United States Patent

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[54] RECEPTACLE HOLDER FOR CENTRIFUGES

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[52] **U.S. Cl.** **233/26,** 211/74

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

[58] **Field of Search** ..... 233/26, 27, 1 R; 88/14; 211/74; 248/311

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[57] **ABSTRACT**

A holder for centrifuges, for receiving specimen containers such as test tubes holding substances to be centrifuged, comprising three major parts which are connected in a form-fitting manner, namely a stirrup member, a cup member therein, and a frame in the latter, with bores in the frame for the test tubes. The cup member is preferably transparent, and the frame has apertured side portions that allow inspection of the substances in the test tubes. Photo-electric means may be provided for automatically controlling the energization of the centrifuge, depending on the progress of the settling process.

12 Claims, 12 Drawing Figures

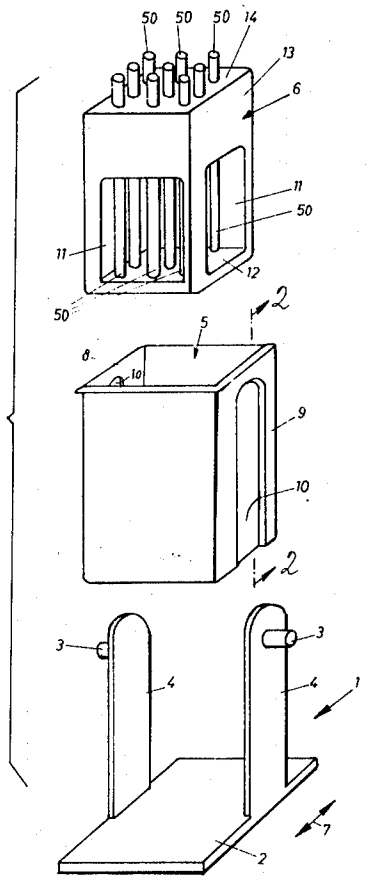


Fig. 1

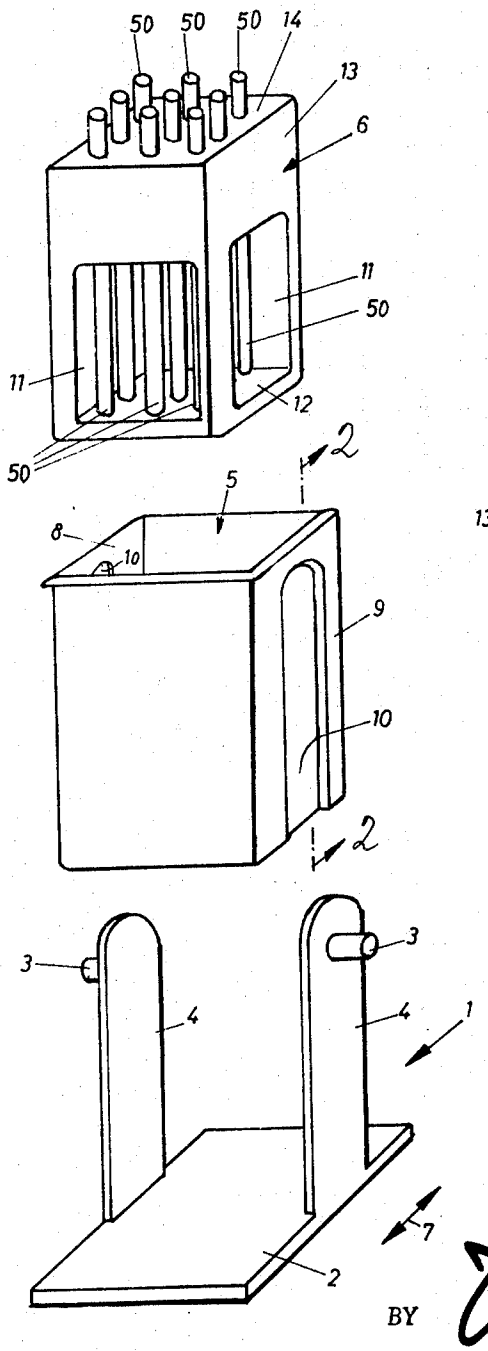
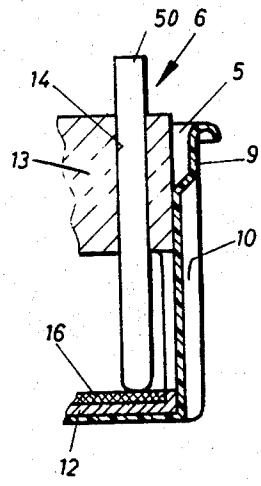


Fig. 2



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Fig. 3

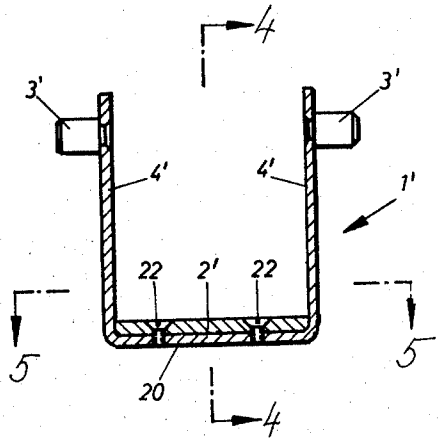


Fig. 4

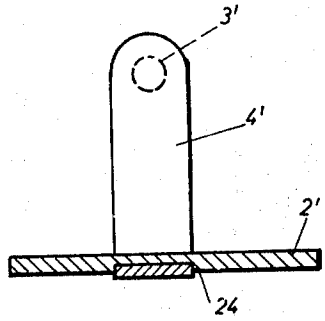


Fig. 5

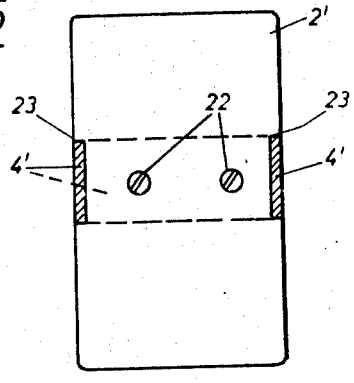


Fig. 6

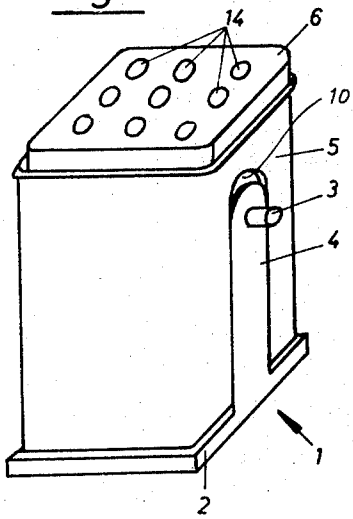
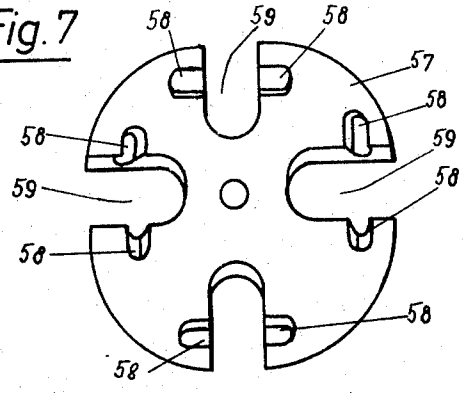


Fig. 7



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Fig.9

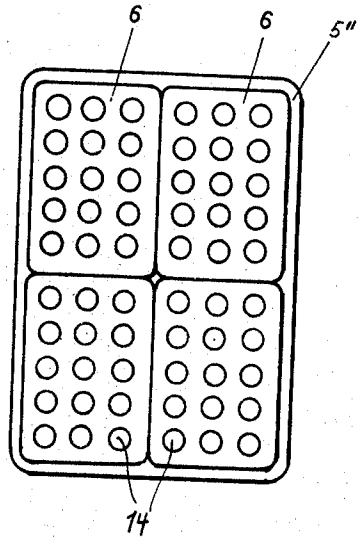


Fig.8

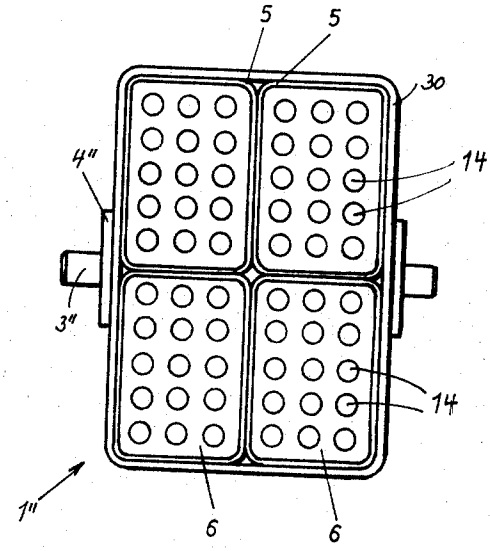


Fig.10

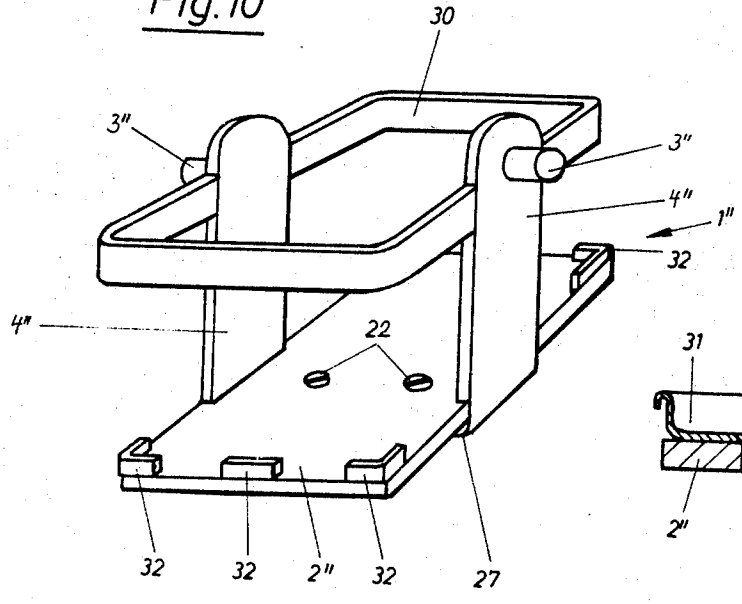


Fig.11

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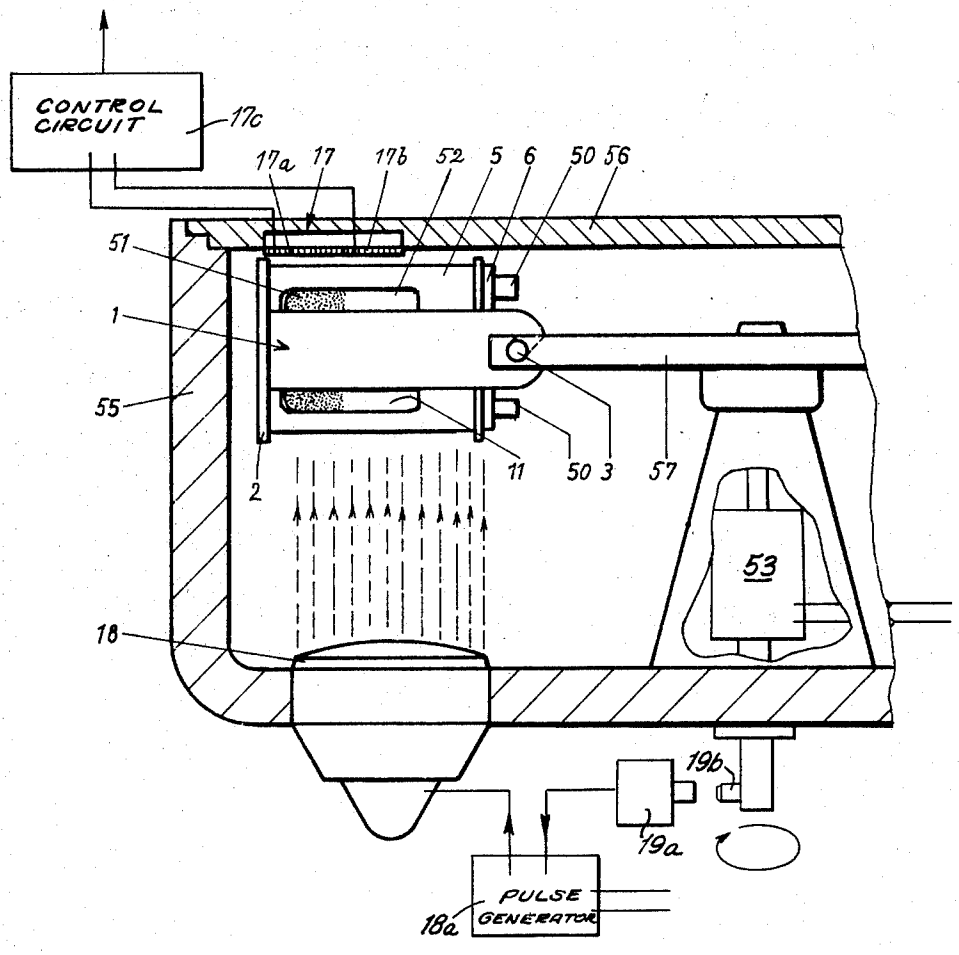


Fig. 12

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RECEPTACLE HOLDER FOR CENTRIFUGES

The invention relates to a receptacle holder for centrifuges, for receiving specimen containers such as test tubes and the like, to be pivotally supported in the centrifuge head by means of lateral journal pins and corresponding grooves in the centrifuge head.

Hitherto known receptacle holders, provided for receiving several specimen containers, such as test tubes, were usually machined from a preferably light-metal block from the solid, and they were provided either with individual blind-hole bores with the diameter of a test tube or with a substantially rectangular recess to receive a supporting frame.

Receptacle holders provided with individual blind bores, each to receive a test tube, had not only the disadvantage to be rather expensive on account of the machining from the solid with a view to obtaining the required sturdiness but they also had a substantial mass which involved exceedingly high centrifugal forces during the operation.

A further disadvantage constituted in that rubber stoppers had to be inserted into the individual blind-hole bores for protecting the test tubes yet the latter broke quite frequently during the centrifuging process whereafter it was rather tedious and time-consuming to clean the respective blind bore or bores.

Even receptacle holders which were provided with a substantially rectangular recess or cut-out for simultaneously receiving several specimen containers placed in a support frame had to be machined from the solid and were consequently similarly expensive and heavy. They necessarily involved very considerable centrifugal forces that acted primarily on the supporting journal pins. On account of these high forces prevailing in both types of known devices it was not even possible separately to manufacture the journal pins and insert them subsequently into the receptacle holders because neither screw connections nor rivets were capable of withstanding the enormous centrifugal forces. The result was that even the journal pins or trunnions had to be machined from the solid material.

Another, considerable drawback of known receptacle holders consists in that these devices, being closed on their sides and made from a non-transparent material, such as mostly steel, do not allow inspection of the lower portions of the specimen containers, such as from the sides. Thus one has to set the centrifuging time according to empirical results or intermediate tests have to be made for which the centrifuge has to be stopped in each instance in order to remove and inspect the individual specimen containers. This procedure naturally considerably disturbs and handicaps the operation.

It is an object of the present invention to provide a receptacle holder which eliminates the aforesaid disadvantages, is cheaper to manufacture, lighter in weight, does not develop exceedingly high centrifugal forces, and is simple to manipulate.

It is also one of the objects of the invention to allow the inventive receptacle holder simultaneously to receive a plurality of specimen containers, such as test tubes, in the form of a battery or set, to be individually withdrawable from the holder.

Further, a receptacle support frame should be provided which allows overall inspection of the lower portions of the test tubes, thereby allowing the lab operator to recognize the results of the centrifuging operation at a glance, without having separately to remove one or more of the individual specimen containers.

It is also one of the objects of the inventive receptacle holder to provide the facility of carrying out a continuous observation of the material being centrifuged, during the entire process, so that the duration of centrifuging is not dependent any more on estimated or empirical values but it can made directly dependent upon the centrifuging effect itself, that is, upon the attained sedimentation in the specimen receptacles.

The inventive receptacle holder is characterized, in one of its important aspects, by a substantially U-shaped stirrup with a bottom plate and journal pins at the ends of its shanks, at least one cup that can be inserted in a form-fitting manner into the stirrup, as well as at least one receptacle supporting frame to be inserted in the cup or cups, with lateral walls open in their lower regions.

As compared to hitherto known devices, the inventive receptacle holder has the following important advantages:

The stirrup is swingably supported in the head of the centrifuge and, while it has to withstand all the centrifugal inertial forces, is much simpler and cheaper to make and also much lighter in weight so that, as a result, the centrifugal forces to be endured by the pins are considerably lower, allowing substantially higher centrifuging speeds as well as a simpler construction of the centrifuge head itself.

The cup, insertable in a form-fitting manner into the stirrup, is similarly simple and cheap to manufacture and has a very low weight whereby it does not substantially contribute to an increase in the centrifuging forces. It is actually the purpose of this cup to receive, in the case of a breakage of a specimen container, both its contents as well as the broken pieces, such as glass fragments of a test tube, and to insure that neither the liquid or other substance nor the broken parts of the specimen container are whirled into the centrifuge drum.

In this manner the contamination of the centrifuge drum in case of a breakage of a specimen container and the development of an unbalance are both eliminated. It is known that for each centrifuging process simultaneously several receptacle holders are suspended in the centrifuge heads, in a manner symmetrical to the center axis, so as to insure a centrifuging process which is possibly free from unbalance.

The receptacle support frame inserted in the cup and receiving a battery of individual specimen containers has the advantage that simultaneously, by a single movement, several specimen containers can be handled whereby a mix-up between individual containers is eliminated or at least considerably reduced. These support frames are furthermore very useful as stands for a number of specimen containers, and after the centrifuging they can be placed on a suitable surface (table, counter top, etc.).

The open arrangement of the side walls of the receptacle support frame, at least in its lower portion, allows inspection by the operator of all inserted specimen containers and their contents so that it is not necessary to remove the individual specimen containers from the support frame in order to make a visual inspection.

This receptacle support frame is similarly simple and cheap to produce. Only its bottom on which the specimen containers rest is exposed to the centrifugal forces of the containers and their contents, thus the receptacle frame does not require a particularly high rigidity so that it can consequently be made, for example, from a light plastic material or any other suitable light-weight material, in a simple and light constructional arrangement.

The inventive receptacle holder consequently exhibits not only the advantages of being simple to produce, cheaper and lighter, as compared to the hitherto known devices serving the same purpose, but it has the added advantage that the manipulation of the specimen containers is considerably simplified. This means that at the same time a substantial saving is obtained in operating time and effort.

As a further, optional feature of the inventive device, the stirrup and the bottom plate can be made from a single piece. This expedient results in a further reduction in costs and simplification of the manufacture.

According to the size of the stirrup it might be advisable, according to the invention, to make the stirrup and the bottom plate separate, these elements being subsequently connected by screws or other conventional expedients in a form-fitting manner.

Unlike the known receptacle holders in which the journal pins were made from the same material and machined from the solid, the invention also provides separate pins which can be riveted or screwed into the shanks of the stirrup. This also results in a very considerably further reduction in costs and simplification of the manufacturing process.

Another preferred, optional feature of the invention resides in that the stirrup can be made from a plastic material or a light metal.

It is suggested to provide the stirrup with an upper girdle or frame member and/or upwardly directed safety members disposed on the surface of its bottom plate, such as ledges, pins, notches and the like, for supporting the cup or cups.

Thus the latter are held in place in a simple manner, and it is not necessary to provide the walls or other parts of the cups with some supporting profiles with which to be attached to or secured with respect to the stirrup.

It is advisable and suggested by the invention to provide the bottom plate with a trough for receiving the lower portion of the cup or cups.

In accordance with another recommended feature of the invention, the stirrup, made in different sizes, is designed to receive several cups and/or support frames.

It is thus possible to lodge several receptacle supporting frames within the stirrup, thereby multiplying the capacity of the device, while using a standardized size of support frames and possibly also of matching cups.

It is also possible to make the stirrup and the cup, or either of them, in various sizes, to receive different quantities of receptacle supporting frames.

In this embodiment only a single cup is required, the size of which corresponds to that of the stirrup, and in which several smaller receptacle support frames of standard size can be inserted. A further reduction in costs and weight is achieved, in combination with an increase in specimen-container receptivity.

The cup itself is preferably made with thin walls, from a plastic material insensitive to acids, lyes and other aggressive chemical substances. This avoids the cups to be damaged, such as, for example, when a specimen receptacle should break and its content spilled into the cup.

The invention suggests a very simple construction for the cups insofar as two opposite lateral walls may have indentations or depressions for receiving the stirrup shanks.

Another rather important feature consists in that the cups are made of a transparent, preferably glass-clear plastic, such as plexiglass.

This allows not only the contents of the individual specimen containers to be observed from the outside through the cup walls and the lateral openings of the receptacle support frame but the possibility is also give continuously to observe during the centrifuging process any changes occurring in the condition of the material being centrifuged, and to photo-electrically to sense and use the changing transparency of the material. During sedimentation in the course of the centrifuging action a dense, opaque deposit develops, as a rule, in the lower portion of the specimen containers, while the upper portion clarifies and becomes transparent.

The receptacle supporting frame consists preferably of a substantially square-shaped hollow body with apertured side walls, a bottom and a massive top portion, the latter having perpendicular through bores, preferably arranged in rows, each for receiving a specimen container or test tube.

According to yet another feature of the invention one or more photo-electric sensors or transducers can be disposed above the flight path of the receptacle holder, assumed during centrifuging, while one or more stroboscope lamps and the like can be arranged below the flight path, their pulse or light frequency being adapted to or varied in accordance with the rotational speed of the centrifuge.

It is of course possible to observe the material contained in the individual receptacle holders and being centrifuged by means of one or more stroboscope lamps through the transparent cups, the inventive device furthermore allowing the centrifuge to be automatically stopped or disconnected when the required effect has been achieved. The man skilled in the art can of course reverse the above-mentioned arrangement of the photo transducers and stroboscope lamps; it is however advisable to keep the former possibly close to the flight path of the receptacle holder.

With a view to attaining a relatively high triggering sensitivity of this supervisory or control arrangement, the invention furthermore suggests two groups of photo-electric cells to be used of which one is responsive to the light dark jump and the other, conversely, to the dark - light jump, a known electronic circuit, for example a logic circuit, being provided for producing a control signal or performing an operational function (stopping of the centrifuge).

Other objects and many of the attendant advantages of the invention will be readily appreciated as the same becomes better understood by reference to the following detailed description, when considered with the accompanying drawings, wherein

FIG. **1** is a disassembled (exploded) perspective view showing an exemplary embodiment of the inventive receptacle holder for centrifuges, with its three major parts: a stirrup, a cup and a frame;

FIG. **2** is a vertical section, partly broken away, along line **2** — **2** in the central section of FIG. **1**;

FIG. **3** is a modified stirrup as compared to the lower section of FIG. **1**;

FIG. **4** is a vertical, partly sectional view taken along line **4** — **4** of FIG. **3**;

FIG. **5** is a horizontal, partly sectional view taken along line **5** — **5** of FIG. **3**;

FIG. **6** is a perspective view of the three major parts of FIG. **1** completely assembled and ready for use;

FIG. **7** is a somewhat oblique top view of a centrifuge head, on a reduced scale, adapted to be used with the inventive receptacle holder;

FIG. **8** is a top view of a multiple assembly having several frames and cups therein;

FIG. **9** is a top view similar to that of FIG. **8** of an assembly including a single frame with four cups therein, the bottom plate, shanks and journal pins having been omitted;

FIG. **10** is a perspective view of another modified stirrup, large enough to accommodate optionally several cups and several frames;

FIG. **11** is a vertical section, partly broken away, through a modified bottom plate of the stirrup of FIG. **10**; and

FIG. **12** is a somewhat schematic vertical sectional view showing the arrangement of the inventive receptacle holder, mounted in a centrifuge drum, with a photo-electric transducer and a stroboscope lamp flanking the flight path of the specimen containers.

As can be seen from FIGS. **1** and **6**, the inventive receptacle holder, in its exemplary, preferred embodiment consists essentially of three major parts, namely a substantially U-shaped stirrup **1**, with a bottom plate **2** and journal pins **3** at the ends of shanks **4**, a cup **5** and a receptacle support frame **6**. Specimen containers, for example test tubes **50**, cam be inserted in the frame **6**, as will be explained later in full detail.

In the exemplary embodiment, the two stirrup shanks **4** are attached (for example welded) about midway along the side edges of the bottom plate **2**. The two oppositely arranged shanks **4**, thus connected to the plate **2**, constitute the U-shaped stirrup, when viewed from the front (see also FIG. **3** for a modified stirrup construction).

The cup **5** is preferably made from a plastic material with relatively thin side walls and a thin bottom. The cup is shaped so that it can be inserted and located on the plate **2**, between the stirrup shanks **4** (see FIG. **6**). In order to secure the cup **5** against unwanted movement in the direction of the double arrow **7** (FIG. **1**, lower section) the two opposite side walls **8** and **9** of the cup **5** are provided with respective indentations or depressions **10** adapted in their form to that of the shanks **4**. FIG. **6** shows how the latter are located within the depressions **10** when the cup **5** is assembled with the stirrup **1**.

The sectional detail view of FIG. **2** shows how the indentations **10** are profiled or shaped, e.g. by molding, when the cup **5** is made from plastic. It will be understood that the indentations could be provided in a different manner, and of course locating means other than the mating shanks and indentations could be provided in the cup and the stirrup, respectively.

The cup 5 is provided to receive the support frame 6; this means that the outer shape of the latter is adapted and closely corresponds to the inner shape of the former.

The receptacle support frame 6 consists essentially of a square-shaped hollow member with windows or apertures 11 in its side walls, as shown in the upper section of FIG. 1. It has a bottom 12 and a sturdy head portion 13, the latter being provided with a plurality of perpendicular through bores 14, preferably arranged in several rows, adapted to receive and hold the above-mentioned test tubes 50 and the like. The latter have usually rounded bottom ends which rest on a soft insert 16 placed atop the bottom 12, inside the frame 6 (see FIG. 2, not shown in FIG. 1).

For the purpose of centrifuging sediments or other substances in the test tubes 50, the latter are placed into the frame 6 which is then inserted in the cup 5, both being subsequently placed into the stirrup 1. The inventive receptacle holder, in its assembled condition, thus consists of the major parts 1, 5 and 6 which can be pivotally inserted, by way of the journal pins 3, in a conventional centrifuge head 57, as schematically shown in FIG. 7. Further details of the head have been omitted since they are well known from centrifuges.

FIG. 7 shows that the head 57 has a number of recesses 58, preferably arranged in a symmetrical manner, 3 or 4 in a circular arrangement, each recess being flanked by cut-outs 59.

Upon completion of the centrifuging process, the operator can remove from the centrifuge head 57 either the entire receptacle holder, that is stirrup 1, cup 5 and frame 6, or perhaps only the cut 5 with the frame 6 therein, or even the latter (frame) by itself, with the test tubes 50 therein. Another unit, assembled cup or frame can be inserted with test tubes containing substances that should be subjected to the next centrifuging operation.

The operator can observe the test-tube contents at any time through the windows 11 in the side walls of the frame 6, before, during and after centrifuging, without requiring the individual containers to be removed from the support frame 6.

FIGS. 3, 4 and 5 show a modification in the form of a stirrup 1', consisting of a single saddle member bent to U shape, having shanks 4' and a bridge portion 20 on which a bottom plate 2' (similar to plate 2) can be secured by means of screws 22 and the like.

In order to secure plate 2' with respect to the stirrup 1', it may be provided with lateral cut-outs 23, as shown in FIG. 5, for clearing the shanks 4'. Additionally, a groove 24 may be provided at the bottom of plate 2' (see FIG. 4) so that both the bridge portion 20 and the shanks 4' are held in a form-fitting manner. The ends of shanks 4' have riveted or otherwise secured journal pins 3', similar to the earlier-described pins 3, actually constituting fastening means between the shanks and the pins.

The modified stirrup 1' of FIGS. 3 to 5 is of course interchangeable with stirrup 1 of FIGS. 1 and 6, and it eliminates the use of welding steps. Only two parts are needed, namely the U-shaped, bent element and the bottom plate, as illustrated.

A further modification of the stirrup for the inventive receptacle holder is shown in FIG. 10, generally designated 1''. In a manner similar to FIGS. 3 to 5, the stirrup proper is bent from flat material, as shown, and a bottom plate 2'' is secured with screws 22 to a horizontal bridge portion 27 between shanks 4''. The latter have respective pins 3'' thereon, these parts of course corresponding to the earlier described parts 4, 4' and 3, 3', respectively.

The stirrup 1'' is so designed as to be adapted to receive four smaller receptacle support frames, such as frame 6 of FIGS. 1 and 6, within a rectangular girdle member 30, and resting on the bottom plate 2''.

FIGS. 8 and 9 show how four frames 6 can be simultaneously disposed in respective one or more cups which are inserted in the stirrup 1''. As a first solution, reference should be had to FIG. 8 which shows four cups 5 each with its own frame of appropriate size, inserted together in the stirrup 1'' and held therein by the girdle member 30.

The sectional detail view of FIG. 11 shows how to provide the bottom plate 2'' of stirrup 1'' with a trough or rim 31, releasably secured thereto by means of screws and the like. FIG. 10 illustrates ledges 32, extending partly or all along the peripheries of the plate 2'', for safely holding the cup or cups in the stirrup.

Coming back to the afore-mentioned FIG. 9, another solution is illustrated for lodging several frames 6 in a stirrup, such as 1'' as shown in FIG. 10, having four receptacle support frames 6 in a common cup 5'' which is thus four times as large, as a matter of example, as the cup 5 of FIGS. 1, 6 and 8. It should be noted at this point that in the modified embodiment of FIGS. 8 to 10, there is no need for the locating means 8, 9 and 10, as described for the first exemplary embodiment, on account of the provision of the rectangular girdle member 30 although the sole or common cup 5'' could have indentations or depressions which cooperate with the shanks 4'' of stirrup 1'', thus dispensing with the need for the number 30. The shanks and pins have been omitted from FIG 9 for the sake of clarity while they are shown in FIG. 8.

It is of course possible to design a support frame which fits snugly into the cup 5– and contains four times as many test tubes as the frame 6 of the standard embodiment. Although measurements and proportions are not considered to be conclusive, for the sake of comparison it might be considered that stirrup 1'' is about four times as large in its overall surface and receiving area as stirrups 1 and 1', with similar proportions prevailing between the respective cups and frames (e.g. 5'' and 5).

The stirrup 1'' of FIG. 10 having a larger space requirement, it should be suspended from a centrifuge head similar to head 57 as shown in FIG. 7, basically constructed for the stirrups 1 and 1'. In a larger centrifuge, an appropriately dimensioned and designed centrifuge head would be used to accommodate the fourfold capacity of stirrup 1'', as will be understood by those skilled in the art.

There is nevertheless the advantage that the standard cups 5 and frames 6 can also be used in the larger stirrup 1'', one each of the cups and frames fitting the stirrup 1 and 1'' while four will be needed for 1''. Similar structures could of course be designed for a smaller or larger number of elements (say three or six cups or frames, with a corresponding number of test tubes to be lodged therein for simultaneous processing).

FIG. 12 is a somewhat schematic partial, vertical sectional view through a centrifuge drum 55 which has a cover 56 closed during centrifuging. The inventive receptacle holder, consisting as it does of a stirrup 1 (1' or 1''), cup 5 (or 5'') and frame 6 (or a modification of the latter), fitted with a number of test tubes 50, is shown in this figure in its flight path, assumed during high-speed centrifuging (the device swings outward on account of the centrifugal force, about the pins by which it is attached to the centrifuge head 57).

The cup 5 is made preferably from plexiglass, making it perfectly transparent, so that the windows or apertures 11 of the frame 6 allow the ends of the test tubes 50 to be visible at all times. Above the area where the apertures 11 pass during the rotation of the unit, the cover 56 or other structure of the centrifuge drum may have a photo-electric transducer or sensor 17 disposed therein. Substantially perpendicularly below, the drum has a stroboscope lamp or other source 18 disposed, with a pulse frequency adapted to the rotational speed of the head 57 and/or the number of the receptacle holders in the device.

The adaptation of the pulse frequency of the lamp 18 is accomplished, for example, by providing a conventional pulse emitter, such as shown in FIG. 12 at 19*a* and 19*b*, in cooperation with a driven shaft or shaft extension of the centrifuge motor, schematically shown at 53. With each revolution of the centrifuge head 57, photo-electric or other pulse producing means in unit 19*a* gates a pulse generator unit 18*a* which in turn controls the flashing frequency of the lamp 18.

The photo-electric unit 17 may include two photocells or two groups thereof, as 17*a* and 17*b*. One of these can be chosen to respond to the light - dark jump in the change of

transparency of the substances within the terminal portions of the test tubes **50**, and the other is further inside (toward the axis of rotation of the centrifuge head), scanning intermediate portions of the test tubes. It is known that during centrifuging thickened sediments such as schematically shown at **51** settle in the ends of the test tubes while clear liquid **52** remains above the sediments, that is further inside toward the rotational axis.

The photocell or group **17*b*** responds to the dark - light jump which occurs in the course of centrifuging by the settling of the sediments and the clarification of the liquid thereabove. In this manner the response sensitivity of the photo-electric unit **17** can be substantially increased. The electrical parameters obtained by way of the photocells or groups **17a**, **17b** can be combined or integrated into a single control signal, such as by using known electrical or electronic circuits, for example an AND-type logic gage and the like.

The above arrangement allows it to determine the duration of the centrifuge process by the centrifuging effect itself, the signal derived from the photo-electric unit **17** serving to stop the centrifuge through conventional electrical circuit and switching means, schematically shown at **17*c***.

It should be understood, of course, that the foregoing disclosure relates only to preferred embodiments of the invention, and that it is intended to cover all changes and modifications, as well as the combination of separately shown features, which do not constitute departures from the spirit and scope of the invention.

What I claim is:

1. A holder for centrifuges, adapted to receive a plurality of specimen containers such as test tubes holding substances to be centrifuged; the holder comprising, in combination: a substantially U-shaped stirrup member having a bottom plate and rigid therewith two upstanding shanks, the latter with journal pins in their terminal portions, for pivotal insertion in the head of the centrifuge; at least one cup member inserted in a form-fitting manner in said stirrup member between said shanks and held in position on said bottom plate; and at least one frame member inserted in a central opening of said at least one cup member, and having therein a plurality of bores adapted to receive test tubes, wherein said at least one cup member is made of a substantially transparent material, and said at least one frame member includes a substantially square-shaped hollow body portion, with apertured side portions that allow inspection of substances within test tubes to be inserted in said frame, a head portion having said bores therein to receive test tubes, and a bottom adapted to support terminal portions of test tubes when inserted therein.

2. The receptacle holder as defined in claim **1**, further comprising fastening means on respective portions of said journal pins and said shanks, adapted to take up substantially high centrifugal forces.

3. The receptacle holder as defined in claim **1**, wherein said stirrup member and said bottom plate are made from a single piece of material.

4. The receptacle holder as defined in claim **1**, further comprising connecting means between said stirrup member and said bottom plate to immobilize the same in a form-fitting manner with respect to said stirrup member.

5. The receptacle holder as defined in claim **1**, further comprising locating means in mating portions of said stirrup member and said at least one cup member to immobilize the same in a form-fitting manner with respect to said stirrup member.

6. The receptacle holder as defined in claim **4**, wherein said shanks are elongated, flat members and said locating means is constituted by elongated indentations in two opposite side walls of said at least one cup member, with a shape allowing nesting therein of at least terminal portions of said shanks.

7. The receptacle holder as defined in claim **1**, including a housing and a rotatable centrifuge head therein, said holder being secured to said head and describing A continuous flight path within the housing when said head is rotated, and said at least one cup member is of a substantially transparent material, and further comprising a stroboscope lamp and at least one photo-electric means secured to said housing, said flight path being between said lamp and said photo-electric means, and circuit means connected to said at least one photo-electric means to provide a signal for controlling the energization of the centrifuge.

8. The receptacle holder as defined in claim **7**, wherein said at least one photo-electric means includes at least two separate photocells aligned with the apertured side portions so that test tubes as they pass in the flight path provide separate output signals for said circuit means, responsive to the light - dark jump and the dark - light jump in transparency during the settling of the substances therein.

9. The receptacle holder as defined in claim **1**, wherein said stirrup member includes immobilizing means for holding in place said at least one cup member.

10. The receptacle holder as defined in claim **9**, wherein said immobilizing means is in the form of a girdle member attached to said shanks, adapted to hold at least two of said cup members.

11. The receptacle holder as defined in claim **9**, wherein said immobilizing means is in the form of at least a pair ledge members attached to said bottom plate.

12. The receptacle holder as defined in claim **9**, wherein said immobilizing means is in the form of a trough attached to said bottom plate, adapted to hold a plurality of said cup members.

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