April 9, 1940. C. LURTZ 2,196,532

GEAR TRAIN ASSEMBLY

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Fig. 1.

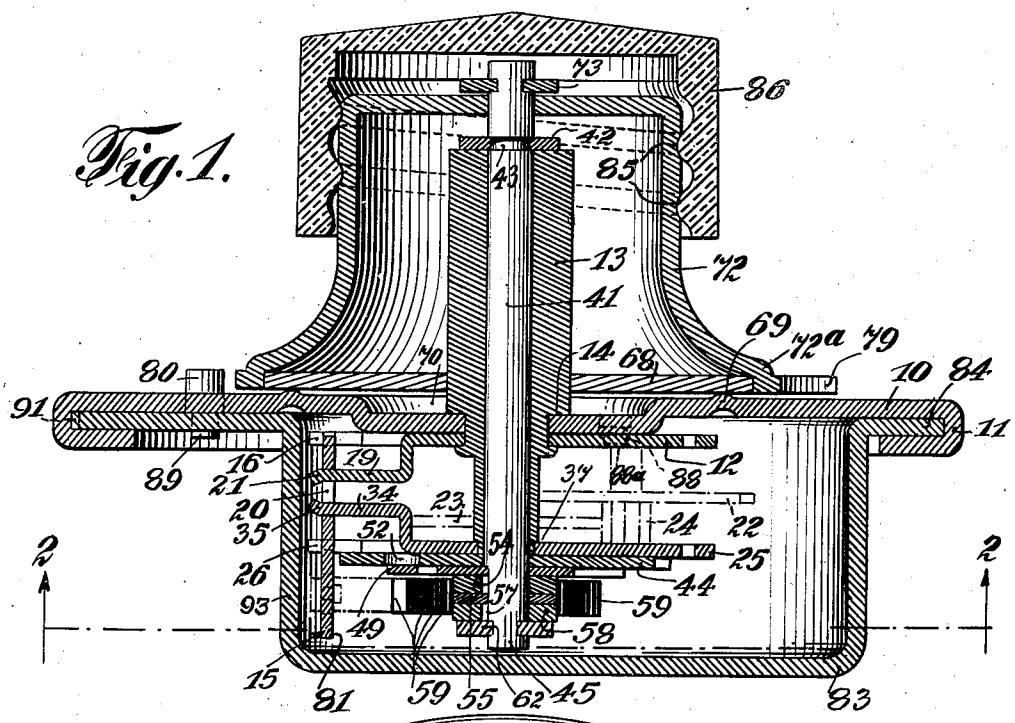
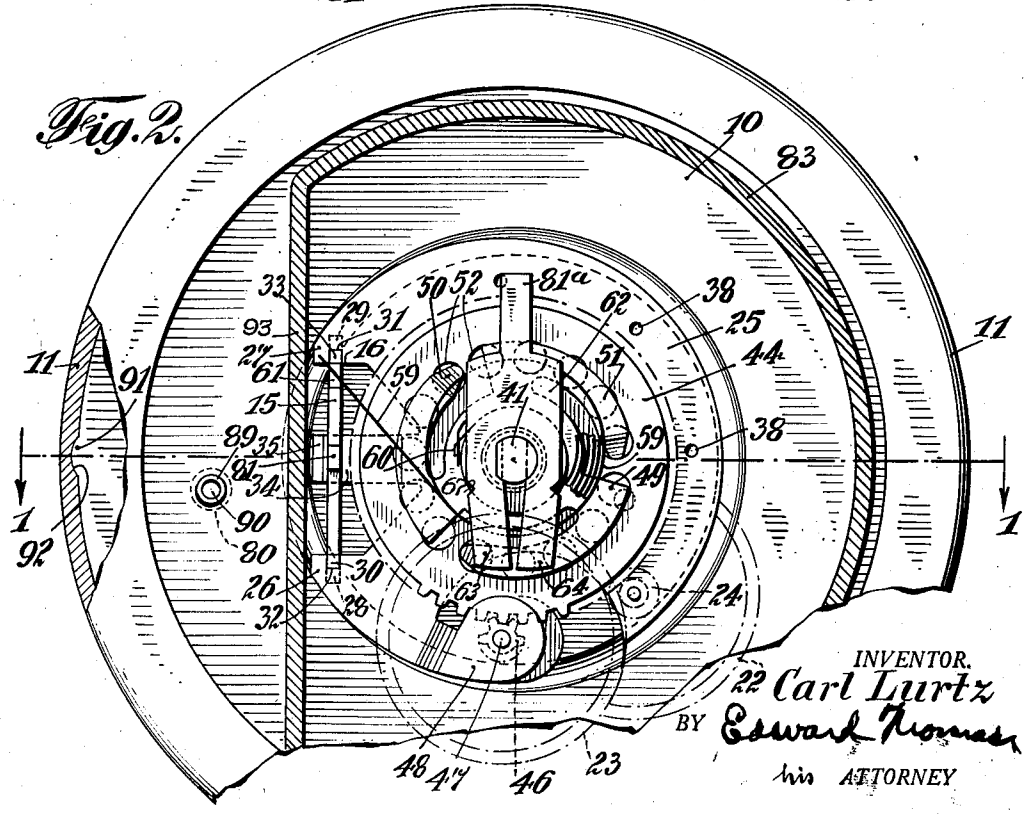


Fig. 2.



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Fig. 6.

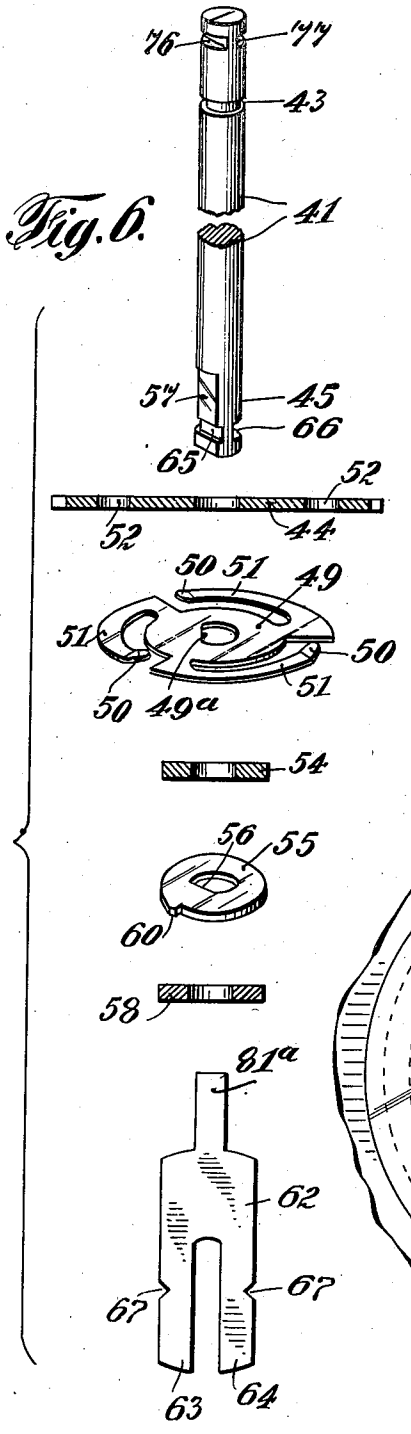


Fig. 3.

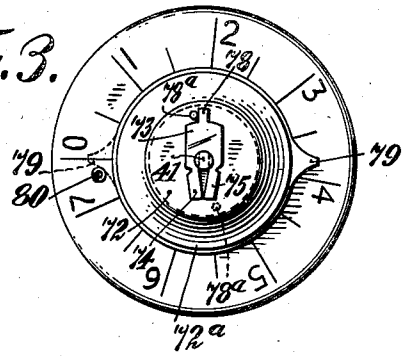


Fig. 5.

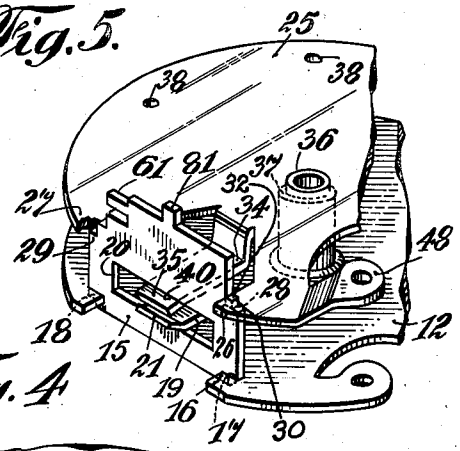
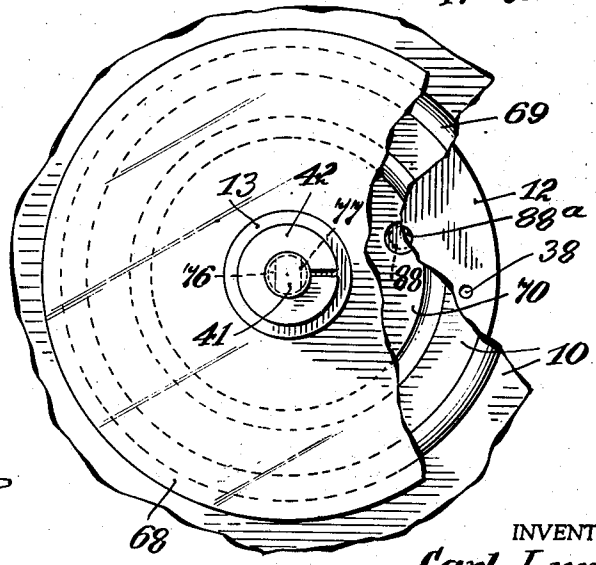


Fig. 4



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UNITED STATES PATENT OFFICE

2,196,532

GEAR TRAIN ASSEMBLY

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Application May 13, 1935, Serial No. 21,207

17 Claims. (Cl. 161—15)

This invention relates to gear train assemblies and is herein illustrated as embodied in an easily assembled escapement-controlled timing unit.

Economical assembling of gear train and escapement controlled units has long baffled designers of clocks and other timing mechanisms. In the past the workman or woman assembling the parts has usually found it necessary to hold several gears with the fingers of one hand while fitting a mechanism plate or journal plate over the small projecting pivots or shaft ends with the other hand. Then the workman usually has had to insert and screw down several screws through the journal plate into four or more corner posts.

Sometimes templates or pigs have been employed as an aid, but using these entailed extra motions by the workman and consequently consumed time which might be saved by the present invention.

According to the present invention the foregoing and other difficulties are overcome, and a compact, rugged, easily assembled gear unit is provided which requires neither screws nor templates and eliminates the need for the waste motions hitherto involved.

In the accompanying drawings:

Figure 1 is a section on the line 1—1 of Figure 2 through a timing unit embodying one form of the present invention, most of the gearing being omitted and most of the rest being shown in dotted lines.

Figure 2 is a bottom sectional view of the same on the line 2—2 of Figure 1.

Figure 3 is a top view on a smaller scale.

Figure 4 is a fragmentary plan view with parts broken away.

Figure 5 is a fragmentary perspective view of the journal plates in position together with a few adjacent parts.

Figure 6 is an exploded view of the main shaft and some parts carried by it.

A housing cover 10, has a flange 11 upon which is riveted a mechanism plate 12 to which in turn is fast a hollow center post 13. In the form shown the post 13 has a shoulder 14 resting upon the outside of the cover 10 and is upset over the under side of the plate 12 so as to rivet the two together.

To assemble the parts a plate spacer 15 is set into a cut out opening 16, so that shoulders 17 and 18 of the spacer rest upon the face of the mechanism plate 12. When the shoulders 17 and 18 thus rest the plate spacer is swung vertical so that a tongue 19 struck out of the mechanism plate 12 projects through an opening 20 in the spacer, and, lying against the lower edge of the opening steadies the spacer. To facilitate this swinging the end 21 of the tongue 19 is turned up out of the way of the bottom of the opening 20.

Next the train of gears forming the movement is inserted. In the form shown the gear 22 is first inserted and the gear 23 is inserted, meshing with a pinion 24 fast on the shaft of the gear 22.

Other gears or time regulating elements such as escapement elements are usually inserted at this time, so far as they have a bearing in the mechanism plate 12.

A second mechanism plate 25 is then inserted so that its little prongs 26 and 27 rest upon shoulders 28 and 29 of the plate spacer 15, and tenons 30 and 31 enter mortises 32 and 33. On the second mechanism plate 25 projects a tongue 34 having a bent over end 35 like the end of the tongue 19 to facilitate the entering of the tongue 34 into the opening 20. As the second mechanism plate 25 swings to its assembled position with its central opening 36 seated on a shoulder 37 of the center post, at the height of the shoulders 28 and 29, the tongue 34 acts as spring tending to face the plate 25 into final position, thus eliminating any need for manual pressure while the pivots of the gears are being adjusted into alignment with their journal holes, such as are shown at 38.

On the other hand the tongue 34 is so formed relative to the shoulders 28 and 29 and the adjacent edge 40 of the opening 20 that it springs the mechanism plate 25 away from the shoulder when the plate is slanted upward.

When the mechanism plate 25 is holding the pivots of the gears aligned the shaft 41 is inserted through the housing cover 10 in the form shown, and a split washer 42 is fitted into a groove 43 in the shaft 41, and the shaft shoved home.

Then a center gear 44 is slipped on over the projecting end 45 of the shaft 41 so that it lies upon the outer face of the mechanism plate 25, and meshes with a small pinion 46 fast on the shaft 47 of the pinion or gear 23, which for this purpose projects above the level of the mechanism plate 25. To form a journal for the shaft 47 of the pinion 46 the mechanism plate 25 is provided with a struck up arm 48 in which the shaft 47 turns.

A pawl disc 49 is then slipped over the pro-

jecting end 45 so that the bent ends 50 of its flexible prongs 51 tend to enter openings 52 in gear 44 and normally engage the openings 52, the number of openings varying with the varying intervals for which the timing device is desired to be set.

An economical hub for the pawl disc 49 is shown as provided by a washer 54 upon which is superposed a second or central washer 55 having flat face 56 to bear against a flat face 57 of the shaft 41. Upon the washer 55 lies a third washer 58, thus providing an anchorage for the main spring 59, which hooks over a projecting tooth 60 of the central washer 55. The pawl disc 49 turns as a unit with the shaft 41 and the washer 55, because it includes a flat face 49a lying against the flat face 57 of the shaft 41.

The free end of the spring 59 is then hooked over a tooth 61 projecting horizontally from the plate spacer. Then a stirrup 62 is slid across the shaft 41, fitting its legs 63 and 64 into notches 65 and 66 in the shaft, holding the spring against buckling and all the parts in place. To prevent the stirrup from slipping out its legs 63 and 64 are pinched toward each other as seen at Figure 2. To cause this bending to take place properly each leg is provided with a notch 67.

A disk 68 is then slipped over the opposite end of the shaft 41 so as to lie next to the cover 10 and rests upon an annular ridge 69 stamped out of the cover 10, so that the disk clears any rough spot. The cover 10 also includes a depression 70 forming a seat for the central part of the mechanism plate thus providing clearance in the rest of the plate for the projecting ends of any pivots.

The spring is normally wound up by turning a knob 72 which fits over the shaft 41 and is provided with a flaring outer edge 72a which rests upon the disk 68. To cause the knob 72 to turn the shaft 41, a stirrup 73 is slipped across the flat outer end of the knob so that its legs 74 and 75 engage notches 76 and 77 in the shaft 41, and so that its projecting lug 78 bears against a post 72a struck out of the knob, and is turned by the knob. This stirrup 73 holds the knob in place on the shaft.

The device herein shown is adapted to operate in a single revolution, and to prevent further turning in either direction a lug 79, which may serve as an indicator upon an adjacent scale divided into minute intervals of time, is provided and is adapted to strike a pin 80 in the cover 10 to arrest the knob 72 at the end of a revolution either in winding or unwinding.

The unwinding of the spring is limited by the stop 81 on the spacerplate 15 which lies in the path of a lug 81a projecting from the stirrup 62 which rotates with the shaft 41, and serves to this end during the remaining assembling operation.

The knob 72 can be turned freely backward without rotating the shaft, thus eliminating the possibility of wrecking the mechanism by attempting to turn it in spring unwinding direction.

The long shaft 41 and the closely fitting long hollow central post 13 together form a long bearing which keeps dirt and moisture from reaching the mechanism under the cover 10.

In the form shown the mechanism is especially adapted to serve as an egg-boiling timer, and, to further keep the mechanism dry and clean, it is covered with a cup-shaped member 83, shown as stamped out of sheet metal, and provided with a projecting flange 84 to lie against the housing cover 10. In the form shown the outer periphery of the cover 10 has the edge of its flange 11 turned over under the flange 84 thus completely sealing the mechanism.

The knob 72 may be provided with a thread 85 upon which is screwed down a fingerpiece 86.

To ensure proper coordination of various parts including the stop 80, the lug 78 on the stirrup 73, and the lug 81a, there is provided an aligning pin 88 projecting from the cover 10 and adapted to enter a suitable opening 88a in the adjacent mechanism plate.

The cup or mechanism housing 83 is shown in Figure 2 as having a flat wall 93 adapted to lie close to the spacer plate 15, and thus provide space for a pin such as the stem 89, which is provided with a through passage 90.

To facilitate aligning of the parts in assembling the mechanism housing or cup 83 is shown as provided with a lug 91 on its flange which is adapted to fit into a corresponding notch 92 on the flange 11.

Having thus described certain embodiments of the invention, what is claimed is:

1. A device including a train of gears having shafts, a mechanism plate in which the gear shafts are journalled, a plate spacer, a second mechanism plate swinging upon the plate spacer to and from the first plate, and a spring tending to swing the second plate down upon the shafts to form a set of journals therefor.

2. A device including a train of gears having shafts, a mechanism plate in which the shafts are journalled, a plate spacer having shoulders, mounted upon the mechanism plate, a second mechanism plate having prongs to engage the plate spacer and rest upon said shoulders, and a spring bearing against the plate spacer and tending to swing the second plate down upon the shafts to form a set of journals therefor.

3. A device including a train of gears having shafts, a mechanism plate in which the shafts are journalled, a plate spacer having shoulders adapted to rest on the mechanism plate and swinging on certain of said shoulders, a second mechanism plate having prongs to engage the spacer plate and rest on other shoulders thereof and also including mortises formed by the prongs, tenons on the spacer plate entering the mortises, so that the second mechanism plate swings on the prongs, and a spring member extending from the second mechanism plate and engaging the plate spacer and tending to swing the second plate down upon the shafts to form a set of journals therefor.

4. A device including a train of gears, a pair of mechanism plates between which the train lies and on which the shafts thereof are journalled, a drive shaft passing through the plates, a pawl disc held to the shaft, a ratchet wheel driving the train and lying between the pawl disc and the adjacent plate, a stirrup lying in grooves in the shaft and holding the ratchet wheel against the plate and means engaging the shaft beyond the further plate holding that plate.

5. A device including a train of gears, a pair of mechanism plates between which the train lies and on which the shafts thereof are journalled, a main spring outside the plates, a shaft passing through the plates, a pawl disc held to the shaft, a ratchet wheel driving the train and lying between the pawl disc and the adjacent plate, a stirrup lying in grooves in the shaft and holding the pawl disc against the ratchet wheel,

and a stirrup engaging grooves in the shaft beyond the further plate holding that plate.

6. A device including a train of gears, means for driving the gears, first and second mechanism plates between which the train lies and on which the shafts thereof are journalled, a plate spacer at one side of the mechanism plates, shoulders on the plate spacer adapted to fix the position of the mechanism plates relative one to another, a main-shaft extending through the mechanism plates, a post surrounding the main-shaft over a considerable part of its length and including shoulders against which both mechanism plates respectively bear, a gear wheel journalled on the main-shaft and lying outside the adjacent mechanism plate, said gear wheel meshing with one of the gears of the train, a clutch device whereby the gear wheel is caused to turn with the main-shaft when the gear train is actuated by said driving means, and means on the main-shaft for holding the gear wheel against its adjacent mechanism plate.

7. A device including a train of gears, first and second mechanism plates between which the train lies and on which the shafts thereof are journalled, a spacer plate at one side of the mechanism plates held non-rigidly interlocked therewith, a spacer post, having an axial bore, located at a distance from said spacer plate and fixed with one end to the first mechanism plate, a shoulder on said spacer post against which the second mechanism plate bears, a main-shaft connected to the gear-train and journalled in the bore of said spacer post, and means for holding the second mechanism plate in fixed position when lying against the shoulder of said spacer post whereby displacement of the mechanism plates from their position of assembly with the interlocked spacer plate is prevented.

8. A gear train device including a closed casing having only a small opening, gearing inside the casing, a driving shaft connected to the gears and projecting through the opening in the casing, a long hollow post forming a bearing for the driving shaft, a pair of mechanism plates serving as journals for the gears, and spaced shoulders on the said post whereby the mechanism plates are supported.

9. A gear train device including a casing, a train of gears inside the casing, a spring, a shaft turned by the spring and connected to the gears, a pair of mechanism plates forming journals for the gears, a post forming a long journal for the shaft and also spacing the mechanism plates, and means engaging opposite ends of the shaft holding the mechanism plates together.

10. A gear train including a closed casing, a train of gears inside the casing, a driven shaft connected to the gears, a mechanism plate surrounding the shaft and lying against the casing, another mechanism plate, a plate spacer holding the mechanism plates apart at one edge so they serve as journals for the gears, a mortise and tenon joint holding one mechanism plate to the spacer plate, and means engaging the shaft to hold the mechanism plates against the plate spacer.

11. A gear train including a closed casing, a train of gears inside the casing, a driven shaft connected to the gears, a mechanism plate surrounding the shaft and lying against the casing, another mechanism plate, a plate spacer holding the mechanism plates apart at one edge so they serve as journals for the gears, a mortise and tenon joint holding one mechanism plate to the plate spacer, and means engaging the shaft to hold the mechanism plates against the plate spacer and an anchorage for the spring in the plate spacer.

12. A device including a gear train, a pair of mechanism plates, in which the gears are journalled, a spacing device, a gear wheel engaging with a gear of said train and lying outside of a mechanism plate, a shaft passing through the mechanism plates on which the gear wheel is journalled, and means on the shaft holding the plates and gear wheel in position.

13. A device including a gear train, a pair of mechanism plates, in which the gears are journalled, a spacing device, a flat ratchet wheel carrying teeth engaging with a gear of said train and lying outside of a mechanism plate, a shaft passing through the mechanism plates on which the flat ratchet wheel is journalled, and means on the shaft holding the plates and flat ratchet wheel in position.

14. A device including a gear train, a pair of mechanism plates, in which the gears are journalled, a spacing device, a flat ratchet wheel engaging with a gear of said train, a flat pawl disc lying upon the ratchet so that its pawls engage the ratchet wheel, said pawl disc and ratchet wheel lying outside of a mechanism plate, a shaft passing through the mechanism plates on which the pawl disc is fast, and means on the shaft holding the plates and pawl disc in position.

15. A device including a main spring and a train of gears, a shaft having a flat face, a gear wheel journalled on the shaft, a hub member slidable loose on to the shaft and having a flat face to turn the shaft and also having a projection to hold one end of the spring, a flexible member between the gear wheel and the said hub member and a stirrup lying in grooves in the shaft and holding the slidable hub member against the said flexible member, pressing the latter against the gear wheel.

16. A gear train including a closed casing, a train of gears inside the casing, a driven shaft connected to the gears, the former extending to the outside of the casing, a pair of mechanism plates forming journals for the gears, a stationary post forming a journal for the drive shaft, and spaced shoulders on said stationary post whereby the mechanism plates are supported in spaced relation.

17. A device including a train of gears, first and second mechanism plates between which the train lies and on which the shafts thereof are journalled, a spacer plate at one side of the mechanism plates, shoulders on the said spacer plate serving to fix the position of the first and second mechanism plate relative to each other, a main shaft extending through the mechanism plates, a post surrounding the main shaft over more than the space between the first and second mechanism plate, said post including shoulders against which both mechanism plates bear, a gear wheel mounted on the main shaft and lying outside the adjacent mechanism plate, a spring for driving the main shaft, a coupling device held to the main shaft for driving the gear wheel during rotation of the main shaft in a spring-de-energizing direction, and means on the main shaft whereby the coupling device is pressed against the gear wheel and the gear wheel against the mechanism plate.

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