March 14, 1967 M. J. HUBER 3,308,681

GEAR CASE VENT

Filed May 11, 1965

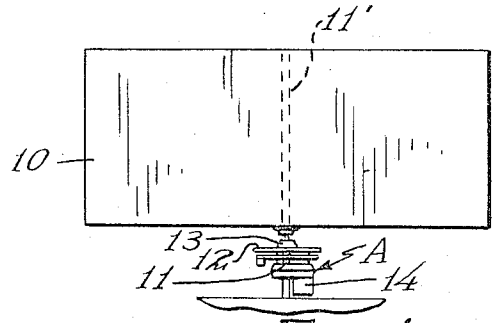


FIG. 1

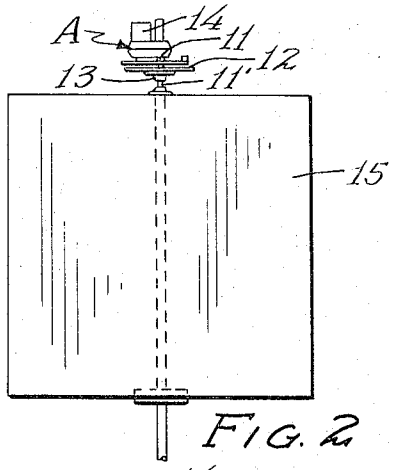


FIG. 2

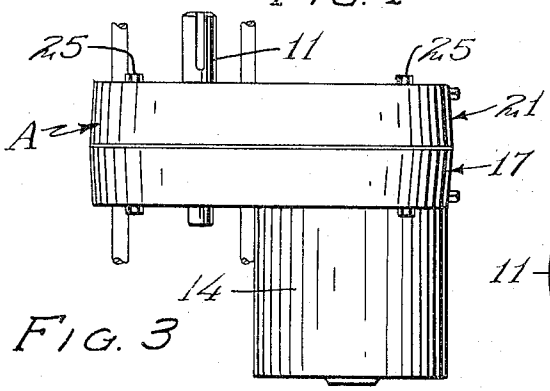


FIG. 3

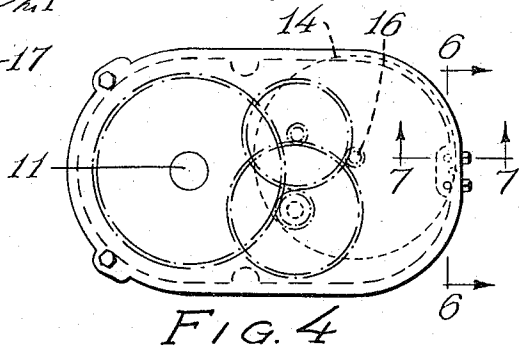


FIG. 4

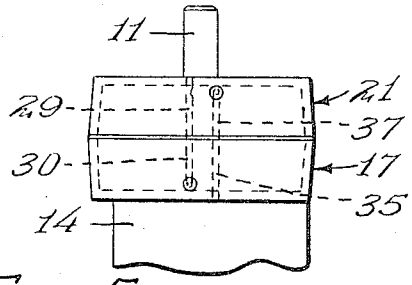


FIG. 5

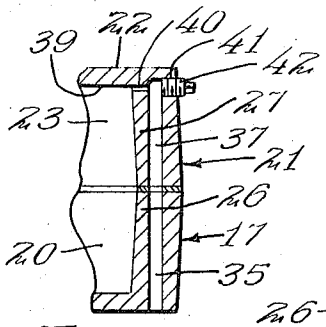


FIG. 7

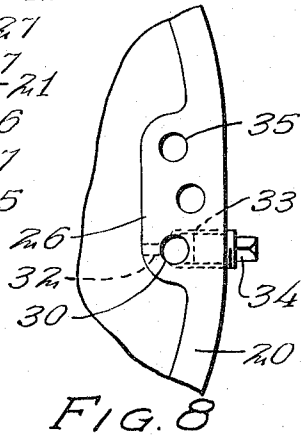


FIG. 8

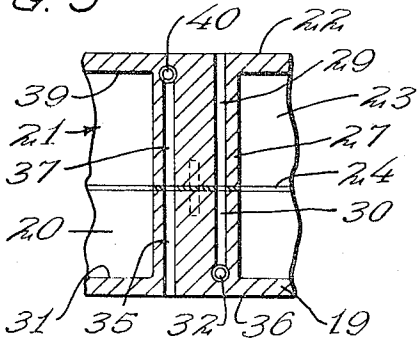


FIG. 6

INVENTOR

MORTIMER J. HUBER

BY Arthur M. Dunning

ATTORNEY

United States Patent Office

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GEAR CASE VENT

Mortimer J. Huber, 5901 W. Bald Eagle Blvd.,
St. Paul, Minn. 55110

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This invention relates to an improvement in gear case vent systems, and deals particularly with a means of filling and venting a gear case used to connect a motor to a driven rotatable shaft.

Rotatable display signs are produced in considerable volume. These signs are normally mounted upon a vertical shaft, and are driven by an electric motor. The motor is normally connected to the vertical shaft through a gear reduction unit. In view of the fact that signs of the type in question are usually subjected to severe strain and to the action of the elements, the gear cases must be ruggedly built and are normally tightly sealed.

One of the difficulties which has been experienced lies in the fact that the oil within the gear cases tends to expand and contract on variations in temperature and, accordingly, the casings must be provided with some sort of vent passage. This is not a particular problem as long as the gear cases are supported in a predetermined position. However, it is extremely desirable that the drive units be arranged so that they can be positioned either above the sign in which case the shaft which supports the sign extends downwardly from the driven unit while in other instances the drive unit is supported beneath the sign with the shaft supporting the sign extending upwardly. A vent opening in what would normally be the top of the unit in one position would act as a drain if the drive unit were inverted.

It is also desirable to provide a filling passage through which the gear case may be filled with oil. Such a filling opening could be provided with a plug to close the opening when desired. However, from a simplicity standpoint, it is desirable to provide a filling opening which need not be closed.

An object of the present invention resides in the provision of an invertible gear housing having a pair of passages incorporated therein, one of which may serve as a filling passage and the other of which may serve as a vent passage. These passages are so arranged as to eliminate the leakage of oil from the gear case whether the housing is mounted in upright or inverted position.

A feature of the present invention resides in the provision of a first passage which extends downwardly from the top surface of the gear case to terminate in closely spaced relation to the bottom of the casing at which point it is connected by a horizontal passage to the interior of the gear casing level with the floor thereof. A second passage is provided from the bottom of the casing to a point in closely spaced relation to the top of the housing, and which is connected by a horizontal passage to the interior of the casing at the top thereof. When the gear casing is mounted in upright position, the passage extending through the top of the casing forms a filling passage through which fluid may flow to substantially fill the casing. The passage extending through the bottom of the casing serves as a vent passage from the upper portion of the casing interior. In filling the casing, the fluid may flow through the filling passage until the casing is virtually full. At this time, the overflow of fluid will flow through the vent passage and drain out. When the casing is mounted in inverted position, the passage which has served as the filling passage will serve as the vent passage, and the vent passage shall serve as the filling passage.

These and other objects and novel features of the present invention will be more clearly and fully setforth in the following specification and claims:

In the drawings forming a part of the specification;

FIGURE 1 is a diagrammatic view showing a sign supported on a vertical shaft above a drive unit.

FIGURE 2 is an elevational view showing a sign mounted upon a vertical shaft and driven by a drive unit supported above the sign.

FIGURE 3 is an elevational view of the drive unit.

FIGURE 4 is a top plan view of the drive unit.

FIGURE 5 is an end elevational view of one end of the drive unit.

FIGURE 6 is a vertical sectional view through a portion of the drive unit housing, the position of the section being indicated by the line 6—6 of the FIGURE 4.

FIGURE 7 is a vertical sectional view through a portion of the gear casing, the position of the section being indicated by the line 7—7 of FIGURE 4.

FIGURE 8 is an enlarged plan view of the end portion of the lower section of the gear casing, with the upper section removed.

While the present drive unit is adaptable for use for many purposes, the construction is actually designed for use in conjunction with a sign mounted for rotation about a vertical axis. FIGURE 1 of the drawings discloses a sign **10** mounted upon a vertically arranged shaft **11**.

In order to describe a reason for the present construction, FIGURES 1 and 2 of the drawings are designed to show signs which are rotatable about a vertical axis, one of which is driven by a drive unit located beneath the sign, and the other of which is designed to support the sign beneath the drive unit. In one instance, the drive unit is in what may be termed an upright position. In the other case, the drive unit is positioned in an inverted position.

As indicated in FIGURE 1 of the drawings, the drive unit A is provided with a driven shaft **11**, an extension of which supports the sign **10** on a vertical axis. The figure housing A is supported by a supporting plate **12** which in turn is supported by a suitable frame not illustrated in the drawings. An extension of the shaft **11** is supported in a vertical position by the bearing **13** and acts to support the sign **10**. A motor **14** is connected to the under-surface of the gear housing A, and the motor shaft is connected to the driven shaft **11** by suitable gearing so as to rotate the sign at a speed substantially less than the speed of rotattion of the motor.

FIGURE 2 shows a similar structure in inverted position, the supporting plate **12** being located above the rotatable sign **15** and the shaft **11** extending downwardly therefrom. While the shaft **11** is normally relatively short, the shaft **11'** merely forms an extension thereof.

As indicated in this figure, the gear case A is above the support **12** and the motor **14** extends upwardly therefrom, the bearing **13** being on the other side of the supporting plate **12**.

As is diagrammatically illustrated in FIGURE 4 of the drawings, the shaft **16** of the motor **14** extends into the housing A and is connected by suitable gears indicated at **18** in broken lines to the driven shaft **11**. As the particular gear arrangement employed is unimportant to the present invention, the gearing is not described in detail.

The gear case A includes a pair of dish-shaped sections of similar contour arranged in edge abutting superposed relation. The lower section **17** includes a substantially flat generally oval-shaped bottom wall **19** and an upstanding peripheral wall **20** encircling the same. The upper section **21** includes a substantially flat generally oval-shaped top wall **22**, and a peripheral downwardly depending wall **23** of similar shape to the wall **20**. The upper edge of the peripheral wall **20** and the lower edge

of the peripheral wall 23 are arranged in edge abutting relation, and a gasket 24 is interposed between the two sections to form a seal. The sections are held together by suitable means such as by cap screws 25 extending through the peripheral wall 23 of the upper section 21 and are threaded into threaded sockets in the upstanding wall 20 of the lower section 19. Portions of the walls 20 and 23 may be thickened to accommodate the cap screws and the sockets.

While the section 17 has been indicated and as the lower section and the section 21 as the upper section, it should be understood that the gear case is designed to function equally well in inverted position as long as the driven shaft 11 is substantially vertical. The problem involved is in providing a means of substantially filling the gear case with lubricating oil, of knowing when the gear case is filled, and in providing a vent which is opened to atmosphere so that any expansion of the oil will not develop pressure within the gear case. This is accomplished in the manner best illustrated in FIGURES 4 through 8 of the drawings.

As indicated in FIGURE 8 of the drawings, and inwardly extending boss 26 is provided in the casing wall 20, and a similar boss 27 is provided in the wall 23 of the upper section 21. The purposes of the bosses 26 and 27 is merely to increase the thickness of a portion of the peripheral wall of the gear case and to provide the necessary space for the apertures. As indicated in FIGURE 6, a hole 29 is drilled downwardly through the top closure plate 22 through the boss 27 and a similar passage 30 in alignment with the passage 29 is drilled into the boss 26 in the lower section 19. The passage 30 terminates about level with the upper surface 31 of the bottom closure plate 19. A substantially horizontal passage 32 extends through the wall of the boss 26 and into the interior of the gear case as is indicated in FIGURE 8 of the drawings. In view of the fact that the passages 29, 30 and 32, are normally formed by drilling, a relatively large diameter aperture 33 extends from the vertical passage 30 to the exterior of the gear case. The aperture 33 is internally threaded to accommodate a screw plug 34 which closes and seals this aperture 33.

As is also indicated in FIGURES 6 and 7 of the drawings, a passage 35 extends upwardly from the under-surface 36 of the bottom closure plate 19 through the boss 26, and a communicating passage 37 is provided in the boss 27 which terminates substantially on the level of the under-surface 39 of the top closure plate 22. A substantially horizontal passage 40 extends through the boss 27 from the passage 37 to the interior of the gear case to provide communication therewith. As a matter of expediency, a concentric larger diameter aperture 41 is drilled through the outer wall 23 of the upper section 21. This aperture 41 being tapped to accommodate a plug 42 to seal the hole 41 after the passage 40 has been drilled.

When the gear case is to be used, it is first normally substantially filled with lubricating oil. This is done by introducing oil through the aligned vertical passages 29 and 30, the oil flowing through the horizontal passage 32 into the interior of the gear housing. As the lubricating oil enters the gear case, it displaces air which is vented to the horizontal passage 40 and the aligned passages 37 and 35. When the level of the oil in the gear case reaches the level of the passage 40, any additional oil added will drain through this passage 40 and the vertical passages 37, 35 providing a clear indication that the gear case is full. In the event the oil expands, the excess oil may also drain through the same openings.

In the event the gear case A is used in what has been termed the inverted position shown in FIGURE 2, the passages described operate in a similar manner except that the aligned passages 35, 37 and the horizontal passage 40 form the filling passages while the horizontal passage 32 and the vertical passages 30, 29 form the overflow and vent passages. Thus, the vent system operates in the same manner regardless of which of the two positions is employed.

In the past some difficulty has been experienced in provided filling openings, vent openings, and drain openings which comprised a fool-proof combination. Normally, it is necessary to have a filling opening on both the top and bottom sides of the housing, a vent opening on both of these sides of the housing, and a drain opening on each side of the housing. If, in installing the gear case, the proper holes were not plugged or left unplugged, the device would not function properly. With the present arrangement, there is no chance of air, as only one passage may be used to fill the gear case, and the other passage automatically functions as an overflow pipe as well as a vent. Thus, while the arrangement is simple, it eliminates the danger of costly errors due to improper installation procedures.

In accordance with the patent statutes, the principles of construction and operation of this improvement in Gear Case Vent have been described, and while an endeavor has been made to set forth the best embodiment thereof, it should be understood that changes may be made within the scope of the following claims without departing from the spirit of the invention.

I claim:

1. A gear case vent system including;
a hollow housing,
a motor secured to said housing and having a motor shaft extending into said housing,
a driven shaft extending from said housing and supported thereby,
a series of gears supported within said housing connecting said motor shaft to said driven shaft,
said housing including a top panel, a bottom panel, and a peripheral connecting wall portion,
a substantially vertical passage extending from the upper surface of the top panel downwardly through the peripheral wall portion to a point spaced from the under surface of the bottom panel and communicating at its lower end with the interior of the gear housing adjoining the upper surface of the bottom panel, and
a second substantially vertical passage extending from the under surface of the bottom panel upwardly through the peripheral wall portion to a point spaced from the upper surface of the top panel and communicating at its upper end with the interior of the housing adjoining the under surface of the top panel, whereby
when oil is directed into the housing through said first mentioned vertical passage, said second vertical passage functions as an overflow and a vent for the interior of the housing.

2. A gear case vent system for use in conjunction with an invertable gear case, the gear case comprising a hollow housing having generally parallel top and bottom walls and peripheral connecting side walls, a drive means connected to said housing and having a drive shaft extending into said housing, a driven shaft supported by said housing and extending therefrom, and gear means connecting said shafts, said vent system incuding:
a filling passage open to atmosphere at the top of said housing and communicating with the interior of said housing at the bottom thereof,
a vent passage open to atmosphere at the bottom of said housing and communicating with the interior of said housing at the top thereof,
whereby when said housing is inverted, said filling passage becomes a vent passage and said first mentioned vent passage becomes a filling passage.

3. The structure of claim 2 and in which said vent and filling passages extend through the peripheral wall of said housing.

4. The structure of claim 2 and in which said housing is formed of two sections in edge abutting relation.

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LAVERNE D. GEIGER, *Primary Examiner.*

H. S. BELL, *Assistant Examiner.*