SOME UNUSUAL USES FOR FIRE-ENGINES.

BY W. G. FITZGERALD.

The builders and designers of fire-engines in Great Britain are frequently called upon to design steamers of special pattern and design for rather remarkable work, other than fire extinguishing. For example, quite a number of handy fire-engines capable of throwing two hundred gallons a minute were used with conspicuous success throughout the South African war, for supplying large bodies of impatient and thirsty troops with water.

This little steamer, which can be readily lifted off its wheels and carried on poles by six or eight men, is frequently carried into the wildest and most rugged country, where roads and rails are alike unknown. It is often used in collieries, for pumping out water in the case of a shaft being flooded. The Natal Government Railways have also adopted this little steam fire-engine for supplying water at their stations to locomotive boilers and tanks; and it has been arranged to burn wood in regions where coal is not available.

Another small steamer of like pattern is used in the country districts of England, not only for putting out fires and supplying water, but also as a motor for driving farm, stable, workshop, laundry, and other machinery. All that is necessary is to put a belt on the flywheel, and the little fire-engine will promptly light the house with electricity, cut timber, make butter, and drain the fields. This little engine weighs about seven hundredweight, yet will throw a hundred-foot or ninety-foot jet with great force, and, moreover, will raise steam from cold water in ten minutes.

There is an even smaller pattern of this steamer made, which will throw eighteen hundred gallons an hour onto lawns and tennis grounds; and several of these engines are used to water important cricket grounds, like the famous Lord's, and race courses like Ascot and Epsom.

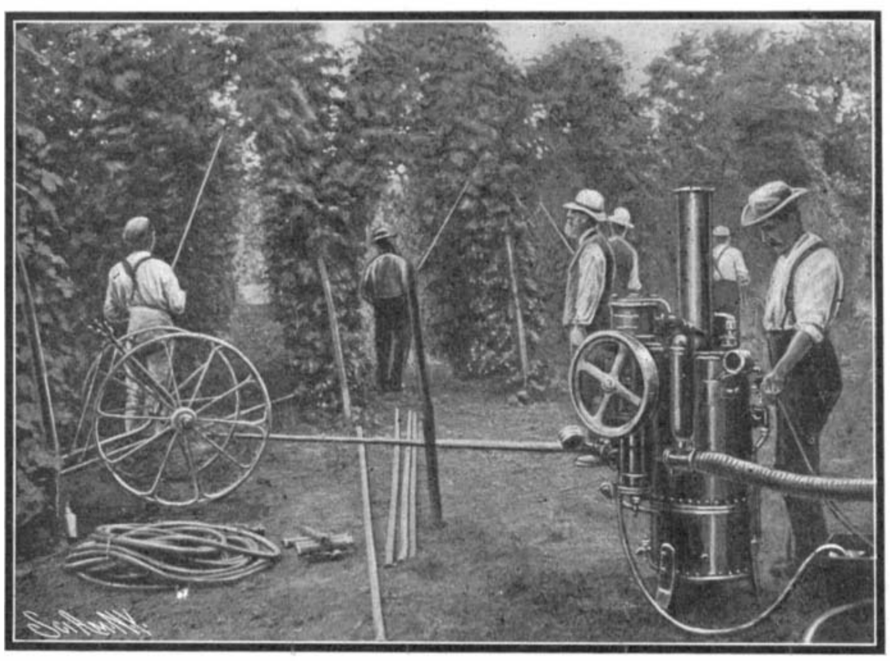
Not the least remarkable of the duties which steam fire-engines are called upon to perform in Great Britain is the digging of holes, driving piles, and rooting up tree-stumps by the direction of a powerful jet at the roots.

A very interesting instance of pile-driving in the sand by means of a fire-engine was shown recently in Blackpool, the popular Lancashire watering place. The work was done in connection with the new pier works, and the contractor, Mr. Robert Finnegan, decided to adopt the water-jet system, in which a powerful flow of water is maintained at the front of the pile, so loosening the sand that the pile will often sink by its own weight. In the present instance ten piles, each fifteen feet long, were sunk in the course of a tide, say four or five hours; whereas driving them in the usual way, no more than two or three could have been driven in this time. A bed of gravel was encountered by the jet four feet below the beach level, but the irresistible rush of water passed through this without difficulty. Even large bowlders were shifted to one side by the rush of high water pressure.

From this it is a natural transition to consider fire-engines that may be said to dig for gold—"hydraulicking," as it is commonly called. This is perhaps the cheapest of all methods of gold mining, for if it be adopted, gravel containing no more than six or eight cents per ton of gold will pay respectable profits.

FIRE-ENGINE INTENDED FOR HYDRAULIC MINING OF PRECIOUS STONES.

Let us consider the case of the Jirnkee Hydraulic and Sluicing Gold Company, whose property is situated at Cassilis in the Australian colony of Victoria. The company estimates that with one jet there are thirty years of profitable work before them. The whole of the alluvial wash-dirt is sluiced, and the gold extracted. The tremendous pressure of water of 271 pounds to the square inch is obtained; and there is a giant nozzle, or hydrant, directed against the face of the wash dirt, from which the gold is afterward collected by means of quicksilver. The value of gold obtained beyond a cost of six cents for each cubic yard is all profit; and it is estimated that 672,000 cubic yards will be treated in a year, yielding a net profit of $697,200.



THE FIRE-ENGINE USED AS A MEANS FOR SPRAYING HOP VINES.

There is a tragedy connected with this very jet of water. One day, not very long ago, the manager of the company was explaining the action of the tremendously powerful jet to some friends on the company's property, when by some accident the nozzle was directed against himself, and he received the full impact of the water. The unfortunate man was not only killed outright by the terrific blow so received, but his body was hurled forty or fifty feet away onto some stones.

Some fire-engines of this kind are in use in the famous ruby mines in Burma, being carried thither on elephants.

One has next to consider the fire-engine as an agricultural implement in Great Britain, where it has largely superseded the old tedious hand-work for spraying insecticides on crops of all kinds. Take, for example, the hop crops of Kent, which must be kept scrupulously clean, in order to eliminate insect pests.

The Kentish farmers have found there is nothing like a powerful fire-engine for spraying hop vines. Some of the farmers tried hand pumps in portable cisterns, which contained a mixture of water and chemicals; and even horse power was tried for throwing the insecticide; but it was found, however, that the cleansing liquid so thrown did not reach the underside of the leaves and flowers.

With a fire-engine twelve jets can be worked simultaneously, and with great power. The steam pump is mounted upon a small quick-steaming boiler, the whole apparatus weighing only about five hundredweight, and being capable of transportation from one plantation to another by means of a horse or bullock. Besides throwing insect and fungus killers, the steamer can also be used to irrigate the plantation in dry weather.

An acre and a half of hop plants can be thoroughly sprayed by one man in a day at an all-round cost of $1.88 per acre, including fuel for the engine. When one considers that the average yield per acre of hops is supposed to be $170, and that this is often reduced sixty per cent through a bad blight, it is easy to see that in a hop garden of several hundred acres, a great saving may result from the use of the fire-engine.

These little steamers are also used in the Kentish fruit orchards. Mr. Isaac Reeder, of Paddock Wood, in Kent, has sprayed in this way twelve acres of apple trees in one day.

Similarly, the managers of tea plantations in India and Ceylon now use fire-engines in increasing numbers for spraying the tea plants with insecticides; and the whole of the apparatus can be transported from one plantation to another by a light four-wheeled carriage, with reels for hose, racks for piping, tanks for the chemicals, and an attachment for towing the fire-engine behind. The plants, when without their leaves, can be sprayed

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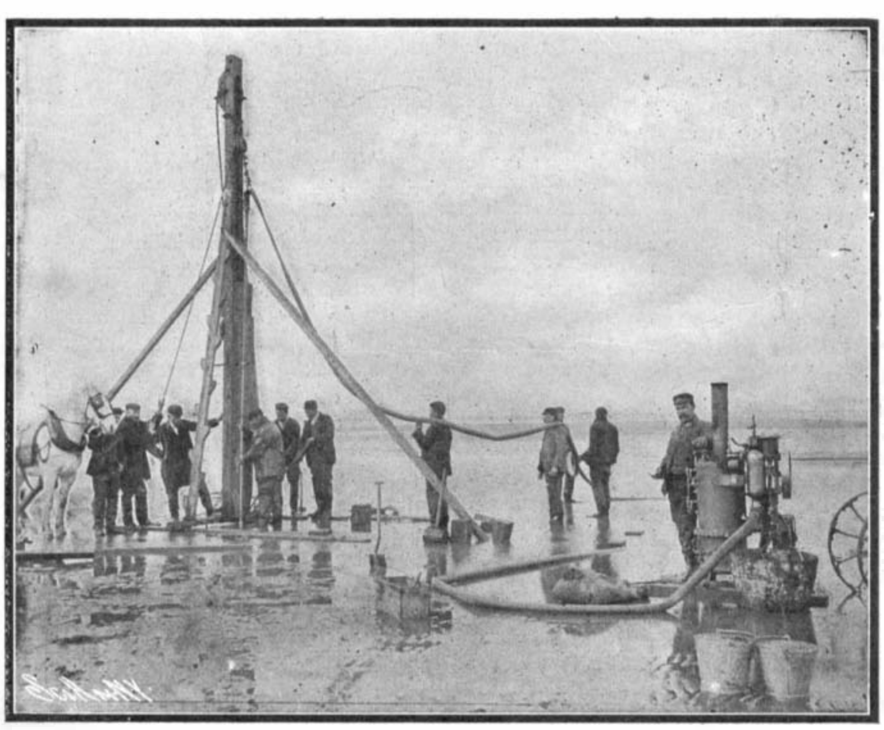
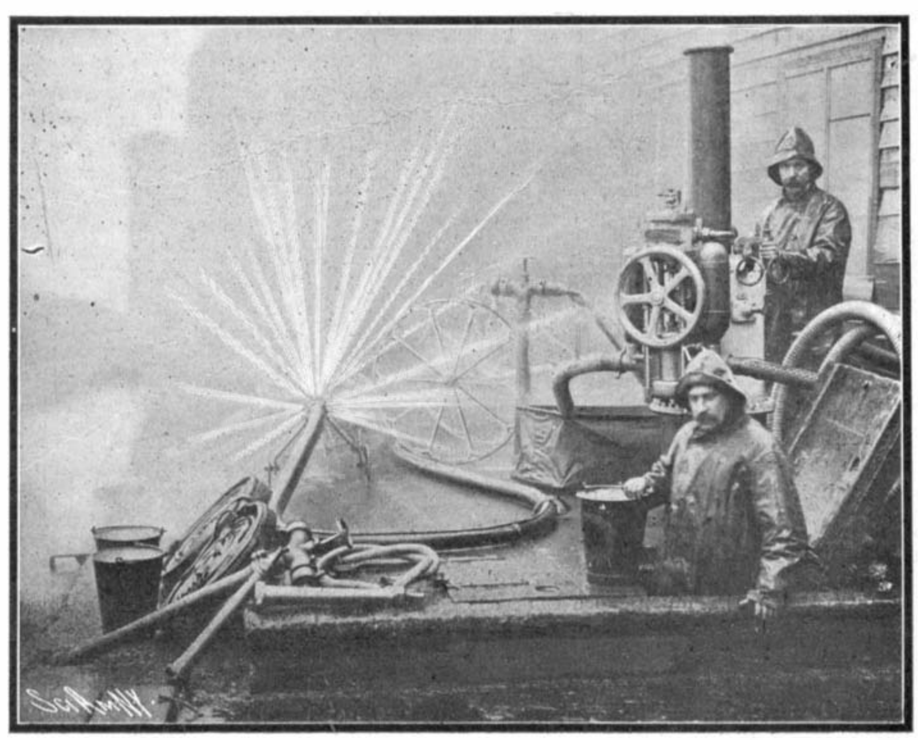


A FIRE-ENGINE USED IN PILE DRIVING.



THE FIRE-ENGINE USED FOR FLUSHING SEWERS.

Yuen," but these are weak pieces, no better than the 8-inch in penetrative power. Some old Krupp 10-inch also exist, but they cannot penetrate more than a 6-inch plate of modern make.

Japanese ships have electric hoists and the Barr and Stroud range finders and transmitters.

The normal Japanese shooting is not very good, but of late immense pains have been taken with it, and considerable improvements have resulted.

The 3-inch rapid-fire gun, which enters so largely into the armament of Japanese ships, is shown in one of our illustrations. It is an Elswick gun, and the pattern that is at present in their navy is a 40-caliber piece, firing a 12-pound shell with a velocity of 2,200 foot-seconds, and an initial energy of 420 foot-tons. This gun, however, is made in 45 and 50 caliber lengths, and it is one of these that is shown in our illustration, mounted on a pedestal mount and protected by a shield.

The 3-inch rapid-fire field gun of the Vickers-Maxim make is a compact and efficient piece, which is used for landing purposes. The gun slides in a cradle provided with trunnions, which rest in trunnion bearings in the top part of the trail. The cradle is provided with two hydraulic buffers, in which work pistons attached to a projection on the under side of the breech of the gun. Inside the cylinders are strong springs, which cause the gun, after firing, to return to battery without any blow or rebound, and without causing any alteration to the elevation or training. It is this feature, coupled with the rapid action and simplified breech mechanism, that gives to this piece its rapid-fire qualities. The trail is fitted with a shoe and an eye for limbering up; and track shoes, shown in the illustrations, are attached by steel-wire ropes to the sides of the trail. The shoes, acting with the spade piece, at the rear end of the trail, which is driven into the ground, serve to prevent the recoil of the cartridge itself. At the extreme end of the trail is an eye for coupling up the gun at the limber.

An important element among the smaller naval guns is the Maxim rifle-caliber gun, which is mounted on the bridges and in the fighting tops, and is also provided with a combined carriage and tripod for landing purposes. The gun, as shown in our illustration, consists of two portions, the recoiling and the non-recoiling. The recoiling portion includes the barrel and the firing mechanism, which move to and fro upon guides attached to the frame, the energy of the recoil being taken up and regulated by means of a spring. The non-recoiling portion consists of the frame and the water jacket, which latter serves to cool off the barrel during firing. The gun is entirely automatic in its action, being fed with cartridges from a belt, and the firing is controlled at will by pressure applied to the trigger lever in the rear. The gun will fire at the rate of 600 shots a minute as long as any cartridges are left in the belt.

It will be seen that while the ballistics, as given above, of the Japanese guns at present mounted in their navy, are about up to the average, compared with the naval guns of other nations at present in service, they are below the ballistics of the latest types that are being mounted in the new ships of our own and other navies. As a matter of fact, the Japanese have suffered somewhat, in respect of the energy of their gun fire, from their intimate connection with the British gun makers, whose pieces, particularly those mounted during the past decade, in the British navy, have fallen sensibly behind the Krupp and Creusot artillery in velocities and energies.

The piece that will form the principal batteries in the new 16,400-ton battleships just ordered from Vickers-Maxim and Armstrong will be considerably more powerful than the present Japanese guns. Thus, the Elswick 12-inch piece of 50 calibers length weighs 65.2 tons, fires an 850-pound projectile with a muzzle velocity of 2,880 foot-seconds and muzzle energy of 48,000 foot-tons; and their 50-caliber 10-inch piece fires a 500-pound projectile with a muzzle velocity of 2,850 foot seconds, and a muzzle energy of 28,161 foot-tons. The ballistics of the new Vickers-Maxim guns are about the same as these. It is probable that the 50-caliber, 10-inch piece will be mounted in the two new battleships; but it is scarcely likely that the 50-caliber 12-inch gun will be used, the 45-caliber 12-inch being a more handy gun, although not so powerful. The latter piece weighs 58.5 tons, and fires an 850-pound projectile, with a velocity of 2,730 foot-seconds and an energy of 43,900 foot-tons.

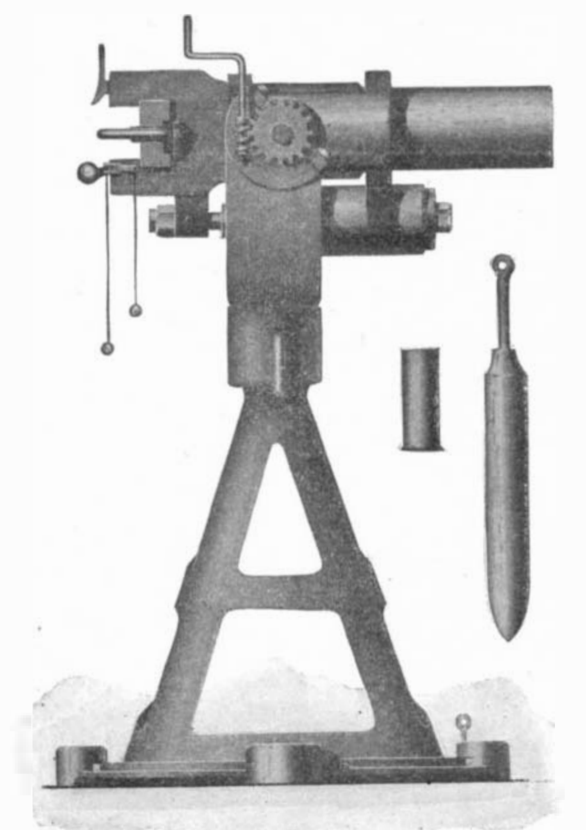
Charles M. Stebbins, the pioneer of the telegraph west of the Mississippi, died recently in Berlin, at the age of seventy-five. In March, 1858, he purchased the St. Louis and Missouri telegraph line, which later became known as the Missouri and Western Telegraph Company. Mr. Stebbins threaded the West with telegraph wires. He constructed lines from St. Louis *via* Syracuse and Springfield, Mo., to Fort Smith, Ark., and from St. Louis, *via* Kansas City, Leavenworth, and Omaha, to Julesburg, Neb.

A NEW LIFE-SAVING GUN.

BY A. FREDERICK COLLINS.

The life-saving gun is absolutely indispensable to life savers at times when the surf runs so high as to prevent launching the lifeboat. In order to use the breeches buoy or lifecar, a line must first be shot to the vessel in distress. To insure success, the gun must load and fire quickly and accurately, for there is no time to be lost. This means further that the construction of the gun and the powder charge must be adapted to conditions of darkness, cold, and wet weather, which conditions are directly opposed to the successful working of the muzzle-loading gun, with its unprotected powder-charge bags, its open bore pointing skyward and closed at the lower end, forming a natural receptacle for water, and its open igniting primer and wooden carriage, which must be securely tied down to prevent recoil.

The disadvantages of such a gun were so overwhelmingly obvious to a young inventor, Mr. Francis G. Hall, that he decided to devise a gun which should embody a departure from the old methods. The improved life-saving gun is considerably less than three feet in length, and is built of steel and a special bronze alloy, which resists the action of salt air and water. The gun tapers from the breech, where the greatest strain comes, to a diameter of five inches at the muzzle. A special self-locking mechanism, at once the simplest and having the fewest working parts of any yet devised, closes the rear of the bore in such a way that any water finding its way into the gun will be instantly drawn out. The firing hammer with its safety device is actuated by a lanyard, and relies wholly on the pull of the gunner, all the springs and delicate latches ordinarily used in army cannon being entirely eliminated. To prevent the troublesome and dangerous jumping back of the gun when fired, it is provided with simple liquid recoil checks attached to the trunnions, and operating very similarly to the common door check. Instead of having the powder charge in a loose woolen bag open to moisture, it is contained, together with its primer, in a hermetically-sealed bronze cartridge core, which slips easily into the breech of the gun. After the cartridge has been inserted and the breech closed, the projectile carrying the line is inserted in the muzzle and shoved home. This projectile is a cylindrical shot, rounded elliptically at the inner end and having means for securing the shot line at the outer end.



A NEW LIFE-SAVING GUN.

For shore use the Hall gun is supplied with a beach carriage of light but strong construction, with wide-tired wheels and a pivot socket for the recoil mounting, so that the gun may be swiveled about as well as elevated without moving the carriage. The recoil mounting renders it unnecessary to secure the carriage, a difficult problem on a sandy beach. A winding apparatus is provided for recoiling the shot line after use, and together with a cleaning rod and cartridge core completes the equipment. Revenue cutters, lighthouse tenders, fisheries vessels, and government tugs oftentimes render more effective aid to disabled ships than can be had from land, since wrecks frequently occur well offshore.

For this service the gun is provided with a light steel stand or tripod, as shown in the illustration, instead of the usual carriage; the tripod may be secured instantly as required in any one of several fixed positions on the vessel's deck. The United States government is at present equipping a number of vessels with this latter type of gun.

SOME UNUSUAL USES FOR FIRE-ENGINES.

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with a solution of lime, covering every branch and twig. An acre of tea is worth about $90, but a bad blight will reduce this by thirty per cent. The all-round cost of spraying tea plants with the fire-engine works out at about $1.25 an acre.

Another remarkable use for the fire-engine in agricultural England is sheep-washing, which may be seen in progress on the estate of Mr. A. H. Tarleton at Uxbridge, about fifteen miles from London. Here a little steam fire-engine throws one hundred gallons a minute onto the fleece of each animal; and even horses are treated in a similar manner.

Sewer flushing is very extensively done in England by means of the fire-engine, which does its work in one-tenth of the time occupied in ordinary flushing. With a rose nozzle on the hose, and a full head of steam on, a tremendous force of water is exerted on the walls of the sewer, which are washed absolutely clean, so that the deadly sewer-gas cannot be formed.

The flusher consists of a cylinder with small nozzles, or perforators, so arranged that the water under pressure radiates in all directions. The flusher can be drawn through the sewer from one manhole to the next by means of a rope, the hose being paid out from the surface as the flusher travels forward. This apparatus will cleanse about eight hundred feet of sewer a day at a cost, including labor and water, of about $15; whereas to do the same work less efficiently in the old way, including labor and cartage of water, would take eight days, and cost over $125. Moreover, sewer cleansing by fire engine would only use 6,000 gallons of water, as against about 50,000 required by the old method.

The fire-engine will also cleanse streets, but this is so well known to the general public, who have often watched the interesting operation, that further description beyond mere mention is almost superfluous.

Nothing but leather hose can be used satisfactorily for street cleaning, as all fabric and rubber hoses have a much shorter life in this work than leather.

The propulsion of boats by fire-engines is more or less familiar to our readers, the jet of water being thrown into the air and acting precisely as a punt pole pressed against the bottom of a shallow stream. Some floating fire-engines were recently sent out from London to Alexandria in Egypt for work on very shallow canals, and these craft depended entirely upon the handling and maneuvering of the jets of water for their propulsion.

In some of the country mansions of England fire-engines are kept, which can be driven by the ordinary electric-lighting current when desired at a critical moment; or the fire-engine will wash the outside of the windows without endangering the lives of servants.

The Death of Charles B. Scott.

Mr. Charles B. Scott, a well-known geologist, died at his home in Plainfield, N. J., on June 20. A graduate of Rutgers and of the University of Michigan, he was for a time connected with the Geological Survey of New Jersey. He became professor of science in the high school at St. Paul. Abandoning this position, he began work at the State Normal School, Oswego, N. Y. In 1889 he was sent by the American Missionary Association to Porto Rico, in order to advance the educational interests of that island. For three years he worked there. At the end of that time he became superintendent of schools of the American Missionary Association in Savannah. Laterly Prof. Scott was engaged in biological work at Hyannis, Mass.

Arrival of the Turbine Yacht "Lorena."

Mr. A. L. Barber's English-built turbine yacht "Lorena," which has been fully described and illustrated in these columns, arrived in New York harbor June 20. She had steamed from Falmouth on the 28th of May, but was compelled to put into Halifax in order to replenish her coal supply. The "Lorena" encountered exceptionally bad weather, head winds and seas almost all the way. One man was lost. It was largely due to the heavy seas that the "Lorena" was unable to make anything like a turbine transatlantic record. Her daily runs in knots are the following: 265, 331, 297, 245, 96, 224, 226, 260, 324, and 384.

An Automobile Record from Boston to New York.

Henry S. Harkness, on Sunday, June 19, covered the distance from Boston to New York, 243.7 miles, in 6 hours and 55 minutes. The time made compares favorably with that of the fastest express trains, and is the best ever made by an automobile on the road in America. At times Harkness claims to have made as much as 83 miles an hour.