April 16, 1935. G. J. STREZYNSKI 1,997,919

CENTRIFUGE

Filed Oct. 3, 1932

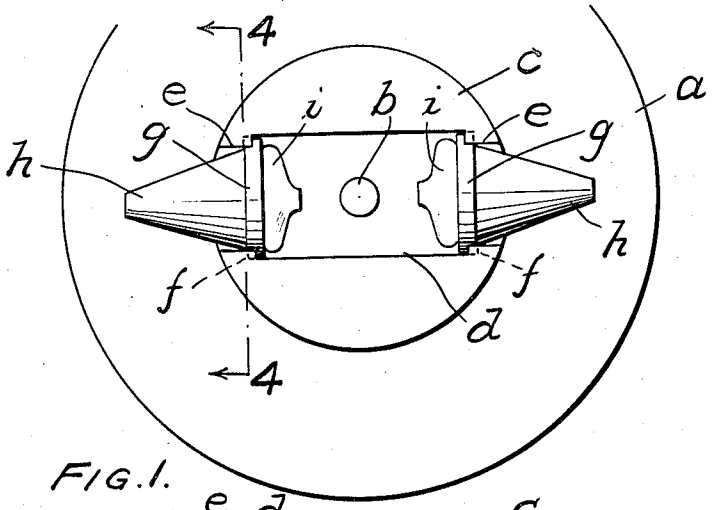


FIG. 1.

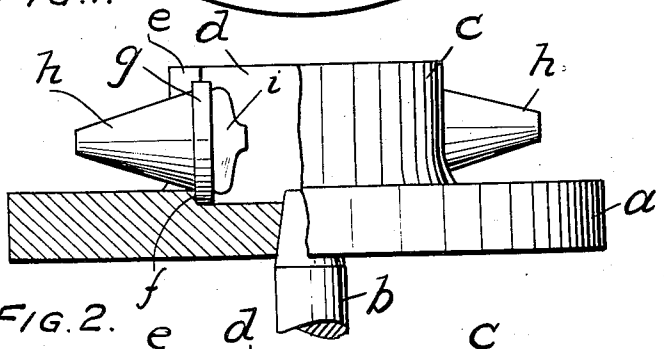


FIG. 2.

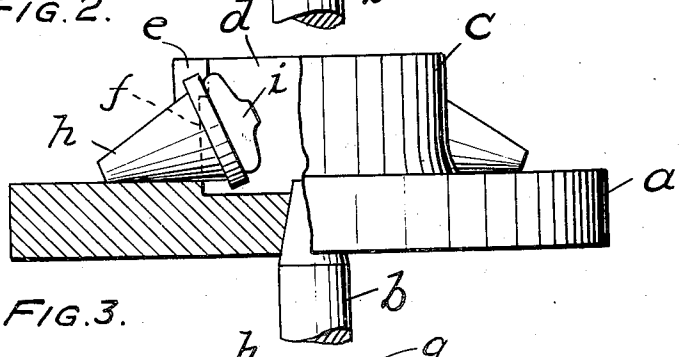


FIG. 3.

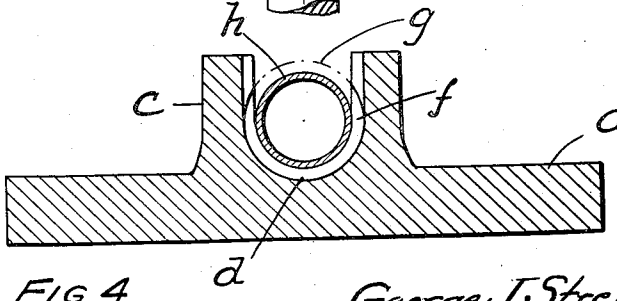


FIG. 4.

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UNITED STATES PATENT OFFICE

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CENTRIFUGE

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Application October 3, 1932, Serial No. 635,997

7 Claims. (Cl. 233—26)

My invention is an improvement in centrifuges of the type, often called "bottle centrifuges", in which small samples, in some machines smaller than 10 cc. and in others as large as 100 cc., are placed in special shaped glass bottles and rotated at high speed to generate a centrifugal force which separates the ingredients of different specific gravity, the proportions of which are then read from a scale marked on the bottle. Each of these glass bottles is generally placed in a metal cup which has, near its upper end, a pair of trunnions supported by recesses in a revolving central head. These trunnions, because they concentrate great forces at two points, must be connected to a strong ring to distribute these forces around the circumference of the cup. This ring increases the weight of the cup and necessitates greater strength in the head. With speeds of 1500–2000 R. P. M. these forces are not excessive, but when speeds of 6000 R. P. M. and higher are attempted, they become quite serious.

The object of my invention is the provision of a cup which is much lighter, for equal strength, than prior cups and the provision of a head especially adapted to support such a cup.

With one type of bottle shown in a co-pending application, Serial Number 626,037, filed July 29, 1932, of A. E. Flowers, it is not necessary that the bottles shall turn, as the machine approaches rest, until their axes are vertical. They need turn only until their axes are 15° to 20° from the horizontal. Using bottles of this character, I have found it practicable to support the cups, not from trunnions, but by a relatively small flange encircling the large end of the cup and resting in a recess in a comparatively simple and massive supporting head.

In the accompanying drawing, which illustrates a preferred embodiment of my invention:

Fig. 1 is a top view and Fig. 2 a side view, partly in section, of one of my improved centrifuge heads with two tubes in the position assumed when rotating. Fig. 3 is a similar view showing the position assumed by the cups when at rest. Fig. 4 is a section taken through a cup and the head in the plane 4—4 of Fig. 1, and showing particularly the area of support of the flange on the cup by the head of the machine.

A cup-carrying head *a* is supported and driven by a spindle *b*. The upper part *c* of the head is of smaller diameter than the lower part and has across its center a semi-circular bottomed groove *d* with smaller semi-circular bottomed ends *e* counterbored at *f* to receive flanges *g* around the large ends of frustro-conical cups *h* adapted to support and carry bottles *i*.

When at rest, the cups *h* and bottles *i* assume the position shown in Fig. 3. When revolving, centrifugal force causes the cups and bottles to assume the position shown in Fig. 2, in which position the flanges *g* fit closely in the counterbores *f* and are supported on more than half the area of the annular surface adjacent to the conical part of the cup.

The lower part of the head is made of great mass in accordance with the principle of my co-pending application, Serial Number 634,674, filed September 24, 1932.

As an example of suitable dimensions, in one size of machine carrying 10 cc. bottles, the outside diameter of the wide end of the body of the cup is 35 mm. and of the flange 40 mm., and the contact between the flange and its support extends approximately 240° of the circumference.

In a centrifuge and cup embodying the invention, it has been found possible to rotate the centrifuge at 18000 R. P. M. without the production of excessive forces.

What I claim and desire to protect by Letters Patent is:

1. A centrifuge comprising a rotatable head having a central body portion and a disk portion extending horizontally beyond the central body, the central body being provided with a groove extending radially of the head and having a semi-circular bottom which is abruptly contracted near its outer end, the smaller bottomed end being counterbored throughout its semi-circular portion to afford a support for the flange of a bottle-supporting cup, said support being operative, when said head is rotating, to support a cup in a position at right angles to the axis of rotation of the head, the head having clearance to permit a cup to tilt and, while said head is not rotating, to rest upon the disk portion of the body.

2. In a bottle centrifuge, the combination, with a bottle-supporting cup having a flange around one end, of a rotatable head having a central body portion and a disk portion extending horizontally beyond the central body, the body being provided with an open top socket adapted to support more than half the annular area of the cup flange and, during rotation, support the cup at its inner end in a horizontal position with its outer end unsupported and overlying said disk portion, the socket having, below the level of the body of the socket, clearance to allow a cup to tilt, said disk portion of the head then affording a support for the cup.

3. In a bottle centrifuge, the combination, with a flanged frustro-conical bottle supporting cup, of a rotatable head provided with a groove extending radially of the head, said groove having a semi-circular bottom which is abruptly contracted near its outer end, the smaller bottomed end being counterbored throughout its semi-circular portion to afford a cup flange support that is operative, when said head is rotating, to support a cup in a position at right angles to the axis of rotation of the head, the head having clearance to permit a cup to drop substantially below a horizontal position.

4. In a bottle centrifuge, the combination with a frustro-conical bottle supporting cup having a flange around its large end, of a rotatable cup-carrying head provided with a socket rigid therewith adapted to support more than half and less than three-quarters of the annular area of the flange and having, below the level of the bottom of the socket, clearance to allow a cup to drop substantially below a horizontal position.

5. A centrifuge comprising a one-piece rotatable head provided with a groove extending radially of the head, said groove having a semi-circular bottom which is abruptly contracted near its outer end, the smaller bottomed end being counterbored throughout its semi-circular portion to afford a cup flange support that is operative, when said head is rotating, to support a cup in a position at right angles to the axis of rotation of the head, the head having clearance to permit a cup to drop substantially below a horizontal position.

6. In a bottle centrifuge, the combination with a flanged bottle-supporting cup, of a rotatable head provided with a groove arcuate in cross section with its axis at right angles to the axis of rotation of the head and having its outer end contracted to form a shoulder which is arcuately counterbored throughout more than 180° and less than 270° to support said flanged cup in a radial position while rotating and in an inclined position when at rest.

7. In a bottle centrifuge, the combination with a flanged bottle-supporting cup, of a rotatable head provided with a diametric groove, having opposing side walls and a semi-circumferential bottom and an open top, the head having inwardly extending shoulders extending along the opposite outer ends of the grooves, said shoulders being counterbored along their inner faces in line with the semi-circular parts of the grooves to form cup flange supports adapted to support cups in an angular position while at rest and in a radial position during rapid rotation.

GEORGE J. STREZYNSKI.