

ELECTRICITY IN MODERN WARFARE.

Is it Destined to Revolutionize Military and Naval Science?

Speculation Based Upon the Swiss Discovery of "Charmed Bullets."

Engineer W. Stuart-Smith Discusses the Matter for the Benefit of "Call" Readers.

The influence of electricity upon modern naval and military methods is a subject of wide speculation at the present time. In some quarters it is thought that the subtle fluid will work a revolution in methods of warfare. The particular phenomenon upon which such speculation is based was observed by a committee of the Swiss Federal Rifle meeting in summing up the results of the practice shooting of the troops at Winterthur. This committee noticed that nearly all the shots fired from the right side of the range had hit the target to the right of the bullseye, while those fired from the left side had, with an equally singular persistency, hit the left half of the target. The great number of men who took part in the shooting precluded the idea that this singular result could have been due to the personal peculiarities of the soldiers, for while it may be true that one marksman habitually shoots too high, another too low or to the right or left of the mark, with a large number of individuals firing at the same target these idiosyncrasies of marksmanship would be set off one against the other and the misses would be fairly distributed on all sides of the bullseye. It became necessary, therefore, to find an extraneous and single cause for the remarkable uniformity with which the bullets appeared to have been deflected from their proper course.

The wind could not have produced the effect noted, since, in the first place, allowance had doubtless been made by the riflemen for deflection by aerial currents, and on the other hand, if the wind had diverted the missiles the deflection would have been in the same direction on both sides of the range. An examination of the steel-clad bullets extracted from the targets disclosed the fact that they had become magnetic, and this led the committee to entertain the theory that the phenomenon observed by it might have been due to electric influence exerted by the large number of telegraph and telephone wires which run along both sides of the range at Winterthur. Further experiment at the ranges of Thun and Berne proved this theory to be correct, and the remarkable discoveries made at these trials may effect another complete change in military tactics. The following account of one of the experiments is given by the Journal de Geneve:

"At Thun, authorities established parallel with the rifle range, at a distance of a little more than forty yards, an electric current of 8000 volts, carried along four steel cables. With a view of tracing the whole effect, paper circles were placed at intervals of ten yards along the line of fire. The first experiments were made with the Swiss model rifles of 1889. With this the influence of the electric current was at once apparent. In a distance of 260 yards the bullet took a lateral deviation of twenty-four yards, and after that the curve of the trajectory was still more marked. The second experiments were made with the Japanese 3.3mm rifle of Colonel Yamagata, and they were still more decisive, the bullet being rapidly attracted to the electric wires and following their course with absolute servility. Further attempts were made with artillery. The range selected was one of 3000 yards. Two hundred yards in front of the targets, but forty yards to the side, was placed the electric battery. Every shot was diverted by its influence far to the side of the target—to be exact, the deviation was one of 14 degrees."

It is interesting to note some of the remarkable conclusions drawn by Eastern writers from those results. One of them says, for instance, that "a dynamo or accumulator of the requisite power placed on the flank of a company of infantry would insure the most complete immunity from the fire of small arms within a range of 500 yards and upward; for all of the bullets would be diverted toward the magnetic field created by the electric current from the dynamo or accumulator. Similarly, artillery fire could be rendered harmless at a range of 1000 yards and over. It would, perhaps, be premature to assert that the consequence of this discovery will be the doom of the modern small-bore military rifle, with its steel-jacketed bullet, for it might be practicable to inclose the leaden missile in hard bronze or some other metal not affected by magnetism. Artillery would probably remain destructive enough on the battle-field by the use of explosive shells. It is in naval warfare that the discovery may have the most important consequences. In Conan Doyle's 'Stark Munro Letters' the hero is credited with an invention to render a warship immune from the shots of an enemy by placing electric accumulators at its stem and stern. The idea was to deflect steel projectiles by magnetism, just like the Swiss military authorities have in fact succeeded in doing. It would certainly be a revolutionary departure if instead of incasing our battle-ships in heavy bombproof armor we could encompass them with an impalpable magnetic veil which would compel the great armor-piercing steel projectiles to pass harmlessly by."

A representative of THE CALL interviewed W. Stuart-Smith, electrical and mechanical engineer, United States navy (retired), on the subject of the electrical influence above mentioned. Mr. Smith smiled broadly as he read the Eastern newspaper deductions. His own views are valuable as coming from a recognized authority on these matters. "The experiments made by the Swiss military authorities," said he, "while of considerable interest from a scientific standpoint, will hardly result in the adoption of methods for rendering the firing of small arms and great guns so ineffective that these weapons will be relegated to the military scrapheap, and the battles of the future become hand-to-hand conflicts as in days of old. A very superficial examination of the conditions prevailing during the tests will show what is required in order that deflection of the shot may be produced. The reports of the test state distinctly that long circuits carrying heavy currents were



London's Girl Artist.

The charming decorative drawing entitled "The Young St. Cecilia," which is reproduced above, has secured the bronze medal of the Royal Drawing Society this year. The artist, Miss Nellie Kuck, a young lady of 16, has already won a considerable measure of success. Two years ago she was awarded Lord Leighton's prize for her drawing, "The Mermaid," and she then recommended her to adopt the artist's profession. Last year she obtained Sir George Kekewich's prize for an illustration of "Undine," and this drawing represents her third success.—London Chronicle.

placed parallel with the rifle range. This condition must prevail in order to produce any appreciable deflection. The principle involved is that an electric current in a wire produces a magnetic field, this field theoretically extending to an infinite distance from the wire. It is most intense in the region immediately surrounding the wire and becomes weaker as the distance increases, the law of variation being inversely as the square of the distance. Any magnetic body placed in a magnetic field (a "magnetic body" is not necessarily one which is magnetized, but one capable of being magnetized. Iron possesses this property in a far greater degree than any other substance) is acted upon by the magnetic lines of force and, in case the field is one of variable intensity, tends to pass into that portion of the field which is most intense. Where a circuit carrying an electric current is parallel with the line of fire the shot, in its flight, is continually acted upon by the lines of force of the magnetic field through which it is passing, and is subjected to a continuous pull toward the wire or that portion of the field which is most intense. If the time during which the shot is acted upon by the force of a considerable deviation, as is reported to have been the case in the Swiss experiments. It must not be forgotten, however, that time is an important element, and if a powerful magnet were placed somewhere along the line of its flight its effect on the shot would be but momentary, and it could do no more than to twitch the shot as it passed. This might be sufficient to somewhat upset the calculations of a marksman who was endeavoring to make a "dead center," but would hardly be sufficient to cause the shot to fly into the arms of a fortification.

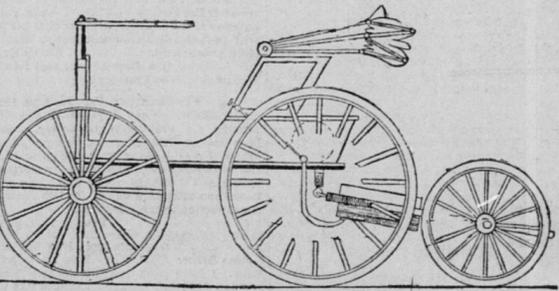
"With regard to the writer who proposes to protect a company of infantry by placing a dynamo or storage battery of requisite power on the flank, it is probable that he has in mind some new form of

stem and stern. The proposal was to place powerful electro-magnets overhanging stem and stern, the idea being to so attract the shots as to make them clear the vessel. "Unfortunately," said he, "if the magnets were sufficiently powerful to produce such a deflection they would attract the shot directly to themselves and quickly promote their own destruction, leaving the vessel without the protection of the 'impalpable magnetic veil.'"

Practicable Bicycle Skirt.

Ladies who object to bloomers and sensibly desire to ride a man's bicycle can now do so. Mrs. Elizabeth F. McCartney of New York has patented a skirt that has all the qualities of a pair of first-class bloomers and the modesty of a skirt.

The front portion of the skirt is open part of the distance from the bottom and the inner edge secured to the back of the skirt, which falls in the usual manner. When riding the opening in the front of the skirt allows it to fall gracefully on both sides of the frame.



MOTOR ATTACHMENT FOR VEHICLES.

dynamo or battery which will automatically follow the company about the field of battle, remaining continually in the proper position on the flank. As at present constructed dynamos and storage batteries would be difficult to handle in this manner. Moreover, the dynamo or storage batteries would in themselves have no effect under any circumstances, but in order to produce any effect it would be necessary to have wires carrying heavy currents passing from the flanks many hundreds of feet toward the enemy, and the writer does not explain how he intends to make these move about the field, following the company on these various maneuvers, always remaining in proper position on the flank and always reaching out the requisite distance toward the enemy. It is conceivable that with an army in a fixed position on the defensive a vast array of wires might be run out in all directions in such a manner that any particular company would have wires on its flanks into which current could be turned, but the shot so deviated would be likely to invade the ranks of some other company, with a consequent production of domestic discord."

With regard to the reference to Conan Doyle's "Stark Munro Letters" Stuart-Smith calls attention to the error in the statement that the hero proposes to protect vessels by accumulators placed at

A GREAT MAP OF THE HEAVENLY ORBS.

It Will Delineate Thirty Millions of Sparkling Stars.

Big Enough to Cover Two Acres and Cost Two Million Dollars.

Eighteen Observatories in All Parts of the World Engaged in the Mighty Task.

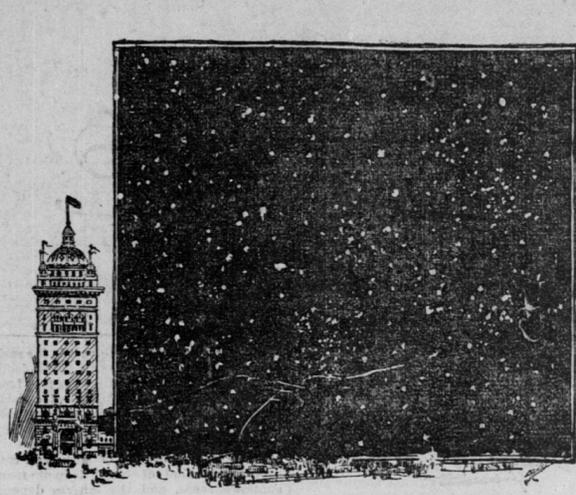
The great map of the sky upon which astronomers have been working for the last nine years is approaching completion. It is an international affair, for no one country could carry through such a gigantic task.

The heavens have been mapped out in sections, a section being assigned to each of the principal observatories in the world, and each of these eighteen observatories must furnish a map of its particular section in 1500 parts. To do this 3000 photographs have been taken at each observatory, making a grand total of 54,000 photographs. The United States is not represented in the international congress for the construction of this map. Professor Pickering of Harvard wished to undertake a share of the work, but it was finally decided that the great amount of time required for the allotted section would interfere with the general work of the Cambridge observatory. The Yerkes observatory was not, of course, ready at the time, and the others did not care to lay out the money for the necessary instruments. The observatories sharing in the work are those of Greenwich, Rome, Catania, Helsingfors, Potsdam, Oxford, Paris, Bordeaux, Toulouse, Alger, San Fernando, Taubaya, Santiago (Chile), La Plata, Rio de Janeiro, Cape of Good Hope, Sydney and Melbourne.

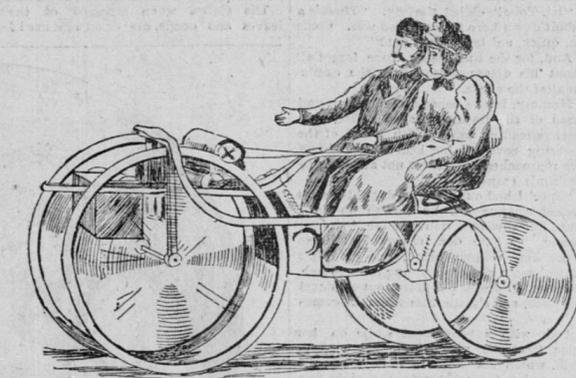
The map will be in total area nearly two acres, but must necessarily be divided up into a manageable size. For each hemisphere there will be 11,000 little maps, or 22,000 for the whole sidereal universe. Upon it will be shown about 30,000,000 of stars. Of these 2,000,000 will be catalogued and numbered, so that any star up to the eleventh magnitude can be located as easily as an island in the map of the world. The stars actually shown upon the map will be all those up to the fourteenth magnitude. A great number of the stars shown upon the map cannot be seen by the human eye, even with the aid of the most powerful telescope. The photographic plate, however, can detect many millions of stars which no man has ever seen.

The long exposure necessary in order to get photographs of stars beyond the fourteenth magnitude renders the operation too difficult for the construction of a map. The measurements and exact position of each star have to be recorded, and to do this hundreds of astronomers have been working for years.

Special apparatus was purchased by each observatory for the work. All the instruments must be similar in size and construction, or the photographs would not be alike. The international congress, which was held at the Paris observatory eight years ago, decided that a telescope must be constructed for each observatory



THE GREAT MAP OF THE SKY AS IT WOULD APPEAR IF PLACED ON MARKET STREET BESIDE THE NEW "CALL" BUILDING.



LATEST MOTOR CYCLE.

completed, will be of inestimable value to astronomers. The idea is to show just what aspect the heavens presented at the period represented. Any changes subsequent to this period will be at once detected and valuable information gained.

The observatories participating in this work will each bear the cost, and be responsible for its own particular piece of sky. When completed the photographs will all be forwarded to the Paris observatory for the production of the map.

Stellar photographs are always used just as they come from the camera, without any retouching whatever. The number of stars shown is proportionate to the length of exposure of the sensitive plate. At first it was intended to include stars of the fifteenth magnitude in the measurements, but the tremendous additional labor involved caused the congress to fix the limit at the fourteenth magnitude. Almost nothing is known of stars which are such an enormous distance away, and no map or record has ever before been made of them. As matters stand at present a few millions of them might disappear without astronomers being any of the wiser. This gigantic map was planned by the Paris observatory in 1896, and a proposition made to all the big observatories to assist in the work. Since that date the principal observatories have been busy on the big scheme, which will certainly be the most wonderful thing that modern astronomy has accomplished.

The principle of the invention consists in making the two rails conform to the action of centrifugal force; that is, to build them at such an angle that they will axially conform to the curve of the roadbed.

This is, of course, an easy matter to calculate, so that the cars will swing to the center as a bicyclist does when turning a corner. By this arrangement there will be very little strain on the upper rail at any time, except the car should come to a standstill, and none at all except gravity on the lower rail.

Another point of Mr. Bynton's invention lies in the fact that the rails can be built parallel to one another and the same center supports answer. Trains can even run in opposite directions at the same time and there would be little extra strain as the axial center of the two trains would be the same.

New Motor Cycle.

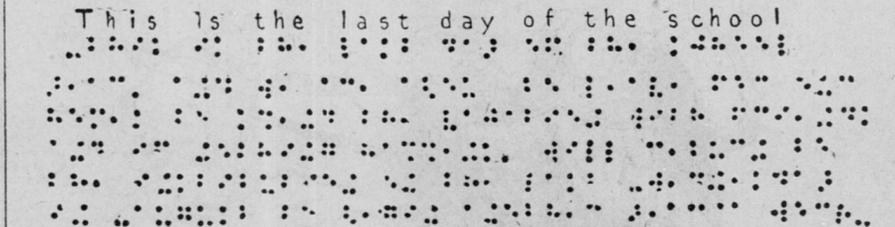
The horseless carriage is designed to become a practical, every-day thing, now that inventive genius has solved the problem of applying power. Charles H. Barrows, a Connecticut man, stands ready to equip any sort of vehicle with a motor, using either electricity, gasoline or compressed air as the power. His latest invention is a motor cycle built for two, in which the power is applied to the front wheels instead of the rear wheels, as has been the custom heretofore.

The invention is a very simple one, with no loss of energy between the motive power and the driving-wheels. Mr. Barrows says that with his method there is no loss of power through friction of intermediate machinery, and no excess of power is required to overcome the short-leverage strain common in the driving mechanism of other horseless vehicles.

Those Earthquake Waves.

Science sometimes illustrates a homely old saying about going away from home to get the news. For instance, the tide roll from the tide gauge at Sausalito has been read by the Coast and Geodetic Survey and the record marks with accuracy the duration of the earthquake waves on the Japanese coast on June 15. Such a record it would be impossible to make at the scene of the disaster, for the tide gauge could not stand under a pressure of waves thirty feet high sweeping over it. Observations made by local spectators cannot take the place of the gauge with which the sea makes its own indisputable record. The first earthquake wave from Japan, on June 15, arrived at Sausalito just about twelve hours after it received its impulse in Japan. The first wave was the largest.

The New Braille Points System in Which Books for the Blind Are Now Written.



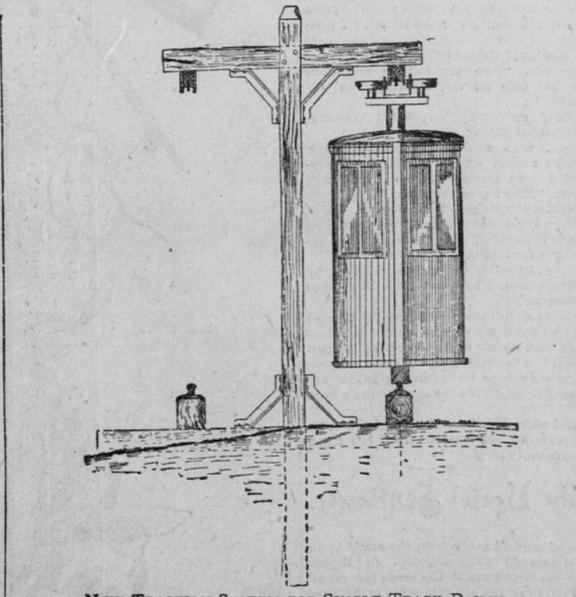
TRANSLATION—This is the last day of the school year, and we are about to leave for our homes, to spend the vacation with friends, and if nothing happens, will return to the institution on the last Wednesday in August, to begin another year's work.



THE PATENT BICYCLE SKIRT.

engaged in the work. These telescopes are all of 11 feet 3 inches focal length, with an object glass 13 inches in diameter.

To take a stellar photograph is not a very difficult task, says the Pittsburg Dispatch. The sitters do not have to look pleasant, and the automatic movements of the telescope keep the objective always opposite the stars to be photographed. The delicate part of the task consists in the accurate measuring and placing of the stars shown upon the photographic plate. Each negative will be transferred in duplicate on copper, and the two plates will be kept in different observatories. This is to obviate any chance of accident to the plates, for if both were lost the damage would be almost irreparable. Some idea of the magnitude of the task undertaken may be gained from the fact that to reproduce the map from the plates will cost over \$2,000,000. When to this is added the cost of the instruments, the time of the calculators and measurers and the numberless et ceteras which pertain to a work of so gigantic a nature, the ultimate cost will be tremendous. But the map, when



NEW TRACTION SYSTEM FOR SINGLE-TRACK RAILWAY.

New Railway System
Inventors have for many years been working on what is known as a "single-track" railway; that is, a system that would have one traction rail and one overhead rail, the car to run beneath the two.

As long as the car was running on a straight track, all previous inventions seemed to do very well, but when curves were reached trouble began on account of the action of centrifugal force. As a consequence, they have been failures.

W. H. Boynton of Morris Park, N. Y., is the inventor of a railway system that seems to overcome this great objection.

This was one foot high at Sausalito, but it will be recollected that on the Hawaiian Islands the wave was thirty feet high. Undoubtedly number one was higher than one foot when it reached the Golden Gate, but as it ran through the gate it was much diminished in size, and as it ran around a corner it got to Sausalito read by the Coast and Geodetic Survey; there was a further shrinkage. The crest of the waves as they arrived at Sausalito were about fifteen to twenty minutes apart, and they continued to come for about twenty-four hours. The time taken to transmit the oscillation verifies the speed observed in the waves that ran here from Simoda in 1854, and is a very interesting demonstration.

LOWEST HUMAN FORM FOUND IN JAVA.

Scientists Think It Will Turn Out to Be the Missing Link.

Coffin Torpedoes That Are Calculated to Blow Up Grave Robbers.

Peculiar Devices for Scaring the Escape of Those Buried Alive Recently Patented.

The "missing link" that scientists have been searching after ever since Mr. Darwin announced his theory of the descent of man from the lower animals may have been found at last.

There have recently been uncovered in Java by a French scientist, M. Dubois, a thigh bone, part of a skull and two molar teeth that seem without doubt to be the fragments of one of these extinct man-apes.

The teeth are as much larger than the teeth of the African as the negro's teeth are larger than the European's. The thigh bone is the size of that bone in the average man of to-day. The skull is about the average in point of brain capacity between the average European and the highest ape.

The femur or thigh bone is said to be unquestionably human. Authorities differ as to the character of the skull and teeth. Shall they be called human or apish? The answer can only be definitely given when all the steps in the change from man to ape are in evidence and the dividing line conventionally established.

Professor S. E. Tillman, writing in the Cosmopolitan, says about the Java discoveries:

"The consensus of scientific opinion, however, decides that all the remains must be regarded as human. It cannot be definitely determined from this find alone, but it is probable that this so-called Pithecanthropus (erect ape) is the lowest human form yet found, and is one of the 'missing links' connecting man with earlier and less human forms, and that he stands a long way off from man on the line leading to these forms.

"This statement should not be understood as implying any direct connection between existing men and existing apes, for it is pretty certain that while both of these may be traced to a common ancestor, they have not traveled the same path from that ancestor to the present, and no discovery will ever bridge the chasm between them."

To Blow Up Grave Robbers.

The "coffin torpedo" is the latest patented device in the line of burial appliances. It is introduced into the casket before the latter is closed, the arrangement being such that any attempt to force the receptacle open will release a spring, strike a percussion cap and set off the bomb. This means almost sure death to the unsuspecting grave robber, whose industry the invention in question is designed to discourage.

Live people do a great deal of thinking about death, if one is to judge from the immense numbers of patents that have been granted for inventions having relation to the tomb, says the Philadelphia Times. They run up into the thousands, and not a few of them are weird and grisly enough to make the flesh creep. Among the most interesting are the so-called "life signals." These are contrivances intended to secure the release of persons prematurely interred. There can be no doubt that to many human beings the fear of being buried alive some day is a haunting dread through life.

All of the patented devices for life signals have one feature in common—namely, a wire or cord attached to the hand of the supposed corpse. In each case it is intended that any movement shall set off an alarm of some kind. One contrivance employs a small red flag, which shoots up from the grave and displays itself above ground if required. Another is called a "grave annunciator." A disturbance in the coffin closes an electric circuit and springs an alarm in the watchhouse of the cemetery. The superintendent takes note of the number of grave indicated by the alarm, and proceeds without delay to dig up the victim.

Yet another species of apparatus is operated by a spring catch, which throws open the lid of a tube extending from the coffin above the ground, thus admitting air. At the same time a bell is set ringing.

On a somewhat different principle is an indicator in a glass case, to be placed on top of the grave and communicating by wires with the alleged defunct below. If the latter moves at all, a needle shows it. Most elaborate of all such devices is one in which a wire is attached to a ring on the thumb of the corpse. The slightest movement of the hand pulls a trigger which starts a clockwork mechanism. This sets off an alarm, and at the same time puts in operation a fan which forces down a tube into the coffin. There is a second tube provided with a lamp and reflector, so arranged that one may look down and see the face of the deceased. After a reasonable period has elapsed, the tubes are to be withdrawn.

A statistic fiend has figured out that a man who shaves regularly until he is 80 cuts off about thirty-five feet of hair from his face.

NEW TO-DAY.

From U.S. Journal of Medicine.
Prof. W. H. Peeke, who makes a specialty of Epilepsy, has without doubt treated and cured more cases than any living Physician; his success is astonishing. We have heard of cases of 20 years' standing cured by him. He publishes a valuable work on this disease, which he sends with a large bottle of his absolute cure, free to any sufferer who may send their P.O. and Express address. We advise anyone wishing a cure to address
Prof. W. H. PEEKE, F.D., 4 Cedar St., N. Y.