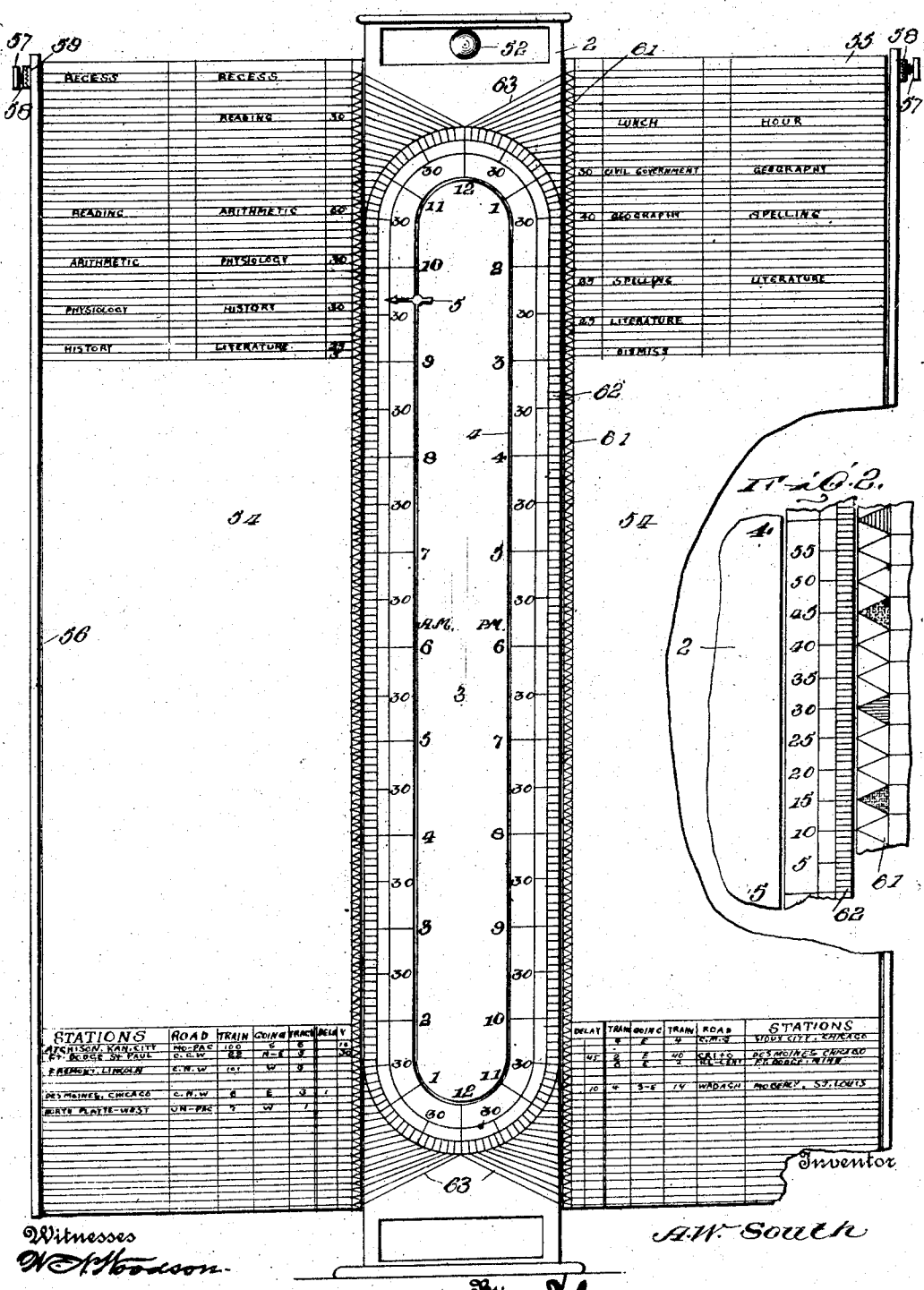




Witnesses

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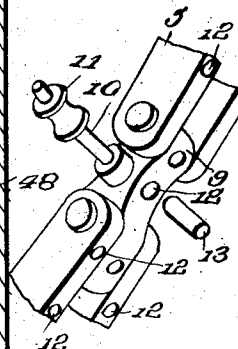
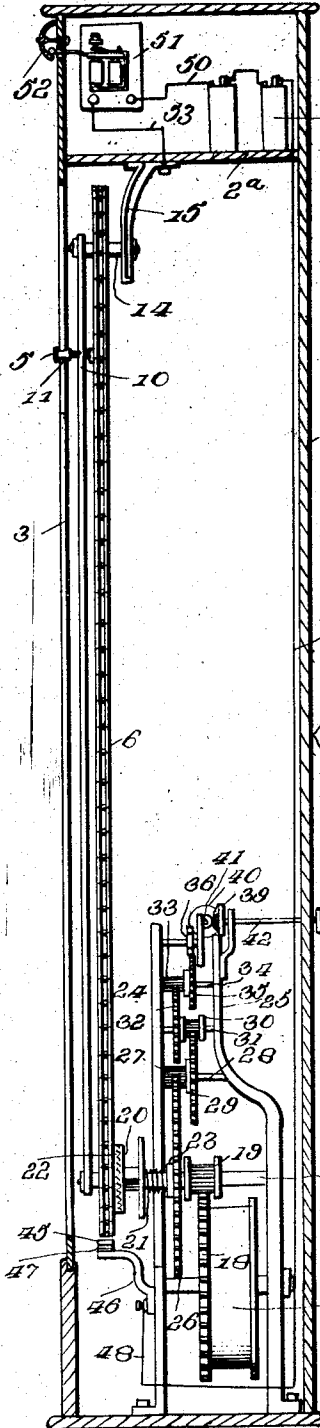
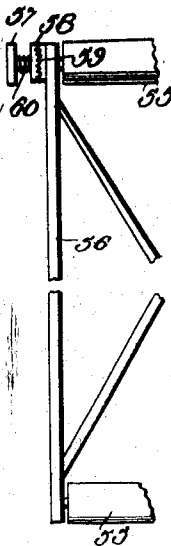
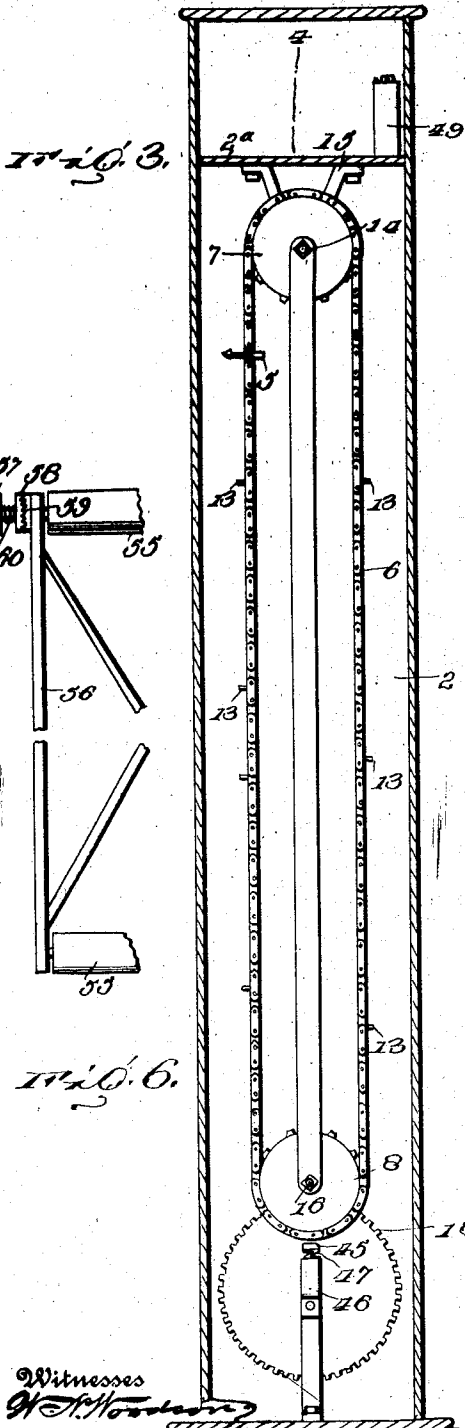
A. W. SOUTH.
PROGRAM CLOCK.

APPLICATION FILED OCT. 12, 1910.

Patented Sept. 26, 1911.

1,004,097.

2 SHEETS-SHEET 2.



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UNITED STATES PATENT OFFICE.

AUGUSTUS W. SOUTH, OF CLARINDA, IOWA, ASSIGNOR TO THE A. W. SOUTH MANUFACTURING COMPANY, A CORPORATION OF SOUTH DAKOTA.

PROGRAM-CLOCK.

1,004,097.

Specification of Letters Patent. Patented Sept. 26, 1911.

Application filed October 12, 1910. Serial No. 586,659.

To all whom it may concern:

Be it known that I, AUGUSTUS W. SOUTH, a citizen of the United States, residing at Clarinda, in the county of Page and State of Iowa, have invented certain new and useful Improvements in Program-Clocks, of which the following is a specification.

My invention relates to clocks and particularly those clocks wherein not only is the time of day denoted but the period of time at which a certain event is predetermined to happen, as for instance the departure or arrival of trains, or the beginning or end of certain acts, such clocks being known as program clocks.

The primary object of my invention is to provide a clock of this character which shall be compact, easily read and extremely simple in its mechanism.

A further object is to provide in connection with a program arranged in vertical columns and horizontal lines, (the latter indicating subdivision of time) a clock which shall be of the same vertical height as the columns and in which the hand or pointer of the clock shall traverse the spaces defined by the horizontal subdivisions of the program, thus permitting of a closer coordination between the clock and the program than is otherwise possible.

Another object is to provide a clock having an oblong dial, this dial having vertical graduated sides which are rounded at top and bottom so that they unite to form a semicircle at each end of the dial, giving it an oblong form, thus requiring but one hand or pointer to indicate the time upon the dial, this pointer moving in one continuous direction, and furthermore providing a dial which is readily adapted to combine perfectly with any program time table or other like list of events or acts, the dial of the clock and the program being so arranged as to leave every item on the program in full view at all times and so combined with the dial of the clock that the one hand or pointer which indicates the time upon the dial also points out plainly and automatically every time for the occurrence or execution for any particular act, or the time for any happening event.

Yet another object is to provide in connection with the clock mechanism an ex-

tremely simple form of signal, either audible or visible, whereby those concerned may be advised that a certain predetermined period has begun or ended, or a predetermined event is about to happen.

A further object is to provide in connection with the clock dial above referred to, oppositely disposed program sheets located on opposite sides of the dial, these sheets being wound upon rollers and adjustable with respect to the dial, thereby providing a very simple and economical means for changing the program, the events on the program in predetermined order and succession, or making up new programs.

The invention includes in general terms a longitudinally extended or oblong dial provided with an endless slot, along which moves a pointer or hand, the dial on both sides of the slot being divided into spaces indicating subdivisions of time as hours, periods of five minutes and minutes.

It also includes an endless chain disposed behind the dial and in alinement with the slot upon which the pointer is mounted, and motor-actuated means for driving the chain, together with signaling contacts adjustably mounted on the chain and adapted to sound or otherwise energize the signal when reaching a predetermined position.

It further includes a movable program divided into spaces, each having a width equal to a time subdivision on the dial, the dial being provided with certain indicating marks, and lead lines of a peculiar character whereby the precise moment that the event named on the program is to happen may be easily and clearly read upon the dial.

My invention is shown in the accompanying drawings wherein:

Figure 1 is a face view of the clock and the laterally disposed programs used therewith. Fig. 2 is an enlarged fragmentary view of a portion of the dial and a portion of the adjacent program. Fig. 3 is a face view of the clock case, the dial being removed. Fig. 4 is a vertical section on the line 4-4 of Fig. 3, the mechanism in the interior of the clock case being in elevation. Fig. 5 is a perspective detail view of a section of the sprocket chain showing the pointer-carrying pin and the electrical contact pin for the signal. Fig. 6 is a detail view enlarged,

showing the means for operating one of the endless programs.

Referring to the drawings, and particularly Figs. 1 and 2, 2 designates a clock case of any desired character and oblong in form. The face of this case is provided with a dial 3 having an endless slot 4, along which travels a hand or pointer 5 actuated by mechanism which will be later described. The endless slot 4 has two parallel stretches, connected by a curved section at each end, as seen in Fig. 1. The dial 3 exterior to the slot 4 is graduated into subdivisions of time and preferably, as shown in Fig. 2, into five minute spaces and minute spaces, the space or column immediately adjacent to the slot being marked off into five minute spaces with numerals indicating each subdivision, and the space or column next adjacent there- to being divided preferably into minute spaces. Inward of the slot the dial is provided at regular intervals with numerals indicating successive hours. It is obvious that this arrangement of graduating marks and subdivisions may be altered to suit any specific case. The graduating or divisional marks are preferably arranged in columns, parallel with the slot 3 entirely around the dial, and thus these divisional spaces are arranged in a semicircle at both ends of the dial. The dial is also provided with triangular index marks and lead lines, whereby the time indicated on the dial may be coordinated with certain events or acts stated on the program sheets located on each side of the dial, these index marks or lead lines being, as before stated, arranged in parallel columns on each side of the dial, as will be later described. The mechanism for moving the pointer or hand 4 along the dial is contained within the case 2 and comprises a sprocket chain 6 passing over sprocket wheels 7 and 8 disposed at opposite ends of the case. Each sprocket wheel has a diameter equal to the distance between the two parallel portions of the slot 3, and the circumference of each wheel travels in alignment with the curved portion of the slot. Thus the sprocket chain is supported directly beneath the entire length of the slot. As illustrated in Fig. 5, one link 9 of the sprocket chain has a stud or pin 10 projecting from its face upon which pin is mounted the channeled anti-friction roller 11 which rolls against the walls of the slot 4. This pin carries the hand or pointer 5. Each link of the chain is also formed with one or more sockets 12 having a staggered relation to each other and adapted to receive contact pins 13 whereby an electrical contact may be made with a fixed contact piece disposed in the path of movement of the pin, thus sounding a signal. While I may support and actuate the sprocket wheels 7 and 8 in any desired manner, I have shown

the sprocket wheel 7 as being mounted on a shaft 14 supported on a hanger 15 attached to a shelf 2^a, while the sprocket wheel 8 is shown as being loose on a shaft 16 which is supported in any suitable manner in the base of the clock case. The shaft 16 is shown as driven from a spring motor 17 which carries a gear wheel 18 meshing with a lantern wheel 19 on the shaft 16. Slidingly mounted on the shaft 16 is a toothed clutch member 20 which is forced by a spring 21 into engagement with a toothed clutch member 22 carried by or rotatable with the wheel 8. The clutch member 20 is longitudinally shiftable relative to the shaft 16 so that the clutch member 20 may be moved out of engagement with the clutch member 22, thus permitting the sprocket wheel 8 to be freely turned around the shaft and thus permitting the sprocket chains 6 to be shifted and the pointer 5 to be set to any predetermined point on the dial while the clock is running. The spring 21 is shown as bearing against a collar 23 fast on the shaft 16. The shaft 16 is rotatably supported in bearings in the supporting plates 24 and 25. Mounted on the shaft 16 is a spur gear 26 which meshes with a lantern pinion 27 on a shaft 28, which shaft carries a gear 29 which meshes with a pinion 30 on a shaft 31 which carries a gear 32, which in turn meshes with a pinion 33 on a shaft 34 which carries an escapement wheel 35. Above said wheel 35 is mounted an escapement lever 36, the pallets of which engage the teeth of said wheel 35. Two balance wheels (not shown) are provided engaging the ends of said lever. The beats of said balance wheels and the rate of movement of the clock may be regulated by worm gears (not shown) on a spindle 41, which spindle is geared by bevel gears 39-40 to a shaft 42 projecting through the side of the casing and carrying the thumb wheel 43.

The detailed construction of the mechanism for regulating the rate of movement of the clock and the beats of the balance wheels is fully illustrated in my Patent, No. 687,865, of December 3, 1901, and therefore requires no extended description at this place.

It will be seen that the driving mechanism described is adapted to cause a continuous movement of the sprocket chain 6 in one direction and thus carry the pointer 5 in one direction around the clock dial. As shown, the pointer 5 is intended to travel around the clock dial once in twenty-four hours, but it will be entirely obvious that the dial may be shorter or longer and the pointer take a less time or a greater to traverse the dial. It will also be obvious that the pointer in its course will traverse the divisional lines indicating the subdivisions of time and that the flight of time will be very clearly read upon the dial.

In order to give a signal at any prede-

terminated time, I provide the links forming the sprocket chain with sockets 12, these sockets not being upon the faces of the links but being upon the edges of the links.

5 While I may use a sprocket chain made up in any desired or suitable manner, I have shown a sprocket chain comprising pairs of spaced links connected by an intermediate link 9. With a chain constructed
10 in this manner the intermediate lengths are each provided with perforations or sockets 12, while the pairs of links are also provided with perforations in each link of the pair, these being arranged in staggered relation
15 to each other so as to economize space without weakening the link. It is obvious, however, that one link of each pair might be provided with one or a plurality of perforations or sockets. A number of contact pins
20 13 are provided which are adapted to be inserted in the perforations or sockets at any point desired along the length of the chain. Located in the path of movement of these pins is a relatively fixed contact piece
25 45 which is supported from a bracket 46 by means of a spring 47. This contact piece 45 is forced by the spring 47 upward toward the path of travel of the pins 13 and is depressed against the force of the spring 47
30 by the movement of the pins past the contact piece. The contact piece 45 is electrically connected by a wire 48 to a battery 49, the jars of which are preferably supported upon the shelf 2. From the battery a wire
35 50 passes to an electrical signaling mechanism 51 of any suitable character but shown as including an electrical bell 52. From the signaling mechanism a wire 53 leads to the hanger 15 supporting the shaft 14 and
40 electrical current is carried from this hanger along the shaft 14 to the chain 6 and from thence to the contact pin or pins upon the chain. It will be obvious that when a pin
45 contacts with the fixed contact 45 that a circuit will be completed through the alarm mechanism and the alarm will be energized. Thus by setting pins along the chain 6 it will be possible to sound the alarm at any
50 predetermined point and in conjunction with the arrival of the pointer 5 at any predetermined point on the dial.

In conjunction with the dial and clock as before described, I provide the program sheets 54 which are located on each side of
55 the clock, the inner edges of the program sheets being in alinement with the outer edge of the dial. These program sheets, however, extend above and below the dial, as illustrated in Fig. 1. The program sheets
60 are preferably in the form of endless bands extending over laterally projecting rollers 55 supported in any suitable manner. As shown, the inner ends of the rollers are supported upon the clock case 2 while the outer
65 ends of the rollers are supported in stand-

ards 56. The arbor of each roller is provided with a thumb wheel 57, and mounted upon the arbor is a toothed clutch wheel 58, while mounted upon the standard 56 and surrounding the arbor is a toothed clutch
70 wheel 59. The arbor upon which the roller is mounted is laterally shiftable so as to permit the clutches to be disengaged and permit the arbor to be rotated. A spring
75 60, however, acts to force the rotatable clutch wheel into engagement with the clutch wheel 59 and thus to lock the arbor and the roller from rotation. When so
80 locked the program mounted upon the roller is held in fixed relation to the clock dial. In order to lead the eye from the time subdivisions on the dial to the sub-subdivisions or graduations on the program, I
85 provide the inner margin of each program with a column designated 61 which is located immediately adjacent to the outer column or space 62 of the dial, which outer column or space is graduated preferably in minutes.
90 In Fig. 1, however, this outer column or space is shown as graduated into five minute spaces. The program is divided by horizontal lines into a number of spaces, each
95 space preferably having a width equal to a five minute space on the dial and the column 61 is provided, opposite each of these spaces into which the program is divided, with a triangular binding or leading mark, the apex of which is coincident with one of
100 the divisional marks in the column 62. Thus the eye is led from any one program space to the particular divisional mark in the column 62 which indicates the moment
105 at which the act or event stated in the program space is to occur. While opposite the straight portions of the dial the program spaces may be arranged in exact alinement
110 with the time spaces on the dial, it is obvious that this arrangement cannot be carried out at the upper and lower portions of the dial where the dial curves and it is for
115 this reason that I provide the lead lines 63 which extend from the time subdivisions on the curved portions of the dial to the triangular pointers 61 which are located on that portion of the program extending above
120 the curved portion of the dial. It will be obvious that the program must extend above or below the curved portion of the dial in order to permit the lead line 63 to lead to the time subdivisions without running to-
125 gether and permit these lead lines to be easily read. It will be seen that one side of the dial, as in the form illustrated in Fig. 1, will indicate the hours of the morning between 12 o'clock midnight and 12 o'clock
130 noon, and that the other side of the dial will indicate the hours between 12 o'clock noon and 12 o'clock midnight, and thus one of the programs will indicate the acts, events or happenings which are to occur between

midnight and noon while the other program will indicate the events which are to occur between noon and midnight.

It will be seen that my oblong dial clock is extremely convenient in that it is a twenty-four hour clock and therefore requires no shifting of the programs between the morning and the afternoon. It will also be seen that only one hand is necessary in order to indicate the time and that the graduations on the dial are so arranged that practically any one can tell the time by the clock, the one hand pointing out definitely the hour and the minute. It will also be obvious that not only does the hand point to that space on the program corresponding to the particular time subdivision in which the hand then is, but that it is an easy matter by glancing down the program and reading the corresponding time subdivisions on the dial to see precisely when any particular act or event is predetermined to occur.

While my invention is capable of a wide range of use, I have illustrated it as applied to a program containing in its upper portion, a list of studies and the periods of recitation therefor, while the program at its lower portion shows how the invention may be applied to railway time tables. When utilized for the purpose of indicating the periods of recitation and study in a school, the various recitation hours, intermissions, etc., forming the school routine are indicated upon the various horizontal lines of the programs and the programs being further subdivided into vertical columns, each column being applied to a particular class. Where the device is to be used as a time table indicator showing the arrival and departure of trains, it will be obvious that the program will be divided into columns showing for instance the particular road upon which the train is to travel, the number of the train, the direction of the train, the track it is to be on, and various other items of information of like character while the time table will be divided by horizontal lines into time subdivisions, as previously described. It will also be obvious that the program or time table on one side of the dial must be read upward, while the time table on the other side of the dial must be read downward.

A clock constructed for an eight hour movement, that is, completing its cycle in eight hours instead of twenty-four as shown in the illustration, combines perfectly with a program for all schools, meetings, etc., public or private, or for lodges, drills and theatrical entertainments. A dial constructed to permit the pointer to make a complete revolution in twelve hours instead of twenty-four combines with programs and time tables for general purposes, but the twenty-four hour dial clock is most com-

plete and useful and is more practical in use as it does not require the shifting of the programs. The twenty-four hour dial combines perfectly with programs and time tables and is particularly useful for indicating the time tables of railway stations, passenger vessels, the arrival and departure of mails and besides is useful for a large number of general purposes.

What I claim is:

1. A clock having a dial provided with an endless slot therein, the dial having graduations on its face adjacent to the slot, a pointer movable along said slot and over said graduations, and motor-actuated mechanism for moving the pointer continuously in one direction.

2. A clock having a dial provided with an endless slot therein, the dial having time graduations on its face adjacent to the slot along the entire length of the same and extending parallel to said slot, and a pointer movable along the slot continuously in one direction and over said graduations in combination with a program divided into horizontal spaces corresponding to the time graduations and located in conjunction therewith.

3. A clock having a dial provided with an endless slot therein, the dial having time graduations on its face adjacent to the slot and extending parallel thereto, and a pointer movable along said slot continuously in one direction and moving over said graduations in combination with a program located adjacent to the outer wall of the slot and divided into horizontal spaces, said program being arranged adjacent to the time graduations on the dial, the inner end of each horizontal space on the program being provided with a pointed index mark leading to a corresponding time graduation mark on the dial.

4. A clock having an oblong dial provided with an endless slot therein, said slot being approximately elliptical in form, the sides of the ellipse described by the slot extending parallel to each other, the ends of said lips describing opposed semicircles, said dial having time graduations extending adjacent to the slot and parallel therewith, a pointer movable along the slot continuously in one direction and over said time graduations in combination with oppositely disposed programs extending vertically on each side of the dial parallel to the sides thereof and divided into horizontal spaces corresponding to the time graduations on the dial.

5. A clock having an oblong dial provided with an endless slot therein, said slot being approximately elliptical in form, the sides of the ellipse described by the slot extending parallel to each other, the ends of said lips describing opposed semicircles, said dial being provided with time graduation

marks disposed adjacent to the slot and extending parallel thereto, a pointer movable in one direction along the slot and over said time graduations in combination with oppositely disposed programs extending vertically on each side of the dial parallel to the sides thereof and extending beyond the rounded ends of the time graduations, said programs being each divided into horizontal spaces, each of said spaces being provided with a lead mark extending to a corresponding time graduation mark on the dial.

6. A clock having an oblong dial provided with an endless slot therein, said slot being approximately elliptical in form, the sides of the ellipse described by the slot extending parallel to each other, the ends of said ellipse describing opposed semicircles, said dial being provided with time graduation marks disposed adjacent to the slot and extending parallel thereto entirely around the dial, a pointer movable continuously along the slot and over said time graduations, and motor actuated means for moving the pointer continuously in one direction in combination with oppositely disposed programs extending vertically on each side of the dial parallel to the sides thereof, and extending beyond the rounded ends of the time graduations, said programs being each divided into horizontal spaces, each of said spaces along the sides of the dial being provided with a triangular index mark, the apex of which is coincident with a time subdivision mark, those spaces on the program which are disposed beyond the straight sides of the dial being also provided with triangular index mark and with lead lines extending from the apices of said marks to the time graduation marks on the circular portions of the dial.

7. A clock having a dial provided with an endless slot therein, the dial having time graduations on its face extending parallel to said slot, and a pointer movable along said slot and over said graduations in combination with a shiftable program divided into horizontal spaces corresponding to the time graduations on the dial and movable into alinement therewith.

8. A clock having an oblong dial provided with an endless slot therein, the dial having time graduations on its face extending parallel to said slot, and a pointer movable continuously in one direction along the slot and over said time graduations in combination with oppositely disposed parallel endless programs mounted adjacent to the straight sides of the dial and divided into horizontal spaces corresponding to the time graduations on the dial, means for supporting said endless programs, and means for shifting said programs relative to the dial.

9. A clock having an oblong dial provided with an endless slot therein, the dial

having time graduations on its face extending parallel to said slot, and a pointer movable continuously in one direction along the slot and over said time graduations, continuously in one direction, in combination with oppositely disposed parallel endless programs mounted adjacent to the straight sides of the dial and divided into horizontal spaces corresponding to the time graduations on the dial, means for supporting said endless programs, and means for supporting said programs adjacent to the dial, means for independently shifting either one of said programs with relation to the graduation marks on the dial, and means for holding said programs set in any shifted position.

10. A clock having an oblong dial provided with an endless slot therein, said slot being approximately elliptical in form, the sides of the ellipse described by the slot extending parallel to each other, the ends of said ellipse describing opposed semicircles, the face on the dial adjacent to the slot on each side thereof being divided by marks indicating time subdivisions, an endless carrier mounted behind the dial and in alinement with the slot therein, a pointer mounted on the carrier and extending out through said slot and movable with the carrier over the time graduation marks on the dial, and motor-actuated means for moving said endless carrier in one direction.

11. A clock having an oblong dial provided with an endless slot therein, said slot being approximately elliptical in form, the sides of the ellipse described by the slot extending parallel to each other, the ends of said ellipse describing opposed semicircles, said dial adjacent to the slot being provided with time graduations, oppositely disposed sprocket wheels mounted behind the dial, the circumference of each sprocket wheel coinciding with the semicircular ends of the slot, a sprocket chain carried upon said wheels, a pin mounted on the sprocket chain projecting through the slot, a pointer carried on the pin and movable over said time graduations of the dial, and motor-actuated means for rotating said sprocket wheels in one direction.

12. A clock having an oblong dial provided with an endless slot therein, said slot being approximately elliptical in form, the sides of the ellipse described by the slot extending parallel to each other, the ends of said ellipse describing opposed semicircles, said dial adjacent to the slot being provided with time graduations, oppositely disposed sprocket wheels mounted behind the dial, the circumference of each sprocket wheel coinciding with the semicircular ends of the slot, a sprocket chain carried upon said wheels, a pin mounted on the sprocket chain projecting through the slot, a pointer carried on the pin and movable over said time

graduations of the dial, motor-actuated mechanism for rotating said sprocket wheels in one direction, adjustable contacts mounted on said sprocket chain, a fixed contact
5 disposed in the path of travel of the chain contacts, said fixed contact and the chain contacts being connected in circuit with a signaling mechanism.

13. A clock having an oblong dial provided with an endless slot therein, the face of the dial being provided with time graduation marks, an endless sprocket chain supported immediately beneath the endless slot, a pointer carried by said chain projecting
10 out through said slot and movable with the chain over the time graduation marks, the links of said sprocket chain being provided with sockets upon the side edges thereof, means for supporting and moving said
15 sprocket chain in one direction beneath the slot, contact pins adapted to be inserted in the sockets of the chain at any desired point, a relatively fixed contact piece mounted in the path of travel of said pins, a sprocket
20 for supporting said contact piece, and an

alarm mechanism, said fixed contact piece and the sprocket chain being connected in circuit with said alarm mechanism.

14. The combination with a dial having a longitudinally extending slot therein, and a
30 pointer movable along said slot, of an endless program sheet arranged parallel to the slot and adjacent to the path of movement of the pointer, a supporting frame for said
sheet, oppositely disposed parallel rollers
35 mounted on said frame over which the endless sheet travels, an arbor for each of said rollers, a fixed toothed clutch member surrounding the arbor and mounted on the
supporting frame, and a longitudinally
40 shiftable toothed clutch member mounted on the arbor and movable into or out of engagement with the fixed clutch member.

In testimony whereof, I affix my signature in presence of two witnesses.

AUGUSTUS W. SOUTH. [L.S.]

Witnesses:

C. W. BISBEE,

J. FRED THOMAS.