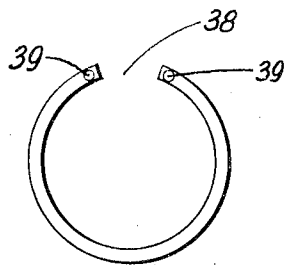
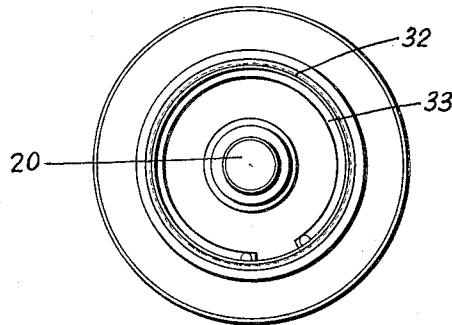
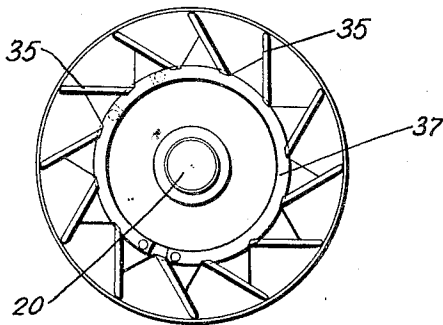
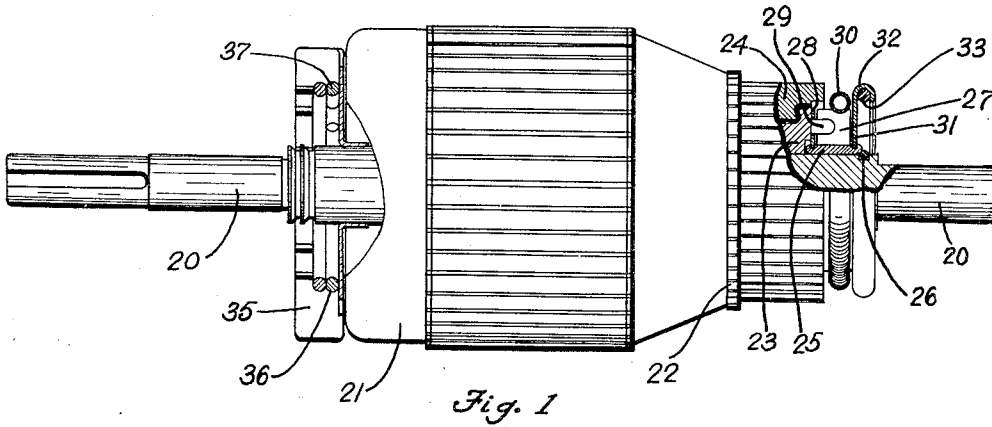


June 3, 1930.

W. G. PONTIS  
COUNTERBALANCING DEVICE

1,761,023

Filed Jan. 27, 1927



Inventor

William Grant Pontis  
By Spencer, Hardman & Fehr  
his Attorneys

## UNITED STATES PATENT OFFICE

WILLIAM GRANT PONTIS, OF DAYTON, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO  
DELCO PRODUCTS CORPORATION, OF DAYTON, OHIO, A CORPORATION OF DELAWARE

## COUNTERBALANCING DEVICE

Application filed January 27, 1927. Serial No. 163,941.

This invention relates to balancing means for a rotating shaft, and particularly to a shaft having an armature core and a commutator mounted thereon.

It is among the objects of the present invention to provide a simple and efficient balancing means for a rotatable shaft which may be easily applied and which is self-securing.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawing, wherein a preferred embodiment of one form of the present invention is clearly shown.

In the drawing:

Fig. 1 is a side view of a shaft having an armature core and commutator mounted thereon and provided with a balancing means, portions of which are shown in section for the sake of clearness;

Fig. 2 is a view taken from the left of Fig. 1 showing the fan and the balancing means;

Fig. 3 is a view taken from the opposite end of Fig. 1; and

Fig. 4 is a detail view of one of the expansible split balancing rings.

Referring to the drawing, the device to be balanced is shown in the form of an armature, comprising a shaft 20, upon which is mounted the armature core 21 and the armature commutator 22.

The armature commutator comprises an inner portion 23, secured to the shaft in any suitable manner, said portion insulatingly supporting the commutator segments 24. In this particular structure the commutator is provided with a short circuiting device comprising a sleeve 25, adapted to fit snugly over the shaft 20, and held in position on said shaft by means of a locking ring 26 resting in a groove formed in the shaft. The sleeve 25 is provided with radial walls at each end thereof, between which the segments 27 of the short circuiting device are adapted to be supported. The radial wall 28 is so positioned on the sleeve 25 as to engage with the outer face of the portion 23 of the commutator, said wall having a plurality of tongues 29 extending outwardly away from

the portion 23 for properly spacing the segments 27 of the short circuiting device. A resilient sleeve, in the form of a circular coil spring 30, maintains the segments 27 normally in position around the sleeve 25. By centrifugal force, the segments 27 will move outwardly against the effect of the spring 30 to engage the commutator segments 24 and thus short circuit the same.

The radial wall 31 secured on the sleeve 25 at the end opposite to which the wall 28 is secured, is provided with a curved peripheral flange 32, which forms an inner groove in which a balancing weight 33 is adapted to be adjustably supported. From this it may be seen that the retaining member, including the radial wall 31, acts to retain both the segments of the short circuiting device and the balancing ring in position.

On the shaft 20 adjacent the end of the core 21, opposite the commutator 22, there is mounted a fan, comprising a plurality of blades 35 spaced in a circular row about the shaft 20, so that the inner edges of said fan blades lie in a circular line coaxial with the shaft. The inner edge of each fan blade is provided with a groove 36, each being centered in a plane passing at right angles to the axis of the shaft. These aligned notches form a broken groove coaxial with the shaft, in which the balancing ring 37 is adjustably supported.

In Fig. 4 a balancing ring is shown in detail, said ring being provided with a gap 38. Adjacent each end of the ring there is provided an indent 39 for receiving a contracting tool, whereby the ring may be contracted for the purpose of positioning it properly in its respective retainer. In providing a split ring, such as is shown in Fig. 4 for balancing purposes, it may readily be noted that the portion of the ring, equal in length to the gap thereof and diametrically opposite said gap, comprises the actual balancing mass or weight, the other portions of the ring extending in opposite directions from said mass, forming expansible securing means by which the mass may rigidly be held in the proper balancing position when in the retainer. Rings having various size gaps

are available to be applied to the unbalanced shaft.

When it is desired to balance an armature, it is first placed in a balancing machine, without having any balancing rings provided on said armature. This balancing machine will indicate the amplitude and plane of unbalance, as well as the lighter side of the armature. These given, computations are available which will indicate the properly gapped ring for compensating for the degree of unbalance. The ring is gripped at its free ends by the contracting tool placed in the retainer at the end of the shaft tested for unbalance, and adjusted so that the plane of unbalance passes through the center of the gap of the ring, said gap being located on the heavier side of the armature. This places the excess or balancing mass of the ring, or more specifically that portion of the ring diametrically opposite its gap on the lighter side of the armature, the remaining portion of the body of the ring being neutral and acting only as an expansible means for securing the balancing mass within the retainer.

One end having been balanced, the other end of the shaft is similarly treated.

To balance the shaft to a finer degree, one or both of the balancing ring retainers may be constructed to receive two balancing rings. In the drawing the fan is shown having the inside edges of the blades provided with two notches arranged side by side, thereby forming two broken grooves for receiving two balancing rings.

In the foregoing description it may be seen that applicant has provided a simple and efficient balancing means for an armature shaft, said balancing means being carried by retainers formed by slight alterations in members already provided on the armature. In case of the fan retainer, it is necessary only to form the notches in the edges of the fan blades, while in the case of the end wall of the short circuiting device, it is necessary only to provide a curved peripheral flange on the one segment retaining wall.

While the form of embodiment of the present invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A device for counterbalancing shafts, comprising, in combination, a grooved retainer secured to the shaft to be balanced; and a resilient, split, balancing ring in said groove, the ring when in the grooved retainer having a gap equal in length to the material of the ring required to balance the shaft.

2. A device for counterbalancing shafts, comprising, in combination, a retainer having an inside groove, circular, and coaxial with the shaft upon which said retainer is

secured; and a split, expansible, balancing ring in said groove, so positioned that the gap thereof lies adjacent the heavier side of the shaft and is bisected by the plane of unbalance of the shaft, the gap being substantially equal to the length of the ring material necessary to balance the shaft when said ring is in the retainer.

3. A device for counter-balancing shafts, comprising in combination, a ring-shaped retainer secured to the shaft to be balanced; an arcuate balancing member adapted to be placed in said retainer, said balancing member including a balancing weight and oppositely disposed arcuate integral portions, said portions being expansible and adapted to engage the retainer for securing the balancing weight therein, each of said portions being one-half the circumferential length of the balancing member minus one-half the length of the arcuate balancing weight.

4. A device for counter-balancing shafts, comprising in combination, a support secured to the shaft to be balanced; an arcuate balancing member adapted to be attached to said support, said balancing member including oppositely disposed arcuate integral portions, said portions resiliently engaging the support so as to secure the balancing member thereto.

5. A device for counter-balancing a shaft, said shaft having a support, comprising an arcuate balancing member adapted to be placed on said support, said balancing member including oppositely disposed arcuate portions, said portions being integral with a balancing weight and adapted to engage the support for securing the balancing weight thereto, each of said portions being one-half the circumferential length of said member minus one-half the length of the balancing weight.

In testimony whereof I hereto affix my signature.

WILLIAM GRANT PONTIS.