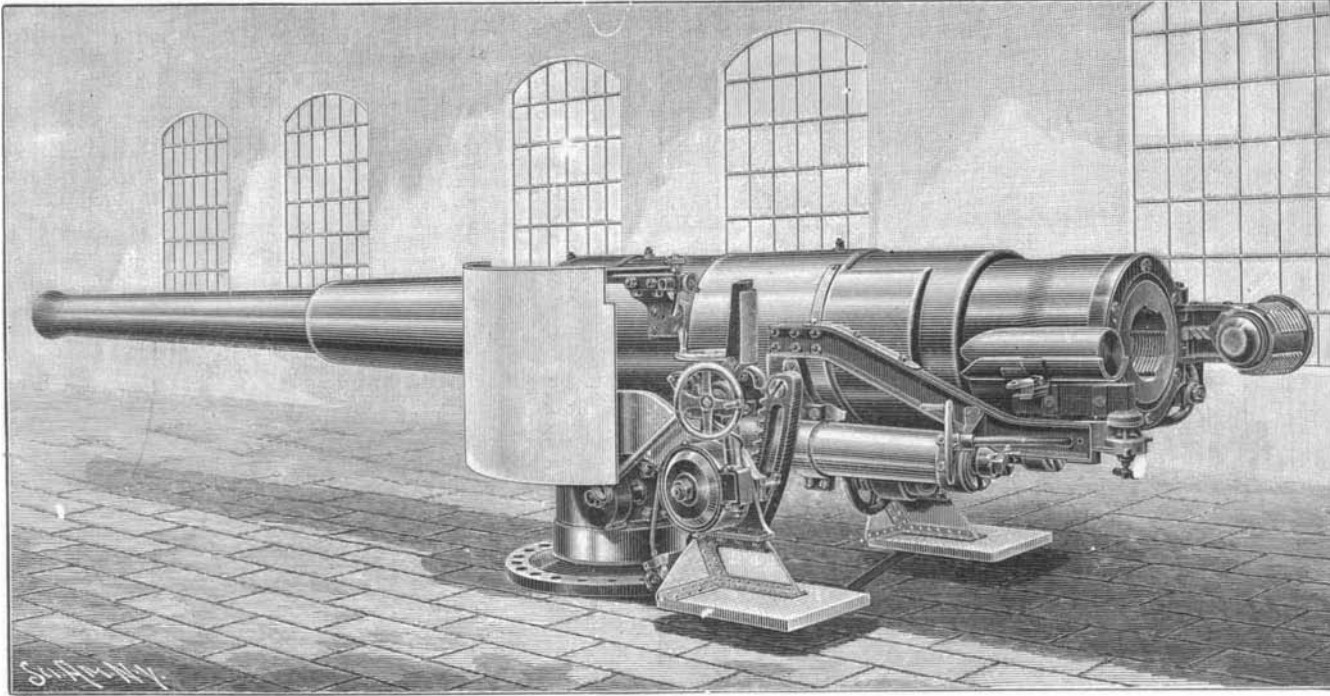
The 7.5-inch gun herewith illustrated was built to meet the demand for a weapon intermediate between the 8-inch and the 6-inch. It was built by Vickers, Sons & Maxim, Limited, of Sheffield, England. Its design is similar to that of the 4.7 quick-firing gun with which the British navy has been so extensively armed. The gun itself is 386.7 inches in total length, with a bore 7.5 inches in diameter. It is constructed on the wire-wound principle, and, including gun, breech-mechanism, shield, and mounting, represents a weight of 26 tons 15½ cwt. Its principal dimensions and ballistics are as follows:

Length of bore .....	375	inches = 50 calibers.
Diameter .....	7.5	"
Length of chamber.....	54.25	"
Diameter .....	11	"
Weight of gun and mechanism.	16	tons 1 cwt.
Weight of mounting complete with 3-inch shield. ....	10	" 14½ "
Weight of cordite charge... ..	50	pounds.
Weight of projectile.....	200	"
Maximum pressure .....	17	tons.
Muzzle velocity (feet per second) .....	2,920	
Muzzle energy (foot tons) ..	11,825	

The angle of elevation is 16 degrees, and of depression 10 degrees, while the rapidity of firing is six rounds per minute. The center pivot upon which the

tion after the recoil. The connection between these three cylinders and the gun is made by arms projecting from the breech ring. The whole weight of the moving parts, gun, cradle, and carriage, is balanced on the roller bearing before referred to, thus making the training of the gun very easy. The elevating and training operations are performed by the rotation of two handwheels placed conveniently to the shoulderpiece against which the gunner leans. Anti-fric-

axis of the gun. The tray is controlled by a worm and worm wheel gear, actuated by a handwheel suitably mounted near the breech; on the left hand side of the gun a clutch is provided so that the worm gear may be put out of action if necessary and the tray controlled by hand only if desired. A safety arrangement is provided to insure that the loading gear and the breech-mechanism will not collide during the operation of either, and that the gun cannot be fired until the loading gear is out of the line of recoil.



**THE NEW VICKERS-MAXIM 7.5-INCH RAPID-FIRE GUN.**

tion bearings are used where most required, so that these operations are easily and readily performed, notwithstanding the tremendous weight of the mass to be moved.

The recoil cylinder differs in no particular from those usually employed. The shield which is shown in our illustration, and which is 3 inches in thickness with a gross weight of 2 tons 1 cwt., is of the usual casemate pattern. An electric contact is fixed on the cradle, and it is so arranged that unless the gun is in the firing position it cannot be fired. The sighting arrangement is so adjusted that only a small aperture in the shield is necessary.

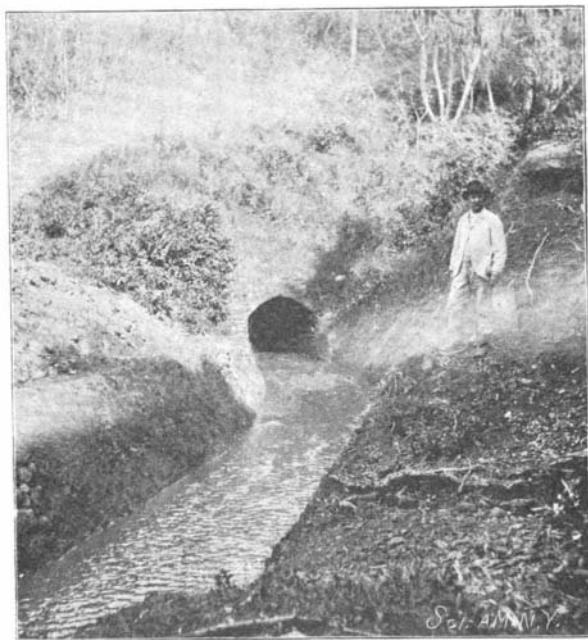
The most salient characteristics of this type of mounting are as follows: Increased protection from shell fire by the construction of the top carriage, which is of considerable thickness, and the general arrangement of the several parts are well disposed and are under exceptional protection. They are also in few

**IRRIGATION IN THE HAWAIIAN ISLANDS.**

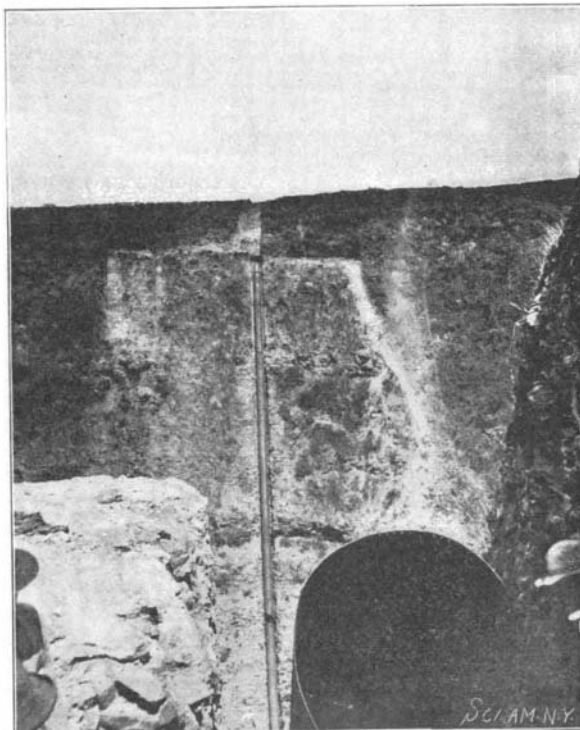
On the island of Maui, one of the larger islands of the Hawaiian group, an engineering feat has just been successfully carried through that has not its equal in the Pacific Islands. To supply water to the Spreckelsville plantation, a canal has been dug along the slopes of the great crater of Haleakala, and by it a stream of water flowing 50,000,000 gallons daily is brought a distance of 22 miles and thence distributed over the plantation lands.

It was no ordinary undertaking, the building of this great canal, for in those 22 miles from Kailua Gulch to Spreckelsville there were gulches and canyons by the score, each of which had to be crossed, and there were a dozen or more high ridges to pass, through which it was necessary to dig tunnels, some of which were nearly half a mile in length. But thanks to the energy of the manager of the plantation, the ditch was plowed and successfully carried through. By its means 6,000 acres of cane land was reclaimed; land which had before been considered waste and barren; where nothing grew but lantana bushes and here and there a few algerobas. In another year it is likely that all this land will be placed under cultivation and will flourish with green cane.

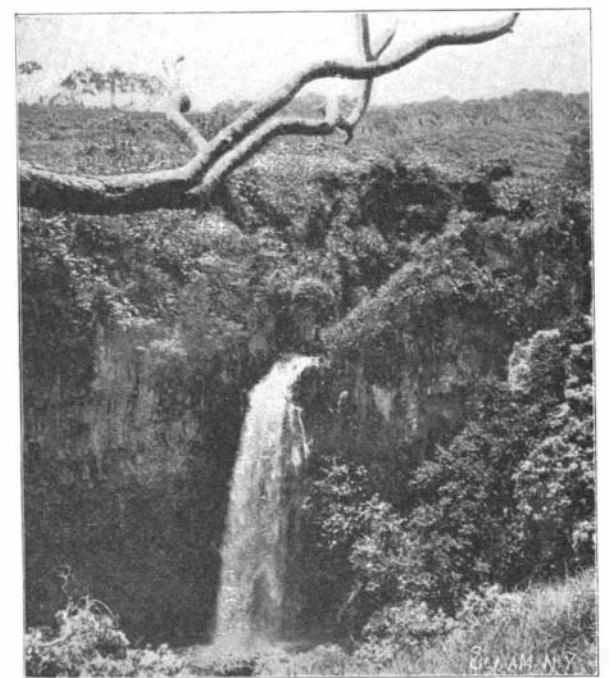
Some statistics with reference to the canal will be of interest. Work on the ditch was begun on July 28, 1899, and the water was flowing through it on September 6, 1900. The work of completing the ditch had been much delayed, owing to the epidemic of plague which afflicted the islands in the past spring. Its actual length, from Kailua Gulch, where the water is



**View Showing Portion of Ditch and One of the Tunnels.**



**Large Syphon Across Maliko Gulch. Diameter of pipe, 44 inches; length, 815 feet; depth of gulch, 350 feet.**



**Kailua Waterfall. All of this is Conserved by the Ditch.**

**LOWRIE IRRIGATION DITCH; HAWAIIAN ISLANDS.**

gun is mounted consists of a steel top carriage resting on a horizontal roller bearing on a steel pivot. The cradle in which the gun is free to slide during recoil is cylindrical, and attached to the cradle are three cylinders, one to overcome the recoil, and the other two—one on each side of the recoil cylinder—contain the springs for running the gun up to the firing posi-

parts, and easily kept in repair, thus necessitating very little attention.

The loading gear consists of a shot tray pivoted on a bar at one side of the cradle so as to move with the gun during elevation or depression, and capable of swinging on its axis in such a manner that the longitudinal axis of the tray is always parallel to the

taken out, to the boundaries of Kihel plantation, at the farther side of Spreckelsville plantation, is 21.9 miles. In this distance there are no less than 74 tunnels, with an aggregate length of 20,850 feet, or nearly 4 miles. The longest of these tunnels is 1,955 feet in length, and there are several which run over 1,000 feet. Of open excavation, there are 85,957 feet, and