# United States Patent [19]

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[54] **CENTRIFUGE POWER HEAD WITH MOUNTING MEANS**


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[52] **U.S. Cl.** ..... **233/26**

[51] **Int. Cl.** ..... **B04b 9/12**

[58] **Field of Search** ..... 233/26, 23 R, 23 A, 233/24, 1 R, 1 B



[56] **References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 1,991,925 | 2/1935 | Garver | 233/26 |
| 3,268,160 | 8/1966 | Talley | 233/26 |
| 3,028,075 | 4/1962 | Blom | 233/26 |
| 3,420,437 | 1/1969 | Blom et al. | 233/26 |

FOREIGN PATENTS OR APPLICATIONS

| | | | |
|---|---|---|---|
| 20,916 | 1/1916 | Denmark | 233/23 A |



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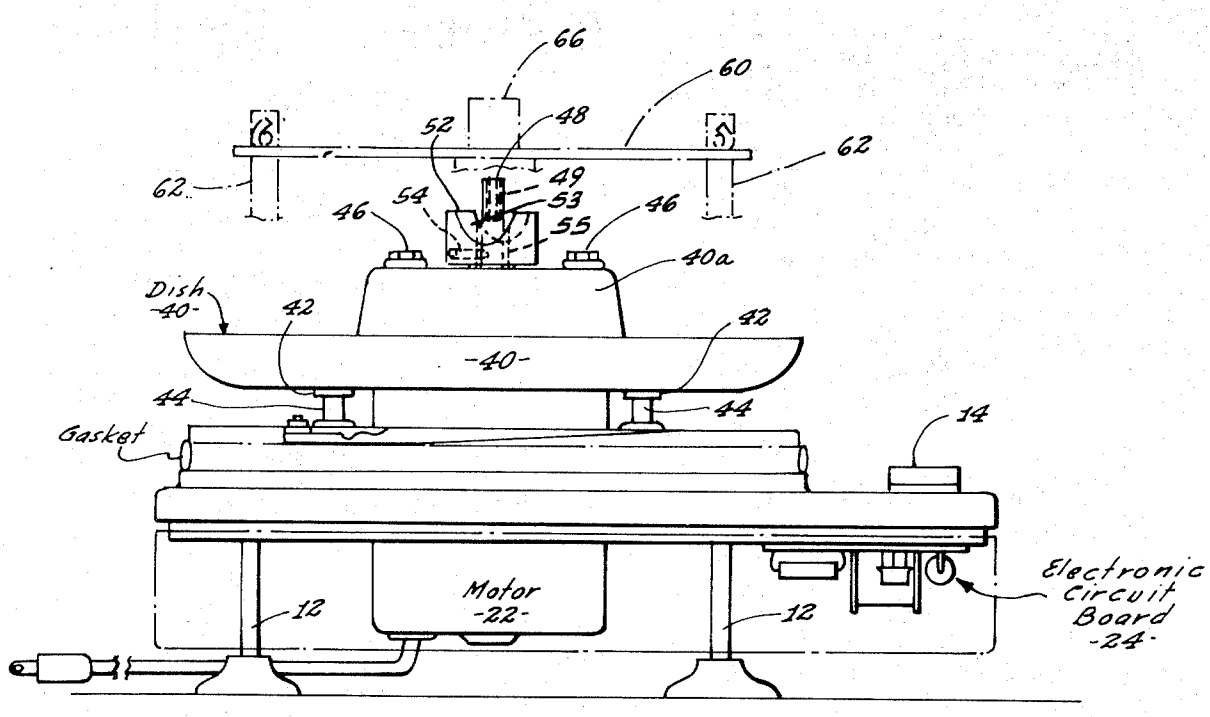


[57] **ABSTRACT**

An improved centrifuge structure is provided for medical diagnostic purposes, and the like, and which is particularly suited for use in conjunction with urine, blood and microhematocrit analyses. The structure involves an electric motor which is supported so that its drive shaft extends upwardly along the central axis of the centrifuge, and a coupler, in accordance with the invention is attached to the shaft by means, for example, of a set screw, or other means. The coupler defines a transverse trough extending radially with respect to the axis of rotation of the drive shaft, and the drive shaft extends upwardly through the bottom of the trough. A mating bushing is attached to the underside of the power head of the centrifuge, and it has a central aperture for receiving the motor shaft. The lower end of the bushing has a configuration which is shaped to fit into the transverse trough of the coupler. A screw extends down through the power head and through the bushing to be threaded into the upper end of the drive shaft.

The aforesaid screw may have a knurled head to permit it to be loosened and tightened by hand. When the screw is tightened, the power head is held securely on the drive shaft with the bushing engaged by the coupler, and a positive drive is provided for the power head. However, it is an easy matter to exchange the power head with another type, if so desired, merely by removing the screw and placing a second power head, equipped with a similar type bushing, over the shaft and down into the coupler.


**3 Claims, 7 Drawing Figures**



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SHEET 1 OF 3

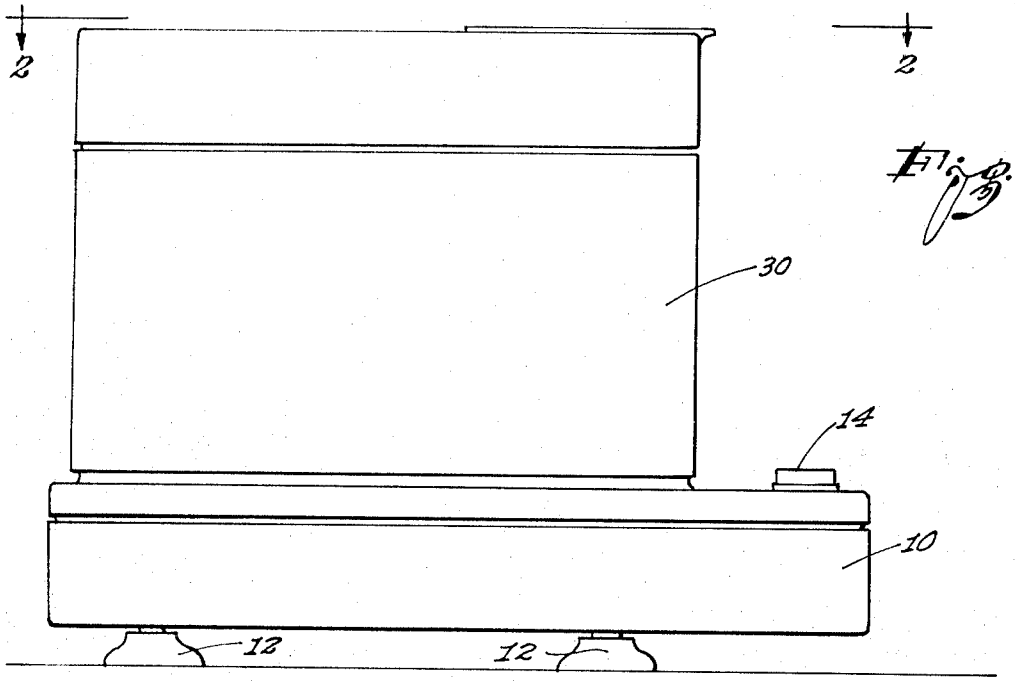
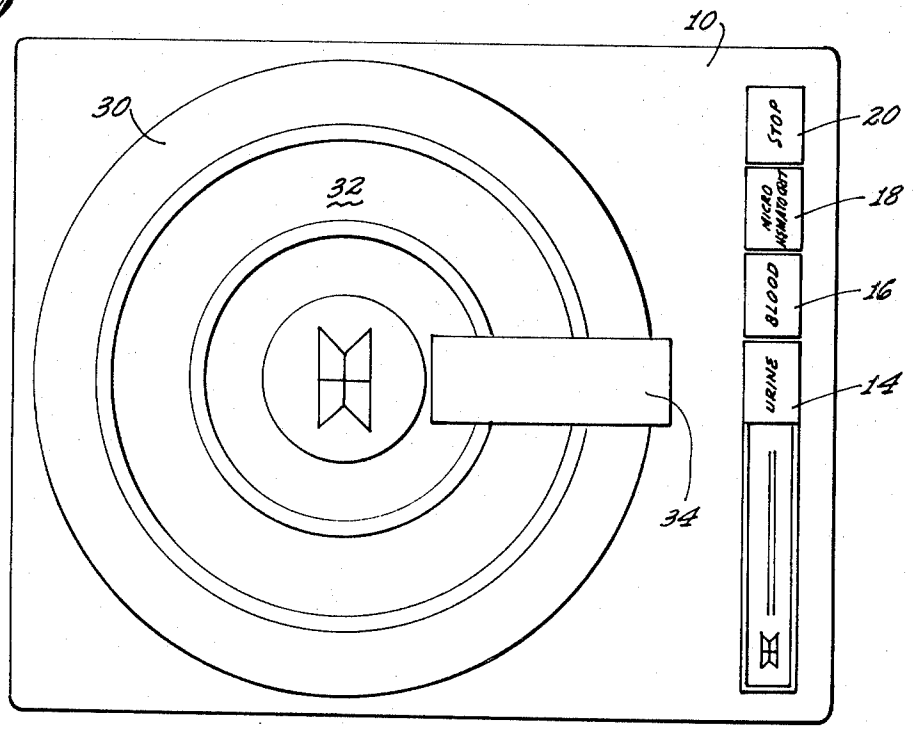



Fig. 1

Fig. 2




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Fig. 3

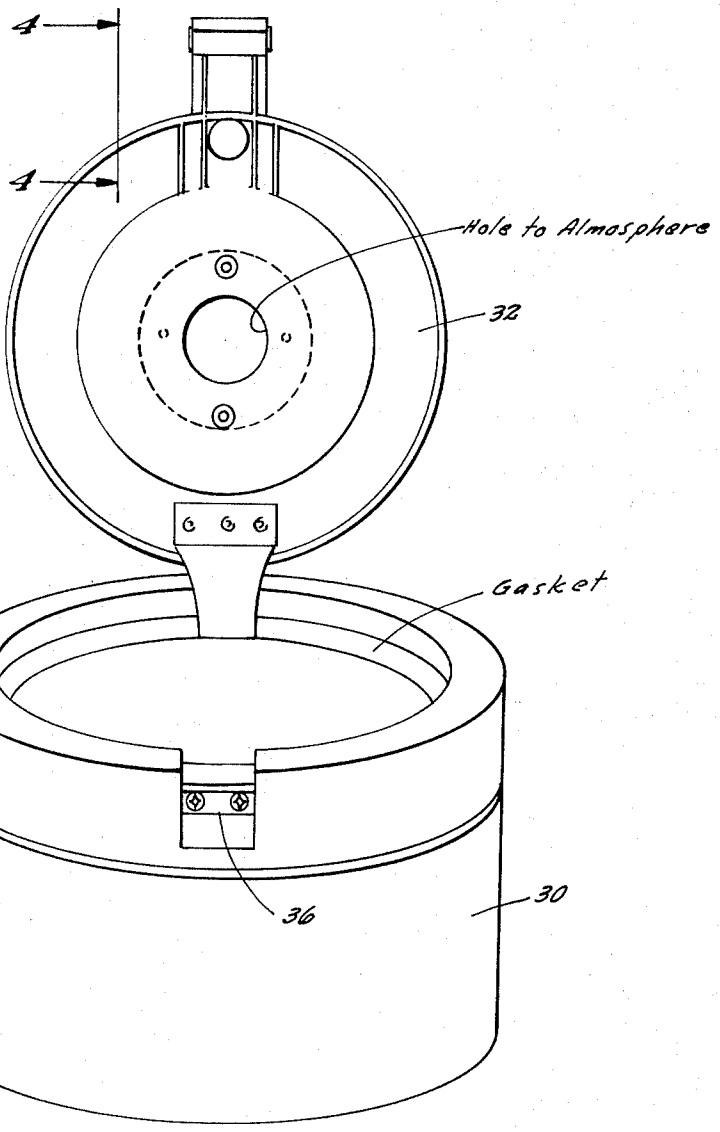
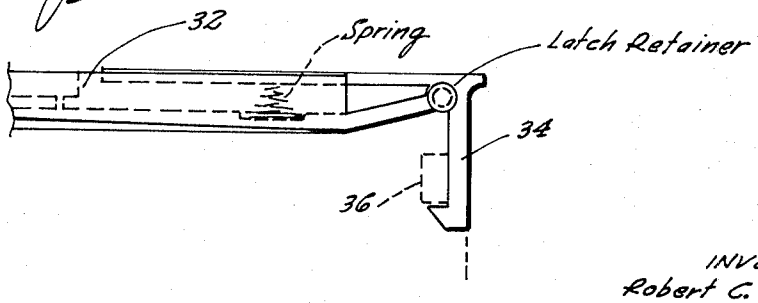



Fig. 4




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Fig. 5

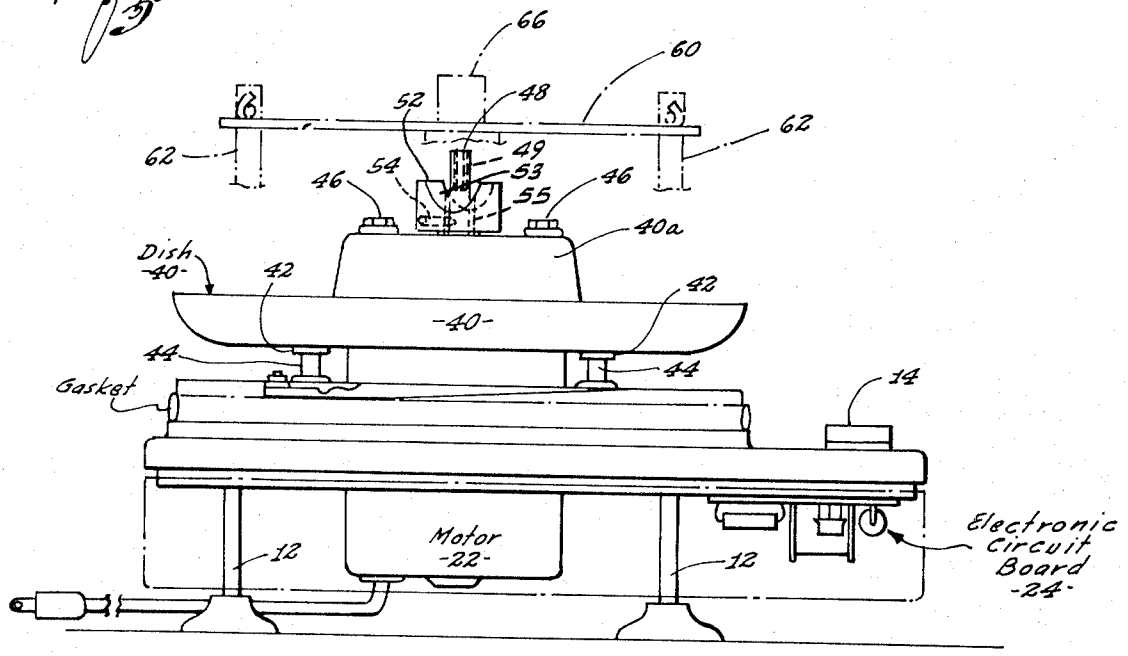



Fig. 6

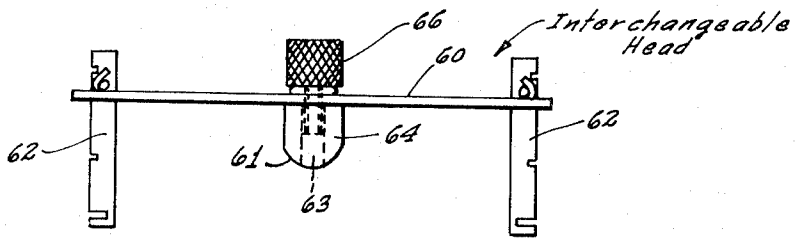
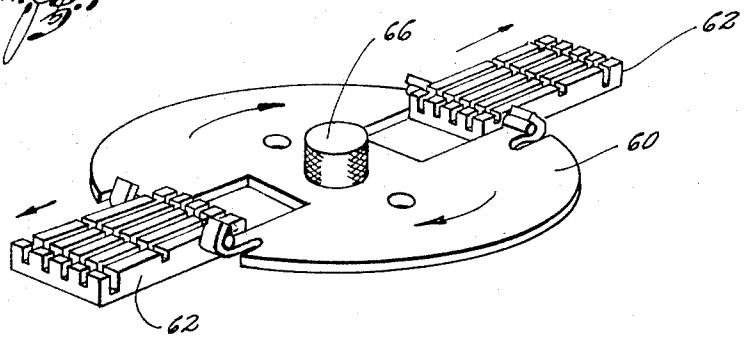



Fig. 7




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# CENTRIFUGE POWER HEAD WITH MOUNTING MEANS

## BACKGROUND OF THE INVENTION

Centrifuges are widely used for medical diagnostic purposes, and for a wide variety of other purposes in which it is desired to separate the various constituents of a sample by centrifugal forces. The usual centrifuge includes an electric motor which drives a power head, the power head rotating at a high speed within the centrifuge housing. Appropriate receptacles for the liquid which is to be subjected to the centrifugal forces are provided on the power head.

In order to make a particular centrifuge of more universal use and acceptance, it is most advantageous to provide an interchangeable type of power head, so that a variety of different power heads may be used for different tests, all with the same unit, and also to provide for the simple removal of the power head for cleaning purposes.

As mentioned above, the structure of the present invention is most advantageous in that it provides an improved and simplified coupling structure, whereby the power head may be positively and rigidly supported on the drive shaft of the centrifuge drive motor, and yet which may be easily and simply removed, when so desired. It will become evident as the description proceeds, that the structure of the present invention is applicable to a wide range of type of centrifuge mechanisms, in which interchangeable power heads are used.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side elevation of a centrifuge which may incorporate the concepts of the invention;

FIG. **2** is a top plan view of the centrifuge of FIG. **1** taken essentially along the line **2—2** of FIG. **1**;

FIG. **3** is a perspective representation of the cylindrical housing of the centrifuge shown in FIGS. **1** and **2**, the housing being shown with its hinged cover in an open position;

FIG. **4** is a view taken along the line **4—4** of FIG. **3**, and showing an appropriate latch mechanism for the cover of the housing;

FIG. **5** is a side elevation of the chassis of the centrifuge, showing the electric motor, and with the power head removed for reasons of clarity;

FIG. **6** is a side elevation of the power head which was removed from the chassis view of FIG. **5**; and

FIG. **7** is a top plan view of the power head.

## DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT

The centrifuge shown in FIG. **1** includes, for example, a base **10** which is supported on pedestals **12**, the pedestals being preferably provided with suction cups, so as to assure stability of the centrifuge when operating at high speeds. A series of push-button controls **14, 16, 18** and **20** are mounted on the forward edge of the base **10**, and these push buttons control the operation of the electric motor **22** shown in FIG. **5**, the control being effectuated through electronic circuitry, for example, mounted on an electronic circuit board **24** shown in FIG. **5**.

The various push buttons may be labelled respectively "urine," "blood," "microhematocrit" and "stop."



When the buttons **14, 16** or **18** are depressed, the centrifuge rotates at various speeds which are suitable for the test indicated by the designation on the individual push button. The operation is stopped when the push button **20** is depressed. A cylindrical housing **30** is supported on the base **10**, the support being preferably by means of suitable latches, so that the housing may be removed from the base to reveal the inner components, such as shown in FIG. **5**. A cover **32** is hinged to the top of the housing, and the cover is normally held closed by means of an appropriate latch **34**.

The view of FIG. **3** shows the housing **30** removed from the base **10** and with the cover **32** in its open position. When the cover **32** is turned down to a closed position, the spring loaded latch **34** engages with a shoulder **36** in the top edge of the housing so that the cover is firmly held closed. However, the cover may be opened by pressing the top part of the latch down so as to release the latch from the shoulder.

A dish **40** is mounted on the base **10**, as shown in FIG. **5**, by means, for example, of appropriate screws **42** and bushings **44**. The dish is supported up from the base **10**. The dish is preferably enamelled, and is intended to serve as a receptacle for blood, urine or the like which might become spilled from the power head of the unit. The dish may be easily cleaned simply by removing the housing **30**, and the power head. The dish has a central portion **40***a* which has a re-entrance configuration, and the motor **22** is supported from the central portion **40***a* of the dish by means of appropriate screws **46**.

The drive shaft **48** of the motor extends upwardly from the top of the central section of the dish, and a coupler **52** is mounted on the drive shaft **48** just above the dish by means, for example, of a set screw **54**. The coupler **52** defines a transverse trough-like surface **53** around the shaft **48**. The upper end of the shaft **48** is hollow, and has an internal thread **49** provided in it. The coupler **52** has an aperture **55**, and the drive shaft extends through the aperture **55** and up through the trough-like surface **53**, as shown.

The power head **60**, such as shown in FIG. **6** may take the form of a flat disc-shaped member, and a pair of carriers **62** may be swively mounted at diametrically opposite positions on the power head. The carrier **62** may be slotted to receive small receptacles of the liquid to be treated. When the power head **60** is rotated at a high speed, the carriers **62** swing out to a generally horizontal position, and the centrifugal separation of the ingredients of the liquids may be carried out. Then, when the power head slows down, the carrier **62** assumes a vertical position, so as to avoid spillage.

A bushing **64** is centrally provided on the underside of the power head **60**, and it defines a transverse generally arcuate lower surface **53** which engages the trough-like surface **53** of the coupler **52** when the power head is in place on the drive shaft **48**. The drive shaft **48** extends up a central passage in the bushing **64**, and a screw **66** is threaded into the threaded hollow end of the drive shaft to hold the power head in place.

It will be appreciated that the mating between the coupler **52** and the bushing **64** provides a positive engagement between the power head and the drive shaft so that high rotational speeds may be developed, the only function of the screw **66** being to hold the bushing **64** in place in the coupler **52**, and to maintain the

power head **60** centered with respect to the drive shaft **48.**

Whenever it is desired to replace the power head **60** with a different power head, it is merely necessary to loosen and remove the screw **66.** The screw may be provided with a knurled head to facilitate the manual tightening and loosening of the screw.

Therefore, the power head **60** may be removed easily and simply to reveal the dish **40** and facilitate cleaning operations. Also, the power head **60** may be replaced by another type power head, equipped with the same type of bushing **64,** this being achieved simply and expeditiously, so that the centrifuge unit may be used for a wide range of applications.

While a particular embodiment of the invention has been shown and described, modifications may be made, and it is intended in the claims to cover the modifications which come within the spirit and scope of the invention.

What is claimed is:

**1.** A centrifuge comprising: a supporting chassis, an electric motor having a drive shaft, said electric motor being mounted on said chassis so that said drive shaft extends in a vertical direction; a coupler affixed to said drive shaft and defining a trough-like surface extending generally transversely to the axis of rotation of said drive shaft, an aperture in said coupler, said drive shaft extending through said aperture in said coupler and projecting up through said trough-like surface, the projecting end of said drive shaft being threaded; and a power head having a bushing affixed to the under surface thereof, and said bushing having a lower arcuate surface extending generally transversely to the longitudinal axis of said bushing and extending into said trough-like surface of said coupler in a mating relationship, said bushing having a central passageway extending longitudinally therethrough for receiving the projecting portion of said drive shaft, said power head having an aperture therein aligned with the passageway in said bushing; and a screw extending through said aperture in said power head and down into said passageway in said bushing into threaded engagement with the projecting end of said drive shaft.

**2.** The combination defined in claim **1,** in which said supporting chassis has an opening and said motor extends therethrough, and which includes a dish-shaped member disposed under said power head for receiving drainage therefrom.

**3.** The combination defined in claim **1,** in which said screw has a knurled head to facilitate manual threading and unthreading thereof.

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