Oct. 11, 1949. J. H. WORTHEN 2,484,771

DIAL INDICATOR MECHANISM

Filed Oct. 17, 1944 2 Sheets-Sheet 1

Fig. 1.

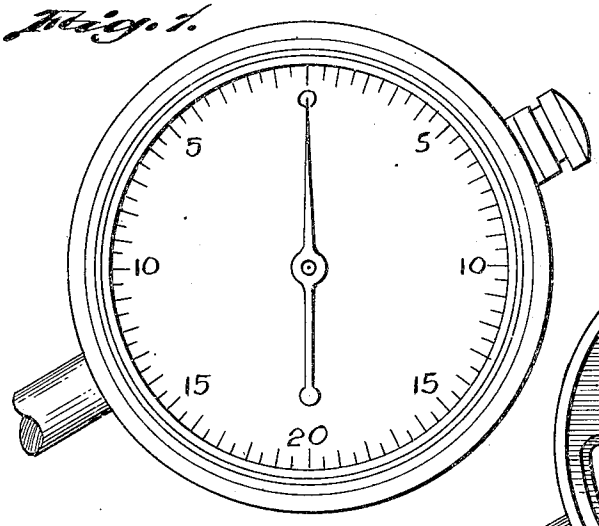


Fig. 2.

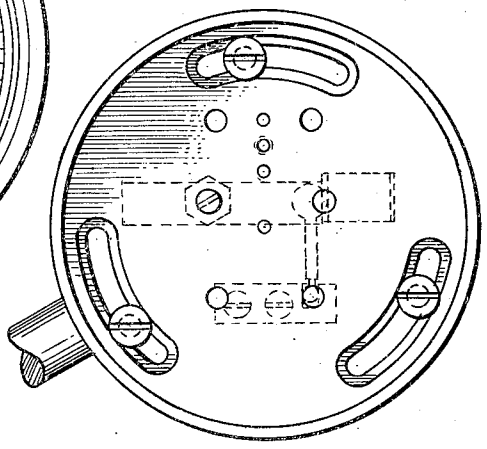


Fig. 3.

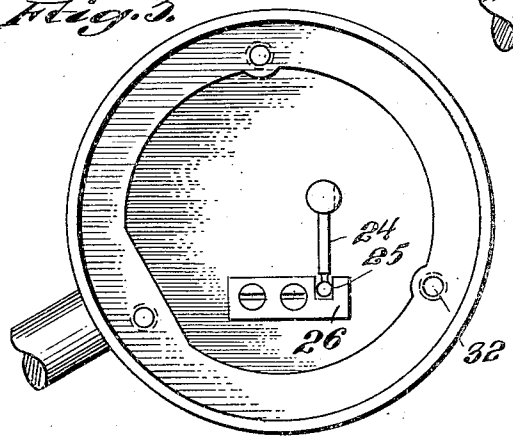


Fig. 4.

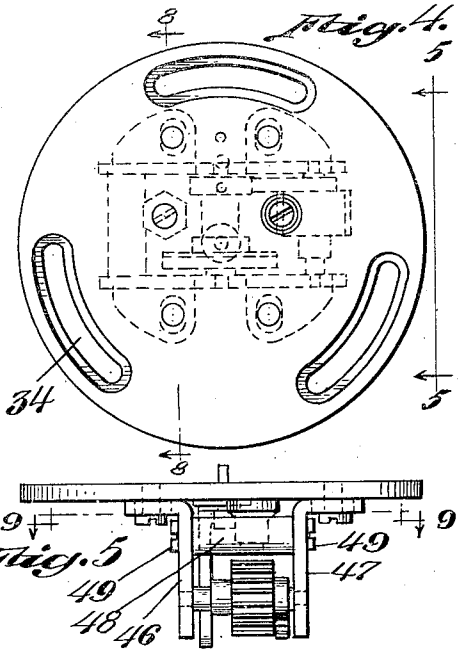


Fig. 6.

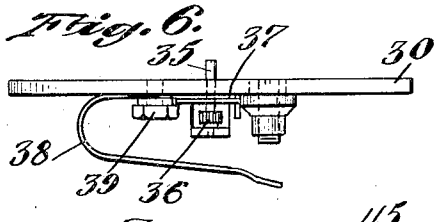
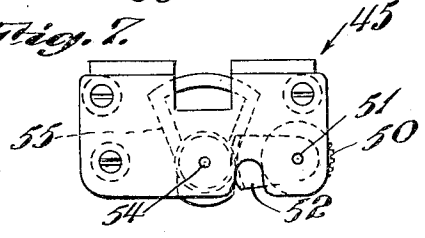


Fig. 5.

Fig. 7.



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Oct. 11, 1949. J. H. WORTHEN 2,484,771

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Filed Oct. 17, 1944 2 Sheets-Sheet 2

Fig. 8.

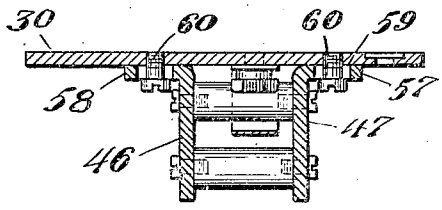


Fig. 9

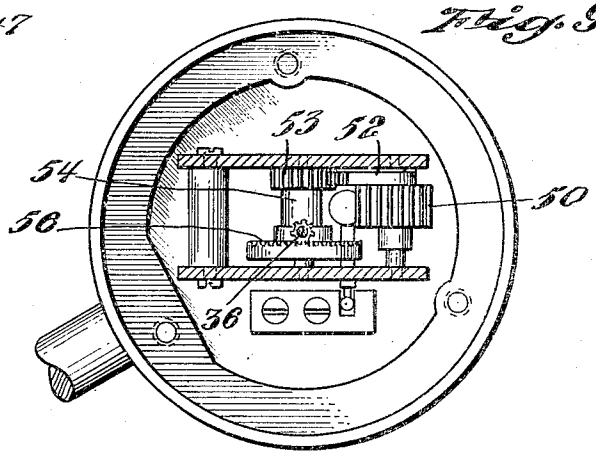
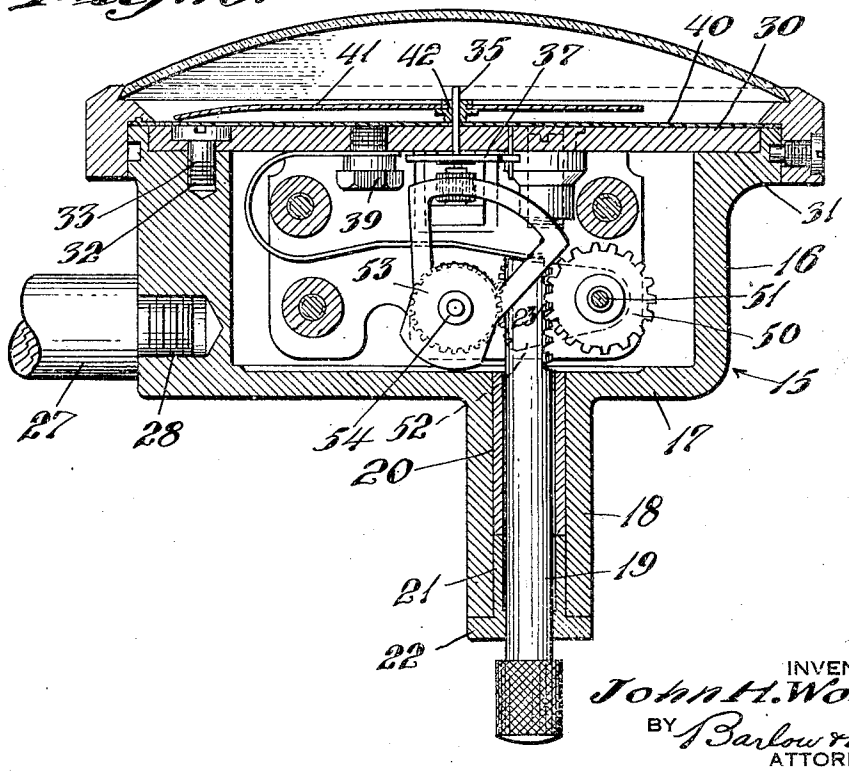


Fig. 10.



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DIAL INDICATOR MECHANISM

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Application October 17, 1944, Serial No. 559,073

3 Claims. (Cl. 74—396)

1

This invention relates to a dial indicator.

In a dial indicator of the perpendicular spindle type, wherein the spindle is at right angles to the dial, a crown gear is used for meshing with the pinion of the staff of the indicator hand and frequently there is a problem of obtaining the proper mesh between such crown gear and pinion on the end of the staff. It also frequently occurs that some difficulty is experienced in the proper location of the pinion which engages the rack on the spindle or operating plunger.

One of the objects of this invention is to provide an arrangement whereby the crown gear may be nicely meshed with the pinion on the indicating hand staff.

Another object of this invention is to provide adjustment between the gear train mechanism for transmission of motion and the pinion on the indicating hand staff so that the entire gear train may be adjusted for mesh with this pinion.

Another object of this invention is to provide an arrangement whereby the front plate may carry the gear train and the assembly may be adjusted for nice mesh of the gear train with the rack of the spindle.

Another object of this invention is to provide a completely separable unit which may be replaced by other units whereby units may be arranged for various multiplications of movement transmission between the spindle rack and the pinion for the indicator hand.

Another object of this invention is to provide a movement of such design that the distance between the gear which meshes with the rack and the gear which meshes with the pinion on the indicator hand staff will be fixed although these may be of different sizes or the train of gears may vary as to various multiplications which may be had.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

Fig. 1 is a plan view of the dial indicator with the mounting support shown broken off;

Fig. 2 is a plan view of the casing with the front plate although the dial, bezel, and crystal are removed;

Fig. 3 is a plan view looking into the end of the case with the front plate shown in Fig. 2 and the unit mounted thereon removed;

Fig. 4 is a plan view of the front plate with the unit mounted thereon shown in dotted lines;

2

Fig. 5 is an edge view of the showing in Fig. 4 on substantially line 5—5 of Fig. 4;

Fig. 6 is an edge view of the plate and the parts attached thereto with the gear train movement removed;

Fig. 7 is an elevation of the gear train movement alone and separated from the plate shown in Fig. 6;

Fig. 8 is a sectional view on substantially line 8—8 of Fig. 4;

Fig. 9 is a sectional view on substantially line 9—9 of Fig. 5 also showing the casing into which the unit is placed;

Fig. 10 is a sectional view through the dial indicator plate and unit in assembled relation in the casing, the sectional showing being somewhat modified from a straight line in order to bring in the relation of the various parts.

In proceeding with this invention the casing with its spindle or plunger is provided with a front plate for closing the casing upon which plate the dial is mounted and through which the staff which carries the hand to move over this dial extends. This front plate carries this indicating hand staff which is provided with a pinion. I arrange a completely separable unit to connect the rack on the plunger and a pinion on the indicator hand staff which unit may be provided with various multiplications of movement. I also provide for an adjustable connection between this unit and the plate that proper meshing relation between the pinion on the indicating hand staff and the actuating gear of the unit may be had. Further, this plate is provided with an arrangement for movement relative to the casing so that after the unit is mounted on the plate the entire plate and unit may be adjusted for meshing a pinion carried by the unit with the rack.

With reference to the drawing, the casing is designated generally 15 and comprises a cylindrical side wall 16 having an integral bottom wall 17 with a stem 18 extending from this bottom wall to slidably mount the spindle or plunger 19 in bushings 20 and 21 the latter of which is flanged as at 22. The inner end of this plunger 19 is provided with rack teeth 23 and carries an arm 24 to extend into a slot 25 in a block 26 so as to prevent turning of this plunger or spindle about its longitudinal axis. A suitable supporting rod 27 is threaded as at 28 into the casing for supporting the indicator in various positions.

A front plate 30 provides a closure for the hollow casing 15 by fitting into a recess 31 formed in the enlarged upper edge of the wall 16 to re-

ceive it. Threaded holes 32 are provided at suitable locations in this recess for the holding of the plate in position. Bolts 33 pass through slots 34 of the plate into these threaded openings 32 for adjustably holding the plate in position. This plate 30 has a staff 35 rotatably mounted thereon which staff carries a pinion gear 36. A hair spring 37 tends to rotate this staff in one direction, the plate also carries a leaf spring 38 one end of which engages the plunger or spindle 19 so as to move the same outwardly from the casing. The spring 38 is held in position on the plate 30 by the bolt 39.

A dial 40 is fixedly mounted on the face plate 30 while a dial hand 41 is mounted on staff 35 by means of hub 42 so as to rotate over this dial in response to motion which is transmitted thereto.

In order to cause the rack teeth of the plunger 19 to move pinion 36 on the staff 35 and consequently move the hand 41 I provide a unit designated 45 which is shown alone in Fig. 7 in which a gear train is provided for connection between the rack 23 and the pinion 36. This unit consists of a pair of plates 46 and 47 which are held together by a plurality of posts 48 into which bolts 49 extend so as to hold these plates in proper spaced relation and provide a frame or holder for the gear train mechanism which is to be contained in this unit. This gear train consists of a pinion gear 50 on a shaft 51. Also mounted on this shaft 51 is a gear segment 52, which gear segment meshes with gear 53 mounted on shaft 54. Also mounted on this shaft 54 is a segmental gear 55 which segmental gear has crown gear teeth 56 to mesh with pinion 36 on the indicating hand staff. The plates 46 and 47 of this unit are bent outwardly to provide flanges 57 and 58 which are provided with slots 59 through which bolts 60 extend into the plate 30.

In assembling this unit on the plate, relative movement between the unit and the plate may occur, because of these slots 59, while the bolt 60 may act to clamp the unit on the plate in the desired adjusted position. By this arrangement the crown gear 56 may be properly meshed with the pinion 36 so as to provide a proper operating position. After the unit is mounted on the plate 30, the plate and unit is then positioned in the casing and the plate may be adjusted circularly in the casing by reason of slots 32 so as to bring the pinion 50 into mesh with the rack teeth 23 so that a proper meshing relation of these two may be had. Thus, it is readily apparent that a meshing relation of the two parts may be provided in a very convenient and simple manner.

It will be readily apparent that units such as 45 providing various multiplications may be provided, it being only required that the relative position and distance between the pitch lines of the teeth of the gear 50 and the teeth of the crown gear 56 be always the same distance apart whereby meshing may be had with the rack and with the pinion 36 for conveying motion from one to the other.

I claim:

1. In a dial indicator, a hollow casing, a plunger having rack teeth extending into the hollow of the casing, a front plate for the casing, an indicator hand staff rotatably carried by said plate and having a pinion on the said staff, a unit comprising a means to transmit motion from said rack to said pinion, means to adjust said unit with reference to said plate and means to adjust the plate and unit with reference to said rack.

2. In a dial indicator, a hollow casing, a plunger having rack teeth extending into the hollow of the casing, a front plate for the casing, an indicator hand staff rotatably carried by said plate and having a pinion on the said staff, a unit comprising a train of gears to transmit motion from said rack to said pinion including a gear to mesh with said pinion and a gear to mesh with said rack, means to adjust said unit with reference to said plate for meshing of said gear with said pinion and means to adjust the plate and unit with reference to said rack for meshing of another of said gears with said rack.

3. In a dial indicator, a casing, a plunger having rack teeth extending into the hollow of the casing, a front plate for the casing, an indicator hand staff rotatably carried by said plate and having a pinion on the said staff, a unit comprising a train of gears to transmit motion from said rack to said pinion including a crown gear to mesh with said pinion and a pinion gear to mesh with said rack, means to adjust said unit with reference to said plate for meshing of said crown gear with said pinion and means to adjust the plate and unit with reference to said rack for meshing of said pinion gear with said rack.

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