

Oct. 1, 1963

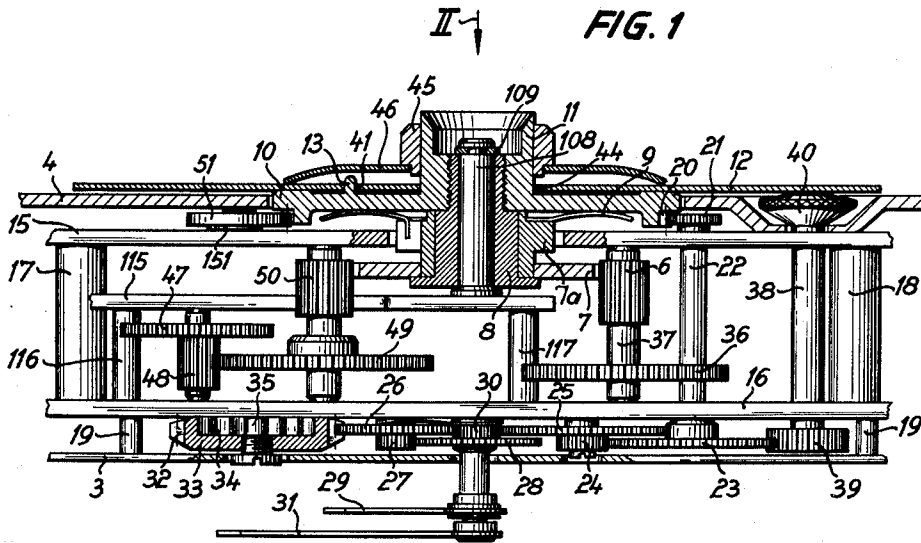
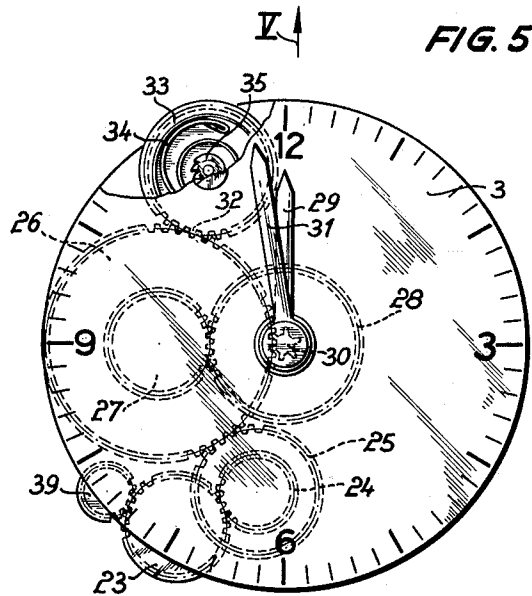
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3,105,731

SETTING ARRANGEMENT FOR INTERCONNECTED INDICATORS

Filed May 12, 1959

3 Sheets-Sheet 1



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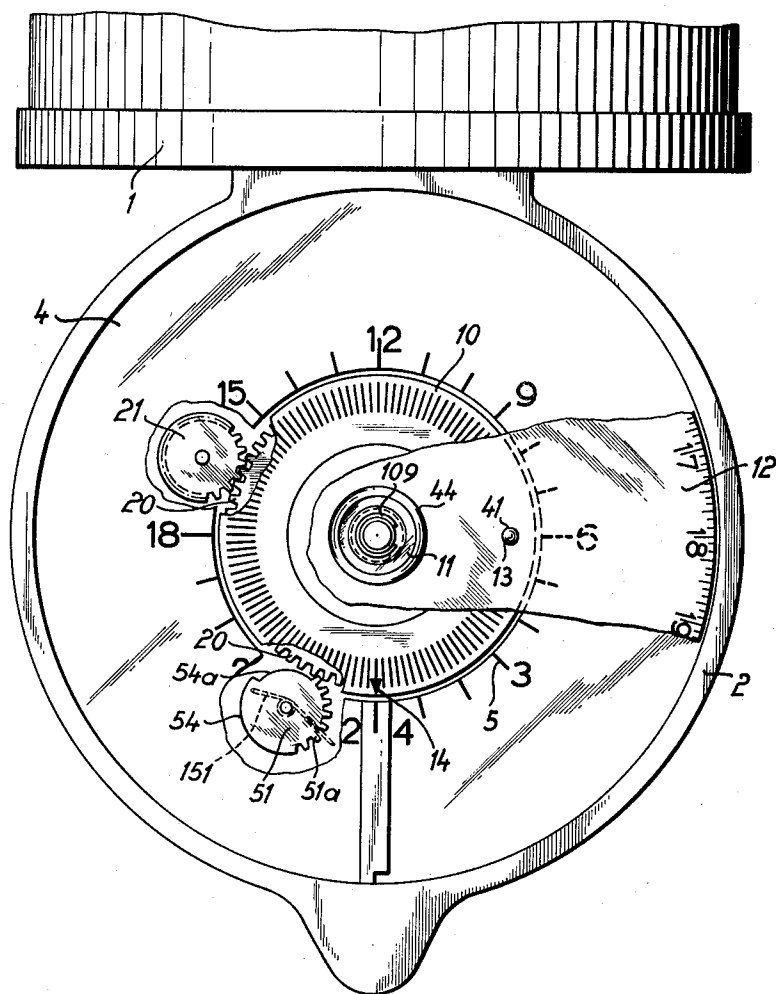
3,105,731

SETTING ARRANGEMENT FOR INTERCONNECTED INDICATORS

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3 Sheets-Sheet 2

FIG. 2



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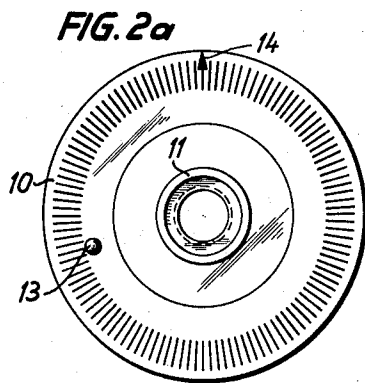
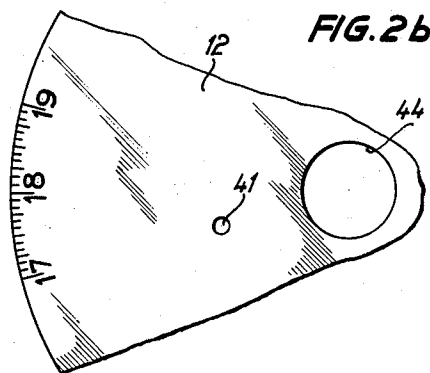
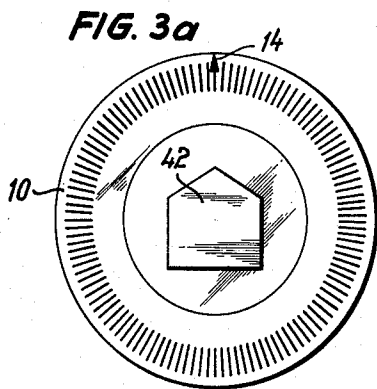
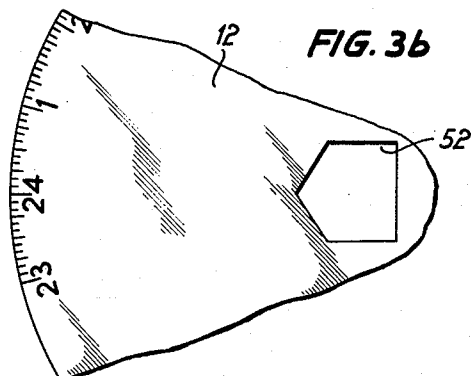
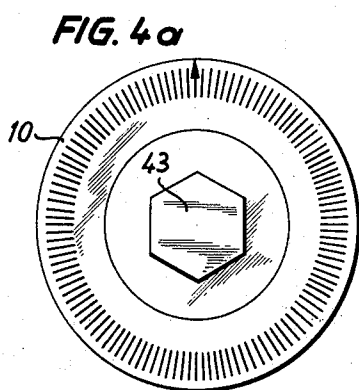
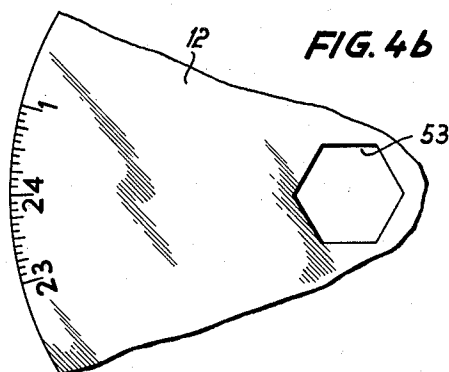
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SETTING ARRANGEMENT FOR INTERCONNECTED INDICATORS

Filed May 12, 1959

3 Sheets-Sheet 3



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3,105,731

SETTING ARRANGEMENT FOR INTER-CONNECTED INDICATORS

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Claims priority, application Germany July 7, 1958

18 Claims. (Cl. 346—20)

The present invention relates to a setting arrangement for interconnected indicators, and more particularly to a setting arrangement for a tachograph which has a first indicator means in the form of a diagram sheet attached to a diagram carrier, and a second indicator means in the form of the pointers of a clock.

A tachograph of the type to which the present invention relates, has a clockwork driving a diagram carrier with a diagram sheet thereon through friction coupling means. The diagram carrier is connected by a gear train to pointers indicating time. The diagram carrier and the diagram thereon must be placed in an exactly predetermined position relative to the dial with which the pointers cooperate. Setting means are operatively connected to the pointers for setting the pointers and thereby the diagram carrier with the diagram to the time at which the operation of the tachograph starts.

Due to the fact that play is unavoidable in the gear train, the diagram sheet and the pointers of the clockwork are relatively displaced during certain setting operations so that an inaccuracy is introduced into the values recorded and measured by the instrument.

It is one object of the present invention to overcome this disadvantage of tachographs of this type, and to eliminate the influence of the play of the gear train between the pointers of the clock and the diagram carrier.

Another object of the present invention is to provide a setting arrangement for two indicators interconnected by a gear train having play, and to construct the setting arrangement in such a manner that the play of the gear train cannot influence the relative position of the two indicator means.

Another object of the present invention is to provide biasing means tending to turn one of the indicator means in one direction to adjust the relative position of two interconnected indicator means after a setting operation.

Another object of the present invention is to provide in the setting arrangement of the present invention, control means which permit unlimited turning of the indicator means in one direction during a setting operation, but permit turning of the indicator means in the opposite direction only through a small angle, so that the biasing means are not relieved of tension.

A further object of the present invention is to provide on the diagram carrier, attaching means for attaching the diagram sheet non-turnably and in a manner permitting axial removal of the diagram sheet.

A further object of the present invention is to provide an additional dial on a tachograph for determining the position of the diagram sheet which is provided with a corresponding mark.

With these objects in view, the present invention mainly consists in a setting arrangement which is advantageously applied to a tachograph, the setting arrangement comprising, drive means, such as a spring-loaded drive gear; first means, such as a diagram carrier driven by the drive means in a normal forward movement; second means, such as a pointer indicating time; a gear train having play and connecting the first and second indicator means for synchronized movement in matching positions; setting means for simultaneously setting the first and second means; and biasing means operatively connected to

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the gear train and to the second means so as to be loaded during movement of the second means in forward direction.

When the first and second means are set in forward direction, the second means moves relative to the first means to an indicating position not matching the position of the first means due to the play in the gear train whereby an error is introduced. When the setting means are released after the setting operation, a loaded biasing means, for example a tensioned spring eliminates the play in the gear train in the forward direction, and the initial matching position of the first and second means is restored. By a further adjustment of the setting means the desired position of the first and second means relative to an associated dial means can be obtained.

The present invention is particularly advantageously applied to a tachograph in which the first means is a diagram carrier to which a diagram sheet is attached in a predetermined position. A mark on the diagram sheet is brought into alignment with a stationary dial in the setting operation. The second means are constituted by clock pointers passing over a stationary dial indicating the time.

In the preferred embodiment of the present invention, the drive includes a clock motor acting through a friction coupling on the diagram carrier, so that the diagram carrier can turn relative to the clock motor during a setting operation.

The biasing means is constituted by a spring which is tensioned during turning of the pointers in forward direction. Setting control means are provided which permit turning of the pointers and of the diagram carrier in the opposite rearward direction only through a small angle in order to prevent untensioning of the spring which eliminates the play during the forward setting operation.

In the preferred embodiment of the present invention, the attaching means for the diagram sheet include axially projecting means which engage corresponding openings in the diagram sheet. Either a central projection of non-circular shape is provided, or the central projection may be circular in which event an additional projecting means radially spaced from the axis of the diagram carrier is provided.

Preferably, diagram sheets of different type are distinguished by differently arranged and designed openings for the attaching means, and the instrument is constructed to permit exchange of diagram carriers so that for each type of diagram sheet, a different diagram carrier is used in the instrument. Such diagram carriers have attaching projections matching only the openings in particular type of diagram sheet.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 is an axial sectional view of a tachograph provided with the arrangement of the present invention;

FIG. 2 is a view in direction of the arrow II in FIG. 1, with certain parts broken off or omitted for the sake of clarity;

FIGS. 2a and 2b illustrate a diagram carrier and a matching diagram sheet, respectively;

FIGS. 3a and 3b illustrate another diagram carrier and a corresponding diagram sheet, respectively;

FIGS. 4a and 4b illustrate a further modified diagram carrier and a matching diagram sheet, respectively; and

FIG. 5 is a fragmentary view taken in direction of the arrow V in FIG. 1.

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The tachograph to which the present invention is applied is of the well known type schematically illustrated in FIG. 2, in which a part 2 is pivotally mounted on a housing 1 and can be moved from a position closing the housing to the illustrated position in which the housing is opened. The tachometer is located in the housing 1, and operates a recording writing point which moves in a radial direction during turning movement of the diagram sheet so that a graph is drawn on the diagram sheet when part 2 is in the position closing the housing 1. When part 2 is moved to open position, diagram sheet 12 is accessible, and can be removed and replaced. The movable part 2 contains a clockwork, and as best seen in FIG. 1, the diagram sheet 12 is attached to a diagram carrier 10 on the inside of the movable part 2, whereas the outer surface of the movable part 2 has a clock dial 3, and pointers 29 and 31, as best seen in FIG. 5. FIG. 2 illustrates the tachometer in a position in which the inner face of the cover part 2 is visible. The inside of the cover part 2 is closed by a cover plate 4 which has a circular central cutout in which the diagram carrier 10 is located. Cover plate 4 is provided with a time dial 5 on which 24 hours are marked corresponding to the design of the diagram sheets 12. The dial 3 on the outside of the cover part 2 has twelve hours marked thereon, as shown in FIG. 5.

In the pivoted cover part 2, a drive means for a diagram carrier 10, and for the pointers 29 and 31 are mounted. The cover part 2 is also provided with the setting arrangement of the present invention by which the pointers 29, 31, and the diagram carrier 10 with the diagram sheet 12 are simultaneously set.

The movable elements of the cover part 2 are supported on a support which includes two plates 15 and 16 secured to each other by distance members 17 and 18. The dial plate 3 is secured to supporting plate 16 by spacing members 19. Support 15, 16, 17, 18 is connected by pivot means, not shown, to the housing 1.

A further support plate 115 is secured by spacing elements 116 and 117 to the support plate 16. A supporting shaft 108 is fixed to supporting plate 115 and turnably carries a sleeve 8 which has a threaded portion to which the hub 11 of the diagram carrier 10 is threaded. A spring washer 109 is provided in a groove of shaft 108 to hold sleeve 8 on shaft 108. The diagram carrier 10 illustrated in FIG. 1 has a single axially projecting element 13 which engages a corresponding opening 41 in the diagram sheet 12, so that the diagram sheet 12 is non-turnably connected to the diagram carrier 10, but can be removed in axial direction when the clamping means 45, 46 are detached. As explained above, the diagram carrier 10 is of circular shape and located in a circular opening in the cover plate 4 which is provided with a dial 5 indicating 24 hours as shown in FIG. 2.

A conventional spring motor, not shown, is supported between plates 15 and 16, and drives a gear 36 connected by a shaft 37 to another gear 6. Gear 6 meshes with a gear 7 which is secured to a bushing 7a turnable on sleeve 8. A spring 9 is fixedly secured to bushing 7a, and frictionally engages the inner surface of the diagram carrier means 10. When the drive means 6 are rotated by the spring motor, not shown, the carrier means 10 are rotated with the diagram sheet 12 through the friction coupling means 9.

A gear ring 20 is integral with the diagram carrier 10, and meshes with a gear 21 fixed to a shaft 22 on which another gear 23 is also fixedly secured. Shaft 22 is turnably mounted in the supporting plates 15 and 16. Gear 23 meshes with a gear 24 which is secured to another gear 25 for turning movement therewith. Gear 25 meshes with a gear 26, as best seen in FIG. 5, and gear 26 is fixedly secured to a gear 27 meshing with a gear 28 to which the hour hand 29 is secured by a sleeve. Gear 26 meshes with a gear 30 which is fixed on the shaft of the minute hand 31.

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It is therefore apparent that the indicator means 29, 31 are connected by a gear train to the diagram carrier means 10. The gear train includes the first gear means 20 on the diagram carrier means, and a second gear means 21, 22, 23.

Gear means 50, 49 is driven by gear 7, and is in meshing connection with another gear means 47, 48 which is connected to a conventional escapement mechanism, not shown. It is evident that the clockwork will turn the pointers 29 and 31 to indicate the time, while the diagram carrier 10 will turn with the diagram sheet 12. During such turning movement, the writing point in housing 1 will draw a graph on a diagram sheet whereby the speed of the vehicle is registered as a function of the time.

A shaft 38 is turnably mounted on the support plates 15 and 16, and carries at one end a manually operated knob 40 located in a recess of dial plate 4. The diagram sheet 12 covers knob 40, but when the diagram sheet is removed, knob 40 can be turned together with the shaft 38 and a gear 39 which is fixed on shaft 38. Gear 39 meshes with gear 23 of the above described second gear means 21, 22, 23. Member 40, 38, 39 constitutes a setting means for setting the indicator means 29, 31 through gears 23, 24, 25, 26, 27, 28 and 30, and for setting the diagram carrier 10 through the gears 21 and 20. When the knob 40 of the setting means is turned, diagram carrier 10 turns relative to the dial plate 4 until the mark 14, see FIG. 2, on the diagram carrier points to a certain line of the dial 5 on the diagram plate 4. During such turning of the diagram carrier 10, the sleeve 8 turns relative to bushing 7a, while spring 9 slides on the diagram carrier since the drive gears 6 and 36 are prevented from turning movement by the resistance of the spring motor acting on the drive gear means 36 and 6.

The gear train between the diagram carrier 10 and the pointers 29 and 31 has unavoidable play. During drive from the drive gear means 6, 36 in normal forward direction, all gears of the gear train assume a certain relative position in which the play has no effect. When the setting means 40, 38, 39 are operated to turn the pointers 29, 31 and the diagram carrier 10, diagram carrier 10 is no longer driven from drive means 6, 36 and coupling spring 9, but is driven from the second gear means 21, 22, 23 which acts on the first gear means 20.

If the setting operation is carried out in a rearward direction opposite to the normal forward direction of the indicator means 10 and 29, 31, the gears of the gear train and particularly the first and second gear means 20 and 21 remain in the same relative position as before. However, if the setting operation is carried out to set the first and second indicator means 10 and 29, 31 in forward direction, the gears of the gear train turn relative to each other through angles corresponding to the play between the gears. Particularly, the second gear means 21, 22, 23 turns relative to the first gear means 20 until the tooth of gear 21 trailing in forward setting direction engages the corresponding tooth of gear 20, which previously was in engagement with the tooth of gear 21 leading in forward setting direction. When after a setting operation in forward direction, the device is again operated by the drive means 6, 36 and the spring motor, diagram carrier 10 and the first gear means 20 turns relative to the second gear means 21, 22, 23 through a corresponding angle before the second gear means 21, 22, 23 is again taken along by the first gear means 20 and effects turning of the indicator means 29, 31. An undesired relative movement between the first indicator means 10 and the second indicator means 29, 31 results, since the two indicator means are displaced relative to each other. Such relative displacement would cause incorrect recordings on the diagram sheet 12, and in accordance with the present invention means are provided to prevent such relative displacement regardless of the direction in which the indicator means are set.

Gear 26 of the gear train between the two indicator

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means is in meshing engagement with a gear crown 32 on a spring housing which is turnably mounted on supporting plate 16, and envelopes a spiral spring 34 whose outer end frictionally engages an inner surface of the spring housing 33, while its inner end is held stationary on a core member 35, as best seen in FIG. 5. The spring 34 is positioned in such a manner that during forward movement of the pointers 29, 31, the spring 34 is tensioned so that during the normal operation of the clockwork, spring 34 is first gradually tensioned, and then continuously held in tensioned condition. The tensioned spring 34 will have a tendency to turn the indicator means and the gear train in rearward direction, but the force of the spring motor of the clockwork is much greater so that spring 34 has no effect during normal running of the clockwork.

However, when a setting operation has been carried out in forward direction, as described above, and a play has been introduced between the first gear means 20 and the second gear means 21, then spring 34 is effective to turn through gears 26, 25, 24 the second gear means 21, 22, 23 in rearward direction until the play between gears 20 and 21 is again eliminated, so that indicator means 10 and indicator means 29, 31 simultaneously start moving when indicator means 10 is driven by the drive means 6, 36 through the friction coupling 9, 7a.

It is possible that the elimination of the play in the gear train by the biasing means 32, 33, 34 requires a resetting of the indicator means to the exact time and desired position of the diagram sheet 12, but such correction can be easily carried out by the operator.

While the above described setting arrangement of the present invention assures the elimination of the influence of the play in the gear train during forward setting, it is not yet absolutely fool-proof. As explained above, a setting in rearward direction can be carried out without introducing any play in forward direction into the gear train. Therefore, the operator may turn the setting means in rearward direction to effect several complete turns of the indicator means in rearward direction, and this would result in untensioning of the biasing spring 34. If shortly after such rearward setting of the indicator means, a forward setting of the indicator means would be carried out, the untensioned spring would be incapable of eliminating the play introduced by such forward setting operation into the gear train.

In accordance with the present invention setting control means are provided to prevent such undesired operation of the setting arrangement. As shown in FIG. 2, the setting control means include a control member 51 which is turnably mounted on the stationary plates 4 and 15 and has a gear sector 51a, a smooth sector 54a of smaller diameter on one side of the gear sector 51a, and another smooth sector 54 of greater diameter on the other side of gear sector 51a. A spring 151, anchored on plate 4, is secured to control member 51, and tends to hold the same in the position illustrated in FIG. 2 in which the portion of gear sector 51a adjacent sector 54a is in meshing engagement with the first gear means 20 on the diagram carrier 10.

When diagram carrier 10 is turned in counterclockwise direction as viewed in FIG. 2 which corresponds to forward setting of the diagram carrier 10 and of the pointers 29, 31, control member 51 permits unlimited turning movement. Every time a tooth of gear 20 passes over the respective tooth of the gear sector 51, spring 151 gives and permits turning of control member 51 in clockwise direction, as viewed in FIG. 2, through a small angle corresponding to the pitch of a tooth of gear sector 51a. Consequently, unlimited setting of the indicator means in forward direction is possible, and as it has been explained above, due to the provision of the biasing means 32, 33, 34, a relative displacement between the two indicator means 10 and 29, 31 is automatically compensated.

When the setting operation is carried out in rearward

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direction, control member 51 is turned through an angle corresponding to the extent of gear sector 51a until the sector 54 of greater diameter engages gear 20 and blocks further turning movement of gear 20, diagram carrier 10, the gear train including gear 21 to 26, the pointers 29 and 31, and biasing means 32, 33, 34.

Consequently setting of the indicator means in rearward direction is possible only for a limited angle, so that the biasing means, and particularly spring 34 cannot be untensioned by rearwardly setting the indicator means. As explained above, such rearward setting is not objectionable as far as the play between the indicator means is concerned, and therefore rearward setting can be carried out within a small angle. However, rearward setting to such extent that the spring 34 is completely untensioned must be prevented, since otherwise the forward setting would be inaccurate. The setting control means 51, 151 prevent such untensioning of the biasing means 32, 33, 34 during a rearward setting operation.

As shown in FIGS. 1, 2a and 2b, diagram carrier 10 has a centrally located axially projecting hub 11 of circular cross section which passes through a corresponding circular opening 44 in the diagram sheet 12. To assure turning movement of diagram sheet with the diagram carrier, the diagram carrier 10 has an eccentric axially projecting element 13 which engages a corresponding opening 41 in the diagram sheet 12. A clamping means including an annular part 45 mounted on hub 11, and a clamping spring 46 is provided for holding the diagram sheet 12 against the diagram carrier 10. When clamping means 45, 46 is removed, the diagram sheet can be detached in axial direction from the diagram carrier.

In accordance with another aspect of the present invention, the diagram carrier 10 can be screwed off the threaded part of sleeve 8, and removed. Another diagram carrier can be then screwed onto the threaded sleeve 8, and such other diagram carrier is provided with a differently positioned eccentric projection 13 onto which only a different type of diagram sheet having a correspondingly positioned opening 13 will fit. Such other diagram sheet has a printed graduation thereon which may correspond to a different range of measurement. Consequently a diagram sheet with a differently arranged and positioned opening 41 cannot be placed on a diagram carrier which has a positioning projection 13 associated with a different range of measurement. For example, pin 13 is positioned in the arrangement of FIG. 2 at an angle of 90° with respect to mark 14, and at a certain radial distance from the axis of diagram carrier 10. In the slightly modified construction of FIGS. 2a and 2b, the pin 13 is spaced at greater angle from mark 14, and has a different radial distance which may correspond to diagram sheets having a range from zero to 70 miles per hour. Evidently, different positions of pin 13 are possible to associate the diagram carrier with different types of diagram sheets.

In accordance with the present invention, the attaching means include axially projecting means which are at least partly eccentric so as to permit removal of the diagram sheet in axial direction, while connecting the diagram sheet to the diagram carrier for turning movement. In the constructions of FIGS. 3a and 3b, and of FIGS. 4a and 4b, the hub of the diagram carrier is of polygonal cross section matching corresponding openings in the respective diagram sheets. In the construction of FIGS. 3a and 3b, the hub 42 has five sides matching a corresponding opening 52 in the diagram sheet 12. In the construction of FIGS. 4a and 4b, the hub 43 is of hexagonal cross section matching a corresponding opening 53 in the diagram sheet. Due to the non-circular shape of the hubs 42 and 43, the diagram sheets are non-turnably attached to the diagram carrier. Evidently, other non-circular hub constructions would accomplish the same purpose. Each different non-circular shape of the hub of the diagram carrier is associated with a diagram sheet corresponding to a different range of measurements, so that be exchange of diagram

carriers, the instrument is adapted for a particular measuring range, for which only particular diagram sheets must be used.

The tachograph provided with setting arrangement of the present invention is operated in the following manner. The spring motor, not shown, is wound up in a conventional manner. Before a vehicle provided with a tachograph starts a trip, the knob 40 of the setting means is operated to simultaneously set the pointers 29, 31, and the diagram carrier 10. The pivoted cover part 2 is opened, and mark 14 of diagram carrier 10 is set to the proper time on dial 5 on dial plate 4, while the pointers 29 and 31 are simultaneously set. Since the indicator means 10 and 29, 31 were previously driven by the spring motor in forward direction, setting of the indicator means in rearward direction will not effect a relative displacement between indicator means 10 and indicator means 29, 31. When the indicator means are set in forward direction, a relative movement between the indicator means 10 and the indicator means 29, 31 will take place due to the play in the gear train, and particularly due to the play between the gears 20 and 21. When the knob 40 of the setting means is released after such forward setting operation, the spring 34, which was previously tensioned during the normal operation of the device, will turn the gears of the gear train including gear 21 until the play introduced by operation of the setting means in forward direction is again eliminated so that indicator means 10 and 29, 31 simultaneously start moving without relative displacement when the drive means drive indicator means 10 through the friction coupling 9.

When an attempt is made to turn the setting means in rearward direction beyond the angle permitted by the gear sector 51, the sector 54 blocks further setting movement so that the spring 34 cannot be relieved by extended setting movement in rearward direction. When the diagram carrier and the pointers are properly set, a diagram sheet 12 is placed on the diagram carrier 10 with projection 13 passing through the corresponding opening 51 in the diagram sheet, and thereupon the diagram sheet is secured by the clamping means 45, 46. The pivoted part 2 is moved to the position closing the housing 1 in which the diagram sheet is located opposite the writing point of the tachograph mechanism which is located in the housing 1.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of setting arrangements for two indicator means differing from the types described above.

While the invention has been illustrated and described as embodied in a setting arrangement for a tachograph having clock pointers and a diagram carrier for a diagram sheet, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. In a device of the type described, in combination, drive means; first turnable indicator means connected to and driven by said drive means in a normal forward movement; second turnable indicator means; a gear train connecting said first and second indicator means for synchronized movement, said gear train including a first gear means fixedly connected to said first indicator means and a second gear means in meshing engagement with said first gear means and having play with the same; setting

means operatively connected to said second gear means for setting said first and second indicator means so that upon setting of said first and second indicator means in said forward direction through said first and second gear means, said second indicator means is moved relative to said first indicator means to a different indicating position due to the play between said first and second gear means; and biasing means operatively connected to said second gear means and to said second indicator means for being loaded during movement of said second indicator means in said forward direction so that upon release of said setting means, said biasing means move said second gear means in an opposite rearward direction until play between said first and second gear means in said forward direction is eliminated and the initial relative position of said first and second indicator means is restored, said biasing means including a spring housing, a gear connected to said spring housing and driven from said second gear means, and a spring in said spring housing operatively connected to the same so as to be tensioned during turning movement of said spring housing while said second indicator means and second gear means turn in said forward direction.

2. In a device of the type described, in combination, drive means; first means connected to and driven by said drive means in a normal forward movement; second means; a gear train having play and connecting said first and second means for synchronized movement, said gear train including a first gear means fixedly connected to said first means and a second gear means in meshing engagement with said first gear means; setting means operatively connected to said second gear means for setting said first and second means in forward and rearward directions so that upon setting of said first and second means in said forward direction through said first and second gear means, said second means is moved relative to said first means to a different position due to the play in said gear train; biasing means operatively connected to said second gear means and to said second means for being loaded during movement of said second means in said forward direction so that upon release of said setting means, said biasing means move said second gear means in said rearward direction until play in said gear train in said forward direction is eliminated and the initial relative position of said first and second means is restored, said biasing means being unloaded during movement of said second indicator means in said rearward direction under control of said setting means; and setting control means operatively connected to said first gear means and said first means for limiting turning movement of said first gear means in said rearward direction to an angle smaller than the turning angle required for complete unloading of said biasing means, while permitting movement of said first means and first gear means in said forward direction.

3. In a device of the type described, in combination, drive means; first indicator means connected to and driven by said drive means in a normal forward movement; second indicator means; a gear train having play and connecting said first and second indicator means for synchronized movement, said gear train including a first gear means fixedly connected to said first indicator means and a second gear means in meshing engagement with said first gear means; setting means operatively connected to said second gear means for setting said first and second indicator means in forward and rearward directions so that upon setting of said first and second indicator means in said forward direction through said first and second gear means, said second indicator means is moved relative to said first indicator means to a different indicating position due to the play in said gear train; and biasing means operatively connected to said second gear means and to said second indicator means for being loaded during movement of said second indicator means in said forward direction so that upon release of said setting means, said biasing means move said second gear means in said rear-

ward direction until play in said gear train in said forward direction is eliminated and the initial relative position of said first and second indicator means is restored, said biasing means including a member operatively connected to said second gear means and to said second indicator means so as to move with the same, and a stationary spring operatively connected to said member so as to be tensioned during forward movement of said second indicator means, and to be untensioned during rearward movement of said second indicator means under control of said setting means; and setting control means operatively connected to said first gear means for limiting turning movement of the same in said rearward direction together with said member to an angle smaller than the turning angle required for complete untensioning of said spring to prevent complete untensioning of said spring during extended rearward movement of said second gear means under control of said setting means, said setting control means permitting unlimited movement of said first indicator means and of said first gear means in said forward direction.

4. In a device of the type described, in combination, drive means; first indicator means connected to and driven by said drive means in a normal forward movement; second indicator means; a gear train having play and connecting said first and second indicator means for synchronized movement, said gear train including a first gear means fixedly connected to said first indicator means and a second gear means in meshing engagement with said first gear means; setting means operatively connected to said second gear means for setting said first and second indicator means so that upon setting of said first and second indicator means in said forward direction through said first and second gear means, said second indicator means is moved relative to said first indicator means to a different indicating position due to the play in said gear train; biasing means operatively connected to said second gear means and to said second indicator means for being loaded during movement of said second indicator means in said forward direction so that upon release of said setting means, said biasing means move said second gear means in an opposite rearward direction until play in said gear train in said forward direction is eliminated and the initial relative position of said first and second indicator means is restored, said biasing means including a member operatively connected to said second gear means and to said second indicator means so as to move with the same, and a stationary spring operatively connected to said member so as to be tensioned during forward movement of said second indicator means; and setting control means including a turnable control member having a gear sector in meshing engagement with said first gear means, a first smooth sector of smaller diameter located adjacent to and on one side of said gear sector, and a second smooth sector of greater diameter located adjacent to and on the other side of said gear sector, said first sector permitting unlimited turning movement of said first gear means in said forward direction, said gear sector permitting limited turning movement of said first gear means in said rearward direction through an angle corresponding to the angle of said gear sector, and said second sector blocking turning movement of said first gear means and of said first indicator means in said rearward direction beyond said angle.

5. In a device of the type described, in combination, drive means; first indicator means connected to and driven by said drive means in a normal forward movement; second indicator means; a gear train having play and connecting said first and second indicator means for synchronized movement, said gear train including a first gear means fixedly connected to said first indicator means and a second gear means in meshing engagement with said first gear means; setting means operatively connected to said second gear means for setting said first and second indicator means so that upon setting of said first and second indicator means in said forward direction through

said first and second gear means, said second indicator means is moved relative to said first indicator means to a different indicating position due to the play in said gear train; biasing means operatively connected to said second gear means and to said second indicator means for being loaded during movement of said second indicator means in said forward direction so that upon release of said setting means, said biasing means move said second gear means in an opposite rearward direction until play in said gear train in said forward direction is eliminated and the initial relative position of said first and second indicator means is restored, said biasing means including a turnable spring housing having gear teeth and being driven from said second gear means so as to turn with said second indicator means, and a spiral spring located in said spring housing and having a fixed inner end and an outer end frictionally engaging an inner surface of said spring housing so as to be tensioned during forward movement of said second indicator means; and setting control means including a turnable control member having a gear sector in meshing engagement with said first gear means, a first smooth sector of smaller diameter located adjacent to and on one side of said gear sector, and a second smooth sector of greater diameter located adjacent to and on the other side of said gear sector, said first sector permitting unlimited turning movement of said first gear means in said forward direction, said gear sector permitting limited turning movement of said first gear means in said rearward direction through an angle corresponding to the angle of said gear sector, and said second sector blocking turning movement of said first gear means and of said first indicator means in said rearward direction beyond said angle.

6. In a device of the type described, in combination, drive means; first indicator means connected to and driven by said drive means in a normal forward movement; second indicator means; a gear train having play and connecting said first and second indicator means for synchronized movement, said gear train including a first gear means fixedly connected to said first indicator means and a second gear means in meshing engagement with said first gear means; setting means operatively connected to said second gear means for setting said first and second indicator means so that upon setting of said first and second indicator means in said forward direction through said first and second gear means, said second indicator means is moved relative to said first indicator means to a different indicating position due to the play in said gear train; biasing means operatively connected to said second gear means and to said second indicator means for being loaded during movement of said second indicator means in said forward direction so that upon release of said setting means, said biasing means move said second gear means in an opposite rearward direction until play in said gear train in said forward direction is eliminated and the initial relative position of said first and second indicator means is restored, said biasing means including a turnable spring housing having gear teeth and being driven from said second gear means so as to turn with said second indicator means, and a spiral spring located in said spring housing and having a fixed inner end and an outer end frictionally engaging an inner surface of said spring housing so as to be tensioned during forward movement of said second indicator means; and setting control means including a turnable control member having a gear sector in meshing engagement with said first gear means, a first smooth sector of smaller diameter located adjacent to and on one side of said gear sector, and a second smooth sector of greater diameter located adjacent to and on the other side of said gear sector, said first sector permitting unlimited turning movement of said first gear means in said forward direction, said gear sector permitting limited turning movement of said first gear means in said rearward direction through an angle corresponding to the angle of said gear sector, and said second sector

blocking turning movement of said first gear means and of said first indicator means in said rearward direction beyond said angle, and a control spring tending to hold said control member in a position in which said first gear means is in meshing engagement with the portion of said gear sector adjacent said first smooth sector, said control spring being tensioned when said first gear means turns in said forward direction and turns said control member to a position in which said first gear means is located opposite said first smooth sector.

7. In a tachograph device, in combination, drive means; turnable diagram carrier means connected to and driven by said drive means in a normal forward movement and including means for detachably attaching a diagram sheet in a predetermined angular position; turnable indicator means; a stationary dial cooperating with said turnable indicator means; a gear train having play and connecting said diagram carrier means with said indicator means for synchronized turning movement in matching positions, said gear train including first gear means fixedly connected to said diagram carrier means and second gear means in meshing engagement with said first gear means; manually-operated setting means operatively connected to said second gear means for simultaneously setting said carrier means and said indicator means so that upon setting of said diagram carrier means and of said indicator means in said forward direction through said first and second gear means, said indicator means is moved relative to said diagram carrier means and to the diagram sheet to an indicating position not matching the position of said carrier means due to the play in said gear train whereby an error is introduced; and biasing means operatively connected to said second gear means and to said indicator means for being loaded during movement of said indicator means in said forward direction so that upon manual release of said setting means, said biasing means move said second gear means in an opposite rearward direction until the play in said first gear train in said forward direction and said error are eliminated and the initial matching position of said diagram carrier means and said indicator means is restored.

8. In a tachograph device, in combination, drive means; turnable diagram carrier means connected to and driven by said drive means in a normal forward movement and including means for detachably attaching a diagram sheet in a predetermined angular position; turnable indicator means; a stationary dial cooperating with said turnable indicator means; a gear train connecting said diagram carrier means with said indicator means for synchronized turning movement, said gear train including first gear means fixedly connected to said diagram carrier means and second gear means in meshing engagement with said first gear means and having play with the same; manually-operated setting means operatively connected to said second gear means for simultaneously setting said carrier means and said indicator means in forward direction or in rearward direction so that upon setting of said diagram carrier means and of said indicator means in said forward direction through said first and second gear means, said indicator means is moved, relative to said diagram carrier means and to the diagram sheet, to a different indicating position due to the play between said first and second gear means; and biasing means operatively connected to said second gear means and to said indicator means for being loaded during movement of said indicator means in said forward direction so that upon manual release of said setting means, said biasing means move said second gear means in said rearward direction until the play between said first and second gear means in said forward direction is eliminated and the initial relative position of said diagram carrier means and said indicator means is restored, said biasing means being unloaded during movement of said indicator means in said rearward direction under control of said setting

means; and setting control means operatively connected to the first gear means and said diagram carrier means for limiting turning movement of the same in said rearward direction to an angle smaller than the turning angle required for complete unloading of said biasing means while permitting movement of said diagram carrier means and said first gear means in said forward direction.

9. In a tachograph device, in combination, drive means; turnable diagram carrier means connected to and driven by said drive means in a normal forward movement and including means for detachably attaching a diagram sheet in a predetermined angular position; turnable indicator means; a stationary dial cooperating with said turnable indicator means; a gear train connecting said diagram carrier means with said indicator means for synchronized turning movement, said gear train including first gear means fixedly connected to said diagram carrier means and second gear means in meshing engagement with said first gear means and having play with the same; manually-operated setting means operatively connected to said second gear means for simultaneously setting said carrier means and said indicator means so that upon setting of said diagram carrier means and of said indicator means in said forward direction through said first and second gear means, said indicator means is moved relative to said diagram carrier means and to the diagram sheet, to a different indicating position due to the play between said first and second gear means; biasing means operatively connected to said second gear means and to said indicator means for being loaded during movement of said indicator means in said forward direction so that upon manual release of said setting means, said biasing means move said second gear means in an opposite rearward direction until the play between said first and second gear means in said forward direction is eliminated and the initial relative position of said diagram carrier means and said indicator means is restored, said biasing means including a turnable member operatively connected to said second gear means so as to turn with the same, and a stationary spring frictionally engaging said turnable member so as to be tensioned during forward movement of said indicator means; and setting control means including a turnable control member having a gear sector in meshing engagement with said first gear means, a first smooth sector of smaller diameter located adjacent to and on one side of said gear sector, and a second smooth sector of greater diameter located adjacent to and on the other side of said gear sector, said first sector being located opposite said first gear means when said first gear means is turned in said forward direction to permit unlimited turning movement of said first gear means and of said diagram carrier means in said forward direction, said gear sector permitting limited turning movement of said first gear means in said rearward direction through an angle corresponding to the angle of said gear sector, and said second sector blocking turning movement of said first gear means and of said diagram carrier means in said rearward direction beyond said angle when said control member turns to a position in which said second sector is located opposite said first gear means.

10. In a tachograph device, in combination, drive means; turnable diagram carrier means connected to and driven by said drive means in a normal forward movement; a diagram sheet located on said diagram carrier means and having at least one opening being at least partly eccentric to the axis of said diagram carrier means; attaching means for attaching said diagram sheet to said diagram carrier means for turning movement with the same in a predetermined angular position, said attaching means including at least partly eccentric positioning means projecting in axial direction from said diagram carrier means into said opening of said diagram sheet to permit detachment and attachment of said diagram sheet in axial direction, said diagram carrier means with said attaching

means being adapted to be exchanged for another diagram carrier means having differently arranged positioning means thereon corresponding only to a single different type of diagram sheet; turnable indicator means; a stationary dial cooperating with said turnable indicator means; a gear train having play and connecting said diagram carrier means with said indicator means for synchronized turning movement in matching positions, said gear train including first gear means fixedly connected to said diagram carrier means and second gear means in meshing engagement with said first gear means; manually-operated setting means operatively connected to said second gear means for simultaneously setting said carrier means and said indicator means so that upon setting of said diagram carrier means and of said indicator means in said forward direction through said first and second gear means, said indicator means is moved relative to said diagram carrier means and to the diagram sheet to an indicating position not matching the position of said carrier means due to the play in said gear train whereby an error is introduced; and biasing means operatively connected to said second gear means and to said indicator means for being loaded during movement of said indicator means in said forward direction so that upon manual release of said setting means, said biasing means move said second gear means in an opposite rearward direction until the play in said first gear train in said forward direction and said error are eliminated and the initial matching position of said diagram carrier means and said indicator means is restored.

11. In a tachograph device, in combination, drive means; a support including a first dial; turnable diagram carrier means mounted on said support in the region of said dial and having an indicating mark; friction coupling means connecting said diagram carrier means with said drive means; a diagram sheet located on said carrier means; attaching means for attaching said diagram sheet to said diagram carrier means in a predetermined angular position; turnable indicator means; a stationary second dial cooperating with said turnable indicator means; a gear train having play and connecting said diagram carrier means with said indicator means for synchronized turning movement, said gear train including first gear means fixedly connected to said diagram carrier means and second gear means in meshing engagement with said first gear means; manually-operated setting means operatively connected to said second gear means for simultaneously setting said carrier means and said indicator means relative to said first dial so that upon setting of said diagram carrier means and of said indicator means in said forward direction through said first and second gear means, said indicator means is moved relative to said diagram carrier means and to the diagram sheet, to a different indicating position due to the play in said gear train, said friction coupling means permitting relative turning of said diagram carrier means with said diagram sheet and of said indicator means relative to said first dial and said second dial until said indicating mark and said carrier means are located in a desired position relative to said first dial while said indicating means assume a corresponding indicating position relative to said second dial; and biasing means operatively connected to said second gear means and to said indicator means for being loaded during movement of said indicator means in said forward direction so that upon manual release of said setting means, said biasing means move said second gear means in an opposite rearward direction until the play in said first gear train in said forward direction is eliminated and the initial relative position of said diagram carrier means and said indicator means is restored.

12. A device as set forth in claim 11 wherein said attaching means includes a centrally-located projecting element, and an eccentric axially projecting element; and wherein said diagram sheet has one centrally-located open-

ing and an eccentric second opening respectively engaged by said projecting elements.

13. Backlash compensating arrangements, comprising, in combination, drive means; first movable means connected to and driven by said drive means in a normal forward movement; second movable means; a gear train having play and connecting said first and second means for synchronized movement, said gear train including a first gear means fixedly connected to said first means and a second gear means in meshing engagement with said first gear means; setting means operatively connected to said second gear means for setting said first and second means so that upon setting of said first and second means in said forward direction through said first and second gear means, said second means is moved relative to said first means to a different position due to the play in said gear train; biasing means operatively connected to said second gear means and to said second means for being loaded during movement of said second means in said forward direction so that upon release of said setting means, said biasing means move said second gear means in an opposite rearward direction until play in said gear train in said forward direction is eliminated and the initial relative position of said first and second means is restored, said biasing means including a member operatively connected to said second gear means and to said second means so as to move with the same, and a stationary spring operatively connected to said member so as to be tensioned during forward movement of said second means; and setting control means including a turnable control member having a gear sector in meshing engagement with said first gear means, a first smooth sector of smaller diameter located adjacent to and on one side of said gear sector, and a second smooth sector of greater diameter located adjacent to and on the other side of said gear sector, said first sector permitting unlimited turning movement of said first gear means in said forward direction, said gear sector permitting limited turning movement of said first gear means in said rearward direction through an angle corresponding to the angle of said gear sector, and said second sector blocking turning movement of said first gear means and of said first means in said rearward direction beyond said angle.

14. In a tachograph device, in combination, drive means; turnable diagram carrier means connected to and driven by said drive means in a normal forward movement and including means for detachably attaching a diagram sheet in a predetermined angular position; turnable indicator means; a stationary dial cooperating with said turnable indicator means; a gear train having play and connecting said diagram carrier means with said indicator means for synchronized turning movement in matching positions; manually-operated setting means operatively connected to said gear train for simultaneously setting said carrier means and said indicator means so that upon setting of said diagram carrier means and of said indicator means in said forward direction, said indicator means is moved relative to said diagram carrier means and to the diagram sheet to an indicating position not matching the position of said carrier means due to the play in said gear train whereby an error is introduced; and biasing means operatively connected to said indicator means for being loaded during movement of said indicator means in said forward direction so that upon manual release of said setting means, said biasing means move said gear train in an opposite rearward direction until the play in said first gear train in said forward direction and said error are eliminated and the initial matching position of said diagram carrier means and said indicator means is restored.

15. In a device of the type described, in combination, drive means; first turnable indicator means connected to and driven by said drive means in a normal forward movement; second turnable indicator means; a gear train connecting said first and second indicator means for synchro-

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nized movement; setting means operatively connected to said gear train for setting said first and second indicator means so that upon setting of said first and second indicator means in said forward direction, said second indicator means is moved relative to said first indicator means to a different indicating position due to the play in said gear train; and biasing means operatively connected to said second indicator means for being loaded during movement of said second indicator means in said forward direction so that upon release of said setting means, said biasing means move said gear train in an opposite rearward direction until play in said gear train in said forward direction is eliminated and the initial relative position of said first and second indicator means is restored, such biasing means including a spring housing, a gear connected to said spring housing and driven from said gear train, and a spring in said spring housing operatively connected to the same so as to be tensioned during turning movement of said spring housing while said second indicator means and said gear train turn in said forward direction.

16. In a device of the type described, in combination, drive means; first means connected to and driven by said drive means in a normal forward movement; second means; a gear train having play and connecting said first and second means for synchronized movement; setting means operatively connected to said gear train for setting said first and second means in forward and rearward directions so that upon setting of said first and second means in said forward direction through said gear train, said second means is moved relative to said first means to a different position due to the play in said gear train; biasing means operatively connected to said second means for being loaded during movement of said second means in said forward direction so that upon release of said setting means, said biasing means move said gear train in said rearward direction until play in said gear train in said forward direction is eliminated and the initial relative position of said first and second means is restored, said biasing means being unloaded during movement of said second indicator means in said rearward direction under control of said setting means; and setting control means operatively connected to said first gear means and said first means for limiting turning movement of said gear train in said rearward direction to an angle smaller than the turning angle required for complete unloading of said biasing means, while permitting movement of said first means and first gear means in said forward direction.

17. In a tachograph, in combination, a diagram carrier member; at least one indicator member for indicating time periods; drive means for driving one of said members in a normal forward movement; a gear train having play and connecting said carrier member and said indicator member for synchronized movement in matching positions; setting means operatively connected to said gear train for setting said carrier member and said indicator member so that upon setting of said members in said forward direc-

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tion through said gear train, the other of said members is moved relative to said one member to an indicating position not matching the position of said one member due to the play in said gear train whereby an error is introduced; and biasing means operatively connected to said other member for being loaded during movement of said other member in said forward direction so that upon release of said setting means, said biasing means moves said gear train in an opposite rearward direction until play in said gear train in said forward direction and said error are eliminated and the initial matching position of said members is restored.

18. In a tachograph, in combination, drive means; a diagram carrier means connecting to and driven by said drive means in a normal forward movement; indicator means for indicating time periods; a gear train connecting said carrier means with said indicator means for synchronized movement in matching positions, said gear train including a first gear means fixedly connected to said carrier means and a second gear means in meshing engagement with said first gear means and having play with the same; setting means operatively connected to said second gear means for setting said carrier means and said indicator means in forward and rearward directions so that upon setting of said carrier means and indicator means in said forward direction through said first and second gear means said indicator means is moved relative to said carrier means to an indicating position not matching the position of said carrier means due to the play between said first and second gear means whereby an error is introduced; and spring means operatively connected to said second gear means and to said indicator means for being loaded during movement of said indicator means in said forward direction so that upon release of said setting means, said spring means moves said second gear means in an opposite rearward direction until play between said first and second gear means in said forward direction and said error are eliminated and the initial matching position of said carrier means and indicator means is restored.

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