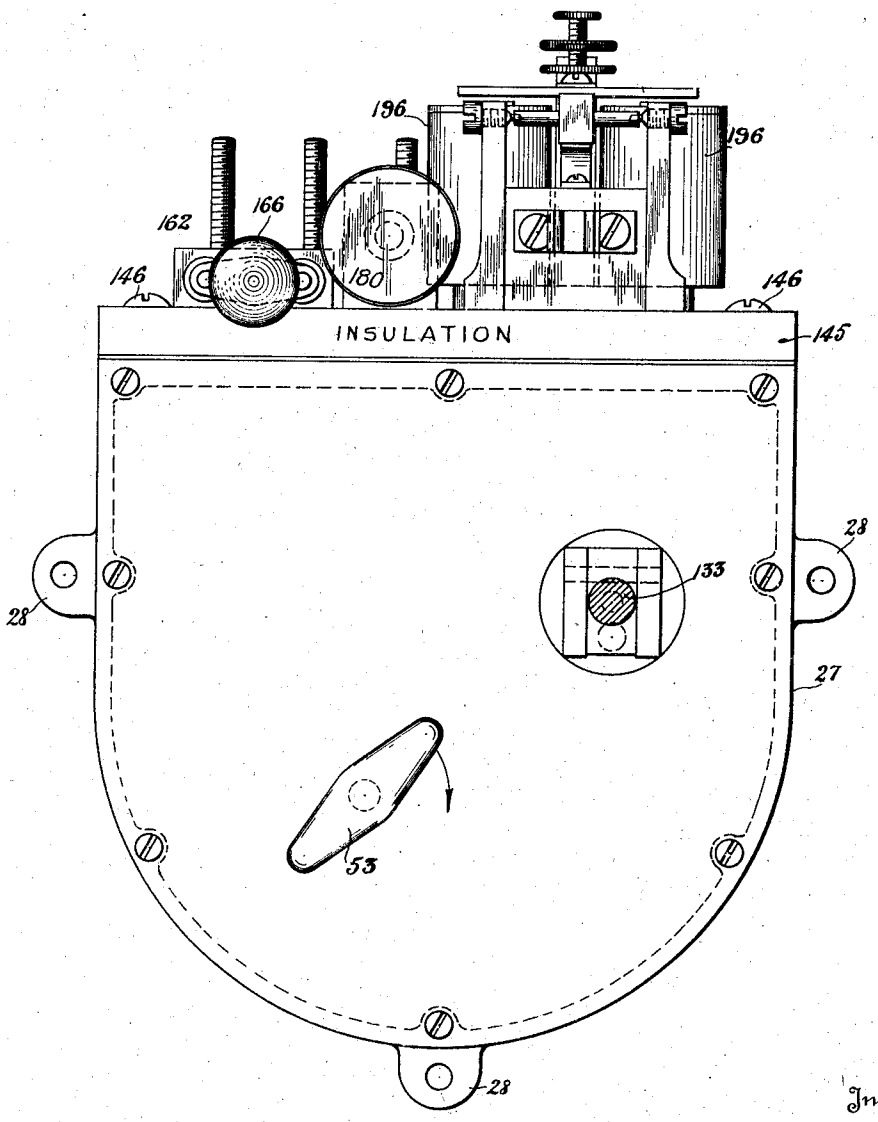
June 30, 1931. C. M. SACKMAN 1,812,173

NONINTERFERENCE SIGNAL TRANSMITTER

Filed Dec. 21, 1925 9 Sheets-Sheet 1

Fig. 1



Inventor

C. M. Sackman

By Fraser and Bond

Attorneys

June 30, 1931. C. M. SACKMAN 1,812,173

NONINTERFERENCE SIGNAL TRANSMITTER

Filed Dec. 21, 1925 9 Sheets-Sheet 2

Fig. 3

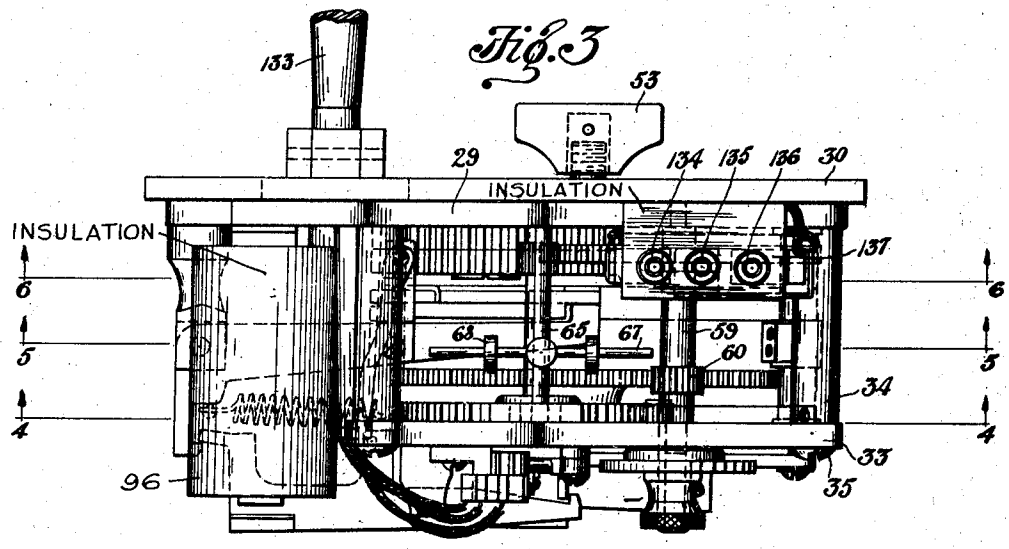
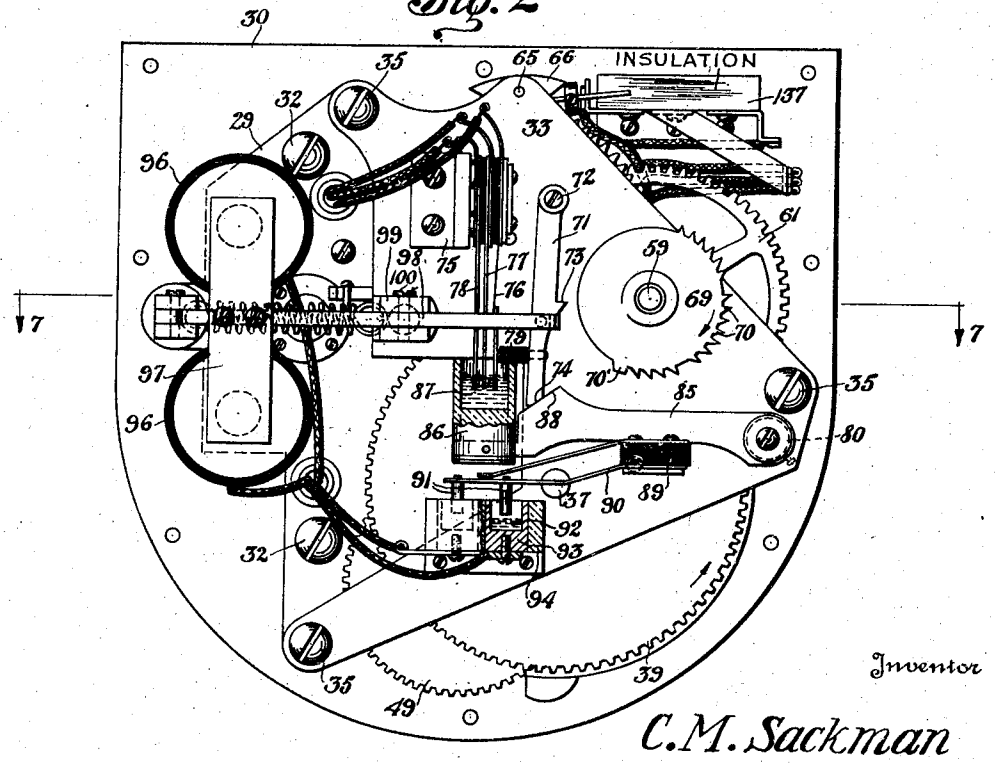


Fig. 2



Inventor

C. M. Sackman

By Frease and Bond

Attorneys

June 30, 1931. C. M. SACKMAN 1,812,173

NONINTERFERENCE SIGNAL TRANSMITTER

Filed Dec. 21, 1925 9 Sheets-Sheet 3

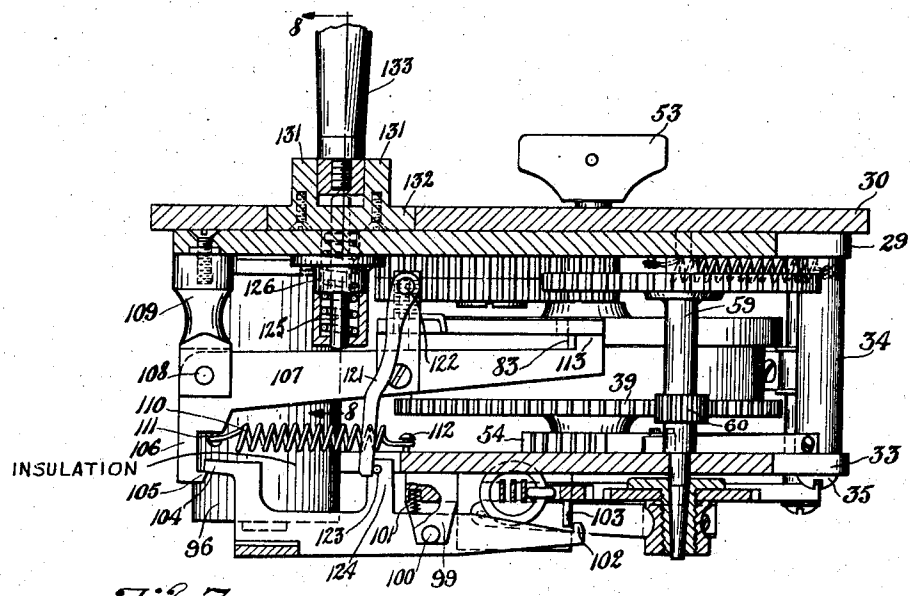


Fig. 7

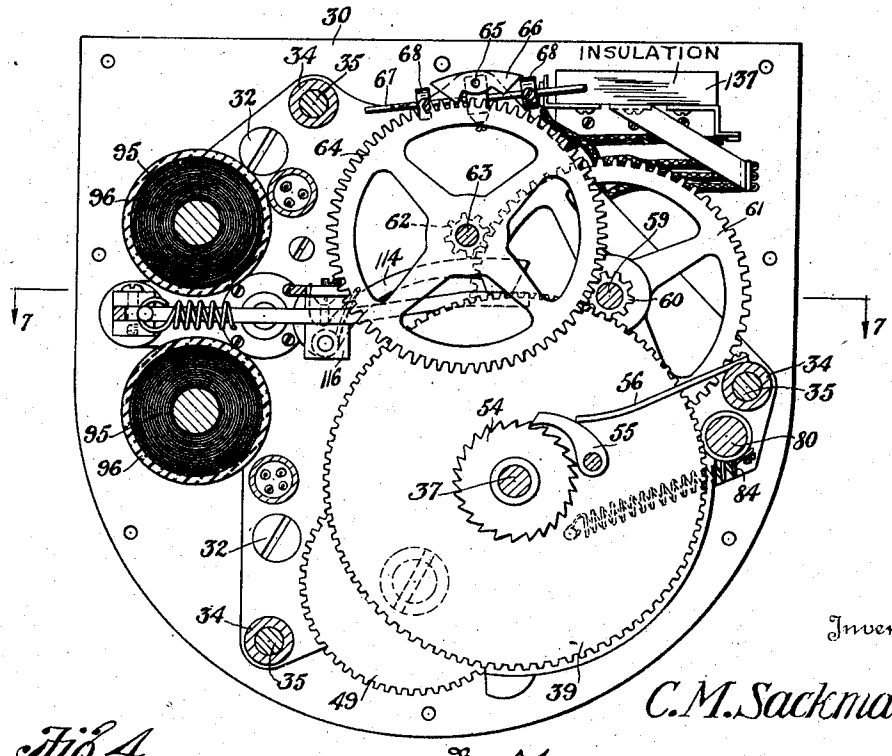


Fig. 4

Inventor

C. M. Sackman

By Treasc and Bond

Attorney

June 30, 1931. C. M. SACKMAN 1,812,173

NONINTERFERENCE SIGNAL TRANSMITTER

Filed Dec. 21, 1925 9 Sheets-Sheet 4

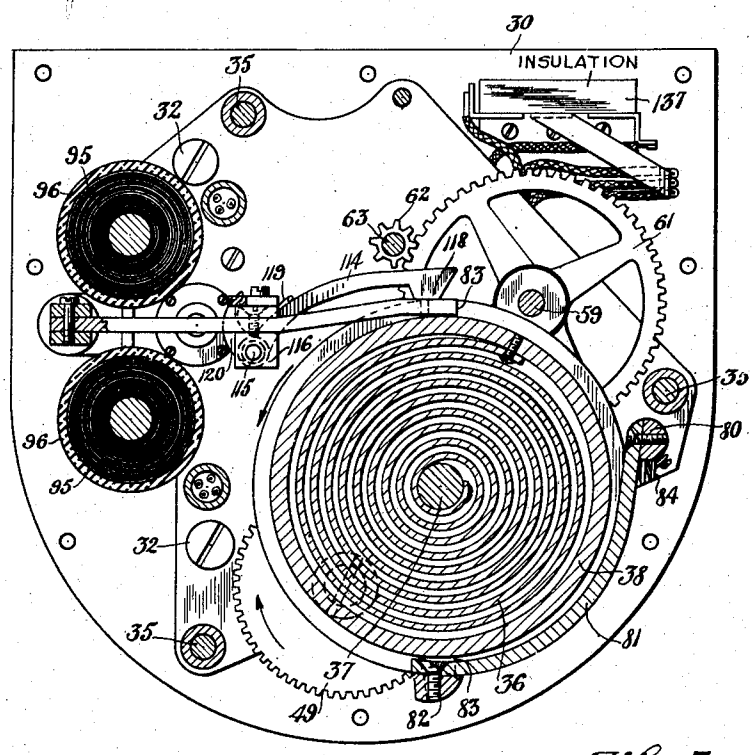


Fig. 5

Fig. 15

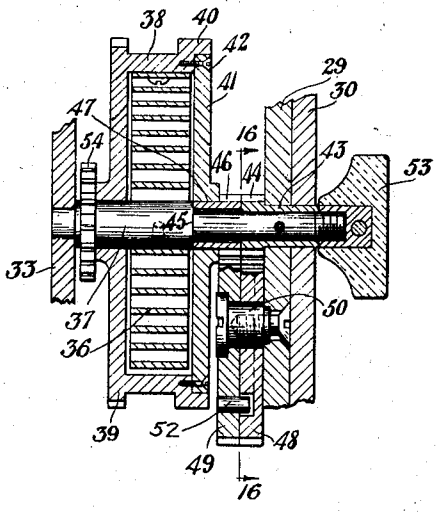
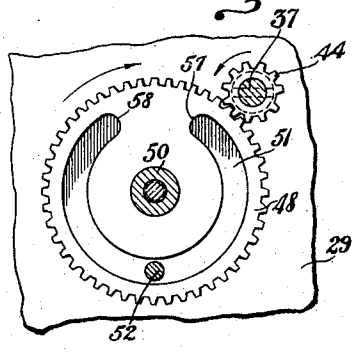


Fig. 16



Inventor

C. M. Sackman

By Fraser and Bond

Attorneys

June 30, 1931. C. M. SACKMAN 1,812,173

NONINTERFERENCE SIGNAL TRANSMITTER

Filed Dec. 21, 1925 9 Sheets-Sheet 5

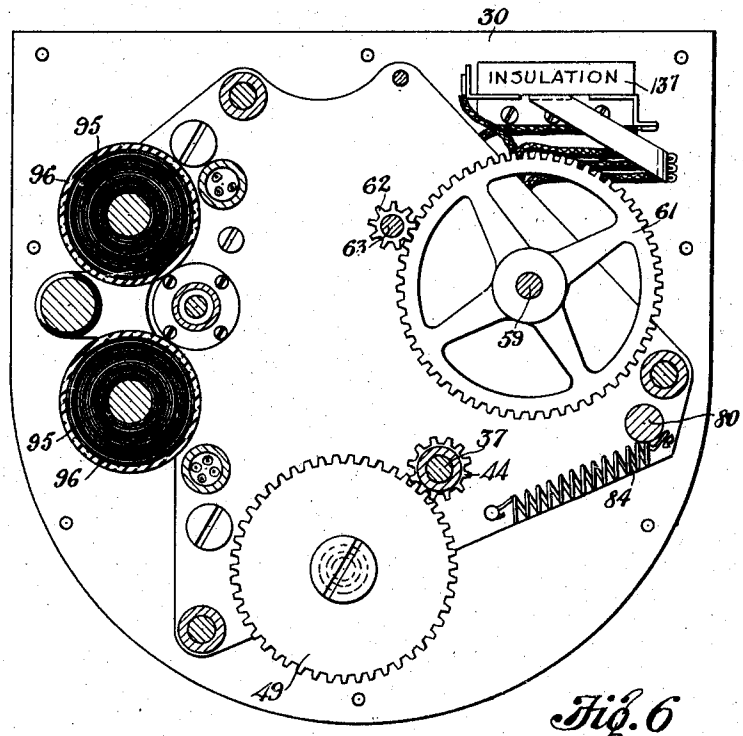


Fig. 6

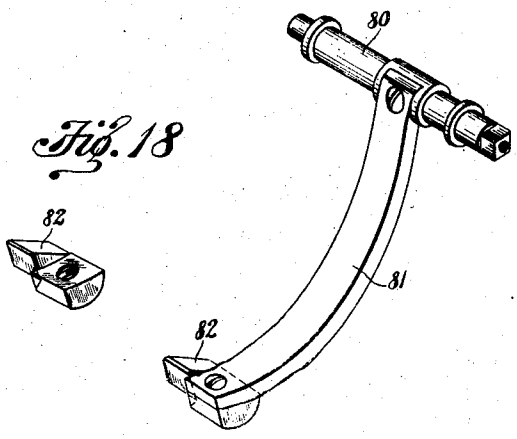


Fig. 18

Fig. 17

Inventor

C. M. Sackman

By Fraser and Bond

Attorneys

June 30, 1931. C. M. SACKMAN 1,812,173

NONINTERFERENCE SIGNAL TRANSMITTER

Filed Dec. 21, 1925 9 Sheets-Sheet 6

Fig. 8

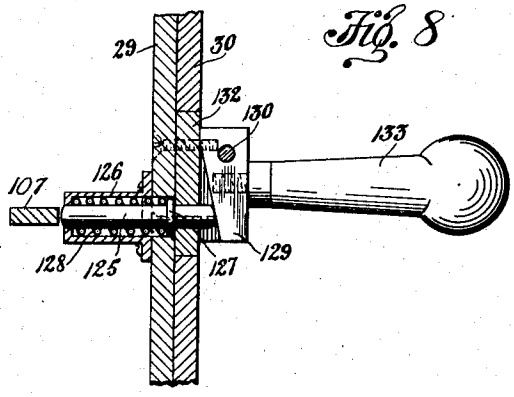
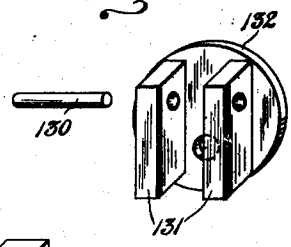


Fig. 9



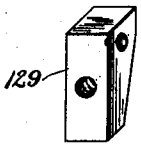


Fig. 10

Fig. 11

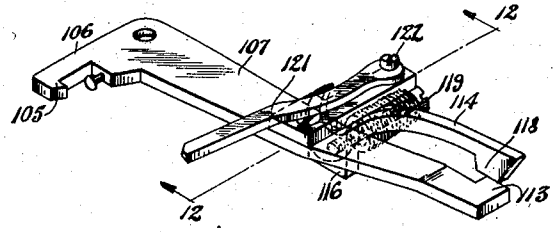


Fig. 13

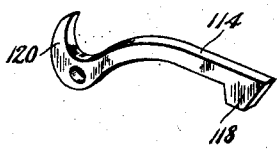
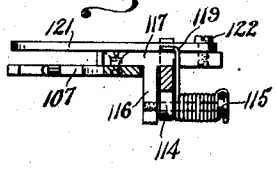


Fig. 12



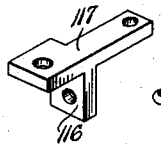


Fig. 14

Inventor

C. M. Sackman

By Fraser and Bond

Attorneys

June 30, 1931. C. M. SACKMAN 1,812,173

NONINTERFERENCE SIGNAL TRANSMITTER

Filed Dec. 21, 1925 9 Sheets-Sheet 7

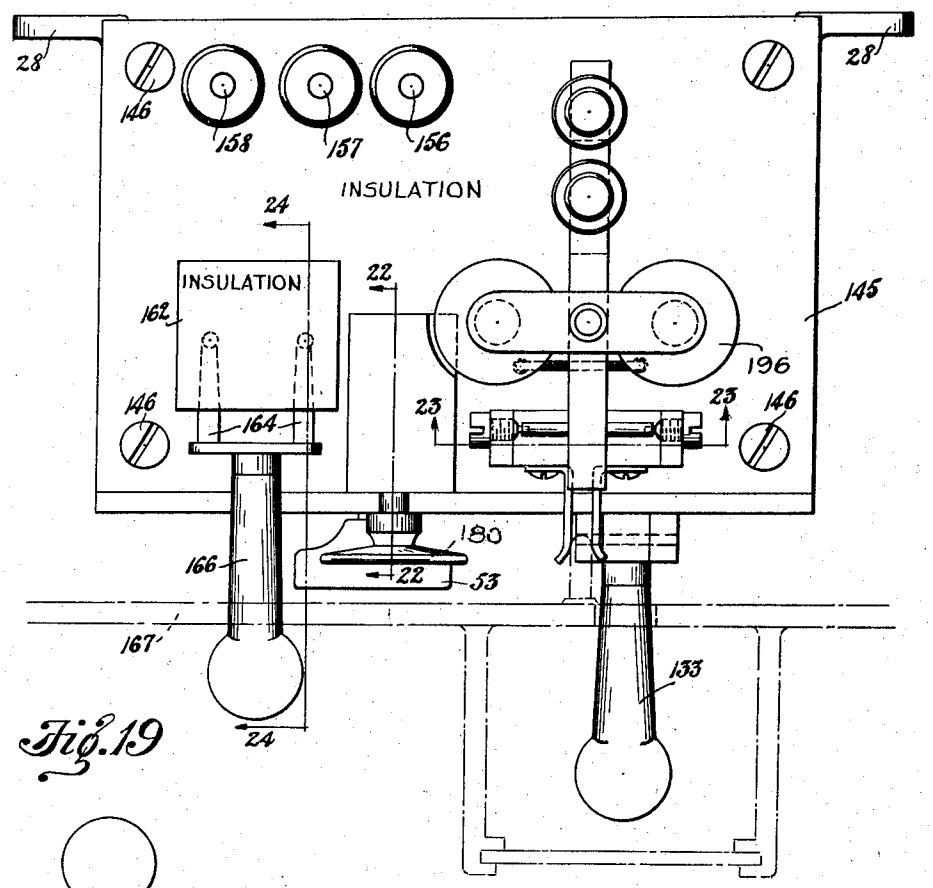


Fig. 19

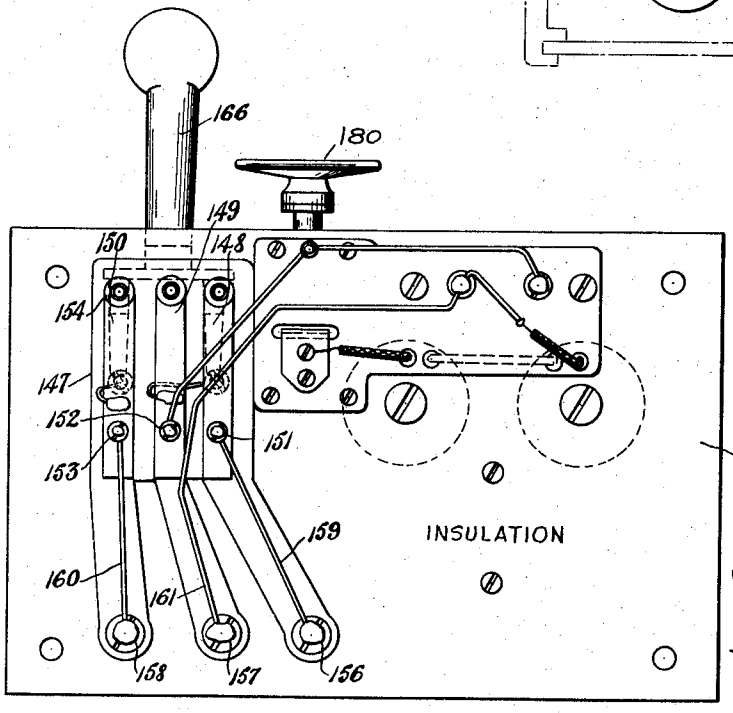


Fig. 20

Inventor

C. M. Sackman

Fraser and Bond

Attorneys

June 30, 1931. C. M. SACKMAN 1,812,173

NONINTERFERENCE SIGNAL TRANSMITTER

Filed Dec. 21, 1925 9 Sheets-Sheet 8

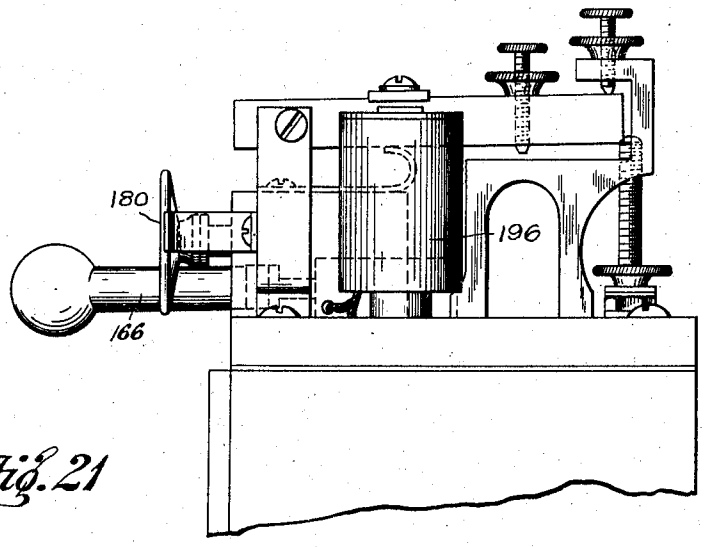


Fig. 21

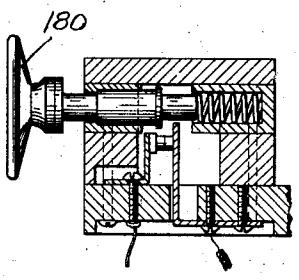


Fig. 22

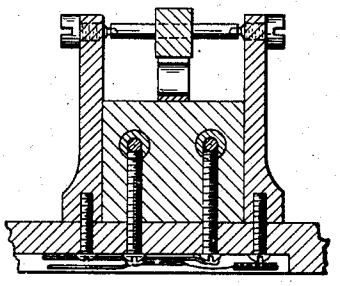


Fig. 23

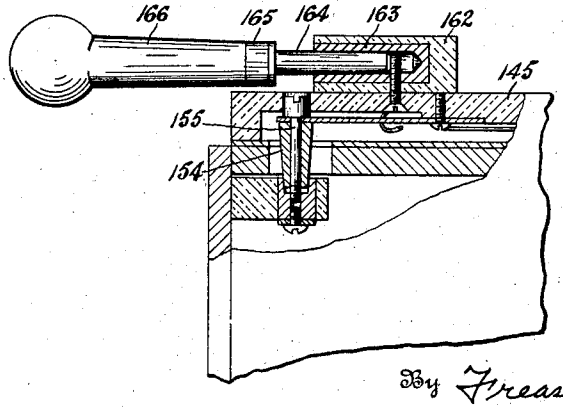


Fig. 24

Inventor

C. M. Sackman

By Frease and Bond

Attorneys

June 30, 1931. C. M. SACKMAN 1,812,173

NONINTERFERENCE SIGNAL TRANSMITTER

Filed Dec. 21, 1925 9 Sheets-Sheet 9

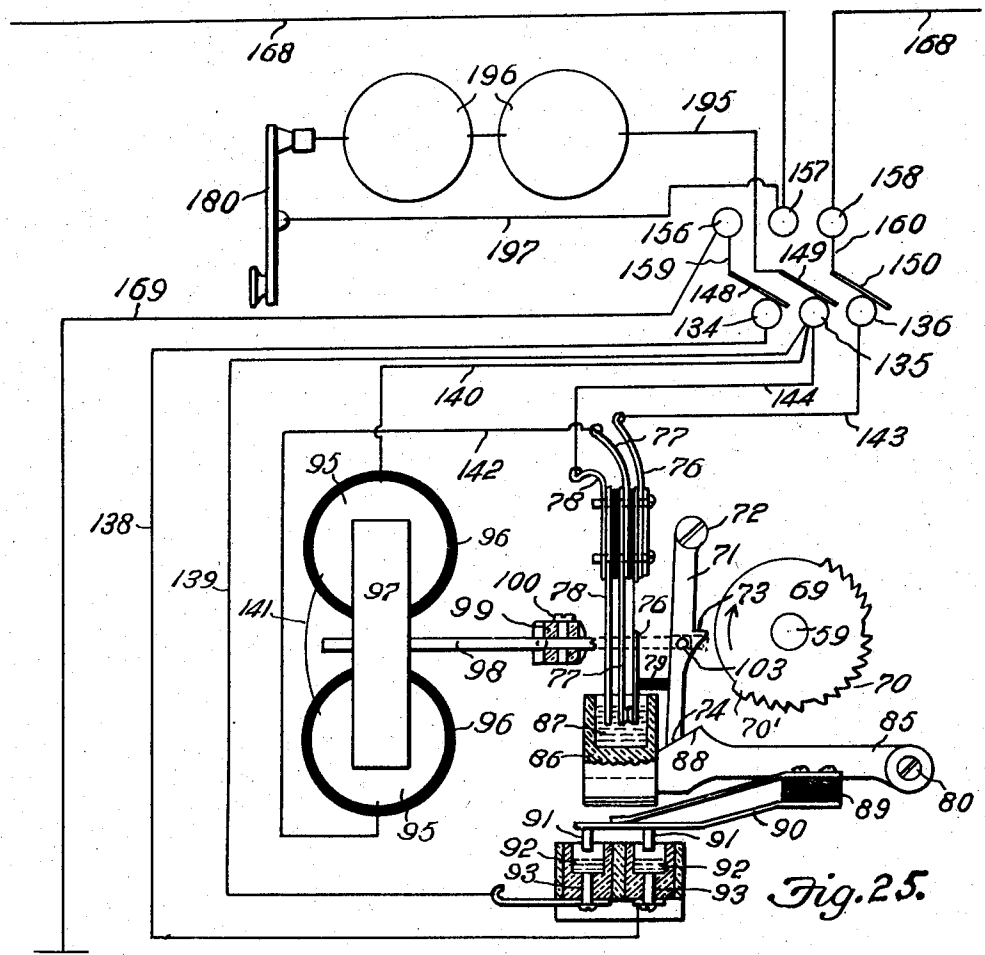


Fig. 25.

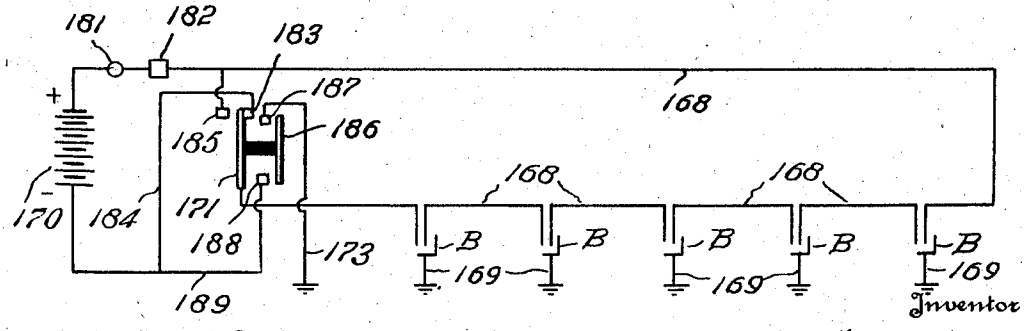


Fig. 26.

Inventor

C. M. Sackman.

By Frease and Bond

Attorneys

Patented June 30, 1931 1,812,173

UNITED STATES PATENT OFFICE

CHARLES M. SACKMAN, OF CLEVELAND, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE PARAMOUNT FIRE ALARM ENGINEERING COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO

NON-INTERFERENCE SIGNAL TRANSMITTER

Application filed December 21, 1925. Serial No. 76,929.

This invention relates to electric signalling apparatus commonly known as signal transmitters such as are used for fire alarm signals, in which a break wheel is employed to transmit a code signal a predetermined number of times, and more particularly to a signalling apparatus of this character so organized and constructed that two or more transmitters, in the same circuit, may be set in operation at approximately the same time without interference, the first box operated taking the line and transmitting its signal, while the other box or boxes subsequently set in operation will continue to run idly without transmitting, until such time as the first box has completed its round of signals, after which the other box or boxes subsequently operated, will successively take the line as they assume position to transmit a complete round of signals, and will, in turn, transmit a complete round of signals, preferably four complete signals.

The objects of the invention are to provide a signal transmitter of such construction that where a number of such signal transmitters are used in the same circuit or loop and one of the transmitters is set into operation to transmit a signal, a transmitter subsequently pulled and while the first transmitter is still in operation, will be automatically prevented from transmitting its signal, the gear train of the second box running idly until the first box completes the transmission of its signal and until such time thereafter as the second box assumes a position to transmit the desired number of rounds when it will automatically take the line and transmit a complete signal.

A further object of the improvement is to so construct the box that regardless of the number of boxes which may be pulled at or about the same time, only one box will take the line to send its signal, while the actuating trains of the remainder of the boxes will continue to run idly and will automatically and successively take the line to send their complete round of signals after the next previously operating box shall have sent its complete round of signals.

A further object is to prevent a subsequently operated box from taking the line and commencing the transmission of its signal until the mechanism thereof is in such position as to transmit a complete round of signals.

A still further object of the invention is to prevent overwinding of the motor spring which furnishes motive power to the actuating train and to prevent said spring from unwinding beyond a point where it will properly actuate the train.

Another object of the invention is to so arrange the circuit, in which a plurality of signal transmitters are located, that in the event the line is broken upon one side of any box, the circuit is not interrupted and the box will function properly if pulled; the circuit comprising a loop which may be connected to one side only of the battery in case of a break in the line, each box or transmitter being connected to the loop, the opposite side of the battery being arranged to be grounded and each box being provided with a grounded connection, whereby a complete circuit is made from the battery around one side of the loop to each box and then through the ground to the other side of the battery.

An embodiment of the invention thus set forth in general terms, is illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of the casing enclosing the transmitting mechanism to which the invention pertains;

Fig. 2, a rear elevation of the transmitting mechanism removed from the casing;

Fig. 3, a top plan view of the same;

Fig. 4, a section on the line 4—4, Fig. 3;

Fig. 5, a section on the line 5—5, Fig. 3;

Fig. 6, a section on the line 6—6, Fig. 3;

Fig. 7, a section on the line 7—7, Figs. 2 and 4;

Fig. 8, a section on the line 8—8, Fig. 7, showing the pull handle for tripping the actuating mechanism;

Fig. 9, a detail perspective view of the trigger bearing;

Fig. 10, a detail perspective view of the trigger;

Fig. 11, a perspective view of the stop arm and associated mechanism;

Fig. 12, a section on the line 12—12, Fig. 11;
Fig. 13, a detail perspective view of the lever which controls the armature;
Fig. 14, a detail of the bracket upon which said lever is mounted;
Fig. 15, a detail sectional view of the spring case and winding mechanism;
Fig. 16, a section on the line 16—16, Fig. 15;
Fig. 17, a detail perspective view of the rocker shaft and arm controlling the make and break devices;
Fig. 18, a detail view of the shoe carried by said arm;
Fig. 19, a top plan view of the casing in which the transmitting mechanism is housed, showing the telegraph key and other mechanism thereon;
Fig. 20, a bottom plan view of the same;
Fig. 21, a fragmentary side elevation of the upper portion of the casing, showing the telegraph key;
Fig. 22, a section on the line 22—22, Fig. 19;
Fig. 23, a section on the line 23—23, Fig. 19;
Fig. 24, a section on the line 24—24, Fig. 19;
Fig. 25, a diagrammatic view of the wiring in each box; and
Fig. 26, a diagrammatic view of the wiring of the circuit.

Similar numerals refer to similar parts throughout the drawings.

The transmitter mechanism is arranged to be housed within a casing 27 adapted to be secured within the usual shell or box as by screws or the like passed through the ears 28 formed upon the rear side of the casing.

The transmitter mechanism is illustrated as supported upon the plate 29 which may be connected to the cover plate 30, of the casing, as by screws 32 or the like. A rear plate 33, of the shape best shown in Fig. 2, is spaced from the plate 29, as by the posts 34, to which said plate is connected as by screws 35.

Motive power is furnished for the actuating train of the transmitting mechanism by a helical spring 36 (Figs. 5 and 15) fastened at its inner end to the main drive shaft 37 and at its outer end to the spring drum 38.

The main driving gear 39 may be formed integrally upon the spring drum, at the rear edge portion thereof and an annular shouldered portion 40 is provided around the forward edge of the drum and receives the cover plate 41 which is connected thereto as by screws 42.

The outer portion of the shaft 37 is reduced and the collar 43 is pinned thereto, the inner end of said collar having a pinion 44 formed thereon and spaced from the shouldered portion 45 of the shaft.

A similar pinion 46 is fixed to the spring drum cover plate 41 in any suitable manner, such as the tubular extension 47, said pinions meshing with the gears 48 and 49 respectively, which are journaled upon a stud shaft 50 mounted in the front plate 29.

A concentric, arcuate groove 51 (Fig. 16) is formed in the inner face of the gear 48 and a stud 52 is carried by the gear 49 and arranged to travel in said groove.

A winding knob 53 (Fig. 15) is fixed upon the outer end of the shaft 37 and a ratchet 54 is fixed upon the inner end portion of said shaft and arranged to be engaged by the pawl 55 (Fig. 4), pivoted upon the back plate and normally held in mesh with the ratchet teeth by means of a spring 56.

In winding the spring, the knob 53 is turned in the direction of the arrow shown in Fig. 1. The spring drum 38 remains stationary during this winding operation, since the gear 39 thereon is in mesh with all the actuating train, which will be hereinafter described, while the inner end of the spring 36 is wound around the shaft 37 as the same is rotated.

As the spring drum does not rotate during this winding operation, the pinion 46 thereon, meshing with the gear 49, holds said gear stationary, the gear 48 being rotated in the direction of the arrow in Fig. 16, by means of the pinion 44 upon the winding shaft.

As the end of the groove 51 indicated at 57 (Fig. 16), engages the pin 52, further turning of the shaft 37 will be prevented, thus preventing the spring from being wound too tightly.

When the actuating train is set in motion, as will be later described, the shaft 37 remains stationary, while the spring drum rotates in the direction of the arrow in Fig. 5 and through the pinion 46 rotates the gear 49 in the direction of the arrow shown in Fig. 5, while the gear 48 is held stationary.

As the pin 52, carried by the gear 49, engages the end of the groove 51 indicated at 58 (Fig. 16), further movement of the spring drum is stopped, thus preventing the spring from unwinding beyond a point where it will function properly to drive the actuating train.

The brake wheel shaft 59 (Figs. 4 and 7) is journaled through the front and back plates 29 and 33 respectively and has a pinion 60 formed thereon and meshing with the drive gear 39, upon the spring drum.

The escapement drive gear 61 is fixed upon the shaft 59 and meshes with the pinion 62 upon the escapement gear shaft 63, which is also journaled in the front and back plates, the escapement gear 64 being mounted thereon.

The escapement shaft 65 is journaled between the front and back plates and provided with a pallet 66 for engagement with the escapement wheel 64. For the purpose of regulating the speed of the actuating train, a transverse weight rod 67 is carried by the escapement shaft and provided with adjustable weights 68.

The break wheel or signal wheel 69 (Figs.

2 and 25) is fixed upon the rear end portion of the break wheel shaft 59 and is provided with teeth 70 upon its periphery, suitably spaced in groups corresponding to the characteristic signal of the box.

The first tooth, indicated at 70', is of greater width than the remaining teeth, as best shown in Fig. 2. The rotation of the break wheel is in the direction of the arrow shown in Fig. 2.

The signal lever 71 is pivoted at its upper end, as at 72, to the back plate, at a point adjacent to the break wheel and is provided, on the side toward the break wheel, with a tooth 73 for engagement with the teeth upon the break wheel. The lower free end of the signal lever is beveled as shown at 74.

A bracket 75 is mounted upon the back plate and supports the make and break springs 76 and 77 and the shunt contact spring 78, all of which are insulated from each other as shown in Fig. 2. An insulation finger 79 is carried by the signal lever and arranged to engage the make and break spring 76.

A rocker shaft 80 (Figs. 5 and 17) is journaled between the front and back plates adjacent to the spring drum and provided with a curved arm 81 having a beveled shoe 82 at its free end for normal engagement with either of the diametrically opposite notches 83 in the annular shoulder 40 of the drum, a spring 84 being provided for normally holding the curved arm 81 in this position, as shown in Fig. 5.

The lift arm 85 (Figs. 2 and 25) is fixed to the outer end of the rocker shaft 80 and carries a cup 86, of suitable insulation material containing mercury, as indicated at 87, for normally immersing the contact ends of the springs 76, 77 and 78 when the lift arm is in the normal raised position, as shown in Fig. 2.

An inclined surface 88 is formed upon the lift arm for normal engagement with the beveled lower end of the signal arm in order to hold the arm in position to close the circuit through the contact springs 76, 77 and 78, when the arm is in the normal position.

An insulation block 89 is mounted upon the lift arm 85 and carries a spring arm 90 to which is attached a spaced pair of contact pins 91, forming a part of the ground switch and adapted to close the ground circuit when said arm is lowered, the contact pins 91 being immersed in the mercury indicated at 92 in the cups 93, which are carried in the insulation block 94.

A magnet is provided in the device and comprises a pair of coils 95 housed in casings 96 (Figs. 2 to 7) of suitable insulation material and grounded upon the front plate 29 and extending backward to a point beyond the plane of the back plate.

The armature 97 (Fig. 2) is in the form of a bar arranged to be engaged by both coils of the magnet and is carried upon a lever 98 pivoted between the ears of the block 99, upon the back plate, as by the pin 100, a spring 101 (Fig. 7) being provided for normally holding the armature in retracted position and engaging the lug 102, upon the opposite end of the lever, with the pin 103 upon the signal arm.

A finger 104 is provided upon the end of the armature lever adjacent to the armature and arranged to be normally engaged by a lug 105 upon the arm 106 of the stop lever 107, which is pivoted as at 108 to the post 109, mounted upon the front plate 29.

A spring 110 is connected to the arm 106 as by the pin 111 and to a pin 112 upon the back plate 32 for normally holding the lever in the position shown in Fig. 7, the lug 113 upon the free end of the lever being engaged in one of the diametrically opposite notches 83 in the spring drum.

The armature controlling lever 114 (Figs. 5 and 11) is pivoted upon the pin 115 carried by the depending flange 116 of a bracket 117 fixed upon the stop lever 107 and provided with the depending, tapered lug 118 at its free end normally located in the position best illustrated in Fig. 11, the spring 119 being provided for tending to urge said lug 118 into engagement with the periphery of the spring drum.

An upwardly curved tail portion 120 is provided upon the lever 114 for engagement with the lever 121, which is pivoted as at 122 upon the bracket 117, the rearwardly extending free end of the lever 121 being adapted to engage the pin 123 (Fig. 7) upon the forwardly extending finger 124 of the armature lever.

For the purpose of tripping the stop lever, a spring pressed plunger 125 (Figs. 7 and 8) is mounted in the tubular casing 126 carried by the front plate 29 and extends through said front plate and through the plate 30, a shoulder 127 thereon being normally held in engagement with the plate 30 by means of the coil spring 128 located within the casing and surrounding the plunger.

The projecting end of the plunger engages the trigger 129 which is pivoted, at its upper end portion, as at 130, between the ears 131 of the trigger bearing 132. A pull handle 133 is attached to the trigger as shown in Fig. 8. By depressing this handle, the trigger is rocked upon its pivot 130, moving the spring pressed plunger inward or rearward against the pressure of the spring and displacing the stop lever 107.

The wiring of each transmitter is very similar and is illustrated diagrammatically in Fig. 25. Three terminals, designated at 134, 135 and 136 are carried in an insulation block 137 (Figs. 2 to 6) mounted upon the upper portion of the plate 30. The terminal 134 is connected as by a wire 138 with one of the mercury cups 93, the other of said

mercury cups being connected by a wire 139 with the terminal 135.

A wire 140, also leads from the terminal 135 to one of the magnet coils 95, which is connected by a wire 141 with the other magnet coil 95, a wire 142 leading from said last named magnet coil to the contact spring 77.

The contact spring 76 is connected by a wire 143 with the terminal 136 and the shunt spring contact 78 is connected, by a wire 144 with the terminal 135.

The top plate 145, (Figs. 1, 19 and 20), is formed of suitable insulation material and arranged to be attached to the top of the housing 27, as by the screws 146. The under side of this top plate is recessed as shown at 147, and the spring contact arms 148, 149, and 150 arranged to engage the terminals 134, 135 and 136 respectively.

These spring contacts are connected to the plate, at their inner ends, by the screws 151, 152 and 153 respectively, the forward, free end of each arm carrying a tapered stud 154 (Fig. 24) arranged to engage a similar socket in the corresponding terminal, screws 155 being preferably provided for drawing each stud tightly into its respective socket.

Three binding posts, designated at 156, 157 and 158, are mounted in the top plate for connecting the signal box in the circuit or loop. The post 156 is connected, as by the wire 159, with the contact spring 148 and the binding post 158 is connected, in like manner as by a wire 160, to the contact spring 150.

A telegraph key 180 and sounder 196, of usual construction, are preferably mounted upon the top plate, the wire 161 leading from the binding post 157 through the telegraph instrument and then to the contact spring 149.

A block 162 (Fig. 24), of suitable insulation material, is mounted upon the top plate, over the spring contacts above described, and provided with a pair of metal sockets 163, electrically connected to the contact springs 149 and 150, and adapted to receive the fingers 164 of the testing stud 165, the handle 166 of which is of such length that the door 167 (Fig. 19) of the shell can not be closed with the plug in the short circuiting position shown in said figure.

In the ordinary or usual circuit, as shown in Figs. 25 and 26, for operating the boxes as non-interference transmitters, the loop or circuit is represented by a wire 168, normally connected at opposite ends to each side of the battery 170, located at the fire department headquarters, as shown in diagram in Fig. 26. This loop or circuit wire is broken at each transmitter or box, one side of the break being connected to the post 157 and the other side thereof to the post 158.

The post 156 is connected, as by the wire 169, to the ground in order to provide a ground circuit to be used for operating the boxes in the event there is an accidental break in the loop or circuit 168, on the side of the circuit connected to the binding post 157.

The circuit of the entire system, as illustrated diagrammatically in Fig. 26, includes the wire 168, leading from the positive side of the battery through any suitable and usual headquarters instruments, such as the gong or alarm, indicated at 181, and the register, indicated at 182, and then to each of the boxes or transmitters in the system, indicated generally at B in said figure.

After communicating with each of the boxes or transmitters, the wire 168 is connected with the switch blade 171, normally contacting with the contact point 183, which is connected, as by the wire 184, with the negative side of the battery. A contact point 185 is spaced from the contact 183, and arranged to be engaged by the switch blade 171, when the circuit is grounded, as will be later described. This contact 185 is connected to the loop adjacent to the gong and register.

A second switch blade 186 is movable with and insulated from the switch blade 171, and arranged to make contact with the contact points 187 and 188, when the blade 171 contacts with the point 185, but to be normally spaced from said contact points 187 and 188, as illustrated in Fig. 26.

The contact 187 is connected, as by the wire 173, with the ground, and the contact 188 is connected, as by the wire 189, with the negative side of the battery 170. Thus the normal circuit in the system is, as shown in Fig. 26, from the positive side of the battery 170, through the gong and register, through all of the boxes or transmitters, through switch blade 171, contact 183, and wire 184, to the negative side of the battery 170.

The normal circuit through each box, when the same is in the inoperative condition, is from the loop 168 through post 158, wire 160, spring contact 150, contact point 136, wire 143, contact spring 76, mercury 87, contact spring 78, shunting out coils 95, through wire 144, contact 135, spring contact 149, wire 195, telegraph sounder spools 196, telegraph key 180, wire 197, post 157 and back to loop 168.

The circuit is thus normally closed through each box, the coils 95 thereof being shunted out of the box circuit, and the entire loop circuit for the system is normally kept under test.

In the operation of a box, to transmit its signal to headquarters, the lever 133, (Figs. 7 and 8) is rocked downward, pushing the plunger 125 inward and rocking the starting lever 107, upon its pivot 108, withdrawing the lug 113 of the starting lever from engagement with the upper notch 83 of the spring casing.

As the spring casing is thus released it will commence to rotate in the direction of the arrow in Fig. 5, immediately displacing the

shoe 82, from the lower notch 83 of the spring casing and rocking the curved arm 81 downward.

The shaft 80 is thus rocked and the arm 85, (Figs. 2 and 25) is swung downward, lowering the mercury cup 86 and breaking the mercury contact between the spring contacts 76 and 78, thus breaking the shunt around the coils 95, and permitting the current to pass through said coils.

At the same time it will be seen that the lowering of the arm 85 lowers the contact pins 91 into the mercury 92, in the cups 93, closing the ground switch. This normally has no effect, but is a necessary feature for operating the box in event the loop or circuit 168 is accidentally broken, as will be later described.

It will thus be seen that the circuit is closed from the loop 168 through the wire 143, contacts 76 and 77, wire 142, coils 95, wire 140 and back to the loop 168.

The tapered lug 118 of the lever 114 will shortly thereafter ride down into the upper notch 83 of the spring casing, the curved tail portion 120 of said lever rocking the arm 121 which through the pin 123 on the lug 124 of the armature lever 98, will move the armature into the magnetic field of the coils 95.

The rotation of the spring drum will cause the signal wheel 69 to rotate, and the long tooth 70′ thereon will have engaged the tooth 73 of the signal arm while the armature controlling lever 114 and arm 121 are holding the armature in the magnetic field of the magnets 95, thus closing the circuit through the spring contacts 76 and 77, the finger 79 upon the signal arm holding the contact 76 against the contact 77, whereby the coils 95 will be energized.

The coils being energized will attract the armature 97 and hold the armature against the coils, rocking the lever 98 upon its pivot 100 and releasing the pin 103, upon the signal arm 71, from engagement with the lug 102 upon the lever 98.

As the signal wheel 69 rotates, the teeth 70 thereon will engage the tooth 73 upon the signal arm 71. As this tooth on the signal arm rides into the depression of each tooth on the signal wheel, the circuit is momentarily broken, the impulses transmitting the signal through the loop 168 to the headquarters instruments.

At each break in the circuit it will be seen that the coils 95 are momentarily de-energized and thus the coils 95 will not themselves hold the armature down. During these breaks in the circuit, the armature is held down by the end of the pin 103 upon the signal arm engaging the end of the lug 102 on the lever 98, thus holding the armature within the range of the magnets until the circuit is again completed and the magnets re-energized by the tooth 73 of the signal arm riding up onto the next tooth 70 of the signal wheel and through the pin 79 on the signal arm, moving the spring contact 76 into contact with the contact 77.

It will be seen, of course, that the signal wheel 69 is rotated, in the direction of the arrow on Fig. 25, by the unwinding of the spring 36 and through the gear 39, pinion 60 and shaft 59.

As the spring casing completes one-half of a revolution, the mechanism will have completed four complete repetitions of the signal.

The armature lever 98 being held down upon the coils at this time, the lug 104 on said lever is in such position that the lug 105 on the stop lever 107 can move over the same.

This permits the lug 113 of the stop lever to engage the upper notch 83 of the spring casing, stopping the rotation of the spring casing and through it stopping the movement of the actuating mechanism above described, and the parts will assume the normal position, the shoe 82 entering the lower notch of the spring casing and rocking the arm 85 up to the position shown in Figs. 2 and 25, opening the ground switch 91—93, sealing the contacts 76, 77 and 78 in the mercury 87 and again shunting out the coils 95; and the inclined surface 88 of the arm 85 will move the signal arm back to the inoperative position, permitting the lug 102 on the armature lever to engage over the pin 103 on the signal arm, as shown in Fig. 7.

Assuming that there is another box operating when a box is pulled, the spring casing of the second box will commence to rotate as above described. The lever 107 having been swung upon its pivot, by the pulling of the box, the lug 105 thereof will have released the lug 104 upon the armature lever, permitting the spring 101 to throw the armature lever out of range of the magnets 95, while the lug 102 at the other end of the armature lever will retain the pin 103 upon the signal arm against movement.

Immediately after this, the tapered lug 118 of the armature controlling lever 114 will ride down into the notch 83 of the spring casing, the tail 120 of said lever rocking the arm 121, which through the pin 123, on the lug 124 of the armature lever 98, will move the armature into the magnetic field of the coils 95 just as the long tooth of the signal wheel engages the tooth on the signal arm. As the current is being rapidly broken by the operation of the first box, the coils 95 in the second box will not be energized, permitting the spring 101 to throw the armature lever out of the field of the coils 95, the lug 102 of the armature lever engaging the pin 103 of the signal arm and thus holding the signal arm against movement preventing the second box from sending its signal, and holding the circuit closed through contacts 76

and 77, permitting the first box to complete its signal.

It will be seen that the rotation of the spring casing will have immediately displaced the shoe 82 from the lower notch 83, in the spring casing, rocking the curved arm 81 downward and through the shaft 80 the arm 85 will be rocked downward, lowering the mercury cup 86 away from the spring contacts 76, 77 and 78 and closing the ground switch 91—93 which, as above described, has no effect excepting when the circuit is broken and the emergency switch 171—186, at headquarters, is closed as above described.

The parts will remain in this position until the spring casing completes one-half of a revolution, at which time the armature lever being still held out of the field of the coils, the end of the lug 104 thereon engaging the end of the lug 105 on the stop lever 107 will prevent the lug 113 on the other end of the stop lever from entering the notch 83, which permits the spring casing to continue to rotate.

Immediately after the lug 113 passes the notch 83, the tapered lug 118 of the lever 114 will ride down into the upper notch 83 of the spring casing, the curved tail portion 120 of said lever rocking the arm 121 which through the pin 123 on the lug 124 of the armature arm 98, will move the armature into the field of the magnets 95.

If the circuit is still being broken by the operation of another box as the armature of the second box is moved into the field of its magnets 95, it will be seen that the magnets in the second box will not be energized and as the tapered lug 118 of the lever 114 immediately rides out of the notch 83 of the spring casing, the arm 121 will immediately release the armature lever while the tooth on the signal lever is engaged by the long tooth 70′ of the signal wheel, permitting the spring 101 to throw the armature back out of range of the magnets 95 and again hold the signal arm inoperative as above described.

Assuming, however, that the first box has completed a signal and returned to inoperative position, it will be seen that as the armature of the second box is thus momentarily moved into range of its magnets, the same being thus energized, by the closing of the circuit in the first box, will attract the armature and hold it, releasing the pin 103 of the signal arm from engagement with the lug 102 of the armature lever, permitting the second box to transmit its signal in the manner above described for the first box.

If one box is operating and another box is pulled while the code wheel of the first box is travelling the long distance separating the last tooth of the series and the wide tooth 70′, it will be seen that the spring casing of the second box will commence to rotate as soon as the box is "pulled". The lever 107 will have swung upon its pivot upon the pulling of the box, and the lug 105 of said lever will have released the lug 104 upon the armature lever, whereupon the spring 101 throws the armature lever out of range of the magnets 95, the lug 102 upon the other end of the armature lever engaging the pin 103 upon the signal lever and holding the signal lever against movement, holding the circuit of said second box closed through the contacts 76 and 77.

The tapered lug 118 on the armature controlling lever 114, of the second box, will immediately ride down into the notch 83 of the spring casing, the tail 120 of said lever rocking the arm 121, which, through the pin 123, on the lug 124 of the armature lever 98, will move the armature into the magnetic field of the coils 95 just as the long tooth of the signal wheel engages the tooth on the signal arm. Since the circuit is broken by the code wheel of the first box travelling the long distance separating the last tooth of the series and the wide tooth 70′, the coils 95 in the second box will not be energized, permitting the spring 101 thereof to throw the armature lever of said second box out of the field of the coils 95, the lug 102 of said armature lever engaging the pin 103 of the signal arm and thus holding the signal arm against movement, preventing the second box from sending its signal, and holding the circuit closed through the contacts 76 and 77 of the second box, permitting the first box to complete its signal.

After the first box has completed its signal and the parts thereof have returned to the inoperative position, the armature of the second box will be momentarily moved into range of its magnets, as above described, and said magnets being thus energized by the closing of the circuit through the first box, will attract the armature and hold it, releasing the pin 103 of the signal arm from engagement with the lug 102 of the armature lever, permitting the second box to transmit its signal in the manner above explained.

In the event the loop 168 should be broken on the left side of a box, both ends of the loop 168 may be connected to the positive side of the battery, and the negative side of the battery may be grounded to complete the circuit from the box through the ground. This may be accomplished by moving the switch blades 171 and 186, shown in Fig. 26, to the left, the blade 171 breaking the contact at 183 and contacting with the point 185, thus connecting both ends of the loop to the positive side of the battery.

The blade 186 will then contact with the points 187 and 188, grounding the negative side of the battery through the wire 189, contact point 188, blade 186, contact point 187, and wire 173.

Then assuming the box is pulled, as above

described, the circuit will be completed from the unbroken side of the wire or loop 168, through the wire 143, contacts 76 and 77, wire 142, magnets 95, wire 140 to contact 135, then through wire 139, ground switch 91—93 which is closed when the box is pulled, wire 138, contact 134, wire 169 to the ground and then through the ground connection 173 to the negative side of the battery at headquarters, completing the circuit through the box without passing through the normal circuit above described.

It will be obvious that in the operation of a box, as the tooth upon the signal arm is engaged by the teeth on the signal wheel, the circuit is continuously opened and closed through the contacts 76 and 77, thus intermittently making and breaking the circuit to the register, alarm or other usual mechanism at headquarters, the impulses produced by the box being responded to by the headquarters apparatus in usual and ordinary manner.

I claim:—

1. A non-interfering signal box including a signal wheel, a drum for rotating the wheel and having a notch in its periphery, means normally urging the drum to rotate, a stop lever normally engaging the notch to hold the drum against rotation, means for disengaging the stop lever from the notch to permit the drum to rotate, signal transmitting mechanism including a circuit controlling device and a signal lever for operating the circuit controlling device adapted to be operated by the signal wheel, a magnet in the box, an armature for the magnet, means for urging the armature out of range of the magnet, an armature controlling lever cooperating with the notch in the drum for momentarily moving the armature into the range of the magnet as the drum starts to rotate and at each rotation thereof, means upon the armature for holding the signal lever inoperative when the armature is away from the magnet and cooperating means upon the stop lever and armature for preventing the stop lever from engaging the notch in the drum when the armature is out of the range of the magnet.

2. A non-interfering signal box including a signal wheel, a drum for rotating the wheel and having a notch in its periphery, means normally urging the drum to rotate, a stop lever normally engaging the notch to hold the drum against rotation, means for disengaging the stop lever from the notch to permit the drum to rotate, signal transmitting mechanism including a circuit controlling device and a signal lever for operating the circuit controlling device adapted to be operated by the signal wheel, a magnet in the box, an armature for the magnet, means for urging the armature out of range of the magnet, an armature controlling lever cooperating with the notch in the drum and having a curved end, and a lever engaging said curved end, for momentarily moving the armature into the range of the magnet as the drum starts to rotate and at each rotation thereof, means upon the armature for holding the signal lever inoperative when the armature is away from the magnet and cooperating lugs upon the stop lever and armature for preventing the stop lever from engaging the notch in the drum when the armature is out of the range of the magnet.

3. A non-interfering signal box including a signal wheel, a drum for rotating the wheel and having diametric notches in its periphery, means normally urging the drum to rotate, a stop lever pivoted intermediate its ends and having a lug at each end, one of said lugs normally engaging a notch in the drum to hold the drum against rotation, means for moving the stop lever upon its pivot to release the drum and permit it to rotate, signal transmitting mechanism including a circuit controlling device and a signal lever for operating the circuit controlling device, a magnet in the box, an armature lever for the magnet, the armature lever being pivoted intermediate its ends, and having a lug at each end, one lug upon the armature lever arranged to engage the other lug upon the stop lever, means for urging the armature lever out of range of the magnet, an armature controlling lever cooperating with either of the notches in the drum for momentarily moving the armature lever into the range of the magnet as the drum starts to rotate, the other one of the lugs upon the armature lever holding the signal lever inoperative when the armature lever is away from the magnet, the cooperating lugs upon the stop lever and armature lever preventing the other lug upon the stop lever from engaging either notch in the drum when the armature lever is out of range of the magnet.

In testimony that I claim the above, I have hereunto subscribed my name.

CHARLES M. SACKMAN.