

Aug. 6, 1940.

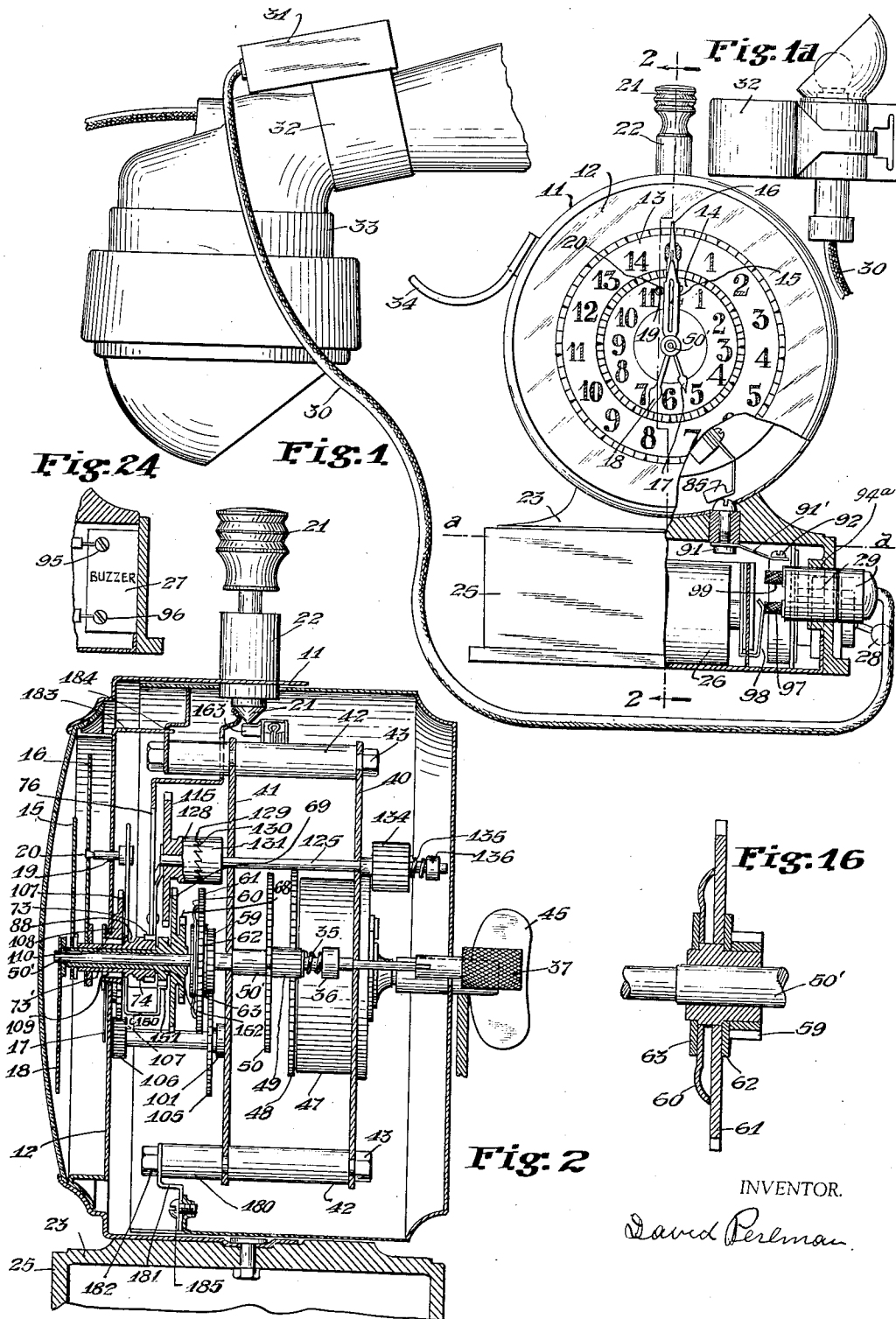
D. PERLMAN

2,210,337

TIME INTERVAL INDICATING DEVICE

Filed Feb. 11, 1935

4 Sheets-Sheet 1



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Aug. 6, 1940.

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4 Sheets-Sheet 2

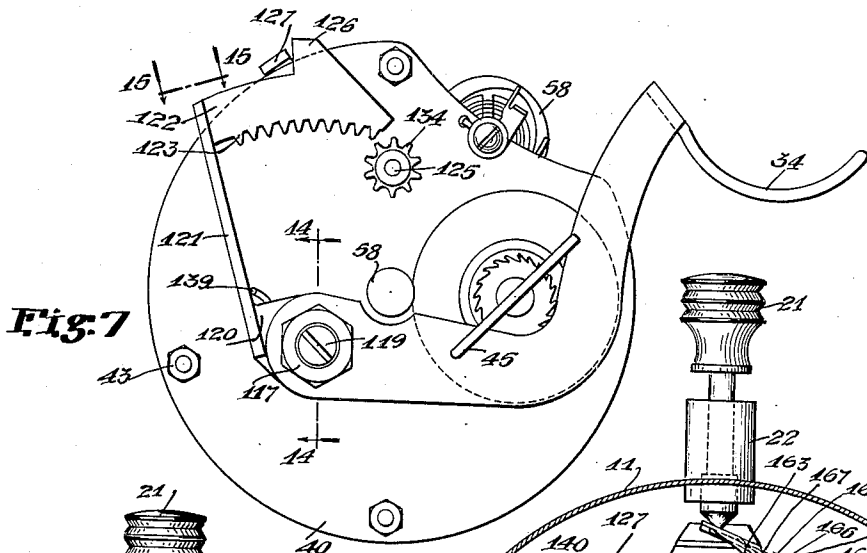


Fig. 7

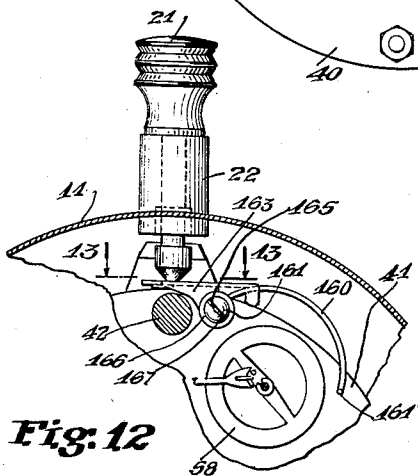


Fig. 12

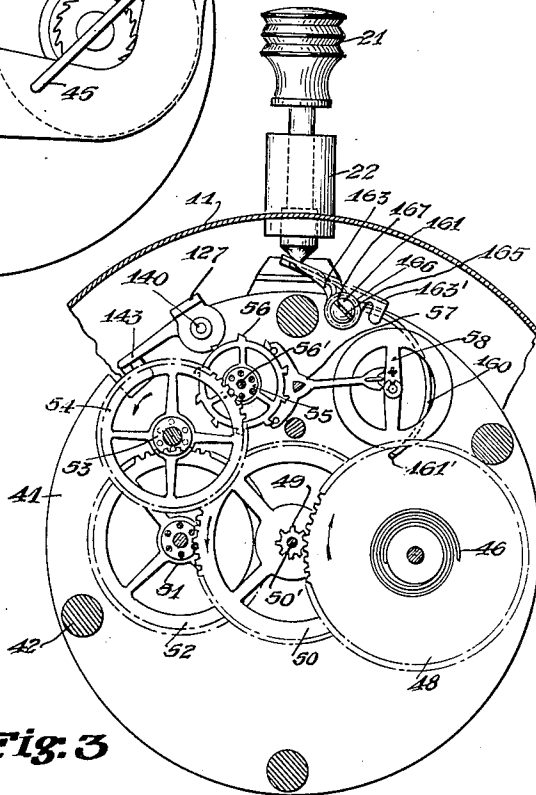


Fig. 3

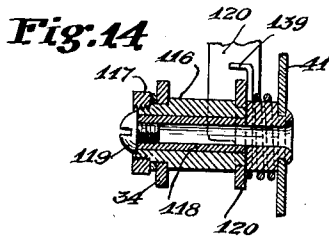


Fig. 14

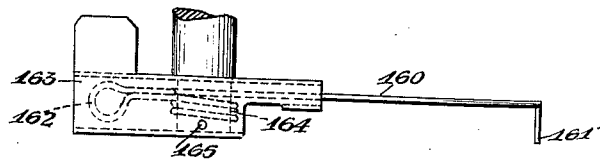


Fig. 13



Fig. 15

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4 Sheets-Sheet 3

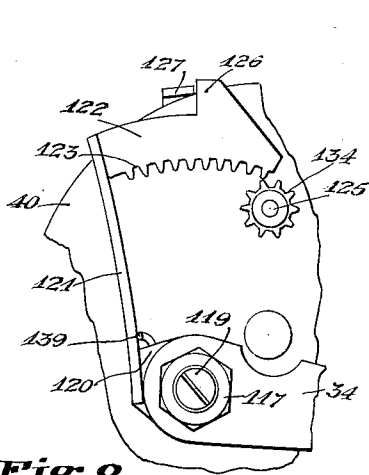


Fig. 8

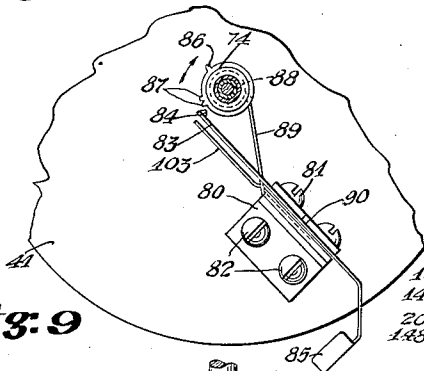


Fig. 9

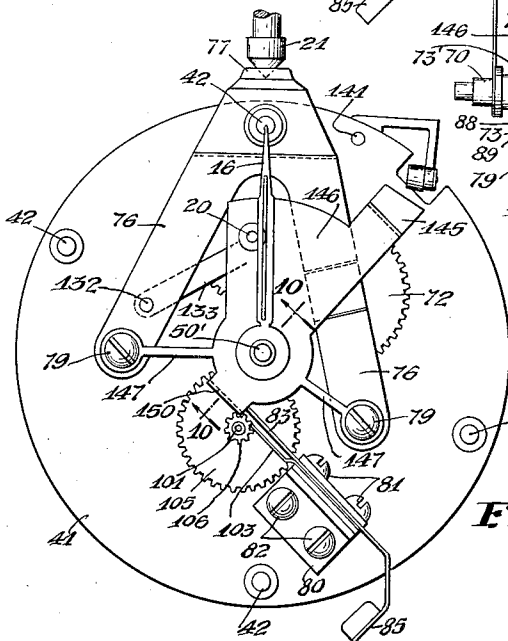


Fig. 6

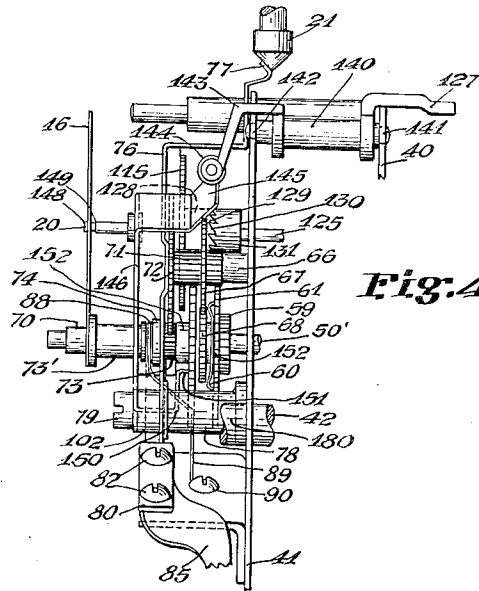


Fig. 4

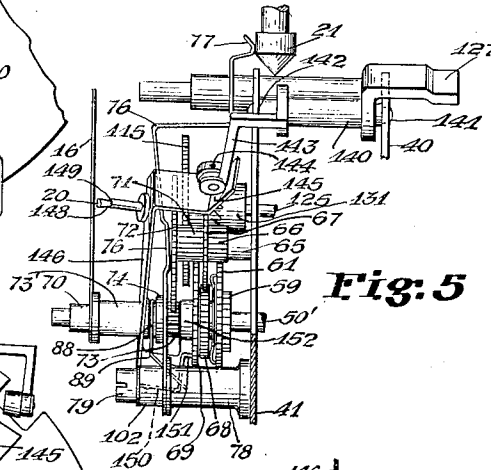


Fig. 5

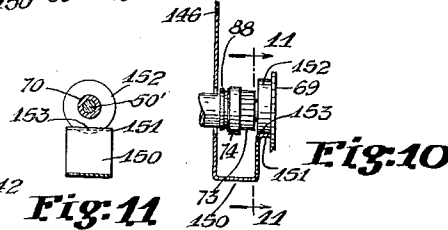


Fig. 11

Fig. 10

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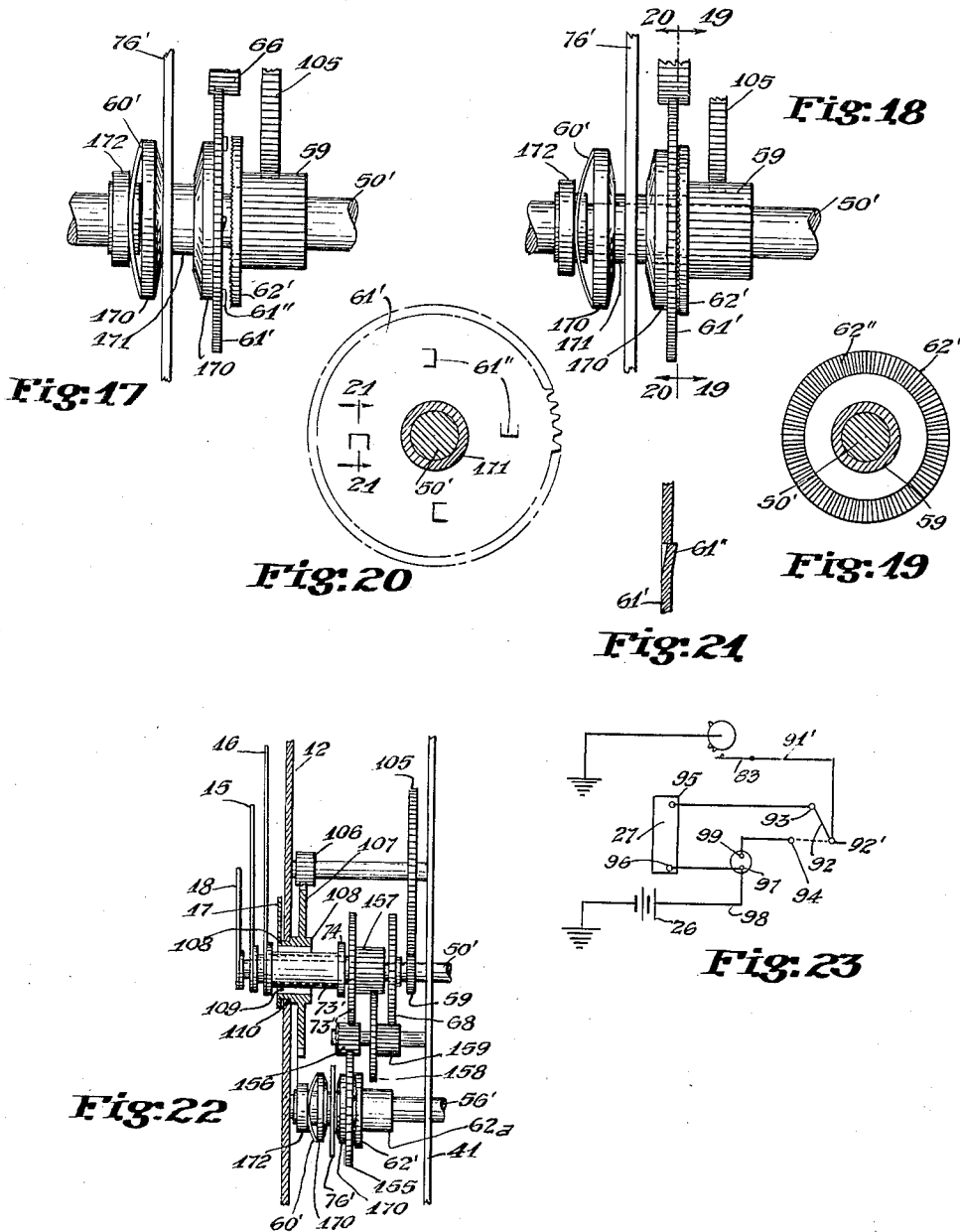
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TIME INTERVAL INDICATING DEVICE

Filed Feb. 11, 1935

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,210,337

TIME INTERVAL INDICATING DEVICE

David Perlman, New York, N. Y.

Application February 11, 1935, Serial No. 5,910

5 Claims. (Cl. 161—19)

This invention relates to timing devices, and more particularly refers to improvements in devices for measuring predetermined time intervals, and for actuating suitable signals in connection therewith, said devices being operable by a clock mechanism or being associated with a clock so as to be adapted to be operatively connected to or disconnected from the mechanism thereof.

Essentially, this invention represents a simplification of and improvement over the invention disclosed and claimed in my copending application Serial No. 742,044, filed August 30, 1934, now Patent No. 2,115,280, granted April 26, 1938, for "Time control devices."

One of the objects of this invention is to provide a practical and relatively inexpensive device, enabling a telephone user to maintain the length of telephone conversations within prescribed limits, without undue difficulty; said device consisting of a clock combined with a time meter adapted to be set in operation when a telephone conversation is started, and to automatically apprise the telephone user of the termination of a predetermined time interval by means of an audible or visible signal, or both. The device is of course also usable for other purposes, and generally in connection with operations where it is necessary or desirable to keep a careful check of the time element involved.

The usual charges for telephone calls are for a definite period, which, when exceeded, will require payment of the full succeeding period, even if the overtime amounts only to a fraction of such period.

Thus, for example, from New York to Los Angeles, the first three minutes of a call cost \$8.75 and every additional minute \$2.75. The telephone company allows twelve seconds overtime on such calls. If the party using the telephone continues the conversation one second beyond the allowed overtime of twelve seconds, he has to pay an additional \$2.75, that is, the minimum charge for a full minute for exactly using the telephone for one second only.

Accordingly, it is a further object of my invention to provide means for apprising the telephone user in due time to close his conversation within the allowed limit and the permissible overtime, such as by warning him in a suitable manner, say fifteen seconds before the expiration of every full minute in the example above given, thus to enable him to close his conversation on time and avoid paying the rate for a full minute for actually using the telephone a fraction thereof.

In this manner, as is obvious, great savings are secured on the part of the telephone subscribers.

A further object of my invention is the construction of a meter of the character specified, adapted to signal electrically, by energizing buzzers, bells, lights, or any other audible or visual signalling means built in the meter or extended from the meter by means of connecting conductors, including selective means to energize either the former or the latter signals.

A further object of my invention is the provision of a very simple means to engage the meter gear train to and disengage it from the clock gear train.

A further object of my invention is the provision of means to prevent the clock or the meter from appreciably gaining or losing in their time indications during the combined or single operation of the clock and the meter with respect to standard time indications.

A further object of my invention is the provision of simple, reliable and durable friction or clutch means for connecting and driving the meter gear train from the clock gear train.

A further object of my invention is the provision of a simple arrangement for controlling the operation of the engaging, disengaging and brake functioning parts by means of a single easily actuated member.

A further object of my invention is the provision of means to minimize to the limit the load due to the meter gear train and thus assure perfect time indication and operation of the meter gear train, and prevent stoppage of the entire gear train through overload.

A further object of my invention is the provision of means to prevent destruction of the cam and switch contacts.

A further object of my invention is the provision of means to reset the meter hands to zero position, arranged so as to prevent inaccuracies of time indication and movement of the meter hands resulting from the play or lost motion between the teeth throughout the entire meter gear train.

A further object of my invention is the provision of means for resetting of the meter hands to zero position from any rest position on the dial, requiring a simple operation, such as the pressing or moving of a lever or plunger.

A further object of my invention is a special construction of the meter resetting gear segment to prevent it from jamming and damaging the

mechanism upon faulty engagement with the gear resetting pinion.

A further object of my invention is the provision of means whereby breakage or disarrangement of the meter mechanism during the resetting operation of the gear train, which is normally stopped in different positions, are automatically prevented.

A further object of my invention is the provision of means for controlling and stopping the meter hands during the resetting operation on the exact zero position of the dial, independently controlled by the resetting member and by the gear train.

A further object of my invention is the provision of resilient bumper means to prevent damaging of the hands or other meter parts upon resetting, when the second hand revolving at a relatively high speed is brought to a sudden stop by bumping into the stop pin.

A further object of my invention is the provision of means to start the operation of the meter with the entire clock gear train simultaneously, when the clock movement operation has come to a stop, due to the main spring having run down.

A further object of my invention is the provision of means for insuring a positive electrical contact on the signalling cam and its carrying hub.

A further object of my invention is the provision of means to overcome the unsteady and jumping movements of the second's signalling hand, and to secure its steady and uniform operation.

A further object of my invention is the provision of simple and efficient electrical contacts which eliminate wiring and soldering and make it possible for the entire device to be quickly and simply assembled, and of other features herein to be described in detail and disclosed in the drawings.

In said drawings:

Fig. 1 is a front view of a combined clock and meter device embodying my invention;

Fig. 1a is a signalling light;

Fig. 2 is a partial view in section on line 2—2 of Fig. 1;

Fig. 3 is a rear view of the clock mechanism with the rear plate removed;

Fig. 4 is a side fragmentary view of the meter mechanism;

Fig. 5 is a side fragmentary view of the same mechanism with the operating parts in different positions;

Fig. 6 is a front view of the same mechanism;

Fig. 7 is a rear view thereof;

Fig. 8 is a fragmentary view of Fig. 7 with the parts in different operating positions;

Fig. 9 is a fragmentary view of the signalling parts;

Fig. 10 is a fragmentary side view taken on line 10—10 of Fig. 6, illustrating the synchronized operation to stop the meter hands on zero position;

Fig. 11 is a fragmentary front view of same taken on line 11—11 of Fig. 10;

Fig. 12 is a plan view showing the mechanism for starting the clock and meter movement simultaneously;

Fig. 13 is a top view of the same on line 13—13 of Fig. 12;

Fig. 14 is a fragmentary view in section on line 14—14 of Fig. 7;

Fig. 15 is a detail top view on line 15—15 of Fig. 7;

Fig. 16 is an enlarged view in section of the friction meter operating gear;

Fig. 17 is a side view of a modified form of meter driving engagement mechanism;

Fig. 18 is the same mechanism in engaged position;

Fig. 19 is a view on line 19—19 of Fig. 18;

Fig. 20 is a view on line 20—20 of Fig. 18;

Fig. 21 is a fragmentary section view on line 21—21 of Fig. 20;

Fig. 22 is a side view showing a modified form of a meter driving mechanism;

Fig. 23 is a schematic diagram of the electrical circuit; and

Fig. 24 is a detail vertical section through the base of the clock.

Referring to Fig. 1, 11 designates a case having an opening for a dial 12 having two sets of indicating numerals, 13 to indicate the meter time reading, and 14 to indicate the conventional time reading. The hands 15 and 16 travel over the meter indicating scale, and the hands 17 and 18 travel over the time indicating scale. The hand 16 indicates by seconds and makes a complete revolution over the dial in 1 minute and the hand 15 indicates by minutes and makes a complete revolution over the dial in 15 minutes. The conventional indication of hands 17 and 18 need not be described herein.

The dial 12 has an opening 19 for a stop pin 20. A plunger 21 is depressible through sleeve 22, carried on case 11 mounted on a base 23. The base 23 terminates on line *a—**a* on models not equipped for electrical signalling, or else it continues with a hollow casing 25 provided for batteries 26, a suitable buzzer 27, or a bull's-eye, with a double throw switch 28 and connector 29 set in case opening 94a for plugging in connecting cord 30 to some suitable signalling unit for use at a distance, like the buzzer 31 or the light in Fig. 1a. The light and the buzzer are equipped with a pair of spring clipping jaws 32 for clamping over the telephone unit 33 on any other suitable object. 34 is the resetting lever projecting from the back of the device, as seen in Fig. 7.

Referring to Figs. 2 and 3, 40 and 41 are plates held together by pillars 42 with nuts 43. Between the plates 40 and 41 in suitable bearing holes is assembled a conventional main spring driven clock gear train having a winding key 45 for winding up the spring 46 housed in barrel 47 and having its outer end attached to the inner wall of said barrel. The inner end of the spring 46 connects with the shaft of gear 48 driving the pinion 49 of gear 50. The gear 50, together with its pinion 49, is loosely carried on shaft 50' and is held in frictional engagement by a spring 35 compressed by a collar 36. The shaft 50' carries a knurled knob 37 for resetting of the conventional time indicating hands 17 and 18. The hand 17 makes a complete revolution every twelve hours and the hand 18 is mounted on the end of shaft 50' and makes one revolution per hour. The rest of the gear train enumerated from 49 to 58 is driving the escapement gear train and is well known to the art and need not be described in detail herein.

Mounted on shaft 50' is a pinion 59 carrying by frictional engagement of a spring 60 a gear 61, as shown in detail in Fig. 16. The gear 61 is facing on one side a washer 62, specially constructed of a suitable material having good wearing prop-

erties. A similar washer 63 faces the outside wall of the spring 60.

On plate 41, Fig. 5, is mounted a stud 65 carrying two intermediate gears and pinions. The gear 61 drives the pinion 66 of gear 67. And the gear 67 drives the pinion 68 of gear 69. The gear 69 carries on its hub 70 the meter minute hand 15 and makes a complete revolution in fifteen minutes. The gear 69 drives the pinion 71 with its gear 72. The gear 72 drives the pinion 73 which carries on its hub the signal controlling cam 74 and the seconds indicating hand 16, and makes one revolution per minute. These gears and pinions constitute the consecutive meter gear train. This gear train is normally held in inoperative position by the spring brake 76, pressing on the gear 72 as shown on Fig. 4. This inoperative position of the meter gear train does not stop the normal operation of the clock gear train which continues in operation against the friction exerted by spring 60 against gear 61. The spring brake 76 is secured on pillars 78 by means of screws 79. As clearly shown in Fig. 6, the brake spring 76 is V-shaped and has a suitably formed extension 77 for engagement with plunger 21 which forces the spring brake 76 outwardly as soon as it is pressed down, as shown in Fig. 5.

The meter is started immediately upon opening of the telephone conversation by pressing down the plunger 21. This releases the brake from the meter gear train which immediately begins to function and drives hands 15 and 16, together with its signal controlling cam 74. Upon completion of the telephone conversation the plunger 21 is raised up again to the position shown in Fig. 4, thus once more causing the operation of the meter gear train to come to a stop.

Fig. 9 shows the electrical switch 83 with cam 74 in the normal reset position and ready to give off its first warning signal about three-quarters of a minute after becoming operative and two additional signals upon completion of the first minute; the signals continuing to be repeated in the same order as long as the meter is operating.

The switch is mounted on angle bracket 80 by means of screws 81, said bracket being attached to plate 41 by means of screws 82. The switch spring 83 carries a silver contact 84 for engaging the contact teeth 86 and 87 of cam 74. As shown in Fig. 9, spring 83 terminates at its lower end with a suitably formed contact shoe 85 for engaging contact screw 91 connecting to a double throw switch blade terminal 92', Fig. 23. The contact 93 from the switch connects to the buzzer 27 at 95 and returns from the buzzer by contact 96 to contact 97 on the outlet connecting plug 29 which connects with a return spring 98 to the battery 26. With the switch in this position the buzzer 27, which is in the meter and is shown in a fragmentary view only to avoid complications in the drawings, is energized by the signalling impulses. By throwing over the switch blade 92 to contact 94 which connects to contact 99 of outlet connector 29, the outlet only becomes energized. The cam 74 has a groove 88 in which rides a spring 89 which is held by a screw 90 to bracket 80. The purpose of spring 89 is to make a perfect electric contact with the cam 74 and also to check and steady the movement of the cam 74 with its hub carrying the hand 16, which would make irregular jumping movements without the said spring.

A check spring 103 is provided, extending alongside spring 83. This spring is provided to

prevent the switch spring 83 from developing vibrating movements and thereby damage the contacts of the cam and switch. This vibration is caused by the speedy movements of the revolving cam 74 during the resetting operations.

By eliminating the electrical parts described and limiting the base 23 to line *a-a*, this combined clock and telephone meter may be made and used with very satisfactory results. The same device may also be produced and used with or without the electrical alarm devices as a telephone meter only by simply omitting the hands 17, 18, the numerals on the dial 14, the pinion 59, the gear 105 with its pinion 106, and the gear 107 with its hand 17, and the hand 18, as shown in Fig. 2.

In stepping up the revolving ratio of the shaft 50' making one revolution per hour, to the pinion 73 to make sixty revolutions per hour, it becomes of great importance for all bearings and bearing parts to offer the least possible frictional resistance, if correct meter time reading is to be had, also in order to prevent the friction gear 61 from slipping while driving the meter gear train.

In the arrangement shown, the hub 73' of pinion 73 represents the point most likely to cause the aforesaid trouble, because the friction and weight of gear 107 with its hub 108 and its hand 17, if borne by it could not fail to generate undue friction.

I overcome this possibility by providing a clearance space 109 between hubs 73' and 108 by making the hub 108 to bear by its outer circumference in the hole 110 of the dial 12, as shown in Figs. 2 and 22.

Normally, before use, the hands 15 and 16 of the meter are at zero position on the dial, and at the end of an operating period the same hands will have come to occupy various positions on the dial, and in order to set these hands again to zero position, a gear 115 meshing with pinion 71 of gear 72 is brought in action, to turn the entire meter gear train backwards to zero position against the friction of brake spring 76 pressing on gear 72.

For this resetting operation the lever 34 is provided. This lever is carried on the outer end of sleeve 116, Fig. 14, and is locked in position by a nut 117. This sleeve is pivotally mounted on stud 118 of plate 41 and is secured from slipping off by a screw 119. The sleeve 116 carries on its inner end a bracket 120 formed with an internal gear segment 122 having teeth 123 adapted to engage pinion 134. The latter is fixed on a shaft 125 carrying at its inner end the resetting gear 115, which is loosely mounted thereon and capable of axial displacement with respect thereto. The gear 115 is fixed on a sleeve 128 provided on its flat face with ratchet teeth 129 for relative engagement with the teeth 130 of the opposing collar 131 which is carried and fastened by a thread on shaft 125, as shown in Fig. 2.

The teeth on collar 131 and sleeve 128 are cut for engagement of the latter by the former only when shaft 125 rotates in a clockwise rotation looking from the end of pinion 134. A spring 133, Fig. 6, riveted to the spring brake 76 at 132 is provided to press gently upon the gear 115 to cause its mounting's teeth 129 to be in constant engagement with the opposing teeth 130, and also to allow axial displacement of the sleeve 128 sufficient to permit its teeth

129 to trip over the teeth 130 when the collar 130 is revolved in the anti-clockwise rotation.

The specific objects in placing the resetting gear 115 so close to the gear carrying the meter seconds hand, so as to reset the gear train by revolving the meter gear train in the reverse rotation from one of its geared elements close to or at the end of the train, is to minimize the errors and the lag which would inevitably occur, for example, if the meter gear train resetting gear 115 should mesh with the lower intermediate pinion 66, for resetting operation to be performed in either direction. The result would be a considerable loss of time from the start of the resetting operation to the time when the seconds hand would begin to move.

This time variation is a result of the lost motion between the loosely meshing teeth, between the gears and the pinions, and the accumulated time it takes from the lower very slow moving gears or pinions to begin to move or to drive one another until all the lost motion of the loose meshing teeth between the gears and pinions, behind the seconds pinion 73 is taken up, and the driving motion becomes effective upon the seconds pinion, which is the last in the train. With my arrangement for reverse resetting I overcome this defect 100% up to the teeth of gear 72 and pinion 73, where there is lost motion left equivalent to a fraction of a second only.

With the unidirectional resetting means operative only in the desired rotation, and tripping upon the slightest reverse rotation, I secure the continuity of proper operation of the meter, by preventing disturbance and the setting up of lost motion between the meshing teeth of the gears and pinions.

The resetting operation can be performed manually by providing the rear end of shaft 125 with a knob similar to knob 37 carried on shaft 50' for resetting of the clock hands 17 and 18.

If the meter is to be used frequently such resetting operation would in time become inconvenient and troublesome. I overcome this inconvenience by providing a pinion 134 on shaft 125. The pinion 134 is frictionally engaged with the shaft 125 by means of a pressure spring 135 interposed between said pinion and a collar 136 carried by said shaft.

The purpose of this frictional arrangement is to secure proper resetting operation of the meter, while at the same time preventing possible breakage of the second's hand 16 or its stop pin 20 upon stopping of the hand on zero position during the resetting operation. When the resetting is completed, the frictional arrangement permits of still further rotation of the pinion 134 by its driving gear segment 122 against the friction exerted on shaft 125 by spring 135, as will be understood.

The resetting gear segment 122 is normally held in its disengaged position shown in Fig. 7 by its spring 139 which is anchored to plate 41 at one end and which has its other end pressing outwardly against the lower part of bracket 120. The gear segment 122 has a projection 126 abutting against a stop arm 127 which rests against the edge of plate 40, as shown in Fig. 7. The stop arm 127 is mounted on a shaft 140 pivoted in plates 40 and 41 at 141 and 142, as shown in Figs. 4 and 5.

The inner end of shaft 140 carries an arm 143 having at its end a roller 144 adapted to engage the sloping cam portion 145 of a frame 146 car-

rying the stop pin 20 for the second's hand 16. The projection 126 of segment 122 abuts against the arm 127 by the action of spring 139. This forces the stop arm 127 to turn on its pivots 141, 142, and to abut against the edge of plate 40, as shown in Fig. 7. This action causes the arm 143 with its roller 144 to engage and ride over the cam portion 145, this causing the frame 146 to remain in the deflected position shown in Fig. 5, due to the pressure of roller 144 against said cam portion 145. The frame 146 is mounted on pillars 78 of plate 41 and is held in place by screws 79.

The frame 146 is made of suitable springy material with ribs 147 for the purpose of providing resiliency not only in a front to rear direction, but also considerable resiliency in a lateral sense in order to act as a bumper for its stop pin 20. The frame 146 is held in place in spaced relation with respect to spring brake 76 by the action of spacers 102 interposed therebetween, by the screws 79. Fig. 5 shows the frame in its normal deflected position with its stop pin 20 retracted and clearing the path for rotation of the second's hand 16.

Fig. 4 shows the arm 143 with its actuating roller 144 raised for the purpose of releasing the frame 146 with its stop pin 20 now blocking the path of movement of hand 16, which must stop by bumping into the pin 20. This pin is provided with a taper 148 and a stop shoulder 149. The taper to prevent the hand from jumping over the pin when bumping into it, and the stop shoulder to prevent the same hand upon bumping into the pin 20 from becoming bent and from getting out of proper alignment with relation to the face of dial 12.

The frame 146 has a lower U-shaped section 150 formed with a shoe 151 for engaging a flat section 153 of cam 152, as shown in Fig. 11. The cam 152 is fixed on hub 70 carrying the meter minute hand 15, and its flat part 153 is synchronized to align with the shoe 151 only when the hand 15 is about to approach the zero position on dial 12. And in this position only is the frame 146 with its stop pin 20 free to yield to the spring pivotal action of its ribs 147, tending to return said frame from the twisted position shown in Fig. 5 to the undeformed position shown in Fig. 4.

In other words, frame 146 will be tilted from its normal vertical position with ribs 147 as a fulcrum, either by the action of roller 144 or by the pressure exerted against shoe 151 by the rounded portion of cam 152, and is free to resume its normal position only when the pressure upon it is released at both ends.

The slanted section 145 with its actuating roller 144 and its actuating parts have the purpose of holding the pin 20 constantly in its retracted position and prevent it from projecting when the hands 15 and 16 reach or travel beyond the zero position on the dial during a long telephone conversation lasting over fifteen minutes. The arrangement has the further object of relieving all the frictional load between the pressing shoe 151 and the cam 152 and its hub 70 during the meter operations, by holding the shoe out of contact with the cam.

In this construction the hands 15, 16 are arranged to be stopped on zero position of dial 12 by the operation of the resetting lever 34 only. And the release of the stop pin 20 is controlled by two independent agencies; namely, the synchronized means, and the resetting means. And it is necessary first to bring into action the re-

setting means causing its projection 126 to release the stop arm 127 with its relative roller 144 and thus release the slanted section 145 of the frame 146 with its pin 20 for cam 152 to become operative. And only in this position does the cam 152 with its relative shoe begin to function to ultimately release the stop pin 20 when the hands 15 and 16 reach the zero position on dial 12.

The resetting gear segment 122 is normally in the position shown in Fig. 7 and is brought into engagement with pinion 134 by downward pressure of lever 34.

The pinion 134 normally revolves with the meter gear train, and at times is in a position as shown in Fig. 8 with its teeth in bucking relation to the teeth 123 of segment 122. This would result in jamming and consequent damage to the mechanism, upon engagement.

In order to correct this condition I provide the segment brackets with a suitable spring section 121 having sufficient resiliency to allow for the yielding of the segment 122 in such contingencies. The spring deformation permits a faulty start over a couple of teeth to occur, this condition soon righting itself when the teeth will trip in proper engagement with one another, without jamming or damaging the device.

In addition to this I prefer to construct the teeth with rounded ends to insure their slipping off from one another and getting into proper mesh.

Figs. 17, 18, 19, 20 and 21 disclose a modified form of a meter gear train engagement and driving means similar to those shown in Fig. 16.

The modified form of construction comprises a disc 62' the contact surface of which may either be smooth or as shown in Fig. 19 at 62''; this face 62'' engages with the face 61'' of gear 61', which may also be smooth or with swedges as shown at 61'' in Fig. 21.

The clutch 170 carrying the gear 61' is loosely mounted on the shaft 50' and is normally pressed by the spring 60' against disc 62' in engaged position as shown in Fig. 18. The collar 172, against which spring 60' abuts, is carried on shaft 50'.

In this position the spring brake 76' is released.

The operating brake spring 76', when operative, as shown in Fig. 17, holds the clutch in disengaged position and at the same time compresses the spring 60' for the purpose of imposing upon the clock gear train a suitable load, in place of the load required to drive the meter gear train, in order to avoid irregularities in the registration of time.

In a spring wound clock which operates with a balancing wheel not provided with any centrifugal automatic governors, the main spring power and the load of the gear train must be very closely maintained in a given relation to each other, in order to avoid appreciable gains or losses in the time indications. The tendency will be for these to advance some when the spring is too strong or when it is fully wound up, and to lag when the spring is too weak or considerably run down. In the combined clock and telephone meter this problem is more acute, owing to the fact that the additional meter gear train only functions intermittently, and requires considerable additional spring driving power for its operation.

Without the friction spring 60 or 60' in either construction it would be almost impossible to

make the clock operate without appreciable time variations.

If it should be regulated to keep the right time with the meter gear train in disengaged position, it would lose considerable time when operating the two combined gear trains.

The compensation afforded by either spring 60 or 60' has proved very satisfactory in practice.

Fig. 22 shows the aforesaid modification applied to a modified gear drive in which the meter gear train is driven not by the shaft 50' which makes one revolution per hour, but by the escapement wheel shaft 56' which makes sixty revolutions per hour.

On escapement wheel shaft 56' is carried the mounting 62a with its disc 62' engaging gear 155 driving an idler pinion 156. The pinion 156 drives the gear 73'' with its second's signalling cam 74 and hand 16. The pinion 157 of gear 73'' drives the gear 158 with its pinion 159. Pinion 159 drives the gear 68 carrying the minute hand 15. All the rest of the parts function in the same manner as already described.

The spring brake lever 76' shown in Figs. 17, 18 and 22 is operating in the same manner as the spring brake lever 76 operates of Figs. 4, 5 and 6, with the only difference that the meter gear train is started by raising of the plunger 21 and stopped by lowering of the plunger 21.

The main spring driving power required to operate the clock with the additional load of the friction gear 61 or 61' is slightly in excess of the actual power required to drive the clock with the normally operating meter gear train engaged, and for this reason when the clock stops it still has sufficient power to continue driving the combined gear train if given a start on its balance wheel 58 upon starting the meter.

For this purpose I have provided a resilient spring starter 160, Figs. 3, 12 and 13, carried on its stud 161 by the plate 41. The starter has a right angular arm 161' for frictional engagement with the periphery of the balance wheel 58 for setting it in motion. The starting spring 160 has a loop 162 for engagement with a shoe 163. This shoe is also pivoted on the stud 161 with suitably formed eye brackets straddling on both sides of the spring 160. The spring 160 is loosely carried between the guide lips 163' provided for free up and down flexing movements. The spring 160 has several coils 164 around the stud 161 and has its outer end 165 in the slot 167 of stud 161. This assembly is held secure on the stud by a washer 166.

The tension of coils 164 normally holds the loop 162 with its shoe 163 in the up position as shown in Fig. 3, with the angular arm 161' of spring 160 in the lower clearing position of the balance wheel 58, where it does not interfere with its normal operation.

When plunger 21 is pressed down, it also presses on the shoe 163 and deflects the spring loop 162, thus causing the spring 160 to tilt upwardly, its right angular arm 161' passing by and frictionally engaging the balance wheel 58, which gets the required starting impulse and begins to operate the clock gear train. The arm 161' will subsequently remain in a clearing position where it does not interfere with the operation of the balance wheel 58.

The movement is finally assembled with additional pillars 180, Fig. 2, for a dial mounting ring 181 held with nuts 182. Dial 12 has suitable legs 183 for mounting in holes 184 in ring 181.

This entire assembly is secured by means of screws 185 in the inner shell of casing 11.

Although the frictional load compensation described is particularly advantageous when the main clock movement is run by spring power, it is obvious that most of the novel features described are also applicable when an electric clock is used.

The constructional details of my device can vary from those shown without departure from the inventive idea; the drawings should therefore be understood as being intended for illustrative purposes only and not in a limiting sense.

I accordingly reserve the right to carry my invention into practice in all those ways and manners which may enter, fairly, into the scope of the appended claims.

I claim:

1. In a device of the character described, the combination with a continuously running clock mechanism, a normally inoperative time meter mechanism, and an indicating member forming part of said time meter mechanism, of a frictional connecting means continuously coupling said time meter mechanism with said clock mechanism, releasable stop means to start and stop the movement of said time meter mechanism, said frictional connecting means being adapted to afford adequate coupling connection between said clock mechanism and said time meter mechanism when the latter is allowed to run freely in the released position of said stop means, and said frictional connecting means being further adapted to function as a brake imposing upon said clock mechanism a load substantially equivalent to that represented by said time meter mechanism when the latter is restrained against movement in the applied position of said stop means, and manually operable means for resetting said indicating member to starting position independently of said clock mechanism, said last mentioned means comprising a depressible lever, a unidirectionally operative driving connection interposed between said lever and said time meter mechanism, a stop member for said indicating member, a carrier for said stop member adapted to retract it out of or to advance it in the path of said indicating member, and means controlled by said lever retaining said carrier in its retracted position when said lever is in operative position and releasing said carrier when said lever is moved to actuate said resetting means.

2. In a device of the character described, the combination with a continuously running clock mechanism, a normally inoperative time meter mechanism and an indicating member forming part of said time meter mechanism, of a frictional connecting means continuously coupling said time meter mechanism with said clock mechanism, releasable stop means to start and stop the movement of said time meter mechanism, said frictional connecting means being adapted to afford adequate coupling connection between said clock mechanism and said time meter mechanism when the latter is allowed to run freely in the released position of said stop means, and said frictional connecting means being further adapted to function as a brake imposing upon said clock mechanism a load substantially equivalent to that represented by said time meter mechanism when the latter is restrained against movement in the applied position of said stop means, and means for resetting said indicating member to starting position independently of said clock mechanism, a depressible lever adapted to actu-

ate said resetting means, a unidirectionally operative driving connection interposed between said lever and said time mechanism, a stop member for said indicating member, a carrier for said stop member adapted to retract it out of or to advance it in the path of said indicating member, means controlled by said lever retaining said carrier in its retracted position when said lever is in its normal inoperative position and releasing said carrier when said lever is moved to actuate said resetting means, and additional means operatively associated with said time meter mechanism restraining said carrier against advancing said stop member to stop position until said indicating member approaches its starting position at the end of the resetting operation.

3. In a device of the character described, the combination with a continuously running clock mechanism, a normally inoperative time meter mechanism and an indicating member forming part of said time meter mechanism, of a frictional connecting means continuously coupling said time meter mechanism with said clock mechanism, releasable stop means to start and stop the movement of said time meter mechanism, said frictional connecting means being adapted to afford adequate coupling connection between said clock mechanism and said time meter mechanism when the latter is allowed to run freely in the released position of said stop means, and said frictional connecting means being further adapted to function as a brake imposing upon said clock mechanism a load substantially equivalent to that represented by said time meter mechanism when the latter is restrained against movement in the applied position of said stop means, and means for resetting said indicating member to starting position independently of said clock mechanism, a pinion adapted to operate said resetting means, a unidirectionally operative driving connection interposed between said pinion and said resetting means, a pivotally mounted gear segment adapted to mesh with said pinion, a manually operable lever associated with and adapted to cause angular displacement of said segment from its normally inoperative position to drive said pinion in its operative direction, a spring adapted to return said segment and lever to inoperative position when released, a normally retracted stop member for said indicating member, and means associated with said resetting means for moving said stop member to operative position in the path of said indicating member when said indicating member approaches the starting position at the end of the resetting operation.

4. In a device of the character described, the combination with a continuously running clock mechanism, a normally inoperative time meter mechanism and an indicating member forming part of said time meter mechanism, of a frictional connecting means continuously coupling said time meter mechanism with said clock mechanism, releasable stop means to start and stop the movement of said time meter mechanism, said frictional connecting means being adapted to afford adequate coupling connection between said clock mechanism and said time meter mechanism when the latter is allowed to run freely in the released position of said stop means, and said frictional connecting means being further adapted to function as a brake imposing upon said clock mechanism a load substantially equivalent to that represented by said time meter mechanism when the latter is restrained against movement in the applied position of said stop means,

and means for resetting said time meter mechanism and indicating member to starting position independently of said clock mechanism, a pinion adapted to operate said resetting means, a unidirectionally operative driving connection interposed between said pinion and said resetting means, a pivotally mounted gear segment adapted to mesh with said pinion, a manually operable lever associated with and adapted to cause angular displacement of said segment from its normally inoperative position to drive said pinion in its operative direction, a spring adapted to return said segment and lever to inoperative position when released, a resilient member connecting said segment to said lever and allowing said segment to yield to prevent jamming when faulty engagement between said segment and pinion occurs.

5. In a device of the character described, the combination with a continuously running spring actuated clock mechanism and a normally inoperative time meter mechanism, of a frictional connecting means continuously coupling said time meter mechanism with said clock mechanism,

nism, releasable stop means to start and stop movement of said time meter mechanism, said frictional connecting means being adapted to afford adequate coupling connection between said clock mechanism and said time meter mechanism when the latter is allowed to run freely in the released position of said stop means, and said frictional connecting means being further adapted to function as a brake imposing on said clock mechanism a load substantially equivalent to that represented by said time meter mechanism when the latter is restrained against movement in the applied position of said stop means, manually operable means for resetting said meter mechanism to starting position independently of said clock mechanism, further means for imparting to said clock mechanism a starting impulse upon the operation of said stop means to establish driving relation between said clock and meter mechanisms, whereby said time meter can still be rendered operative even after said clock mechanism may have become run down sufficiently to cause its operation to stop.

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