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(54) DIGITAL CLOCK

(71) We, GENERAL ELECTRIC COMPANY, a corporation organized and existing under the laws of the State of New York, United States of America, of 1 River Road, Schenectady 12305, State of New York, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a digital clock, and more particularly to a mechanism for supporting and indexing hours, tens of minutes, and minutes numerals of such a digital clock.

In devices of this type it has been common practice to provide hours, tens of minutes, and minutes numerals on drums or wheels which are rotated by an electric motor in order to bring successive numerals into position behind a viewing window. It is desirable that the indexing of the rotatable drums or wheels from one numeral to a next succeeding numeral occur rapidly so that one numeral may be viewed for a relatively long period of time, and then, the next succeeding numeral may be quickly advanced into position where it may be viewed for a relatively long period of time. It is also desirable that numeral drums be positioned relatively close to each other in order to minimize unsightly spaces between the drums, and the driving arrangement for a digital clock should generally be inexpensive.

The present invention provides a digital clock comprising:

(a) a rotatable minutes drum having an elongated shaft fixed thereto;

(b) a rotatable tens of minutes drum having a shaft fixed thereto, said tens of minutes drum and said tens of minutes shaft being coaxial with and mounted for rotation on said minutes shaft;

(c) a geneva wheel fixed to said tens of minutes shaft for driving said tens of minutes drum;

(d) a tens of minutes geneva driver cam mounted for engagement with said tens of minutes geneva wheel, said tens of minutes geneva driver cam having a gear integrally formed therewith; and

(e) a gear fixed to said minutes shaft in meshing engagement with the gear integrally formed with said tens of minutes geneva driver cam for driving said tens of minutes geneva driver cam and said tens of minutes geneva wheel.

The gear integrally formed with the tens of minutes geneva driver cam and the gear fixed to the minutes shaft may both have conventional gear teeth. With this construction, the tens of minutes geneva driver cam and the tens of minutes geneva wheel may be compactly located in a limited amount of space and may be readily driven by the minutes shaft.

This construction also permits the minutes drum and the tens of minutes drum to be positioned relatively close to each other in order to minimize unsightly spaces between the drums. Both the minutes shaft and the tens of minutes shaft may be elongated so that the geneva wheel, the geneva driver and the two conventional gears may all be positioned substantially to one side of not only the minutes drum and the tens of minutes drum but also an hours drum. Thus, a minutes, tens of minutes, and hours drum may be readily mounted and positioned within a digital clock relatively close to each other without unsightly spaces between the drums.

The invention further provides a digital clock comprising:

(a) a rotatable minutes drum having a shaft fixed thereto;

(b) a rotatable tens of minutes drum having a shaft fixed thereto, said tens of minutes drum and said tens of minutes shaft being mounted for rotation on said minutes shaft;

(c) an hours drum mounted for rotation on said tens of minutes shaft;

(d) a geneva wheel integrally formed

with said hours drum for driving said hours drum;

(e) a geneva wheel fixed to said tens of minutes drum;

5 (f) an hours geneva cam mounted for engagement with said hours geneva wheel;

(g) a tens of minutes geneva driver cam mounted for engagement with said tens of minutes geneva wheel, said tens of minutes
10 geneva driver cam having a gear integrally formed therewith;

(h) a gear fixed to said minutes shaft in meshing engagement with the gear integrally formed with said tens of minutes geneva driver cam for driving said tens of minutes geneva driver cam and said tens of minutes geneva wheel; and

(i) a toothed gear integrally formed with said tens of minutes geneva wheel and in meshing engagement with a toothed gear integrally formed with said hours geneva driver cam for driving said hours geneva driver cam and said hours geneva wheel.

20 The gears, geneva wheels and geneva drivers are positioned relatively close to each other, and thus, a very compact, exceedingly simple, reliable, and readily manufactured digital clock is achieved. In order that the invention may be clearly understood, a preferred embodiment thereof will now be described by way of example only with reference to the accompanying drawings, in which:—

35 Fig. 1 is a front perspective view of a digital clock constructed in accordance with the embodiment of the invention;

Fig. 2 is a front perspective view generally similar to Fig. 1 with the outer casing removed for purposes of illustration;

40 Fig. 3 is a fragmentary exploded front perspective view of the clock illustrated in Figs. 1 and 2;

Fig. 4 is a front elevational view of the clock shown in Fig. 2;

45 Fig. 5 is a cross-sectional view of the clock taken substantially on the plane of 5—5 of Fig. 4;

Fig. 6 is a cross-sectional view of the digital clock taken substantially on the plane of 6—6 of Fig. 4 showing one of the numeral pages being flipped to display a numeral on the other side of the page;

50 Fig. 7 is a cross-sectional view of the clock also taken on the plane of 6—6 of Fig. 4 showing the numeral pages in a different operating position;

55 Fig. 8 is a cross-sectional view of the clock taken substantially on the plane of 8—8 of Fig. 4;

60 Fig. 9 is a cross-sectional view of the clock taken substantially on the plane 9—9 of Fig. 4 showing the details of construction of a drive finger and detent lever arrangement for advancing a minutes drum
65 from one position to a next succeeding

position and for holding the minutes drum in an accurate viewing position, the parts being shown with the detent lever holding the ratchet wheel of the minutes indicator member in an accurate viewing position;

70 Fig. 10 is a cross-sectional view of the digital clock also taken substantially on the plane of 9—9 of Fig. 4 showing the drive finger arrangement with the finger holding the detent lever away from the ratchet wheel while the finger moves the ratchet wheel from one position to a next succeeding position;

80 Fig. 11 is a cross-sectional view of the digital clock also taken substantially on the plane of 9—9 of Fig. 4 showing the finger gradually lowering the detent lever onto one of the teeth of the ratchet wheel; and

85 Fig. 12 is an enlarged partial cross-sectional view of the tens of minutes and hours geneva mechanism taken substantially on the plane of 5—5 of Fig. 4.

Referring now to the drawings, and first particularly to Figs. 1 and 2, there is shown a digital clock which includes our mechanism for supporting minutes, tens of minutes, and hours display indicators, and a mechanism for driving the tens of minutes and hours display indicators. As shown, the digital clock numerals include three sets of pages 2, 4 and 6 for indicating minutes, tens of minutes, and hours, respectively.

90 The digital clock is driven by a conventional self-starting synchronous motor 8 having a magnetic core 10 and energizing coil 12. As shown in Fig. 2, the motor is readily attached to an end plate 14 of the clock by means of screws 16 and 18 or other suitable securing means, and as shown
105 in Fig. 5, an output pinion 20 of the motor extends through an aperture 22 which is formed in the end plate 14.

As shown more particularly in Figs. 3, 5, 6 and 7, the minutes numerals 2 are printed or otherwise formed on both sides of five pages 24, 26, 28, 30 and 32, and the pages are pivotally mounted on flanges 34 and 36 of a rotatable minutes drum 38.

115 A generally similar arrangement is used for the hours display indicator 6. Twelve numerals are required for the hours display, and this is accomplished by using six panels 40, 42, 44, 46, 48 and 50, which are pivotally mounted on flanges 52 and
120 54 of a rotatable hours drum 56.

A tens of minutes display indicator 4 requires six digits, and thus, the tens of minutes numerals may be made the same size as the hours and minutes numerals without the use of flippable pages that have numerals on both sides of the pages. As shown more particularly in Figs. 3 and 5, the tens of minutes numerals are conveni-

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ently positioned on the outer surface of a six sided tens of minutes drum 58.

5 The minutes, tens of minutes, and hours drums are supported for rotation between mounting plates 60 and 62. The minutes spool or drum 38 is fixed to a centrally positioned shaft 64 by means of knurling 66 or other suitable connecting means. As shown, the shaft 64 extends a considerable distance to the left of the spool and is supported for rotation within a bearing 61 which is formed in a stub shaft 63 which is fixed to a plate 112.

15 The right end portion of the minutes shaft 64 is formed with a bearing surface 74 which is supported within a bearing 76 which is integrally formed with end plate 60. As shown more particularly in Figs. 3 and 5, the supporting plate 60 may be formed of plastics or other suitable material, and it includes an outwardly extending portion 80 for integrally connecting the bearing portion 76 with the main portion of the supporting plate.

25 The tens of minutes drum 58 is fixed to a hollow support shaft 68 which is mounted for rotation on the minutes shaft 64, and the hours drum 56 is supported for rotation on the hollow shaft 68 of the tens of minutes drum 58.

30 The minutes drum 38 is quickly indexed from one numeral position to a next succeeding numeral position in about five seconds of time, and it is held in appropriate positions to display numerals midway between the upper and lower edges of a viewing window 82, illustrated in Fig. 1. As shown more particularly in Fig. 3, a ratchet wheel 84 having five teeth is integrally formed with the minutes drum 38 for incrementally driving the minutes drum and the shaft 64 which is fixed to it (Fig. 5).

35 A drive finger 96 is eccentrically mounted for rotation with respect to the ratchet wheel 84 to engage and move one tooth of the ratchet wheel for each revolution of the drive finger 96. As shown more particularly in Figs. 3 and 5, the drive finger 96 is integrally formed on a reduction gear unit 98 which is positioned between the output pinion 20 of the electric motor 8 and the ratchet wheel 84. The reduction gear unit 98 is supported between plates 60 and 104 on a shaft 100 which is integrally formed with the reduction gear unit. As shown in Fig. 5, the shaft 100 is mounted for rotation within apertures 102 and 103 which are provided in mounting plates 60 and 104 respectively.

60 The apertures 102 and 103 are located somewhat rearwardly of the axis of the ratchet wheel 84 in order to provide the desired eccentricity between the ratchet teeth 86, 88, 90, 92 and 94, and the drive finger 96. With this construction, the out-

put pinion 20 of the motor drives a gear 106 of the integrally formed reduction gear unit 98 to move the drive finger 96 at one revolution per minute. With reference to Fig. 3, it can be appreciated that the drive finger 96 will remain in engagement with a tooth of the ratchet wheel 84 for about 30 degrees of travel of the reduction gear unit, and accordingly, movement of the minutes drum 38 from one position to a next succeeding position will occur in the relatively short span of about five seconds. A spring loaded detent lever 108 is provided for holding the ratchet wheel 84 in any one of a plurality of numeral positions. The driving arrangement more particularly shown in Figs. 9-11 is further described and claimed in our co-pending Patent Application No. 9062/74 (Serial No. 1,455,858).

70 The tens of minutes drum 58 and the hours drum 56 are quickly indexed from one numeral position to a next succeeding numeral position by a geneva mechanism 110. As shown in Figs. 3 and 5, the geneva mechanism 110 is located at the left of the numerals and is readily supported and positioned on the digital clock without substantially increasing the overall size of the clock. A mounting plate 112 is arranged generally parallel to mounting plate 62 for supporting a pair of geneva driver cams 114 and 116 therebetween. As shown more particularly in Fig. 12, the geneva driver cams 114 and 116 are coaxial with each other, of substantially the same external diameter, and are supported on a common shaft 117. The geneva driver cam 116 is integrally formed to include a pair of driving fingers 120 and 122, a toothed gear 124, a hollow shaft portion 126, and a pinion gear portion 128 at the left portion of shaft 126. Geneva driver cam 114 is integrally formed to include a driving finger 130, a toothed gear 134, and a generally circular sleeve bearing 136 which is supported for rotation on the coaxial shaft 126 of the integrally formed geneva driver cam 116. The shaft 126 is formed to include a central hollow cylindrical bearing surface 136' for receiving shaft 117. Thus, as shown in Fig. 12, the supporting shaft 117 is positioned within apertures 119 and 121 which are formed in plates 112 and 62, respectively, and readily held between the plates for supporting the geneva driver cams 114 and 116.

115 The geneva driver cam 114 is arranged for driving a tens of minutes geneva wheel 115 while the geneva driver cam 116 is arranged for driving an hours geneva wheel 113. As shown more particularly in Fig. 5, the geneva wheel 113 is integrally formed with the hours drum 56 for indexing the hours drum one increment every hour, and

the generally similar geneva wheel 115 is fixed to the hollow shaft 68 of the tens of minutes drum 58 for indexing the tens of minutes drum one increment every ten minutes. The pair of geneva driver cams 114 and 116 are positioned behind the geneva wheels 113 and 115, respectively, for driving the geneva wheels, and thus, the geneva wheels and the geneva drivers form a compact arrangement which does not increase the overall height of the clock.

With particular reference to Fig. 5, it can be seen that a gear 140 is fixed to the minutes shaft 64 for driving the geneva mechanism 110 to advance the hours drum 56 one increment every hour and to advance the tens of minutes drum 58 one increment every ten minutes. Gear 140 is arranged in mesh with gear 134 of the tens of minutes geneva driver cam 114, and with one driving finger 130 on the geneva driver cam 114, the gearing ratio between gears 140 and 134 will be arranged to enable the timing motor 8 to rotate the geneva driver cam 114 once every 10 minutes. Thus, every ten minutes the geneva driver finger 130 will be moved into one of the notches on the geneva wheel 115 to rotate the tens of minutes geneva wheel 115 one increment every ten minutes.

As shown more particularly in Fig. 3, a gear 144 is integrally formed with the tens of minutes geneva wheel 115 for driving the hours geneva driver cam 124. Gear 144 is arranged in mesh with gear 124 and with two driving fingers 120 and 122 on the hours geneva driver cam 116 the gear ratio between gear 144 and gear 124 of the hours geneva driver cam is arranged so that the hours geneva driver cam makes one revolution every two hours. Accordingly, one of the driving fingers 120 or 122 is moved into one of the notches of the geneva gear 113 once every hour to move the hours drum 56 once every hour.

In operation, it can be appreciated that the minutes drum 38 rotates shaft 64 and gear 140 at two revolutions every ten minutes. Gear 140 is arranged in mesh with gear 134 which is integrally formed with the tens of minutes geneva driver cam 114, and thus, the tens of minutes geneva driver cam 114 drives the tens of minutes geneva wheel 115 and the tens of minutes drum 58 at one increment every ten minutes and one revolution per hour. Through the gear 144 which is integrally formed with the tens of minutes geneva wheel 115, and the gear 124 of the hours geneva driver cam, the hours geneva driver cam 116 is rotated to move the hours geneva wheel 113 one increment every hour.

From the foregoing description it can be appreciated that our supporting and driving construction for a drum-type digital clock

is achieved with the use of relatively few parts which may be readily assembled in the clock. The geneva driver cams 114 and 116 are coaxially mounted with respect to each other on a common supporting shaft 117 and include integrally formed toothed gears 124 and 134 which are arranged in mesh with gears 140 and 144 for inexpensively driving the geneva mechanism. In like manner, the geneva wheels 113 and 115 are readily formed and coaxially positioned with respect to each other. Geneva wheel 113 is integrally formed with the hours drum 56, while the tens of minutes geneva wheel 115 is integrally formed with a gear 144 for driving the hours geneva driver cam 116. Thus, a very compact geneva driving mechanism at the left side of the numerals is achieved. With such a construction, no driving mechanisms are positioned between the numeral drums and the drums may be located relatively close to each other without having unsightly large spaces between the drums. In addition, it can be seen that with the geneva mechanism 110 located to the left and rear of the numerals, and the motor 8 located to the right of the numerals, a compact low profile digital clock is constructed.

A mechanism for manually rotating the minutes, tens of minutes, and hours drums 38, 58 and 56, respectively, to set the hours, minutes and tens of minutes numerals may be readily incorporated with the digital clock mechanism thus far described. As shown more particularly in Figs. 5 and 8, a time set gear 146 is positioned in mesh with gear 140. As shown, gear 146 is supported on a shaft 148 which is conveniently fixed to mounting plate 62. A portion of gear 146 extends through the casing of the clock, as shown in Fig. 1, and it can be appreciated that rotation of gear 146 will cause corresponding rotation of gear 140 which in turn will cause rotation of the minutes drum 38 through shaft 64, and the hours and tens of minutes drums 56 and 58, respectively, through the geneva gear mechanism 110, in order to set the time.

The geneva driver 114 is also designed so that it may readily drive an alarm mechanism 160. With particular reference to Fig. 3, it can be appreciated that the hours geneva driver cam 116 is driven at six revolutions every 12 hours, and thus, it may be readily utilized for driving a 12 hour cam gear 162 of a 12 hour alarm mechanism. To achieve this, the hours geneva driver cam 116 is fixed to an elongated shaft 126 which extends through the tens of minutes geneva driver cam 114, and a conventional gear 128 is integrally formed on the left end portion of shaft 126. As shown in Fig. 5, gear 128 is arranged in mesh with the 130

12 hour cam gear 162 to drive the cam gear 162 at one revolution every 12 hours.

Conventional 12 hour alarm cam mechanisms include two coaxially mounted gears which are provided with interacting cams for causing relative axial movement of the gears at a preset alarm time for actuating a switch or other alarm mechanism. Thus, as shown in Fig. 5, the cam gear 162 is formed with two leftwardly extending projections 163 and 165 for cooperating with slots 164 and 166 (Fig. 3) which are formed in a manually adjustable alarm set cam 168.

In view of the foregoing, it can be appreciated that the geneva driving mechanism 110 is constructed so that it may readily drive an alarm mechanism without the use of additional parts. The gear 128 for driving the alarm mechanism is integrally formed with the hours geneva driver shaft 126 at the same time that the drive fingers 120 and 122 and the other portions of the hours geneva driver cam are being formed.

WHAT WE CLAIM IS:—

1. A digital clock comprising:
 - (a) a rotatable minutes drum having an elongated shaft fixed thereto;
 - (b) a rotatable tens of minutes drum having a shaft fixed thereto, said tens of minutes drum and said tens of minutes shaft being coaxial with and mounted for rotation on said minutes shaft;
 - (c) a geneva wheel fixed to said tens of minutes shaft for driving said tens of minutes drum;
 - (d) a tens of minutes geneva driver cam mounted for engagement with said tens of minutes geneva wheel, said tens of minutes geneva driver cam having a gear integrally formed therewith; and
 - (e) a gear fixed to said minutes shaft in meshing engagement with the gear integrally formed with said tens of minutes geneva driver cam for driving said tens of minutes geneva driver cam and said tens of minutes geneva wheel.
2. A digital clock as claimed in claim 1 wherein an hours drum is mounted for rotation on said tens of minutes shaft between said tens of minutes drum and said tens of minutes geneva wheel.
3. A digital clock comprising:
 - (a) a rotatable minutes drum having a shaft fixed thereto;
 - (b) a rotatable tens of minutes drum having a shaft fixed thereto, said tens of minutes drum and said tens of minutes shaft being mounted for rotation on said minutes shaft;

- (c) an hours drum mounted for rotation on said tens of minutes shaft;
 - (d) A geneva wheel integrally formed with said hours drum for driving said hours drum;
 - (e) a geneva wheel fixed to said tens of minutes shaft for driving said tens of minutes drum;
 - (f) an hours geneva driver cam mounted for engagement with said hours geneva wheel;
 - (g) a tens of minutes geneva driver cam mounted for engagement with said tens of minutes geneva wheel, said tens of minutes geneva driver cam having a gear integrally formed therewith;
 - (h) a gear fixed to said minutes shaft in meshing engagement with the gear integrally formed with said tens of minutes geneva driver cam for driving said tens of minutes geneva driver cam and said tens of minutes geneva wheel; and
 - (i) a toothed gear integrally formed with said tens of minutes geneva wheel and in meshing engagement with a toothed gear integrally formed with said hours geneva driver cam for driving said hours geneva driver cam and said hours geneva wheel.
4. A digital clock as claimed in claim 3 wherein said geneva driver cams are coaxially mounted with respect to each other.
 5. A digital clock as claimed in claim 4 wherein said geneva driver cams are located between two supporting plates, a shaft is positioned between said supporting plates, and both of said geneva driver cams are coaxially mounted on said shaft.
 6. A digital clock as claimed in claim 3 or claim 4, wherein a gear is arranged in meshing engagement with the gear on said minutes shaft for setting the minutes, hours, and tens of minutes drums.
 7. A digital clock as claimed in any one of claims 3 to 6, wherein said tens of minutes and hours geneva wheels are generally similar and are coaxially mounted with respect to each other.
 8. A digital clock as claimed in any one of claims 3 to 7, wherein said geneva driver cams are of substantially the same external diameter and said hours geneva driver cam has two drive fingers while the tens of minutes geneva driver cam has one drive finger.
 9. A digital clock as claimed in any one of claims 3 to 8, wherein the hours geneva driver cam is integrally formed with an elongated shaft which extends through the tens of minutes geneva driver cam, and an end portion of said elongated shaft includes an integrally formed conventional gear which is arranged in mesh with a con-

12 hour cam gear 162 to drive the cam gear 162 at one revolution every 12 hours.

Conventional 12 hour alarm cam mechanisms include two coaxially mounted gears which are provided with interacting cams for causing relative axial movement of the gears at a preset alarm time for actuating a switch or other alarm mechanism. Thus, as shown in Fig. 5, the cam gear 162 is formed with two leftwardly extending projections 163 and 165 for cooperating with slots 164 and 166 (Fig. 3) which are formed in a manually adjustable alarm set cam 168.

In view of the foregoing, it can be appreciated that the geneva driving mechanism 110 is constructed so that it may readily drive an alarm mechanism without the use of additional parts. The gear 128 for driving the alarm mechanism is integrally formed with the hours geneva driver shaft 126 at the same time that the drive fingers 120 and 122 and the other portions of the hours geneva driver cam are being formed.

WHAT WE CLAIM IS:—

1. A digital clock comprising:
 - (a) a rotatable minutes drum having an elongated shaft fixed thereto;
 - (b) a rotatable tens of minutes drum having a shaft fixed thereto, said tens of minutes drum and said tens of minutes shaft being coaxial with and mounted for rotation on said minutes shaft;
 - (c) a geneva wheel fixed to said tens of minutes shaft for driving said tens of minutes drum;
 - (d) a tens of minutes geneva driver cam mounted for engagement with said tens of minutes geneva wheel, said tens of minutes geneva driver cam having a gear integrally formed therewith; and
 - (e) a gear fixed to said minutes shaft in meshing engagement with the gear integrally formed with said tens of minutes geneva driver cam for driving said tens of minutes geneva driver cam and said tens of minutes geneva wheel.
2. A digital clock as claimed in claim 1 wherein an hours drum is mounted for rotation on said tens of minutes shaft between said tens of minutes drum and said tens of minutes geneva wheel.
3. A digital clock comprising:
 - (a) a rotatable minutes drum having a shaft fixed thereto;
 - (b) a rotatable tens of minutes drum having a shaft fixed thereto, said tens of minutes drum and said tens of minutes shaft being mounted for rotation on said minutes shaft;

- (c) an hours drum mounted for rotation on said tens of minutes shaft;
 - (d) A geneva wheel integrally formed with said hours drum for driving said hours drum;
 - (e) a geneva wheel fixed to said tens of minutes shaft for driving said tens of minutes drum;
 - (f) an hours geneva driver cam mounted for engagement with said hours geneva wheel;
 - (g) a tens of minutes geneva driver cam mounted for engagement with said tens of minutes geneva wheel, said tens of minutes geneva driver cam having a gear integrally formed therewith;
 - (h) a gear fixed to said minutes shaft in meshing engagement with the gear integrally formed with said tens of minutes geneva driver cam for driving said tens of minutes geneva driver cam and said tens of minutes geneva wheel; and
 - (i) a toothed gear integrally formed with said tens of minutes geneva wheel and in meshing engagement with a toothed gear integrally formed with said hours geneva driver cam for driving said hours geneva driver cam and said hours geneva wheel.
4. A digital clock as claimed in claim 3 wherein said geneva driver cams are coaxially mounted with respect to each other.
 5. A digital clock as claimed in claim 4 wherein said geneva driver cams are located between two supporting plates, a shaft is positioned between said supporting plates, and both of said geneva driver cams are coaxially mounted on said shaft.
 6. A digital clock as claimed in claim 3 or claim 4, wherein a gear is arranged in meshing engagement with the gear on said minutes shaft for setting the minutes, hours, and tens of minutes drums.
 7. A digital clock as claimed in any one of claims 3 to 6, wherein said tens of minutes and hours geneva wheels are generally similar and are coaxially mounted with respect to each other.
 8. A digital clock as claimed in any one of claims 3 to 7, wherein said geneva driver cams are of substantially the same external diameter and said hours geneva driver cam has two drive fingers while the tens of minutes geneva driver cam has one drive finger.
 9. A digital clock as claimed in any one of claims 3 to 8, wherein the hours geneva driver cam is integrally formed with an elongated shaft which extends through the tens of minutes geneva driver cam, and an end portion of said elongated shaft includes an integrally formed conventional gear which is arranged in mesh with a con-



ventional gear of an alarm cam mechanism. shown in the accompanying drawings.
10. A digital clock substantially as here- J. A. BLEACH,
inbefore described with reference to and as Agent for the Applicant.

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