Sept. 28, 1971 W. C. WINGLER 3,608,300

CALENDAR CLOCK

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Fig. 1.

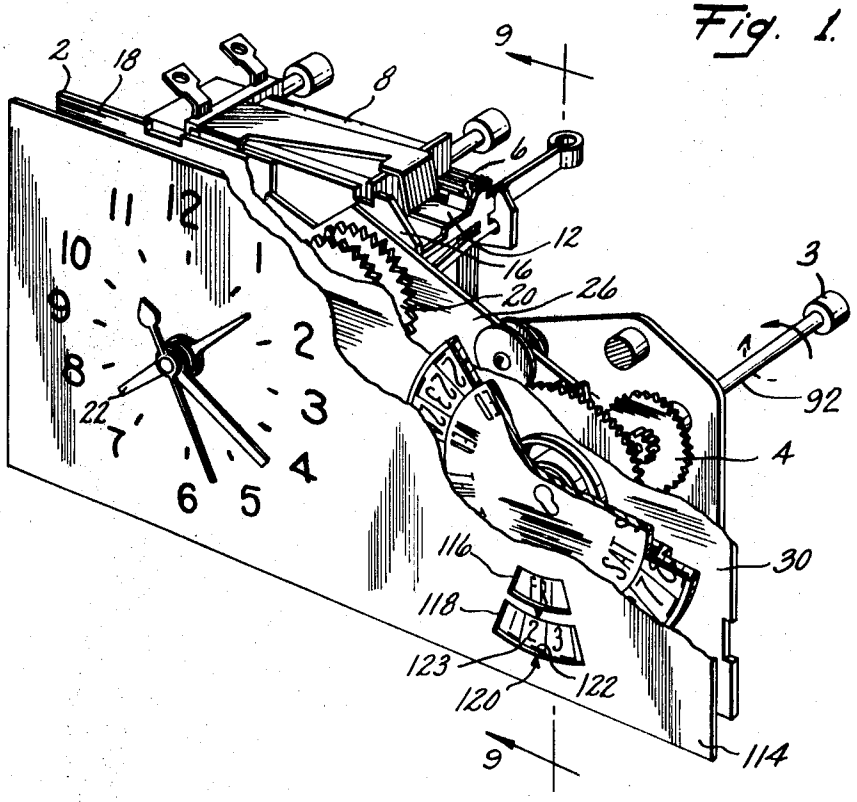
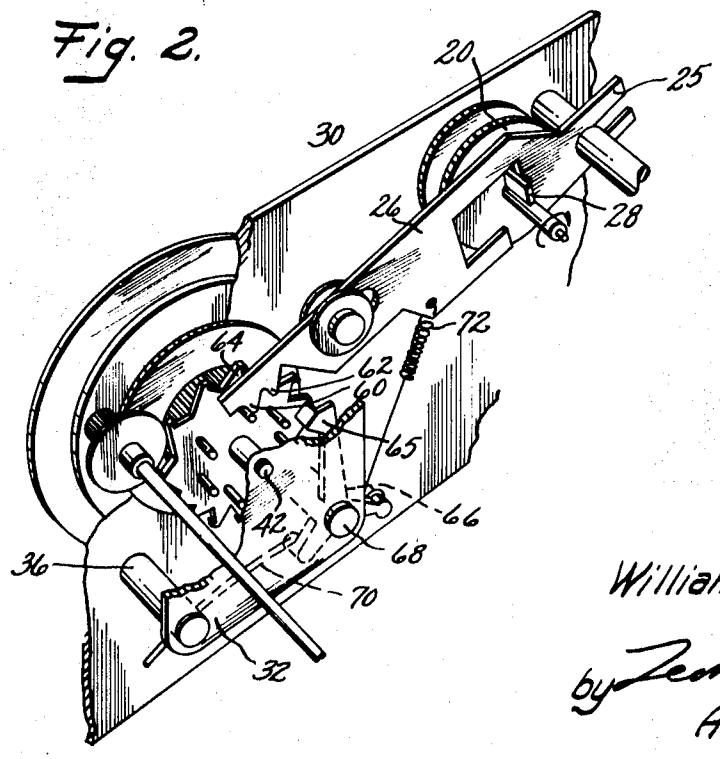


Fig. 2.



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CALENDAR CLOCK

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Fig. 3.

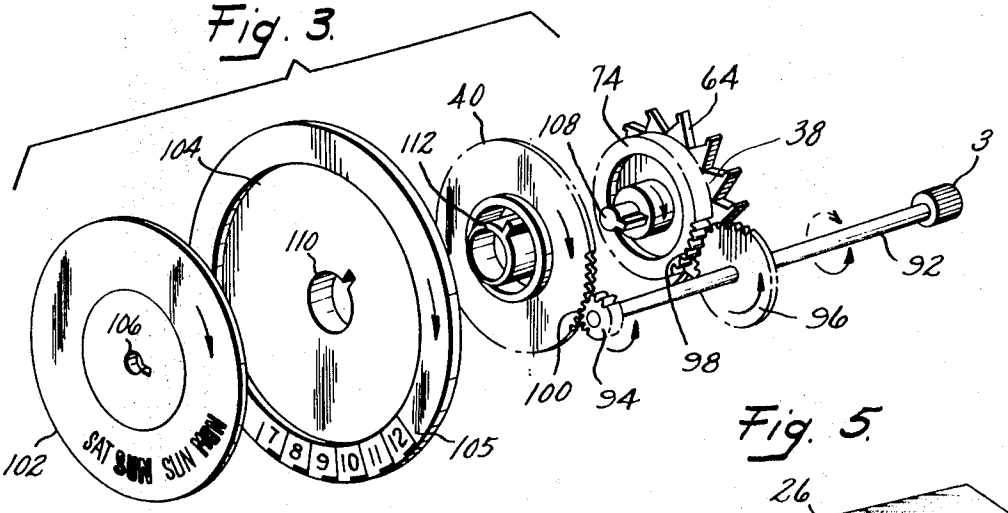


Fig. 5.

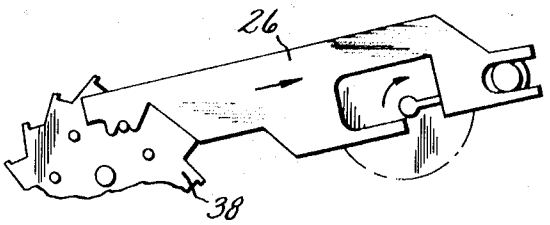


Fig. 4.

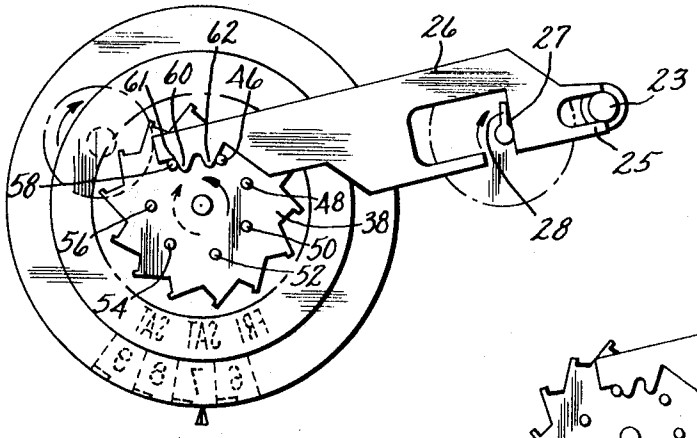


Fig. 7.

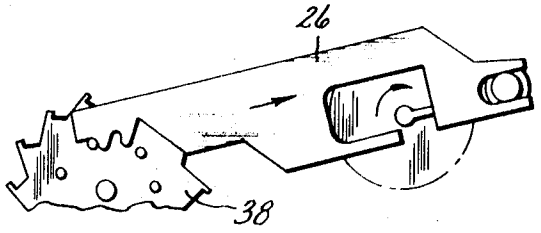
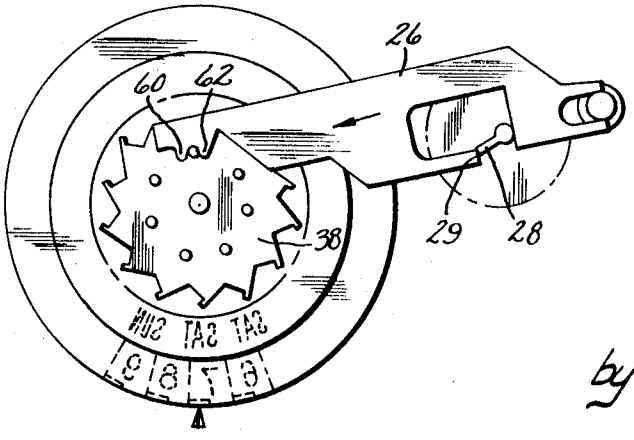


Fig. 6.



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Sept. 28, 1971 W. C. WINGLER 3,608,300

CALENDAR CLOCK

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Fig. 8.

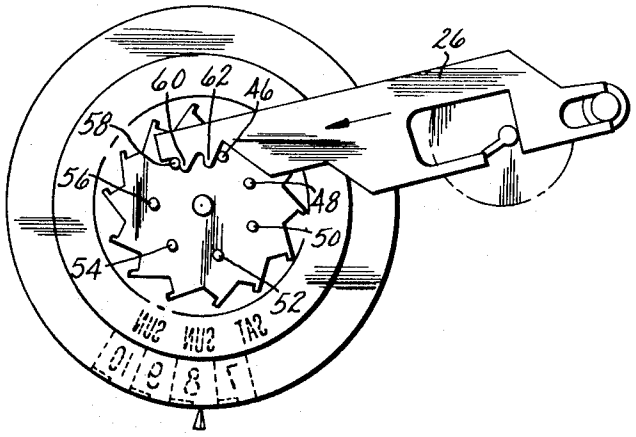


Fig. 10.

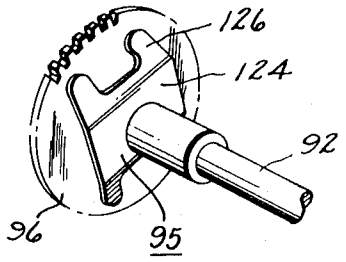
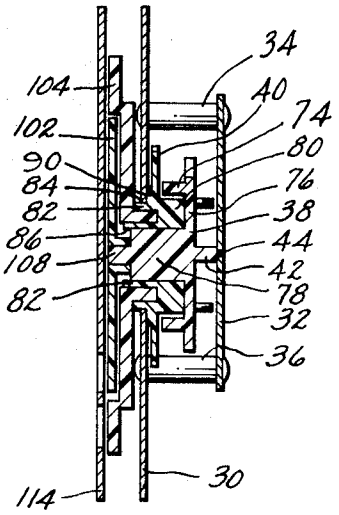


Fig. 9.



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United States Patent Office 3,608,300
Patented Sept. 28, 1971

3,608,300

CALENDAR CLOCK

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Filed Apr. 6, 1970, Ser. No. 25,756
Int. Cl. G04b *19/24*
U.S. Cl. 58—5 9 Claims

ABSTRACT OF THE DISCLOSURE

A calendar clock wherein a day and date mechanism is uniquely constructed and mounted between a front plate and a base plate of a clock.

BACKGROUND OF THE INVENTION

This invention relates to a calendar clock and more particularly, to an improved day and date mechanism for a calendar clock.

In a co-pending application of Robert L. Boyles, Ser. No. 822,659, filed May 7, 1969, now Pat. No. 3,564,836 and assigned to the same assignee as the instant invention, there is disclosed a seven-day automatic alarm clock which can be programmed so that the alarm will ring only on the desired days of the week. As shown and described in the above-mentioned application, a day wheel having a plurality of abutment members mounted thereon is rotatably supported on the clock structure, and an indexing lever is positioned between a continuously rotated gear and the day wheel for moving the day wheel at one revolution in a week. This invention is concerned with such a clock movement, and the use of such an indexing lever mechanism for rotating a unique day and date wheel of a calendar clock mechanism.

While calendar clocks including day wheels and discs for indicating the day of the week and date wheels and discs for indicating the date of the month have been combined with each other in a number of different ways, it is especially desirable that the day and date indicating mechanism be reduced to a minimum number of parts that can be readily constructed and assembled to each other. A reliable low cost day and date indicating mechanism, which may be readily added to a prior clock mechanism such as the clock mechanism disclosed and illustrated in the above-mentioned co-pending application of Robert L. Boyles, is especially desirable.

Correspondingly, it is a primary object of this invention to provide a day and date indicating mechanism for a calendar clock having a minimum number of parts which may be easily incorporated in a clock mechanism.

SUMMARY OF THE INVENTION

In accordance with one of the aspects of this invention, a timing mechanism is rotatably mounted on a clock supporting structure including a front plate and a base plate. A day wheel is positioned between the front plate and the base plate and a date wheel is positioned coaxially with respect to the day wheel and is also mounted between the base plate and the front plate. An actuating mechanism is connected between the day wheel and the date wheel for rotating the day wheel one revolution in seven days and for rotating the date wheel on revolution in a month. A rearwardly extending bearing shaft is integrally formed with the day wheel, a forwardly extending bearing shaft is integrally formed with the date wheel, and bearing apertures are formed in the base plate and the front plate for receiving the bearing shafts in order to rotatably mount the day and date wheels with respect to each other.

By this arrangement the day and date wheels are readily mounted with respect to each other on the clock supporting structure utilizing a minimum number of parts. Thus, an exceedingly simple unique day and date mechanism for a calendar clock has been achieved.

BRIEF DESCRIPTION OF THE DRAWING

Other aspects and attendant advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing in which:

FIG. 1 is an exploded front perspective view of a calendar clock mechanism constructed in accordance with my invention showing a day indicating disc in one of its Friday positions and a date disc in its p.m. position on the second day of the month;

FIG. 2 is a partial rear perspective view of the calendar clock shown in FIG. 1 with the parts in the same positions shown in FIG. 1;

FIG. 3 is an exploded perspective view of a portion of the day and date mechanism of my invention;

FIG. 4 is a fragmentary cross sectional view of the calendar clock mechanism shown in FIG. 1 with the day disc in its Saturday a.m. position and the date wheel in its a.m. position on the seventh day of the month;

FIG. 5 is a fragmentary cross sectional view of the calendar clock shown in FIG. 1 illustrating in particular the indexing lever being moved away from the day wheel for positioning the indexing lever on one of the actuating pins integrally formed on the day wheel;

FIG. 6 is a fragmentary cross sectional view similar to FIG. 4 illustrating in particular movement of the indexing lever to the left by a cam on the twelve hour cam gear for moving one of the actuating pins on the day wheel with the parts in their Saturday p.m. position on the seventh day of the month;

FIG. 7 is a fragmentary cross sectional view similar to FIG. 5 showing the indexing lever being moved to its right most position with respect to the day wheel;

FIG. 8 is a cross sectional view similar to FIG. 6 showing the indexing lever being moved to the left to move the day wheel and the date wheel to their Sunday a.m. position on the eighth day of the month;

FIG. 9 is a cross sectional view of the day and date wheels and discs of the calendar clock mechanism illustrated in FIG. 1; and

FIG. 10 is a rear perspective view of the day and date setting mechanism.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing, and first particularly to FIG. 1, there is shown a calendar clock which includes my unique day and date mechanism. As illustrated, a conventional clock mechanism may be located at the left portion of a relatively thin clock casing **2** and my unique day and date indicating mechanism **4** may be positioned at the right side of the casing.

As shown in FIG. 1, the clock may be driven by a conventional timing mechanism including a self-starting synchronous motor. Portions of the motor stator magnet core and energizing coil are shown at **6** and **8** respectively.

A supporting structure including a base plate **16** and a front plate **18** spaced from plate **16** and arranged generally parallel thereto is provided for supporting the clock mechanism. In a manner well known in the art, a twelve hour cam gear **20** is driven by the timing mechanism of the clock through a suitable gearing arrangement so that it makes one revolution each twelve hours, and its position is indicated on the face of the clock by a conventional hour hand **22**.

The structure so far described is illustrated and described in greater detail in the aforementioned copending application of Robert L. Boyles. The co-pending application of Robert L. Boyles also described and illus-

trates a mechanism for utilizing movement of the twelve hour gear **20** to actuate a seven-day mechanism, and the actuating mechanism illustrated in the aforementioned co-pending aplication is essentially the same as the actuating mechanism which is utilized for actuating my unique day and date mechanism. As shown more particularly in FIGS. 1 and 2, the actuating mechanism comprises a generally elongated indexing slider lever **26** which is moved back and forth once every twelve hours by a cam projection **28** on the twelve hour gear **20**. This incremental movement once every twelve hours is utilized to actuate my unique seven-day wheel **38**.

DAY AND DATE MECHANISM

My unique day and date mechanism which is provided for conveniently indicating the day of the week and the date of the month will now be more particularly described.

As shown more particularly in FIGS. 2, 3 and 9, the principal parts of the day and date indicating mechanism can be completely pre-assembled as a separate unit including a front plate **30**, a base plate **32**, and a plurality of spacer posts **34** and **36** for connecting the plates to each other. The mechanism includes a unique day wheel **38** which is rotated at one revolution every week and a date wheel **40** which is rotated at one revolution in a month. The day and date wheels **38** and **40** are uniquely constructed so that they may be readily mounted with respect to each other on the supporting structure of the clock.

The seven-day wheel may be integrally molded of acetal plastic or other suitable material, and as shown more particularly in FIG. 9 it includes an integrally formed bearing shaft **42** which is received in a bearing aperture **44** formed in the rear plate **32**. A plurality of rearwardly extending pins **46**, **48**, **50**, **52**, **54**, **56** and **58** are also integrally formed with the day wheel for cooperating with the pawls **60** and **62** formed at the left side of the indexing lever **26** for moving the day wheel 14 increments in a week. Fourteen notches **64** are also integrally formed at the outer periphery of the day wheel for cooperating with a spring load detent lever **66** for insuring that the seven-day wheel has been moved precisely the correct amount by the indexing lever **26**.

As shown more particularly in FIG. 2, the detent lever **66** is rotatably mounted on a spacer post **68**, and a suitable spring **70** is provided for resiliently urging the pawl **65** at the end of detent lever into one of the notches **64**. This detent arrangement does not form a part of my invention and is described and illustrated in greater detail in the aforementioned co-pending application of Robert L. Boyles.

In accordance with my invention, the seven-day wheel is uniquely mounted with respect to the date wheel **40** utilizing a minimum number of parts. As illustrated more particularly in FIGS. 9 and 3, the day wheel **38** includes an integrally molded forwardly extending collar **74**. As shown, the collar **74** extends forwardly from an inner wall **76** of the day wheel and is co-axially arranged with a forwardly extending bearing shaft **78** which is also integrally formed with the day wheel. As shown in FIG. 9, the date wheel **40** is provided with a rearwardly extending bearing collar **80** which is provided for rotatable slidable movement against the outer cylindrical surface of bearing shaft **78** and the inner wall **76** of the day wheel.

In order to rotatably mount the date wheel on the front plate, the date wheel **40** is provided with a forwardly extending bearing collar **82**. As shown more particularly in FIG. 9, the outer cylindrical surface of the bearing collar **82** is arranged for rotatable movement within a bearing aperture **84** which is formed in the front plate. With reference to FIG. 9, it can also be appreciated that an inner cylindrical surface **86** of the bearing collar **82** is arranged for rotatable slidable movement on the outer cylindrical surface of the bearing shaft **78** of the day wheel **38**. In addition, as shown in FIG. 9, a front wall **90** of the date disc **40** arranged for slidable movement on the rear surface of front plate **30**. With this construction, it can be appreciated that the day wheel **38** and the date wheel **40** are uniquely constructed so that they may be readily mounted to the clock supporting structure utilizing a minimum number of parts. In effect, the day wheel **38** and the date wheel **40** are conveniently sandwiched between front plate **30** and rear plate **32** without the use of additional parts. The rear bearing **42** is integrally molded on the day wheel, the front bearing **82** is integrally molded with the date disc and cooperating bearing surfaces **86** and **78** are integrally formed on the day and date wheels for rotatably mounting the day and date wheels with respect to each other.

A reduction gearing arrangement is provided for adjusting the position of the day wheel **38** and the date wheel **40** and for driving the date wheel at one revolution in a month. As illustrated more particularly in FIG. 3, a shaft **92** having reduction gears **94** and **96** mounted thereon is conveniently positioned generally parallel to the axis of the day and date wheels **38** and **40**. As shown, a plurality of gear teeth **98** may be integrally formed on the outer periphery of collar **74** of the day wheel for cooperating with gear **96**, and a plurality of gear teeth **100** may be integrally formed on the outer periphery of the date wheel **40** for cooperating with reduction gear **94**. By this arrangement, as the day wheel **38** is rotated at one revolution in seven days by the indexing lever **26**, the reduction gearing **98**, **96**, **94** and **100** causes the date wheel **40** to be rotated at one revolution in a month.

DAY AND DATE INDICATING DISCS

In accordance with my invention, day and date indicating discs **102** and **104** are provided for indicating the position of the day and date wheels **38** and **40**, respecfully, to thereby indicate the day of the week and the date of the month. As shown more particularly in FIG. 3, the date disc includes a forwardly extending annular portion **105** on which numerals corresponding to the days of the month are located. The day disc **102** is smaller than the date disc, and as shown more particularly in FIGS. 1 and 9, it is positioned within the forwardly extending annular portion **105** of the date disc. The day disc **102** includes a key-hole slot **106** for receiving a key projection **108** which is integrally formed with the day wheel **38**, and the date disc **104** includes a key-hole slot **110** for receiving a key projection **112** which is integrally formed on the date wheel **40**. With this construction, it can be appreciated that movement of the day wheel **38** results in corresponding movement of the day disc **102** and movement of the date wheel **40** results in corresponding movement of the date disc **104**. As shown more particularly in FIG. 1, the day and date discs **102** and **104** are conveniently sandwiched between front plate **30** and a dial plate **114** and suitable aperture **116** and **118** are formed in the dial plate for viewing the position of the day and date discs.

In the illustrated embodiment of my invention, the day disc includes 14 a.m. and p.m. day indicia, that is, there are two indicia for each day of the week. For example, there is an indicia for Saturday a.m. and another indicia for Saturday p.m. As illustrated, the Saturday a.m. indicia includes black letters "SAT" on a white background and the Saturday p.m. indicia has white letters "SAT" on a black background.

With this construction it can also be appreciated that the day wheel **104** will be caused to move two increments in one day. Thus, as shown more particularly in FIG. 1, indicating pointer **120** may point to a black segment **122** immediately below the numerical date "2" for indicating the afternoon of the second day of the month or to the white position under the numerical date thereby indicating a.m. on the second day of the month.

OPERATION

With particular reference to FIGS. 2 and 4, it can be appreciated that as the twelve hour cam gear **20** is rotated at one revolution every twelve hours, cam **28** is rotated in the direction of the arrows shown in FIGS. 2 and 4 against a side surface **27** of the indexing lever **26** to move the indexing lever to the right as shown in FIGS. 2 and 4. Similarly, it can be appreciated that when the cam **28** engages a left guide surface **29** of the indexing lever **26**, the indexing lever is moved to the left as shown more particularly in FIG. 6. As particularly illustrated in FIGS. 4 and 6, pawls **60** and **62** are formed at the left side of the indexing lever **26** for moving the seven-day wheel **38** one increment every twelve hours. With this construction, the indexing lever **26** moves each of the pins **48**, **50**, **52**, **54**, **56** and **58** two increments during the day that a respective one of the pins is in position to be actuated by the indexing lever **26**. Thus, it can be appreciated that the seven-day wheel **38** will be moved 14 increments in seven days, and with particular reference to FIG. 3, it can be appreciated that the day disc **102** will be sequentially moved from the Saturday p.m. position, to a Sunday a.m. position, to a Sunday p.m. position, to a Monday a.m. position, etc.

In order to insure that the seven-day wheel **38** will be moved precisely the correct amount during each incremental movement, 14 notches **64** are formed at the outer periphrey of the seven-day wheel for cooperating with the spring loaded detent lever **66** which has been described in more detail hereinbefore. With particular reference to FIG. 3, it can be appreciated that an appropriate number of teeth have been provided on the reduction gear train **94**, **96**, **98** and **100** for rotating date wheel **40** fourteen increments in a week and one complete revolution in 31 days. It can also be appreciated that since the date wheel will be moved two increments in a day, 62 incremental movements are required to move the date disc one complete revolution. With particular reference to FIGS. 1 and 3, it can be seen that the 62 incremental movements correspond to the a.m. and p.m. positions of the 31 days of the month. Thus, as shown in FIG. 3, the date wheel **40** will move the date indicating disc **104** from the a.m. position on the seventh day of the month to the p.m. position on the seventh day of the month, to the a.m. position on the eighth day of the month to the p.m. on the eighth day of the month, etc.

DAY AND DATE SETTING MECHANISM

With particular reference to FIG. 1, it can be seen that a knob **96** is formed at the end of shaft **92** for setting the day and date disc mechanism. It can be appreciated that when the knob is rotated in the direction of the solid line arrows shown in FIGS. 1 and 3, gears **96** and **94**, the day and date wheels **38** and **40**, and the day and date discs **102** and **104** will be moved in the direction of the solid line arrows to advance the day and date wheels. During such movement the pins **46**, **48**, **50**, **52**, **56** and **58** on the day wheel **38** will be moved in the direction of the solid line arrow shown in FIG. 4 and the left end of indexing lever **26** will be lifted as the respective pins abut and slide on the right side surfaces of pawls **60** and **62**. In addition, during this movement the pawl **65** at the end of detent lever **66** will be moved in and out of the notches **64** formed at the periphery of the day wheel.

Since the date wheel **104** is provided with indicia corresponding to a.m. and p.m. positions for thirty-one days of the month, it can be appreciated that an adjustment should be made for those months having fewer than thirty-one days. Thus, for example, at the end of April which has thirty days, some arrangement must be provided for skipping the a.m. and p.m. positions of numeral **31** without skipping the next day of the week as indicated by the day wheel. For example, during 1970, April 30 falls on a Thursday and the next day May 1 naturally falls on a Friday. Thus, some arrangement must be provided for moving the date disc to numeral 1 but leaving the day disc in its Friday a.m. position on the first day of May. To achieve this, I have provided a slip clutch in the reduction gear mechanism. Gear **94** is fixed to shaft **92** so that it will always rotate with the shaft, and gear **96** rotatably mounted on and frictionally coupled to the shaft **92** by a friction clutch **95** as shown more particularly in FIG. 10.

The friction clutch **95** includes a friction disc **124** having a plurality of fingers **126** which are spring urged against the rear surface of gear **96**. The frictional force between the friction clutch and the disc are such that when the shaft **92** is rotated in the direction of the solid line arrows shown in FIGS. 1 and 3, the gear **96** and clutch **124** rotate as a unit to advance the setting of the day and date wheels and discs. Likewise, when the gear **96** is rotated by the gear **98** at the periphery of day wheel **38**, the gear **98**, clutch **124** and gear **94** rotate as a unit to advance the day and date discs **102** and **104**, respectfully. However, when the knob **3** is rotated in the direction of the dotted line arrows shown in FIGS. 1 and 3, the notches **64** on the day wheel and the end of the detent lever **66** are so shaped that rotation of gear **96**, the day wheel **38** and the day disc **102** will be prevented, but rotation of the knob **96** will cause corresponding movement of the date wheel **40** and disc **104**. Thus, in order to adjust the day and date disc mechanism at the end of a month which has fewer than thirty-one days, it is merely necessary to rotate knob **3** in the direction of the dotted line arrows to thereby rotate the date wheel **104** in the direction of the dotted line arrows until the a.m. position of the first day of the month appears immediately above arrow **120** shown in FIG. 1.

From the foregoing description, it will be appreciated that my improved day and date indicating mechanism is achieved with the use of a minimum number of parts which are uniquely connected to each other so that the day and date mechanism may be readily added to an existing clock structure. In order to connect the day and date mechanism to a clock structure, it is merely necessary to place the bifurcated end **25** of the indexing lever **26** over a spacer stud **23** and connect the front plate **30** of the day and date mechanism to the front plate **18** of the clock.

It can also be appreciated that my unique day and date mechanism includes a minimum number of relatively easy manufactured parts which are readily connected to each other. The day wheel **38**, for example, including its integrally formed bearing shaft **42**, shaft **78**, indexing pins **46**, **48**, **50**, **52**, **54**, **56** and **58**, detent notches **64**, and key **108** is formed from a single piece of molded plastic. Likewise, the date wheel **40**, and the day and date discs **102** and **104** are each formed from a single piece of molded plastic. Moreover, the day and date wheels **38** and **40** are readily rotatably mounted with respect to each other and sandwiched between front plate **30** and rear plate **32** without the use of additional bearings or parts. Thus, an exceedingly simple, yet reliable, day and date mechanism has been achieved.

What I claim is:

1. A calendar clock mechanism comprising:

(a) a supporting structure including a front plate and a base plate;

(b) a timing mechanism mounted on said supporting structure;

(c) a day wheel positioned between said front plate and said base plate;

(d) a date wheel positioned co-axially with respect to said day wheel, said date wheel also being mounted between said base plate and said front plate;

(e) actuating means positioned between said timing mechanism and said day and date wheels for rotating said day wheel one revolution in seven days and said date wheel one revolution in a month;

(f) a bearing aperture formed in said base plate and a

rearwardly extending bearing shaft integrally formed with said day wheel positioned in said bearing aperture;

(g) a bearing aperture formed in said front plate and a bearing shaft integrally formed with said date wheel extending through the bearing aperture formed in said front plate, whereby said day and date wheels are supported between said front plate and said base plate by bearing shafts which are integrally formed on the day wheel and the date wheel.

2. A calendar clock mechanism as defined in claim 1 wherein said date wheel includes a rearwardly facing bearing surface and said day wheel includes a forwardly facing bearing surface arranged for slidable movement on the rearwardly facing surface of said date wheel, said day wheel includes a rearwardly facing bearing surface arranged for slidable movement on a forwardly facing surface of said base plate, and said date wheel includes a forwardly facing bearing surface arranged for slidable movement on a rearwardly facing bearing surface of said front plate whereby said date and day wheels are uniquely sandwiched and supported between said front plate and said base plate for rotary movement with respect to each other and with respect to said front plate and said base plate.

3. A calendar clock mechanism as defined in claim 1 wherein a dial plate is supported on said supporting structure in front of said front plate and said calendar clock mechanism also includes:

(a) a day disc positioned between said front plate and said dial plate, said day disc having indicia corresponding to the days of the week located thereon and said day disc being connected to said day wheel for rotation therewith at one revolution in a week;

(b) a date disc positioned between said front plate and said dial plate and connected to said date wheel and drive at one revolution in a month, said date wheel having a plurality of numerals corresponding to the days of the month located thereon; and

(c) a day aperture formed in said dial plate for enabling one of the days of the week on said day disc to be viewed therethrough, and a date aperture formed in said dial plate for permitting days of the month to be viewed therethrough.

4. A calendar clock mechanism as defined in claim 3 wherein said day wheel includes a shaft having a key coupling member extending through said front plate and said day disc includes a key hole slot for receiving said key coupling member.

5. A calendar clock mechanism as defined in claim 4 wherein said date wheel includes an annular shaft extending through said front plate and positioned co-axially radially outwardly from said day wheel shaft, said date wheel annular shaft including a key coupling member extending in front of said front plate and said date disc including a key-hole slot for receiving said annular coupling member.

6. A calendar clock mechanism as defined in claim 3 wherein said date disc includes a forwardly extending annular portion and numerals corresponding to the days of the month are located on said forwardly extending annular portion, and said day disc is smaller than said date disc and is positioned within the forwardly extending annular portion of the date disc.

7. A calendar clock mechanism comprising:

(a) a supporting structure including a front plate and a base plate;

(b) a timing mechanism mounted on said supporting structure;

(c) a day wheel positioned between said front plate and said base plate;

(d) actuating means positioned between said timing

mechanism and said day wheel for rotating said day wheel one revolution in seven days;

(e) a date wheel positioned co-axially with respect to said day wheel, said date wheel also being mounted between said base plate and said front plate;

(f) gear reduction means connected between said day wheel and said date wheel for rotating said date wheel one revolution in a month;

(g) a bearing aperture formed in said base plate for receiving a rearwardly extending bearing shaft integrally formed with said day wheel;

(h) said date wheel including a generally annular axial portion having an inner cylindrical bearing surface for cooperating with a complementary bearing surface formed on said day wheel;

(i) a bearing aperture formed in said front plate; and

(j) a generally cylindrical bearing integrally formed on said date wheel positioned within the bearing aperture formed in said front plate whereby said date wheel and said day wheel are uniquely supported between said front plate and said base plate and with respect to each other by bearing surfaces which are integrally formed on said day wheel, date wheel, front plate, and base plate.

8. A calendar clock mechanism comprising:

(a) a supporting structure including a front plate and a base plate;

(b) a timing mechanism mounted on said supporting structure;

(c) a day wheel positioned between said front plate and said base plate;

(d) actuating means positioned between said timing mechanism and said day wheel for rotating said day wheel one revolution in seven days;

(e) a date wheel positioned co-axially with respect to said day wheel, said date wheel also being mounted between said base plate and said front plate;

(f) a bearing aperture formed in said front plate;

(g) a forwardly extending hollow bearing shaft integrally formed with said date wheel extending through the bearing aperture formed in said front plate;

(h) a forwardly extending bearing shaft integrally formed with said day wheel positioned co-axially inside of the forwardly extending hollow bearing shaft of said date wheel whereby the bearing shafts of the day and date wheels extend through said bearing aperture formed in the front plate;

(i) gear reduction means connected between said day wheel and said date wheel for rotating said date wheel one revolution in a month; and

(j) said gear reduction means including a shaft having an adjustment knob for manually adjusting the position of said day wheel and said date wheel.

9. A calendar clock mechanism as defined in claim 8 wherein said gear reduction means includes a gear and a friction clutch for connecting said gear for movement with said shaft and a second gear fixed to said shaft so that said shaft may be manually rotated for moving said second gear without moving said first gear in order to adjust the position of said date wheel without moving the day wheel.

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