Aug. 30, 1932. H. S. MARSH 1,874,775

SEPARABLE GEAR ASSEMBLY

Filed April 22, 1930

Fig. 1.

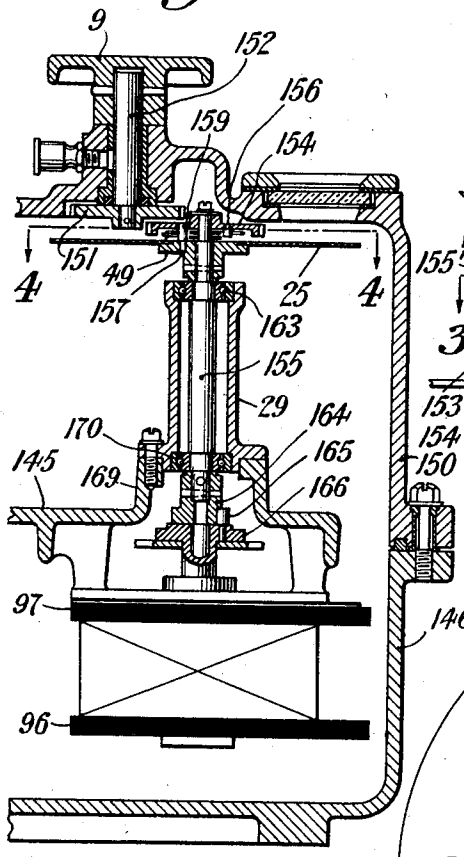


Fig. 2.

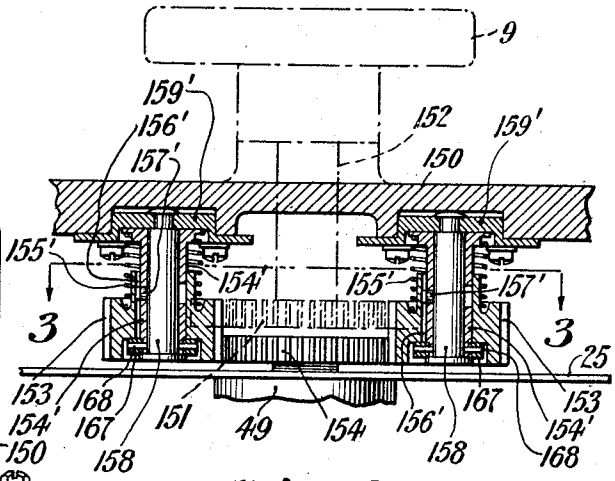


Fig. 3.

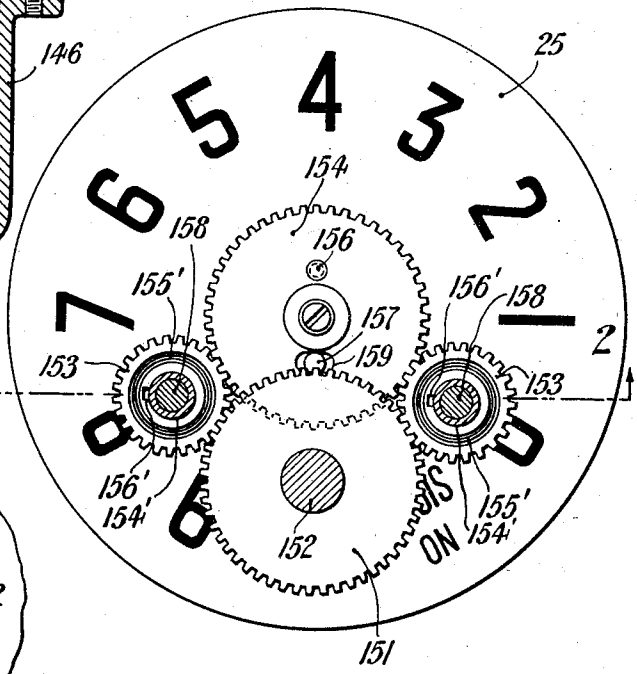
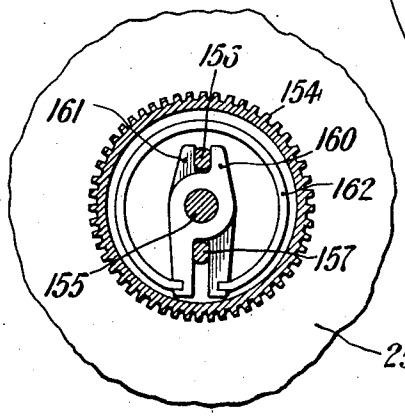


Fig. 4.



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Patented Aug. 30, 1932 1,874,775

UNITED STATES PATENT OFFICE

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SEPARABLE GEAR ASSEMBLY

Application filed April 22, 1930. Serial No. 446,247.

This invention relates to separable gear assemblies, and particularly to such assemblies as have part of the gears mounted in one structure, as a casing, and other gears co-operative with the first mentioned gears, but which are mounted in another structure, as a cover for the casing. An object of the invention is to effect an arrangement and association of gears by which two structures, as the casing and its cover, each supporting but part of a set of gears, may be applied one to the other without impedance due to failure of the gears to get properly into mesh as the application of one of the structures to the other is made. Other advantages of the novel separable gear assembly will appear hereinafter, and are, of course, to be understood as forming part of the invention.

In the drawing,

Fig. 1 is a fragmentary vertical section of a portion of an instrument, showing the separable gear assembly;

Fig. 2 is another fragmentary vertical section viewed at right angles to the section of Fig. 1 and taken on the line 2—2 of Fig. 3;

Fig. 3 is a section taken on the line 3—3 of Fig. 2, being viewed in the direction of the arrows and showing the separable gear assembly in plan view; and

Fig. 4 is a section on the line 4—4 of Fig. 1 and shows the centralizing device associated with the switch there illustrated.

Referring to the drawing, when the cover 150 is placed upon the casing 146, it is guided accurately into place without the necessity exceptional care on the part of the workman making the assembly. The gears of the separable gear assembly are partially shown in Fig. 1, and are more clearly shown in Figs. 2 and 3. One of these gears 151 is secured to the lower end of a short vertical shaft 152 which carries at its upper end an operating knob designated as 9. Reference to Figs. 2 and 3 will show that the gear 151 actuated by the knob 9 meshes with pinions 153 that in turn mesh with another gear 154 mounted as seen in Fig. 1 upon the upper end of a vertical shaft 155.

There is a circular recess in the underside of gear 154, and projecting into it is a pin 156 secured to the gear. Diametrically opposed to pin 156 is another pin 157 secured to the hub 49 of the dial 25 of the switch unit. The pin 157 projects into an elliptical recess 159 in the gear 154, as best seen in Fig. 3. The pins 156 and 157 co-operate with a double jawed device comprising levers 160 and 161. The longer arms of the levers 160 and 161 are notched near their outer extremities and receive the ends of a spring pressure annulus 162 which tends to press them together, so as to grip the pins 156 and 157.

In view of the here-described-construction, it will be plain that the actuation of the knob 9, seen in Fig. 1, turns the shaft 152 and gear 151, the pinions 153 revolving in response to this action and driving the gear 154. Consequently, pin 156 travels in an annular path rotating the spring pressed levers 160 and 161 thereby in turn driving pin 157 which, of course, turns the hub 49 and the dial 25 of the switch unit. It is apparent that shaft 155 mounted in ball bearings 163 and 170 also turns and through the coupling comprising the member 164 attached to the lower end of shaft 155, the pin 165 and the hub 166 actuates the drum of the switch unit.

Referring to Figs. 2 and 3, it will be seen that the pinions 153 are mounted on sleeves 154′ to slide longitudinally thereof against the action of springs 155′. These springs bear against upper enlarged portions of the sleeves 154′ and socketed upper faces of the pinions 153, normally tending to thrust the pinions 153 downward, so that they will be in mesh with both gears 151 and 154. The pinions have keyways 156′ into which project the squared ends of pins 157′ anchored in the sleeves 154′, thereby establishing the unified rotation of the pinions 153 and sleeves 154′ about central pins 158 which are riveted to seat members 159′ fastened in the top of the cover 150. The bottom end of each pin 158 is flanged to retain a thick washer 167 fitted tightly onto the lower end of the sleeve 154′ with which it is associated. Pairs of opposed pins 168 pass through the washers 167 locking them in place, but such pins do not penetrate the central pins 158. Therefore the pinions 153 and their sleeves 154′ are

free to spin on the central pins 158 when they are driven by the gear 151.

In view of the construction just described, when the cover 150 is placed upon the casing 146, if the teeth of the pinion 153 do not properly align with the notches between the teeth of the gear 154, they will slide upwardly of their sleeves 154′, and not interfere with the assembling of the internal parts. Subsequent turning of the handle 9 will cause the pinions 153 to rotate, whereupon any that are not in mesh will slip into mesh as their teeth are brought into register with the notches in the gear 154.

The switch unit is mounted upon a mounting plate 145 situated approximately midway the height of the interior of the instrument casing. Other similar switch units may be mounted on the mounting plate 145 for operating other dials. The switch shown in Fig. 1 has spaced upper and lower commutator drum frame insulating plates 97 and 96, respectively, between which it is to be understood there is located the rotatable switch drum referred to hereinbefore. The stem 29, as shown in Fig. 1, is mounted upon a hollow boss 169 that is integral with the mounting plate 145. As seen in the drawing, the stem 29 serves to hold ball bearings 163 and 170 for the shaft 155.

I claim:

1. In apparatus of the character described, a device having a rotatable element, a gear on said element, a cover-supporting structure in predetermined relationship to said device, a removable cover, a gear journalled therein, and spring-pressed gears in balanced arrangement meshing with the gear on the cover and yieldable to permit placing of the cover in position with respect to said structure irrespective of the meshing of the balanced gears and to cause such meshing upon a slight turn of the gear on the switch cover.

2. In apparatus of the character described, a device having a rotatable member, a gear attached to said member, a driving gear having its axis offset with respect to the axis of the first gear and intermediate gears in balanced arrangement to mesh with both of said gears on opposite sides of the plane passing through the axes of the first mentioned gears, said intermediate gears and one of said other gears being maintained in permanent co-operative relation and displaceable axially into and out of co-acting combination with the remaining gear.

3. In a device of the character described, a device having a rotatable member, a gear having an energy-storing connection with said device, and a separately combined operating mechanism to be placed over said rotatable member and comprising a gear above the plane of the first mentioned gear, a thick gear to mesh with both the first and second gears, and spring supporting means for said thick gear to permit it to yield when engaged by a side face of one of the first and second gears and to move it into mesh with such gear upon relative turning thereof.

4. In apparatus of the character described, a device having a rotatable shaft, a gear on the free end of said shaft, a cover for said device, a shaft journalled in said cover, a gear on the lower end of the second shaft, a thick pinion meshing with the second mentioned gear and spring-pressed toward the first mentioned gear so as to yield in case of failure to mesh with said first mentioned gear and to slip into mesh therewith when turned into proper relation with said first mentioned gear.

5. In apparatus of the character described, a support, devices mounted thereon, gears connected with said devices for operating the same, a cover, gearing mounted on said cover, and means to enable the cover to be placed on said support irrespective of the position of the gears and to insure operative connection therebetween when operated.

6. The combination with different structural members movable into predetermined rigid but separable correlation, of gears mounted on the different structural members, gears intermediate to said other gears in continuous mesh with and urged to seek meshing engagement with the gears respectively mounted on said different members.

7. The combination with different structural members movable into predetermined rigid but separable correlation, of driving and driven gears respectively mounted on the different structural members, a gear intermediate said driving and driven gears rotatably mounted on one of said members for axial displacement, and means urging said intermediate gear to seek meshing engagement with the gear mounted on the other of said members from which said intermediate is separable when said members are separated.

8. The combination with structural members to be separably united, of a driving gear mounted on one of said members, a driven gear mounted on the other of said members, an axially displaceable intermediate gear having a rotational axis parallel to the rotational axes of said other gears and continuously in mesh with one of the last named gears, and means axially urging said intermediate gear for meshing engagement with said driven gear upon said members being united and rotation of said driving gear.

9. In apparatus of the character described, driving and driven shafts, separate supports for said shafts movable into unified correlation, a driving gear fast on said driving shaft, a driven gear loosely mounted on said driven shaft, an axially displaceable intermediate gear rotatably mounted on the support for said driving gear retained in continuous

mesh with the latter gear and urged in a direction to mesh with said driven gear as said supports are correlated, and a yieldable spring-controlled driving connection between said driven gear and driven shaft.

10. In apparatus of the character described, gears adapted to be meshed including a driven gear, a driven shaft on which the driven gear is loosely mounted, a member fast on said driven shaft, pins on opposite sides of said shaft carried respectively by said driven gear and member, and spring-controlled levers pivoted on said driven shaft co-acting to embrace said pins to form a driving connection between said driven gear and driven shaft.

In testimony whereof I affix my signature.

HARRY S. MARSH.