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Nestor

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[45] **Apr. 8, 1975**

[54] **COUNTERBALANCE FOR ROTARY ENGINE**

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[52] **U.S. Cl.** ..... **418/61 A;** 418/151

[51] **Int. Cl.** **F01c 1/02;** F01c 21/00; F04c 29/00

[58] **Field of Search** ..... 418/61 A, 151

[56] **References Cited**

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Primary Examiner—John J. Vrablik

[57] **ABSTRACT**

A counterbalance for a rotary engine, e.g. of the type described in application Ser. No. 203,211 now U.S. Pat. No. 3,744,941, includes a disc rotating about the drive shaft and within the rotor side wall opening, and a counterbalance weight suspended therefrom.

3 Claims, 6 Drawing Figures

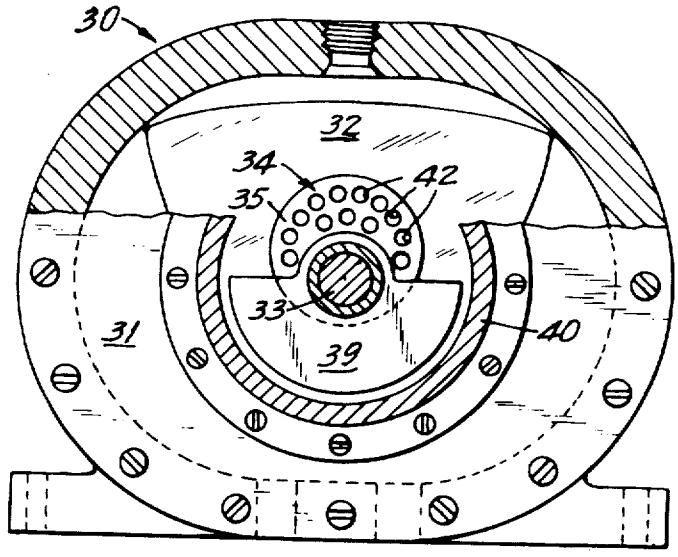


FIG. 4

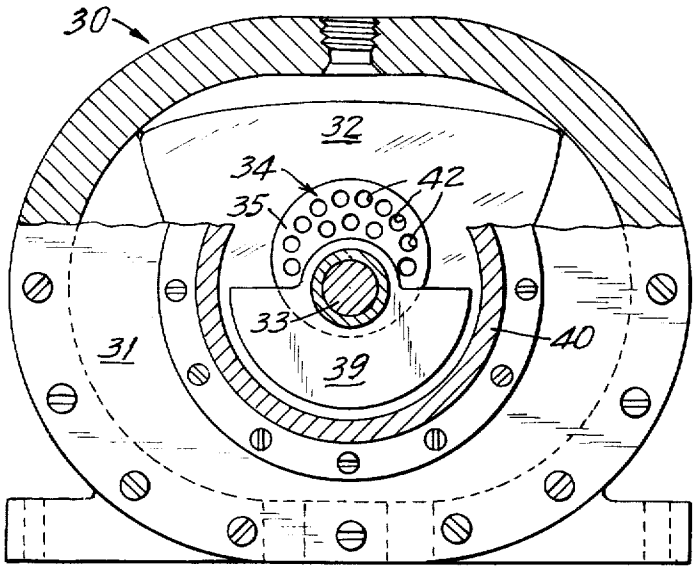


FIG. 5

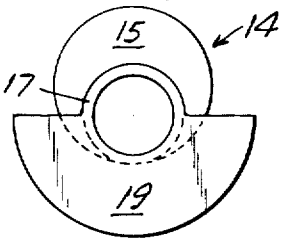


FIG. 6

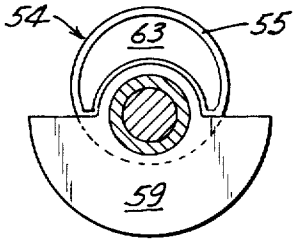


FIG. 1

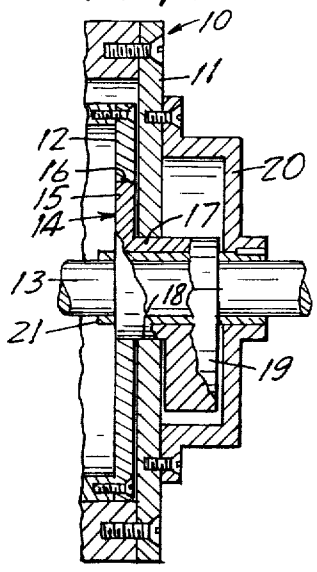


FIG. 2

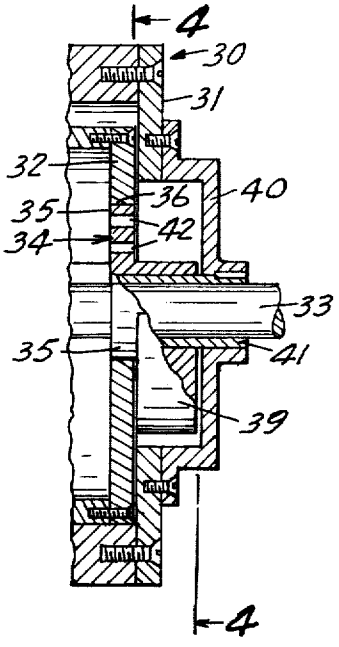
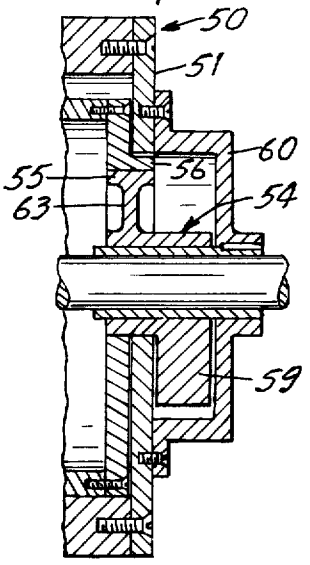


FIG. 3



COUNTERBALANCE FOR ROTARY ENGINE

This inventnion relates to rotary engines and in particular to means for reducing the vibrations associated with their normal operation.

In my copending application Ser. No. 203,211 filed Nov. 30, 1971, now U.S. Pat. No. 3,744,941 I describe an improved form of rotary engine wherein a multi-sided rotor, oscillatively revolving within a multi-lobed epitrochoidal stater cavity, is constrained by means of internal supporting mechanism to follow accurately the curved internal stator surface. While the amount of vibration is thereby substantially reduced below that obtained with earlier rotary engines, I have now found it possible to achieve further desirable reduction in vibration of this, as well as significant reduction in the vibration of earlier forms of rotary engines, by counterbalance means now to be described.

In the drawing,

FIGS. **1**, **2** and **3** are fragmentary views primarily in section of three modifications of my novel counterbalance as installed in modified forms of the engine of FIGS. **1** and **2** of said Ser. No. **203,211**;

FIG. **4** is a partial sectional elevation taken approximately at line **4—4** of FIG. **2**, showing the counterbalance unit in front elevation and as installed, and

FIGS. **5** and **6** are front elevations of the counterbalance units of FIGS. **1** and **3** respectively.

Referring first to FIGS. **1** and **5**, the rotary engine **10** includes a stator side wall **11**, rotor side wall **12**, shaft **13**, and counterbalance unit **14**. The latter includes a guide disc **15** disposed within the circular central opening **16** in the rotor wall, a ring **17** disposed within the circular central opening **18** in the stator wall, and a counterbalance weight **19** extending from said ring in a plane parallel to said disc and enclosed within a casing **20** fastened to the stator side wall. A hub opening extends through disc, ring and weight to receive a tubular support member **21** within which the shaft **13** rotates. The support member here serves to support a fixed spur gear, not shown, located within the rotor as part of the constraining mechanism therefor, as shown in my application Ser. No. 203,211, but in other forms of rotary engines may be omitted, the counterbalance unit then being rotatively mounted directly on the shaft **13**.

It will be understood that suitable bushings or bearings are provided between disc and rotor side wall, ring and stator side wall, inner hub surface and outer tubular support surface, and elsewhere as required, but have here been emitted both for clarity of illustration and as forming no part of the present invention.

The rotary engine **30** of FIGS. **2** and **4** similarly include stator side wall **31**, rotor side wall **32**, shaft **33**, and counterbalance unit **34**. In this modification the balance weight **39** is attached directly to the guide disc **35** and rotates directly adjacent the rotor side wall, the stator wall **31** extending inwardly only to the rim of the outer casing **40**. The disc **35** is here seen as perforated throughout the portion lying opposite the balance weight **39**, the perforations **42** serving to reduce the weight of that portion of the disc and thereby permitting a reduction in the weight of the counterbalance

and making possible the cooling of the rotor by forced air flow if desired. However, the perforated disc fails to isolate the interior of the rotor, which isolation may in some instances be desirable, e.g. in obtaining improved lubrication.

The counterbalance unit **54** of FIGS. **3** and **6** again, as in FIG. **2**, has the weight **59** joined directly to the disc **55**. In order to obtain increased bearing surface between disc and rotor wall, the latter is extended outwardly around the central opening to form a wide lip **56**, and the disc **55** is made to similar width. The unbalanced portion of the disc is then reduced in thickness to provide a thin web portion **63**, the structure effectively isolating the interior of the rotor while reducing unbalanced weight in the sealing disc.

It will be understood that the dimensions of the several components will be selected consistent with the materials of construction employed and with the particular engine structure under consideration, with a view to compensating for the inherent imbalance of the rotor assembly. Minor deviations may later be made in the completed device to further reduce any subsequently appearing imbalance, e.g. by drilling or plugging the counterbalance unit at appropriate points. The engine structure will be seen to permit such changes in a simple manner due to the ease of removal of the outer casing.

To facilitate illustration and description, the invention has been here presented primarily in terms of a single counterbalance unit applied to a rotary engine of a particular type. However the invention is not to be construed as limited to such structure, since the same counterbalance unit and method may be applied at either or both sides of rotary engines, pumps, or other analogous rotary devices of analogous structure and operating characteristics.

What is claimed is as follows:

1. A counterbalance unit for a rotary device having a drive shaft and a rotor disposed for oscillative rotation about said shaft and having side plates with circular central openings, said unit comprising a guide disc fitting within a said rotor plate opening for rotation therein and having an off-center circular hub opening for rotation of said shaft, and a counterbalance weight integral with said disc and extending from one side of said disc to oscillative rotation outside of said rotor plate.

2. A rotary engine comprising a stator having side plates each with an axial opening; a drive shaft extending through the stator side plate openings; a rotor, having side plates each with an axial circular opening, for oscillative rotation within said stator and about said shaft; and, at least at one side of said engine, a counterbalance unit rotating about said shaft and comprising a guide disc rotating within the rotor side plate opening and having an offcenter circular hub opening for rotation of said shaft therein, and a counterbalance weight integral with said disc and disposed outwardly of said rotor side plate.

3. Engine of claim **2** wherein said counterbalance weight is disposed outwardly of said stator side plate.

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