R. E. LAPHAM.

BALANCING MEANS FOR CENTRIFUGAL MACHINES.

APPLICATION FILED APR. 29, 1921.

1,438,768.

Patented Dec. 12, 1922.

2 SHEETS—SHEET 1.

Fig. 1.

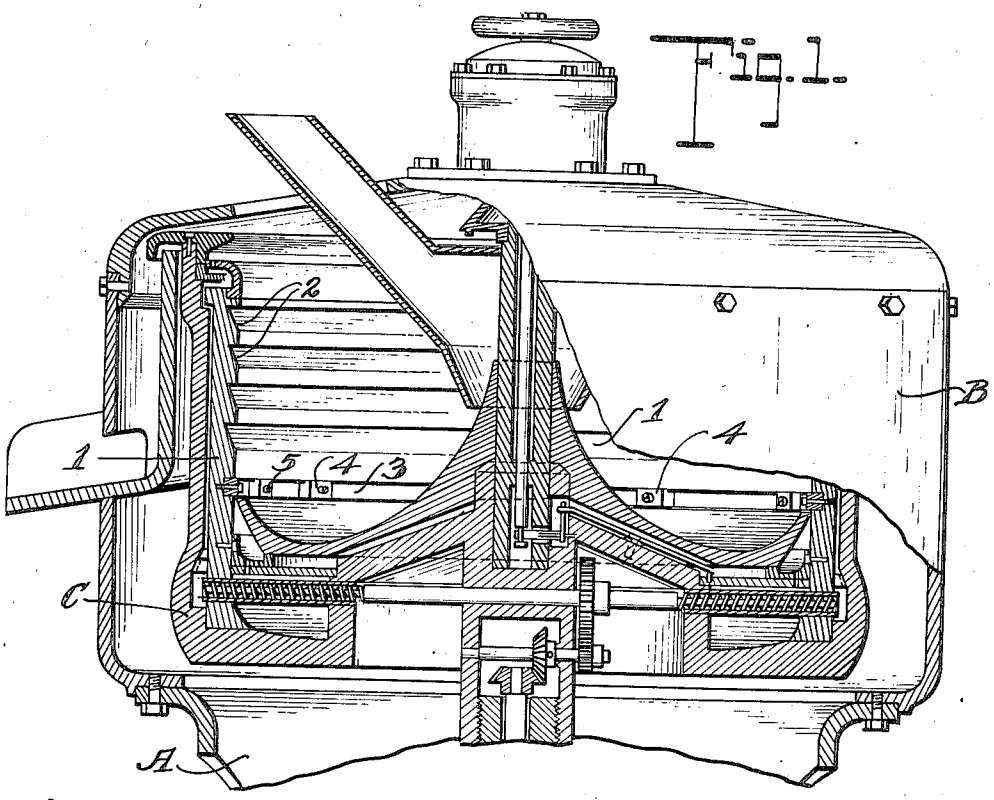


Fig. 2.

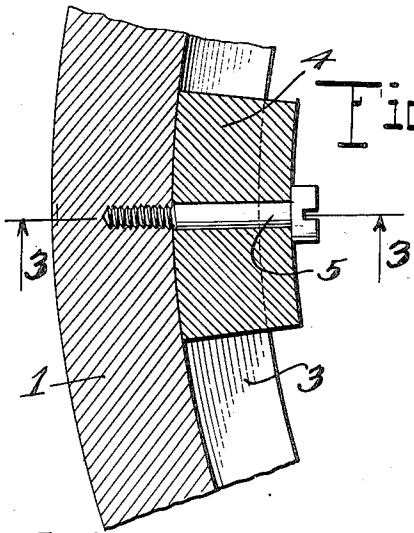
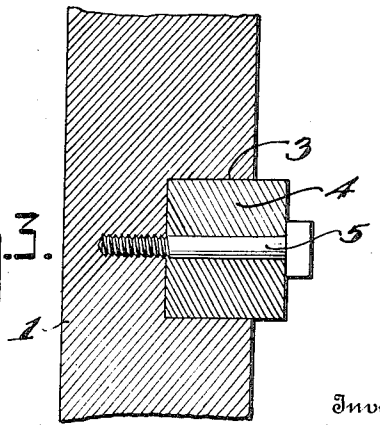


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

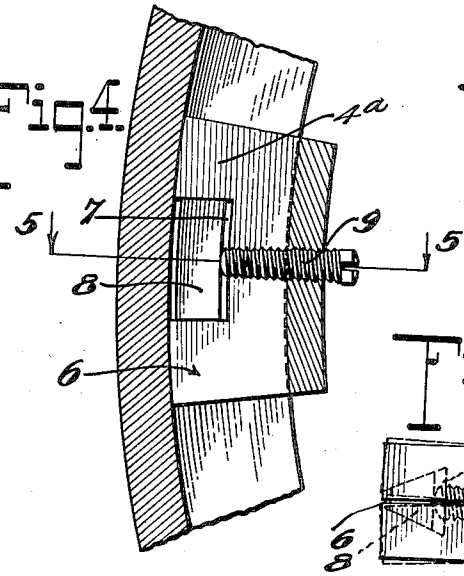


Fig. 5.

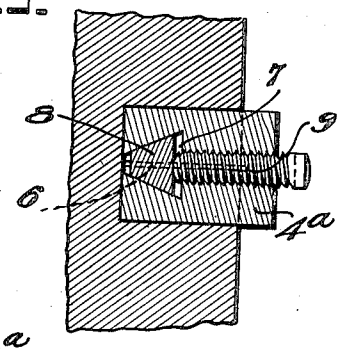


Fig. 6.

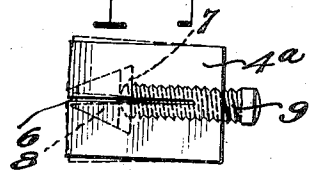


Fig. 7.

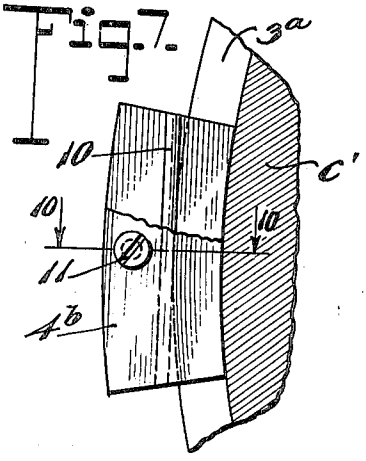


Fig. 8.

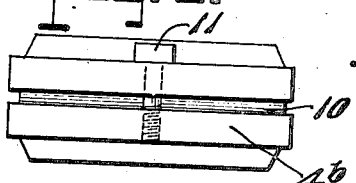


Fig. 9.

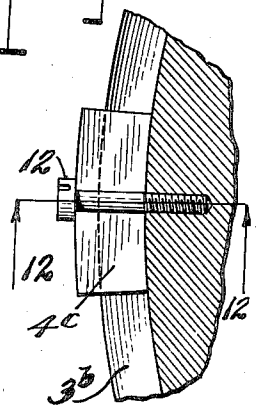


Fig. 11.

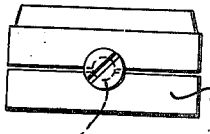


Fig. 10.

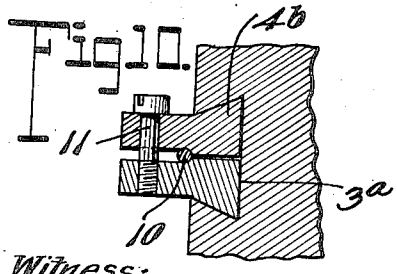
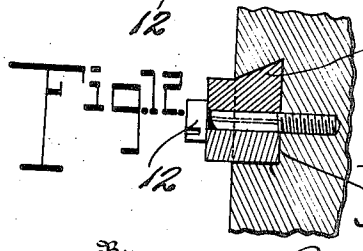


Fig. 12.



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UNITED STATES PATENT OFFICE.

RALPH E. LAPHAM, OF OAKLAND, CALIFORNIA.

BALANCING MEANS FOR CENTRIFUGAL MACHINES.

Application filed April 29, 1921. Serial No. 465,580.

To all whom it may concern:

Be it known that I, RALPH E. LAPHAM, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Balancing Means for Centrifugal Machines, of which the following is a specification, the same being in part a division of my application Serial No. 327,713, filed October 1, 1919, for centrifugal separating means.

In the operation of centrifugal machines of different kinds, such as centrifugal separators, and for the proper operation of rotors of various types such as are driven at high speed, the proposition of establishing and maintaining the rotating body in proper running balance is a matter of no small importance. Especially is this true in relation to long revolving pieces of machinery, so improvements in means and methods of accomplishing the above result are highly desirable.

The primary object of this invention has been to design a simple mode of constructing centrifugal operating bodies so as to quickly and easily enable them to be placed in running balance, for the obvious purpose of eliminating undue vibration and avoiding excess wear and tear on the parts of the machine, which is the natural result of lack of running balance.

A complete understanding of my invention in a number of different forms will be had upon review of the following description, and reference to the accompanying drawings in which:—

Figure 1 is a fragmentary elevational sectional view of a centrifugal mineral separator showing my invention applied thereto;

Figure 2 is an enlarged horizontal section, showing more clearly the balancing groove and weight disposed therein;

Figure 3 is a section on the line 3—3 of Figure 2;

Figure 4 is a sectional view of a modification;

Figure 5 is a section on the line 5—5 of Figure 4;

Figure 6 is an end view of the weight device shown in Figures 4 and 5, dotted lines indicating the spread of the side portions under the action of the wedge;

Figure 7 is a sectional view showing still another modification;

Figure 8 is a front view of the adjustable weight of Figure 7;

Figure 9 is a sectional view of a further modification;

Figure 10 is a section on the line 10—10 of Figure 7;

Figure 11 is a front view of the weight means of Figure 9; and

Figure 12 is a section on the line 12—12 of Figure 9.

It is unnecessary to describe in detail the construction of the centrifugal separator partly shown in Figure 1. It may be noted, however, that it comprises the pedestal or support A, the upper portion of which is shown, a casing B, and the inner revolving bowl C which is equipped with an internal wall member 1 over which a separating medium, preferably consisting of mercury, is adapted to pass upwardly, and thus traverse said wall during the centrifugal operation of the machine. The method of separation and mode of passing off of the mercury, which rises in a sort of film as it passes over the wall 1, is not material to this invention. It is notable, however, that the wall 1 is equipped upon its inner surface with a plurality of annular grooves or pockets 2 to catch the values to be separated from the material operated upon by the machine. Also said wall 1 is equipped with what may be called a balancing groove 3, and in this balancing groove are adapted to be disposed one or more weights or members 4, capable by their weight, and by their function of displacing liquid, or materials being separated, from the groove 3, of establishing a proper running balance for the bowl C as it is driven at high speed. The members 4 are in the form of segments or the like, and are obviously adjustable in the groove 3; they may be secured in place or they may be set in the groove 3 and maintained therein by the centrifugal operation of the machine, in an obvious manner.

The principle of my invention consists, obviously, in the employment of a balancing groove and a member or members to be carried therein, and adjustable to establish the proper running balance and maintain such balance for the highest degree of efficiency operation of the machine.

Whether the groove 3 is internal or external is not material to the invention, save as conditions admit or require this groove

to be located within a rotating body. The groove may be located externally, and I have designed arrangements for employing the principle of my invention either as an internal or external balancing means. In Figures 2 and 3 are illustrated quite clearly the internal groove 3 and the provision of a securing screw fastening 5 adapted to hold the segment 4 in place. The segment 4 may be cut off at either end so as to reduce its mass in obtaining the proper balancing result. In Figures 4 to 6 inclusive the balancing member or segment 4^a is split as shown in dotted lines at 6, and also in full lines in Figure 6. A channel 7 is provided in the innermost portion of the member 4^a, and the channel receives a wedge 8 adapted to be forced laterally so as to separate slightly the portions of the member 4^a on opposite sides of the split 6. In this way the member 4^a is positively held in a desired position by the adjustment of a set screw 9 forming the actuating means for the wedge 8. In Figures 7, 8 and 10, a somewhat similar structure is utilized. In this instance the balancing groove 3^a is external of the body C' to be balanced. The balancing member 4^b is comprised of two parts or halves seen best in Figures 8 and 10. The inner portions of said member 4^b being adapted to be received in the groove 3^a having outer sides diverging inwardly to afford a sort of interlocking or dove tail connection with the groove 2^a, which is of corresponding form in cross section. A rocker pin 10 between the halves of the member 4^b permits of slight separating rocking movement of their inner portions under the action of a screw 11, to effect fastening of the member 4^b in the groove 3^a. Respecting the modification of Figures 9, 11 and 12, the construction is very similar to that just described, except that one of the halves of the member 4^c has a diverging or inclined outer wall to fit into a correspondingly shaped portion of the groove 3^b, and the halves are separated to wedge them in the groove 3^b by means of a screw 12 passing transversely through the space between the parts of the member 4^c.

The foregoing are all simple methods of applying a segment or balancing member in an adjustable manner to internal or external grooves applied to a rotative body forming a part of centrifugal apparatus of the class hereinbefore referred to. Any number of the grooves may be utilized depending upon the length of the centrifugal body and the number of the balancing members will be modified as necessary for the particular purposes. In machines having little or no length, a single groove will suffice, but in longer machines two or more will be necessary preferably. The balancing members will be adjusted to the proper place where they efficiently perform their function of establishing and maintaining the running balance. In the constructions of Figures 7 to 12 inclusive, the halves of the balancing members will be individually inserted in their groove and moved together by a lengthwise movement as perhaps the easiest method of placing them in position.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a centrifugal machine, a rotating body having a balancing groove, a split balancing member entered in said groove, and a part coacting to push apart the split portions of the balancing member to cause the same to bind in the groove.

2. In a centrifugal separating machine, a rotative bowl in which the separation of materials may take place, said bowl being provided with a cut away portion, and means adapted to be seated in a greater or less part of said cut away portion whereby to facilitate balancing of the bowl in action, the cut away portion being located in the path of the materials adapted to be treated in the machine.

3. In a centrifugal machine, a rotating body having a balancing groove, a split balancing member entered in said groove, a rocker member between and on which the split portions of the balancing member may rock, and a part to cause relative rocking of the said split portions on the rocker member to cause the latter to bind against the opposite walls of the balancing groove.

In testimony whereof I affix my signature.

RALPH E. LAPHAM.