United States Patent [19]

Insley et al.

[11] **3,898,792**

[45] **Aug. 12, 1975**

[54] **DIGITAL TIMER**

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[73] Assignee: **General Electric Company**, Fort Wayne, Ind.

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[52] **U.S. Cl.**..... **58/39.5;** 58/85.5; 58/125 C

[51] **Int. Cl.**... **G04f 3/06;** G04b 27/00; G04b 19/02

[58] **Field of Search**..... 58/39.5, 74, 85.5, 125 C

[56] **References Cited**

UNITED STATES PATENTS

2,636,339	4/1953	Holzner	58/85.5 X
2,762,190	9/1956	Holzner	58/125 C X
2,959,914	11/1960	Harada	58/85.5 X
3,574,995	4/1971	Turner	58/125 C
3,590,572	7/1971	Niznik	58/125 C X
3,609,956	10/1971	Funaki	58/125 C X
3,611,705	10/1971	Niznik	58/125 C X
3,807,167	4/1974	Chappatte	58/125 C

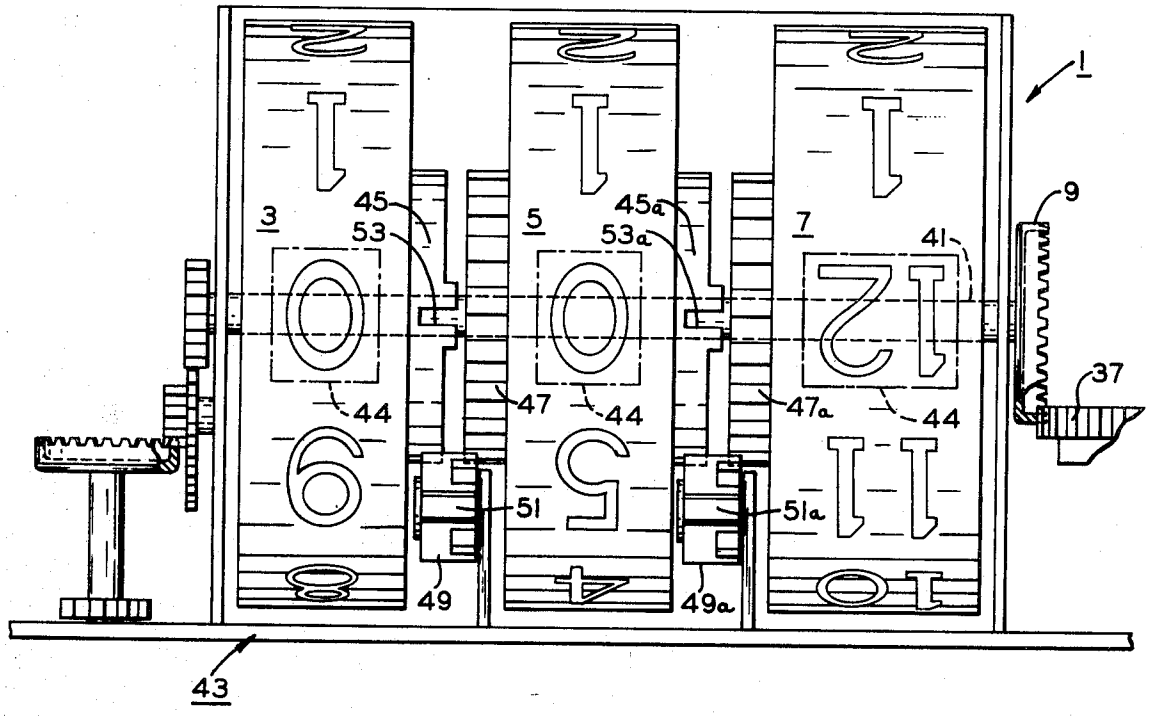
Primary Examiner—George H. Miller, Jr.
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[57] **ABSTRACT**

A digital timer is provided with means operable generally for indicating digital time and means for controlling the operation of the indicating means. Means for driving the controlling means effects the time indicating operation of the indicating means, and means is both idly driven through the controlling means by the driving means and operable manually for actuating to controlling means to effect reset of the indicating means to the selected time. The controlling means includes means for releasing the drive of the driving means upon the manual operation of the actuating means.

A method of operating a digital timer is also disclosed.

21 Claims, 9 Drawing Figures



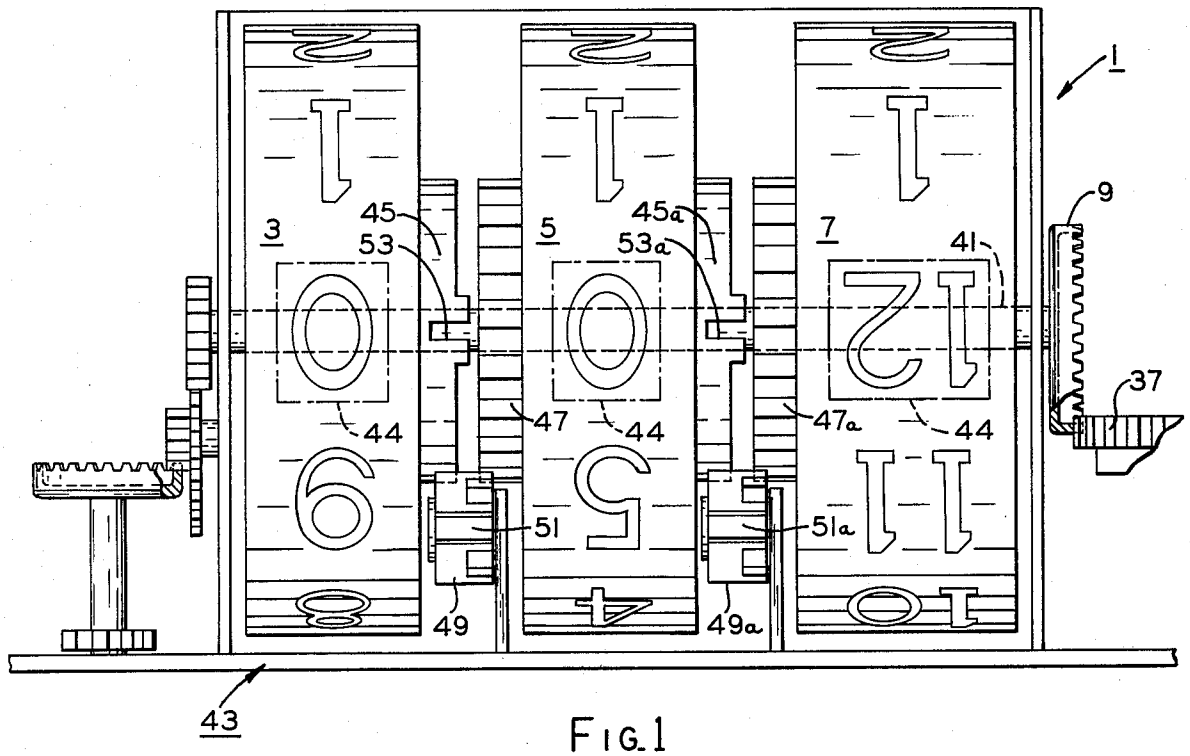

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49a
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FIG. 1

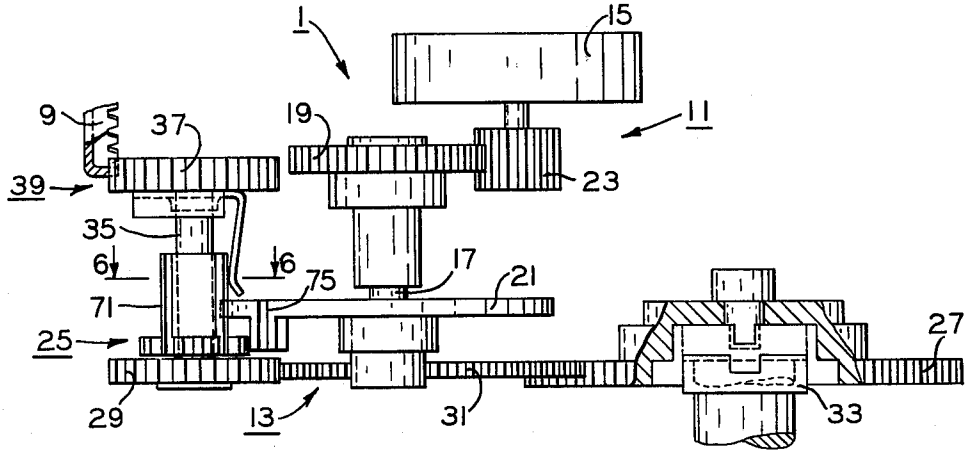

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FIG. 2

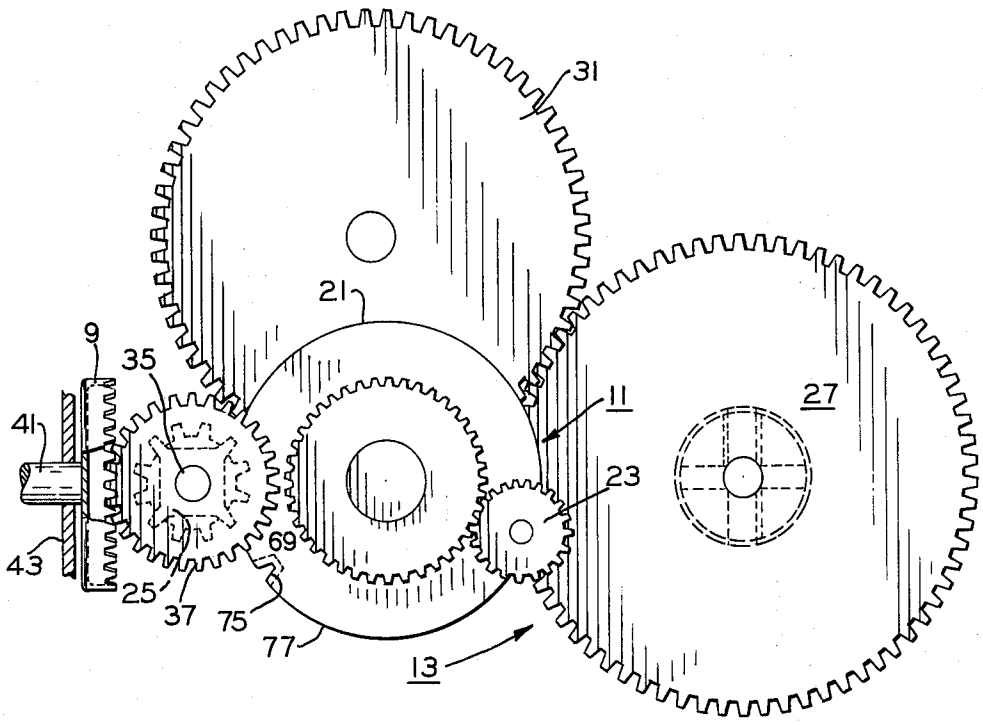


FIG. 3

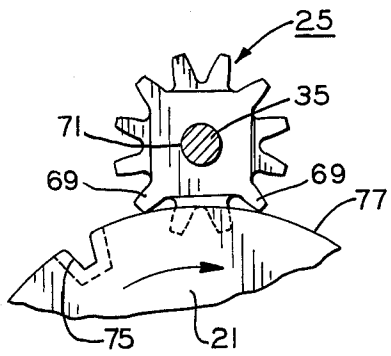


FIG. 4

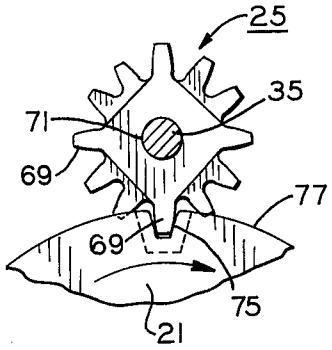


FIG. 4a

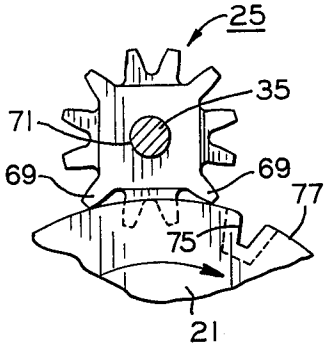


FIG. 4b

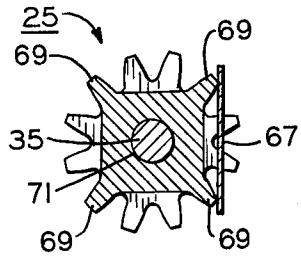


FIG. 6

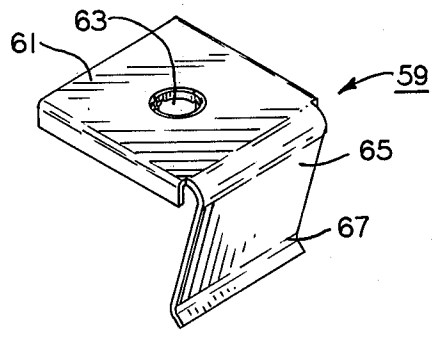


FIG. 7

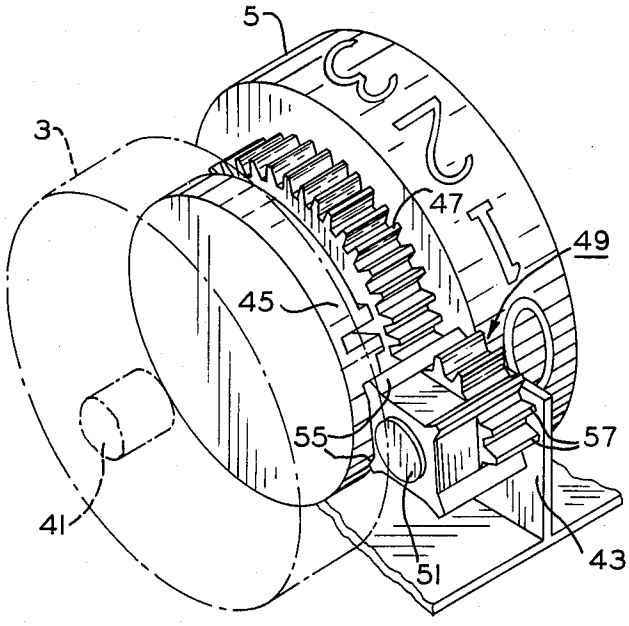


FIG. 5

DIGITAL TIMER

BACKGROUND OF THE INVENTION

This invention is related in general to digital timer and in particular to means and a method for effecting operation of the digital timer.

In the past, various types of digital timers were provided with counting or time indicating wheels or drums which were drivingly interconnected by various means, such as a geneva or mutilated gear, to indicate at least hours, tens-of-minutes, an minutes viewable through windows or the like provided at predetermined positions with respect to the drums. In many of the past digital timers, a synchronous timing motor was drivingly interconnected with the minute drum (or a second indicating drum) to effect the digital time indicating function of the drums. In addition, various means for manually resetting the drums to indicate a selected digital time were also provided in some of the past digital times. The past digital timers were of various construction and sizes, and one criteria was to miniaturize or make the digital timer as small as possible since, in many installations therefor, space was at a premium. One of the disadvantageous or undesirable features of at least some of the past digital timers was that if the operator or user did not make the exact correct time setting of the time indicating drums, the digits thereon would not index into their respective digital time viewing windows accurately. Another disadvantageous or undesirable feature of some of the past digital timers was that due to gear backlash in the gear train or the like for driving the time indicating drums, the operator or user may have set the digital time accurately but lag in the gear train produced inaccurate positioning of the digits on the time indicating drum at the respective windows thereof. Yet another disadvantageous or undesirable feature of some of the past digital timers was that they were inordinately large with respect to the relatively small operating spaces provided therefor in some of the current minaturized assembly or manufacturing applications for such digital timers. And still yet another disadvantageous or undesirable feature of some of the past digital timers was that the timer resetting means thereof was operable to set or reset time only in one direction.

SUMMARY OF THE INVENTION

Among the several objects of the present invention may be noted the provision of a digital timer and a method of operating such which overcomes the aforementioned disadvantageous or undesirable features, as well as others, with respect to the past digital timers; the provision of a digital timer and method of operating such having means for maintaining the time indicating drums in their respective indexed or time indicating positions; the provision of a digital timer and method of operating such having means for automatically releasing a driving means for the digital timer upon a manual resetting or re-indexing of the time indicating drums to a selected digital time; the provision of a digital timer and method of operating such having a drive train for driving the time indicating drums of the digital timer and a resetting train for resetting the time indicating drums wherein the resetting train is idly driven by the driven train yet operable independently thereof to effect its resetting function; the provision of a digital timer and method of operating such in which the resetting train is operable in both a forward and reverse direction for setting or resetting the digitally indicated time; the provision of a digital timer and method of operating such which utilize releasing or clutching means not only to insure accurate setting and the maintenance thereof of the time indicating drums but also to permit the independent operation of the resetting train relative to the drive train; and the provision of a digital timer which is simplistic in design, economically manufactured, and easily assembled.

In general, a digital timer in one form of the invention has means operable generally for indicating digital time and adapted to be reset to a selected digital time. Means is provided for controlling the operation of the indicating means, and means for driving the controlling means effects the time indicating operation of the indicating means. Means is both idly driven through the controlling means by the driving means and operable manually for actuating the controlling means to effect the reset of the indicating means to the selected digital time. The controlling means includes means for releasing the drive of the driving means upon the manual operation of the actuating means.

Also in general, a digital timer in one form of the invention has a support, and a rod is rotatably mounted to the support. At least a pair of digital time indicating drums is rotatably mounted to the rod with one of the drums being connected to the rod for conjoint rotation therewith. A geneva gear is mounted to the support and engaged between drums, and the geneva gear is driven by the one drum upon the conjoint rotation thereof with the rod for effecting relative rotation of the other of the drums on the rod in a predetermined time sequence. Means for controlling rotation of the rod includes a driven gear, a timing motor, a geneva pinion adapted to be intermittently driven, and a drive train between the driving motor and the geneva pinion for effecting the intermittent driving movement of the geneva pinion in another predetermined time sequence. A clutch device is releasably engaged between the geneva pinion and the driven gear for normally effecting conjoint rotation thereof. A resetting train is normally idly connected with the driven gear and is adapted to be manually operable for driving the driven gear independently of the drive train to effect the resetting rotation of the rod and drums to a selected digital time. The clutch device releases the drive train upon the manual operation of the resetting train, and another gear is provided on the rod and engaged with the driven gear for translating the rotation thereof into conjoint rotation of the rod.

Further in general a method in one form of the invention is provided for operating a digital timer having means adapted to be intermittently driven for indicating digital time. This method includes actuating a drive train for intermittently driving the indicating means and conjointly driving in idling relation a resetting train manually operable for driving the indicating means to a selected digital time. The drive train is released form the indicating means automatically in response to the manual operation of the resetting train for driving the indicating means to the selected digital time independently of the drive train.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevational view of time indicating drums for a digital timer embodying the present invention in one form thereof;

FIG. 2 is a front elevational view of a drive train and resetting train of the digital timer of FIG. 1;

FIG. 3 is a plan view of the drive train and the resetting train of FIG. 2;

FIG. 4, 4*a* and 4*b* are respectively enlarged fragmentary views taken form FIG. 3 and illustrating the coaction between the gearing thereof for effecting the sequence of time indicating drum rotation;

FIG. 5 is an isometric view illustrating the driving coupling of the time indicating drums of FIG. 1;

FIG. 6 is a sectional view taken along line 6—6 of FIG. 2; and

FIG. 7 is an isometric view of a clutch device of the present invention taken from FIG. 2. Corresponding reference characters indicate corresponding parts throughout the several views of the drawing.

The following examples set out in the specification illustrate the invention but are not to be construed as limiting to the invention in any manner.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in general, there is illustrated in one form of the invention a method for operating a digital timer 1 having means, such as a plurality of digital time indicating drums, 3, 5, 7, for indicating time digitally (FIG. 1). In this method, means, such as at least a face or crown gear 9 or the like, for effecting operation of the time indicating operation of drums 3, 5, 7 is connected therewith. A drive or gear train, indicated at 11, is actuated for intermittently driving operation effecting means or gear 9 and for conjointly driving in idling relation a resetting or gear train, indicated generally at 13, which is manually operable for driving drums 3, 5, 7 through operation effecting means or gear 9 to selected digital time indicating positions (FIGS. 2 and 3). Drive train 11 is released from gear 9 upon the manual operation of resetting train 13 for driving drums 3, 5, 7 through gear 9 to the selected digital time indicating positions thereof independently of the drive train.

More particularly and with specific reference to FIGS. 1–3, a synchronous or timing motor 15 of a type well known in the art is provided for acutating drive train 11 at a predetermined rate of speed. Typically this type of synchoronous motor will operate at a speed of approximately one to three revolutions per minute. Drive train 11 is generally constituted by a drive shaft 17 which carries a reduction gear 19 and an impulse gear segment 21, and a motor pinion 23 is drivingly engaged with the reduction gear while the impulse segment intermittently drives a mutilated or geneva pinion or gear 125 in a predetermined time relation or sequence, as discussed in detail hereinafter.

Resetting train 13 is provided with a time set gear 27 which drives a pinion gear 29 through an idler gear 31. A time set shaft 33 is adapted to be manually moved into rotatable driving engagement with time set gear 27 for manually actuating or operating resetting train 13 to effect the resetting of drums 3, 5, 7 to the selected time indicating positions, as discussed in greater detail hereinafter. Resetting train 13 is connected with gear 9 through a drive shaft 35 which carries pinion gear 29 adjacent the lower end thereof and another pinion or driven gear 37 is carried adjacent the upper end of the drive shaft in driving or meshing engagement with gear 9. Geneva pinion 25 of drive train 11 is mounted for relative rotation on drive shaft 35.

A clutch mechanism or device, indicated generally at 39, is interposed between driven gear 37 and drive and resetting trains 11, 13 so that the dirve and resetting trains are mechanically interconnected generally in parallel relation. In this manner, it may be noted that resetting train 13 normally is idly driven by drive train 11 through clutch device 39; however, when the resetting train is manually driven by the driving engagement of reset shaft 33 with time set gear 27, as previously mentioned, the clutch device momentarily releases the drive of the drive train. Therefore, it may also be noted that resetting train 13 is manually operable independently of drive train 11 albeit normally idly driven by the drive train. Inherent in the operation of clutch device 39 is that it will also at least momentarily release the drive of drive train 11 upon the occurrence of any backlash or other malfunction of the component parts of digital timer 1 disposed generally between the clutch device and drums 3, 5, 7 which might lock them or otherwise inhibit the digital time indicating operation or rotation thereof. Of course, the manual operation of resetting train 13 drives driven gear 37 through shaft 35, and in turn, the driven gear drives controlling gear 9 to effect the resetting movement or rotation of time indicating drums 3, 5, 7 to selected digital time indicating positions, as discussed in detail hereinafter. In view of the above, it is apparent that pinion gears 29, 37, shaft 35, and clutch device 39 generally constitute means for controlling the operation of indicating means 3, 5, 7 in response to the driving actuation of drive train 11 and resetting train 13, respectively, and the clutch device, which is included in the controlling means, generally constitutes means for releasing the drive of the driving means or drive train upon the manual or resetting operation of the actuating means or resetting train.

Referring now again in general to the drawings and recapitulating, at least in part, the foregoig discussion, digital timer 1 in one form of the invention is provided with a rotatable member, such as a rod or shaft 41, and means, such as drums 3, 5, 7, is rotatably mounted on the rod and adapted to be driven thereby for indicating digital time (FIG. 1). Means, such as drive train 11, is provided for intermittently driving rod 41, and means, such as clutch device 39, is provided for selective actuation to interrupt the driving relation of the drive train with the rod (FIGS. 2 and 3). Means, such as resetting train 13, is normally connected in idling driven relation with drive train 11 through clutch device 39, shaft 35 and pinion 29 and the resetting train is also manually operable for effecting the selective actuation or operation of the clutch device and for effecting resetting of drums 3, 5, 7. Resetting train 11 is operable in response to a manually applied force thereon to selectively actuate clutch device 39 thereby to interrupt the driving relation of drive train 11 and drive rod 41 and effect the resetting of drums 3, 5, 7.

More particularly and with specific reference again to FIG. 1, digital timer 1 is provided with a support or housing, indicated generally at 43, in which opposite end portions of rod 41 are rotatably received or mounted. Drum 3 is a minute wheel or counter and is adapted to carry numerals from 0 to 9; drum 5 is a tens-of-minute wheel or counter and is adapted to carry a

dual set of numerals from 0–5; and drum 7 is an hour wheel or counter and is adapted to carry numerals from 1 to 12. Of course, the numerals on drums 3, 5, 7 are adapted to align with windows 44 provided in housing 43 as shown in phantom in FIG. 1. Drums 3, 5, 7 are rotatably mounted on rod 41, and drum 3 is secured by suitable means (not shown) to the rod for conjoint rotation therewith. Drums 3, 5, are respectively provided with impulse gear segments 45, 45*a* which may be integrally formed therewith, and drums 5, 7 are respectively provided with ring gears 47, 47*a* disposed adjacent and generally opposite to impulse gear segments 45, 45*a*. Ring gears 47, 47*a* may also be integrally formed with drums 5, 7 respectively. A pair of like mutilated or geneva pinions or gears 49, 49*a* are rotatably mounted on shafts 51, 51*a* which are respectively secured to support 43 by suitable means (not shown) between drums 3, 5 and 5, 7. For the sake of brevity and clarity, only the mutilated pinion 49 for engagement with impulse gear segment 45 and ring gear 47 of drums 3, 5 is shown in greater detail in FIG. 5; however, the impulse gear segment, ring gear, and mutilated pinion disposed between drums 5, 7 are indicated by the subletter *a*. Impulse gear segments 45, 45*a* are provided with single *recesses 53, 53a* defined between adjacent half-tooth forms, and the recesses are adapted to mesh with or receive gear teeth 55, 55*a* of mutilated pinions 49, 49*a*. Gear teeth 57, 57*a* of mutilated pinions 49, 49*a* are adapted to mesh with or receive the teeth of ring gears 47, 47*a*. In this manner, conjoint rotation of drum 3 with rod 41, effects intermittent driving engagement of recess 53 in impulse gear segment 45 with a cooperating tooth 55 of mutilated pinion 49, and in turn, teeth 57 of the mutilated pinion mesh with teeth of ring gear 47 to intermittently dirve or rotate drum 5 about rod 41. This intermittent rotation of drum 5 effects intermittent driving engagement of recess 53*a* in impulse gear segment 45*a* with a cooperating tooth 55*a* of mutilated pinion 49*a*, and in turn teeth 57*a* of the mutilated pinion intermittently mesh with teeth of ring gear 47*a* to intermittently drive or rotate drum 7 about rod 41, as best seen in FIG. 1. It may also be noted that the number of teeth on ring gears 47, 47*a*, mutilated pinions 49, 49*a* and the number of recesses 53, 53*a* on impulse gear segments 45, 45*a* may be selected to establish a predetermined time relation or sequence with respect to the relative driven rotation of drums 3, 5, 7. The coupling relation of mutilated pinions 49, 49*a* between drums 3, 5 and 5, 7 is described and shown in the Dec. 23, 1965 issue of *Machine Design* on page 125 thereof. Gear 9 is fixedly connected with rod 41 at the rightward end portion thereof, and if desired, other gearing or drives (not shown) may be taken off of the leftward end portion of the rod. Gear 9 on rod 41 is meshed with driven gear 37 thereby to translate the rotation of the driven gear into conjoint rotation of the rod.

Referring now to FIGS. 2, 6 and 7, clutch device 39 includes a resilient member or spring 59, and a base or generally flat portion 61 of the spring is disposed in abutting engagement with the lower side or driven gear 37. An opening 63 is provided in base portion 61 through which drive shaft 35 is received in press-fit engagement so that spring 59 and driven gear 37 are conjointly rotatable. A depending spring or clutch arm 65 is integrally formed with base portion 61 and has a free end portion 67 which is resiliently urged into clutching or releasable engagement with adjacent teeth 69 provided on geneva gear 25. It may be noted that the releasable engagement of clutch arm 65 with adjacent teeth 60 on geneva gear 25 serves to positively maintain drums 3, 5, 7 in their respective digital time indicating positions by compensating for any backlash which may be created in the drive train 11 or resetting train 13. If desired, it is contemplated within the scope of the invention that another depending spring arm may be integrally formed on base portion 61 opposite spring arms 65 for releasable engagement with adjacent teeth 69 of geneva gear 25 opposite to those with which spring arm 65 is engaged.

Geneva gear 25, as best seen in FIGS. 2 and 6, is provided with a bore 71 therethrough, and the bore is rotatably received on drive shaft 35 so as to effect relative rotation between the geneva gear and the drive shaft. Opposite pairs of flats 73 are provided on the peripheral portion of geneva gear 25, and teeth 69, for indexing or abutting engagement with clutch arm 65, as previously mentioned, extend generally lengthwise of the geneva gear between adjacent pairs of flats 73.

Impulse gear segment 21 of drive train 11 is provided with a recess 75 in the peripheral portion 77 thereof between adjacent half-tooth forms for intermittent driving or meshing engagement with the teeth 69 of geneva gear 25, as illustrated in FIGS. 4, 4*a* and 4*b*. Adjacent pairs of teeth 69 on geneva gear 25 are adapted to engage peripheral portion 77 of impulse segment 21 so as to prevent rotation of the geneva gear with the impulse segment throughout a predetermined part of its rotation, as shown in FIG. 4. As the rotation of impulse gear segment 21 advances its recess 75, the recess engages a geneva gear tooth 69 to conjointly drive or rotate geneva gear 25 with impulse segment through another predetermined part of its rotation as shown in FIGS. 4*a* and *b*. Upon further rotation of impulse gear segment 21, recess 75 thereof is released from its driving engagement with geneva gear tooth 69 so that successive adjacent teeth 69 of geneva gear 25 are once again engaged with peripheral portion 77 of the impulse segment, as shown in FIG. 4*b*. Of course, upon successive revolutions of impulse gear segment 21, recess 75 thereof again drivingly engages tooth 69 of geneva gear 25 to effect further intermittent drive or rotation thereof, as previously described. It may be noted that the engagement of spring arm 65 of clutch device 39 with adjacent teeth 69 on geneva gear 25, as shown in FIGS. 2 and 6, effects conjoint intermittent rotation driving of driven gear 37 with geneva gear 25. Of course, such intermittent rotation of driven gear 37 is translated by gear 9 meshed therewith into conjoint intermittent rotation of rod 41 for indexing or effecting intermittent rotation of drums 3, 5, 7 to advance the digital time indication thereof, as described hereinabove. It may also be noted that the releasable engagement or connection of spring arm 65 of clutch device 39 with geneva gear transmits the intermittent movement thereof through drive shaft 35 to resetting train 13 so that it is normally idly driven by drive train 11. From the foregoing, it may be seen that timing motor 15 drives motor pinion 23 at a predetermined speed which is reduced by reduction gear 19 meshed therewith so that impulse gear 21 intermittently drives geneva gear 25 in a predetermined time relation or sequence which is transmitted through clutch device 35,

driven gear 37, gear 9 and rod 41 to drums 3, 5, 7, as previously mentioned.

Resetting train 13 is normally idly driven by drive train 11, as previously mentioned, wherein the intermittent drive of driven gear 37 is transmitted through shaft 35 to pinion gear 29 and thereform through idler gear 31 to time setting gear, FIG. 2. In the event it is desirable to reset or move drums 3, 5, 7 to selected digital time indicating positions, time set shaft 33 is manually moved to a position in driving engagement with the set gear 27 and thereafter rotated with a force at least great enough to overcome the clutching engagement of clutch device 39 with geneva gear 25 of driven train 11. When this manual force is applied for time setting gear 27 to actuate or operate resetting train 13, rotation of the time setting gear 27 drives or rotates pinion gear 29 through idler gear 31 meshed therebetween. Driven gear 37 is conjointly rotated or driven with pinion gear 37 through drive shaft 35 connected therebetween, and since clutch device 39 is conjointly rotated with the driven gear, the spring arm 65 of the clutch device is indexed or moved over one of the teeth 69 of geneva gear 25 into releasable engagement with successive teeth 69 thereof. During the indexing rotation of clutch 39 on geneva gear 25, the engagement of successive teeth 69 of the geneva gear with peripheral portion 77 of impulse segment 21, as shown in FIGS. 4 and 4*b* for instance, obviates rotation of the geneva gear during the manual operation of resetting train 13. Of course, rotation of driven gear 37 is translated by gear 9 meshed therewith into conjoint rotation of rod 41 for rotatably driving drums 3, 5, 7 to the selected digital time indicating position. It may be noted that the releasable engagement of clutch device 39 with geneva gear 25 permits operation of resetting train 13 in both the forward and backward or opposite directions for resetting the digitally indicated time.

From the foregoing, it is now apparent that a novel digital timer 1 and a method of operating such has been provided meeting the objects and advantages set out hereinbefore, as well as others, and that changes may be made by those having ordinary skill in the art as to the precise arrangements, shapes and details of the constuctions, as well as the precise order of the steps of the method, set forth herein for purpose of illustration without departing from the spirit of the invention or the scope thereof which is set out by claims which follow.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. A digital timer comprising means operable generally for indicating digital time and adapted to be reset to a selected time, means for controlling operation of the indicating means, means for driving the controlling means to effect the time indicating operation of the indicating means, means idly driven through the controlling means by the driving means and operable manually for actuating the controlling means to effect the reset of the indicating means to the selected digital time, and the controlling means including means for releasing the drive of the driving means upon the manual operation of the actuating means.

2. A digital timer as set forth in claim 1, wherein the releasing means interconnects the driving means and the actuating means generally in parallel mechanical relation.

3. A digital timer as set forth in claim 1, further comprising means movable in response to an applied force thereon for manually moving the actuating means, the manually moving means being initially movable into engagement with the actuating means and thereafter further movable in response to the applied force to effect the release of the releasing means thereby isolating the driving means and also to effect actuation of the controlling means for resetting the indicating means to the selected digital time.

4. A digital timer as set forth in claim 6, wherein the releasing means comprises means for conjoint actuation with the controlling means, and means resiliently urged into releasable engagement with at least a part of the drive train, the resiliently urged means being operable generally to normally transmit the drive of the drive train through the controlling means and also to release the drive of the drive train upon the manual operation of the actuating means.

5. A digital timer as set forth in claim 1, wherein the controlling means further includes a pair of conjointly rotatable gears engaged with the indicating means and the actuating means.

6. A digital timer as set forth in claim 1, wherein the controlling means further includes a pair of conjointly rotatable gears engaged with the indicating means and the actuating means, the driving means including at least means adapted to be intermittently driven, and the releasing means being releasably coupled between the gear pair and the intermittently driven means to effect conjoint actuation thereof when the intermittently driven means is driven through the driving means.

7. A digital timer as set forth in claim 1, wherein the controlling means includes a pair of gears respectively engaged with the indicating means and the actuating means, a shaft connected between the gears to effect conjoint rotation thereof, the driving means including at least a mutilated geneva pinion rotatably mounted on the shaft, and means for intermittent driving engagement with the geneva pinion to effect intermittent rotational movement thereof, the releasing means being carried on the shaft and releasably coupled with the geneva pinion for transmitting the intermittent rotational movement thereof to the gears.

8. A digital timer as set forth in claim 1, wherein the releasing means includes means for engagement with at least a part of the driving means for generally maintaining the indicating means against displacement from the driven digital time indicating positions thereof.

9. A digital timer as set forth in claim 1, wherein the driving means includes at least means adapted to be intermittently driven, and the releasing means being releasably coupled with the intermittently driven means to effect the driving of the controlling means by the driving means.

10. A digital timer as set forth in claim 9, wherein the driving means further includes a rotatable impulse segment having means for driving engagement with the intermittent driven means to effect the intermittent movement thereof only during a predetermined portion of each revolution of the impulse segment.

11. A digital timer having at least one time indicating drum rotatably mounted therein comprising a driven gear for connection with the drum at least one to effect the rotation thereof, a timing motor, a geneva pinion, a drive train connected between the timing motor and the geneva pinion for driving it intermittently in a pre-

determined time sequence, a clutch device releasably engaged between the geneva pinion and the driven gear for normally effecting conjoint rotation thereof, a resetting train normally idly connected with the driven gear and manually operable to drive the driven gear independently of the drive train to effect resetting of the drum to a selected digital time, the clutch device releasing the drive train upon the manual operation of the resetting train.

12. A digital timer as set forth in claim **11,** wherein the clutch device includes means connected with the driven gear for conjoint rotation thereofoperable therewith, and means for releasably coupling the geneva gear and the driven gear to effect the conjoint rotation thereof, the releasably coupling means being operable generally to release the geneva gear thereby to interrupt the conjoint rotation therewith of the driven gear upon the manual operation of the resetting train.

13. A digital timer as set forth in claim **11,** wherein the driving train includes at least an impulse segment rotatably driven by the timing motor and having means for driving engagement with the geneva gear to effect the intermittent driving thereof in the predetermined time sequence only during a predetermined portion of each revolution of the impulse segment.

14. A digital timer as set forth in claim **11,** wherein the clutch device further includes a resilient arm releasably coupled with the geneva gear to effect the conjoint rotation of the driven gear therewith, the resilient arm being operable generally to release the geneva gear thereby to interrupt the conjoint rotation thereof with the driven gear upon the manual operation of the resetting means.

15. A digital timer as set forth in claim **11,** futher comprising another gear operably engaged with the resetting train, and means for connecting the driven gear and the other gear to effect conjoint rotation thereof.

16. A digital timer as set forth in claim **15,** wherein the clutch device includes means mounted to the connecting means wherein the clutch device is conjointly rotatable with the driven gear and the other gear.

17. A digital timer comprising a support, a rod rotatably mounted to the support, at least a pair of digital time indicating drums rotatably mounted to the rod, one of the drums being connected to the rod for conjoint rotation therewith, a geneva gear mounted to the support and engaged between the drums, the geneva gear being driven by the one drum upon the conjoint rotation thereof with the rod for effectng relative rotation of the other of the drums on the rod in a predetermined time sequence, and means for effecting rotation of the rod including a driven gear, a timing motor, a geneva pinion adapted to be intermittently driven, a drive train between the driving motor and the geneva pinion for effecting the intermittent driving movement of the geneva pinion in another predetermined time sequence, a clutch device releasably engaged between the geneva pinion and the driven gear for normally effecting conjoint rotation thereof, a resetting train normally idly connected with the driven gear and adapted to be manually operable for driving the driven gear independently of the drive train to effect resetting rotation of the rod and drums to a selected digital time, the clutch device releasing the drive train upon the manual operation of the resetting train, and another gear on the rod and engaged with the driven gear for translating the rotation thereof into conjoint rotation of the rod.

18. A method of operating a digital timer having means adapted to be intermittently driven for indicating digital time comprising the steps of:

a. actuating a drive train for intermittently driving the indicating means and conjointly driving in idling relation a resetting train manually operable for driving the indicating means to a selected digital time, and

b. releasing the drive train from the indicating means automatically in reponse to the manual operation of the resetting train for driving the indicating means to the selected digital time independently of the drive train.

19. The method as set forth in claim **18,** comprising the preliminary step of connecting with the indicating means a means for controlling the operation therof, the drive train and resetting train each driving through the controlling means for driving the indicating means.

20. The method as set forth in claim **18,** comprising the preliminary step of disposing a clutch device generally in parallel mechanical relation between the drive train and the resetting train, the clutch device being operable for releasing the drive train from the indicating means upon the manual operation of the resetting train.

21. The method as set forth in claim **18,** wherein the releasing step comprises applying a force to the resetting train for manually operating it thereby to effec the release of the drive means and the driving of the ndicating means to the selected digital time.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 3,898,792

DATED : August 12, 1975

INVENTOR(S) : Gene L. Insley & Merle J. Lewis

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 1, line 4, delete "timer" and insert --timers--;
line 11, delete "an" and insert --and--.
Col. 2, line 46, delete "the" (second occurrence);
line 60, delete "form" and insert --from--.
Col. 3, line 17, begin new paragraph with "Corresponding";
line 29, after "drums" delete ",";
line 49, delete "synchoronous" and insert --synchronous--;
line 56, delete "125" and insert --25--.
Col. 4, line 41, delete "foregoig" and insert --foregoing--;
line 53, after "29" insert --,--.
Col. 5, line 8, after "5" delete ",";
line 14, after "7" insert --,--;
line 23, delete "a" and insert --"a"--;
line 31, after "41" delete ",".
Col. 6, line 4, delete "60" and insert --69--;
line 37, after "rotation" insert --,--;
line 38, delete "b" and insert --4b--;
line 50, after "rotation" insert --or--;
line 59, after "gear" insert --25--.
Col. 7, line 10, delete "the" and insert --time--;
line 45, delete "constructions" and insert --construction--.
Col. 8, line 11, delete "6" and insert --1--;
line 64, after "the" delete "drum";
line 64, after "one" insert --drum--.
Col. 9, line 7, before "drum" insert --at least one--;
line 12, delete "thereofoperable";
line 49, delete "effectng" and insert --effecting--.

Signed and Sealed this

seventeenth Day of *February 1976*

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks

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