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J. E. COOK

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SANITARY FOOT MOUNT FOR CENTRIFUGES AND THE LIKE

Filed March 17, 1948

2 Sheets-Sheet 1

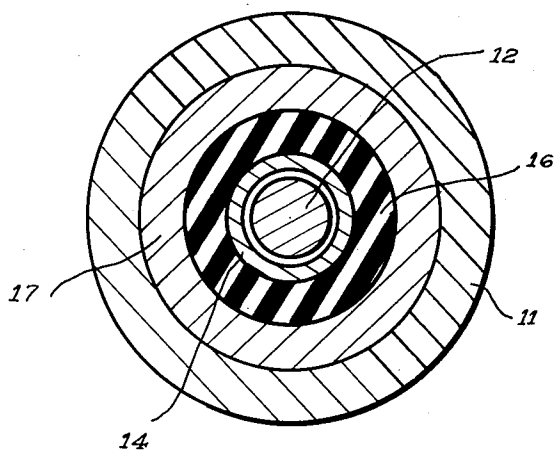


FIG. 1

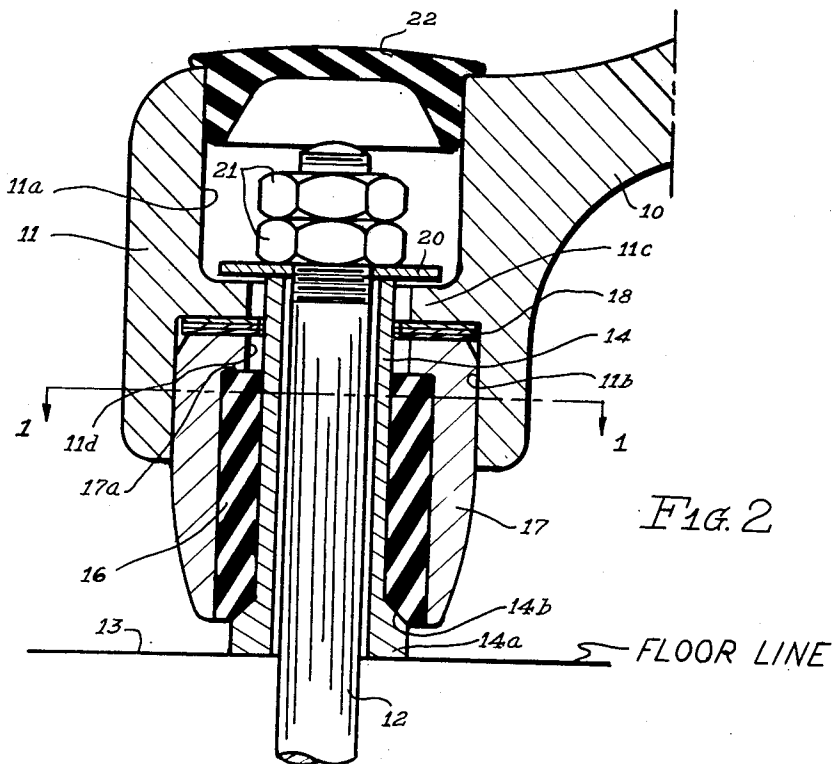


FIG. 2

INVENTOR
JAMES E. COOK
BY
Davis, Vopie & Faithfull
ATTORNEYS

April 3, 1951

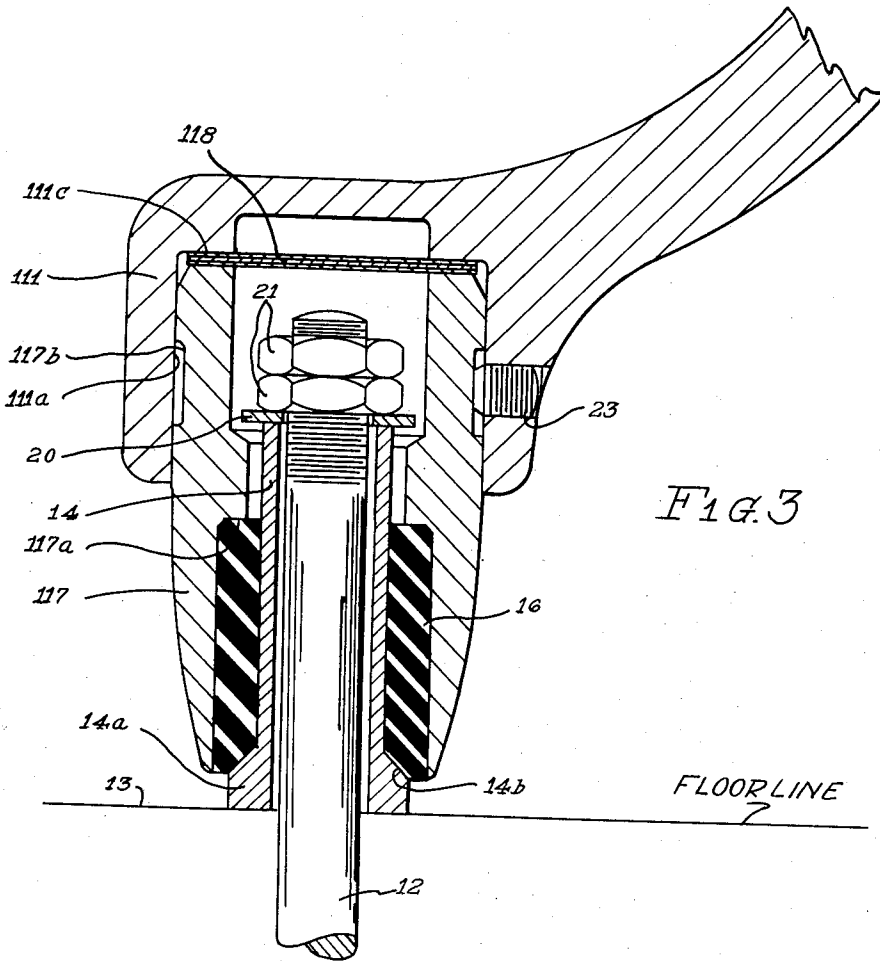
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INVENTOR
BY JAMES E. COOK

Devis, Vokie & Faithfull
ATTORNEYS

UNITED STATES PATENT OFFICE

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SANITARY FOOT MOUNT FOR
CENTRIFUGES AND THE LIKE

James Edward Cook, Poughkeepsie, N. Y., as-
signor to The De Laval Separator Company,
New York, N. Y., a corporation of New Jersey

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11 Claims. (Cl. 248-24)

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This invention relates to devices for mounting centrifugal separators, and the like, upon a floor or other supporting structure. More particularly, the invention has reference to an improved foot mount for this purpose, in which the weight of the centrifuge is transmitted to the floor through a rubber-like element stressed in shear.

It is common practice to provide centrifuges with three or more feet for mounting the centrifuge upon the floor or other supporting structure. In addition to providing a strong support for the centrifuge, the foot mounts must be of a character such that they reduce transmission of the centrifuge vibrations to the floor. It is well known that centrifuges undergo considerable vibration, both vertically and laterally, due to the high speed rotation of the centrifugal bowl. If these vibrations are allowed to be transmitted undampened to the supporting structure, an undesirable condition is likely to result, particularly in the case of the heavier types of centrifuge. Moreover, when the centrifuge is used for clarifying or separating milk or other food products, it must conform to the sanitary codes of the localities in which the centrifuge is used. The sanitary codes in some localities are particularly exacting with respect to the foot mounts, and accordingly the foot mount must be of a character such that it does not readily accumulate dirt and can be easily cleaned, which, of course, imposes still another requirement upon the construction of the mount.

One object of the present invention, therefore, resides in the provision of an improved foot mount which effectively dampens the vibrations of the centrifuge and, at the same time, complies with the most rigid sanitary requirements.

Another object of the invention is to provide a foot mount of the character described, which is of simple construction and can be readily assembled and disassembled for cleaning purposes.

The new foot mount comprises a supporting sleeve adapted to seat at its lower end upon the floor or other supporting structure underlying the centrifuge. A rubber-like ring closely surrounds the sleeve and at its lower end engages an upwardly facing, external shoulder of the sleeve. The rubber-like ring, in turn, is closely surrounded by a sheathing collar spaced from the sleeve by the ring and having an internal shoulder engaging the top of the ring. The centrifuge foot has a generally vertical opening which closely receives the upper portion of the sheathing collar, and part of the foot overlies the top of the collar to support the foot thereon. A stay bolt, or the like, which may be permanently fixed to the floor, extends upwardly into the supporting sleeve to provide lateral support for the foot. Preferably, there is a substantial radial clearance between the bolt and the inner

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wall of the sleeve to allow some lateral displacement of the latter relative to the bolt, and a releasable connection is provided between the bolt and the sleeve to resist such lateral displacement and also to limit upward movement of the foot relative to the bolt.

In one form of the invention, the foot has an internal shoulder overlying the top of the collar to support the foot thereon, the foot shoulder underlying a retaining member held against the top of the sleeve by a nut or other releasable means on the bolt. The foot has a close fitting cover for the nut and the foot opening, the cover being removable to allow the nut to be taken off, whereby the foot can be lifted from the stay bolt. In another form, the sheathing collar itself is provided with an internal shoulder underlying the retaining member, and a set screw or other releasable element on the foot is engageable with the collar to resist upward movement of the foot relative to the collar. In the latter form, the foot opening is permanently closed at the top, the set screw being releasable to allow the foot to be lifted from the collar and the stay bolt.

With the new construction, the weight of the centrifuge transmitted to each foot mount is supported by the rubber-like ring in shear, which is a distinct advantage. This ring is completely confined at its inner surface by the supporting sleeve and at its outer surface by the sheathing collar which supports the foot, there being an enclosed free space directly above the rubber-like ring inside the adjacent shoulder of the sheathing collar, and also a free space below the rubber-like ring outside the shoulder on the supporting sleeve. Thus, the rubber-like ring, stressed in shear, is adapted to absorb both lateral and vertical vibrations of the centrifuge transmitted through the foot. The height of the foot above the floor can be adjusted by simply inserting a spacing disc or discs of predetermined thickness between the top of the sheathing collar and the overlying part of the foot. The interior of the foot is effectively closed against admission of dirt, and the exterior of the mount can be easily cleaned. Also, the mount can be readily disassembled for cleaning or other purposes.

For a better understanding of the invention, reference may be had to the accompanying drawing, in which

Fig. 1 is a horizontal sectional view of one form of the new foot mount, taken on the line 1-1 in Fig. 2;

Fig. 2 is a vertical sectional view of the foot mount shown in Fig. 1, and

Fig. 3 is a view similar to Fig. 2 but showing a modified form of the foot mount.

Referring to Figs. 1 and 2, the numeral 10 designates one of the feet of the centrifuge frame.

The foot 10 terminates in an enlarged portion 11 having a vertical opening extending there-through. The upper part of the opening is enlarged somewhat, as shown at 11a, and the lower part 11b of the opening is enlarged somewhat more than the upper part 11a. An internal shoulder 11c is located between the enlargements 11a and 11b of the opening and defines a restriction 11d.

A stay bolt 12 projects upwardly from a floor 13 to which the bolt is secured, as by embedding the bolt in the floor. The bolt 12 is considerably smaller in diameter than the restriction 11d of the socket opening and terminates well above the internal shoulder 11c but below the top of the socket. A supporting sleeve 14 surrounds the bolt 12 in spaced relation thereto and rests upon the floor 13, the upper portion of the sleeve likewise being of smaller diameter than the restriction 11d of the socket opening and terminating above the internal shoulder 11c. At its lower portion, the sleeve 14 is thickened, as shown at 14a, to form an upwardly facing shoulder 14b which preferably flares downwardly from the smaller diameter portion of the sleeve.

A ring 16, which may be made of rubber or similar elastic material, is fitted closely around the smaller diameter portion of the supporting sleeve 14 and engages the sleeve shoulder 14b, from which it extends outwardly beyond the thickened portion 14a of the sleeve. That is, the internal diameter of the rubber ring 16 is somewhat less than the external diameter of the thickened sleeve portion 14a, while the external diameter of the rubber ring is somewhat greater than the external diameter of the thickened sleeve portion. The rubber ring 16, in turn, is fitted closely in a metal sheathing collar 17 which covers the entire outer cylindrical surface of the rubber ring and thus extends downwardly to a point adjacent to but outwardly from the lower extremity of the sleeve shoulder 14b. Near its upper end, the sheathing collar 17 is provided with an internal shoulder 17a resting upon the top of the rubber ring 16. While the internal diameter of the top flange forming the shoulder 17a of the sheathing collar is considerably less than the internal diameter of the lower portion of this collar, it is considerably greater than the external diameter of the adjacent portion of the supporting sleeve 14. The sheathing collar 17 is fitted closely in the enlargement 11b forming the lower portion of the socket opening, and it serves to support the internal flange 11c of the socket. Between the top of the sheathing collar 17 and the internal flange 11c of the socket is a spacer 18 which may be made up of a plurality of washers of predetermined thickness.

A retaining washer 20 is clamped against the top of supporting sleeve 14, as by means of nuts 21 threaded on the upper portion of the stay bolt 12. The washer 20 overlies the internal shoulder 11c of the socket in spaced relation thereto. Thus, while the retaining washer 20 allows some upward movement of the foot 10 incident to the spring action of the rubber-like ring 16, it limits this upward movement and serves to lock the foot to the mount. However, the foot may be removed from the mount by unscrewing the nuts 21 and removing the retaining washer 20, to which access may be had through the enlargement 11a forming the upper portion of the socket opening. The latter may be closed at the top by a removable cover 22, which may be made of rubber and fitted tightly in the

opening to prevent entrance of dust or other foreign matter.

The operation of the new foot mount is as follows: The downward pressure of the foot 10 is transmitted to the floor through the internal shoulder 11c of the socket, the spacer 18, sheathing collar 17, rubber ring 16 and the supporting sleeve 14. As previously described, the rubber ring 16 is stressed in shear by the downward force which it transmits to the supporting sleeve 14. Because of the spacing between the supporting sleeve 14, on the one hand, and the socket shoulder 11c and the sheathing collar 17 on the other hand, the lateral vibrations of the centrifuge are largely absorbed or dampened by the rubber ring 16, without any metal-to-metal contact between the moving parts and the fixed parts. In this connection, the retaining member 20 is spaced a sufficient distance above the internal shoulder 11c of the socket to prevent metal-to-metal contact between these parts in the normal operation of the centrifuge, although the member 20 will limit upward movement of the foot due to any abnormal vibrations. It will be understood that the lateral forces transmitted by rubber ring 16 to the supporting sleeve 14, incident to vibration of the centrifuge, tend to displace the sleeve laterally, but such displacement is opposed by the clamping action of the retaining washer 20 upon the top of the supporting sleeve. However, the space between the supporting sleeve 14 and the stay bolt 12 allows some lateral movement of the sleeve under extreme conditions, whereby the sleeve can more or less center itself with respect to the foot 10 and the rubber ring 16. The mount can be easily disassembled for cleaning or for any other purpose, by removing the retaining washer 20 and lifting the foot 10 from the sheathing collar 17. The supporting sleeve 14, rubber ring 16 and sheathing collar 17 can then be lifted as a unit from the stay bolt.

In the modified construction shown in Fig. 3, the enlargement 11i of the foot has an opening 11ia extending upwardly from the bottom of the foot but terminating below the top thereof, whereby the opening is permanently closed at the top. The sheathing collar 117 is closely received in this opening, the top of the collar underlying a shoulder 11ic in the opening near the top of the foot. Spacers 118 may be interposed between the top of the collar and the shoulder 11ic to determine the height of the foot. The collar 117 has intermediate its ends an internal shoulder 117a engaging the top of the rubber-like ring 16. This shoulder underlies the retaining member 20 and is spaced therefrom and also from the sleeve 14. Accordingly, the collar is movable laterally and vertically relative to the sleeve 14 but is limited in its upward movement by the retaining member 20. A set screw 23 extends through the side wall of the opening 11ia and into a groove 117b in the collar, thereby preventing the foot from being lifted off the collar. With this construction, the mount is disassembled by simply loosening the set screw 23 to allow the foot to be lifted from the collar. The nuts 21 can then be removed to permit the collar 117, the sleeve 14 and the confined rubber-like ring 16 to be lifted as a unit from the stay bolt 12.

It will be observed that a mount made in accordance with the invention has relatively few sharp corners capable of accumulating dirt, and these are readily accessible for cleaning. The in-

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terior of the foot enlargement is effectively sealed against the intrusion of dirt. Moreover, the mount is of a compact and rugged construction which can be easily installed or removed.

With the new construction, no chemical bonding of the rubber cushioning ring to the metal is necessary, because the rubber ring 16 is tightly compacted in the annular space between the parts 14 and 17 (117). In assembling these parts and the rubber ring, the latter may be inserted in the collar 17 (117) which holds it somewhat contracted circumferentially. Then the reduced portion of sleeve 14, which is of somewhat greater diameter than the internal diameter of the rubber ring, is forced through the ring so as to expand its internal diameter and cause it to fill completely the space between the parts 14 and 17 (117) bounded by the shoulders 14a and 17a (117a), the ring being tightly compacted in this space as a result.

I claim:

1. A sanitary foot mount for at least partly supporting a centrifuge, or the like, upon an underlying structure, which comprises a supporting sleeve adapted to seat at its lower end upon said structure, the sleeve having an upwardly facing, external shoulder, a rubber-like ring closely surrounding the sleeve and engaging said shoulder, a sheathing collar closely surrounding the rubber-like ring and spaced from the sleeve by the ring, the sheathing collar having an internal shoulder engaging the top of said ring, and a foot on the centrifuge having a generally vertical opening closely receiving the upper portion of said collar, the foot having a part overlying the top of said collar to support the foot thereon.

2. A sanitary foot mount according to claim 1, comprising also a stay bolt projecting upwardly from said structure through the supporting sleeve, there being a substantial radial clearance between the bolt and the inner wall of the sleeve, a rigid retaining member projecting laterally from the bolt, releasable means coacting with the bolt to hold said member against the top of the sleeve, and means connected to the foot and underlying the laterally projecting portion of said member in spaced relation to said member and the sleeve, said last means and member coacting to limit upward movement of the foot relative to the sleeve.

3. A sanitary mount according to claim 1, comprising also a removable spacer between the top of the sheathing collar and said overlying part of the foot, the sheathing collar being slidable in said foot opening and removable therefrom to permit insertion of the spacer under said overlying part of the foot.

4. A sanitary foot mount according to claim 1, in which the supporting sleeve confines the entire inner surface of the rubber-like ring, and the sheathing collar confines the entire outer surface of said ring.

5. A foot mount according to claim 1, in which the sheathing collar terminates at its lower end adjacent to but outwardly from said sleeve shoulder and above said supporting structure.

6. A foot mount according to claim 1, in which the rubber-like ring normally has an internal diameter less than the diameter of the sleeve engaging the inner wall of the ring.

7. A foot mount according to claim 1, in which said foot opening extends through the foot, the

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foot having an internal shoulder in the opening forming said overlying part, a stay bolt projecting upwardly from said structure through the sleeve and terminating below the top of the foot, there being a substantial radial clearance between the bolt and the inner wall of the sleeve, a rigid retaining member engaging the top of the sleeve and having an edge portion overlying part of the foot above said internal shoulder thereof, releasable means on the bolt for holding said retaining member against the top of the sleeve, said releasable means being accessible through the top of the foot opening, and a removable cover on the foot for closing the top of said opening.

8. A foot mount according to claim 1, in which said foot opening extends through the foot, the foot having an internal shoulder in the opening forming said overlying part, a stay bolt projecting upwardly from said structure through the sleeve and terminating below the top of the foot, there being a substantial radial clearance between the bolt and the inner wall of the sleeve, a rigid retaining member engaging the top of the sleeve and having an edge portion overlying part of the foot above said internal shoulder thereof, releasable means on the bolt for holding said retaining member against the top of the sleeve, said releasable means being accessible through the top of the foot opening, a removable spacer interposed between the top of the collar and said internal shoulder of the foot, and a removable cover on the foot for closing the top of said opening.

9. A foot mount according to claim 1, comprising also a releasable element on the foot engageable with the sheathing collar to resist upward movement of the foot relative to the collar.

10. A foot mount according to claim 1, in which the sheathing collar has an upwardly facing internal shoulder above said first internal shoulder of the collar, a stay bolt projecting upwardly from said structure into the sleeve, a retaining member overlying said last upwardly facing shoulder, and releasable means on the bolt for holding the retaining member against the top of the sleeve.

11. A foot mount according to claim 1, in which the sheathing collar has an upwardly facing internal shoulder above said first internal shoulder of the collar, a stay bolt projecting upwardly from said structure into the sleeve, a retaining member overlying said last upwardly facing shoulder, releasable means on the bolt for holding the retaining member against the top of the sleeve, and a releasable element on the foot engageable with the collar to resist upward movement of the foot relative to the collar.

JAMES EDWARD COOK.

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