G. L. FOOTE.

NON-INTERFERENCE SIGNAL BOX.

APPLICATION FILED FEB. 1, 1911.

1,043,818.

Patented Nov. 12, 1912.

3 SHEETS—SHEET 1.

Fig. 2

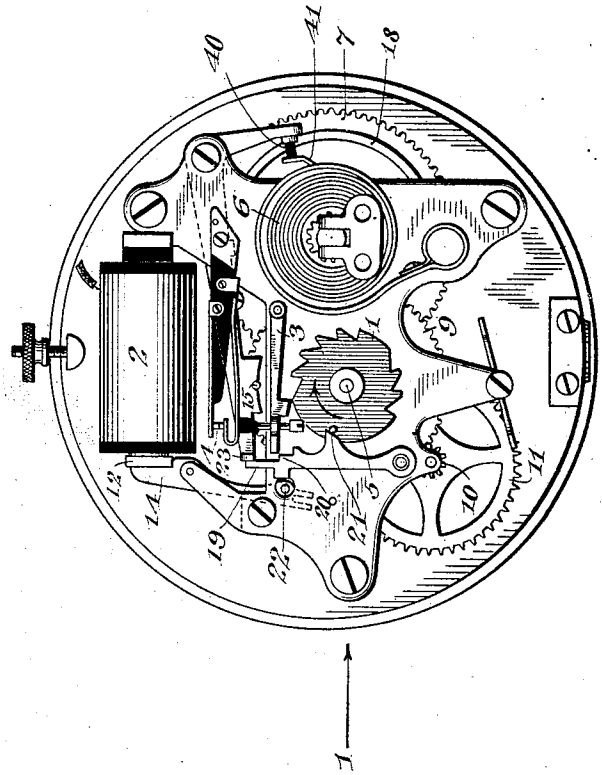
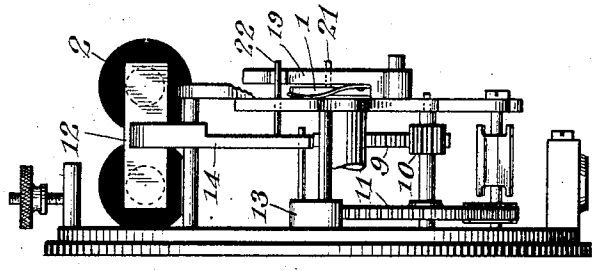


Fig. 1.



WITNESSES

Frederick S. Borden

Irene Lefebvre

INVENTOR

George L. Foote

BY

Townsend & Sutcliffe

ATTORNEYS

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3 SHEETS—SHEET 2.

Fig. 3.

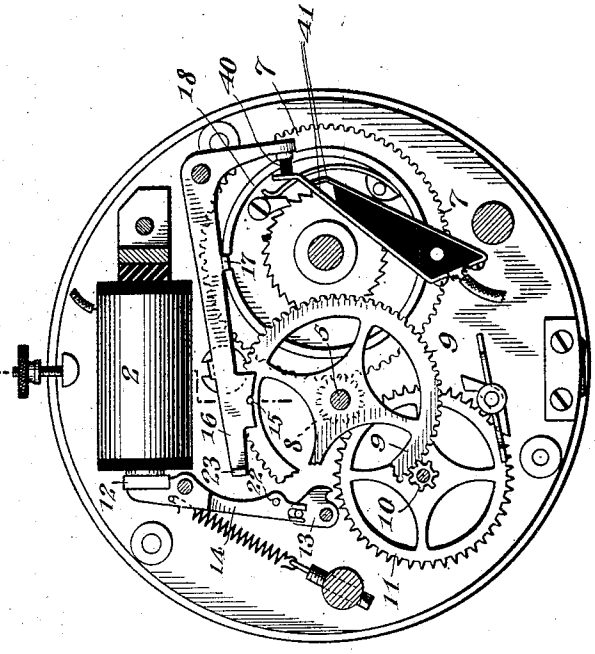
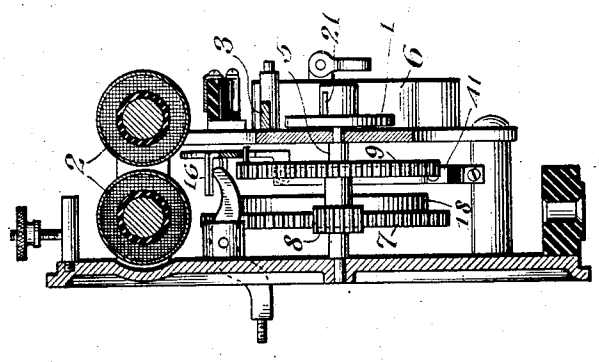


Fig. 4.



WITNESSES:

Frederick S. Braden

Irene Lippincott

INVENTOR

George L. Foote

BY

Townsend & Bucher

ATTORNEYS

G. L. FOOTE.

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3 SHEETS—SHEET 3.

Fig. 6.

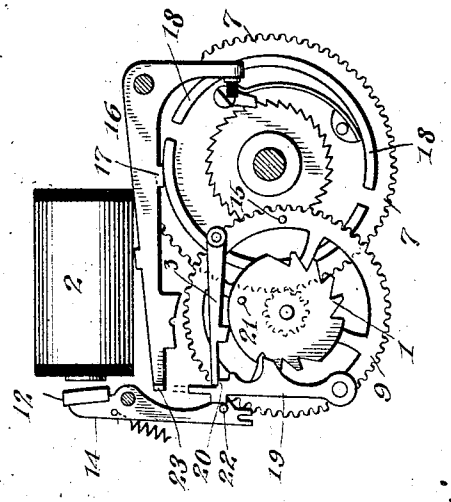


Fig. 7.

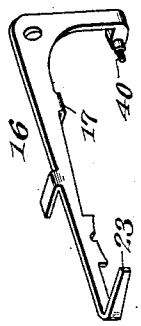
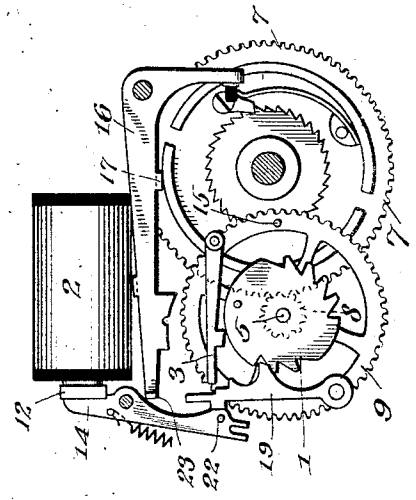


Fig. 5.



WITNESSES

Frederick S. Bodrn

Jens Lepkowitz

INVENTOR

George L. Foote

BY

Townsend & Seeker

ATTORNEYS

UNITED STATES PATENT OFFICE.

GEORGE L. FOOTE, OF BROOKLYN, NEW YORK, ASSIGNOR TO GEORGE L. FOOTE AND HENRY G. PIERSON, DOING BUSINESS AS FIRM OF FOOTE, PIERSON & COMPANY, OF NEW YORK, N. Y.

NON-INTERFERENCE SIGNAL-BOX.

1,043,818. Specification of Letters Patent. Patented Nov. 12, 1912.

Application filed February 1, 1911. Serial No. 605,859.

To all whom it may concern.

Be it known that I, GEORGE L. FOOTE, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Non-Interference Signal-Boxes, of which the following is a specification.

My invention relates to electric signaling apparatus commonly known as signal boxes or signal transmitters and particularly to that special form of such apparatus in which a signal wheel is employed adapted to send a characteristic signal repeated a number of times.

The object of my invention is to produce a box or transmitter of such character that when a number of them are used upon the same circuit and one of them is pulled to transmit a signal, a second box pulled after the first will be automatically locked out of action and have its signal stored and will, when the first box completes its action, be automatically caused to come into action and send its signal through the normal change of circuit condition resulting from the cessation of action of the first-pulled box.

A further object of my invention is to cause the boxes to operate in such manner that there shall be no mutilation or confusion of signals arising from the second-pulled box transmitting its signal before the lapse of the usual space following each complete signal of the first-pulled box.

A further object of my invention is to so construct the apparatus that while the second-pulled box may be locked from sending its signal, the actuating train of said box will be left ready to act but will act only intermittently during the transmission of the signal by the first box, thereby preserving the source of power such as an actuating spring by which the train of the box is operated.

A further object of my invention is to so construct the boxes that no matter how many boxes may be pulled at or about the same time, one only will operate to send its characteristic signals while the remainder will be locked out but will have their signals stored and will automatically and successively start and each send its characteristic signals after the next previously operating box shall have sent its complete round of signals.

In its main purpose of preventing interference between boxes operated on the same circuit, my invention resembles previous apparatus but differs therefrom in the essential features which will be obvious to those skilled in the art from the subjoined description taken in connection with the accompanying drawings.

The invention consists in the construction and combinations of devices hereinafter described and then more particularly specified in the claims.

In the accompanying drawings, Figure 1 is an edge view of the mechanism of a signal transmitter embodying my invention, looking in the direction of the arrow 1 of Fig. 2. Fig. 2 is a front elevation of the same. Fig. 3 is an elevation of the parts back of the front plate and signal wheel. Fig. 4 is a vertical section on the line IV IV of Fig. 3. Fig. 5 illustrates a position of the sending lever and lockout device after the box has been started and in the position which permits the same to send its signal. Fig. 6 shows the same parts in position for locking out a second box in case the same has been pulled while the first box is transmitting its signal. Fig. 7 is a perspective view of the starting lever.

1 indicates a signal wheel of the usual construction employed in the class of apparatus to which my invention relates. Such signal wheel has notches in its edge suitably spaced in groups and having in each group the proper number of notches to cause the box to send its own characteristic signal. The direction of rotation of this signal wheel in sending the signal is indicated by the arrow and the notches as shown are adapted to cause the box to send the signal No. 35, which as usual in this class of boxes, is repeated any desired number of times to give what is called a "round" of signals, usually four complete signals.

2 is a lockout or non-interference magnet which is normally out of circuit when the box is at rest, but is thrown into circuit, when the box is pulled, by the breaking of a shunt normally completed around the magnet and circuit breaking devices by which the signal is transmitted, as usual in the art.

The signal wheel operates upon a signal

transmitting mechanism of any desired character. Preferably I employ that form which comprises a sending lever 3 engaging the periphery of the notched wheel so as to be actuated thereby and in turn operating upon the contacts of a circuit breaker 4 in such manner as to open the circuit when the lever drops into a notch in the wheel, but to close the circuit when raised out of the notch. The actuating mechanism for the wheel may be of any desired form but is preferably a spring operated actuating mechanism, the spring of which, indicated at 6, is connected to a gear wheel 7, which in turn gears with pinion 8 on the shaft 5 carrying the signal wheel. The retarding mechanism for retarding the action of the spring may comprise the ordinary escapement wheel 11 upon a shaft 10, with which a gear wheel 9 on shaft 5 is geared. The starting lever 16 operated by the usual pull-knob is provided, as indicated, with an arc adapted to receive a pin 15 on the wheel 9 or other wheel of the train to lock the actuating mechanism against operation until the pull-knob is operated to send a signal. When the lever is lifted the pin being freed from the notch permits the wheel 9 to rotate. The starting lever likewise is provided with a projection 17 adapted to ride on a collar 18 of the main or other wheel of the actuating mechanism and said collar is notched at two points preferably, so that the starting lever may drop into the notch and stop the revolution of the actuating mechanism when the signal wheel is revolved to send the signal the allotted or proper number of times.

The lockout or non-interference magnet 2 is normally shunted and means are provided for breaking said shunt and throwing the magnet into circuit with the signal transmitting mechanism when the box is pulled. Said means may comprise, as usual in the art, an insulating pin 40, carried by the starting lever and adapted to separate the shunting springs 41, thereby breaking a normal shunt around the magnet and contacts 4 of the signal transmitting mechanism.

The apparatus further embodies a mechanical locking or lockout device adapted to mechanically engage and lock some portion of the transmitting mechanism against operation by the actuating mechanism and signal wheel driven thereby, leaving said actuating train or mechanism free to act under the control of the remaining parts of the apparatus, as will be presently described. Said mechanical lockout device in a simple form embodies a lever 19 suitably formed to engage with the sending lever of the signal transmitting mechanism, for which purpose it is provided with a shoul-

sending position, that is to say when it is lifted by riding on the unbroken edge of the signal wheel or upon the teeth intermediate the notches in said wheel. Said lockout device is so mounted or constructed as to be without bias, that is to say it is adapted to retain either of the positions into which it is thrown until it is thrown positively in the other direction. For this purpose the lever 19 may be freely pivoted with slight friction upon its pivotal pin. Its movement in one direction to lock the sending lever is produced by an armature lever 14 which engages the rear of the lockout device by a pin 22 or other means. The lockout device is thrown out of action by a device connected with the actuating train, as for instance a pin 21 mounted upon the signal wheel 1 or other member of said train. When the lever is thrown to "lock out" the box it will retain its lockout position until positively actuated by the pin 21. Likewise when thrown back by the operation of said pin to the non-locking position indicated in Fig. 2, it will automatically retain that position even after being freed from the pin 21 until it is thrown forward positively by the action of the lockout magnet armature lever. If the sending lever be lifted fully and the magnet 2 be at such time discharged through breaking of the main line circuit by transmission of signals from any other box, the armature 12 of the magnet is thrown back by the usual action of the spring, and the pin 22 carried by the armature lever 14 will engage the rear side of the lockout lever 19 and force the same forward, so that the shoulder 20 will pass under the sending lever and hold the same lifted until the pin 21 has resumed the position shown, or normal position, and forced the lever 19 back. This normal position is the position reached by the actuating train after the box mechanism has moved to an extent sufficient to send a complete signal and has arrived at the normal position or position ready for beginning the transmission of another signal of the four or more signals making a round of signals from the box. In this normal position the sending lever is free of the shoulder, thus permitting said sending lever to rise and fall under the action of the signal wheel when the latter is rotating. When the sending lever drops into a notch and thereby opens the circuit and consequently discharges the magnet 2, its end falls below the shoulder of the lever and thereby holds the lockout device in inoperative condition, although it is, at such time, engaged by the pin 22, owing to the retraction of the armature lever 14 by its retracting spring. The armature lever of the magnet 2 also connects with and operates upon a detent 13

drawn forward and the lower end of the lever 14 is pulled back, pawl 13 is lifted from engagement with the teeth of wheel 11 and the signal box mechanism is free to rotate. When the magnet is discharged and the sending lever is at such time in non-sending position or lifted, as shown in Fig. 6, which represents the position of the parts at one stage of the operation of the box, the detent 13 will be permitted to engage the escapement wheel and temporarily stop the rotation of the actuating train of the box, this being due to the fact that the shoulder of the lever 19 at such time is free to pass under the end of the sending lever, as shown in Fig. 6. If, however, when the magnet is discharged, the said sending lever is in sending position, that is depressed, it will prevent the detent from moving into engagement with the escapement wheel to temporarily stop the rotation of the train, because the lever 19 will then engage the end of the sending lever and the lower end of the armature lever will be prevented from moving over, by engagement of its pin 22 with the rear side of lever 19.

The general operation of the apparatus is as follows: Normally the parts stand in the position shown in Figs. 2 and 3, the lockout device 19, armature lever 14 and pawl 13 being held in such position by the action of the pin 21 upon the inclined projection of the lockout device. The pawl 13 being then lifted from the teeth of the wheel 11, the box train is free to rotate and send the signal when released by the starting lever. As soon as the box is pulled the shunt around the magnet 2 and transmitter spring is broken at the springs 41 in the usual way and the main line circuit is now through the circuit breaker springs 4 and magnet 2 in series. As soon as signal wheel 1 starts to rotate the pin 21 passes beyond the projection of the lockout lever or device 19 and at first the sending lever rides on the unbroken surface of said signal wheel 1. During this time, if no other box has been previously pulled, the circuit through the magnet 2 will remain unbroken and the lever 19 being without bias, as described, will retain the position shown, or the position in which the sending lever will be free to fall whenever it encounters a notch in the sending wheel. On reaching the first notch the sending lever drops and the circuit through the springs 4 is broken to send the first impulse of the signal No. 35. In dropping, the end of the sending lever 3 as before described, drops into position to hold the lockout lever back although there is pressure by the pin 22 through the action of the retractor spring of the armature lever at the instant the magnet 2 is discharged by the breaking of the circuit. This action is repeated at each break of the circuit by the sending lever, which is therefore free to follow the signal on the wheel 1 so long as the magnet remains undischarged while the lever is in fully lifted position. As will be obvious, when said lever is fully lifted, the magnet 2 can only be discharged by the breaking of the main line circuit by the transmission of signals by some other box. In the absence therefore of any other box being pulled, the first box pulled will transmit its signal without interference and having completed its round of four or more complete signals, it will be brought to rest automatically by the starting lever engaging pin 15, at which time pin 21, being properly positioned for the purpose, will arrive again at normal position opposite the projection on the lockout lever or device 19. Should another box on the same line be pulled after the first is started and while it is in operation, the mechanism of the second will start into operation and its sending lever will ride at first on the unbroken periphery of the signal wheel, being at such time in lifted position or in position indicated in Figs. 5 and 6. The first time the armature 12 drops away from the magnet in said second box, owing to the breaking of circuit, produced by a transmission originating in the first box, said armature will force the lockout device over, bringing the shoulder under the end of the sending lever, which position, the lever 19, being without bias, will retain, thus holding the sending lever up and preventing it from sending any signals. The armature 12 of the second box will however be caused to vibrate by the interruptions of circuit of its magnet 2, which has been thrown into the circuit by the act of pulling such second box. Every time the armature drops back by the breaking of circuit through the magnet of the second box, the stop pawl or dog 13 will drop into a tooth of the escapement wheel 11 and temporarily prevent rotation of the mechanism of the second box. Therefore, it will be seen, that while the first box is sending, the second will be prevented from sending, and while the signal wheel of the first-pulled box is rotating continuously, the actuating train of the second-pulled box is only rotating intermittently owing to the vibration of the armature 12 under the influence of the signals sent by the first-pulled box. By this means, the main or driving spring is prevented from running down and its power is conserved for the sending of the signals when the box is pulled. In the meantime, the first-pulled box completes its round of signals, as already described, and its starting lever automatically resumes normal position and closes the shunt around the mechanism of said box. The armature 12 of the magnet in the second-pulled box is now held up by the current on the circuit, which cur-

rent is the ordinary signaling current, thereby holding the pawl 13 out of the teeth of the escapement wheel and the second box now rotates continuously until its pin 21 engages the lockout device and restores the same to its normal position, thereby freeing the sending lever, which can then send its signal. No matter in what position of the wheel 1 of the second box the first box stops sending, the sender 3 of the second box cannot operate until the beginning of its signal, inasmuch as it will be held locked up until the actuating train has brought the pin 21 around the zero or normal starting position, and has forced the lockout lever 19 over to release the sending lever. Should it happen that the mechanism of the second-pulled box rotates so far as to throw off the lockout before the first box completes its signal, said lockout will again be brought into action to lock out the sender lever at the first interruption of the circuit by the first-pulled box and in the manner just described.

No matter how many boxes be pulled at or about the same time, the one which first breaks the circuit by its sending lever will automatically lock out all of the others and will go on and complete its round of signals. As soon as its mechanism is restored to normal, the train is stopped by the stop lever 16 and the circuit will be placed by said first operating box, in normally closed condition, and that one of the other boxes whose pin 21 first reaches normal position will have its lockout restored to normal position and said box will start in to operate in the normal way, since the magnet of said box is adapted to respond to the normal signaling current and will therefore draw up its armature and hold the stop 13 out of the teeth of the wheel 11 of the actuating train and the operation of said box will then proceed in just the same way as if it were the only box that had been pulled. The remaining boxes will be still retained in locked out condition but ready to cut in on the circuit and send their characteristic signals in the order in which their pins 21 respectively reach normal position. Should it happen that the signal wheels of any two boxes begin a revolution at identically the same instant and break circuit at the same instant, the one having the greater number of notches in its initial group will seize the line and send its signal without mutilation because the first interruption of circuit produced after the number of notches in common has run out will lock out the box having the smaller number in the initial group, the sender lever of the latter at such time riding on the space segment between groups of notches. After the box so seizing the line has completed its round, the box with the smaller initial tion of signals necessary to complete its round if its round has been interrupted. In the case of both boxes however, all the signals will be complete, although the round of signals of one or both may have been interrupted or delayed.

It will be observed that during the operation of one box in sending its round of signals, the mechanism of other boxes which in the meantime have been pulled will be running, but only intermittently, so that they cannot move sufficiently to exhaust the necessary action of the power in sending at least the final one of the round of signals. Thus, for instance, if a second box should be pulled immediately after the first, the cam 18 on the second, would be permitted to move only a part of the way necessary to bring its notch under the pin 17 of the starting lever and said second-pulled box would therefore send at least the final signal of its round of four and said signal would be complete, owing to the fact that the lockout is only thrown off when the signal wheel is at normal or zero position.

As will be seen, the individual signal transmissions coming over the line from the box first pulled act in a second-pulled box through the pawl 13 operating the stop device to delay the action of the actuating train. But in the case of the first-pulled box or the one acting in its normal manner to transmit its signals, it is desirable that the gear train of said box should move uninterruptedly. This is accomplished as will be seen by rendering said stop mechanism inoperative at each transmission, since each time the sender lever drops to break the circuit and thereby discharge the magnet 2, the lever 14 will be held from operating the stop 13 by reason of the engagement of pin 22 with the lever 19, which at such time is blocked by the depressed end of the sender lever. In all cases it will be seen that no confusion of signals can arise from the characteristic signal of one box following the characteristic signal of a previously acting box before the usual space which should follow or exist between characteristic signals is produced, since any locked out box is unlocked only when its signal wheel reaches the normal or starting position and the segment of the signal wheel on which the sending lever first rides is sufficiently prolonged to cover at least the usual or allotted terminal space following each characteristic signal and serving to space characteristic signals from one another.

Should it happen that a number of boxes are pulled at or about the same time and that one or more of them may have its sending lever held up so long that its mechanism, intermittently rotating as described,

wheel 1, and thereby have moved to position where the lever 16 would be permitted to drop and stop the rotation of the mechanism, thus requiring the box to be pulled again, such action will be prevented by the lockout lever locking the starting lever from dropping through engagement of a projection 23 on the starting lever with the end of the lock-out lever when in its forward or lockout position. Hence, the box locked out for the abnormally prolonged period will go on without interruption to resume its round or cycle of actions and will be ready to send its own signal as soon as the signals stored in the other box or boxes, or being transmitted, have been finished.

When boxes constructed in accordance with my invention are used upon a circuit, signals may be sent over said circuit at any time during the operation of a box or a series of boxes by the usual signaling key without so far mutilating the signals being transmitted by a box as to render the same unrecognizable on the receiving tape or instrument. Thus for instance, in the case of boxes used on a fire alarm circuit, a fire chief may utilize the circuit for sending signals by a Morse key at any time while a box is in the act of sending its characteristic signals. When the key is so used, an initial prolonged depression of the key to open the circuit will lock out the box which is in the act of sending its signal because the lockout device will engage beneath the sending lever as soon as the signal wheel 1 raises the same to non-sending position and the subsequent makes and breaks of circuit produced by the operation of the key will affect said box in just the same way that said box affects the operation of the other boxes which have been pulled and as already described. As soon as the manipulation of the key ceases, the circuit will resume its normal condition and the box whose pin 21 first reaches normal position will cut in on the circuit and resume the sending of the characteristic signals of its round. The act of locking out the box by the first break of circuit produced by the signaling key may, it is true, mutilate one of the characteristic signals constituting the round of signals sent by said box, but the remaining characteristic signals of the round will be unmutilated and may be read upon the receiving tape.

What I claim as my invention is:

1. In a non-interference signal box, the combination of a signal transmitting mechanism, an actuating mechanism therefor, a mechanical lockout device adapted to mechanically engage and lock some portion of the signal transmitting mechanism out of operation by the actuating mechanism, a main line magnet having an armature adapted to throw said mechanical lockout device into lockout position and means carried by the actuating mechanism for restoring the lockout device to normal position to free the signal transmitting mechanism at the termination of each complete movement of the actuating mechanism requisite for sending a complete signal.

2. In a non-interference signal box, the combination of a signal wheel and actuating mechanism therefor, a signal transmitting mechanism operated by the signal wheel and embodying a sending lever, a mechanical lockout device adapted to engage with and lock the sending lever in non-sending position, said lockout device being without bias and a non-interference magnet having an armature adapted to engage and throw the lockout device into locked out position upon interruption of the main line circuit.

3. In a non-interference signal box, the combination of a main line magnet, a signal transmitting mechanism, a mechanical lockout device therefor operated by the armature of the magnet on interruption of the main line circuit but mechanically disconnected therefrom so as to be free to retain its lockout position during subsequent movement of the armature and means controlled by said armature for intermittently interrupting the movement of the actuating mechanism of the box at each subsequent interruption of the circuit produced by another box.

4. In a non-interference signal box, the combination with the actuating mechanism and signal transmitting mechanism, of means for locking the signal transmitting mechanism out of action when the box is pulled during operation of another box on the same circuit and means for intermittently interrupting the operation of said actuating mechanism at each interruption of the circuit produced by another box while engaged in sending a signal.

5. In a non-interference signal box, the combination of a main line magnet, means controlled thereby for preventing the box from sending its signal during rotation of the driving or actuating mechanism and means for interrupting the movement of said actuating mechanism at each interruption of the main line circuit produced by another box throughout its operation in sending signals.

6. In a non-interference signal box, the combination of an actuating mechanism, signal transmitting mechanism, a magnetically controlled lockout for locking said signal transmitting mechanism out of operation upon interruption of the main line circuit from another box and means responsive to each closure and interruption of the main line circuit, due to the sending of signals from another box for intermittently inter-

rupting the operation of the actuating mechanism in the locked out box.

7. In a non-interference signal box, the combination with the actuating train, of means for freeing the same to send the signal, a sending mechanism operated thereby, a magnetically controlled lockout for locking the sending mechanism out of operation at the first interruption of line circuit occuring after the box is pulled and produced by a box engaged in sending a signal, and means for stopping the movement of the train at each subsequnt break of circuit produced by the latter box in sending its signal.

8. In a non-interference signal box, the combination of a sending lever, a non-interference main line magnet, a mechanical lockout device controlled thereby for engaging and holding the sending lever in inoperative position and adapted to retain its lockout position independently of the main line magnet, and means for automatically restoring said lockout to normal position when the actuating mechanism of the box reaches normal.

9. In a non-interference signal box, the combination of a signal wheel, a sending lever actuated thereby, a mechanical lockout device adapted to engage and hold the sending lever in inoperative position and means responsive to signals from a distant box for stopping the rotation of the signal wheel and its actuating mechanism at each interruption of circuit.

10. In a non-interference signal box, the combination of a sending lever, an unbiased mechanical lockout device therefor, means responsive to interruption of the main line circuit for throwing said lockout device into position for engagement by the sending lever and means connected with the actuating mechanism of the box for restoring the unbiased lockout to normal position to free said sending lever.

11. In a non-interference signal box, the combination with a signal transmitting device, of means responsive to signals coming over the line for rendering the same inoperative, an actuating train and means for permitting intermittent operation of the actuating train throughout the transmission of signals by another box and while the said signal transmitting device remains inoperative.

12. In a non-interference signal box, the combination of an intermittently acting stop for the actuating train, a controlling magnet in the signaling circuit and means controlled by the sending portion of the box and acting at each signal transmission by said box for automatically rendering the stop inoperative to stop the train.

13. In a non-interference signal box, the combination of a lockout device, means for rendering said lockout device inoperative at each normal interruption of circuit produced by a transmission, and means for throwing said lockout device into lockout position upon prolonged interruption of the main line circuit and to leave it in such position during subsequent normal interruptions of the main line circuit produced by another instrument.

14. The combination in a non-interference signal box, of an actuating train, means controlled by a magnet on the main line for permitting intermittent operation of the train throughout the transmission of signals from another box and means for holding the intermittently acting devices out of operation during the operation of the actuating train in sending signals.

15. In a non-interference signal box, the combination of a sending lever, a signal wheel and a lockout device for locking the sending lever when raised by the signal wheel, said sending lever being adapted to hold the lockout device out of action when the sending lever drops to send the signal.

16. In a non-interference signal box, the combination of a sending lever, a mechanical lockout device therefor normally out of engagement with the sending lever but adapted to be thrown into position to engage and hold the same inoperative, an actuating mechanism for operating the sending lever, a main line magnet controlling the position of the lockout device and means governed by said magnet for producing a delayed movement of the actuating mechanism throughout its stages of movement, wherein it is adapted to operate the sending lever.

17. In a non-interference signal box, the combination of a lockout device, signal sending mechanism, means connected with the signal sending mechanism for throwing off the lockout after each transmission of a complete characteristic signal, a stop controlling the movement of the actuating train and a magnet in the main line circuit for holding the stop out of action and means controlled by the sending mechanism for holding the stop out of action at each individual transmission.

18. In a non-interference signal box, the combination of a lockout device, a controlling magnet therefor, an actuating train, means for permitting intermittent operation of said train in response to interruptions of main line circuit produced by another box while the said lockout device retains the lockout position, mechanism for automatically stopping the actuating train when the box has completed its round of signals and means for holding said mechanism out of action at the completion of the round, if the lockout device be at that time in lockout position.

19. In a non-interference signal box, the

combination of a notched signal wheel, a sending lever engaging therewith, a shouldered locking device adapted to engage and hold said sending lever in lifted position, means upon the signal wheel for throwing off said shouldered locking device to free the sending lever at the completion of a signal, a main line magnet normally shunted, means for opening said shunt automatically when the box is pulled and mechanism controlled by said magnet for throwing the shouldered locking device into lockout position upon interruption of circuit through the magnet, occurring when the sending lever is in lifted position.

20. In a non-interference signal box, the combination of a normally shunted main line magnet, a signal wheel and actuating mechanism therefor, means for automatically breaking the shunt of said magnet when the box is started, sending devices mechanically actuated by said wheel, a locking device normally mechanically disengaged from the sending devices and means for throwing said locking devices into position to retain the sending devices in inoperative position upon an interruption of the circuit through said magnet and throughout subsequent makes and breaks of circuit through said magnet, and means for releasing and stopping the actuating train at each make and break of circuit produced by another box while said sending mechanism is locked out of action.

21. In a non-interference signal box, the combination of a sending lever, a locking device adapted in one position of the sending lever to engage beneath and hold the same lifted, and in another position to lock against and be itself held out of action, and a main line magnet having an armature mounted independently of said lockout device and adapted to engage the lockout device and throw it into locking position on movement of the armature in one direction, said armature being free to vibrate while the lockout device retains its lockout position.

22. In a non-interference signal box, the combination of signal sending mechanism and an actuating train therefor, a lockout device for locking the sending mechanism out of operation, a main line magnet maintained in circuit during the operation of the box and adapted on interruption of said circuit at another point to bring the lockout mechanism into operation and means controlled by said magnet for stopping the movement of the actuating train at each interruption of circuit produced by the normal signal transmissions from another box.

23. In a non-interference signal box, the combination of a lockout adapted in one position to prevent the transmission of signals and in the other to allow the box to act and transmit said signals, a main line magnet having an armature adapted to vibrate at each interruption and closure of the main line circuit and throughout the whole operation of the box, after the box is pulled, means connected with said armature for throwing the lockout device into lockout position upon interruption of the main line circuit and adapted to leave it in such position during subsequent interruptions affecting said magnet and armature and means connected with the transmitting mechanism for throwing off the lockout device after the transmission of a complete characteristic signal.

Signed at New York city in the county of New York and State of New York this twenty seventh day of January A. D. 1911.

GEORGE L. FOOTE.

Witnesses:
WM. R. STOUT,
FREDERICK S. BORDEN.