Aug. 10, 1948. S. FLAM 2,446,818

VIBRATOR

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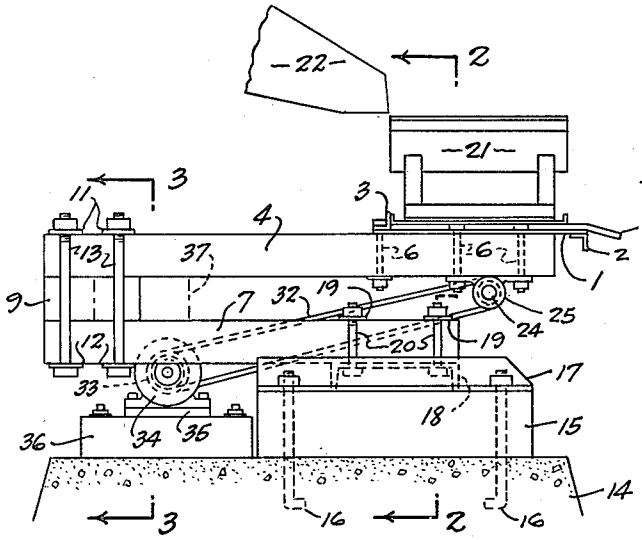


Fig. 1

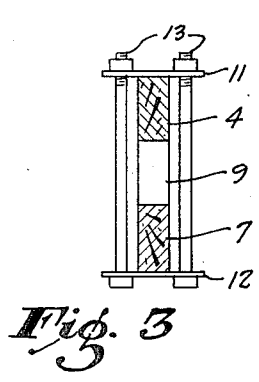


Fig. 3

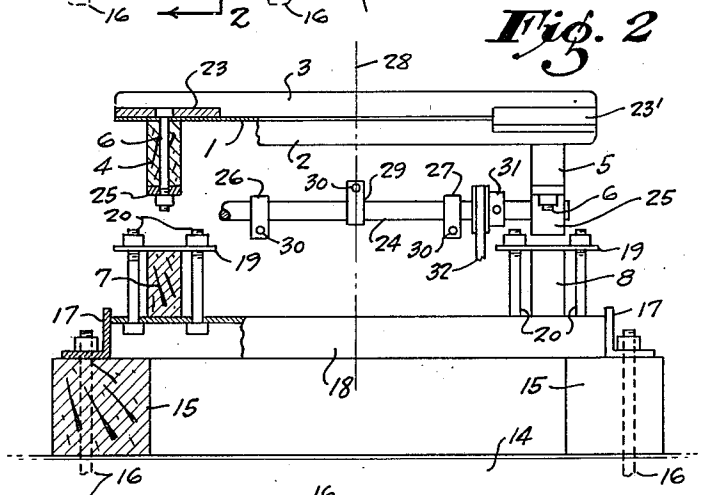


Fig. 2

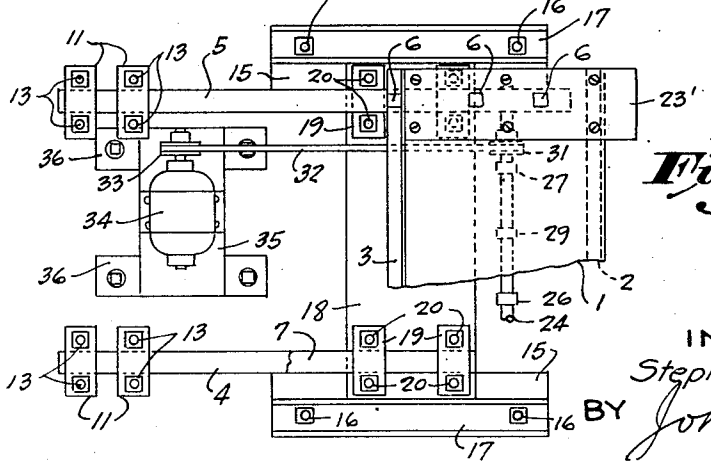


Fig. 4

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VIBRATOR

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Application November 25, 1944, Serial No. 565,092

1 Claim. (Cl. 259—72)

1

This invention relates to a vibrator, and more particularly to a device that is especially adapted to provide a temporary support for an object, and to vibrate the object while thus supported. Such vibrators are now in general use for supporting molds filled with plastic material (such as a cementitious mixture). In this way, the quality of the casting is improved. It has been found that such vibrations are of especial benefit during the process of casting artificial stone out of concrete or other forms of cementitious materials.

It is one of the objects of this invention to improve and simplify vibrators of this general character.

In one prior form of vibrator, use is made of one or more arms, supported rigidly at one end, and free to vibrate at the other end, upon which the mold may be temporarily supported. The vibrations are created by the aid of a rotary shaft transverse to the arms, and carrying unbalanced weights.

It is another object of this invention to make it possible to adjust the vibrator in a simple manner, to comply with the kind of load being vibrated, and particularly by adjustment of the free vibrating length, of the arms upon which the load is supported.

It is still another object of this invention to reduce the overall length of the vibrator mechanism, in spite of the fact that the length of the vibrating arms is not reduced.

This latter object is attained by forming each of the arms in two sections, one over the other, the effective length corresponding to the sum of the lengths of the sections, although overall dimension is no greater than that of one section.

Such a structure has the additional advantage that a smaller supporting base or pier is required, since the center of gravity is much closer to the center of the base. Accordingly there is little tendency to tilt the base or foundation.

It is still another object of this invention to make it possible to confine the vibration to a direction substantially normal to the arms, without producing any forces that tend to twist the arms. This is accomplished by so arranging the unbalancing weights that they are symmetrical about a vertical plane passing through the center of the structure, although they are asymmetric about a horizontal plane passing through the axis of the shaft that supports the weights.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of

2

one embodiment of the invention. For this purpose there is shown a form in the drawings accompanying and forming part of the present specification. The form will now be described in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of this invention is best defined by the appended claim.

Referring to the drawings:

Figure 1 is an elevation of a vibrator mechanism incorporating the invention, the mechanism being illustrated as supporting a mold;

Figs. 2 and 3 are sectional views, taken along the correspondingly numbered planes of Fig. 1; and

Fig. 4 is a plane view of the vibrator, having a part of the top supporting plate broken away.

The vibrator mechanism includes two sets of pairs of connected vibrating arms, 4—7, and 5—8, one (such as 4) overlying the other (such as 7), to form generally a U-shaped structure. The arms may be generally horizontal and vibrate, although a considerable departure from the horizontal may be tolerated. In the present instance, these two sets of arms are spaced so as to accommodate a rest or support 1 extending transversely between the arms. This rest 1 may be of metal reinforced beneath the front edge by an angle iron 2. Further reinforcement may be provided by an angle iron 3 disposed above the rear edge of the rest 1.

The arm members 4 and 5 are made of wood, or any other suitable material that can withstand continued vibration.

As shown most clearly in Figs. 1 and 2, the rest 1 may be attached to the free ends of arm sections 4 and 5, as by the aid of the bolts 6 that pass through the arm sections 4 and 5, adjacent the free ends of these arms.

The arm sections 4 and 5 are spaced above the corresponding lower arm sections 7 and 8, likewise made of wood, or the like. Disposed between the arms 4 and 7, adjacent the left-hand end, is a spacer block 9. The arms 4 and 7, and block 9, are held together by the aid of removable clamps, such as the plates 11 and 12 disposed respectively above arm 4 and below arm 7. Bolts 13 pass through appropriate apertures at the extremities of the clamping plates 11 and 12, and serve to hold the structure in assembled relation.

While the right-hand ends of the arm sections 4 and 5 are free to vibrate, the right-hand ends of the lower arm sections 7 and 8 are firmly

secured to the pier 14. Upon this pier there rest wood supporting blocks 15. These supporting blocks are held permanently in place by the aid of the the bolts 16 that have their ends anchored in the pier 14. The bolts also pass through the horizontal flanges of the angle irons 17. Extending transversely by the angle irons 17 and appropriately attached thereto is a channel beam 18. The ends of this beam rest on the blocks 15. Upon channel beam 18 are supported the arms 7 and 8 of wood or other suitable material. Clamping plates 19 are disposed on top of the arms 7 and 8, and clamping bolts 20 passing through plates 19 and through the upper web of the beam 18, serve firmly to secure the arms 7 and 8 to the upper surface of the beam 18.

The effective lengths of the vibrating arms are represented by the combined lengths of the arms 4 and 7 or the arms 5 and 8. Since the arms 4 and 5 overlie the lower arms 7 and 8 respectively, the overall length of the mechanism is considerably less than the combined lengths of the arms.

The load, in this instance, is supported by the aid of the plate or rest 1, and may be a mold structure shown generally by the reference character 21. This mold structure is of the type described in Patent No. 2,319,313, issued May 18, 1943, in the name of Stephen Flam. The discharge end 22 of a hopper for filling the mold is illustrated disposed above the mold 21.

If desired, the mold structure may be accommodated on the pair of wear plates 23, 23', attached to the opposite edges of rest 1. The table can be enlarged to accommodate larger molds.

The manner in which the ends of the arms 4 and 5 are vibrated may now be described. Thus, extending transversely of the arms 4 and 5 and beneath these arms, a shaft 24 is provided. This shaft may be supported in appropriate bearing standards 25 attached to the lower surfaces of the arms 4 and 5, as by the aid of the bolts 6. The shaft 24 carries a pair of fixed, unbalanced weights 26 and 27, symmetrically disposed with respect to the vertical center line 28 (Fig. 2). These weights are in the form of rectangular blocks, each having a bore near one end thereof, through which the shaft 24 passes. These blocks may be fixed against angular motion on shaft 24 in any desired manner. A bolt or screw 30 is indicated for that purpose. The angular positions of weights 26 and 27 with respect to the axis of shaft 24 are coincident.

In order to adjust the degree of unbalance, a third weight 29 is provided, arranged on the vertical center line 28 of the vibrator. By adjusting the angular position of weight 29 with respect to the weights 26 and 27, the extent of unbalance produced by the weights may be adjusted.

Since the arrangement of all of the weights 26, 27, and 29 is symmetrical about axis 28, the vibration resulting from the rotation of shaft 24 is free of any substantial lateral component. There is, accordingly, no appreciable twisting strain on the arms and the associated supports.

Rotation of shaft 24 accordingly sets up vibrations in the arm structures in a vertical direction. The degree of vibration is adjusted, as heretofore stated, by adjustment of the angular position of the weight 29. Rotation may be imparted to the shaft 24 as by the aid of a pulley structure 31 (Fig. 2) driven by a belt 32. This belt 32, as shown most clearly in Figs. 1 and 4, passes over a driving pulley 33 that is mounted on the shaft of an electric motor 34. This electric motor 34 is shown as accommodated upon a base 35 of wood or other material, extending across the stationary blocks 36. These blocks 36 may be attached to the pier 14 as by appropriate anchor bolts.

Since the weight of the load represented by the mold structure 21 is disposed immediately above the pier 14, there is no tendency for overturning the pier by the imposition of this load.

Furthermore, it is possible to adjust the free vibrating length of the sets of vibrating arms. This is accomplished by adjusting the position of the block 9 and the corresponding block that is disposed between arms 5 and 8. In the full line position of Fig. 1 the block 9 is shown as disposed adjacent the left-hand extremities of the arms 4 and 7. Accordingly, the combined length of the vibrating arms is a maximum. However, by loosening bolts 13, the block 9 may be moved toward the right, shortening the effective combined length. Such an adjusted position is illustrated by the dot-and-dash lines 37. The adjustment of the block 9 is advantageous in order to adjust the vibrations to fit the weight of the load (such as the mold 21) imposed upon the arms, and which may vary considerably in accordance with the size of the mold.

The displacements of the axis of the shaft 24 during the process of vibration do not result in any interference with the belt drive to that shaft. The reason for this is that the center distance between the shaft 24 and the motor 34 is quite large, and the direction of motion of the shaft axis is transverse to the line joining the centers of the motor shaft and shaft 24.

The inventor claims:

In a vibrator mechanism, a first arm, means for anchoring said arm so that it has a free length, a second arm overlying the first arm, said second arm having provisions to support a load, a block interposed between the arms at a place remote from the anchoring means, said block being adjustable with respect to the arms, means for fastening the arms and the block together, and an unbalanced rotary device for applying a vibrating force to the second arm, and mounted on said second arm at a place remote from the block.

STEPHEN FLAM.

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The following references are of record in the file of this patent:

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