(No Model.)

4 Sheets—Sheet 1.

F. FRICK.

ELECTRIC PROGRAM CLOCK.

No. 535,948. Patented Mar. 19, 1895.

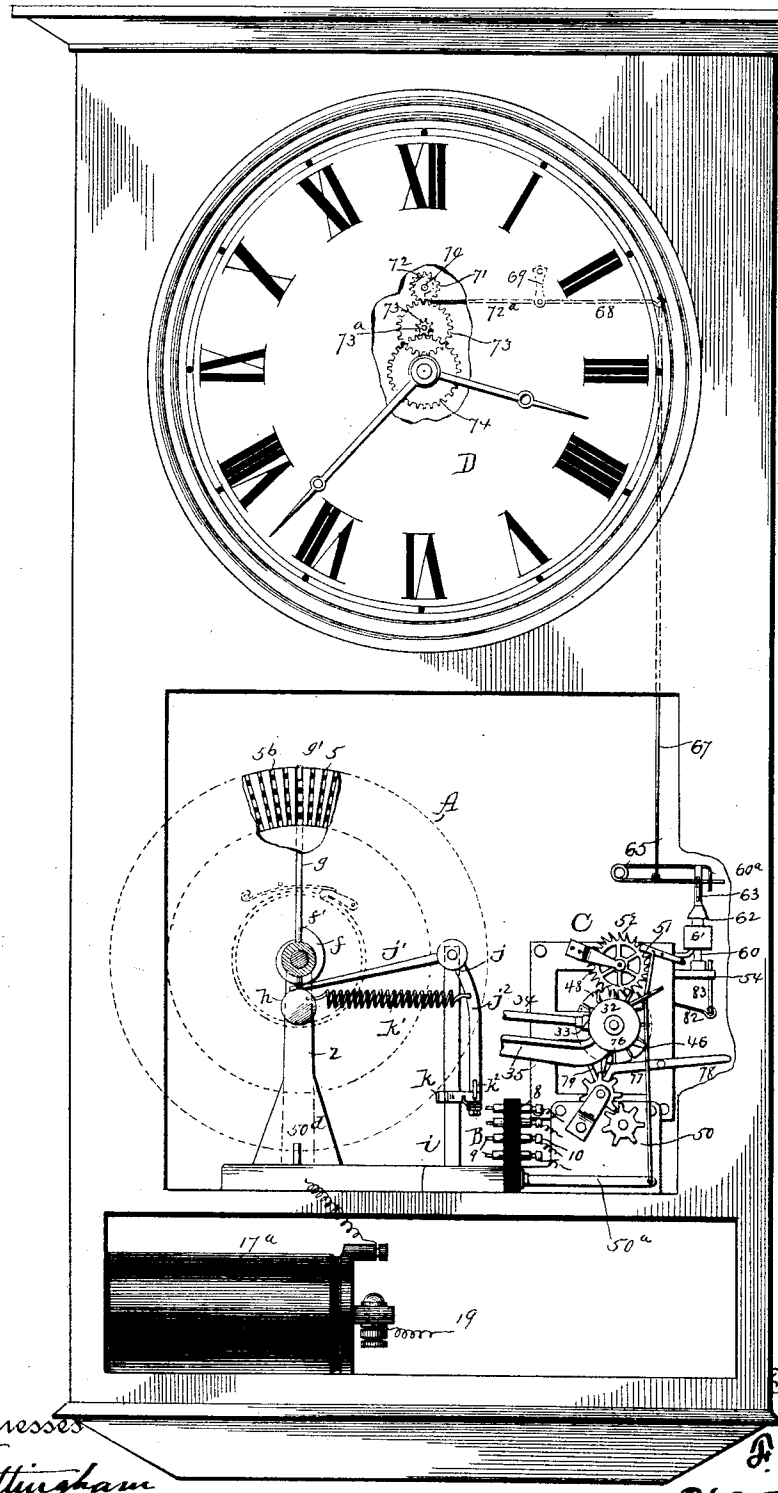

Fig. 1.

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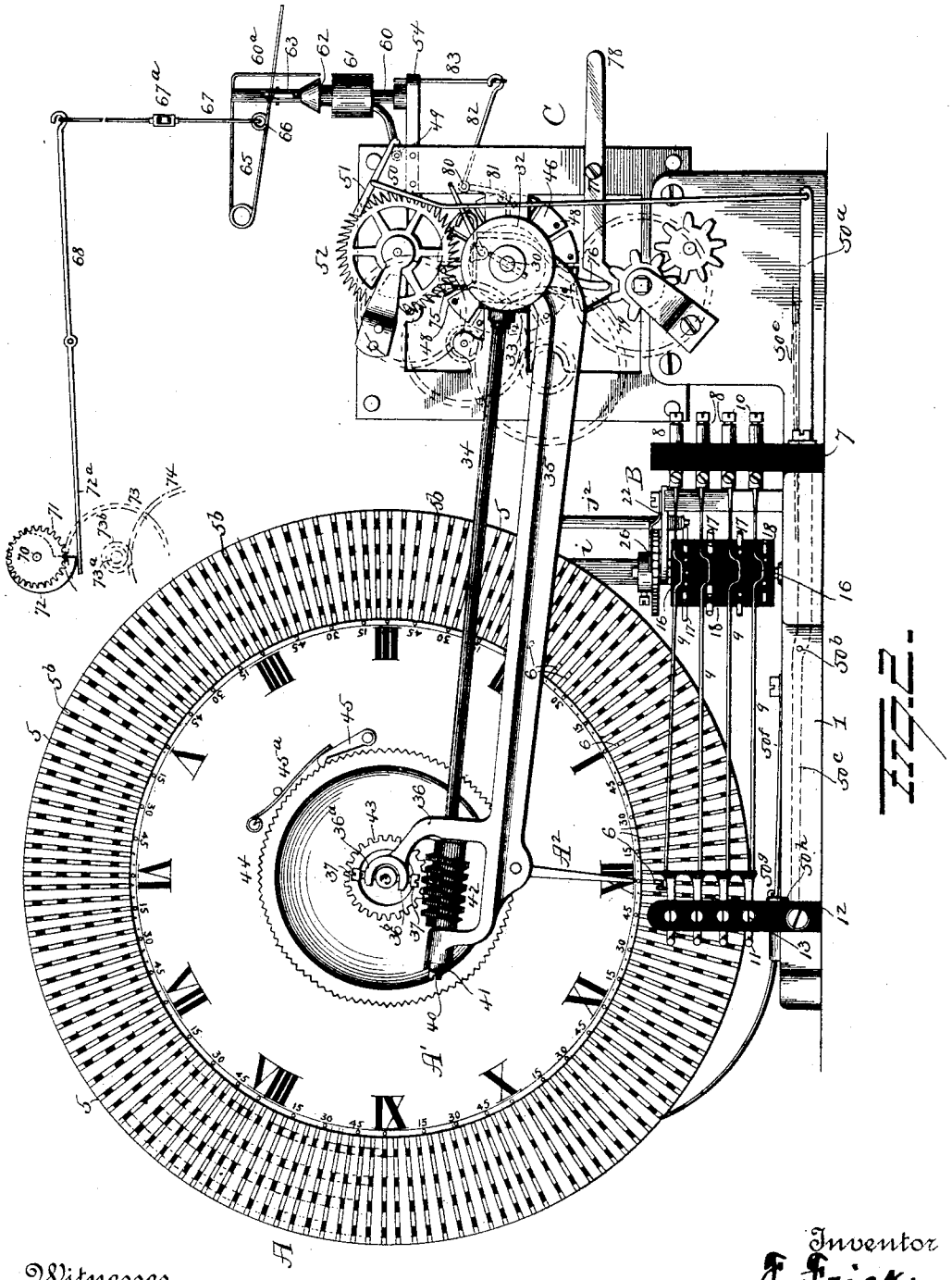
(No Model.) 4 Sheets—Sheet 2.

F. FRICK.

ELECTRIC PROGRAM CLOCK.

No. 535,948. Patented Mar. 19, 1895.



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(No Model.) 4 Sheets—Sheet 3.

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ELECTRIC PROGRAM CLOCK.

No. 535,948. Patented Mar. 19, 1895.

Fig. 4.

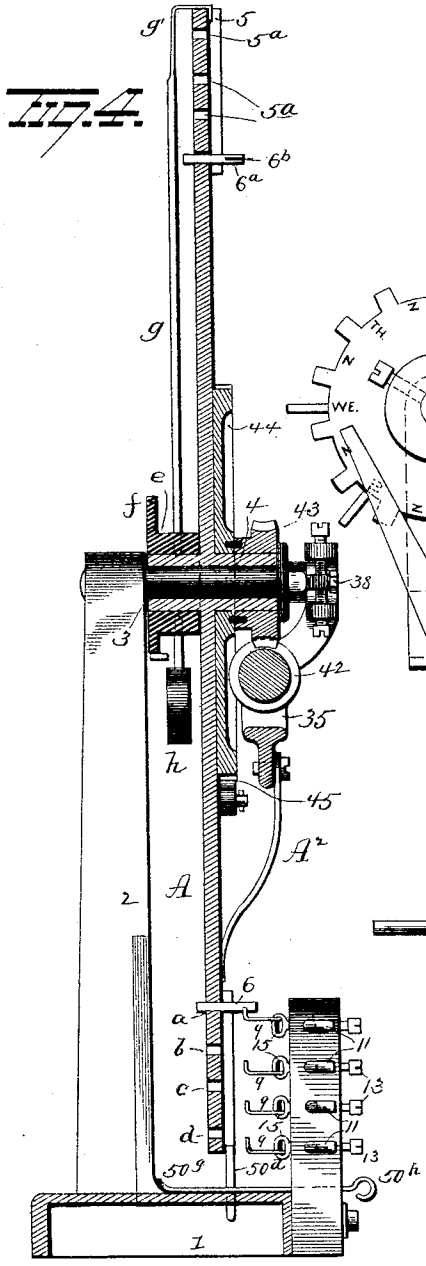


Fig. 5.

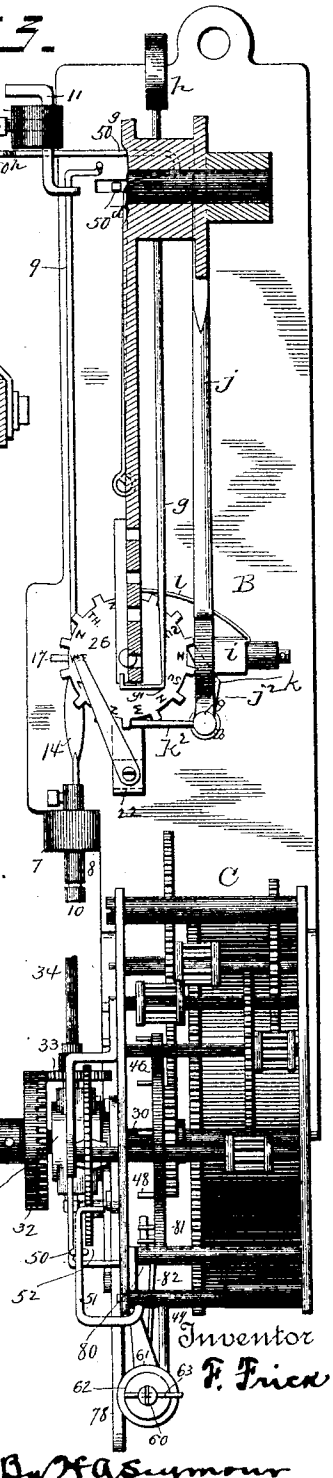


Fig. 6.

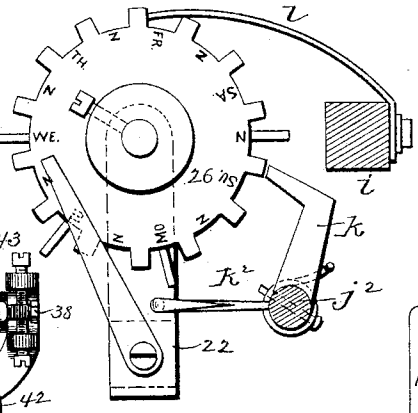
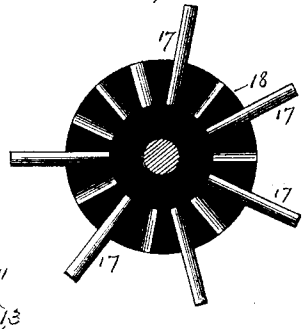


Fig. 7.



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(No Model.) 4 Sheets—Sheet 4.

F. FRICK.

ELECTRIC PROGRAM CLOCK.

No. 535,948. Patented Mar. 19, 1895.

Fig. 5.

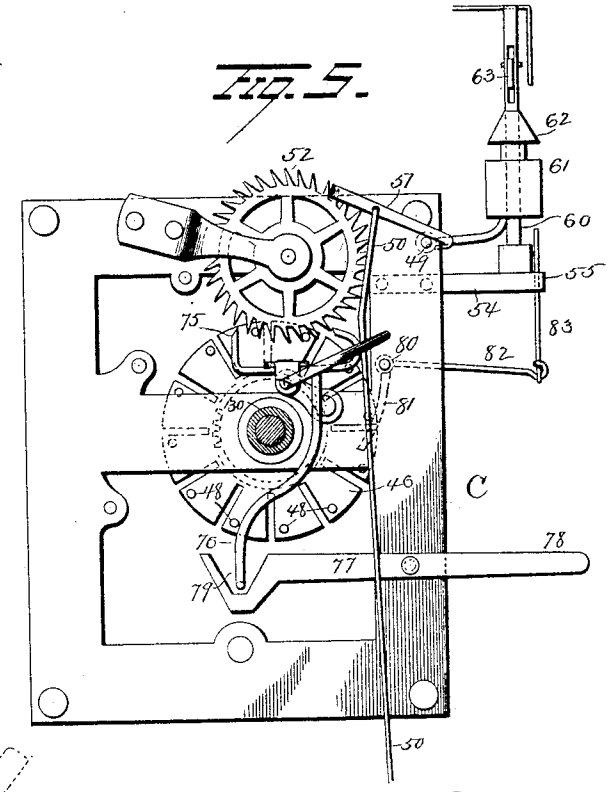
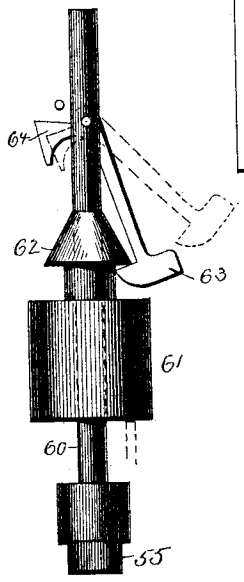


Fig. 8.



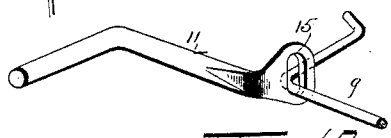
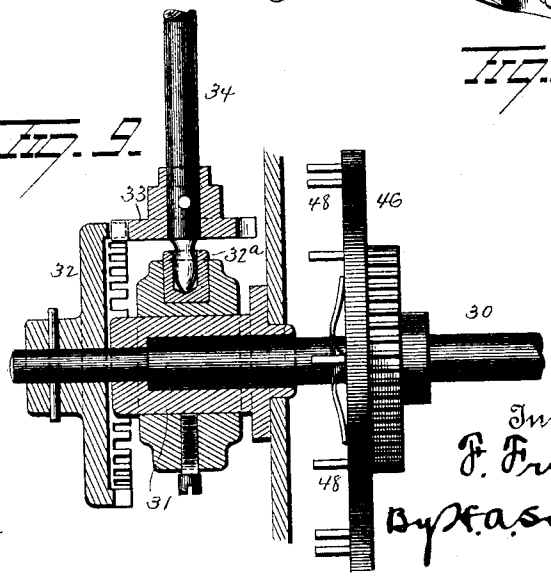


Fig. 10.

Fig. 9.



Witnesses
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UNITED STATES PATENT OFFICE.

FRED FRICK, OF WAYNESBOROUGH, PENNSYLVANIA.

ELECTRIC PROGRAM-CLOCK.

SPECIFICATION forming part of Letters Patent No. 535,948, dated March 19, 1895.

Application filed May 28, 1894. Serial No. 512,741. (No model.)

To all whom it may concern:

Be it known that I, FRED FRICK, a resident of Waynesborough, in the county of Franklin and State of Pennsylvania, have invented certain new and useful Improvements in Electrical Program-Signaling Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in electrical program signaling apparatus;—the object of the invention being to produce efficient mechanism by means of which certain predetermined signals can be automatically brought into and out of action at certain predetermined times.

A further object is to so construct the apparatus that it will operate automatically to cause a signal to be sounded at certain predetermined intervals and so that said signal can be made to sound only on certain days of the week and so that it may be sounded at different times on different days.

A further object is to construct a signaling apparatus in such manner that a series of signals can be sounded, automatically, during a given period of time and at the same or different intervals.

A further object is to produce an apparatus which can be made to operate automatically to produce a distinct series of signals located in the same or at different points, on each day of the week or on certain predetermined days.

A further object is to produce a program signaling apparatus which shall be of compact construction; automatic and accurate in operation; capable of opening and closing electrical circuits whereby to control the sounding of signals at certain predetermined intervals during a day or night or both, and on certain predetermined days of the week; and to so construct and arrange the apparatus that it shall be effectual in the performance of its functions and so that its various parts can be readily and accurately adjusted.

With these objects in view the invention consists in certain novel features of construction and combinations and arrangements of parts as hereinafter set forth and pointed out in the claims.

In the accompanying drawings: Figure 1 is a general face view of my improvements with some parts removed. Fig. 2 is a view of the program disk, motor, switch and trip mechanism. Fig. 3 is a plan view of the same with some parts removed. Fig. 4 is a sectional view. Fig. 5 is a view of the motor, with some parts removed. Figs. 6, 7, 8, 9 and 10 are detail views.

My improved apparatus comprises a program disk A, switch mechanism B, motor mechanism C and certain other mechanism hereinafter described, actuated or controlled by an eight-day clock D,—all of said mechanism being preferably inclosed within a suitable clock casing.

1 represents a suitable base, on which a standard 2 is located and from the upper end of said standard a shaft or stud 3 projects laterally for the reception of the hub 4 of the revoluble program disk A. The disk A is provided on its front face with figures from 1 to 12 to produce a fac simile of a clock dial A′, said dial being also divided into minutes and preferably counting by fives. The peripheral portion of the disk is preferably made thicker than the dial portion and on its front face a circumferential series of radial grooves 5 are made in said thickened portion, said grooves being of a depth equal to one half the thickness of said thickened portion of the disk. In the rear face of the thickened portion of the disk A, a series of circular grooves 5^a are made, said circular grooves being of a depth equal to one-half the thickness of the thickened portion of the disk,—thus producing, with the radial grooves 5, several series of angular (practically square) perforations 5^b for the reception of contact pins 6 made angular in cross section, four series, *a*, *b*, *c*, *d*, of such perforations being shown in the drawings. A post 7 of insulating material is supported by the base 1 in proximity to the program disk A and carries a series of socketed holders 8 (four being shown in the drawings) for the reception of contact arms or springs 9, which are inserted into said holders and retained in place by means of set screws 10,—the free ends of said contact arms being bent laterally and adapted to be engaged by the pins 6 projecting from the disk A, whereby to close an electric circuit, the path of which will be hereinafter traced.

It is important that some means be pro-

vided to insure the retention of the contact arms in proper position under spring tension to be engaged by the pins 6 and for this purpose I provide a crank arm 11 (one for each contact arm) supported by a suitable post 12 of insulating material, each crank arm being made with an elongated slot 15 for the accommodation of a contact arm, and each crank arm is retained in the position to which it is adjusted by means of a set screw 13.

Each contact arm is made with a flattened or spring portion 14 and at a point in proximity to said spring portion, each contact arm 9 is bent to produce a shoulder 16 adapted to be engaged by a pin 17 projecting from a revoluble drum 18 of insulating material, and when said pin 17 engages the shoulder 16 the free end of the contact arm will be moved into the path of one series of pins in the program disk A and such position of the contact arm will be maintained until the drum 18 is moved. When the contact between the contact arm 9 and a pin 6 is made, an electric circuit will be established through a battery 17^a and a signal (not shown), through the standard 2, the disk A, pin 6 projecting from the latter, contact arm 9 and holder 8 and back to the battery by a wire 19.

The program disk A will be made to make one revolution in twelve hours by means of mechanism which will be hereinafter fully explained and the disk, each time it is actuated by said mechanism will move an extent equal to five minutes as indicated by the graduations on the face of said disk.

In the drawings, a pin 17 is shown in one of the upper perforation of the drum 18, and it may be here stated that this drum is provided with several series of perforations corresponding with the number of contact arms and programs on the disk A and that each series comprises fourteen perforations. When the pin 17 is in engagement with the shoulder 16 of the upper contact arm 9 the latter will be in position to be engaged by a pin in the series *a* in the disk A, and a circuit will be closed as above explained. Now in the drawings, the pins in the series *a* are so arranged that the circuit will be closed at 12 o'clock, 12.20, 12.25, 1, 1.35, 1.40, and 2 o'clock, so that the signal included in circuit with the upper contact arm 9 will be sounded at these times, but it is evident that this arrangement may be changed at will or that pins may be inserted in all the perforations of the series *a* so that the signal will be sounded every five minutes. It will also be seen that pins 17 may be placed, one in each series of perforations in the drum 18 so that all the pins will be in the same vertical line. With such arrangement, four independent signals will be sounded when the various contact arms are engaged by the various series of pins *a b c d* in the disk A. The pins in the series *a* may be so arranged that the corresponding signal will be sounded at certain intervals, the pins in the series *b* arranged so that the corresponding signal will be sounded at similar or different intervals and so on, so that with this arrangement of pins in the drum 18, four signals will be sounded during twelve hours and each signal may be made to sound at different intervals from the other signals or at the same intervals if desired.

One journal of the drum 18 is mounted in base 1 and the other journal is mounted in a bracket 22 projecting from said base. The upper journal of the drum 18 carries a wheel 26 having fourteen teeth, corresponding with the number of perforations in each series of perforations in said drum. On said wheel, letters are placed indicating the days and nights of the wheel and the desired position of the drum will be indicated by a pointer 23, secured to the bracket 22. The drum 18 will be moved once every twelve hours, by means of devices which will now be described. On the hub of the program disk A, a collar *e* is loosely mounted and to said collar a cam *f* is secured. From the collar *e* and in line with the point or tooth *f'* of the cam, a spring arm or indicator *g* projects to the periphery of the program disk, where it is provided with a hook or finger *g'* adapted to enter one of the radial grooves 5, and thus retain the cam *g* in the position to which it is set, and the position to which said arm is set will indicate the time at which the drum 18 will be moved and the code of signals changed or the signals cut out of circuit. A weighted arm *h* projects from the collar *e* at a point diametrically opposite the connection therewith of the arm *g*.

From the base 1, a post *i* projects upwardly to a point about in line with the shaft 3 and to the upper end of this post, a bell-crank-lever *j* is pivotally connected, the arm *j'* of said lever being adapted to ride on the periphery of the cam *f*. To the free end of the depending arm j^2 of the bell-crank lever, a spring actuated dog *k* is connected and adapted to engage the toothed wheel 26, and said bell-crank-lever will be positively and vigorously operated when released by the cam *f*, to cause the dog *k* to move the toothed wheel 26, by means of a strong spring *k'*, one end of which is attached to the depending arm j^2 of the bell-crank-lever and the other end to the standard 2. To prevent the momentum imparted to the toothed wheel 26 and drum 18 by the quick movement of the bell-crank lever, from moving said toothed wheel and drum 18 more than one tooth at a time, a dog k^2 is fixed to the arm j^2 of the bell-crank-lever and adapted, when the latter is released to operate the toothed wheel 26 and drum 18, to enter between two of the teeth of said toothed wheel and thus prevent the same from moving more than one tooth As the disk A makes one revolution in twelve hours, it will be seen that at the end of each twelve hours the toothed wheel 26 will be moved one tooth and there being fourteen teeth on said wheel, it will require one week for it to make a com-

plete revolution and consequently the perforated drum 18 will make one revolution per week. Now assume that there is a pin 17 in each perforation 20 of the upper series of perforations in the drum 18 (with the exception of two), and that the apparatus is set to start at six o'clock on Monday morning. The upper contact arm 9 will be in circuit with a signal and said signal will be sounded in accordance with the arrangement of pins 6 in the series *a*, as above explained. While the disk A is making its revolution, the cam *f* will also be making its revolution, and moving the bell-crank-lever *j* on its fulcrum. The dog *k* will thus be gradually moved back or away from the toothed wheel 26, the latter being prevented from accidental rotation on account of the frictional cantact therewith of the dog *k*, by means of a spring dog *l*.

When the twelve hours shall have expired and the disk A and cam *f* completed their revolution, the tooth of said cam will ride past the free end of the arm *j'* of lever *j*, whereupon said lever will be turned quickly on its fulcrum by the spring *k'* and the dog *k* made to move the wheel 26 one tooth, thus turning the drum 18 and changing the relation of the pins 17 therein to the shoulders 16 of the contact arms, thereby moving some (one or more) of said contact arms out of operative relation to the pins in the program disk; moving others (one or more) into operative position or moving all of said pins out of line with the shoulders of all the contact arms, in which latter case the entire apparatus will be cut out of circuit,—but as I have assumed, for the purpose of illustration, that the upper series of perforations in the drum 18, is provided with its full quota of pins (except two), it will be seen that when the drum 18 is turned as above explained, the upper contact arm 9 will still be in operative relation with contact pins in the series *a* in the program disk and that the signal will continue to be sounded, at intervals, during Monday night. This will continue for six days or until Sunday morning, and as two pins have been omitted from the upper series, the contact arm will not be moved into operative relation to the pins 6 during Sunday or Sunday night and consequently no signal will be sounded then, the circuit including said signal being left open on account of the absence of said two pins. It is of course evident that not only the upper series of pins 17 may be thus arranged, but any series may be so arranged, depending upon the particular signal which it is desired to be sounded in this manner. It will also be seen that if pins 17 be placed only in alternate perforations of a particular series, that the signal will be sounded only during the day, or at night, as the case may be.

If desired all the contact arms, or certain of them, may be connected with the same bell circuit and the pins so arranged in the drum 18 that the signal may be sounded at certain intervals during one day, at certain other intervals during the next day and so on, in accordance with the arrangement of pins in the disk A. In short, pins may be so arranged in the drum 18 and disk A that a signal or signals may be caused to automatically sound on all or any number of the days of the week desired, at any intervals desired, a certain system of signals sounded during the day and a different system at night and all of this will be accomplished automatically during the revolution of the disk A and the disk A will be made to revolve automatically, step by step through the medium of mechanism which will be presently explained.

In some cases it is desirable that previous to a regular signal, a warning or preliminary signal be given, and that such warning or preliminary signal be distinguishable from the regular signal. For this purpose a pin 6^a will be placed in the perforation in the program disk, just in advance of the pin 6 which closes the circuit for the sounding of the regular alarm, and said pin 6^a is split and a small piece of insulation 6^b inserted, so as to cause a break in the sounding of the alarm as the pin 6^a passes over the contact arm, thus causing a warning signal, distinguishable from the main signal to be sounded, five minutes before the regluar signal.

The actuating mechanism of the motor C is the same as that of an eight day clock and a detail description of its construction is unnecessary here.

An arbor 30 is mounted at one end in one plate of the motor frame and at the other end in a hollow boss 31 projecting from the other plate of said frame. The free end of the arbor 30 is preferably contracted and projects through the end of said boss, where it is provided with a crown wheel 32 adapted to mesh with and impart motion to a spur wheel 33 carried by a shaft 34. The shaft 34 is mounted in the ends of a yoke 35, one end of which is connected to the hollow boss 31 or end of yoke 35 and provided with a steel bushing 32^a for the reception of said shaft. The other end of the yoke 35 is made with an arm 36 which projects in an inwardly direction and at its free end is made with two fingers 36^a, 36^b, having perforations for the accommodation of screws 37, which are made to engage the free end of the shaft or stud 3. In this manner the end of the yoke from which the arm 36 projects, is supported and is prevented from displacement by means of a nut 38 screwed on the end of the shaft or stud 3.

At the end of the yoke 35 a boss 39 is made coincident with the bearing of the shaft 34 and in this boss a screw 40 is inserted, by means of which to regulate the end thrust of the shaft, said screw being retained in the position to which it may be adjusted by means of a nut 41. Between the end of the yoke and the arm 36, a worm 42 is secured on the shaft 34 and meshes with a worm wheel 43 mounted loosely on the hub 4 of the program disk A. It will be seen that by means of the set screws 36^a

and 36^b, the worm can be readily adjusted relatively to the worm wheel. On the hub of the worm wheel 43, a ratchet wheel 44 with one hundred and forty-four teeth is secured and adapted to be engaged by a dog 45 pivoted to the program disk A, said dog being maintained in engagement with the ratchet wheel by means of a spring 45^a. The object of connecting the driving mechanism to the disk A by the use of the ratchet and dog is to permit the diskto be set without affecting the motor mechnism. To assist in setting the program disk a hand or pointer A^2 will be secured to the yoke 35 and adapted to register with the dial.

A shaft 49 is mounted in the motor frame at or near the upper right hand corner thereof, to which shaft an arm or pawl 51 is secured and adapted to engage the teeth of the escapement wheel 52 of the motor. At a point between the ends of the arm or pawl 51, a rod 50 is attached thereto and extends downwardly to a point near the bottom of the base 1, where it is connected with one end of a lever 50^a, said lever being fulcrumed at a point between its ends in the base 1, by means of a shaft 50^b. The lever 50^a is preferably made of spring metal and from the free end of its forward arm 50^c, a pin 50^d projects upwardly through the base 1 and is adapted to enter the end of one or another of the lateral grooves in the disk A, said pin 50^d being normally retained in such position by means of gravity or a spring 50^e secured at one end to the under face of the base 1 and adapted to bear at its free end against the arm 50^c of the lever 50^a. A spring arm 50^f is secured at one end to the base 1 and made to normally project behind the pin 50^d. The free end of said spring arm 50^f is bent to produce a stop 50^g adapted to engage the standard 2 to limit the movement of said spring arm, and also with a thumb piece 50^h by means of which to operate it. When it is desired to turn the disk A manually in order to set it, the operator will pull upon the thumb piece 50^h and thus move the pin 50^d out of engagement with the disk A, the arm 50^c of the lever 50^a being sufficiently flexible to permit this movement of the pin 50^d.

To one end of the plates of the motor frame in proximity to the upper right hand corner thereof, a bracket 54 is secured and projects outwardly therefrom, the free end of said bracket being made with perforation 55 and having secured to it, in proximity to said perforation, a post 60, on which a sliding weight 61 is located, said weight being provided on its upper end with a shank made with a shoulder 62. A weighted dog 63 is pivoted at or near its upper end in a suitable slot in the post 60 and adapted to engage the shouldered shank of the weight, the upper end of said dog being made with a tooth or projection 64 which, when the dog is in its normal position, projects slightly past the post and in position to be struck by the free end of a spring 65. The spring 65 is preferably made U-shaped in form and disposed horizontally, said spring being coiled between its ends and at one end is secured to the upper end of the post 60 and made with a depending arm 60^a. The free arm of the spring 65 is bent to produce an eye 66, to which one end of a rod 67 is connected, the other end of said rod being connected with one end of a lever 68 and between the ends of the rod 67 a turnbuckle 67^a is located, whereby to adjust said rod. The lever 68 is pivotally supported between its ends (on knife edges) in a bracket 69 and the frame of the clock D. A suitable bracket is secured to the clock frame and between it and said clock frame, an arbor 70 is mounted. On the arbor 70 a pinion 71 and a cam 72 are secured, the free end of the arm 72^a of the lever 68 being adapted to ride on the periphery of said cam. Motion is imparted to the pinion 71 by a spur wheel 73 carried by an arbor 73^a and on said arbor a pinion 73^b is secured, to which motion is imparted by a spur wheel 74 carried by and moving with the arbor of the minute hand of the clock. The gearing above described is so proportioned and timed that the cam 72 will be caused to make a complete revolution in five minutes. As the cam 72 rotates, the lever 68 will be gradually turned on its fulcrum (putting very little work on the mechanism of the clock for the purpose),—thus causing the gradual raising of the free end of the spring 65 and when the tooth of the cam wheel passes the end of the lever 68 the latter will quickly return to its normal position and the free end of the spring 65 will fly downwardly, striking the tooth 64 of the weighted dog 63 and thus moving said dog out of engagement with the shouldered shank of the weight 61, thereby releasing the latter. The weight being thus released, it will fall and, striking an arm 54 secured to the shaft 49, will cause said shaft to turn, thereby moving the arm or pawl 51 out of engagement with the escapement wheel 52 and turning the lever 50^a, through the medium of the rod 50. When the arm or pawl 51 is thus moved out of engagement with the escapement wheel 52, the motor will be released, and the lever 50^a being turned on its fulcrum by the operation of said arm or pawl 51, the pin 50^d carried by said lever, will be moved out of the path of one of the radial grooves of the program disk A, thus releasing the latter. Thus it will be seen that when the weight 61 falls, the motor which drives the disk A and the disk itself will be released, practically simultaneously. As the program disk (driven by the motor as above explained) turns, the pin 50^d will ride on the periphery thereof until the next radial slot in the disk is reached, when it will move thereinto, whereupon the arm or pawl 51 will be again permitted to engage the escapement wheel 52 and the motor and program disk will be thus stopped.

When the motor mechanism shall have been released (its speed being controlled by means

of a verge 75) motion will be transmitted through the shaft 34 to the program disk A, the extent of movement of the disk being sufficient to cause a pin 6 in one of the programs to pass over one of the contact arms 9 and the extent of movement of said disk will be regulated by the pin 50^a entering one of the radial grooves in the disk, as above explained.

The duration of an alarm will depend upon the length of time occupied by a pin 6 in passing over a contact arm 9,—so that if the disk be moved very slowly the duration of the signal will be correspondingly long and if the disk be moved quickly the duration of the signal will, of course, be correspondingly short.

It is desirable that some means be provided whereby to control the duration of the sounding of the signals and for this purpose I attach to the verge 75, an arm 76 which projects downwardly from the verge and at its lower end enters a V-shaped recess 79 in the free end of a lever 77, said lever being pivoted at a point between its ends and having one end projecting beyond the motor frame and adapted to produce a handle 78, by means of which to adjust said lever. Now it is evident that when the free end of the arm 76 is at or near the top of recess 79 the vibration of the arm 76 and the verge will be comparatively slow, so that the operation of the motor will be comparatively slow and the movement of the program disk will, of course, be comparatively slow and the signal long,—but when the lever 77 is so adjusted that the lower end of the arm 76 will be in the lower or narrow portion of the V-shaped recess 79, the extent of vibration of the verge will be more restricted and consequently it will vibrate rapidly and the motion of the motor and disk A will be faster and the duration of the signal proportionately shorter.

On the arbor 30 of the motor (which arbor corresponds with the arbor on which the minute hand of the clock mechanism would be connected) a disk 46 is secured and provided with twelve pins or projections 48 which project from one face thereof at equidistant points.

A shaft 80 is mounted between the plates of the motor frame and carries a depending curved arm 81 which is normally disposed in the path of the pins 48 of the disk 46. An arm 82 is secured to the shaft 80 and projects laterally therefrom, and to the free end of this arm an upwardly projecting rod 83 is loosely connected, the upper end of said rod 83 passing up through the perforation 55 in the end of the bracket 54 and terminating directly under the bottom of the weight 61. From this construction and arrangement of parts it will be seen that as the disk 46 moves, during the operation of the motor, one of the pins 48 will engage the depending curved arm 81 and move it, thereby causing the shaft to which said arm is attached to turn and raise the free end of the arm 82, the effect of which will be to move the rod 83 upwardly, the upper end of said rod engaging the weight 61 and moving it upwardly until the dog 63 engages the weight, when the apparatus will be again in position to be operated by the cam 72 when the clock mechanism shall have run five minutes.

From the construction and arrangement of the apparatus as above described, it will be seen that the motor C will be set in motion automatically every five minutes so as to move the disk A and result in the production of a signal as hereinbefore explained, that said motor and disk will be automatically stopped after having turned the disk A to a sufficient extent; that the trip mechanism will be automatically reset by the operation of the motor and that the duration of a signal will be regulated by the speed of the motor which can be readily adjusted.

It is evident that the signals may be sounded at different intervals than above described by providing a cam wheel with a number of teeth, or the gearing which actuates the cam may be arranged so as to cause the cam wheel 72 to make a revolution in more or less than five minutes.

By the construction and arrangement of apparatus above set forth the propelling power for the program disk is derived solely from the motor C, thus relieving the clock mechanism of any such duty. This is an important feature of my invention as it relieves the clock mechanism of work which would seriously affect its efficiency as a time piece and which would therefore render the operation of the whole apparatus inaccurate.

Various slight changes might be made in the details of construction of my invention without departing from the spirit thereof or limiting its scope and hence I do not wish to limit myself to the precise details of construction herein described, but

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a program signaling apparatus, the combination with a disk adapted to receive a series of pins constituting a program, of means for including said pins successively in electric circuit with a signal, a motor for moving said disk, means for controlling the operation of the motor and devices constructed and adapted to regulate the speed of the disk whereby to control the duration of sounding of the alarm, substantially as set forth.

2. In a program signaling apparatus, the combination with a program disk adapted to receive several series of pins, of a series of contact arms adapted to be engaged by said pins, means for moving the disk at predetermined intervals and mechanism constructed and adapted to operate automatically to cause said contact arms to be moved into and out of operative position relatively to the pins in the program disk, at predetermined intervals, substantially as set forth.

3. In a program signaling apparatus, the

combination with a program disk having a series of programs thereon consisting of several series of pins, of a contact arm for each series of pins, means for moving said disk at certain predetermined intervals, and devices constructed and adapted to automatically move one or more of said contact arms into position to be engaged by one or more series of pins on certain predetermined days of the week, or on certain predetermined parts of a day, substantially as set forth.

4. In a program signaling apparatus, the combination with a disk adapted to receive a series of pins constituting a program, of a contact arm to be engaged by said pins, whereby to close an electrical circuit through a signal, a holder for said contact arm, means between the ends of the contact arm for automatically moving said contact arm into operative relation with the pins in the disk, and means for moving said disk at predetermined intervals, substantially as set forth.

5. In a program signaling apparatus, the combination with a disk adapted to receive a series of pins constituting a program, of a contact arm adapted to be engaged by said pins to close an electrical circuit through a signal, a crank arm adapted to maintain said contact arm in proper position to be engaged by said pins and means for moving said disk at predetermined intervals, substantially as set forth.

6. In a program signaling apparatus, the combination with a disk adapted to receive a series of pins constituting a program, of a contact arm, a perforated drum of insulating material for the reception of pins adapted to move said contact arm into operative relation to the pins in the disk, devices controlled by the program disk for rotating said drum, and means for moving said program disk at predetermined intervals, substantially as set forth.

7. In a program signaling apparatus, the combination with a disk adapted to receive a series of pins constituting a program, of a contact arm adapted to be engaged by said pins to close an electric circuit through a signal, a drum adapted for the reception of pins whereby to move the contact arm into operative relation to the pins in the disk, a toothed wheel carried by said drum and devices actuated by the disk for moving said toothed wheel and drum at each revolution of the disk and means for moving said program disk at predetermined intervals, substantially as set forth.

8. In a program signaling apparatus, the combination with a disk adapted to receive a series of pins constituting a program, of a contact arm adapted to be engaged by said pins to close an electric circuit through a signal, a drum adapted for the reception of pins whereby to move the contact arm into operative relation to the pins in the disk, a toothed wheel carried by said drum, and devices actuated by the disk for moving said toothed wheel and drum at each revolution of the disk, means for preventing said drum from moving too far at each operation, and means for moving said program disk at predetermined intervals, substantially as set forth.

9. In a program signaling apparatus, the combination with a disk adapted to receive pins constituting programs, of contact arms adapted to be engaged by said pins to close an electric circuit through a signal, a drum for the reception of pins adapted to move the contact arms into and out of operative relation to the pins in the disk, a toothed wheel carried by said drum, a cam adapted to be made to rotate with the disk, a bell-crank-lever actuated by said cam, a spring for moving said bell-crank-lever in one direction, and a dog carried by said bell-crank-lever and adapted to actuate said toothed wheel to turn the perforated drum, step by step, substantially as set forth.

10. In a program signaling apparatus, the combination with a disk adapted to receive pins constituting programs, of contact arms adapted to be engaged by said pins to close an electric circuit through a signal, a drum for the reception of pins adapted to move the contact arms into and out of operative relation to the pins in the disk, a toothed wheel carried by said drum, a cam adapted to be made to rotate with the disk, a bell-crank lever actuated by said cam, a spring for moving said bell-crank-lever in one direction, a dog carried by said bell-crank-lever and adapted to actuate said toothed wheel to turn the perforated drum, step by step, and an arm secured to said cam and adapted to engage the disk, whereby the cam can be made to rotate with the disk and set to release the bell-crank lever at any desired time during the day or night, substantially as set forth.

11. In a program signaling apparatus, the combination with a disk adapted to receive pins constituting programs, of contact arms adapted to be engaged by said pins to close an electric circuit through a signal, a drum for the reception of pins adapted to move the contact arms into and out of operative relation to the pins in the disk, a toothed wheel carried by said drum, a cam adapted to rotate with the disk, a bell-crank lever actuated by said drum, a spring for moving said bell-crank lever in one direction, a dog carried by said bell-crank lever and adapted to actuate said toothed wheel to turn the perforated drum step by step, an arm secured to said cam and adapted to engage the disk whereby the cam can be made to rotate with the disk and set to release the bell-crank-lever at any desired time during the day or night and a weight secured to said cam at a point diametrically opposite said arm, substantially as set forth.

12. In a program signaling apparatus, the combination with a disk adapted to receive pins constituting programs, of contact arms adapted to be engaged by said pins to close

an electric circuit through a signal, a drum for the reception of pins adapted to move the contact arms into and out of operative relation to the pins in the disk, a toothed wheel carried by said drum, a cam adapted to be made to rotate with the disk, a bell-crank lever actuated by said cam, a spring for moving said bell-crank-lever in one direction, a dog carried by the bell-crank-lever and adapted to actuate said toothed wheel to turn the perforated drum step by step and an arm carried by the bell crank lever and adapted to engage the toothed wheel to prevent it from being moved too far at each operation, substantially as set forth.

13. In a program signaling apparatus, the combination with a disk adapted to receive pins constituting programs, of contact arms each having a shoulder between its ends, a drum, pins projecting from said drum and adapted to engage said shoulders to move the contact arms into operative relation to the pins in the disk and means for automatically turning said drum, substanstially a set forth.

14. The combination in a program signaling apparatus, of a disk having a series of radial grooves in one face and a series of circular grooves in the other face, whereby to produce angular perforations for the reception of pins and contact arms adapted to be engaged by said pins to close an electric circuit through a signal, substantially as set forth.

15. In a program signaling apparatus, the combination with a disk adapted to receive pins constituting programs and contact arms adapted to be engaged by said pins to close an electric circuit through a signal, of a motor for moving said disk, a pivoted lever adapted at one end to engage said disk, an arm or pawl adapted to engage the escapement wheel of the motor and connected with said lever and devices actuated by a clock for moving said arm or pawl and lever out of engagement with the escapement wheel and disk respectively, whereby to release the motor and disk, substantially as set forth.

16. In a program signaling apparatus, the combination with a disk adapted to receive pins constituting programs and contact arms adapted to be engaged by said pins to close an electric circuit through a signal, of a motor for moving said disk, a pivoted lever adapted at one end to engage said disk, an arm or pawl adapted to engage the escapement wheel of the motor and connected with said lever devices actuated by a clock for moving said arm or pawl and lever out of engagement with the escapement wheel and disk respectively, whereby to release the motor and disk and a spring arm for moving the lever out of engagement with the disk when it is desired to set the latter, substantially as set forth.

17. In a program signaling apparatus, the combination with a program disk adapted for the reception of a series of pins constituting a program, and means for causing the program disk to rotate once in twelve hours, of a contact arm adapted to be engaged by the pins on the disk to close an electrical circuit through a signal, a drum having a series of fourteen sockets or perforations therein for the reception of pins whereby to move the contact arms into operative relation to the pins in the disk and means for moving said drum once every twelve hours, substantially as set forth.

18. In a program signaling apparatus, the combination with a program disk adapted to receive several series of pins constituting several programs, and means for causing said disk to rotate step by step, so as to make one revolution in twelve hours, of a contact arm for each program, a drum of insulating material adapted to receive several series of pins numbering fourteen each, said pins being adapted to move the contact arms into operative relation with the pins in the disk, a toothed wheel having fourteen teeth, a cam adapted to operate with the disk, a bell-crank-lever actuated by said cam, a spring attached to said lever and a dog carried by the lever and adapted to engage said toothed wheel, substantially as set forth.

19. In a program signaling apparatus, the combination with a standard having a shaft at its upper end, of a disk having its hub mounted loosely on said shaft, pins carried by said disk, contact arms adapted to be engaged by said pins to close an electric circuit through a signal, a worm wheel mounted loosely on the hub of said disk, a ratchet wheel carried by said worm wheel, a dog carried by the disk and engaging the ratchet wheel, a worm meshing with said worm wheel, and means for transmitting motion to said worm, substantially as set forth.

20. In a program signaling apparatus, the combination with a shaft, of a disk mounted thereon, pins carried by said disk, a contact arm adapted to make contact with the pins to close an electric circuit, a worm wheel connected with the disk, a motor a yoke connected at one end with the motor frame and at the other end adjustably connected to said shaft, a worm shaft mounted in said yoke, a worm on said worm shaft meshing with the worm wheel, and means for causing the motor to operate at predetermined intervals, substantially as set forth.

21. In a program signaling apparatus, the combination with a shaft, of a disk mounted thereon, pins carried by said disk, a contact arm adapted to make contact with said pins to close an electric circuit, a worm wheel connected with the disk, a motor, a yoke connected at one end with the motor frame and at the other end connected with said shaft, of a worm shaft mounted in said yoke and adapted to receive motion from the motor, a worm on said worm shaft meshing with said worm wheel, and a screw in the end of the yoke adapted to regulate the thrust of said worm shaft, substantially as set forth.

22. In a program signaling apparatus, the combination with a disk adapted to receive a series of pins and contact arms adapted to be engaged by said pins to close electrical circuits through signals, of a worm wheel connected with said disk, a motor, an arbor actuated by said motor, a gear carried by said arbor, a shaft, a gear on said shaft meshing with the gear on the arbor and a worm also on said shaft and meshing with said worm wheel, and means for controlling the operation of the motor, substantially as set forth.

23. In a program signaling apparatus, the combination with a disk adapted to receive pins constituting a program and a contact arm adapted to be engaged by said pins to close an electric circuit through a signal, a shaft mounted in the motor frame, a dog carried by said shaft and adapted to engage the escapement wheel of the motor, an outwardly projecting arm secured to said shaft, a vertically movable weight, means for retaining said weight normally elevated, a clock, and devices connected with the clock adapted to release said weight at predetermined times so as to permit it to fall and strike the outwardly projecting arm and release the motor, substantially as set forth.

24. In a program signaling apparatus, the combination with a program disk adapted to receive a series of pins constituting a program, and a contact arm adapted to be engaged by said pins to close an electric circuit through a signal, of a motor adapted to rotate said disk, a shaft mounted in the motor frame, an arm projecting outwardly from said shaft, a vertical post, a sliding weight on said post, a dog adapted to engage said weight and retain it elevated, a spring secured at one end to said post and adapted to engage said dog to release the weight whereby to release the motor, a clock, and devices actuated by said clock and connected with said spring, whereby to release said weight at certain predetermined intervals, substantially as set forth.

25. In a program signaling apparatus, the combination with a disk adapted to receive pins constituting a program and a contact arm adapted to be engaged by said pins to close an electrical circuit through a signal, of a motor adapted to transmit motion to said disk, means for retaining said motor at rest, a weight adapted to trip said retaining mechanism, a clock, devices connected with said clock and adapted to trip the weight at certain predetermined intervals, a vertically movable rod and devices actuated by the motor for moving said rod, whereby to elevate the weight to its normal position after having been tripped, substantially as set forth.

26. In a program signaling apparatus, the combination with a disk adapted to receive pins constituting a program and a contact arm adapted to be engaged by said pins to close an electric circuit through a signal, of a motor adapted to transmit motion to said disk, a disk or wheel actuated by the motor, a shaft mounted in the frame of the motor, an arm projecting outwardly from said shaft, a vertically movable weight, a trip mechanism for said weight, a clock, devices actuated by said clock for releasing the weight at predetermined intervals whereby to release the motor, pins projecting from one face of said disk or wheel, a shaft mounted in the frame of the motor and carrying an arm projecting into the path of said pins, an arm projecting outwardly from said last-mentioned shaft and a rod connected to the free end of said last-mentioned arm and adapted to engage the weight to return it to its normal position, substantially as set forth.

27. In a program signaling apparatus, the combination with a disk adapted to receive a series of pins constituting a program, and a contact arm adapted to be engaged by said pins to close an electric circuit through a signal, of a motor adapted to transmit motion to said disk, means for automatically starting and stopping said motor at predetermined intervals, an arm secured to the verge of said motor, and a pivoted lever having a V-shaped recess in one end for the reception of the free end of said arm, whereby to regulate the speed of said motor, substantially as set forth.

28. In a program signaling apparatus, the combination with a program disk having a series of perforations therein, of two sets of pins adapted to be inserted in said perforations, contact arms adapted to be engaged by said pins to close an electrical circuit through a signal, one set of said pins having interposed insulation whereby to cause an interrupted signal, one set of pins being adapted to produce warning signals and the other set intended to produce main signals, substantially as set forth.

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

FRED FRICK.

Witnesses:
ALF. N. RUSSELL,
CAL KROME.