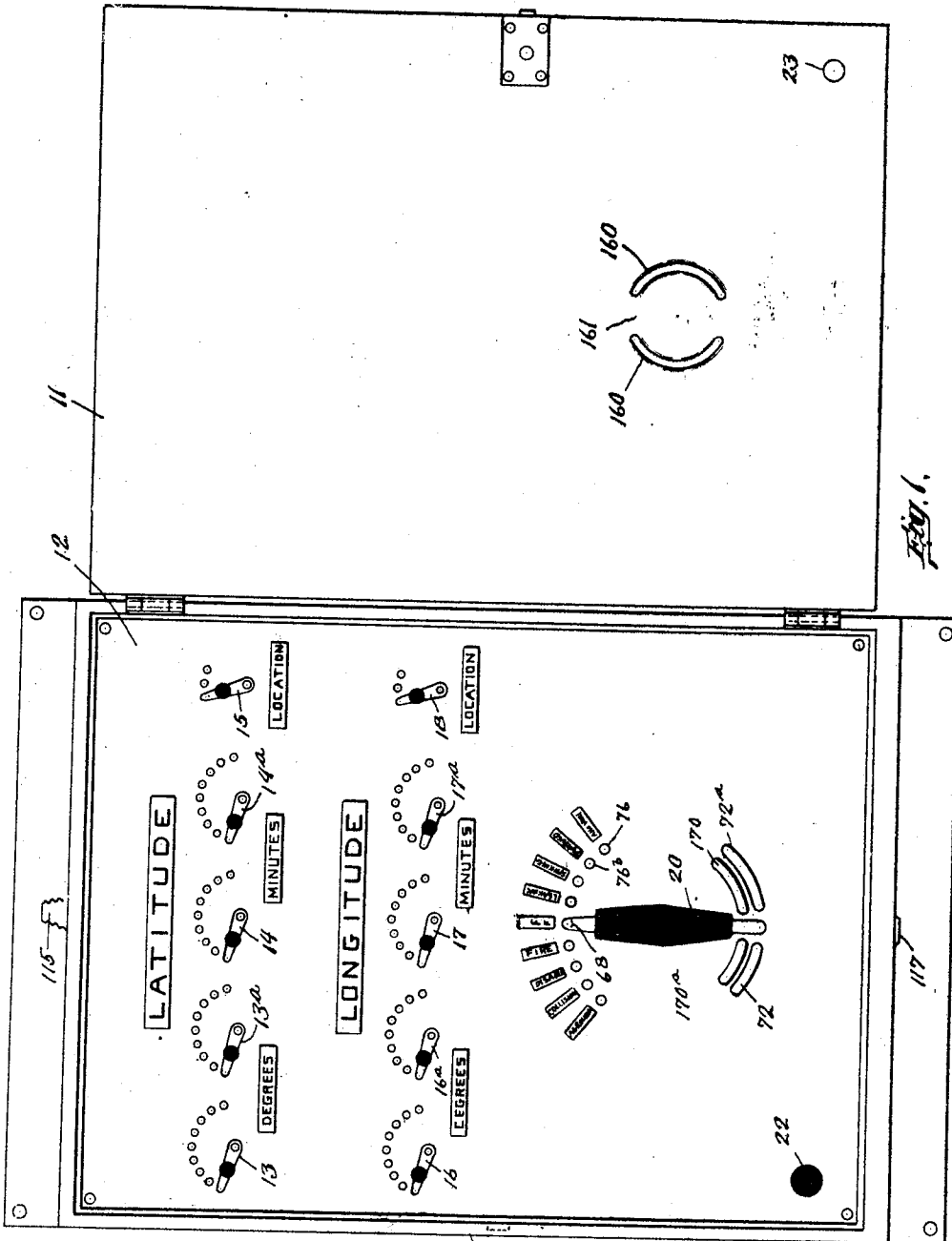


1,438,567.

Patented Dec. 12, 1922.
4 SHEETS—SHEET 1.



Inventor,
Robert E. Winstanley Jr.
by
B. D. Noyes Atty.

1,438,567.

R. E. WINSTANLEY, Jr.
WIRELESS SIGNALING APPARATUS.
APPLICATION FILED FEB. 1, 1919.

Patented Dec. 12, 1922.

4 SHEETS—SHEET 2.

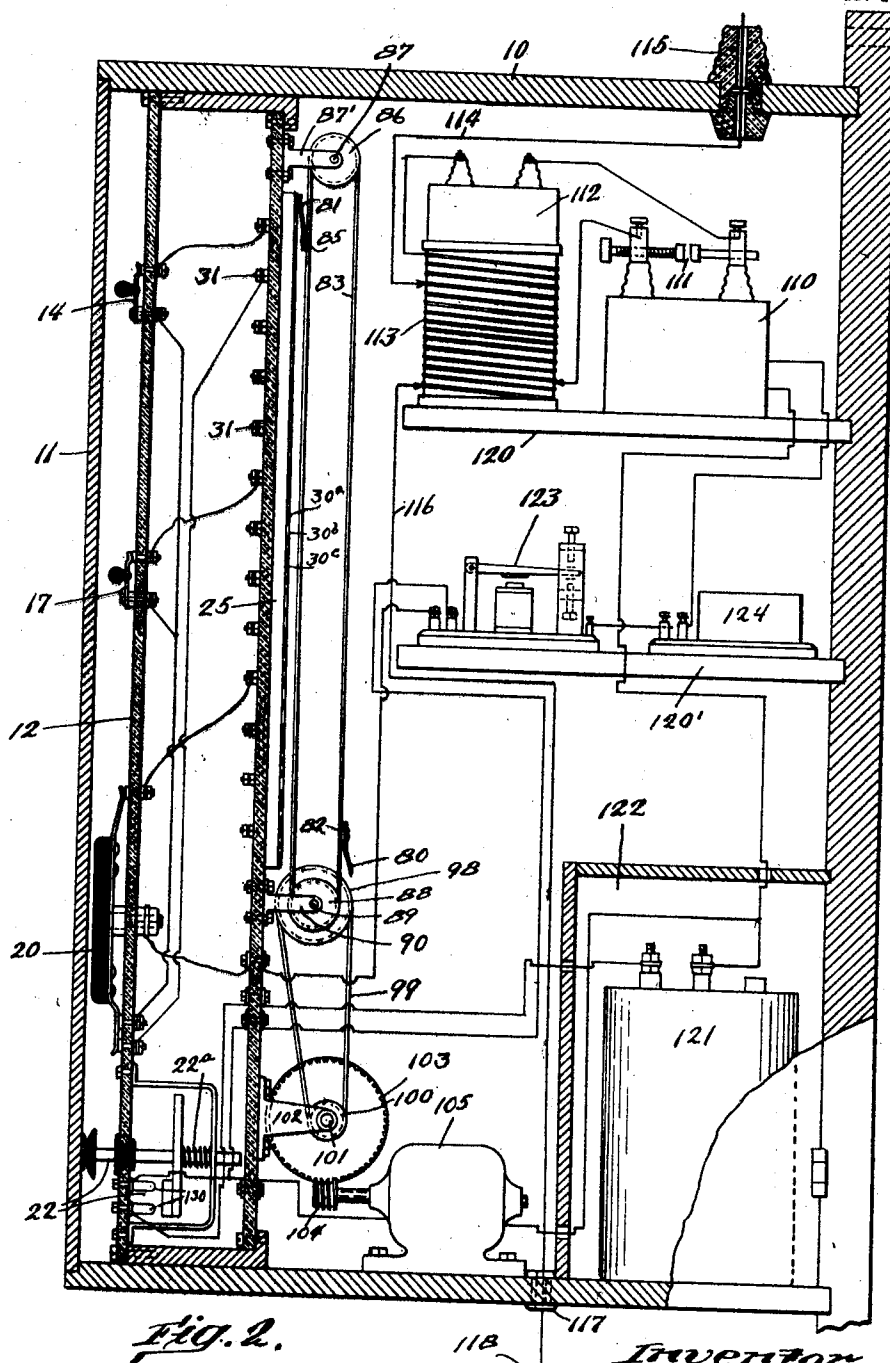


Fig. 2.

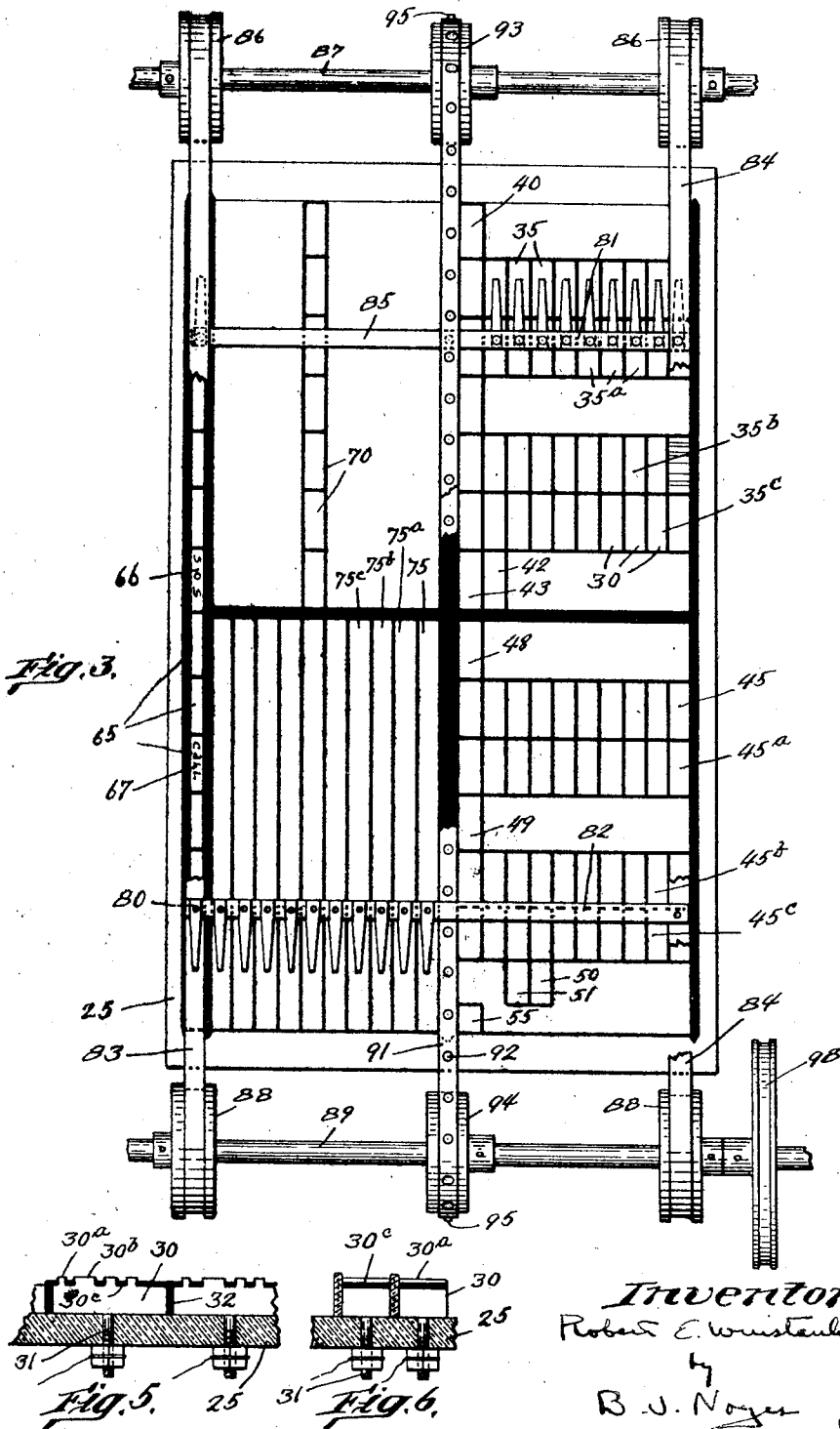
Inventor:
Robert E. Winstanley
B. J. Noyes atty

R. E. WINSTANLEY, JR.
WIRELESS SIGNALING APPARATUS.
APPLICATION FILED FEB. 1, 1919.

1,438,567.

Patented Dec. 12, 1922.

4 SHEETS—SHEET 3.

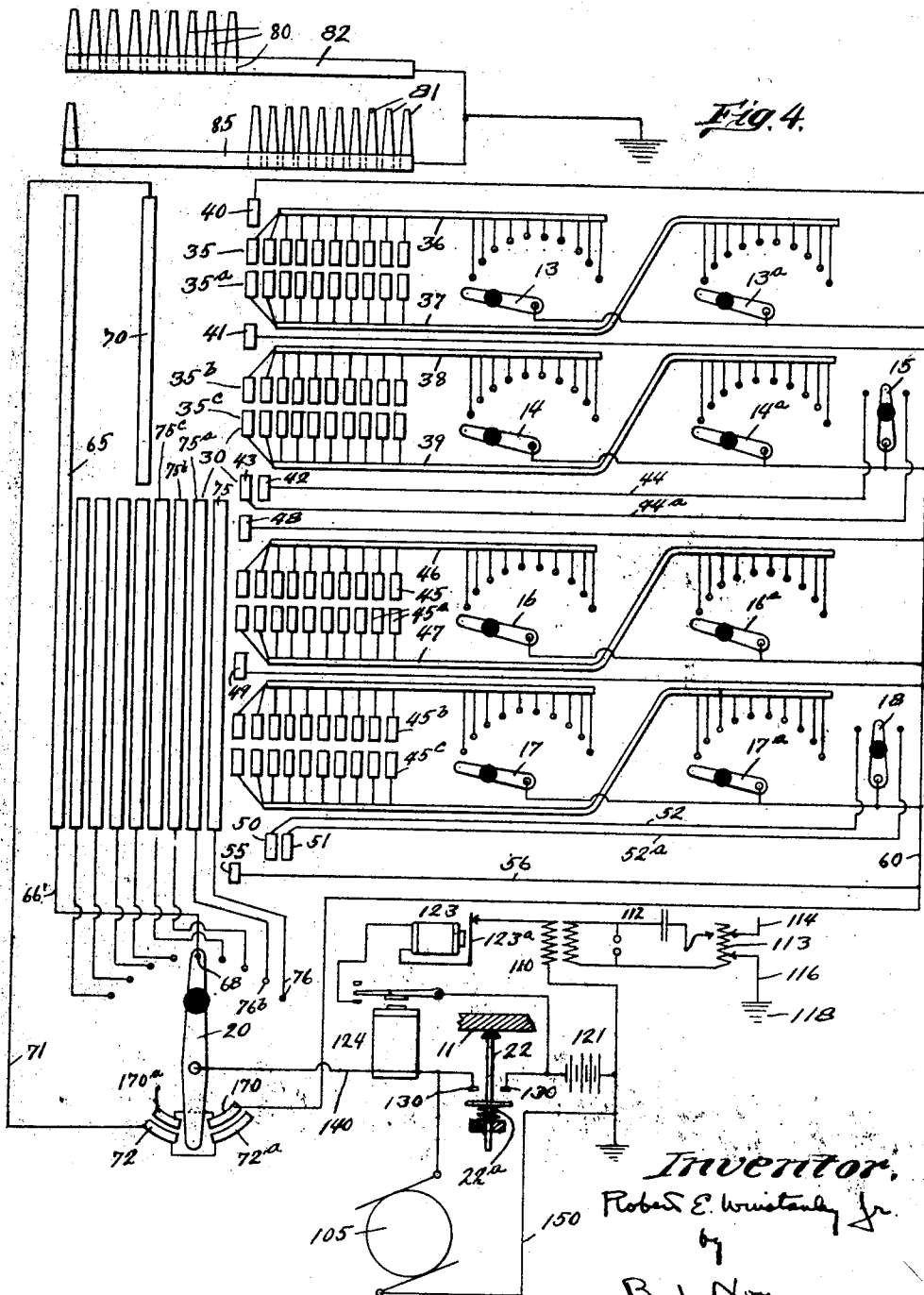


Inventor.
Robert E. Winstanley, Jr.
by
B. J. Noyes atty

R. E. WINSTANLEY, JR.
WIRELESS SIGNALING APPARATUS.
APPLICATION FILED FEB. 1, 1919.

1,438,567.

Patented Dec. 12, 1922.
4 SHEETS—SHEET 4.



UNITED STATES PATENT OFFICE.

ROBERT E. WINSTANLEY, JR., OF BOSTON, MASSACHUSETTS.

WIRELESS SIGNALING APPARATUS.

Application filed February 1, 1919. Serial No. 274,522.

To all whom it may concern:

Be it known that I, ROBERT E. WINSTANLEY, Jr., a citizen of the United States, and resident of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improvement in Wireless Signaling Apparatus, of which the following is a specification.

My invention relates to the wireless transmission of signals and has more particular reference to apparatus for the automatic transmission of a selected number of a plurality of predetermined signals or messages and in a predetermined and also selected order.

Apparatus for the transmission of wireless signals is required by law to be installed upon all boats and vessels above a certain, and small, displacement. It is required, for instance on certain ocean going tub-boats, fishing boats, small coastwise vessels, as well as on larger vessels, in order that the vessel may, in time of distress, communicate to other vessels, in the vicinity or to coast stations, for instance. Wireless apparatus of the present types, is usually leased to the ship owner and requires a trained operator. The cost of the apparatus, including the salary of the operator, runs up into the thousands of dollars, and in addition to this cost, must be reckoned the expense of maintaining the operator on shipboard. The smaller vessels, of and including the type above mentioned, have no reason or necessity, normally, of communicating with the shore or with other vessels, and the apparatus which they are required to install, imposes a very heavy burden upon the ship owners, and the apparatus and its operator may be idle for long periods at a time. It is only when an accident has happened to the ship, as when it is disabled, sinking or the like, that the wireless apparatus and its operator comes into action. It is very infrequently that a vessel becomes disabled or in need of assistance and between such periods the apparatus may not be used.

When a vessel is in need of assistance, but a relatively short message is required to be sent to supply all the information necessary for its speedy assistance. It is merely necessary to send out the international distress signal (S. O. S.), the ship's signal letters, the latitude and longitude of the ship, and the nature of the distress, sinking, or fire, disabled or the like. But relatively few dis-

tress signals are required to cover the majority of possible causes for distress.

An object of my invention, therefore, is in the provision of apparatus which, when properly adjusted, will automatically send the required signals, and without the necessity for a trained operator, and will continue to cause said signals to be sent out continuously until the apparatus is adjusted for the automatic transmission of a different signal, or is stopped.

The apparatus in which my invention is embodied includes a plurality of means constructed and arranged to send, when properly operated, a predetermined signal or message. A plurality of selecting switches are provided which are manipulated to select the desired signal or group of signals, and a master or control switch is provided which controls the starting and stopping of the apparatus.

I prefer to install the apparatus embodying my invention in a relatively small cabinet which is adapted to hang or be disposed in the pilot house of the vessel where it is easily and quickly accessible. The cabinet is arranged to be normally closed by a cover or door and a further object of my invention is in the association of a master or control switch for the apparatus with the cover so arranged that, upon the opening of the door or cover for access to the various selector switches the master switch will be actuated to start the apparatus to automatically send out a continuous distress (S. O. S.) signal, together with the ship's signal letters. The apparatus is arranged to cause this signal to be continuously repeated until the various selector switches for the latitude, longitude and nature of distress have been adjusted, whereupon, upon the adjustment of the last selector switch, the continuous distress signal is discontinued and the selected signals are sent out, together with a short distress signal, and the latter signal is repeated for so long as the cover is open or until the selecting switches are re-adjusted. If, during the continuance of the sending of the distress signals, the distress is relieved, as for instance, there is a fire and the fire is extinguished before assistance has arrived, the "nature of distress" selector switch may be adjusted to send an "All is well" signal in place of the previous "fire" signal and together with the previously sent position signals to notify any vessels approaching with

assistance that such assistance is no longer needed. After the transmission of this signal, repeated for so long as is desired, the closing of the door, with the "nature of distress" selector switch in its normal position causes the apparatus to stop and the sending out of signals is discontinued and the apparatus is again in condition for the continuous sending of a distress signal upon the opening of the door of the cabinet upon some future necessity.

Fig. 1 is a view of the switch board of an automatic wireless signaling apparatus embodying my invention as installed in a cabinet and with the door of the cabinet open.

Fig. 2 is a sectional view through the cabinet of Fig. 1, and showing the relative disposition therein of apparatus embodying my invention.

Fig. 3 is a plan view of the signal board and associated contact members.

Fig. 4 is a diagram showing the circuit connections of apparatus embodying my invention.

Fig. 5 is a side view of a signal member.

Fig. 6 is a sectional detail through two adjacent rows of signal members.

As here shown the apparatus embodying my invention is contained in a cabinet having a door or cover 11 which, when closed, completely encloses the apparatus.

The various selector switches, by means of which the apparatus may be adjusted to send the desired preconceived signals, are installed on the switch board 12 within said cabinet and near the front of said cabinet whereby, upon the opening of the cover, they are conveniently arranged for access and manipulation.

It is essential that one of the signals which the apparatus is required to automatically send is that indicating the latitude in which the boat is positioned at the time of distress and consequently latitude switches 13 and 13^a, 14 and 14^a and 15 are provided which are movably arranged over contact points by which the apparatus may be conditioned for the sending of all degrees and minutes of latitude and the location, either north or south.

Similar longitude switches 16 and 16^a, 17 and 17^a, and 18 are provided by means of which the apparatus may be conditioned for the sending of all degrees and minutes of longitude and the location, either east or west.

It is also essential that the apparatus be arranged for the sending of any one of several preconceived signals which may indicate the nature of distress, and a nature of distress switch 20 is consequently provided which is movable over a plurality of independent contact points to condition the apparatus for the sending of such nature of distress signals as "fire", "disabled" "sink-

ing", "collision", etc., and as many contact points and co-operating signal members may be provided as are desired for the sending of any desired number of predetermined nature of distress signals, or, for that matter, other signals which do not necessarily include nature of distress.

In addition to nature of distress signals an "All is well" signal is provided which is arranged to be sent by the apparatus when the switch member 20 is moved into co-operation with the proper contact points whereby ships hastening forward with assistance may be notified that such assistance is no longer needed and that they may resume their previous courses. After the sending of the "All is well" signal the switch member 20 is adapted to be moved to a neutral or off position, as shown in Fig. 1, previous to the closing of the cover 11 of the cabinet and the consequent stopping of the apparatus. The master, or control, switch 22 of the apparatus has a component thereof extended through the switch board 12 and is adapted to be engaged by the cover 11 carried thereby in its closed position to thereby control the operation of the apparatus and when the cover is opened to permit the apparatus to operate for the sending of the signal and when the cover is closed to stop the apparatus.

The signal board 25 bearing the signal members which co-operate with a signaling circuit, and which determine the preconceived signal to be sent is secured within the cabinet in the rear of the switch board 12.

Each signal member may comprise the bar or strip 30 provided with a bolt 31 which is adapted to extend through the signal board and by means of which said signal member may be secured to the board and electric connection made therewith. The face of each signal block may be provided with raised signal portions as 30^a and 30^b, spaced from each other. Said raised portions may be made of varying length and the length of such portions and their relative number and position with each other determines the message which may be sent. Said raised portions are formed and arranged to represent the dots and dashes of a signal code, and when properly co-operating with the signal circuit will cause a comprehensible message to be sent out.

The spaces, as 30^c, between the raised portions 30^a and 30^b are or may be completely or partially filled with an insulating medium to thereby prevent unintentional contact between said signals and the contact brushes which are arranged to pass thereover; which contact would mutilate the signal. Each signal member which determines a complete message is insulated from adjacent signal members by a suitable insulating means as indicated at 32. The signal mem-

bers are, or may be, of varying length, which length will be determined by the length of the message.

The groups of signal members, which together determine any specific message may be arranged in any desirable order on the signal board and, as here shown, I prefer to arrange them in two parallel groups one of which comprises latitude and longitude signals and the other the nature of distress signals. The latitude signal members are illustrated at 35, 35^a, 35^b and 35^c. There are twenty signal members each insulated from all others and arranged in two parallel rows as at 35 and 35^a which bear raised portions arranged to co-operate with the signal circuit for the sending of the numerals 0, 1, 2, 3 . . . 9. These signal members are connected through the wires of the cables 36 and 37 to degree selector switches whereby the desired signal members may be selected and connected to the circuit for the sending of any predetermined degree of latitude.

Similarly the minute signal members 35^b and 35^c are individually connected through the wires of the cables 38 and 39 to the minute selector switches 14 and 14^a which may, in the same way, be adjusted to send any desired minute of latitude. The signal member 40 arranged to send the signal "latitude" is positioned on the board ahead of the first row 35 of latitude signal members and is arranged, in the operation of the apparatus, to send the signal "latitude" previous to the sending of the numerals indicating the degrees and minutes of latitude. A signal member 41 is arranged between the rows of degree and minute signal members and may bear a period or other signal to separate the degrees from the minutes in the message.

Signal members 42 and 43 are provided at the end of the signal members 35^b and 35^c when indicating minutes of latitude which are arranged to be connected through the leads 44 and 44^a to the latitude location switch 15, whereby the apparatus may be adjusted to properly indicate either north or south latitude.

In the same manner similar longitude signal members 45 and 45^a, 45^b, and 45^c are provided and arranged to send the numerals 1, 2, 3, . . . 9 and co-operate through cables 46 and 47 with the degrees and minute selector switches 16 and 16^a respectively for the sending of degrees and minutes of longitude.

Said signal members are also preceded by the signal member 48 which is arranged to send the word "longitude", or its abbreviation, and the degree signal members are separated by the contact member 49 which serves to separate, in the signal, the degrees from the minutes of longitude. Location signal members 50 and 51, to indicate east and west longitude are connected

through leads 52 and 52^a to the longitude location selector switch 18 and said switch, when properly adjusted, causes the proper longitude location to be sent.

A separate signal member 55 is provided at the end of the rows of latitude and longitude signal members which is separately connected through the lead 56 to the main bus wire 60 with which all of said switches are connected and which is properly arranged to send an "AR" or termination of message signal. The latitude and longitude signals and the "AR" signal are so related to each other that said signals will be sent in the order mentioned.

Previous to the sending of the latitude and longitude signals and when the apparatus is first operated it is required that a continuous distress signal be sent out which comprises the international distress signal "S. O. S." repeated and associated with the ship's call letters. For this purpose a strip 65 is provided and which may be made up of members 66 bearing the "S. O. S." and others members 67 bearing the ship's call letters all electrically connected together.

This strip for convenience is located on the opposite side of the switch board from the latitude and longitude signal members and, when the apparatus is first set in operation and previous to the adjustment of the nature of distress switch, is designed to be continually in circuit for the sending of the continuous distress signal.

For this purpose the strip 65 is connected through the lead 66' with a contact point 68 associated with the nature of distress signal switch 20 and the movable switch member thereof is arranged to be in electrical engagement with said contact point in the normal condition of the switch, and when the cover of the cabinet is first opened and previous to its adjustment to condition the apparatus for the sending of other signals.

After the various selector switches have been adjusted for the sending of the latitude and longitude and nature of distress signals the continuous distress signal sent by the strip 65 is arranged to be cut out and an intermittent distress signal, coupled with the latitude and longitude and nature of distress signals, is arranged to be sent by the apparatus. The intermittent distress signal is arranged to precede the message and is sent out by the co-operation of the strip 70 with the signal circuit. This strip 70 is properly arranged to bear raised portions to give two or three "S. O. S." signals and the ship's call letters and the "TV" signal to separate the distress signal from the body of the message. Said strip 70 is connected through the lead 71 with the electrically connected segments 72 and 72^a arranged to be engaged by the movable member of the control switch 20 to thereby connect said strip 70 with the

signal circuit for the sending of its message.

A plurality of nature of distress signal strips as 75, 75^a 75^b and 75^c are provided which are behind the strip 70 and are formed to cooperate with the signal circuit to each send a separate distress signal, such as "On fire," "On shore," "Disabled," "Sinking," etc. Each one of said strips is arranged to be independently connected to contact points 76 and 76^a, etc., of the nature of distress switch 20.

Each of the rows of signal members or contact strips are arranged to be engaged by a brush of the sets of brush members 80 and 81 which are electrically connected to the signaling circuit. The brush members 80 are carried by the metal strip 82 which is secured at its ends to the endless belts 83 and 84. The brush members 81 are secured to a similar metal strip 85 the ends of which are also secured to said belts 83 and 84 and upon the opposite sides of said belts from said strip 82.

Said arrangement is such that while one set of brushes is being moved over one set of signal members the other set of brushes is free from contact with its set of signal members whereby interference of signals is prevented.

Said belts 83 and 84 are extended over pulleys 86 fixed to a shaft 87 supported in bearings 87' at one end of the signal board and over pulleys 88 fixed to a shaft 89 supported in bearings 90 arranged at the opposite end of the signal board. The relation of said brush members 80 and 81 and said signal board is such that the lower part of the belts 83 and 84 is adjacent the signal members carried thereby, whereby the brushes may be moved alternately into contact with said signal members.

A flexible metal endless belt 91 having a line of perforations 92 therein may be extended over and between the sprocket wheel 93 fixed to the shaft 87 and the sprocket wheel 94 fixed to the shaft 89.

Said wheels are provided with pins or teeth 95 therein which are arranged to enter the perforations in said strip to thereby cause the positive rotation of said shafts 87 and 89.

The brush member supports 82 and 85 are arranged to be electrically and mechanically connected to said strip 91 and said strip 91 and said shafts 87 and 89 are arranged to be connected to a part of the signaling circuit to thereby connect said brush members 80 and 81 also to the signal circuit.

It is also seen that by this arrangement the brush members are positively and alternately moved over the signal board and that the belts 83 and 84 serve to hold said brush members in alignment.

The shaft 89 is provided with a pulley 98 fixed thereto which is connected through

the belt 99 with a pulley 100 of smaller diameter fixed to the shaft 101 which is journaled in support 102 carried by the signal board 25. A gear 103 is also fixed to said shaft 101 and meshes with a worm gear 104 fixed to the shaft of the motor 105.

The arrangement described forms means whereby the brush members 80 and 81 are moved by the motor and the relatively high speed of the motor is reduced to the desired relatively low rate of movement of the brush members.

While the signal board with its signal members above described constitutes a satisfactory means whereby the signaling circuit may be controlled for the sending of the desired preconceived signals yet other equivalent means may be employed whenever desirable.

The wireless apparatus may comprise any usual or suitable type and as here shown a high voltage transformer 110, a spark gap 111, condenser 112, and tuning coil 113 are provided which are arranged to be connected in the usual manner as shown in Fig. 2.

A lead 114 may be arranged to be adjustably connected to the turns of the tuning coil. Said lead 114 may extend through the insulator 115 secured in the top wall of the cabinet 10 and to be connected to an aerial not shown. A lead 116 may also be arranged to be adjustably or otherwise connected to the tuning coil and may extend through the insulator 117 in the bottom wall of the cabinet and be connected to a ground, indicated at 118.

Said transformer and tuning coil may be conveniently arranged on a shelf 120 in the cabinet and in the rear of the signal board and other associated apparatus may be arranged on a lower shelf as 120'.

The current for operating the transformer 110 and the motor 105 is furnished by a battery 121 arranged in a separate compartment 122 of the cabinet 10. Said battery preferably is composed of a plurality of wet cells of some type having a high capacity with long life on open circuit, such, for instance, as the well known Edison caustic potash cell. A sufficient number of these cells may be connected together in series to furnish the voltage necessary for the operation of the motor and transformer.

Inasmuch as direct current is supplied by the battery some form of vibrator or circuit interrupting device is necessary in order that the transformer may properly function. For this purpose a simple vibrator 123 is provided having a vibrating member 123^a arranged to alternately make and break the circuit including the transformer, although it is obvious that other forms of vibrator or circuit interrupting device may be employed as desired.

The signal members and co-operating

brush members are arranged to control the transformer circuit through the relay or magnet key 124 whereby the signaling circuit including the signal members and brush contact members carry but a relatively low value of current and arcing upon the breaking of the signal circuit at the signal members is thereby greatly reduced, and a consequent long life of said members may therefore obtain.

Previous to the operation of the apparatus for the automatic sending of distress signals, the cover of the cabinet 10 including the apparatus is designed to be maintained closed and the control switch 22 is consequently moved out of co-operation with its stationary contact members 130 and the signaling circuit 140 and the motor circuit 150 is thereby open and the motor consequently is at rest. The movable switch member of the nature of distress switch 20 is designed to be in the neutral or off position indicated in Figs. 1 and 4, and the cover is provided with two opposed ledges 160 having a gap 161 therein adapted to receive the movable member of said switch when it is in the off position to thereby permit the cover to be completely closed and in all other positions of the switch to prevent complete closure of the cover whereby the operator is warned that he must move said switch into off position.

In the event of an accident happening to a ship in which this apparatus is installed and which renders it imperative to send a distress signal, the cover is opened. Immediately the main switch 22 is moved upward by its spring 22^a to thereby complete the motor circuit 150 to start the apparatus in action and also close the signal circuit 140 for the control of the magnetic key of the transformer by the signal members for the sending of the desired signals. Upon the completion of the motor circuit the motor consequently starts to operate and moves the two sets of brush members 80 and 81 alternately over the signal members carried by the signal board 25. Since the nature of distress switch is in "off" position all of the signal members except the continuous "S. O. S." signal strip 65 is cut out of the signal circuit and this strip only is in circuit. Consequently when a brush member 81 passes over said signal strip 65 it makes and breaks the signal circuit 140 and causes the operation of the magnetic key 124 to energize the transformer circuit in accordance with the nature of the raised portions formed on said strips to thereby send out the desired distress signal. When this brush member 81 has been moved beyond the strip 65 brush member 80 of the second set of brush members is arranged to co-operate with said strip whereby a continuous distress signal is sent out for an indefinite period and until the selector switches are adjusted.

With the continuous "S. O. S." or distress signal being sent out the operator, having previously known or determined the latitude and longitude, adjusts the latitude and longitude switches to connect the required signal members to the main bus lead 60 of the signaling circuit, all other signal members being cut out of the signaling circuit.

The main bus lead 60, however, is connected to segments 170 and 170^a of the nature of distress switch 20 and a gap is provided in said segments and when said switch is in the neutral or off position said bus lead 60 is disconnected from the circuit and consequently the adjustment of the latitude and longitude switches is without effect, so far, in changing the nature of the signal sent out by the apparatus.

After the latitude and longitude selector switches are properly adjusted the nature of distress signal is then moved into engagement with the proper contact point, which contact point may be properly labelled, to select the proper nature of distress signal strip as 75, 75^a, etc., to send out a nature of distress signal. When the nature of distress switch is so adjusted, the continuous "S. O. S." is cut out of the signaling circuit and the intermittent distress signal strip 70 is connected to the signaling circuit 140 through the movable member of said switch 20 and the segments 72 and 72^a and consequently one of the brush members 80 will co-operate therewith upon its passage thereover for the sending out of the signal formed thereon.

The same brush member 80 or another brush member, depending upon the particular nature of distress signal chosen, is adapted to co-operate with the selected nature of distress signal strip for the sending out of the signal formed thereon as said brush member passes said part of the signal board. As said brush members 80 are carried past the board and away from co-operation with their signal members the second brush members 81 are moved into co-operation with other associated signal members and the latitude and longitude signals are consequently sent.

At the termination of the latitude and longitude signals, which completes the message, the signal "AR" is sent by the signal members 55 which is directly connected to the bus lead 60 to thereby indicate the termination of the message.

The operation of the apparatus above described may be indefinitely repeated for so long as the selector switches remain in any adjusted position or until the apparatus stops.

If the distress has been relieved without outside assistance it is desirable that notice of such relief be sent out in order that vessels approaching with assistance may resume

their original courses. One of the strips 75, 75^a, etc., is so formed that it will co-operate with the signaling circuit to send the message "All is well" or its equivalent in place of the nature of distress signal as "Fire," "sinking," etc. Said "All is well" signal may be sent by simply moving the nature of distress switch to the required contact point thereby cutting out the previous signal strip and connecting the "All is well" strip in the signaling circuit. The apparatus may repeat the intermittent distress signal, latitude and longitude and "All is well," or the latter signal alone, indefinitely or until the nature of distress switch has been moved to neutral position and the cover immediately closed, whereupon the main or control switch 22 is caused to open, and the signaling and motor circuits opened and the apparatus stopped.

It is obvious that modifications of the apparatus above described may be made without departing from the spirit of my invention.

1. Automatic wireless signaling apparatus comprising a cabinet in which components of the apparatus are installed, a cover for said cabinet adapted to be normally closed and the apparatus inoperative, said apparatus arranged for the sending of a plurality of predetermined messages, means controlled by said cover operated upon a movement of the cover from closed position to start the apparatus to send a predetermined signal, and means to discontinue the sending of the signal and cause the apparatus to send a second predetermined signal, said controlling means operated by the movement of the cover into closed position to stop the apparatus and arrest the sending of the signals.

2. Automatic wireless signaling apparatus comprising a plurality of signal members each arranged to co-operate with components of the apparatus for the sending of different wireless signals, a plurality of manually operable selector switches associated with said signal members to select the desired signals to be sent, means to start the operation of the apparatus to send a definite preconceived signal during the setting of the selector switches, certain of said selector switches arranged to be operated to select different desired signals during the continuance of the sending of the initial signal without affecting the sending of said initial signal, another selector switch arranged to be operated to cause the discontinuance of the initial signal and the sending of the selected signals in preconceived sequence.

3. Automatic wireless signaling apparatus comprising a plurality of signal members each arranged to co-operate with components of the apparatus for the sending of different wireless signals, a plurality of manually op-

erable selector switches associated with said signal members to select the desired signals to be sent, means to start the operation of the apparatus to send a definite preconceived signal during the setting of the selector switches, certain of said selector switches arranged to be operated to select different desired signals during the continuance of the sending of the initial signal without effecting the sending of said initial signal, another selector switch arranged to be operated to select a desired signal and when operated to cause the discontinuance of the initial signal and the sending of the selected signals in preconceived sequence, said apparatus arranged to continue the continuance of the sending of said latter signal until stopped.

4. Automatic wireless signaling apparatus comprising a signal board, a plurality of signal members thereon insulated from each other and arranged in predetermined order in rows, a contact supporting member movably arranged for continuous movement over said rows of signal members, and a plurality of contact members supported by said supporting member arranged to be moved along said rows of signal members and co-operate therewith and with other components of the apparatus for the sending of a preconceived wireless message.

5. Automatic wireless signaling apparatus comprising a signal board, a plurality of signal members thereon insulated from each other and arranged in predetermined order in rows, a contact member for each row of signal members arranged to be simultaneously moved along said rows to co-operate with said signal members and with other components of the apparatus for the sending of a preconceived wireless message, an endless belt associated with said signal board and supporting said contact members and movable to move said contact members along said rows, driving means for said belt, and a plurality of selector switches associated with said signal members arranged to be operated to select the message to be sent.

6. Automatic wireless signaling apparatus comprising a signal board, a plurality of signal members thereon insulated from each other and arranged in predetermined order in rows, two sets of contact members for said rows of signal members arranged to be simultaneously moved along said rows to co-operate with said signal members and with other components of the apparatus for the sending of a previously conceived wireless message, two endless belts arranged on opposite sides of said signal board and by and between which said contact members are supported, said belts being simultaneously rotatable to move said contact members over said rows of signal members for the sending of a signal, driving means for

said belts, said sets of contact members arranged on opposite sides of said belts and associated with independent rows of signal members, whereby but one set of contact members is in contact with the signal members at a time, and a plurality of selector switches associated with said signal members arranged to be operated to select the message to be sent.

10 7. Signaling apparatus having a plurality of message-forming devices and means to select indiscriminately a desired number of said devices and subsequently send their messages in predetermined order.

15 8. Signaling apparatus having a plurality of signal-forming devices, means to select indiscriminately a number of said devices to form a complete message when sent in predetermined order, and means to send the signals thus formed in predetermined order to form the complete message.

20 9. Signaling apparatus having a plurality of message-forming devices, means to select indiscriminately certain of said devices for the sending of their messages, and means

arranged to govern the order of sending the messages formed by said devices for the sending of the selected messages in predetermined order.

10. Signaling apparatus comprising a plurality of message-forming devices, a signal circuit controlled by each device, and manually-operated means to select a predetermined signal circuit for the sending of the message formed by its controlling device. 30 35

11. Signaling apparatus comprising means to form a plurality of independent messages, means to condition the apparatus to send selected messages in predetermined order, and means to send the selected messages in predetermined order. 40

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ROBERT E. WINSTANLEY, JR.

Witnesses:

H. B. DAVIS,

T. T. GREENWOOD.