

W. J. LYONS.

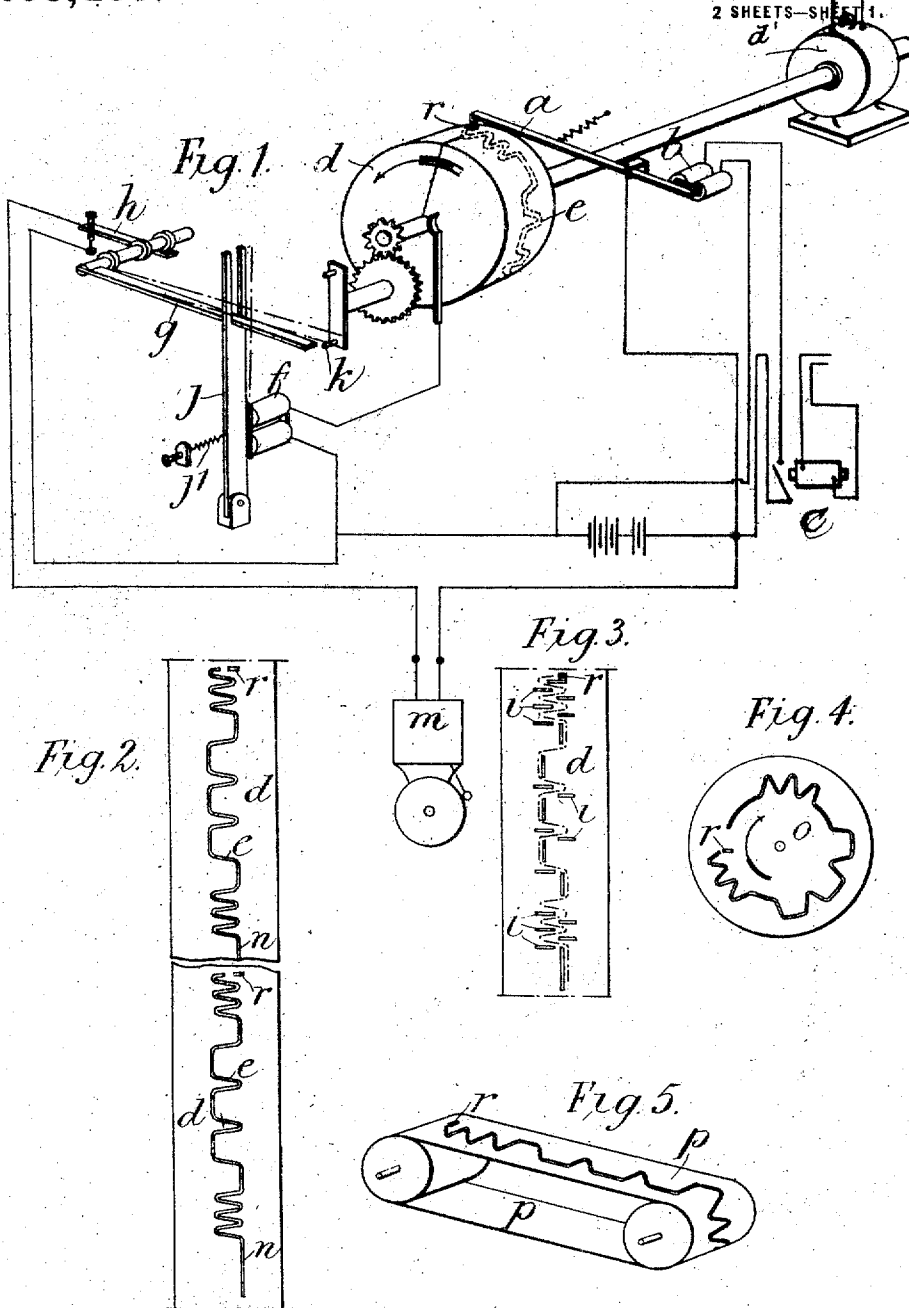
RECEIVING APPARATUS FOR ELECTRIC TELEGRAPHS AND ELECTRIC SELECTIVE SYSTEMS.

APPLICATION FILED MAY 5, 1913.

1,205,460.

Patented Nov. 21, 1916.

2 SHEETS—SHEET 1.



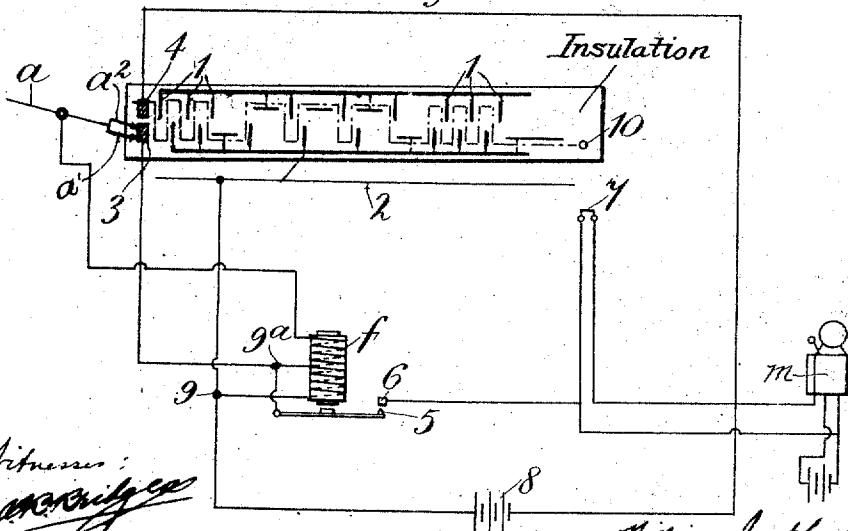
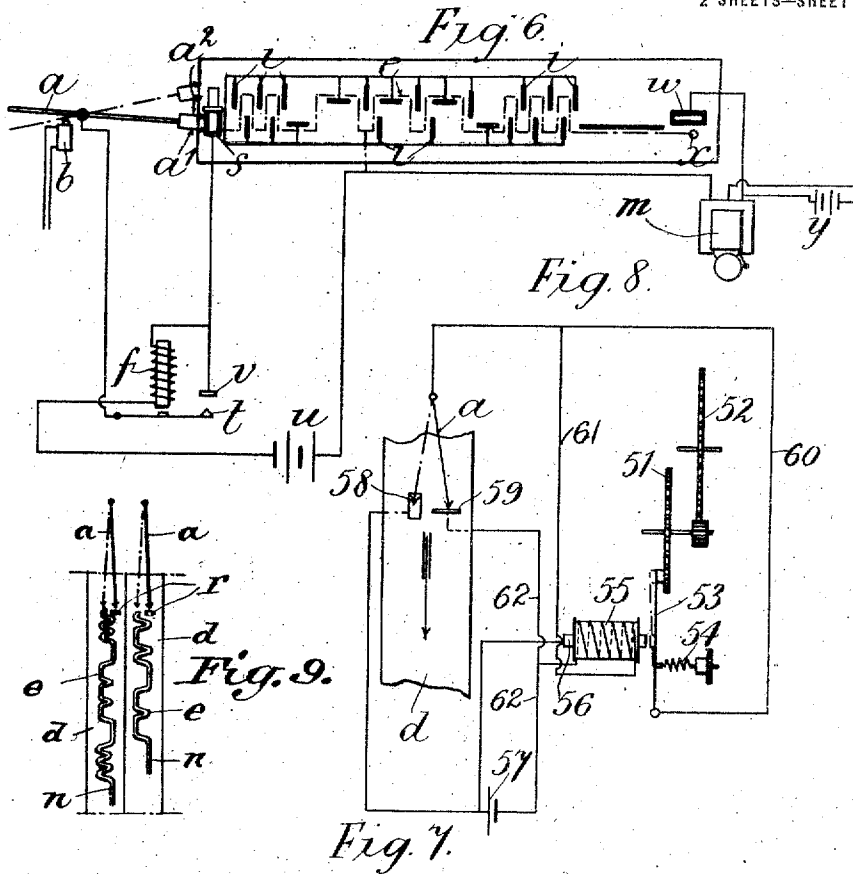
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2 SHEETS—SHEET 2.



Witness:
Edwin L. Yewell

William Joseph Lyons
By Daniel J. Davis
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UNITED STATES PATENT OFFICE.

WILLIAM JOSEPH LYONS, OF DUBLIN, IRELAND.

RECEIVING APPARATUS FOR ELECTRIC TELEGRAPHS AND ELECTRIC SELECTIVE SYSTEMS.

1,205,460.

Specification of Letters Patent.

Patented Nov. 21, 1916.

Application filed May 5, 1913. Serial No. 765,560.

To all whom it may concern:

Be it known that I, WILLIAM JOSEPH LYONS, a subject of the King of Great Britain and Ireland, residing at Dublin, Ireland, have invented Improvements in Receiving Apparatus for Electric Telegraphs and Electric Selective Systems, of which the following is a specification.

This invention relates to receiving apparatus of the selective type whereby a calling or other device can be automatically brought into action at any particular station or place after the complete reception, but not otherwise, at such station or place of a predetermined telegraphic signal or message transmitted by wireless or other method.

The present invention relates to improvements in selective receiving apparatus of the type referred to and comprises for the purpose of controlling the working of the call or other device (hereinafter referred to as the call device) a novel arrangement of primary controlling means subject to the electric signals received and working on a new principle whereby *inter alia* the construction of the selective apparatus can be simplified, as compared with previously proposed arrangement of such apparatus, and whereby the range and exactness of the selectivity obtainable in signaling can be improved.

Broadly, receiving apparatus of the type referred to constructed according to the present invention, comprises a controlling lever or arm (hereinafter usually referred to as the arm or controlling arm, arranged to be moved either directly or indirectly through a relay, by the impulses corresponding to the received electric signal, and a surface which is set in motion on the receipt of the first impulse and which then, independently of any action of the arm, continues in motion in a direction at right angles or substantially so, to the movements of the controlling end of the said arm which may be across or perpendicular to the said surface, the motion of the said surface combined with the movements of the said end of the arm being such that the aforesaid end of the arm will, during the reception of a

signal, be caused to come into contact with a definite portion or with definite portions of the said surface. The moving surface is so formed or constituted with reference to the movements of the said end of the arm that result from the reception of the particular signal which is to cause the operation of the call device, that this device will not be brought into operation if the end of the arm should make contact with portions of the moving surface with which it would not make contact if the prearranged signal were received.

Apparatus constructed and operating as just described can be used to effect selective operation of a calling device in response to signals of the type consisting of a definite number of electric impulses of the same duration of activity separated by prearranged intervals of codal inactivity; to signals of the type, consisting of, electric impulses—short and long, as in the Morse system—of a prearranged number, sequence and rate, and to signals which might consist of single electric impulses of prearranged duration of activity, or of combinations of such impulses of prearranged number and sequence. Furthermore, by means of the new apparatus a call device designed to be brought into operation by a particular signal, for example S O S on the Morse code, will not be put into operation by or during the reception of the electric impulses corresponding to a signal, as for example S O S O on the Morse code, or during the reception of any other signal, which, in part, involves the aforesaid particular signal for which the apparatus is arranged.

The construction and arrangement of the controlling arm and movable surface may conveniently be such that when the apparatus is in action the arm will close an electric circuit during the movement of the surface, so long as the signal being received corresponds to the prearranged code and is not followed within a given time by any other effective impulses; or it may be such that the arm will be prevented from closing an electric circuit during the movement of the surface so long as the signal being

received corresponds to the prearranged code and is not followed within a given time by any other effective impulses. In an arrangement of this kind the arm may, for example, be adapted to form a contact arm and be arranged to oscillate across an endwise movable surface provided with conducting and insulating material, the part of the surface upon which the arm travels while subject to the electric signal to which the apparatus is designed to respond, being arranged lengthwise of the surface and composed either of conducting material, or of insulating material, or it may be of insulated material (hereinafter included in the term insulating material) and having adjacent thereto in the one case insulating material and in the other case conducting material so that the electric circuit controlling the call device will either be kept closed, or be kept open, as the case may be, while the electric signal being received corresponds to the pre-arranged code signal, but will either be opened or be closed respectively by the arm moving onto the insulating material, or on to the conducting material, as the case may be, in the event of a different signal being received.

Receiving apparatus of the kind referred to, designed to operate in the manner set forth, can be constructed in various forms.

In the accompanying drawings, Figure 1 is a diagram of one constructional arrangement according to the invention. Fig. 2 is a development of part of Fig. 1 and Fig. 3 is a part development of a modification. Fig. 4 is an elevation of a disk for use in another arrangement of the kind shown in Fig. 1. Fig. 5 is a perspective view of an endless band device also adapted to be used in a modification of Fig. 1. Figs. 6, 7 and 8 are diagrams illustrative of other constructional arrangements according to the invention. Fig. 9 is a diagram of still another construction and arrangement.

In Fig. 1 there is employed a pivoted spring actuated metallic arm *a* that is under the control of an electro-magnet *b* the circuit of which is controlled by a relay *c* responsive to long and short telegraphic signals transmitted by wireless or other methods, the said arm *a* being arranged to act at its free end against a drum *d* adapted to be rotated by suitable mechanism, such as is hereinafter described. The drum has a peripheral surface of insulating material in which is laid, so as to be flush therewith, a strip *e* of conducting material, such as metal, of a zig-zag form corresponding to the path that the free end of the arm will trace out on the drum as a result of the particular rate of motion of the drum and the oscillating movements of the free end of the arm *a* caused by the electro-magnet *b* upon the receipt of the particular sequence, rate,

and number of the electric impulses corresponding to the special telegraphic signal or message for which the apparatus is designed to respond. The arm *a* and conducting strip *e* are arranged to form part of an electric circuit including an electro-magnet *f* that controls the lateral position of a movable member *g* of a circuit-closing device *h*. The member *g* is engaged by a lever *j* arranged to be moved against the action of a spring *k* or other restoring means, by the electro-magnet *f*, when this is energized, so as to enter into the path of a pin *l* or equivalent device that is set in operation with the setting into operation of the drum *d* by the initial movement of the arm *a* and thus as long as the electro-magnet *f* is kept energized to gradually bring the said member *g* into a position to close, through the device *h*, the circuit of the calling or other device, for example an electric bell *m*, when a predetermined complete signal or message is received.

If the impulses received do not correspond to the particular telegraphic signal or message for which the form of the path or strip *e* is arranged, the free end of the arm *a* will necessarily depart from the path or strip *e* and the circuit of the said electro-magnet *f* will be broken and the movable member *g* controlled thereby returned to an initial and inoperative position, so that the calling or other device cannot then be brought into operation.

As shown in Fig. 2, which is a development of parts of the drum *d*, hereinafter more particularly referred to the end *n* of the metal strip *e* is so formed and arranged, as by lengthening it in the circumferential direction of the drum, that in the event of the impulses corresponding to a particular signal or message being followed within the predetermined time by another impulse, the circuit of the said electromagnet *f*, will be broken and the movable member controlled thereby returned to an initial and inoperative position before the circuit of the calling device *h*, can be completed, so that the calling device *m* will not then be brought into operation.

In the example, the arrangement is adapted to respond to the signal S O S adopted in wireless telegraphy as the distress call for ships.

Instead of providing the drum with an insulated surface and a strip *e* of metal of the form mentioned, the surface of the drum *d* may be of metal and be provided, as shown for example in Fig. 3, which is a developed view of part of the drum, with pieces *i* of insulating material at parts thereof where the free end of the arm would necessarily pass upon the receipt of impulses not corresponding in sequence, rate or number to that of the required special signal or mes-

sage, so as to break the circuit of the electromagnet *f* (Fig. 1) controlling the motion of the movable member *g* of the circuit closing device and cause such member to move into a position in which it is inoperative and will continue to be inoperative until the apparatus is again in an initial condition and is again set in action for receiving another message.

The zig-zag shaped piece *e* of metal, or the group of pieces *i* of insulating material, carried by the drum *d* and corresponding to a special signal or message, may, as is intended in Fig. 1, be arranged to extend around the whole of the circumference of the drum, or nearly so, so that one cycle of operations will take place for each rotation of the drum. Or a number of pieces *e* of metal, or groups of pieces *i* of insulating material, may be arranged in series around the drum so that in this case two or more cycles of operations will take place for each rotation of the drum, the apparatus being in an initial or receptive condition at a number of definite and equally spaced points around the drum. Thus Fig. 2 is intended to show an arrangement in which two cycles per revolution are obtained.

In lieu of a drum, a rotary disk *o*, Fig. 4, or an endless traveling belt *p*, Fig. 5, may be used, and for the zig-zag shaped piece *e* of metal, or the pieces *i* of insulating material, the surface of the drum or equivalent may be otherwise adapted to permit the arm *a* to move into a position to close the circuit of the electro-magnet *f* and to move the arm and break the circuit when the sequence, rate or number of the impulses departs from that corresponding to the special message or signal for which the apparatus is designed.

The starting of the drum or equivalent and associated mechanism on the receipt of the first impulse of a signal or message can be effected in various ways, as by the pivoted arm *a* being withdrawn from a stop *r*, or one of a number of stops *r*, on the drum *d*, or equivalent, or by its releasing a brake on the driving mechanism of the drum; or the starting of the driving mechanism may be effected by electromagnetic means, as will be described hereinafter.

The arrangements thus far described illustrate some ways of carrying out the invention which may however be modified.

The closing of the circuit which operates the electric bell *m* or other device depends, in the arrangements described with reference to Figs. 1 to 5, on the free end of the arm *a* being made to sustain a contact with the metallic portion of the surface of the drum and thus to keep closed an electric circuit until the complete reception of the particular message has been effected. When such is the case the mechanical device comprising the parts *f*, *g*, *h*, *j*, *j'*, *k*, may be re-

placed by an arrangement such as is diagrammatically shown in Fig. 6 where the developed surface of the drum with the pieces *i* of insulating material is arranged for the signal S O S. One end of the arm *a* is bifurcated, as at *a'*, *a''* and in the initial position both of these ends *a'* and *a''* are in contact with the metal stop *s* which is insulated from the metallic surface *c* of the drum. A contact key *t* is actuated by the electromagnet *f* and the battery *u* is connected as shown. When the first electric impulse received causes the electromagnet *b* to move the arm *a*, the circuit through the electromagnet *f* is completed by the bifurcation at the end of the arm *a* connecting the stop *s* for a short time with the conducting surface *c* of the drum. Contact between *t* and *c* is made when the electromagnet *f* is thus energized and the circuit through such electromagnet is maintained closed through this contact as long as the end *a'* or *a''* of the arm *a* is in contact with the surface of the drum *d*. It is arranged that the end *a''* shall be in contact with the drum *d* before the end *a'* leaves the stop *s* and that the end *a'* makes contact with the drum *d* before the end *a''* is put out of contact with the latter. In the subsequent path along the drum, it can be arranged that only the end *a'* touches the surface of the drum until a contact *w* is reached. If the arm *a* is influenced by impulses in sequence, rate and number corresponding to the signal or message for which the drum is arranged, the end *a'* continues in contact with *e* and the electro-magnet *f* remains energized. When the complete signal has been received and is not followed by another impulse within a predetermined time, the end *a''* of the arm *a* engages the contact *w* before the end *a'* leaves the conducting path *e* at *v* so that when the latter event happens, current passing through *f*, *v*, *t*, *a* and *w* is made to operate the circuit closer of a battery *y* and cause the continuous ringing of an electric bell *m* or other device. If during the reception of the signal or message the arm end *a'* leaves the conducting path *e* on the drum the circuit through *f* is broken, and the key *t* recedes from the contact *v* thereby rendering the mechanism inoperative until the apparatus is again in its initial condition and is again set in action for another signal or message. An arrangement of this character is applicable also where the selective operation of the calling or other device is arranged to depend on the free end of the selective arm *a* not making contact with a conducting strip or surface on the drum. Thus, in the arrangement shown in Fig. 7, the pieces 1, which are in metallic communication with each other, are connected through a conductor 2 to one pole of a battery 8. In the

initial position, the free end of the selective arm *a*, which is bifurcated, as in Fig. 6, is in contact with the metallic drum stop 3. On the reception of the first impulse the said arm end connects the metallic stop 3 to a contact piece 4, the said stop 3 and contact 4 being insulated from the contacts 1, and contact 4 being connected to the other pole of the battery 8. A current consequently flows through half the winding of the electro-magnet *f*. Thus energized, the electro-magnet closes the gap between two contacts 5 and 6 and the current due to the bridging of the stop 3 and contact 4 is now replaced by current flowing through the contacts 5 and 6 across a switch 7.

If during the reception of the impulses the arm end *a*¹, which may be arranged to alone touch the drum, deviates from the path that accords with a particular signal or message, the said end *a*¹ will be put into electrical connection with conductor 2 through one of the pieces of metal 1, and, as will be seen from the figure, current from the battery 8 will divide at the point 9 part passing through what in the illustration is the lower half of the solenoid *f* to the point 9^a and part passing through the conductor 2, contact 1 and arm *a*, *a*² and through the upper half of the solenoid *f* in the reverse direction to that in the lower half to the point 9^a and thence through the contacts 5 and 6 and switch 7 to the other pole of the battery. In this way the action of the solenoid is neutralized. The neutralization of the solenoid *f* releases contact 5 from contact 6 and the system becomes inoperative until the mechanism returns to its initial condition and is again set in action to receive another signal or message. If the sequence, rate and number of the impulses correspond to those of the signal or message for which the surface of the drum is arranged, the circuit will continue closed at 5, 6. After the complete reception of the signal or message, the free end of lever *a*, viz., the ends *a*¹ and *a*² of the bifurcation will reach a part of the drum where, as in the case of Fig. 6, by means of the bridging of contacts in the drum the current may be deflected through the call operating device, or, as represented in Fig. 7, a pin 10 on the drum at the end of the path may be made to open the switch at 7 and deflect the current that passes through 5, 6 so as to cause it to flow through and start the continuous ringing bell *m* or other device.

The method of this invention can obviously be applied so as to make one mechanism selectively respond to two or more different signals or messages and close a particular circuit and thus operate a particular bell or indicator or other device in

response to each message. Thus, on the same drum *d* two or more strips *e* of material may be inlaid side by side as shown in Fig. 9, or the paths for two or more different signals may be otherwise defined as already described by two or more series of pieces of material *i* (Figs. 3 and 6) laid into the surface of the drum as already described. A separate movable arm *a* is provided for each message and otherwise the arrangements may be of the type already described.

Instead of the apparatus being used for bringing into action an audible calling device, for example an electric bell *m*, as for instance when the apparatus is to be used for receiving danger signals or other special signals sent by wireless or other telegraphic method, it may be used for some other purposes, as for example for firing a particular mine, gun, rocket or the like.

Signals other than dots and dashes of the Morse code *e. g.* a signal consisting of a single sustained impulse of predetermined duration, or a signal consisting of a predetermined number and sequence of impulses each being sustained for a predetermined period, the several periods in the latter case being equal or different, may be adopted, the invention permitting such signals to be treated selectively. The signals may be transmitted automatically at a definite rate, or simple signals, such as the dot, dash, dot-dash or dash-dot may be transmitted without automatic mechanism.

In a apparatus such as hereinbefore described the drum *d* or equivalent surface may be driven by a clock-work or electric motor *d*¹ (Fig. 1), the fixing of the proper speed being regulated in known or suitable manner.

The drum or equivalent surface may be permanently coupled to the driving mechanism, in which case the starting and stopping of the drum is determined by the starting and stopping of the mechanism, or, alternatively, the driving mechanism may be run continuously and the drum or movable surface may be connected thereto and disconnected therefrom at starting and stopping respectively by the action of a friction device or by a mechanical or magnetic clutch.

The starting of the drum or driving mechanism on the receipt of the first impulse, of continuing the motion, and of suddenly stopping it at the proper time can be effected in various ways other than by the use of one or more stops as hereinbefore mentioned. Thus, in the case of weak electric impulses such as are produced in wireless telegraphy the starting and stopping of the drum may be effected by electromagnetic means. Fig. 8 shows dia-

grammatically one arrangement of this kind. In this example, the drum *d* is driven by suitably controlled clockwork, 51 being a disk connected to the most rapidly moving part of the clock mechanism another element of which is shown at 52. 53 is a brake lever that normally holds the mechanism stationary in its zero or initial position under the action of an adjustable spring 54; a slight pressure of which suffices owing to the high gearing of the mechanism. 55 is an electromagnet the core 56 of which is arranged to pull back the brake lever 53 against the action of the spring 54, when energized by current from a battery 57. 58 and 59 are two insulated metal contacts arranged in and flush with the surface of the drum and connected to the opposite poles of the battery. The core 56 is connected to the same pole of the battery as the contact 58 and makes metallic contact through a thin layer of silver or platinum with the brake lever 53 when it attracts the latter. The oscillating arm *a* is electrically connected through a conductor 60 to the brake lever 53 and through a conductor 61 to one terminal of the coil of the electromagnet 55 the other terminal of which is connected by a conductor 62 to the same pole of the battery as contact 59. Initially, the movable end of the arm *a* is at a definite position on the drum, viz. on contact 59. On the receipt of the first impulse it moves across the surface of the drum and makes connection with contact 58. The circuit through the electromagnet 55 is thus made, the brake lever 53 pulled back and the clock mechanism and drum *d* started. The circuit thereby made through the battery 57, conductor 62, the coil of the electro-magnet 55, conductors 61 and 60, brake lever 53 and core 56 is maintained during the subsequent movement of the drum which is in the direction of the arrow. When the drum is just at the end of its prearranged course, the contact 59 passes under the end of the arm *a* and the current passing from one pole of the battery 57 through the core 56 and brake lever 53 instead of flowing through the high resistance coil of the electromagnet 55 by way of the conductor 61, takes a momentary short circuit through the arm *a*, contact 59 and conductor 62 back to the battery. The electromagnet 55 being thus deenergized the brake lever 53 is thus released and stops the mechanism, the current is automatically cut off and the apparatus left in its zero position ready for another signal. It will be seen that owing to the high gearing of the mechanism and the slow movement of the drum relative to that of the disk 51 the gradual stopping of the disk will result in the stopping of the drum *d* at a very exact

position in relation to the end of the arm *a*. The above method can obviously be applied to operating the starting and stopping of the other driving mechanism referred to above, *e. g.* for starting or stopping an electric motor, the brake lever 53 being then replaced by a switch, or for coupling up the drum to a continuously driven mechanism in which case the brake lever 53 would be replaced by a mechanical or magnetic clutch as already suggested.

What I claim is:—

1. Electric telegraph receiving apparatus of selective type comprising a movable member, means whereby said movable member will be set in motion upon the receipt of an electric impulse, a second movable member adapted to co-act with the first mentioned movable member, electro-magnetic means whereby said second movable member will be operated in a variable manner by the electric impulses received, and in such manner that movement of said second movable member relative to the first mentioned movable member will be determined by the nature of the electric impulses received, a device to be operated upon the receipt of a predetermined signal, electric connections and a source of current for operating said device, said movable members being arranged to coöperate in conjunction with the electric connections and cause the operation of said device only upon the complete receipt of a signal of a predetermined character.

2. Electric telegraph receiving apparatus of selective type comprising an electric contact device mounted to move to and fro in a variable manner and in accordance with the electric impulses received, a rotary circuit closing device co-acting with said contact device, means whereby said rotary circuit closing device will be set in motion upon the receipt of an electric impulse, electrical connections, a call device to be operated upon the receipt of a predetermined signal and a source of current for operating said call device, said contact device and circuit closing device being arranged to coöperate to close a circuit in said electric connections and bring about the operation of said call device only when they occupy certain predetermined relative positions depending upon the nature of the signal for which the apparatus is designed to respond.

3. Electric telegraph receiving apparatus for selective type comprising a movable circuit controlling surface, means whereby said surface will be set in motion upon the receipt of an electric impulse, an arm movable in relation to said surface, means under the control of the electric impulses received adapted to move said arm in relation to and upon said surface, electrical connections controlled by said relative movement between said sur-

face and arm, and call means adapted to be brought into action under the control of said electrical connections only upon the arm following a predetermined path relatively to said surface and occupying a definite position at the completion of the transmission of the predetermined signal for which the apparatus is designed to respond.

4. Electric telegraph receiving apparatus of selective type comprising a movable circuit controlling surface, means whereby said surface will be set in motion upon the receipt of an electric impulse, an arm movable in relation to said surface, means under the control of the electric impulses received adapted to move said arm transversely to the direction of movement of said surface and upon said surface, electrical connections controlled by the transverse movement of said arm relatively to said surface and call means adapted to be brought into action under the control of said electrical connections only upon the arm following a predetermined path relatively to said surface and occupying a definite position at the completion of the transmission of the predetermined signal for which the apparatus is designed to respond.

5. Electric telegraph receiving apparatus of selective type comprising a movable circuit controlling surface, means whereby said surface will be set in motion upon the receipt of an electric impulse, an arm movable in relation to and upon said surface, means under the control of the electric impulses received adapted to move said arm in a to-and-fro direction across said surface, said surface being arranged to be set in motion in a direction substantially at right angles to the to-and-fro motion of said arm upon the receipt of an electric impulse, electrical connections controlled by the relative movement between said surface and arm and a call device, the formation of said controlling surface and the movement of said arm being such that said call device will not be brought into operation by an electric signal of shorter or longer duration than that for which the apparatus is designed to respond.

6. Electric telegraph receiving apparatus of selective type, comprising a device to be operated only upon the transmission and reception of an electric signal according to a pre-arranged code, and mechanism for bringing said device into operation, said mechanism comprising an arm, means whereby said arm will be moved by the received electric signal, a surface with which such arm co-acts, means whereby said surface is arranged to be moved substantially at right angles to that of the motion of the operative end of said arm on the receipt of a signal, said surface after being started continuing its motion independently of the arm, and

means whereby said surface is caused to start on the receipt of a signal, said surface being of a composite nature dependent upon the nature of the signal for which the apparatus is to respond and said arm acting to bring said device into operation only upon its following a predetermined path on said surface corresponding to the predetermined signal.

7. Electric telegraph receiving apparatus of selective type, comprising a device to be operated only upon the transmission and reception of an electric signal according to a pre-arranged code and mechanism for bringing said device into operation, said mechanism comprising a movable surface adapted to start traveling in a particular direction upon the receipt of an electric impulse and carrying a trace of a predetermined signal, means for permitting said surface to start traveling upon the receipt of an electric impulse, a contact arm and means responsive to electric impulses adapted to displace said contact arm relatively to said moving surface, said arm following said trace and bringing said device into operation only in the event of the signal sent corresponding to that for which the apparatus is designed to respond.

8. Electric telegraph receiving apparatus of selective type, comprising a member, means whereby said member can be started and stopped, a source of current having one pole in connection with the surface of the said member and an arm connected with the other pole of the current source, means whereby said arm can be started in synchronism with such member so as to be brought into operative relationship thereto, and means whereby said member and arm will maintain a given condition of an electric circuit so long only as the relative movement between them accords substantially with a predetermined signal code.

9. Electric telegraph receiving apparatus of selective type, comprising a member having a movable surface, means whereby said member can be moved at a uniform speed, an arm adapted to co-act with said surface and means whereby said arm is moved in a variable manner in relation to said surface under the action of and in accordance with the electric impulses received, metallic contact being made between the surface of the member and the arm to complete an electric circuit during some period of codal activity.

10. Electric telegraph receiving apparatus of selective type, comprising a contact body, means whereby said body will be set in motion on the receipt at its location of a signaling impulse and continue in motion during the receipt of a message, a signaling device, an arm arranged to co-act with said

contact body and means whereby said arm is adapted to be moved in relation to the contact body under the control of the same impulse, and means to bring about the operation of said signaling device only in the event of the receipt of a predetermined signal.

11. Electric telegraph receiving apparatus of selective type, comprising a movable member having a surface of insulating material, means whereby said movable member can be moved at a uniform speed, a source of current, contact material of a conducting character associated with such surface and connected to one pole of said source of current, a conducting arm movable in relation to the said surface and connected to the other pole of the source of current and means adapted to set the movable surface and arm in motion simultaneously on the receipt of the first impulse of a signaling series, the said conducting arm being adapted to bear upon the insulating portion of the moving surface and prevent closure of the electric circuit of said source of current so long as the signal being received corresponds to the prearranged code and is not followed within a given time by any other effective impulses.

12. In electric telegraph receiving apparatus of selective type, a movable body having a surface, part whereof is made of insulating material and part of conducting material, means whereby said body will be set in motion on the receipt at its location of a signaling impulse, a contact arm and means whereby said arm will be caused to move transversely to the direction of movement of the surface of the body and to remain in contact with the insulating portion thereof so long as the signal being received corresponds to the prearranged code but to engage the conducting portion thereof when the pre-arranged code is departed from.

13. Electric telegraph receiving apparatus of selective type, comprising a movable body having a surface, part of which is made of insulating material and part of conducting material, means whereby said body will be set in motion on the receipt at its location of a signaling impulse, a contact arm, means whereby said arm can be moved transversely to the direction of movement of the surface of said body by signaling impulses, said arm being arranged to remain in contact with the signaling impulses and to remain in contact with the insulating portion of said surface after the latter has started in motion and so long as the signal being received corresponds to the pre-arranged code but to engage the conducting portion of said surface when the pre-arranged code is departed from, two insulated contacts arranged on said surface adjacent to each other and against one of

which said arm bears when the body is at rest in its starting position and against both of which said arm bears when first moved, an electromagnet having two windings, a source of current having one pole connected to the conducting material of the movable body surface and to one end of said windings the other end of which is connected to the insulated contact against which the arm normally bears and to one end of the second winding the other end of which is connected to said arm, the other or second pole of said source of current being connected to the second insulated contact, a circuit conductor between the connected ends of said windings and the second pole of the source of current, a switch for closing the circuit through said conductor when the first mentioned winding is energized, a second switch in said circuit adapted to be opened mechanically by the movable body when a signal is completed, a circuit shunting such mechanically operated switch and an indicating device in the shunting circuit rendered operative upon opening said mechanically operated switch.

14. In electric telegraph receiving apparatus of selective type, the combination with a movable body having an endless surface carrying conducting and insulating material, an arm and means whereby said arm will be moved transversely across and upon said surface by signal impulses, of a self-acting motor for rotating said body, a brake device adapted when released to automatically arrest said motor, an electro-magnet for retracting said brake and allowing the motor to start, two insulated contacts arranged on said body and against one of which said arm normally bears, a source of current having one pole connected to the last mentioned insulated contact and to one end of the winding of the said electro-magnet the other end of which is connected to said arm, the second pole of said source being connected to the second insulated contact so that the circuit of said electro-magnet will be completed when the arm is first displaced laterally, a switch adapted to be closed when said brake device is retracted and a second circuit arranged to be connected across said source of current through the winding of said electro-magnet and switch when the latter is closed.

15. Electric telegraph receiving apparatus of selective type comprising a movable circuit controlling surface, an electric contact device, means whereby said contact device can be moved in relation to said surface under the control of the electric impulses received, means whereby said surface will be set in motion upon the receipt of an electric impulse, a call device and means controlled by the said relative motion between

said controlling surface and contact device
for causing operation of said call device,
said controlling surface and contact device
being arranged to prevent the call device
5 being brought into action until after a pre-
determined time of codal inactivity has
elapsed after the complete receipt of the
signal to which the apparatus is to respond.

Signed at The Royal College of Science,
Dublin, Ireland this twenty-fifth day of 10
April 1913.

WILLIAM JOSEPH LYONS.

Witnesses:

WILLIAM BROWN,

WILLIAM DONALD DOUGLAS.