March 11, 1969 W. C. PHILIPP 3,432,127

MOUNTING DEVICE

Filed May 11, 1967

Fig. 1

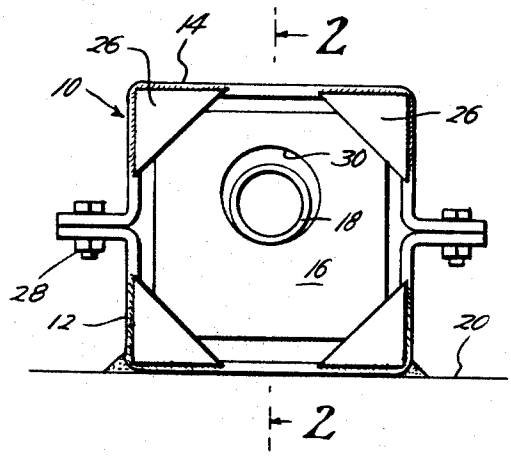


Fig. 2

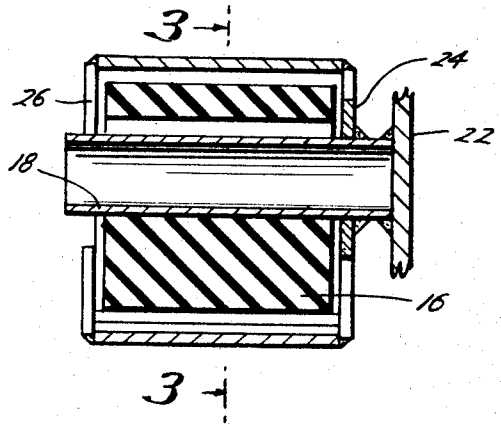
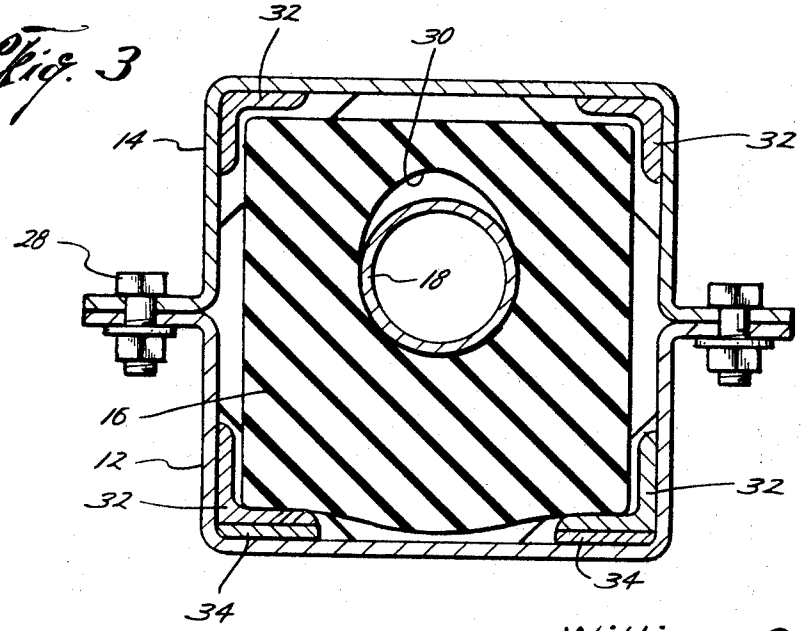


Fig. 3



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MOUNTING DEVICE

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ABSTRACT OF THE DISCLOSURE

A mounting device for vibrating equipment to permit relatively undamped vibration comprising a resilient block which is loosely held within a mounting bracket, the resilient block having a large opening therethrough, in which rests a loose fitting support for the vibrating basket.

The present invention relates to improvements in vibrating equipment, and more particularly relates to an improved mounting device that permits relatively undamped vibration of the vibratable portion of the equipment.

Mounting devices for vibrating equipment are well known in the art and are generally illustrated in such patents as Nos. 3,107,890, 2,693,331, 2,565,785, and 3,044,624.

In general, the present invention constitutes an improvement over the resilient blocks **11** illustrated in the patents to Hutchison, Nos. 2,408,558 and 2,716,493, and is particularly adapted for use with such vibratory equipment, although its use is not restricted thereto.

As is pointed out in the patents to Hutchison, in the drilling of wells, the drilling mud is circulated down into the wells through a hollow string of pipe and back to the surface, the mud carrying with it the cuttings from the formation. It is, therefore, necessary to remove these cuttings from the drilling mud so that it may be reused. Vibrating equipment utilized for this purpose is known in the trade as a shale shaker.

Over the years, improvements in drilling techniques have resulted in a wide variety of types of drilling muds, each utilized for a particular formation, temperature, depth, or the like. Further, it has become necessary to extract greater amounts of solids using finer screen apertures, and these varying conditions now require a wide range of vibrating screen slope adjustability (or amplitude of vibrating basket) in order to remove the solids without loss of expensive drilling fluid over the end of the screen surface. This problem is particularly great in off-shore rigs where one piece of equipment is called upon to perform this screening operation under all conditions.

It is therefore necessary to provide a mounting device which permits relatively undamped vibration of the vibrating basket (or that portion of the machine it is designed to vibrate) not at just a single angle, such as is illustrated in the prior Hutchison patents, but at a wide variety of slopes. For example, an oil base drilling mud may require a subhorizontal slope (or negative slope of several degrees) whereas when drilling gumbo or other similar clays, the vibrating basket may need to be tilted to 45°. Throughout this or an even wider range, the mounting device must continue to permit a relatively undamped vibration of the vibrating basket.

In addition, the mounting device must limit the end sway or longitudinal shift of the vibrating basket with respect to the base frame along the length of the vibrating basket, especially when the slope or altitude of the basket is inclined from subhorizontal to 90° above horizontal. Additionally, the mounting device must limit side sway of the vibrating basket.

Finally, it is desirable that the mounting device accomplish the foregoing objectives and in addition provide a measure of vibration isolation or dampening between the vibrating basket and the base plane. Obviously, if the base frame were to vibrate, then the structure, floor or building upon which the vibratory machine sits will in turn vibrate, and this is not usually desirable.

It is therefore an object of the present invention to provide a mounting device for vibratory equipment which attains the foregoing objectives. This is accomplished in the present invention by providing a resilient material which is only loosely held, rather than being confined as in Patents Nos. 2,693,331 and 3,081,875. The mounting device contemplated by the present invention is based on the principle that a resilient material behaves like a solid material when it is completely confined on all sides.

Generally, the mounting device of the present invention comprises a resilient block which is loosely held within a mounting bracket, the resilient block having a large opening therethrough, in which rests a loose fitting support for the vibrating basket.

Other and further objects, features and advantages will be apparent from the following description of the presently preferred embodiments of the invention, given for the purpose of disclosure, and taken in conjunction with the accompanying drawings, wherein like character references designate like parts throughout the several views, and where:

FIGURE 1 is a side view of the mounting device in an unloaded condition,

FIGURE 2 is a sectional end view taken along the line **2—2** of FIGURE 1, and

FIGURE 3 is a sectional side view, similar to FIGURE 1, and taken along the line **3—3** of FIGURE 2.

Referring now to the drawings and particularly to FIGURE 1, the reference numeral **10** generally designates the mounting device which includes the lower bracket **12**, the upper bracket **14**, and generally rectangular vertically disposed resilient block **16** having a generally centrally disposed horizontal opening **30** therein which supports the supporting member, here shown as a tube **18**. The mounting device **10** may be attached to a base frame **20** in any suitable manner, such as by welding the lower bracket **12** to the base frame **20**. The upper and lower brackets **12** and **14** are symmetrically shaped strap members which are joined together in any convenient manner, such as by the bolts **28**.

Referring now to FIGURE 2, the tube **18** may be appropriately attached, as by welding, to the vibrating basket **22** of the vibrating equipment. It is to be particularly noted that the tube **18** is smaller than the opening **30** extending through the resilient block, and thus the tube **18** is not confined by this opening. The tube **18** and opening **30** are generally perpendicular to the plane of vibration of the vibrating basket **22**. Also suitably attached to the tube **18** is a washer **24** which limits endwise movement of the tube in the resilient block **16**, in combination with another symmetrically disposed mounting device. As seen in FIGURES 1 and 2, generally triangularly shaped gussets **26** are attached in each corner of the upper and lower brackets **12** and **14**, and the function of these gussets is to retain the resilient block **16** within the brackets should endwise pressures develop.

Referring now to FIGURE 3, it is to be noted that in each corner of the baskets **12** and **14** is a small spacer **32**, which, in the instance shown, comprises a length of angle iron, welded inside the corners of the brackets. Further, at the bottom of the lower bracket **12**, and beneath the spacer **32** is an additional spacer **34** which serves to further raise the bottom of the resilient block **16** above the bottom of the bracket **12**. In FIGURE 3 it will be noted that the bottom of the resilient block **16**

is deflected downwardly, for in this figure the vibrating basket 22 supported by the tube 18 is assumed to be completely assembled, loaded and ready for operation. Generally, the opening 30 is deformed from a circular opening, and somewhat resembles a tear drop shape. However, it is again emphasized that the tube 18 still loosely fits the opening 30, and the resilient block 16 is only loosely confined within the brackets 12 and 14. Clearance will be found along the resilient block at both ends, at the top, sides, and beneath the tube 18.

In operation, the vibrating basket 22 is suitably vibrated and consequently the tube 18 similarly vibrates. This vibration will be approximately 3/32 of an inch in a true high speed (1200 r.p.m. or higher) off-center weight machine. This vibration is usually elliptical, although depending upon where the mounting device is placed, it may approximate a circle. The plane of this vibration is generally perpendicular to the opening 30. In accordance with the present invention, the resilient block is loosely held as is the tube 18, and therefore the vibration is absorbed by the flexing or resilient block. This is to be contrasted with the prior art, wherein the rubber is confined. Here the vibration is not transmitted from the vibrating basket to the mounting base, since the resilient material is not confined, and thus does not act as a solid.

Because of the vibration of the tube supporting the vibrating basket, and because of the loose fit of the tube within the opening and of the resilient block in the brackets, it is now apparent that a heat resistant and wear resistant grade of neoprene, or other resilient material, is necessary. It is also apparent from an examination of FIGURE 3 that the resilient block is subjected to compression, as well as shear by the weight and vibratory action of the vibrating basket.

When used with a shale shaker, as the consistency of the slurry being vibrated in the basket varies, it is necessary to vary the slope of the base frame 20, so that it is no longer horizontal. The mounting device of the present invention continues to loosely hold the resilient block as the base frame 20 is changed from the horizontal, without causing the resilient block to become confined, which would result in dampening the vibration of the vibrating basket, as well as some transmission of the vibration to the base frame. Of course, a plurality of mounting devices are utilized to support the vibrating basket, and as previously noted the washer 24 on each of the respective tubes 18 holds the vibrating basket in the desired endwise position.

It will thus be appreciated by those skilled in the art that the mounting device herein described will limit the movement of the vibrating basket in end sway and side sway, over various slopes of the vibrating basket and at the same time will permit relatively undamped vibration of the vibrating basket. The present invention, therefore, is well adapted to carry out the objects and attain the ends and advantages mentioned as well as others inherent therein. While a presently preferred embodiment of the invention has been given for the purpose of disclosure, numerous changes in the details of construction, and the combination, shape, size, arrangement of parts may be resorted to without departing from the spirit and scope of the invention.

What is claimed is:

1. A mounting device for vibrating equipment having a frame member and a vibrating basket with a support extending perpendicularly therefrom, including:
   - a generally rectangular vertically disposed resilient block,
   - the block having a generally centrally disposed horizontal opening therethrough,
   - the opening arranged perpendicularly to the plane of vibration of the the vibrating equipment,
   - a mounting bracket loosely enclosing the block and attached to the frame,
   - spacer members within the bracket at the corners of the rectangular block and spacing the block from the bracket, thereby maintaining a gap between the block and bracket below the opening,
   - means attached to the bracket to prevent endwise displacement of the block,
   - the support extending loosely through the opening, and
   - means attached to the support to prevent endwise movement of the support through the opening.

2. A mounting device for high speed off-center weight vibrating equipment of the type having a frame member and a vibrating basket with a plurality of cylindrical supports extending perpendicularly therefrom, including:
   - a generally rectangular vertically disposed resilient block,
   - the block having a generally centrally disposed circular, horizontal opening therethrough,
   - the opening arranged perpendicular to the plane of vibration of the vibrating equipment,
   - a generally rectangular mounting bracket attached to the frame member,
   - the bracket loosely enclosing the resilient block,
   - spacer means within the bracket located in the corners of the generally rectangular bracket to space the block from the bracket,
   - gussets attached to the edges of the bracket to prevent endwise displacement of the resilient block,
   - the cylindrical support inserted through the opening in the resilient block and loosely fitting therein, and
   - stop means attached to the support to prevent endwise movement of the support through the opening.

3. The invention of claim 2 wherein the mounting bracket includes:
   - a lower bracket attached to the frame,
   - an upper bracket, and
   - fastening means securing the upper bracket to the lower bracket.

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U.S. Cl. X.R.

248—9, 358; 267—1