March 22, 1949. M. E. SCHLENKER ET AL 2,465,042

MOTOR CASING

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Fig. 1.

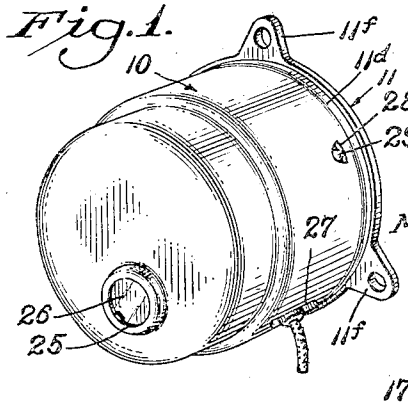


Fig. 2.

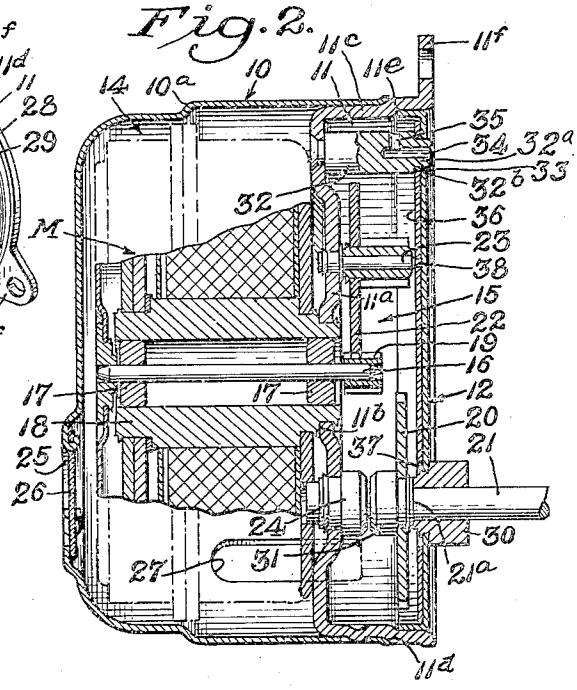
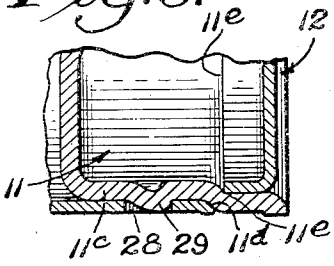


Fig. 3.



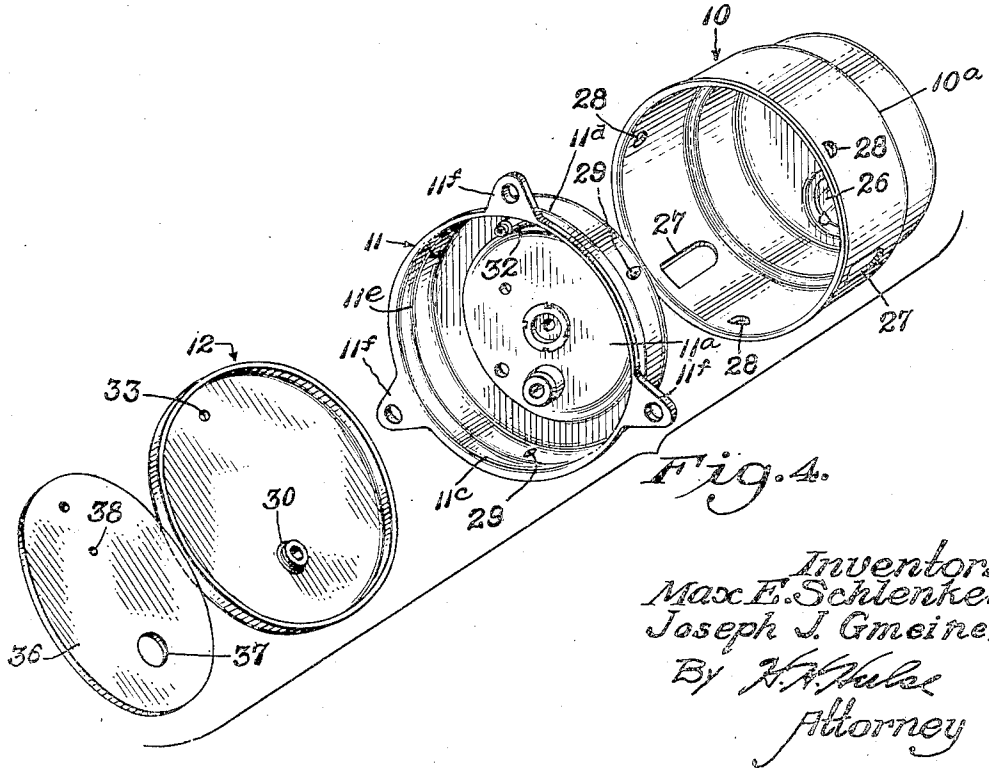


Fig. 4.

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MOTOR CASING

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2 Claims. (Cl. 172—36)

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The present invention pertains to a novel casing for small electric motors and their speed reduction gear trains. Motors of the type contemplated are usually small, synchronous motors such as are employed in time movements not only for clocks but in recorders and a great variety of other instruments. Since such motors have fairly high speed rotors, it is commonly necessary to equip them with a speed reduction gearing.

One general object of the present invention is to provide a case for both motor and gearing which is fashioned of sheet metal with structural shapes for the parts which particularly suit the casing for economical large-scale production and assembly.

Moreover, it is an object to provide such a casing which is characterized not only by its ruggedness and strength but also by its smooth and pleasing appearance.

Another object is to provide a casing of the general class indicated embodying a novel arrangement for lubricating the gear train.

Further objects and advantages of the invention will become apparent as the following description proceeds, taken in connection with the accompanying drawings in which:

Figure 1 is a perspective view of a combined motor and gear casing embodying the present invention.

Fig. 2 is an enlarged longitudinal sectional view of the casing of Fig. 1 with the associated motor and gear train indicated, generally, in broken lines.

Fig. 3 is an enlarged fragmentary detail sectional view showing the friction catch arrangement for securing the motor cover in place.

Fig. 4 is an exploded perspective view of the casing.

While the invention is susceptible of various modifications and alternative constructions, we have shown in the drawings and will herein describe in detail the preferred embodiment, but it is to be understood that we do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

Referring more particularly to the exemplary embodiment of the invention illustrated in the drawings, the casing there shown embodies as its primary structural elements three sheet metal cups or shells 10, 11 and 12 assembled to define two separate chambers 14, 15 for reception, respectively, of an electric motor and gear train,

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such contained elements being but fragmentarily indicated since they form, per se, no part of the present invention. Thus the motor is indicated at M and is shown as having a rotor shaft 16 journaled in bearings 17 carried by a sleeve 18, one end of which is staked in a central aperture in the end wall of the intermediate casing member 11. The gear train is indicated as including two terminal elements, namely, a pinion 19 fixed to the motor shaft 16 and a gear 20 fixed to an output shaft 21. The pinion 19 is shown meshing with a gear 22, the latter being connected to the gear 20 through a suitable series of gears and pinions (not shown) to complete a train of desired overall ratio.

The intermediate cup 11 of the series of three cups (10, 11 and 12) constitutes the primary supporting member for the motor and gear train elements, the other two cups 10 and 12 serving primarily as removable covers for the motor and gear train chambers 14, 15, respectively. For this purpose the intermediate cup 11 may, as shown, be drawn from sheet metal of somewhat heavier gauge than the other two cups. The end wall of the cup 11 is slightly dished as indicated at 11*a*, and its central portion reversely dished as indicated at 11*b*, not only to increase its rigidity but also to afford clearance and support for the parts attached to it. Thus the central sleeve 18 of the motor, heretofore noted, is staked to the reversely dished central portion 11*b* so that the end of the sleeve does not project beyond the inner face of the dished portion 11*a*. The end of the motor frame bears against the undished marginal portion of the end wall of the cup 11 bordering the dished portion 11*a*, while stub shafts, such as the shaft 23, for the several gears in the train, are fixed to the dished portion 11*a*, the contour of the latter providing clearance for the inner ends of such stub shafts. These stub shafts project cantilever fashion, without outboard support. Also staked to the dished portion 11*a* is a bearing 24 in which the inboard end of the output shaft 21 has a running fit. The side walls of the cup 11 are formed by a peripheral annular skirt 11*c*. The marginal portion of this skirt is enlarged in diameter in order to provide shoulders at 11*d* and 11*e* for a purpose which will appear below. Finally, three integral outturned mounting lugs 11*f* are provided at the periphery of the skirt 11*c* to make possible panel mounting of the casing as a whole.

The deep-drawn cup 10 is telescoped over the exterior of the intermediate cup 11 to house the motor M, the marginal edge of the cup 10 being

slightly curled and arranged to bear against the shoulder 11*d* as a stop. The outer portion of the cup 10 is of slightly reduced diameter, the cup being shouldered as indicated at 10*a* in order to increase the rigidity of its side walls, conform it more closely to the contour of the enclosed motor, enhance its appearance, and facilitate drawing of the same. An observation port may be provided in the end wall of the cup 10 as indicated at 25, the same being closed by a transparent disk 26. Slots 27 are provided in the side walls of the cup 10 for entry of the motor leads.

Catches are provided to retain the motor cover or cup 10 releasably in place on the intermediate cup or base 11. For that purpose apertures 28 are provided in the side walls of the cup 10 in registry with protrusions or bumps 29 struck out from the skirt 11*c* of the intermediate cup 11 (see Fig. 3). As the cup 10 is slid into place on the intermediate cup 11 the protrusions 29 snap into the apertures 28, holding the cup 10 in position.

The third cup 12, which closes the gear chamber 15, is the shallowest of the three cups and constitutes a cover plate for the gear chamber. It is telescoped within the intermediate cup 11, rather than on the exterior of the latter as in the case of the motor cover cup 10, and abuts against the shoulder 11*e*. The side wall or annular skirt portion of the cup 12 is short enough that when this cup is pushed into place within the cup 11, the end wall of the cup 12 is nearly flush with the edge of the cup 11, being slightly inside the latter so that the casing unit may be secured to a panel by the mounting lugs 11*f* without interference from the cup 12.

A bearing 30 for the output shaft 21 is staked to the cover plate or cup 12. In the arrangement shown the terminal gear 20 is staked to a collar 31 which is in turn force-fitted on the shaft 21 to bear against a shoulder 21*a* on the latter and the adjacent end face of the bearing 30. Accordingly, the cover plate or cup 12 may be removed by pulling on the outer end of the shaft 21, thereby withdrawing such shaft from the bearing 24 and pulling out not only the shaft but also the cup 12 as well as the collar 31 and the terminal gear 20 attached to the shaft.

To aid in properly locating the cup 12 within the intermediate cup 11, a locating stud 32 is staked to the cup 11 and presents a reduced inner end 32*a* dimensioned to enter a hole 33 in the opposed end wall of the cup 12. Ventilation for the gear chamber 15 is provided through this same stud 32. For that purpose an axial hole 34 is drilled in the outer end of the stud, as well as a transverse hole 35 communicating with the hole 34 and the interior of the chamber 15. The holes 34, 35 thus constitute a so-called "breather passage" for the gear chamber.

The stud 32 also serves a further purpose, namely, to hold a plastic or sheet metal disk 36 in place against the inner face of the cover plate or cup 12, such disk forming a part of the lubricating system for the gear train. The outer end of the stud 32 is shouldered as indicated at 32*b*, thereby securing the disk 36 in place. This latter disk has a large aperture in it as indicated at 37 in which the end of the outlet shaft bearing 30 is located, and also has small apertures, such as the aperture 38, in it adjacent the outboard ends of the several stub shafts that support elements of the gear train. Lubricating oil moves by capillary action between the opposed faces of the members 12 and 36 from the low side of the gear chamber 15 to the outlet holes 38 where it passes to the several stub shafts, lubricating the same. In this way lubricating oil is effectively fed to the several shafts of the elements of the gear train, such feed being substantially equally effective no matter what angular position the casing may be mounted in.

What is claimed is:

1. In a double chambered casing for an electric motor and its associated speed reduction gearing, the combination of a sheet metal base adapted to have an electric motor fixed to one side thereof and a speed reduction gearing mounted on the other side, said base being bordered by an annular integral skirt; and first and second sheet metal cups telescoped respectively over and into said skirt, and separately removable therefrom, to define first and second chambers on opposite sides of said base for separately housing the motor and gearing.

2. In a double chambered casing for an electric motor and its associated speed reduction gearing, the combination of a sheet metal base centrally apertured for passage therethrough of a motor shaft, said base being adapted to have an electric motor fixed on one face thereof and being bordered by an annular peripheral skirt projecting away from said face, said base being adapted for the mounting on its other face of a gear train driven from a shaft projecting through said central aperture and enclosed laterally by said skirt, the outer portion of said skirt being of enlarged diameter to present two oppositely facing annular shoulders at the point of beginning of such enlargement and with one shoulder inside the skirt facing away from said base and the other shoulder on the outside of said skirt, a deep sheet metal cup telescoped over the exterior of said skirt with its edge bearing against said exterior shoulder on the latter to enclose a motor fixed on said one face of said base, and a shallow sheet metal cup telescoped within said skirt and bearing against said interior shoulder to close the open end of said skirt.

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