

July 2, 1968

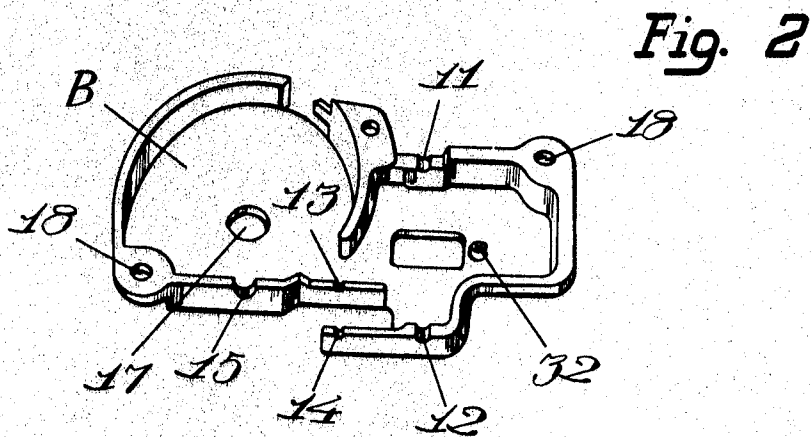
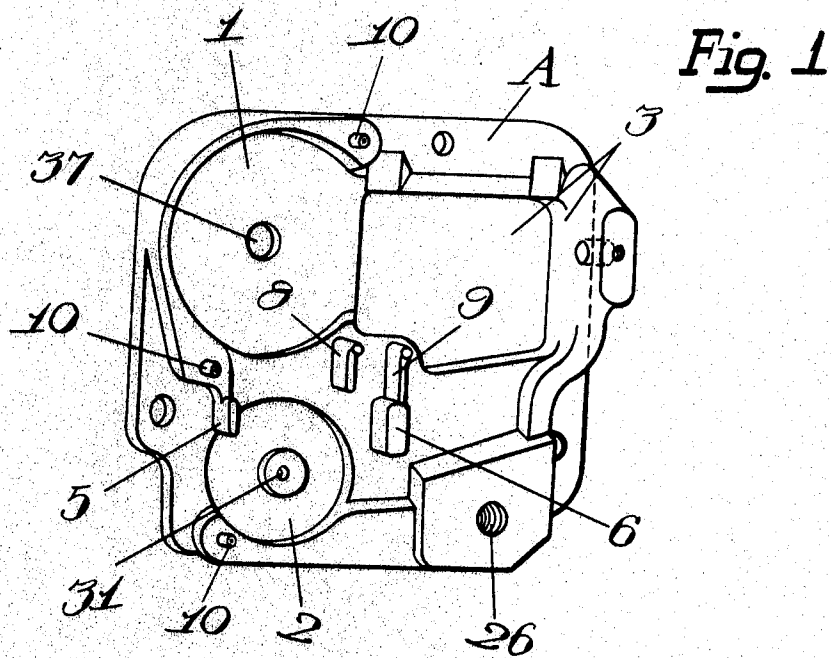
FUMITO KOMATSU

3,390,599

MUSIC PRODUCING DEVICE FOR A MUSIC BOX AND THE LIKE

Filed May 5, 1965

4 Sheets-Sheet 1



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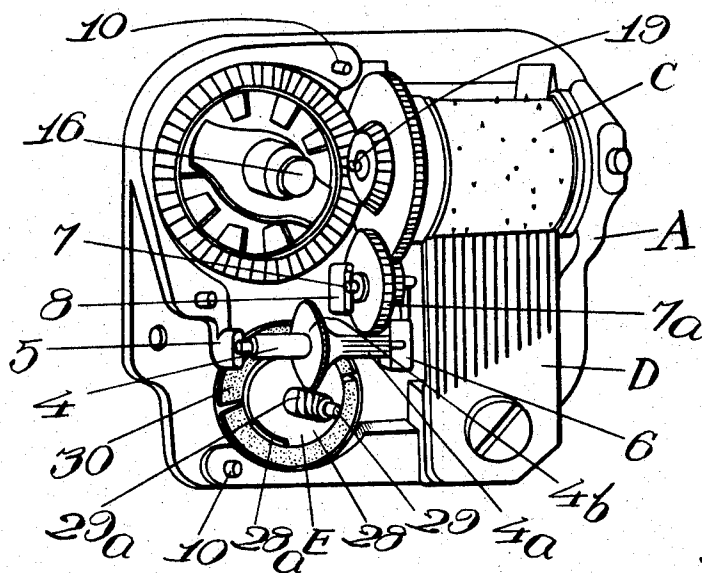


Fig. 3

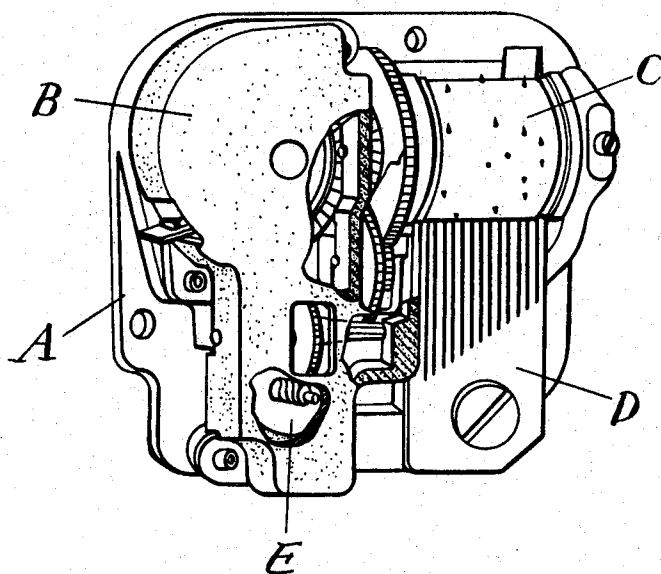


Fig. 4

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Fig. 5

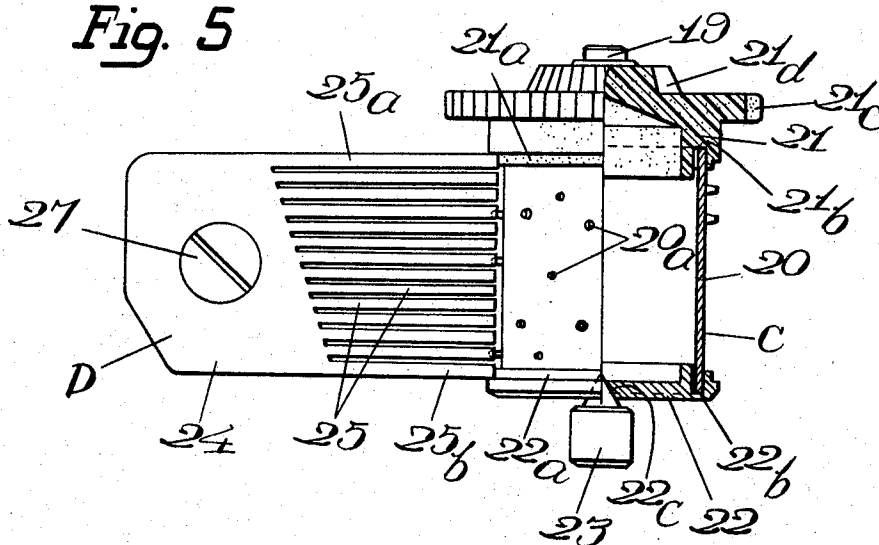
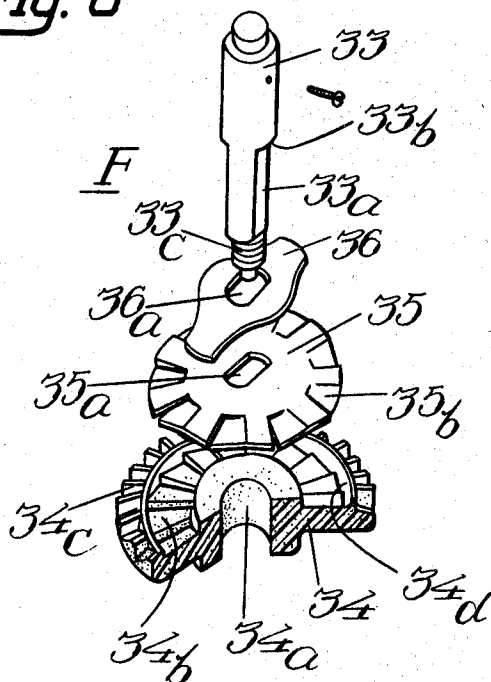


Fig. 6



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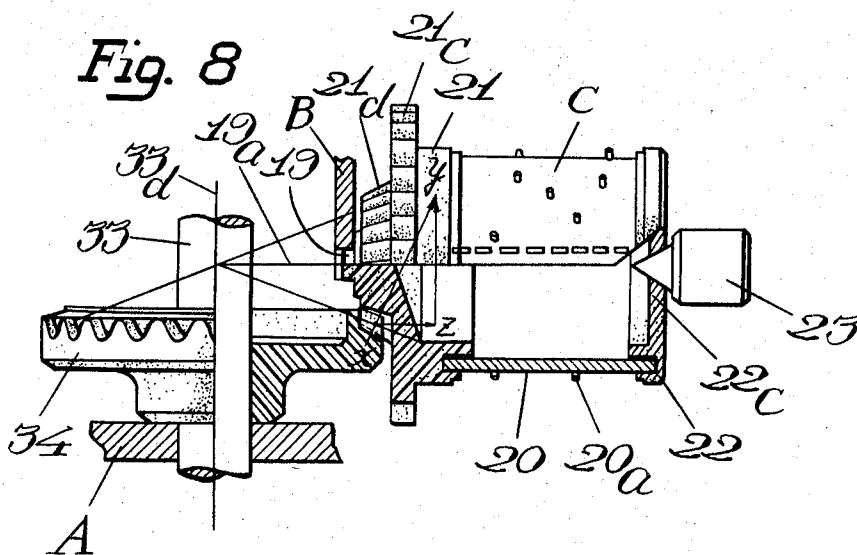
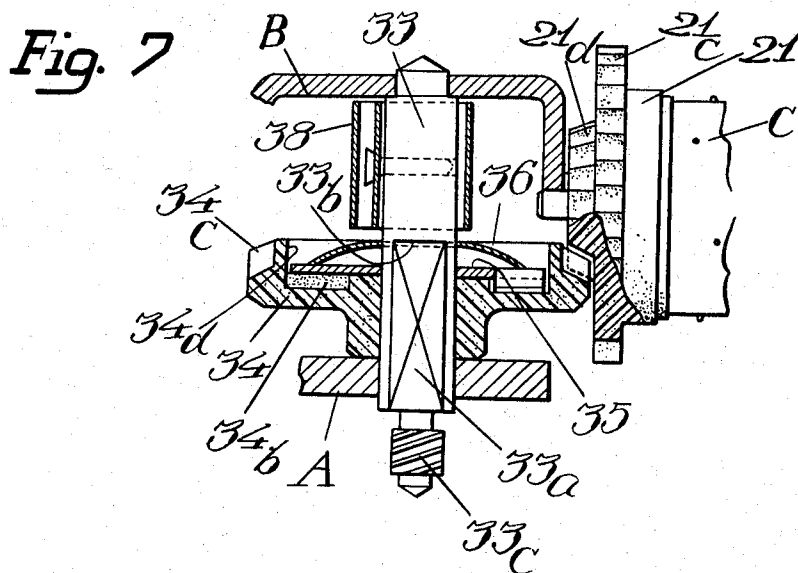
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3,390,599

MUSIC PRODUCING DEVICE FOR A MUSIC BOX AND THE LIKE

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5 Claims. (Cl. 84-96)

ABSTRACT OF THE DISCLOSURE

A music box having a two-part housing which has interconnecting walls grooved to provide bearings for the axles of the drum, driving spring, governor, and associated transmission gears, said drum having cylindrical bearing portions projecting less than the drum pins and being engaged by the two end reeds of the reed plate, and said music box having bevel gears transmitting the force from the driving spring to the drum.

This invention relates to a sound producing device for music boxes and the like.

An object of the present invention is to provide a sound producing device for a music box and the like in which the axles of the transmission gear members, the rotary drum axle, and all or part of the other axles mounted in the device are journaled on the base block at a predetermined spacings from each other, and which provides a construction which can be assembled readily in a manner such that these transmission gear members may accurately engage with each other and the gear member mounted on the axis of the drum.

Another object is to provide a sound producing device for music box and the like in which the adjustment of the axial spacings of the transmission gear wheel axles and the rotary drum axle may be dispensed with in the assembling operation without interfering with the arrangement of the component gear members and in which the gears and axles can be mounted by any unskilled worker easily and speedily.

A further object is to provide a sound producing device for music boxes and the like which can be assembled easily and speedily and in which a plurality of pins implanted on the rotary drum may engage with reeds in a superb manner as attuned.

A further object is to provide a sound producing device for music boxes and the like in which the spring repulsion controlling stabilizer plate formed with a stopper projection to retard the repulsion of the spring is made integral with the worm axle provided, in turn, with a worm gear of plastic material which is made both smooth and friction-tight, whereby in assembling the device the machining process is dispensed with and the worm gear may be rotated smoothly in engagement with the transmission gear wheels.

A further object is to provide a sound producing device for a music box and the like which is formed with a simplified driving or coiled spring winding member whereby the coiled spring can be wound accurately and the manufacture and mounting operation is considerably facilitated.

A further object is to provide a sound producing device for music boxes and the like in which the bevel gear driven by the spring is made from a plastic material and provided with a recess on the upper surface so that mechanical sounds may be absorbed and the bevel gear may be prevented from becoming deformed, and in which a catch plate in mesh with the ratchet teeth formed upon said

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recess and a leaf spring which biases said catch plate onto the ratchet teeth are disposed inside said recess so that the driving or spring winding member may be assembled in a compact size.

A further object is to provide a sound producing device for music boxes and the like so adapted that the torque of the driving axle may be accurately transmitted to the rotary drum and the rotary axle of the drum may not wear away and the center line of the rotary drum may not be biased with relation to the associated reeds even if the axle might wear away partially so that the axle of the rotary drum is always spaced a predetermined distance from the reeds.

These and other objects which will be described hereinafter will be carried into effect in the following description of the invention and the appended claims, one embodiment thereof illustrating the arrangement of each part of the invention being shown with reference to the drawings, in which:

FIG. 1 is a perspective view of the base block;

FIG. 2 is a reverse perspective of the spring casing;

FIG. 3 is a perspective view of the base block on which are shown various members which make up the sound producing device of the present invention assembled thereon;

FIG. 4 is a view similar to FIG. 3 shown with a casing fitted thereon, one portion thereof being cut away;

FIG. 5 is a plan view, partially cut away, illustrating the relationship between the rotary drum and the reed-plate;

FIG. 6 is an exploded perspective view of the driving or spring winding member;

FIG. 7 is a longitudinal cross section of the same member; and

FIG. 8 is a side elevational view representing the relationship between the driving axle and the bevel gear thereof and the rotary drum, one portion thereof being cut away.

Now, by way of explaining the present invention with reference to the drawings, reference character A is a holder plate, B is a casing enclosing the driving or spring winding member and other affixed parts, C is a rotary drum, D is a reed-plate formed with reeds, E is a governor, and F is a driving member or member for winding the spring.

As shown in FIGS. 1 and 3, base block A is formed with a recessed portion 1 for the driving or spring winding member and a recessed portion 2 for the governor member and is partially cut away at 3 for rotatably carrying the rotary drum C. At the desired positions of the base block A are installed flanges 5 and 6 oppositely to each other for rotatably carrying the worm wheel axle 4 for rotating the governor and projections 8 and 9 for rotatably carrying the intermediate gear axle 7, and a spindle or dowel 10 for mounting the casing.

As best shown in FIG. 2, the casing B for enclosing the spring wheel member is formed with opposing semi-circular seats 11 and 12 for rotatably carrying the gear wheel axle 4, opposing semi-circular seats 13 and 14 for rotatably carrying the intermediate gear wheel 7, a semi-circular seat 15 for rotatably carrying the rotary drum axle, an aperture 17 for receiving the spring wheel axle 16 and an aperture 18 for receiving the spindle or dowel 10.

In mounting the transmission gear wheels and the casing to the holder plate, both ends of the gear wheel axle 4 for rotating the governor member and the intermediate wheel axle 7 are placed on top of the projections 5, 6 and projections 8, 9 respectively. Then the casing B will be mounted with the seats 11, 12 and seats 13, 14 engaging with said ends of the worm wheel axle 4 and the intermediate wheel axle 7 respectively, producing axle-tunnels

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for receiving them. The apertures 18, 18 receive the respective spindles 10, 10. The mounting of the governor E and the driving axle 16 will be explained later.

By so mounting the transmission gear wheels and the casing to the base block, the intermediate gear wheel axle 7 and the worm wheel axle 4 for rotating the governor member are disposed in properly spaced apart positions with each other and the rotary drum axle and the transmission gear wheels mounted on these rotary axes may be properly interengaged, so that the adjustment of the axial distances may be dispensed with in an assembling operation which may be carried out in a very efficient manner. For mounting these gear axes to the base block, the abovementioned circular seats 11, 12, 13, 14 and 15 are provided on the rims of the casing B.

Referring to FIG. 5, reference character C is a rotary drum and D is a reed-plate. Rotary drum D consists of the drum proper 20 and the cylindrical lateral frames 21, 22 on both sides of the drum proper 20. Said cylindrical lateral frames 21 and 22 are made from plastic material, such as Teflon, which is made both smooth and friction-tight. The frames 21 and 22 are formed with cylindrical projections of lesser diameter 21a, 22a with annular grooves 21b, 22b, on the sides adjoining to the drum proper 20, and with cylindrical projections 21a and 22a located so as to project a lesser amount than the apex of the pins 20a arranged on the rotary drum. The annular grooves 21b and 22b are adapted to receive the ends of the drum proper 20.

The lateral frame 21 is formed with a gear wheel 21c and bevel gear 21d and axle 19 while the lateral plate 22 is formed with a conical aperture 22c to receive the end of the conical bearing 23 mounted on the base block A.

Reed-plate D is composed of the base portion 24 and a plurality of reeds 25. Reed-plate D is secured to the holder plate A by tightening the set screw 27 received in the tapped hole 26 of the base block A with the reeds 25a and 25b resting on the respective cylindrical projections 21a, 22a of lateral frames 21 and 22. By so mounting the reed-plate D to the holder plate A the mounting operation is facilitated and reduced in time, while the pins 20a arranged on the rotary drum 20 will become engaged with their associated tuned reeds 25.

The governor E shown in FIG. 3 is formed integral with the stabilizer plate 28 and worm axle 29, having a worm gear 29a, from a plastic material which is both smooth and friction-tight, such as, for instance, Teflon. A stopper 28a, adapted to prevent the rotation of the drum C by a driving spring 38 when required, projects upwardly from the stabilizer plate 28 for engagement with a suitable catch (not shown) which may be manually operated. A well-known type of rubber-made governor disc 30 is fitted to the worm axle 29 on the underside of the stabilizing plate 28 which will be radially expanded because of the centrifugal force as the disc 30 is rotated over a predetermined speed. The lower and upper ends of the worm gear axle 29 are journaled within the bearing hole 31 on the base block A and the bearing hole 32 on the casing B, respectively. The worm gear 29a meshes with the worm wheel 4b mounted on the axle 4 for rotating the governor E. As above described, the structure of the governor member comprises a stabilizer plate 28 having a stopper 28a of and a worm axle 29 having a worm gear 29a which are integrally formed from materials which are made both smooth and friction tight such as plastic. This unitary formation in plastic permits elimination of the grinding process and provides a gear 29a which rotates smoothly in mesh with the worm wheel 4b.

A driving or spring winding member F as shown in FIGS. 6 and 7 comprises a driving axle 33, a bevel gear wheel 34, a catch board 35 and a leaf spring 36. Driving axle 33 is formed integral with a square axle portion 33a, a step 33b and the lowermost threaded portion 33c for engaging the threaded portion of the manually rotatable knob. Bevel gear 34 is made from plastic materials and

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provided with a central axle hole 34a and a slightly recessed upper surface formed with a plurality of radially extending ratchet teeth 34b. Beveled gear teeth 34c are formed integral with and in the circumference of the bevel gear 34 while an annular wall 34d is formed between the ratchet teeth 34b and beveled gear teeth 34c.

In mounting the driving or spring winding member to the holder plate, the square axle 33a of the driving axle 33 is fitted into the axle hole 34a of bevel gear 34, the square hole 35a of the catch board 35, and the square hole 36a of the leaf spring 36, while the beveled gear teeth 34c engage with the bevel gear 21d of the rotary drum C and the catches 35b of the catch board 35 are removably engaged with the ratchet teeth 34b. The lowermost threaded end of the axle 33 is insertedly fitted into the axle hole 37 of the base block A so that the threaded end 33c thereof will project outwardly of the block A. The upper end of the axle 33 is insertedly fitted into the axle hole 17 of the casing B. A coiled spring is indicated at 38.

It will be readily seen from the above description of the spring wheel member that the device utilizing the driving or spring winding member as described can be assembled in a far more simplified manner than the existing type device, and that, by having the spring wheel 34 made wholly from plastic materials and formed with the recess in which are leaf spring 36 and catch board 35, not only the mechanical noises are absorbed but also the whole structure is arranged in a compact size without becoming deformed or warped while assembled or in use.

FIG. 8 shows in particular the relationship between the driving axle 33 and the rotary drum axle 19, wherein the axes 33d of the driving axle 33 vertically intersects the axes 19a of the rotary drum axle 19. By thus adjusting the wheel axle 33 with relation to the rotary drum 19 the force shown by xy will be exerted on the bevel gear 21d. This force xy will be divided into component force xz and component force zy. It will be readily seen that the rotary drum C will be pressed against the conical surface of the bearing 23 by the component force xz whereby the wearing away of the bearing 23 will decrease as compared with the conventional device, and that, even if the bearing might wear partially the center line of the rotary drum will not be biased with relation to the reed-plate, so that the drum can always be held at a predetermined distance from the reed-plate. It is to be noted that although description has been made with reference to the preferred embodiment of this invention, other structures may also be included within the scope of this invention as defined in the appended claims.

What is claimed is:

1. In a music box and the like of the type having a reed plate formed with a plurality of reeds extending therefrom for producing distinct musical sounds, a rotary drum having drum axle means and a cylindrical portion with a plurality of pins projecting radially outwardly therefrom for contact with the free ends of the reeds as the drum is rotated about the axis of the drum axle means and the cylindrical portion, driving means connected to the drum axle means to rotate the drum and including a driving axle, a governor having a governor axle, transmission gear means interconnecting the drum axle means and the governor axle for driving of the governor by the drum, and mounting means for the reed plate, the drum axle means, the driving axle and the governor axle: the improvement comprising said drum including a pair of cylindrical frames, each on a respective axially opposite end of said cylindrical portion; each of said frames having a cylindrical bearing portion, and the free ends of the two end reeds on said reed plate bearing against said cylindrical bearing portions for mounting of said reed plate in proper relation to said drum and for maintaining said reed plate properly positioned relative to said drum.

2. In a music box and the like, the improvement claimed in claim 1, wherein said cylindrical frames have cylindrical steps constituting said bearing portions and which

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project radially beyond the surface of said drum a radial extent less than that of said pins.

3. In a music box and the like, the improvement claimed in claim 1, in which the axis of the drum axle means and the cylindrical portion is perpendicular to said driving axle; one of said cylindrical frames having a first bevel gear projecting axially outwardly therefrom; said driving means including a second bevel gear coaxial with said driving axle and meshing with said first bevel gear; said drum axle means including a bearing member centered in the other cylindrical frame; whereby the driving thrust imparted to said drum includes both a radial component and an axial component, resulting in reduction of the magnitude of the radial component.

4. In a music box and the like, the improvement claimed in claim 3, in which said bearing member is a bearing secured in said mounting means and having a conical bearing projection engaged in a central opening in said other cylindrical frame.

5. In a music box and the like, the improvement claimed in claim 1, in which said transmission gear means includes first and second substantially parallel axles each carrying a gear, said gears intermeshing and one of said gears being driven by said drum and the other driving said governor; said mounting means comprising a two-part

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housing including a first part and a second part; said first part including rim means formed with outwardly opening bearing recesses for each of said last two mentioned axles for dropping of the latter into proper position relative to each other; said second part of said housing including correspondingly located projection means arranged to engage and overlie the ends of said last two mentioned axles to retain the same in assembled position upon assembly of said first part of said housing to said second part of said housing.

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