W. S. REYNOLDS.

ELECTRIC SIGNAL APPARATUS.

APPLICATION FILED MAR. 17, 1911.

1,023,875.

Patented Apr. 23, 1912.

5 SHEETS—SHEET 1.

Fig. 1.

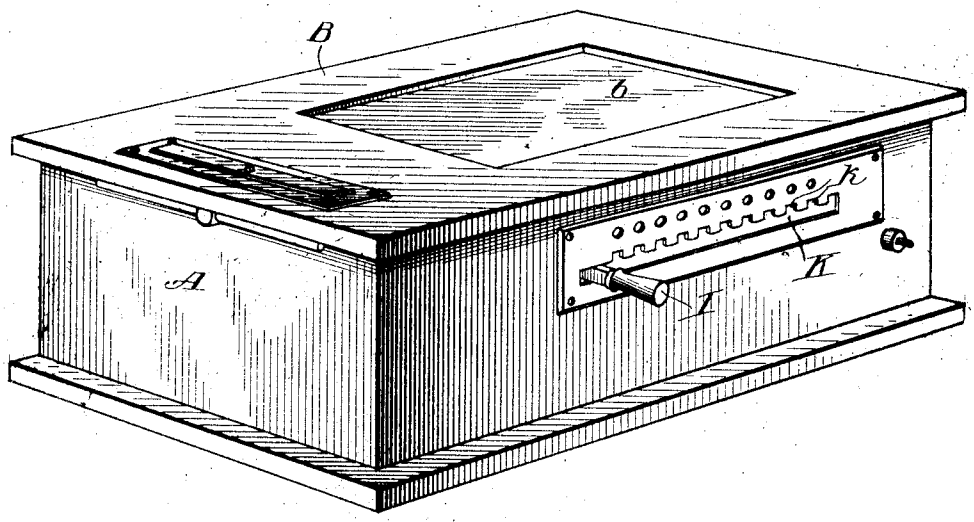
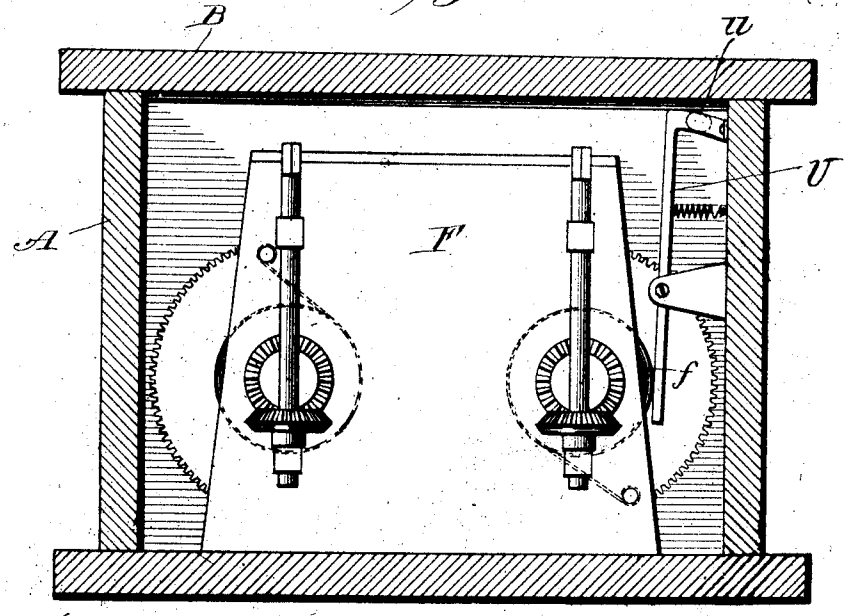


Fig. 3.



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5 SHEETS—SHEET 2.

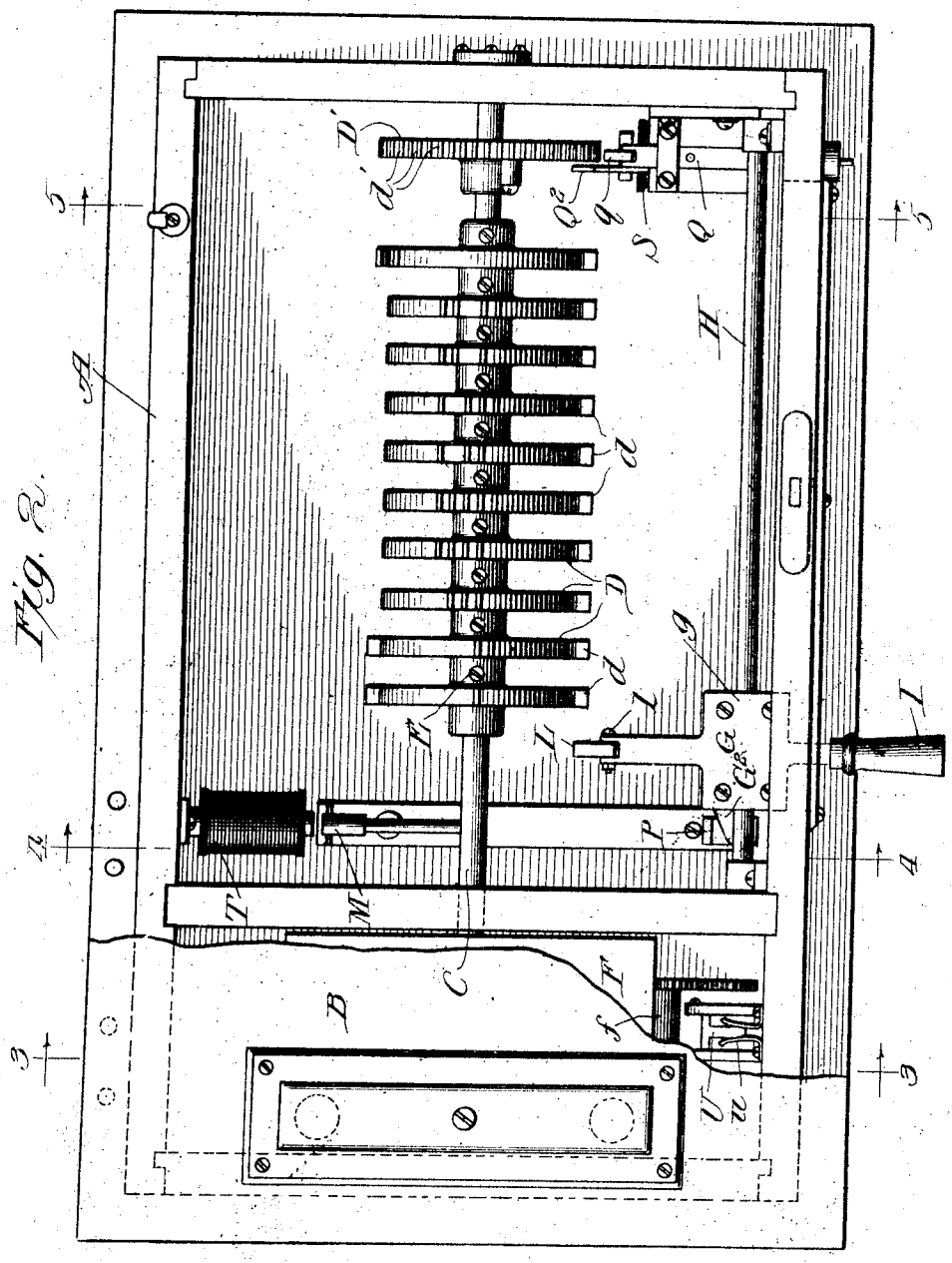


Fig. 2.

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5 SHEETS—SHEET 3.

Fig. 4.

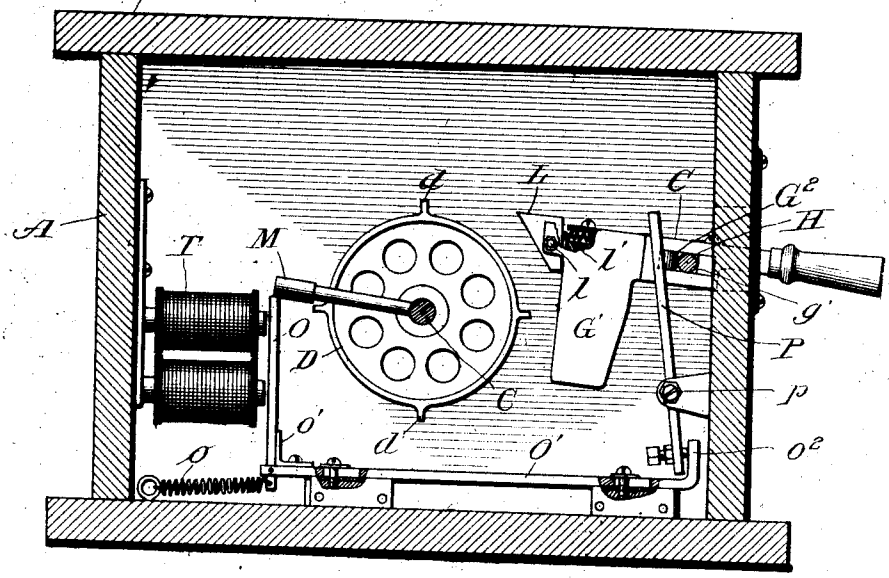
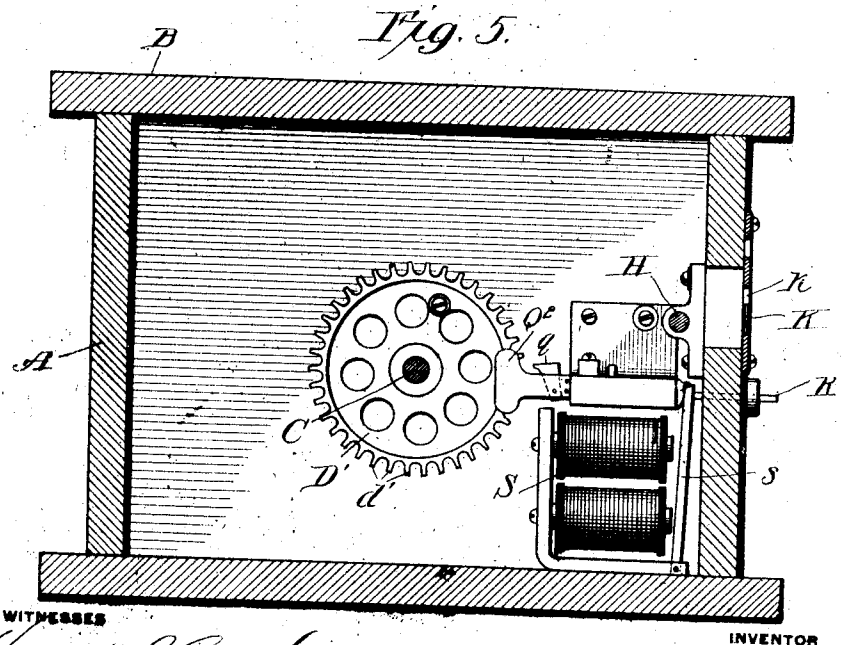


Fig. 5.



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5 SHEETS—SHEET 4.

Fig. 6.

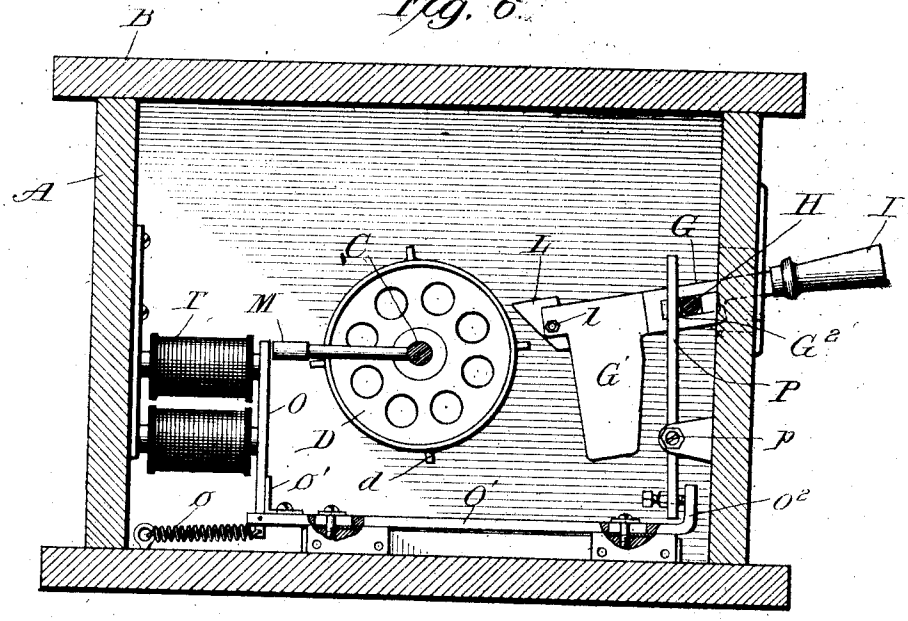


Fig. 8.

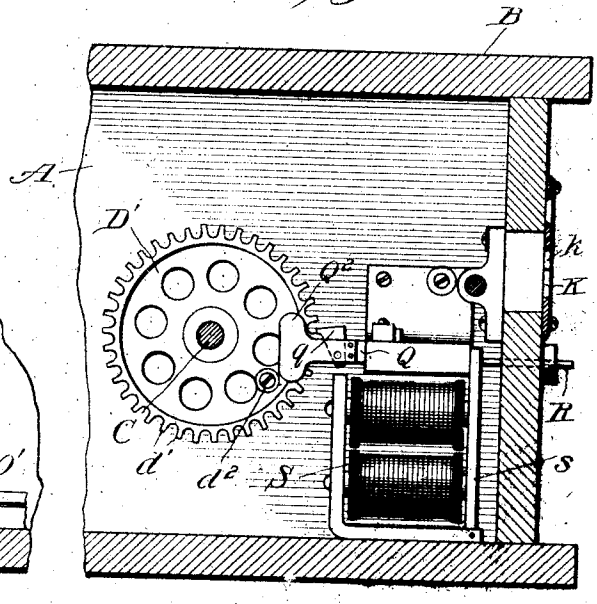
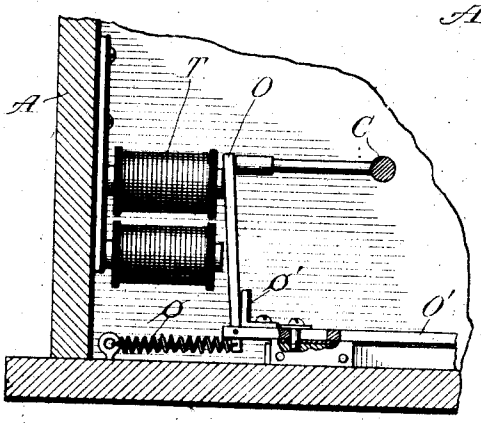


Fig. 7.



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5 SHEETS—SHEET 5.

Fig. 10.

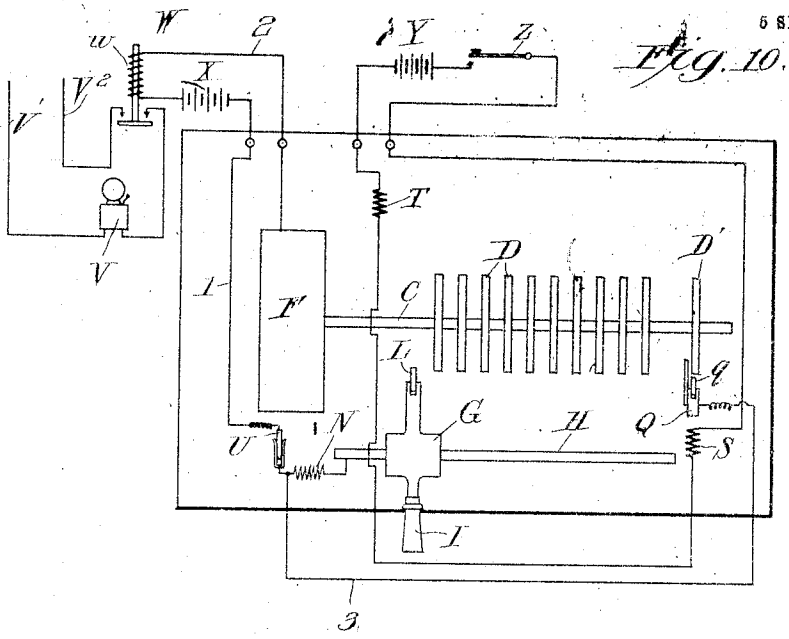
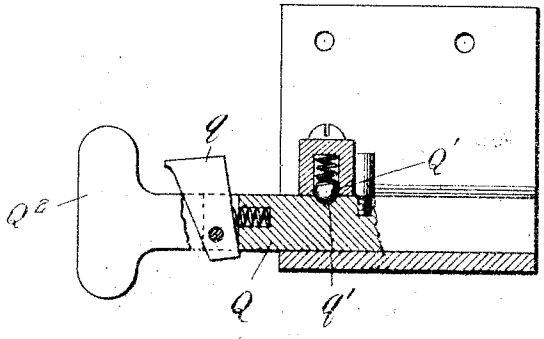


Fig. 9.



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UNITED STATES PATENT OFFICE.

WILL S. REYNOLDS, OF SHELBY, OHIO, ASSIGNOR TO THE AUTOCALL COMPANY, OF SHELBY, OHIO, A CORPORATION OF OHIO.

ELECTRIC SIGNAL APPARATUS.

1,023,875. Specification of Letters Patent. Patented Apr. 23, 1912.

Application filed March 17, 1911. Serial No. 615,002.

To all whom it may concern:

Be it known that I, WILL S. REYNOLDS, a citizen of the United States, residing at Shelby, county of Richland, State of Ohio, have invented a certain new and useful Improvement in Electric Signal Apparatus, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to apparatus for ringing electric bells or sounding alarms at a plurality of distributed points and has for its primary object to produce an apparatus of this kind which shall be simple in construction and efficient and reliable in operation.

A further object of my invention is to produce an apparatus of the character specified by which signals or alarms of different natures may be produced by means of a single set of signal or alarm devices, the arrangement being such that one of the signals or alarms may always be produced even when the controlling mechanism for another is in operation.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in the claims; but for a full understanding of my invention and of its various objects, including those enumerated and others, and for a full understanding of the advantages of my invention, reference may be had to the following detailed description taken in connection with the accompanying drawing, wherein:

Figure 1 is a perspective view of the controller or central station apparatus forming part of a complete system arranged in accordance with my invention; Fig. 2 is a plan view, on a larger scale, a portion of the cover of the casing being omitted more clearly to show the interior; Fig. 3 is a section on line 3—3 of Fig. 2; Fig. 4 is a section on line 4—4 of Fig. 2; Fig. 5 is a section on line 5—5 of Fig. 2; Fig. 6 is a view similar to Fig. 4 showing different positions of the parts; Fig. 7 is a view similar to Figs. 4 and 6 of a fragment of the apparatus, showing a still further change in positions; Fig. 8 is a view similar to the right hand portion of Fig. 5 showing parts in a different position; Fig. 9 is a view on an enlarged scale, partly in elevation and partly in section, showing a detail; and Fig. 10 is a diagram of connections.

My invention relates in general to the apparatus shown in the patent to Van Horn 936,835, granted October 12, 1909 and, in some of its aspects may be regarded as consisting of improvements thereon. The purpose in both instances is to make it possible to produce code signals or alarms simultaneously at a plurality of distributed points. In accordance with my invention the mechanism is simplified and made more efficient and reliable and at the same time I have added other features which make the system more complete and widen its field of usefulness.

Referring first to Figs. 1 to 9 of the drawings, A represents a box or casing having a detachable cover B. The cover may be provided with a glazed window *b* through which the working parts may be viewed. Journaled in the casing is a horizontal shaft C provided with a series of disks D. Any desired number of disks, to meet the particular conditions of service in any particular case, may be employed. The disks are not required to be insulated from each other and therefore they may conveniently be assembled upon the supporting shaft by being slipped thereon one over the other and secured thereto by means of set screws E or the like. The shaft with its disks constitutes the rotating contact member of a circuit controller; each of the disks being provided about its periphery with a series of projecting contact pieces *d*. The projections on the disks are grouped differently throughout the series and also the number of the projections may differ throughout the series; the number and grouping of the projections on each of the disks being adapted to produce a definite code signal of any desired character whenever a signaling circuit is completed by bringing a coöperating contact piece into operative relation to one of the disks and the rotatable contact member set in operation. The rotatable contact member may be actuated in any suitable manner, preferably by means of a suitable motor F arranged within the casing and connected with the shaft C. In the arrange-

ment shown there is a spring motor, but I do not desire to be limited to this type.

G represents the contact piece which is adapted to coöperate with the disks on the rotary contact member and it is conveniently made in the form of an arm having a widened portion g with a square hole g' extending through it.

H is a stationary shaft mounted in the casing parallel with the shaft C and passing through the square opening in the contact piece. The member G is therefore capable of being slid along the shaft H and may also be oscillated upon the same. I have found that the combination of the square hole and round shaft permits the movable contact piece to slide very freely along the shaft and to be free from binding when it is grasped for the purpose of moving it. The member G has a handle I which projects outwardly through an elongated slot K in the casing. The upper wall of the slot is notched as indicated at k, the notches corresponding in number and in location to the disks of the rotary contact member. The inner end of the contact piece is provided with a heavy counterweight G' so that the inner end of the contact piece always hangs down as far as it can go. Upon the inner end of the contact piece is a yieldable contact finger L which is adapted to engage with the projections on each of the contact disks when the handle is moved into the notch corresponding to that disk. In Fig. 4 the movable contact piece is shown in its idle position, corresponding to the position which it occupies in Fig. 2; while in Fig. 6 it is shown in a position opposite one of the disks on the rotary member. In this latter position the handle has been lifted by the counterweight until brought to rest within the notch corresponding to the disk opposite which the movable contact piece lies; the contact finger L being in position to be engaged by the lugs or projections d. By means of the counterweight the contact finger is held positively in its operative position and the rotating lugs or projections can make a good wiping contact with the finger without having to bear the weight of the entire contact piece. The contact finger may be variously formed, but I prefer to make it in the form of a small dog pivoted to the supporting arm as at l and normally held at the forward limit of its movement by a small spring l'. As the movable contact member rotates, the projections on one of the disks engage with the contact finger and force it back against the tension of the small spring. As soon as one of the projections has passed the finger, the spring again thrusts the latter forward so as to bring it into the path of the succeeding projection.

In the arrangement shown the motor tends constantly to actuate the rotary contact member. In order to restrain the rotary contact member when no signal is to be given or alarm sounded, I provide the shaft C with a radially projecting arm M which is adapted to be engaged by a movable abutment and thus hold the shaft against further rotation. In the arrangement shown the abutment takes the form of an upright bar O hinged at its lower end to a horizontally slidable bar O'. A bracket o' on the horizontal bar limits the swinging movement of the upright bar in one direction. A spring o, secured at one end to the lower end of the member O and at its other end to a part of the casing, tends to hold the slidable bar in the position wherein the member O is clear of the end of the stop member M. The spring also serves to hold the member O against the bracket o' and thus hold the member O upright. The opposite end of the member O' is bent up at o^2 for engagement with the lower end of a lever P which is pivotally supported on the casing as at p at a point between its ends. The upper end of the lever P projects above the stationary shaft H. On one side of the movable contact piece is fixed a wedge block G^2 which, when the contact piece is moved into its idle position, enters behind the upper end of the lever P, as indicated in Figs. 2 and 4, and swings the lever sufficiently to cause the member O to be brought into the path of movement of the stop arm on the rotary member. When the movable contact piece is shifted into one of its working positions, the wedge member passes from behind the lever P and the spring o returns the parts to the positions indicated in Fig. 6; the member O being now clear of the path of movement of the stop arm. It may happen that the movable contact piece is brought into its idle position just after the stop has come into alinement with the upper end of the abutment member. Injury to the parts is prevented, when this occurs, by reason of the fact that the spring o permits the member O to yield as indicated in Fig. 7, thus permitting the stop arm to pass by it. As soon as the stop arm clears the abutment member, the spring returns the latter to the position indicated in Fig. 5 so that, after the rotary member has completed almost another revolution, the stop arm strikes upon the upper end of the abutment member as indicated in Fig. 4.

It is often desirable to produce a general signal or sound a general alarm, independently of the code signals or alarms produced by the controlling mechanism which I have just described. Instances of general signals or alarms are those which indicate a fire, opening and closing hours, and the like. It is desirable that such general alarms or signals be effected without duplicating the wir-

ing and the signal or alarm devices which are employed for code purposes as heretofore explained. To this end I have provided additional controlling mechanism which operates on the same circuits as the other mechanism but dominates the latter so that the general signal or alarm will always take precedence even though both sets of controllers be in operation at the same time. For general signaling purposes I have mounted upon the shaft C an additional contact disk D′ provided with lugs or projections d' of any suitable form and arrangement. In the apparatus as illustrated, the member D′ is in the form of an ordinary gear wheel, the teeth serving as contact members. A second movable contact piece, Q, is slidably mounted in the casing adjacent to the disk D′. The member Q is provided with a contact finger q corresponding to the finger L. The normal position of the member Q is that illustrated in Fig. 5, the contact finger being out of engagement with the projections on the coöperating disk. When desired, the member Q may be pushed inwardly into the position indicated in Fig. 8 by means of a push rod R or electromagnetically. The member Q may be held yieldingly in its innermost position by means of a small spring-held ball Q′, which is adapted to be pressed into a socket q' in the top of the member Q, as indicated in Fig. 9. This prevents the member Q from being pushed back under the action of the teeth on the contact disk as they wipe past the finger q. For moving the member Q electromagnetically I have provided an electromagnet S whose armature s extends across the outer end of the member Q in such a position that when the electromagnet is energized the armature is drawn inwardly and the parts assume the positions indicated in Fig. 8. For disengaging the contact finger q from its coöperating disk, I have provided the disk with a pin d^2 which is adapted to strike against a head Q^2 which projects forwardly from the member Q into the path of the pin at the time the contact finger is in engagement with the disk.

It is necessary to release the rotary contact member at the time the member Q is pushed inwardly and this may either be accomplished by sliding the member Q into one of its working positions or electromagnetically. For releasing the rotary contact member electromagnetically I have provided an electromagnet T for which the abutment member O serves as an armature. When it is desired to release the stop arm from the abutment while the contact piece G remains in its idle position, the electromagnet T is energized and draws the member O from the position indicated in Fig. 4 to that indicated in Fig. 7. It will therefore be seen that whenever electromagnets S and T are simultaneously energized, the contact piece Q will be pushed inwardly until its finger is in operative relation to the disk D′ and the rotary contact member will be released and be set in motion by its motor. The disk D′ will turn in the counterclockwise direction as viewed in Figs. 5 and 8 until the pin d^2 reaches the point indicated in the latter figure. The pin then engages with the head Q^2 and forces the same backwardly until the contact finger is brought out of engagement with the disk. If the electromagnets have in the meantime been deënergized, the disk continues to turn until the stop arm M strikes the abutment. If the circuits of the electromagnets should, however, have remained energized the contact piece will again be drawn forward as soon as the pin is out of the way and the signal will continue to be given during another revolution of the rotary member.

The electromagnets S and T may be controlled in various ways. They are preferably included in a single circuit which is controlled by a suitable switch which is either adapted to be operated manually or by a clock.

Where a spring motor is used for driving the rotary contact member, there is danger that the winding of the motor will be neglected so that the motor will run down while the apparatus is working. It is evident that the motor will stop at a point where it meets resistance and therefore when the motor is just about ready to run down and one of the projections on a contact disk engages with one of the two contact fingers, sufficient burden will be imposed upon the motor to stop it at this point. Consequently the circuit which has just been established will be maintained and the safety of the apparatus will be endangered because of the possibility that something will burn out. To prevent danger from this source I provide in the signaling circuit a safety switch which is under the control of the motor and which opens the circuit before the motor can run down. This switch is most clearly shown in Figs. 2 and 3, being indicated as a knife-blade switch having a movable member U. One end of the member U extends into proximity to the motor spring f. As the motor runs down, the diameter of the spring increases and finally the movable switch member is shifted thereby until it is out of engagement with the stationary switch member u.

In Fig. 10 I have shown one arrangement of circuit connections which may be employed. There is a local circuit for the magnets S and T and also a local circuit which directly controls the main signaling circuit. This permits the use of a small current through the controlling apparatus and a heavy current for actuating or con-

trolling the actual signal devices. Referring to Fig. 10, V represents a conventional bell which I have shown as an example of any signal or alarm which it may be desired to employ. Current for operating the signal is taken from wires V′ and V², these wires leading from a lighting circuit, a power circuit or some other suitable or convenient source. W is a relay for closing the circuit through the signal device. X is a battery or other suitable source of current for energizing the coil *w* of the relay. One terminal of the battery is connected to one terminal of the relay and the opposite terminal of the battery is connected by wire 1 to the switch U. From the switch U a conductor including a resistance N extends to the rod or shaft H. The other terminal of the relay coil is connected to the motor F by means of a wire 2, the motor and the shaft C being in electrical connection with each other so that no further conductors are required to complete the circuit from the motor to the rotary contact member. It will be seen that whenever the movable contact piece G is shifted so as to bring its contact finger into operative relation to one of the contact disks, a circuit will be established from the battery through wire 1, through the switch U, through the resistance N, shaft H, contact piece G, the rotary contact member, the motor, wire 2, the coil *w* of the relay and back to the battery. Consequently the relay is energized and the signal set in operation. As the rotary contact member revolves, the circuit is interrupted and completed and again interrupted, successively, as one projection after another wipes past the finger on the member G. Therefore, as long as the controller remains in operation the relay will be energized and deënergized so as to operate the signal through a series of cycles each of which forms part of a predetermined code; the whole code being represented by the different cycles which may be obtained throughout the whole series of contact disks.

For signals of a general character the same relay and signal device or devices are employed. The electromagnets S and T are arranged in series with each other and with a battery Y in a circuit controlled by a suitable switch Z. The switch Z, as heretofore explained, may be actuated manually or by means of a suitable program clock. The actuating circuit for the magnets S and T is simple and can easily be traced, so I shall not describe the wiring in detail. The local signaling circuit is the same for general signals as the one heretofore described except that from switch U a branch 3 leads to the contact piece Q. When the member G is in its idle position the local signaling circuit is the same as heretofore described except that from switch U the current passes to wire 3, to contact piece Q and thence to the rotary contact member. Consequently as the rotary contact member revolves the circuit is made and broken as one tooth of the disk D′ after the other comes into engagement with the contact finger *q*. It may sometimes happen that the general signal is to be given at the time the other controlling devices are in operation. As I have heretofore explained, it is desirable that the general signal shall prevail regardless of the other controlling mechanism. The purpose of the resistance N is now clear. If the contact piece G is in a working position at the time the controlling mechanism for the general signal is brought into play, two parallel circuits exist between the switch U and the rotary contact member. The resistance of the branch which contains the contact piece Q is negligible while the branch which includes the contact piece G contains the resistance N. This resistance is not great enough to interfere with the operation of the relay in the ordinary use of the member G but it is sufficient to reduce the current which passes through the member G when both of the movable contact pieces are in working positions so that control of the relay is taken away from the member G.

While I have illustrated and described only a single preferred form of my invention, and one combining all of the various novel features of my invention, I do not desire to be limited to a device embodying all such features in combination with each other or the particular structural details thus illustrated and described; but intend to cover all forms and arrangements which fall within the terms employed in the definitions of my invention constituting the appended claims.

I claim:

1. In an apparatus of the character described, a rotatable contact member, means for rotating said member, a stop on said member, an abutment mounted on a fixed support adjacent to said member, a movable contact piece having an idle position and one or more positions wherein it engages with said contact member, and means associated with said contact piece for moving said abutment into the path of said stop when said contact piece is brought to its idle position.

2. In an apparatus of the class described, a rotatable contact member, means for rotating said member, a stop on said member, an abutment for engaging with said stop, a movable contact piece having an idle position and one or more positions wherein it engages with said contact member, and means associated with said contact piece for moving said abutment into the path of said stop when said contact piece is brought to its idle position, said abutment being yield-

able in a direction transverse to that portion of the path described by the stop while in the vicinity of the abutment.

3. In an apparatus of the class described, a rotatable contact member, a stop arm projecting from said member, an abutment mounted on a fixed support adjacent to said member movable across the path of said stop arm, a movable contact piece having an idle position and one or more positions wherein it engages with said contact member, and means on said arm for moving said abutment into the path of said arm when said contact piece is brought into its idle position.

4. In an apparatus of the class described, a rotatable contact member, a stop projecting from said member, a sliding bar, an abutment pivoted to said bar so as to swing in the plane of movement of said stop, a spring for holding said abutment at one end of its limit of movement on said bar, a movable contact piece having an idle position and one or more positions wherein it engages with said contact member, and means including a wedge on said contact piece for moving said bar into a position to bring said abutment into the path of said stop when the contact piece is brought into the idle position.

5. In an apparatus of the character described, a rotatable contact member, a cooperating contact piece having an idle position and one or more working positions, a stop on said member, a bar slidably supported below the stop, an abutment hinged to the slide and projecting upwardly therefrom, a spring engaging the abutment and serving to hold the abutment upright and the bar at one limit of its movement, a lever loosely engaging said bar at one end and projecting toward said contact piece at its other end, and a wedge device on said contact piece arranged to engage with said lever when the contact piece approaches its idle position for the purpose of moving the bar against the tension of the spring to bring the abutment in the path of said stop.

6. In an apparatus of the character described, a rotatable contact device, means for rotating said contact device, a coöperating contact piece, means for moving said contact piece into engagement with the rotatable contact device, and means on said device for throwing said contact piece out of engagement therewith.

7. In an apparatus of the character described, a rotatable contact device, means for rotating said contact device, a coöperating contact piece, means for moving said contact piece into engagement with the rotatable contact device, and means on said device for throwing said contact piece out of engagement therewith at a predetermined point in the rotation of said device.

8. In an apparatus of the character described, a rotatable contact device, means for rotating said device, a restraining means for said device, a coöperating contact piece, means for simultaneously moving said contact piece into engagement with said device and releasing the latter from said restraining means, and means under the control of said device for throwing the contact piece out of engagement with the said device.

9. In an apparatus of the character described, a rotatable contact member, means for rotating said member, a stop on said member, an abutment, a movable contact piece having an idle position and one or more positions wherein it engages with said contact member, means associated with said contact piece for moving said abutment into the path of said stop when said contact piece is brought to its idle position, a second movable contact piece, and means for simultaneously moving said second contact piece into operative relation to said contact member and removing the said abutment from the path of the stop.

10. In an apparatus of the character described, a rotatable contact member, means for rotating said member, a stop on said member, an abutment, a movable contact piece having an idle position and one or more positions wherein it engages with said contact member, means associated with said contact piece for moving said abutment into the path of said stop when said contact piece is brought to its idle position, a second movable contact piece, and means for simultaneously moving said second contact piece into operative relation to said contact member and removing the said abutment from the path of the stop, independently of the other contact piece.

11. In an apparatus of the character described, a rotatable contact member, means for rotating said member, a stop on said member, an abutment, a movable contact piece having an idle position and one or more positions wherein it engages with said contact member, means associated with said contact piece for moving said abutment into the path of said stop when said contact piece is brought to its idle position, a second movable contact piece, manually-actuated means for moving said second contact piece into operative relation to said contact member, and electromagnetic means for simultaneously moving said second contact piece into operative relation to said contact member and removing the said abutment from the path of the stop independently of the other contact piece.

12. In an apparatus of the character described, a movable contact member, means for moving said member, two independent contact pieces coöperating with said member, a signaling circuit divided throughout

a portion thereof into two branches arranged in multiple with each other and each containing said contact member and one of said contact pieces, and a resistance in one of said branches having sufficient resistance to prevent control of the signal by the contact piece in that branch when both branches are closed.

13. In an apparatus of the character described, a signaling circuit, two controllers connected in parallel in said circuit, and a device associated with said controllers for taking away control from one of said controllers when both are in operation at the same time.

14. In an apparatus of the character described, a signaling circuit, two controllers for said circuit connected in parallel therein, and a resistance in the branch of the circuit passing through one of the controllers for taking away the control from that controller when both controllers are in operation at the same time.

15. In an apparatus of the class described, a driven contact member having two contacts, means for driving said member, two contact pieces each of which is arranged to be moved into and out of engagement with one of the said contacts, a signaling circuit connected in series with two parallel branches each of which contains one of said contact pieces and its coöperating contact, and a resistance in one of said branches for taking away the control from the contact piece in that branch when both contact pieces are in engagement with their coöperating contact at the same time.

16. In an apparatus of the character described, a rotatable contact member, a cooperating contact piece, a spring motor for actuating the said member, an electric circuit containing said member and said contact piece, and switch mechanism in said circuit arranged to open the circuit when the motor has run down to a predetermined degree.

In testimony whereof, I sign this specification in the presence of two witnesses.

WILL S. REYNOLDS.

Witnesses:
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EARLE W. BAGG.