SOME MODIFICATIONS OF THE NORMAL PHOTOGRAPH.

BY GEORGE M. HOPKINS.

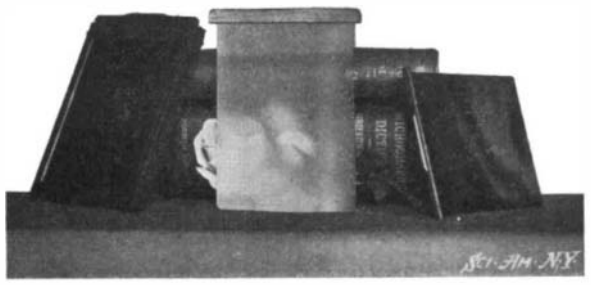
The amateur photographer begins with an ordinary camera, becomes dissatisfied and procures a better one, and frequently proceeds in the same manner until he is satisfied that he has secured the best instrument that can be obtained. It cuts the photographic image from the center to the edge of the plate with fidelity, and he derives great satisfaction in possessing as good a lens as can be made. But before very long he learns that a picture photographically perfect lacks a great deal in true artistic feeling and quality, and he begins to remedy the defects of the perfect lens by throwing the plate out of focus, or by using a larger stop, or both, and thus secures to some extent the broad effect that he has learned to admire.

In addition to following out these suggestions he may produce artistic effects in other ways which recommend themselves to the experimenter in photography. One of the simplest methods of obtaining a soft ethereal effect consists in interposing between the lens and the plate a piece of ground glass, glass coated with ground glass substitute, or ground glass celluloid, placed at different distances from the plate, according to the effect desired. A very good scheme is to withdraw the slide from the plate-holder and replace it by a slide of translucent ground glass celluloid, like that shown in one of the illustrations, taking care to exclude the entrance of light by changing the slides under the focusing cloth, the exposure being made through the ground glass celluloid. The resulting picture, whether portrait or landscape, is soft in outline, and is possessed of mellow lights and shades. The finer details of the photographic image are omitted, and the much-desired breadth is secured. If broader effects are desired a square of finely-ground glass can be placed in the camera within or inside of the reversible back. Of course, the farther the glass or celluloid is removed from the sensitive plate the more details are omitted from the negative. If it is desired to show more of the detail than is possible with a translucent slide of the kind described a thin sheet of crystal glass of the size of the plate may be coated with ground glass substitute and placed in the holder along with the plate, with either the film or coated side out, according to the effect desired. The ground glass celluloid when placed either side out in contact with the sensitive film produces a desirable effect. If it is difficult to get ground glass celluloid a piece of fine, thin tracing paper may be secured by its corners to a thin piece of glass (an old negative glass, thoroughly cleaned will answer). The effect will be quite broad if the glass side is placed next the sensitive film, and the negative will be very soft if the tissue paper is placed next the sensitive film. These interposed films absorb more or less of the light, and necessitate an increased exposure, but the increase is very slight and can be determined only by experiment in each case. A lantern slide produced from a negative of this kind, if well colored, appears on the screen more like a painting than a photograph.

Another peculiar effect is secured by placing over the sensitive plate a thickness of fine, thin muslin stretched over a frame of common tin, or thin brass plate, the frame being placed in the holder along with the plate. The muslin should be wet when mounted and secured to the frame by stratena or some other adhesive cement. Broader effects may be produced by removing the muslin screen to the reversible back.

Lantern slides printed from ordinary negatives through fine ground glass, or ground glass substitute, lend themselves beautifully to coloring, as they are broader and more like paintings than other colored slides.

A painter who dislikes to copy an ordinary photo-



TRANSLUCENT SLIDE.

PHOTOGRAPH TAKEN WITH TRANSLUCENT SLIDE.

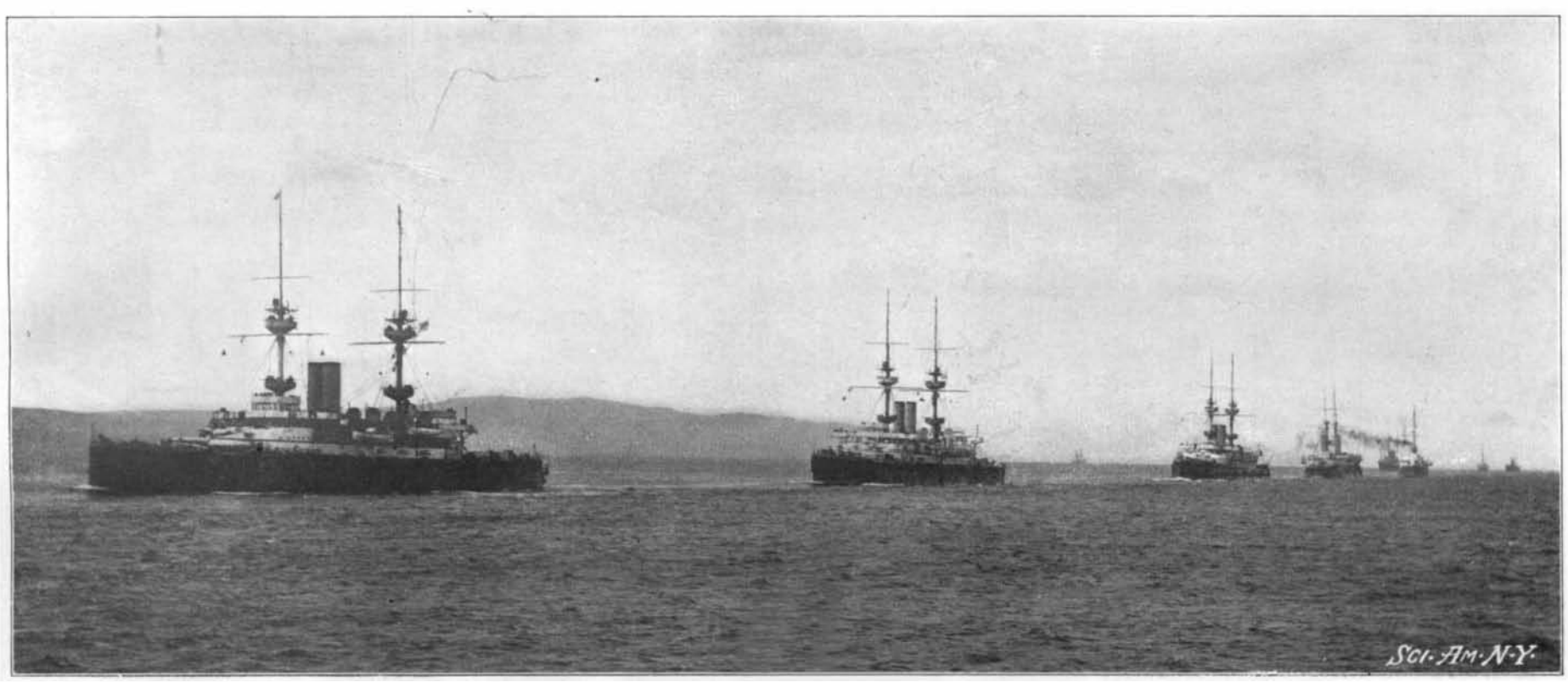
graph, on account of the difficulty of omitting detail, will find a copy of a good photograph taken through ground glass or tracing paper much more agreeable to follow than the photo with its many details. Half-tones may also be copied in this way.

This may seem to the ultra-photographer, who takes the greatest interest in sharpness, depth and multitudinous detail, as a retrograde movement, tending toward the degradation of photography, but the true artist will find use for photographic pictures with reduced detail.

THE CORONATION NAVAL REVIEW.

As far as the numbers and strength of the British ships were concerned, the postponement of the coronation naval review detracted nothing from the splendor of the naval pageant of August 16; although the necessity for the withdrawal of most of the foreign warships caused the event to lose some of its international character. The only foreign ships that were present at the review were the Japanese armored cruiser "Asama," of 9,700 tons displacement, and the 4,180-ton protected cruiser "Takasago," with the Italian armored cruiser "Carl Alberto," of 6,500 tons, and the 4,100-ton Portuguese cruiser "Dom Carlos I." Outside of these four vessels the great fleet of 103 ships was marshalled from the British navy, without withdrawing a single vessel from the Mediterranean or any foreign station or from the reserve fleet. The ships were those of the Channel squadron, the Home or Defense fleet, and the Cruiser squadron, the last named being the latter-day representative of the famous Flying Squadron which was organized when Emperor William sent his famous message at the time of the Jamestown raid. Of the 107 vessels present, 4 were foreign ships, 20 were battleships, 24 were cruisers and the balance was made up of torpedo-boat destroyers, torpedo boats and other miscellaneous craft. The fleet was anchored in five long lines which covered some 25 square miles of the sea, the line of visiting yachts being drawn up in position at the southeastern end. The battleships line included such vessels as the "Prince George," "Hannibal," "Jupiter" and "Majestic," with the "Trafalgar," "Nile," "Royal Sovereign," and other vessels of from 12,000 to 14,900 tons displacement. The most modern and formidable of the cruisers was the armored vessel "Sutlej," of 14,000 tons and 23 knots speed. She was followed by the "Narcissus," "Galatea," "Niobe," "Crescent" (late flagship of the North Atlantic squadron) and the "Endymion." A one-gun signal from the battleship "Royal Sovereign" at 2 o'clock announced the departure of the King in the new yacht "Victoria and Albert" from Cowes. The crews of the fleet at once manned shipped and simultaneously from over 100 vessels there thundered forth a salute of twenty-one guns, the firing being taken up by the shore batteries and the crash of artillery lasting for at least a quarter of an hour. The royal yacht then passed up and down the lines, and at 4 o'clock, at the finish of the review, as she came to her moorings escorted by a flotilla of torpedo-boat destroyers, another royal salute was fired. At night every vessel in the fleet at a given signal burst into a blaze of electric lights, the scheme of illumination consisting of a row of incandescent lights at the water line and at the upper deck, the outlining of the masts and funnels by similar lines of light. This was followed by an elaborate colored searchlight display by every vessel of the fleet, which formed the closing feature of the day's festivities.

In the accounts of the review cabled over to this country there has been a great deal of misleading criticism, which would lead the public to infer that the quality and efficiency of the British navy is in the inverse ratio of its numbers. As a matter of fact, the vessels engaged in the review were not by any means the most modern and formidable in the British navy, the battleships, for instance, and most of the cruisers having been designed nearly a decade and a half ago. Hence, it is entirely misleading to compare the vessels present at the review with foreign vesels which have only just been turned out from the builders' yards. These battleships are of the same date as our "Oregon" and "Massachusetts." The



British Battleships Proceeding [illegible]head in Column of Line Ahead,

THE CORO[illegible]N REVIEW.

latest vessels of the British navy were, as has been mentioned above, doing duty on the Mediterranean and foreign stations, from which they could not be spared, even for such an important occasion as the coronation of the King.

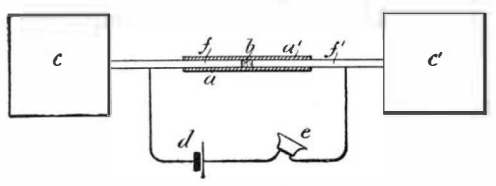
ELECTRICAL RESONANCE AND ITS RELATION TO SYNTONIC WIRELESS TELEGRAPHY—II.

BY A. FREDERICK COLLINS.

(Continued from page 120.)

Having developed the theory that light and electric or Hertzian waves are electromagnetic and that both originated from the same cause and are propagated by the same medium, the next step toward the new art of wireless telegraphy was when Branly observed

FIG. 4.



that electric waves acted on metal filings very much like light waves on selenium, i. e., lowered its resistency; these filings were placed in a glass tube for convenience in operating, and to its evolution is largely due the practicability of the wireless telegraph. Branly's radio-conductor, as he named the tube, entirely supplanted the wire-ring detector of Hertz, owing to its wonderful sensibility to the electric waves. Lodge renamed this electric eye a coherer, which has almost entirely supplanted its original appellation of radio-conductor. The coherer with battery and telephone receiver shown diagramatically in Fig. 4 is the fundamental receiving apparatus required for wireless telegraphy.

WIRELESS TELEGRAPHY.

The apparatus employed in wireless telegraphy consists of the Ruhmkorff coil and oscillator, as in the Hertzian experiments, but with the addition of a long vertical wire or antenna, suspended from a mast, its lower terminal connected with one arm of the oscillator; a second wire leading from the opposite oscillator arm to a sheet of metal in the earth. Fig. 5, *A*, shows the arrangement. The receiving device consists of the coherer with a vertical wire leading from one of its conductor plugs to a mast as in the transmitter; the opposite coherer conductor plug is connected with an earthed plate of metal. In series with the coherer are a battery and relay, and in an auxillary circuit are placed the tapping device to decohere the filings in the tube and a Morse register for recording the messages on tape. The receiver is illustrated in Fig. 5, *B*. Now when the waves are emitted by the transmitter, *A*, at a distance from the receiver, *B*, they are propagated through the electro-magnetic medium or ether, and every impinging wire on the vertical wire attached to the coherer, *B*, decreases its resistance from thousands of ohms to a few tens or even less; the resistance of the circuit, including the coherer, battery and relay is now reduced sufficiently to offer little opposition to the current from the battery, the relay armature is drawn into contact and actuates the circuit controlling the register.

RESONANCE.

With this brief description of the *modus operandi* for wireless telegraphy it will be interesting to ascertain the laws governing the electrical resonance effects between the transmitter and receiver and the apparatus necessary to transmit waves to "any one or more of a number of different instruments in various localities." This is accomplished by prolonging a series of rapid electric oscillations of a particular frequency on the transmitter and having the receiving circuit so balanced in its coefficients of inductance, capacity and resistance as to respond to that frequency or some multiple or sub-multiple of it. This is clearly shown in the case of Lodge's syntonic jars. Fig. 6, *A*, is a Leyden jar, 1, having a spark-gap, 2, and a circuit formed of a rectangular conductor, 3. At *B*1, is a second Leyden jar of equal capacity to *A*1, a spark-gap, 2, of microscopic size and a circuit, 3, made variable by the sliding wire, 4. If the jar, *A*1, is now charged and then discharged through the gap, 2, oscillations will be set up in the circuit, *A*3, of definite frequency and if the inductance capacity and resistance of both circuits, *A*3 and *B*3, are equal, then oscillations having the same periodicity will occur in *B*3. The scale upon which these experiments are made may be greatly extended; the Ruhmkorff coil and Hertz oscillator may be substituted for the Leyden jar at *A*1, and a coherer for the micrometer spark-gap of *B*2. But in substituting these essential factors two great difficulties are encountered; first, an open circuit, i. e., Hertz oscillator, emits waves with such energy that only two or three swings of the high frequency current take place before it is *damped* out or the current

FIG. 5.

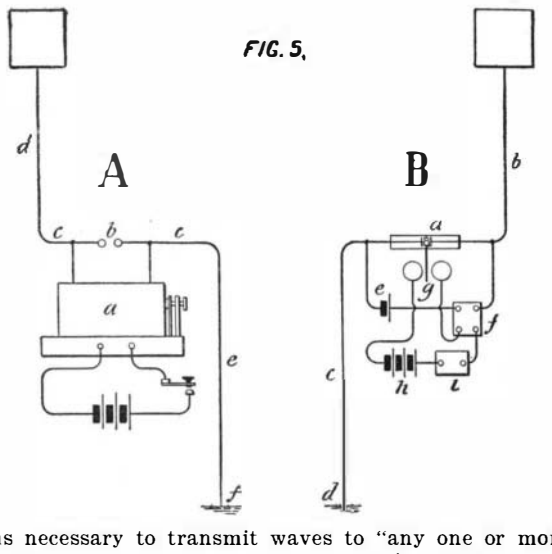
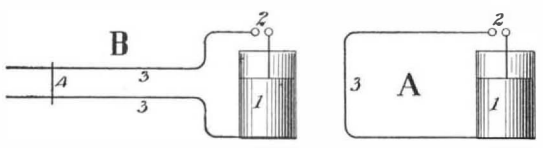
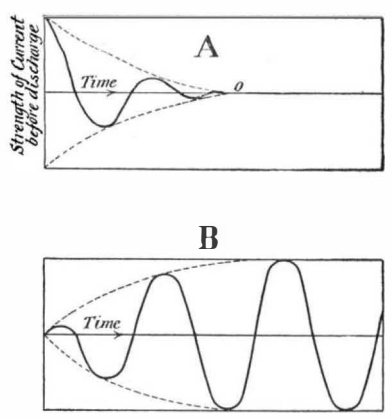


FIG. 6.



dissipated, as shown in the diagram, Fig. 7, *A*. Waves emitted by this system are propagated to great distances, but the oscillations producing them are not sufficiently prolonged to create oscillations of similar frequency in the receiving circuit. In the closed circuit oscillator of the Lodge syntonic jar type the oscillations are quite persistent and in consequence the emitted waves are very feeble; this precludes its use for commercial wireless telegraphy. Such a closed circuit oscillator will set up in a receiver in tune with it oscillations of remarkable persistency, depicted graphically in Fig. 7, *B*. The second difficulty in changing from the experimental apparatus to that required in practice is the tremendous additional capacity loaded on the oscillator and coherer circuits by connecting one arm of either to the earth.

FIG. 7.



The capacity of the earth is so great that practically all oscillators and coherer circuits are tuned or syntonized, and by inserting other values of capacities and inductances in the form of inductance coils and condensers, the value of the earthed systems is but little changed.

SYNTONIZATION.

To systems employing pure resonance effects in which both transmitting and receiving circuits are tuned by inductance and capacity, the name *syntonic* has been given. By clever arrangement of the devices the objectionable features of the closed oscillator are partially eliminated and its good features partly retained, in other words, a compromise has been effected.

The three principal syntonic systems are the Slaby-Arco, the Braun and the Marconi. The Slaby-Arco syntonic wireless telegraph is shown in diagram, Fig. 8, *A*, *B*. It is assumed by the inventors that electric oscillations in the vertical wire, 1, are like the mechanical vibrations of a flexible steel bar with the greatest amplitude at *a*, *a'*. *A*. *B*. with the ether as the connecting medium. The coherer then should be attached to the highest point of the wire, *a'*. The terminal of the vertical wire or antenna forming contact with the earth is, according to Dr. Slaby's theory, the nodal point of the electric waves. At this point a second wire, 2, having inductance and capacity equal to the wire, 1, is connected in, with the opposite terminal attached to the coherer, 3, thus the amplitude of the wave is again the greatest, and the maximum effect obtained without attaching the coherer to the upper terminal of the vertical wire. The transmitter is arranged similarly in its relation to the antenna. An adjustable condenser, 2, and inductance coil, 3, permit the periodicity of oscillation to be changed to a

FIG. 8.

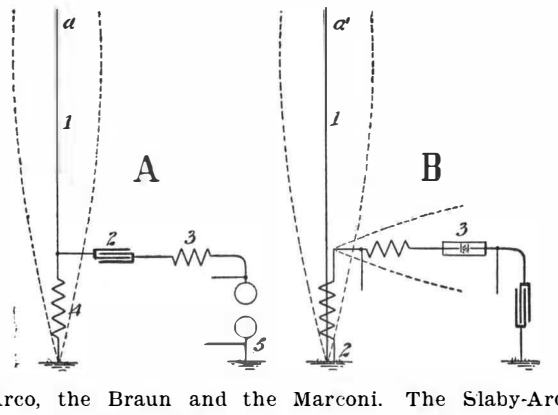
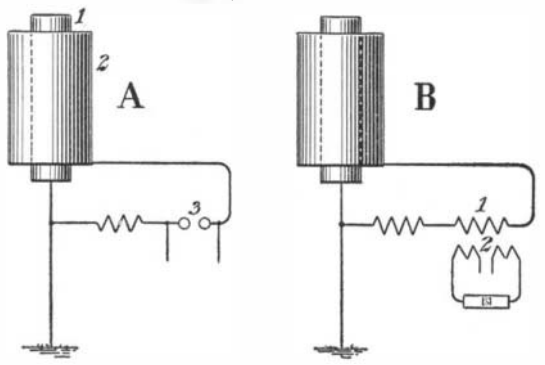


FIG. 9.



value suitable for the receiver. The coil, 4, serves to regulate the harmonies between the vertical wire emitting them and the oscillator system producing them. One terminal of the oscillator system, 5, leads to earth, which forms, virtually, a loop or closed circuit as in the Lodge syntonic jar. This system was exhibited by Dr. A. Slaby and Count d'Arco before the German Emperor in 1899 when two messages were sent and received simultaneously from different stations without interfering.

In the Marconi syntonic wireless telegraph system the feeble radiation of the closed circuit has been obviated by a widely different method from that of Slaby. Marconi has worked along the lines laid down by Lodge, producing the emitter shown in Fig. 9, *A*. It consists essentially of two concentric copper cylinders, one within the other, but separated by an insulating film of air. The inner cylinder, 1, is connected with the earth and one terminal of the spark-gap, 3. The outer cylinder, 2, is connected to the opposite terminal of the spark-gap, the whole representing a huge Leyden jar, the current surging to and fro, equalizing the difference of potential. The receiver is shown at *B*, Fig. 9. The system is arranged like that of the transmitter. One of the greatest improvements in commercial apparatus is that of the transformer coil shown, 1, 2. The coherer, instead of being placed in the electric wave system direct, is arranged in a separate circuit. The free periods of the oscillations set up are not affected by the high resistance of the coherer, and the oscillations may be stepped up or stepped down, as in the case with commercial alternating current transformers. This arrangement was tested between Biot and Calvi, near Nice, by Marconi, who has since fully described the equipment in a paper before the Society of Arts.

Another syntonic wireless system is that of Dr. F. Braun and has been described in the SCIENTIFIC AMERICAN SUPPLEMENT. Fig. 10, *A* and *B*, shows the arrangement of the transmitter and the receiver. *J* is the secondary of the induction coil, *S* the spark-gap, *c*, *c* condensers, and *L* the inductance primary, the whole forming a closed circuit, the oscillations being very persistent; *M* is the secondary of the transformer, and with the conductors $\frac{\lambda}{4}$ an open oscillator system is produced. This arrangement has all the advantages of the closed and open oscillators combined. The receiver, *B*, consists of the vertical wire, *a*, condensers, *c*, *c*, and the inductance coil, *L*, forming the closed circuit and the secondary, *M*, and conductors, $\frac{\lambda}{4}$ included in one of them is the coherer and receiving apparatus. The conductors marked *a*. *a*, *A* and *B*, are the antenna and all others marked $\frac{\lambda}{4}$ are of equal length, but are coiled up loosely. This system is now in use in Germany and has given satisfaction over distances of 40 miles.

FIG. 10.