Correspondence.

Prevention of Premature Firing of Big Guns.

To the Editor of the SCIENTIFIC AMERICAN:

Referring to the gun explosion on the battleship "Missouri" on the 13th instant, will inquire if it would not be a simple mechanical problem to design a device which would make it impossible to fire one of these guns until the breech was closed, similar in principle to the safety attachment on the handle of a Smith & Wesson pistol, which prevents the trigger being pulled until the palm of the hand grasps the handle?

GEORGE BRECK.

San Francisco, Cal., April 15, 1904.

[The latest types of guns are provided with a safety device for the purpose of preventing premature firing. The gun is fired by closing an electrical circuit, and the contacts are not in a condition to close until the breechblock is entirely screwed home.—ED.]

The Blondlot, or N-Rays.

In this laboratory we have obtained uniformly negative results in experiments on the Blondlot rays. Our experiments were made with the help of seven observers, including five doctors, one student, and one laboratory attendant. Calcium sulphide screens rendered fluorescent in a separate room by burning magnesium were employed. They were brought into an absolutely dark room in which the observers had been kept for some time. Two forms of screens were used:

(1) Flat screens on which a circular area on a slip of glass is covered by calcium sulphide.

(2) The later form in which a circular area at the back of the hemispherical lens is covered by calcium sulphide.

The screens were either held by the hands of the observers or were clipped on stands.

The observers were told first to look steadily at the screens and report any variation in brightness, calling out "bright," "dimmer," "dim," "brighter," etc., as the appearances seemed to change. Even with the screens on the slips of glass the observers after a few moments were able to call out the changes, *although there was no attempt at muscular contraction.* With the lens form of screen the changes in brightness were very marked.

We next attempted to find whether muscular contraction behind the screen caused an increase of brightness. Of course, where the observer sees a change in brightness without muscular contraction it is easy to be misled on this point. We made the observer continue to call out the degree of brightness, and we contracted the muscles of the arm behind the screens sometimes after he had called out "bright" and sometimes after he had called out "dim." In the great majority of cases the effect we looked for did not follow. In the few cases in which it occurred we naturally attributed the results to the changes in brightness which can be observed without any muscular contraction.

We next told our observers to look, as it were, into the distance beyond the bright spot, and to report on the brightness of the screens. When the accommodation of the eyes for the near vision was relaxed they reported without exception that the brightness of the screens was constant, and that muscular contraction made no difference.

When observers were then asked to touch the backs of the screens, thus warming them, they reported an increase of brightness.

It is not easy to explain the phenomena we have described. We believe that there is difficulty in accommodating for the fluorescent circle, and that there is a wavering movement of the ciliary muscles, and probably also a wavering in the size of the pupils. Yet it is asserted that we can focus a point of light in a dark room, and it is difficult to see why the fluorescent screen cannot also be kept steadily in focus when it consists of a flat glass slip with fluorescent circle. In the case of the later, and presumably more successful form of apparatus, the difficulty is easily understood. In that form the fluorescent rays proceed from the back of a hemispherical lens, that is, from a point within the posterior principal focus, and they are widely divergent and thus strain the accommodation of all but near-sighted people. The fact that in every instance we found that the light becomes steady after relaxation of the accommodation is very striking.

But the phenomena observed by us do not go any distance toward explaining the results described in M. Blondlot's papers. How is it that he and many of his compatriots see increase of brightness under conditions in which we see none? Is the explanation to be found in the paper by Heinrich, "Die Aufmerksamkeit und die Funktion der Sinnesorgane" (Zeitschr. für Psychologie u. Physiol. d. Sinnesorg., vols. ix. and xi.), in conjunction with our observations? Heinrich found after many careful experiments that the pupil dilates when attention is directed to an object situated in the field of indirect vision, and that it dilates still more during a short mental effort, such as a calculation. He found also that on directing attention to an object in the field of indirect vision the ciliary muscle relaxes, thus diminishing the curvature of the crytalline lens, and that during mental calculation this change is very marked, causing a curvature even less than that required for vision of a remote object. He found also that under the same conditions the axes of vision tend to become parallel or even divergent.

Can it be that the mental condition of some observers in a state of expectancy reacts on the intrinsic muscles of their eyes, and thus they see what they think they should see?

We have also experimented with the rays from a Nernst lamp, but without result.—Physiological Laboratory, the University, Glasgow, March 29. John G. McKendrick, Walter Colquhoun, in Nature.

TWO HOME MADE WIRELESS TELEGRAPH RECEIVERS.

Wireless telegraph receivers or "kumascopes," to adopt the name given them by Prof. Fleming, nearly all depend upon the principle of an imperfect contact in a local circuit being made better by oscillations generated by the Hertzian waves. Most of these kumascopes have an exceedingly simple form and can be constructed by any amateur. One of the simplest is that

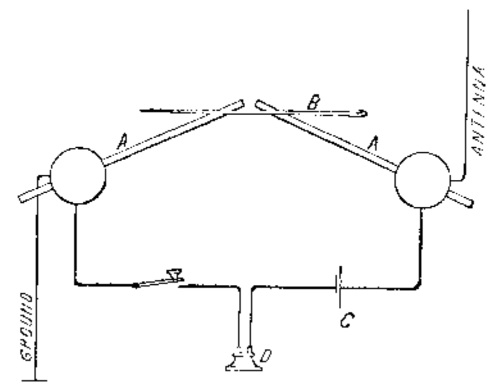

Fig. 1.

shown in Fig. 1, which only requires two binding posts, two pieces of No. 12 aluminium wire, and a large sewing needle. The wires *A* are supported at an angle with each other, as shown in the diagram, and across them lies the needle *B*. The kumascope is connected up in the usual way to a telephone receiver *D* and a local battery *C*. Care should be taken to make the battery sufficiently weak, for this is a very common cause of failure. A battery of suitable power can be made by filling a half-pint fruit jar half full of water and dissolving in the water a heaping teaspoonful of common salt. An electric-light carbon and an ordinary battery zinc rod may then be used for the electrodes. The kumascope may be used in connection with transmitting apparatus, such as that described in the SCIENTIFIC AMERICAN of September 14, 1901. The Hertzian waves sent out by the transmitter will be detected by the usual bubbling or buzzing noise in the telephone. In our diagram we have shown one of the binding posts connected with the ground, and the other to the antenna. This is necessary only where considerable distances are to be covered, but may be dispensed with where the transmitter and receiver are both located in the same room or building. The imperfect contact in this kumascope is due to the thin film of oxide which always covers the surface

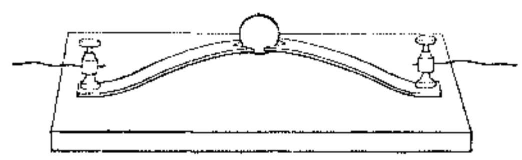

Fig. 2.

of aluminium. The film is sufficiently thick to normally prevent the passage of the low-power current of the local circuit, but its conductivity is readily increased by the peculiar action of the electric surgings or oscillations set up in the aluminium wires by the Hertzian waves. The resistance of the oxide, however, is immediately restored when the oscillations cease, and the buzzing sound in the telephone is therefore due to the rapid variations in the battery current.

Another kumascope which will be found just as easy to make, and which gives equally good results, consists of two strips of copper or tin secured to a board, as shown, and having notches cut in their adjacent ends to form a seat for a carbon ball. The ball may be carved out of an electric light carbon and rounded off smoothly with a file. Connections with a telephone and local battery are made, similar to those described above. The imperfect contact between the carbon ball and the copper strips normally offers a great resistance to the current in the local circuit which is greatly lessened by the electric oscillations. It will be observed that both of these kumascopes are self-restoring, that is, they require no tapper or other mechanical device to effect decoherence.

Electrical Notes.

Some interesting experiments have been carried out in Milan with an electric street railroad car equipped with a single-phase alternate-current motor of the series laminated field type. This motor is the device of Dr. Finzi, and is designed for a frequency of 18 periods per second. The motor weighs 16 hundredweight. In this apparatus the ordinary series parallel controller is replaced by a transformer giving respective voltages of 80, 100, 120, or 140 volts as desired, when supplied with a current at 500 volts in its primary. The commutation proved highly satisfactory at starting loads, and under full voltage sparking was no greater than is the case with a good continuous-current motor. The commutator and brushes were examined after a run of 125 miles, and were found to be clean, and showed no signs of appreciable wear. The starting acceleration was not quite as good as that of a continuous-current motor, but was maintained constant longer, so that a car speed of 16 miles per hour was reached in the same time by both, the energy taken being 14.85 watt-hours per ton in the case of the continuous-current motor, as compared with 10.6 watt-hours per ton in that of the alternator.

The Kelvin Compass.—In the marine world the Thomson compass still holds its own, and its users apparently have not even yet got used to the change in name from Sir William Thomson to Lord Kelvin. We notice, however, that the most recent patent compass issued by Messrs. Kelvin and James White, Limited, bears the name of Lord Kelvin. The feature in connection with the design of this which calls for special attention is the improvement in the means of suspension, in order to secure a steady card in spite of the greater vibration due to higher speed in steamships. Another feature is the illumination of the compass at night entirely from the underside. This can be done either with electric light or by means of oil lamps. In either case adjustment in the intensity of the light is provided, as this has been found particularly useful when taking bearings from stars or other faint lights. A new form of helmet is now introduced having rifle sights upon the top. This helmet moves round freely in any direction, and bearings of the sun, lights, buoys, or other objects are taken instantaneously and read directly upon the compass card. Bearings by azimuth mirror in the usual way can also be taken by day or night without removing the helmet. These facilities for taking bearings smartly and conveniently are being greatly appreciated by shipmasters and navigating officers.

M. Routin, of Lyons, has devised an electro-mechanical governor which is described in a recent article by M. F. Brock in the Elektrotechnische Zeitschrift. The device consists of a solenoid, magnetized by a few series turns and a coil which is in shunt with the generator. The magneto-motive forces of the two windings are opposed, that of the shunt coil, however, predominating under normal conditions. The field switch, the valve mechanism and a rheostat in series with the shunt coil of the solenoid are mechanically connected to the armature of the solenoid. The last-named switch performs the function of securing the predominance of the shunt coil of the solenoid for any position of the latter's armature. Assuming additional load to be put on the generator, the armature of the solenoid will drop a certain distance, because the increased magnetomotive force of the series winding of the solenoid will, by more nearly balancing that of the shunt coil, diminish the strength of the electromagnet. In falling, the armature will have acted upon the valve gear, at the same time cutting out resistance from the field circuit of the generator as well as from the circuit of the shunt coil of the solenoid. If load is taken off, the action is reversed and the armature is drawn higher up into the solenoid, and if a short circuit takes place the series coil largely predominates, the armature is drawn right up and steam is shut off. If the fuse blows in the generator circuit, the same thing occurs, the shunt coil now being responsible for this.

The Current Supplement.

The article begun by Frank C. Perkins, in the last number of the SUPPLEMENT on the "Development of the Electric Mining Locomotive," is concluded. Some well-known foreign and American locomotives are described and illustrated. "Electrolytic Rectifiers for Charging Storage Batteries," is the title of a very instructive paper. Dr. G. Erlwein begins an admirable discussion of the "Purification of Potable Water by Means of Ozone." Mr. Hiram Percy Maxim's very thorough study of the cost of operating automobiles for commercial purposes is concluded. Assistant Naval Constructor Gleason writes instructively on the steam turbine. Mr. Charles H. Stevenson has much that is of value to write on the menhaden industry. How an automobile can be run on a railway track is a subject that is well illustrated in the current SUPPLEMENT, No. 1478. The usual electrical, engineering, and consular notes will be found in their accustomed places.

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