

NEWEST SCIENTIFIC DISCOVERIES & REMARKABLE FACTS

MUZZLE Loading Cannon Is Reintroduced Into British ARMY for WORK in TRENCHES

MUZZLE-LOADING cannon, declared obsolete a half century or more ago by armament experts, have returned in Europe, along with the hand grenade and armor, also believed of a past age until the world was developed in all its fury. French and Russian soldiers are very frankly and openly wearing steel helmets to ward off bullets and the hand grenade has been one of the most effective of trench weapons.

Now the British are equipping their trenches in Flanders and France with hundreds of muzzle-loading cannon, found to be the ideal weapon for trench warfare. But it is only in that the weapon is loaded through the muzzle and not through the breech, that the new weapon resembles the ordnance of a century ago. Otherwise, it is the most modern of weapons, invisible to the enemy, rapid fire and automatically aimed. The gunners are protected by a steel canopy. The gun is aimed and fired through a periscope. The barrel of the gun follows the range finder as that when the gunner sights an objective, the gun is trained and aimed automatically at the object.

The shell, which weighs 250 pounds, is dropped down the muzzle of the gun. It has a cartridge on the end which strikes a spike in the bottom of the gun, discharging the shell immediately. By an ingenious loading device, the shells are dropped into the muzzle of the gun and the old shells ejected with great rapidity.

The new muzzle-loading cannon is the product of a hitherto unknown inventor named Stokes, who had haunted the British war office for eleven years prior to the war. He had never even received a hearing. With the coming of war, however, the war office was reorganized, fresh blood was injected and Stokes' plans dug out from the musty pigeon-hole in which they had reposed for years.

The government set aside a plot of ground for Stokes and the inventor soon demonstrated the efficacy of his gun.

Stokes was given a substantial sum of money by the British government and now, in his own laboratory, he is busy working out plans to improve his device, which, it is predicted by the officials, is destined to revolutionize trench warfare.

SAND Is Frozen Then CUT Away

EVERY conceivable engineering difficulty has been met and overcome by the builders of New York's additional subways. One of the problems faced by the engineers was caused by large bodies of quicksand far below surface. Removal of this quicksand threatened the collapse of large sections of territory. So the engineers borrowed an idea from Europe and froze the sand.

In old world mines, when big sections of quicksand are encountered in a shaft, pipes are driven in a circle around the shaft and cold brine circulated through them until the quicksand is frozen solid. Then the shaft is cut through and the pipes pulled up. Never had the method been employed in America, but the subway builders saw no reason why the principle should not be applied to subway construction. It was, with entire success.

BACK to FIRST Principles in Motorboat Construction

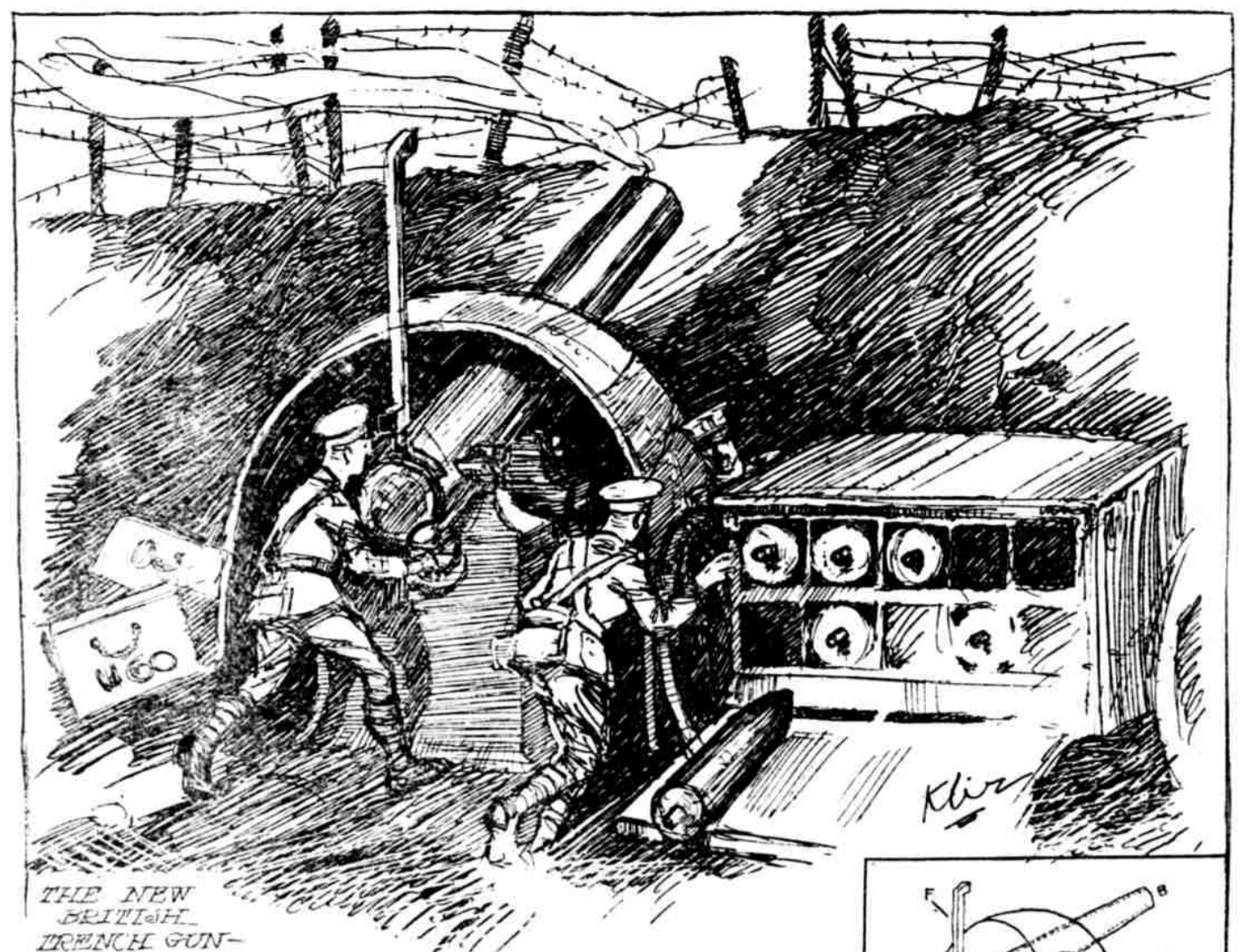
AGAIN the original code has been de-mystified, this time in motorboat construction. The first water craft on record, history tells us, were hollowed-out logs, primed boats which are still used by the natives of Africa and the South seas. There is now in commission another boat built from a single log and it is acknowledged to be the finest displacement motorboat ever built.

The Fruda was constructed by the famous British motorboat engineer, S. E. Saunders, of Covea. It was built from a single mahogany log that had lain at the London docks for twenty years. For grace and lightness the Fruda has no rival.

Another record breaking motorboat has just been finished by Saunders. It is a sixteen-foot yacht tender and cost more than \$1,200. The builder's price for constructing the hull and installing the motor was \$700. The engine, gear, propeller and stainer were purchased separately.

For the hull of the motor-tender, there are three thicknesses of selected thin red cedar planking, with a layer of oil silk between, the whole being sewn together with copper wire, no rivets being used. This makes a very strong, light, resilient craft, but the work has to be carried out with extreme care, each wire hole being measured out before drilling, and grooves cut between alternate holes to make the wire flush with the planking.

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THE NEW BRITISH TRENCH GUN.

WIRELESS Chain Now Extends TWO-THIRDS Around WORLD

THE Marconi wireless telegraph service now extends nearly two-thirds of the way around the globe and in another year it will be possible to relay a message the entire Japanese miles of the earth's circumference. The distance covered will be much larger, as the stations are not situated on the same parallel of latitude. Nine stations will be employed in circling the earth.

The latest station in this worldwide chain to be opened is the great station at Funabashi, near Yokohama. The next to be opened will be at Singapore on the Malay peninsula. From Singapore messages will be transmitted to a station to be erected at Bangalore, capital of the province of Mysore, India. Aden, on the southern tip of Arabia, will then receive and send the message to the last link in the chain to be formed, Alexandria, Egypt. Alexandria will send messages east to Aden and west to the great station now in the use of the British government at Carnarvon, Wales.

The Carnarvon station has been in operation some time. At the beginning of the war it was taken over by the British government, which uses it almost exclusively for communication with Petrograd.

The new Funabashi station is already in communication with Vladivostok, Russia, on the west and Koko head, Onu Island, Hawaii, eastward, so that it is possible to relay messages from the Marconi station at Belmar, N. J., to Vladivostok, via the Bonus bay plant, near San Francisco and the Koko head station, although under ordinary circumstances the Marconi people use wires for transcontinental service in America.

The stations in San Francisco, Hawaii and Japan are among the most powerful in the world. The transmitting apparatus at each station is equipped with thirteen towers, each 100 feet high. They have 300-kilowatt transmitters, which are three times as powerful as those used at the Sayville station in sending messages to Nauen, Germany, 4,000 miles.

Although it is more than 600 miles farther from Sayville to Nauen than from Hawaii to Japan, the more powerful apparatus was installed in the Pacific stations for the purpose of eliminating from the start most of the difficulties due to the so-called "atmospheric conditions." While the station at Sayville is only in operation at certain periods when conditions are favorable, the stations on the Pacific can be operated during every minute of the twenty-four hours. The 300-kilowatt transmitter is capable of making itself felt over almost any electrical disturbance.

Double-Headed Locomotives Supply French TRENCHES

THAT France was long ago prepared for a long war is evidenced by the recent delivery to her of 100 double-headed engines, built in America, to be used on the temporary lines of rails running from the regular railways to the trenches. The locomotives are narrow-gauge of the Peconic type. They are mounted on two bogies, or pivotal trucks, so that sudden turns and sharp curves in the track can be negotiated at top speed.

The locomotives are double-barreled throughout. There are four boilers and two cylinders with the four in the center. Separate sets of wheels are used, depending on which way the engine is headed. The locomotives look as if the rear part of two small ones had been joined together.

Each boiler barrel has a separate set of tubes and is supported on saddles placed immediately over the center pins of the bogies. An outside shell, between the two trucks, and supported on plate frames riveted to the saddle, carries the two fireboxes. The inside of these is made of copper, the tubes are of brass and the boiler shell of steel.

Switzerland announces its readiness to receive sick and wounded prisoners of all belligerent countries, in accordance with the pope's proposal.

Motion Picture Car Is Latest

IT will soon be possible for the tired business man to see a motion picture show on his way home from work. The stenographer and the shop girl will be given an opportunity to see Charlie Chaplin's latest capers on their way down town in the morning. A boon to suburbanites has been invented which threatens to reduce considerably the popularity of the daily paper and the Six Best Sellers as "time killers" to and from work.

The invention is a motion picture car, in which films may be shown to an audience comfortably seated in an inclined auditorium. The cars should prove exceedingly attractive to commuters. They can be hooked up with either steam or electrical cars, as the platforms are of standard size, permitting standard coupling devices.

The motion picture car is the invention of Antoni Truchan, of Flint, Mich. Mr. Truchan has applied for and received a patent on his idea. The cars can be made to seat from 75 to 100 persons comfortably.

RADIUM Cures Highly Charged X-Ray DISEASE In EARLY Stage

EPITHELIOMA, the dread and curse of the Roentgenologist, has been found, in its early stages, amenable to radium cure, so that a distinct step in the advancement of Roentgen-ray science has been achieved. Epithelioma is skin cancer caused by the X-ray and has been the cause of the loss of fingers, hands and even the lives of Roentgen-ray experts.

At a recent meeting of the British Medical Association, the Roentgenologist section was notable for the large number of disfigured hands, arms and faces. In some cases epithelioma has spread to the chin and chest. Skin grafting, freezing and other desperate measures have been used in vain to arrest the course of the dread disease.

It is now firmly established, however, that radium rays will cure the malady in its early stages and relief has been obtained, even when the disease had run a couple of years. The effect of radium on long standing cancers, however, is nil.

It seems almost a paradox of radiology that the accepted use of a heavy gamma radiation from a Roentgen tube will cause a diseased condition of the skin, while a similar radiation from a tube of radium will cure. The output of the Roentgen-ray tube is almost wholly composed of hard, penetrating, irritating gamma rays. The radium discharges the beta ray in great quantity, as well as the gamma ray. It is the beta ray that has been proved beyond question to be the efficient curative power, and it is only the secondary betas generated by the gamma when striking any resisting substances, that gives it its value in the Roentgen-ray tube work. Hence a surface lesion of morbid cell growth, be it hyperkeratosis or basal cell, is cured by the large output of soft beta radiation of radium.

It is not possible that, if it were possible to gauge the output of the Roentgen-ray tube in power enough to generate the curative beta rays by impact on the superficial disease, it could be cured, as well as by radium, but in so doing it would be necessary to discharge energy enough of the hard gamma variety to be highly injurious to the deeper tissue of the vessels, muscle and skeleton.

SPEED of Auto Seen at Glance

A COMBINATION license tag holder and speed indicator for automobiles has been patented by a trio of Easton, Pa., inventors. The device is in the form of a square board, to the top of which the license tag is attached. At the bottom of the board is a speed indicator and pointer, the different speeds being indicated by different zones in order to make it more easy to read.



Sweden A. Richards, Eben H. Van Emburgh and Clayton Zeller are the patentees. Speed of ten miles an hour and under is indicated by one color, fifteen to twenty-five miles by another and more than thirty miles by a third hue of the indicator.

The pointer is regulated by a governor and spring, to keep it steady. The combination tag holder and speed indicator is primarily for the benefit of city and country police officials, who may see by a glance whether the machine is running faster than the prescribed speed limits.

Machine DRIES YOUR HANDS

UNCLE SAM has abolished the hand towels in some of his Washington departments and in its place has installed electric hand driers. The device looks like a rectangular box with the face front knocked out. It is about as high as a cabinet phonograph. The aperture is just large enough to accommodate two hands. An electric heating and blowing device forces a stream of warm, dry air into the opening, the flow being led into the lower chamber of the box.

Girl employees in the departments in which the electrical driers are installed, with truly feminine resourcefulness, have converted the driers into hand beautifying accessories. They rub their hands with cold cream and let the electro-towel do the rest.

Tune-Deafness DEFECT of the GREAT

THE defect in many persons known as "tune-deafness," or the inability to carry or distinguish a tune, is not an indication of lack of artistic or poetic character. The fault is with the nerves. Musical appreciation extends to a great extent on the exercise of mental and physical faculties, and the delight in music calls for an alert sympathy between the nerves and the cerebral faculties, without which connection there is definite musical lack, although the nerves perform their ordinary function of communicating sound to the mind.

Among the notable cases of "tune-deafness" among the great were President Grant, Queen Catherine of Russia and Dean Stanley. The latter, although he was the first person to introduce Bach's passionate music into the religious service of the English church, often declared that "he had not a note of music in his head." Queen Catherine, famous for the relentless warfare she waged on Frederick the Great, used to say she would give the world to be able to appreciate and love music, declaring that for her "music was noise and nothing but noise."

President Grant's attitude towards music is ably summed up in his famous remark: "I can distinguish but two tunes—one is 'Yankee Doodle' and the other isn't."

Highly Charged Drinks Declared to Be Dangerous

EFFERVESCENT drinks are becoming more and more popular, but now comes a part of the medical profession to tell us they are more unhealthful than light wines and beers. Cider and unfermented juices of fruits are declared far superior to both, when physiological correctness is considered.

The chief fault with the effervescent drink seems to be that one calls for another, in ever pyramiding style. The scientific explanation of this is that the slight stinging or pricking of the palate caused by the highly charged drink produces immediately an increased flow of saliva. The salivary glands are no more susceptible to perpetual stimulation than any other, and after each period of excitement one of depression follows. Thus, while the effervescent quaff may for the moment effectually quench the thirst, it is not long before the thirst is back, stronger than ever.

Another fault laid at the doors of the effervescent drink is that it is generally charged with carbonic acid. Now the stomach, especially when it is empty, always contains a quantity of carbonic acid for purposes nature knows best. When to this natural supply is added the amount in the effervescent drinks, nature is over-supplied and the general system suffers.

MUSIC Softens Fear of KNIFE

DO you prefer to have your appendix removed to the lulling tune of "Call-tornia and You," or to the more sombre strains of "The Rosary" or "O perhaps, according to your unneutrality, you would like to go under the knife with "Tipperary" or "Germany Over All" ringing in your ears.

It's the newest adjunct to surgery, music in connection with operations. And the anesthetic is not permitted to interfere with your enjoyment of your favorite selection, for the music continues until you are waded off to sweet unconsciousness on the wings of the ether sponge.

Dr. Max Thorex, surgeon-in-chief of the American hospital, New York city, was the first to employ music as a first aid to surgery. A vaudeville player, Marie Allerton, of the sisters' team of that name, was about to have her appendix removed, but was extremely nervous. Dr. Thorex, by having nervousness a deleterious condition just before an operation, induced the actress to sing, all the nurses and attendants joining in the chorus. Miss Allerton chose to face the knife with "Moonlight on the Rhine" on her lips. At the third stanza she succumbed to the effects of the anesthetic, skillfully administered, and passed off to unconsciousness with a smile on her face.

The operation was eminently successful, much of the credit for which was laid to the music by Dr. Thorex.

VOLCANOES Now Harnessed

VOLCANOES are being harnessed in Italy. Steam is generated and from the steam electricity. And the novel part of the affair is that the power issues from the volcano in the shape of steam, but it is too full of impurities to be very effective in its original form. So fresh-water steam is generated by means of the escaping steam.

Borings of thirty or forty feet yield an unending supply of steam at pressures up to more than three atmospheres, and of temperatures up to more than 700 Fahrenheit. The steam is found in Tuscany, near the village of Volterra, in a volcanic hot springs region.

The steam has been wastefully used in small engines of an old noncondensing type, but in recent experiments the heat of the springs—on account of the impurities contained—is made to generate steam from fresh water, and this is employed in low-pressure turbines for driving electric generators. The large area to be served with electric energy from the earth's own heat, if present expectations are realized, will include the neighboring cities of Volterra, Siena and Leghorn.

One-Millionth Inch Measured by Device

AN instrument so delicate that it will measure one-millionth of an inch has been invented by a British scientist, Prof. C. W. Chamberlain, president and head of the physics department of Denison University. Some idea of how small one-millionth of an inch is may be gained by comprehending, if possible, the size of the head of an ordinary pin viewed from a distance of 227 miles.

Professor Chamberlain calls his instrument a compound interferometer. It is 400 times as powerful as the most perfect compound microscope.

Cost of Sugar Beets

A recent investigation into the cost of sugar beet growing in England showed that the expense incurred by the farmer in growing an acre of sugar beets was approximately \$40, representing a cost per ton of beets of \$4.15. The charge for loading and transportation brought the cost of the beets delivered at the factory up to \$5.10 a ton.