A. H. MORSE.

ELECTRIC SELECTIVE DEVICE.

APPLICATION FILED SEPT. 14, 1916.

1,287,396.

Patented Dec. 10, 1918.

2 SHEETS—SHEET 1.

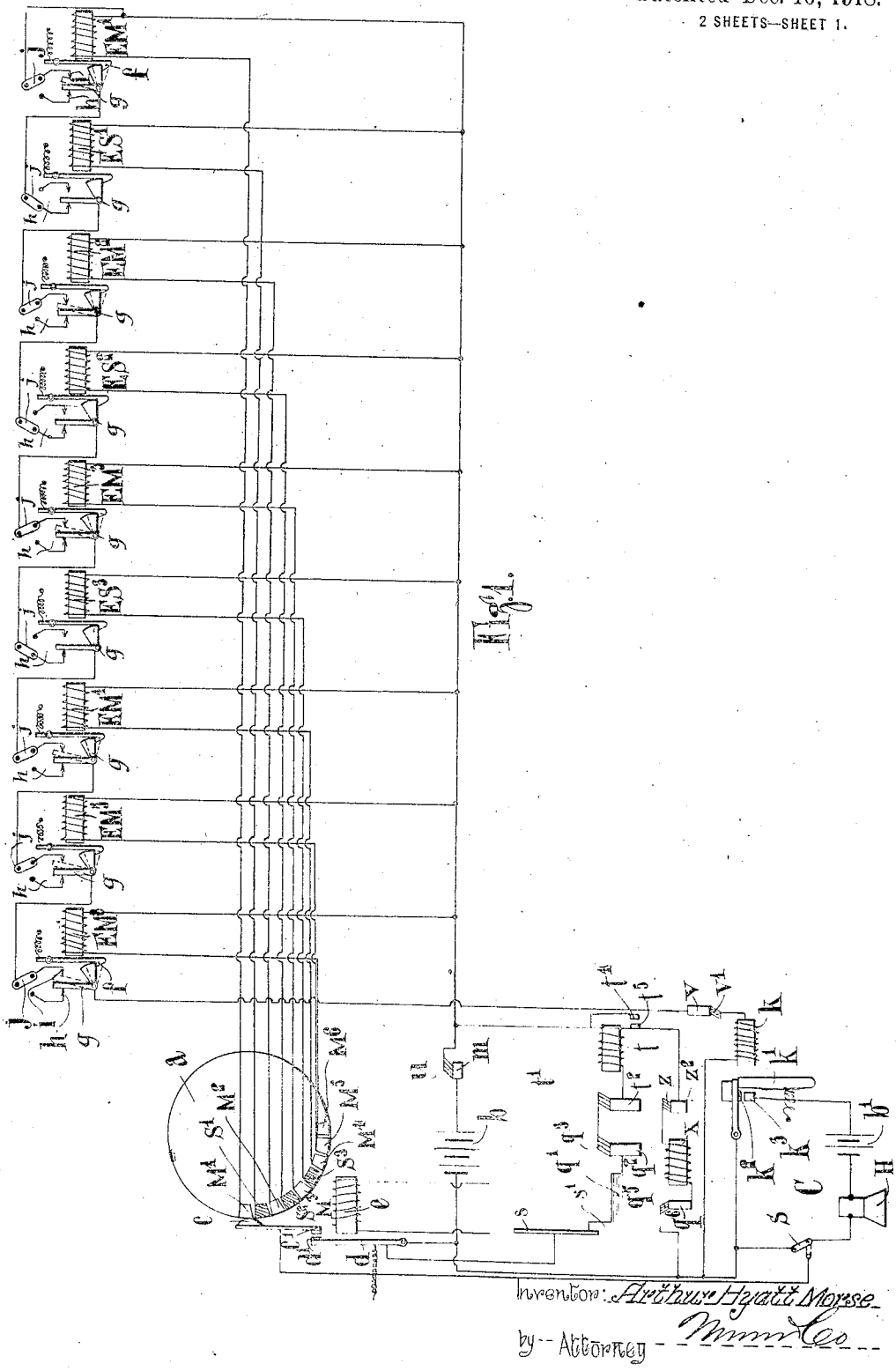

Fig. 1.

Inventor: Arthur Hyatt Morse

by Attorney — Munn & Co

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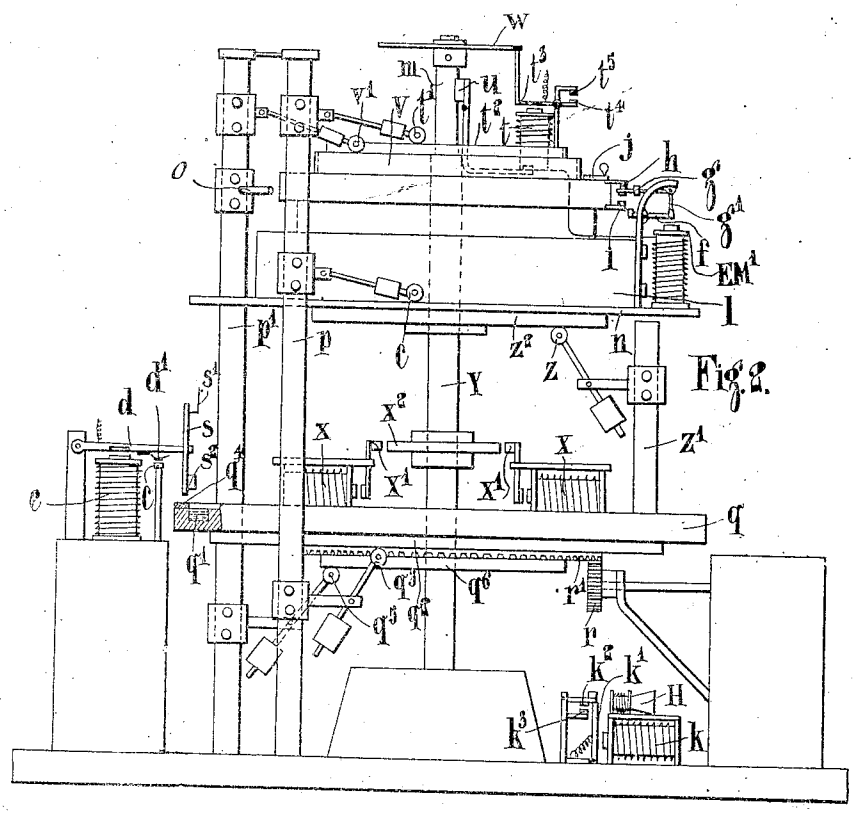

Fig. 2.

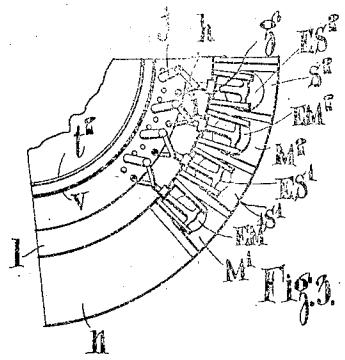

Fig. 3.

Inventor:

Arthur Hyatt Morse

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UNITED STATES PATENT OFFICE.

ARTHUR HYATT MORSE, OF LONDON, ENGLAND.

ELECTRIC SELECTIVE DEVICE.

1,287,396. Specification of Letters Patent. Patented Dec. 10, 1918.

Application filed September 14, 1916. Serial No. 120,050.

To all whom it may concern:

Be it known that I, ARTHUR HYATT MORSE, subject of the King of Great Britain and Ireland, and residing at 18 Old Broad street, London, E. C., England, have invented certain new and useful Improvements in and Relating to Electric Selective Devices, of which the following is a specification.

This invention relates to an improved electric selective device and more particularly to a selective calling device of the kind comprising a plurality of electro-magnetically controlled switching devices set to be operated in succession when a predetermined signal is received, thereby causing the alarm or other electric circuit to be completed only upon the reception of such signal.

According to the present invention, the circuit to be completed includes a plurality of switching devices in series with each other and capable of being set in one or the other of two possible positions, according to the succession of signs and spaces between the signs constituting a particular selected signal, one of which positions (that used for dots and dashes in this invention) requires that the switching device should be operated if the circuit to be controlled is to be operated or completed, while the other position (that used for spaces in this invention) requires that the switching device should not be operated if the circuit to be controlled is to be operated or completed. One switching device is used for each dot and a plurality of switching devices for each dash of the signal, and one or more switching devices for each of the spaces between said dots or dashes, or dots and dashes. During the reception of the calling signal, the circuit is completed only if each one of the switching devices corresponding to the dots and dashes, is operated, and none of the switching devices corresponding to the spaces, is operated while the calling signal is being received.

All the switching devices are connected in series with one another and are set in such positions that those corresponding to the spaces between the dots or dashes or dots and dashes close their portions of the circuit to be completed while those corresponding to the dots and dashes leave their portions of the circuit to be completed open. When a signal is received corresponding to the selected signal of the receiver the switching devices corresponding to the spaces remain in their positions while those corresponding to the dots and dashes are caused to close their portions of the circuit, whereby the circuit is completed. If the signal sent does not correspond to the selected signal of the receiver either one or more of the switching devices corresponding to the spaces are caused to open their portions of the circuit and, or one or more of those corresponding to the dots and dashes are left in their open positions, the result being that the circuit is not completed and therefore remains inoperative.

The invention also consists in the modes of carrying the invention into effect as hereinafter more particularly described with reference to the accompanying drawings, in which:—

Figure 1 is a diagram illustrating the main idea of the invention as carried out by means of the apparatus described by way of example with reference to Figs. 2 and 3, which illustrate an elevation of one form of construction of the apparatus and a plan view of a portion thereof respectively.

Referring more particularly to Fig. 1, a is a rotary disk provided on its periphery with a plurality of contacts M^1, M^2, M^3, M^4, M^5, M^6, and S^1, S^2, S^3, hereinafter referred to as "marking" and "spacing" contacts respectively. These contacts are connected to one end of each of a series of electro-magnets EM^1, EM^2, EM^3, EM^4, EM^5, EM^6, and ES^1, ES^2 and ES^3, hereinafter more particularly referred to as "marking" and "spacing" electro-magnets respectively, the other end of said electro-magnets being connected to one pole of a common battery b. The other pole of the battery is connected to a fixed contact c coöperating with the marking and spacing contacts on the rotary disk a, through the intermediary of a spring controlled contact armature d which has a contact d^1 coöperating with a fixed contact c^1, connected with the contact c, and which during the rotation of the disk a is caused to complete the circuits through the various electro-magnets above referred to in succession under the control of

an electro-magnet *e* through which the calling signals are received by means of electric currents of predetermined duration, separated from one another by intervals of "no current", also of predetermined duration. Each of the marking and spacing electro-magnets is associated with a switching device hereinafter referred to as a "marking" or "spacing" switch and comprising a spring controlled armature *f*, a contact arm *g* which is retained by the armature *f* against a contact *h* when the electro-magnet with which the switch is associated is not energized, and is released by said armature, and owing to its construction as a weighted bell crank lever is automatically caused to come against another contact *i* when the electro-magnet is energized, and a switch arm *j* electrically connected to the contact arm *g* of an adjacent switching device and adapted to be connected either with the contact *h* or with the contact *i* according as to whether the particular switching device is intended to operate as a spacing or as a marking switch. The switch arm *j* of the one end switching device and the contact arm *g* of the other end switching device are connected with the two poles of the battery *b* respectively through the intermediary of an electro-magnet *k* operating an alarm circuit C.

Assuming the predetermined calling signal to be the letter V, consisting of three dots and a dash, and the contact corresponding to the dash to be divided into three consecutive marking contacts of the same lengths, as the marking contacts corresponding to the dots and the spaces, all the arms *j* of the marking switches are shifted to the positions in which they are connected with the contacts *i*, while the arms of all the spacing switches are shifted to the positions in which they are connected with the contacts *h*. It will thus be seen that when the disk *a* carrying the marking and spacing contacts rotates in front of the fixed contact *c* coöperating with the contact armature *d*, and the latter is attracted by its electro-magnet *e* which is energized under the control of the transmitting station in synchronism with the passage of the marking contacts, the marking electro-magnets EM^1, EM^2. . . EM^6, will be energized in succession, while the spacing electro-magnets ES^1, ES^2, ES^3 will remain unaffected if the letter V is transmitted by the calling station, and that if the letter or signal transmitted is different from such letter, either the contact armature *d* will not close a circuit through some of the marking electro-magnets, or it will close a circuit also through some of the spacing electro-magnets, the result being that in the first case all the marking switches associated with the marking electro-magnets will be operated, as shown in dotted lines, the spacing switches associated with the spacing electro-magnets remaining operative, so that all the switches will be connected together in series with one another, thereby completing the circuit through the electro-magnet *k* operating the calling circuit C, and that in the second case the latter circuit will not be operated, the circuit containing the electro-magnet *k* not being completed owing to some of the spacing switches being operated by the electro-magnets with which they are associated, or some of the marking switches not being operated by the electro-magnets associated therewith. In the first case the various marking and spacing switches are connected together in series along the following path: *j i g* associated with EM^1, *j h g* associated with ES^1, *j i g* associated with EM^2, *j h g* associated with ES^2, *j i g* associated with EM^3, *j h g* associated with ES^3, *j i g* associated with EM^4, *j i g* associated with EM^5, and *j i g* associated with EM^6.

Referring to Figs. 2 and 3 illustrating one form of construction of the apparatus for carrying the invention into effect, the various marking and spacing electro-magnets EM^1, ES^1, EM^2 and so on, together with their respective weighted armatures *f* and switching devices are carried on a portion of the periphery of a horizontal disk *l* loosely mounted on a fixed spindle *m* and hereinafter referred to as the "selecting disk", the various marking and spacing contacts M^1, S^1, M^2, etc., being mounted beneath the corresponding electro-magnets and projecting sufficiently radially to serve as a support for the contact roller *c* which is attached to a fixed post *p*, and the remaining portion of the periphery of the disk *l* being completed by a plate *n* forming a continuation of the marking and spacing contacts in the peripheral direction, for the purpose of serving as a support for the contact roller *c* after the passage of the marking and spacing contacts beyond said contact roller.

A rod *o* fixed to a post p^1 is arranged to project in the path of the arms g^1 of the weighted bell crank levers gg^1 for the purpose of returning the latter to their initial positions after they have been operated by their respective electro-magnets and after the reception of the calling signal.

Beneath and concentric with the selecting disk *l* is mounted a disk *q* hereinafter referred to as the "priming disk," which is continuously rotated by a clockwork mechanism through the intermediary of a suitable gear rr^1. This disk is arranged to rotate by friction a third disk *s*, which is loosely mounted on the contact armature *d* at right angles to the priming disk, when said armature is depressed under the action of the electromagnet *e*.

The switching disk *s* is provided near its periphery with a radially protruding conductor s^1 which is connected through the

contact armature d to the source of energy b, and is so arranged that when the contact armature is depressed for a predetermined period of time, the said conductor will make contact with the mercury in an annular trough q^1 provided in the rotating priming disk q, and by means of an electro-magnet t mounted on the selecting disk l release the latter and allow it to be rotated by the priming disk q through the intermediary of clutching electro-magnets x and clutches x^1 x^2, the member x^2 of which is attached to a sleeve y to which the selecting disk l is secured, as hereinafter referred to. The electro-magnet t is connected in series with the battery and with the contact effected between the conductor s^1 of the switching disk s and the mercury in the trough q^1 through the intermediary of a contact roller t^1 in contact with a contact ring t^2 connected to one end of the electro-magnet t, a contact brush u in contact with the spindle m and connected to the other end of the electro-magnet t, and through a contact roller q^3 which is electrically connected with the contact roller t^1 and together with the latter are mounted on the fixed post p. The roller q^3 makes contact with a contact ring q^2 which is provided on the lower surface of the priming disk q, and is electrically connected with the mercury provided in the annular trough q^1 formed in the priming disk.

The electro-magnet t is arranged to operate a spring controlled armature t^3 engaging in a slot provided in a locking disk w fixed to the spindle m and simultaneously to cause a contact to be made between contacts t^4 and t^5 arranged in series with a pair of clutching electro-magnets x mounted on the priming disk q, and operating the movable members x^1 of a friction clutch, the member x^2 of which is constructed in the form of a disk attached to a sleeve y to which the selecting disk l is secured. The electrical connection of the electro-magnets x with the contact t^5 and the battery b is effected through the intermediary of a contact roller z which is mounted on a rod z^1 carried on the priming disk q, and makes contact with a contact ring z^2 provided on the lower surface of the selecting disk and electrically connected to the contact t^5, and through a contact roller q^5 mounted on the post p^1 and making contact with a contact ring q^6 provided on the lower surface of the priming disk, one end of the pair of electro-magnets x being connected to the contact ring q^6 and the other end thereof to the contact roller z.

The electro-magnet k arranged in series with the marking and spacing switches, together with the parts and apparatus included in the calling circuit C, which it operates, are mounted on the base of the apparatus and are connected to said switches through the intermediary of a contact roller v^1 mounted on the fixed post p^1 and making contact with a contact ring r which is mounted on the selecting disk l, and is electrically connected with one of the two end switches of the series of marking and spacing switches. The electro-magnet k operates a spring controlled armature k^1 which when attracted by the electro-magnet allows a weighted contact k^2 to drop and remain in contact with a contact k^3 until removed by hand. The calling circuit C includes, in addition to the contacts k^3 k^2, a battery b', an electromagnetically operated horn H and a switch S by which the contacts e^1 d^1 operated by the contact armature d can be included in the circuit C when it is desired that the latter circuit shall repeat the signals received through the electro-magnet e controlling the armature contact d^1 after the circuit has been closed by electro-magnet k (see Fig. 1).

The priming disk q is preferably provided with a rubber, felt or like lining q^4 along the track of its frictional engagement with the switching disk in order to increase the friction and at the same time reduce sound vibrations and wear of the switching disk.

For the purpose of insuring that the passage of the contacts provided on the selecting disk l in front of the contact e should synchronize with the proper impulses energizing the electro-magnet e operating the contact armature d, it is necessary that the switching disk s should always return to the same position of rest, and this is attained by weighting said disk at one point as shown at s^2.

The operation of the electric selective device hereinbefore described is as follows:—

The priming disk q is continuously rotated by the clockwork mechanism through the intermediary of the gear, and immediately upon the reception of the preliminary signal through the electro-magnet e the armature d thereof is depressed, thereby bringing the switching disk s into frictional engagement with the priming disk and the latter thus rotating the switching disk until the projecting conductor s^1 makes contact with the mercury in the trough q^1, whereby the circuit through the electro-magnet t is closed. This circuit is as follows: battery b, spindle m, contact brush u, electro-magnet t, contact ring t^2, contact roller t^1, contact roller q^3, contact ring q^2, mercury in the trough q^1, projecting conductor s^1, switching disk s, contact armature d, and back to the battery (see Fig. 1).

Upon the electro-magnet t being energized its armature t^3 is attracted, thereby releasing the locking connection between the selecting disk l and the locking disk w secured to the fixed spindle m. At the same time the circuit through the clutching electro-magnets x is closed by the contacts t^4, t^5 be

ing brought into contact with each other by the electro-magnet t. The electro-magnets x being energized cause the engagement of the members x^1, x^2 of the friction clutch, whereby the selecting disk l is caused to be rotated by the rotation of the priming disk q.

The marking switches of the set of marking and spacing switches which were previously set in the positions corresponding to the predetermined signal are now operated in succession (the spacing switches remaining unaffected) by the marking electro-magnets, as the marking contacts M^1, M^2. . . M^6 come successively in contact with the contact c, provided the passage of the electric currents through the electro-magnet e synchronizes with the passage of the marking contacts in front of the contact c. The passage of the last marking contact M^6 in front of the contact c causes the last of the marking switches to complete the circuit through the series of marking and spacing switches, and through the electro-magnet k controlling the alarm circuit, the electric circuit being as follows:—battery b, spindle m, contact brush u, the series of marking and spacing switches, contact ring v, contact roller v^1, electro-magnet k and back to the battery.

The electro-magnet k now being energized, it operates the alarm circuit C, the electric horn H remaining in operation until the operator removes the switch S to the position in which the circuit C is closed through the contact armature d.

The contacts t^4 and t^5 operated by the electro-magnet t being positively caused to remain in contact with each other until the spring controlled armature t^3 can engage again in the recess provided in the locking disk w, the clutching electro-magnets x remain energized and cause the selecting disk to be taken around by the primary disk during a complete revolution, that is to say until the armature t^3 comes to lie again in front of the recess provided in the locking disk w, the contacts t^4, t^5 being then automatically disengaged from each other, thereby interrupting the circuit of the clutching electro-magnets x and thus stopping the further rotation of the selecting disk.

Before arriving again in front of the contact c, the bell crank lever contacts gg^1 which have been operated, under the control of the electro-magnet e are forced back to their original positions by means of the projecting rod o which lies in the path of the arms g^1 of said levers and causes them to be moved back as they pass in front of it.

The device hereinbefore described may be used as calling devices in ordinary or wireless telegraphy or as selective devices for closing a particular circuit in preference to other circuits such as the fuse circuit of a mine or explosive charge particularly selected among other mines or explosive charges.

What I claim is:—

1. An electric selective device comprising in combination a plurality of switching devices in series in one and the same electric circuit and capable of being set in one or the other of two possible positions according to the succession of the signs and spaces of a particular signal, and electromagnetic means arranged under the control of the received signals and capable of operating the switching devices upon the receipt of a signal, as and for the purpose set forth.

2. An electric selective device comprising in combination a plurality of switching devices in series in one and the same electric circuit and capable of being set in one or the other of two possible positions according to the succession of the signs and spaces of a particular signal, a series of electro-magnets individually associated with said switching devices, a rotary selecting disk, marking and spacing contacts provided on the selecting disk, a receiving electro-magnet and an interrupting contact which is under the control of the receiving electro-magnet and is arranged to coöperate with said marking and spacing contacts on the selecting disk, as and for the purpose set forth.

3. An electric selective device comprising in combination a series of switching devices provided for the signs constituting a particular signal, a series of switching devices provided for the spaces between said signs, a series of electro-magnets individually associated with said switching devices, a rotary selecting disk, marking and spacing contacts provided on the selecting disk, a receiving electro-magnet, an interrupting contact which is under the control of the receiving electro-magnet and is arranged to coöperate with said marking and spacing contacts on the selecting disk, an electro-magnet which is arranged in series with the two series of switching devices, an alarm circuit associated with the latter electro-magnet, and a switch arranged in the alarm circuit and having a contact electrically connected with the interrupting contact, whereby, when the said interrupting contact is inserted in the alarm circuit through the said switch, the latter circuit will repeat the signals received through the receiving electro-magnet controlling the interrupting contact, as and for the purpose set forth.

4. An electric selective device comprising in combination a series of switching devices provided for the signs constituting a particular signal, a series of switching devices provided for the spaces between said signs, a series of electro-magnets individually associated with said switching devices, a rotary selecting disk carrying the switching de-

vices and the electro-magnets associated therewith, marking and spacing contacts provided on the selecting disk, a receiving electro-magnet, a priming disk and an interrupting contact which is under the control of the receiving electro-magnet and is arranged to coöperate with said marking and spacing contacts on the selecting disk, as and for the purpose set forth.

5. An electric selective device comprising in combination a series of switching devices provided for the signs constituting a particular signal, a series of switching devices provided for the spaces between said signs, a series of electro-magnets individually associated with said switching devices, a rotary selecting disk, carrying the switching devices and the electro-magnets associated therewith, marking and spacing contacts provided on the selecting disk, a receiving electro-magnet, a priming disk, a switching disk which is under the control of the receiving electro-magnet and is arranged to coöperate with said marking and spacing contacts on the selecting disk, as and for the purpose set forth.

6. An electric selective device comprising in combination a series of switching devices provided for the signs constituting a particular signal, a series of switching devices provided for the spaces between said signs, a series of electro-magnets individually associated with said switching devices, a rotary selecting disk carrying the switching devices and the electro-magnets associated therewith, marking and spacing contacts provided on the selecting disk, a receiving electro-magnet, a priming disk, a switching disk which is under the control of the receiving electro-magnet and is arranged to coöperate with the priming disk, an interrupting contact which is under the control of the receiving electro-magnet and is arranged to coöperate with said marking and spacing contacts on the selecting disk, an unlocking electro-magnet mounted on the selecting disk, and clutching electro-magnets mounted on the priming disk, as and for the purpose set forth.

7. An electric selective device comprising in combination a series of switching devices provided for the signs constituting a particular signal, a series of switching devices provided for the spaces between said signs, a series of electro-magnets individually associated with said switching devices, a rotary selecting disk, marking and spacing contacts provided on the selecting disk, a receiving electro-magnet, an interrupting contact which is under the control of the receiving electro-magnet and is arranged to coöperate with said marking and spacing contacts, and means for returning the switching devices to their normal positions, as and for the purpose set forth.

In testimony whereof I have signed my name to this specification.

ARTHUR HYATT MORSE.