Oct. 3, 1967 J. H. MacBLANE 3,345,525

ADJUSTABLE ELECTRIC MAGNETIC VIBRATOR

Filed April 5, 1965

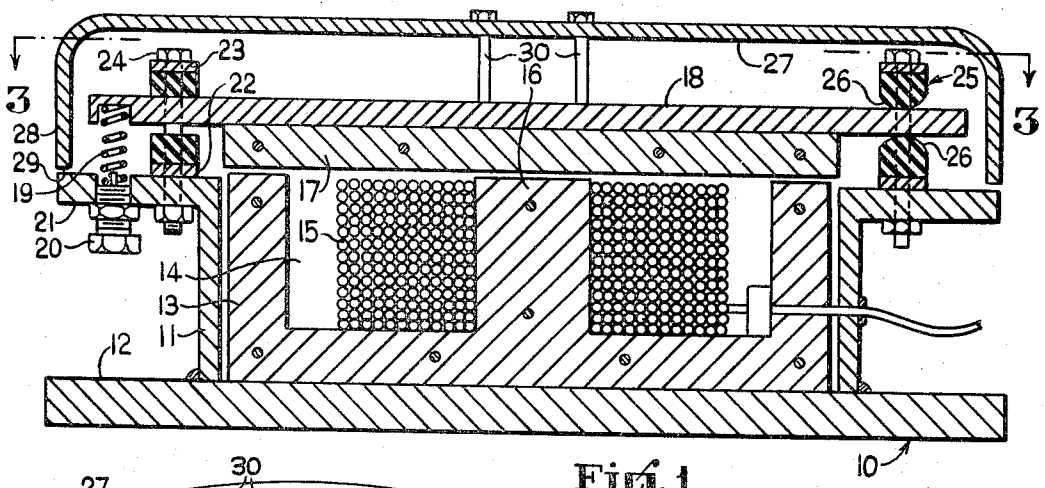


Fig. 1

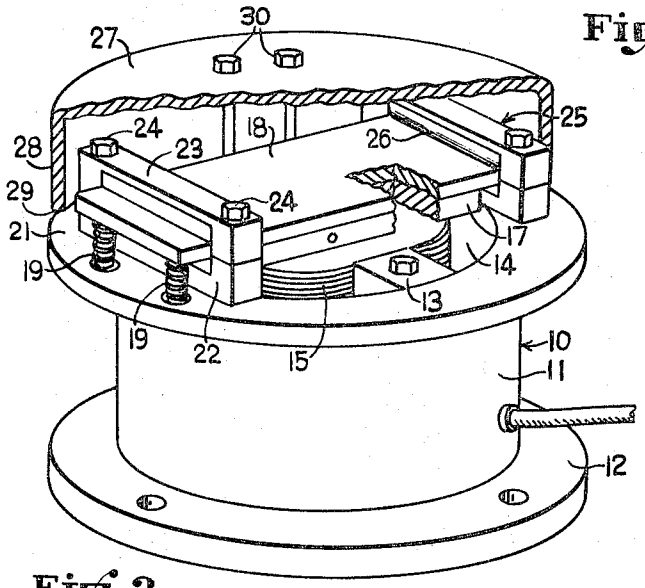


Fig. 2

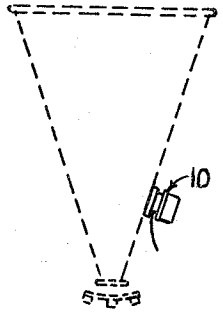


Fig. 4

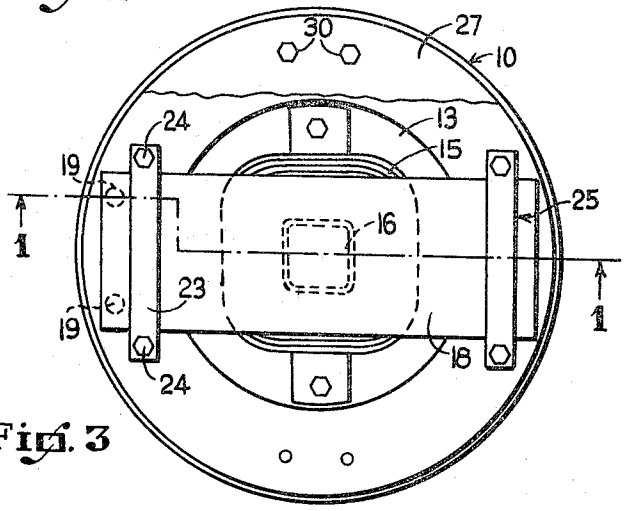


Fig. 3

INVENTOR
James H. MacBlane

United States Patent Office

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ADJUSTABLE ELECTRIC MAGNETIC VIBRATOR

James H. MacBlane, Indiana, Pa.
(Rte. 5, Carrollton, Ohio 44615)

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ABSTRACT OF THE DISCLOSURE

For inducing vibrations in a feed hopper, an electromagnetic vibrator including a housing securable to the hopper and having a peripheral sidewall with a radial flange at its outer extent; an iron core securely mounted in the housing and having a coil wound thereon; an armature secured to a laterally larger metal plate and the plate resiliently mounted on the flange with the armature adjacent the coil, a cover enclosing the outer end of the housing; and an adjustment element protruding through the flange into contact with the plate peripherally of the armature for adjustably resiliently biasing the armature away from the coil.

The foregoing abstract should not be used to interpret the scope or principles of the invention disclosed in this document.

This invention relates to material handling, and more particularly to a device that will activate granular material which is in any hopper, chute, or similar container, so that the material may be moved from the same when it is opened at the bottom.

One of the most troublesome problems of men engaged in the handling of granular material, which may be sand or any substance so closely packed as to resemble a solid or the like, is that of getting the material to move once it has stuck to the sides of the hopper or chute in which it is placed. Generally, the material can only be moved by beating the sides of the container in which it is stuck or else, if the container is high enough, by reaching down from the top and prying the material from the sides with a shovel or the like.

It is, therefore, the principal object of this invention to provide a mechanism that will move, and keep moving, material in any form of container having this invention of an electric magnetic vibrator mounted on the outside thereof.

Another object of this invention is to provide an electric magnetic vibrator that contains a minimum number of parts that cannot get out of order, and is, therefore, a device of the character herein described that will move and keep moving the material within the container on the outside of which this invention is mounted merely by the throwing of an electric switch or the pressing of the switch button.

Another object of this invention is to provide an electric magnetic vibrator that is totally enclosed within a dust proof case.

Another object of this invention is to provide an electric magnetic vibrator that embodies but six parts which are major, namely, a housing, laminated core, coil, flexible hinge, power transmission blocks, and tuning screws.

Still another object of this invention is to provide an electric magnetic vibrator that can be manufactured in any desired size, and of any desired strength; to move, and keep moving, any kind of granular or similar material that is placed in any container having this invention secured to its outside.

With these and other objects not specifically mentioned in view, the invention consists in certain combinations and constructions which will be hereinafter fully described,

and then specifically set forth in the claims hereunto appended.

In the accompanying drawings which form a part of this specification, and in which like characters of reference indicate the same or like parts:

FIGURE 1 is a sectional view of this invention, taken substantially along line 1—1 of FIGURE 3, and viewed in the direction indicated by the arrows.

FIGURE 2 is a perspective view of this invention with its cover broken open in order to show its internal construction.

FIGURE 3 is a sectional view of this invention, taken substantially along line 3—3 of FIGURE 1, and viewed in the direction indicated by the arrows.

FIGURE 4 is a side view of this invention secured in place to the outside wall of a typical hopper, which is shown in phantom lines.

Referring to the drawing, it will be observed that FIGURE 1 clearly illustrates the inside of this invention **10**, which embodies a hollow circular housing **11** having a flanged bottom **12** that is bolted onto the outside of whatever container one desires to be vibrated in order to loosen the material that is located therein. An iron core **13** has a recess **14** therein, in which is located the coil of electric wire **15** through the center of which upwardly projects the center member **16** of the aforesaid iron core **13**. A laminated metal armature **17**, that is of the same length as that of the diameter of the aforesaid iron core **13**, is located directly above the top of the iron core and the aforesaid coil of electric wire **15**. The armature **17** is secured to the underside of the metal plate **18**, that has the underside of one end provided with a pair of spaced recesses in which rests the top of the coil springs **19** which in turn rests upon the upper end of the tuning screws **20**, that are located in the upper flange **21** of the aforesaid circular housing **11** of this invention.

A U-shaped power block **22** is secured to the upper surface of the aforesaid upper flange **21**, while an alike block **23** rests on top of the aforesaid metal plate **18** in a manner that will permit its ends to be bolted to the U-shaped block **22** and to the often mentioned upper flange **21** by means of the two end screws **24**.

A part of this invention, which I personally call a flexible hinge **25**, is almost identical in appearance with the two aforesaid U-shaped blocks **22** and **23**. The hinge **25** is located at the opposite end of the aforesaid metal plate **18**, which is supported by the rounded portions **26** of this hinge, as is clearly shown in FIGURE 1 of the drawing. A dust cap **27**, having a downwardly turned peripheral side **28**, the edge **29** of which is normally held just above the upper surface of the aforesaid upper flange **21** by the spaced screws **30** that secure the cap to the upper flange **21** of this invention.

It will be understood by anyone experienced in the electrical arts that when the coil **15** of this invention is connected to a split wave rectifier by means of a switch and a rheostat, the latter controls the voltage, and the rectifier cuts off half of the wave length, thereby reducing the frequency from 7200 impulses per second to 3600 impulses per second. Neither the switch, the rheostat, nor the rectifier are shown in any of the views of the drawing since they do not form an actual part of this invention.

It is now clear to anyone experienced in either the materials handling art or the electrical arts, that when this invention of an electric magnetic vibrator is secured by bolts to the outside of any hopper or the like, as is shown in FIGURE 4 of the drawing, and the device is activated by the turning on of the electric switch after the unit has been connected to a source of electricity, the vibrations transmitted to the inside of the hopper or the like will naturally loosen any material that will be in the aforesaid hopper.

Although it has not been previously mentioned in this specification, the aforesaid U-shaped block **22** and the hinge **25** are made of resilient material, as one can see by looking at FIGURE 1 of the drawing. The use of resilient material for these two parts of this invention permits the movement of the ends of the aforesaid metal plate **18** to be transmitted to the stationary structure of the invention, as will be understood by anyone versed in that portion of the mechanical arts that deals with both vibrations and materials.

The invention above described may be varied in construction within the scope of the claims, for the particular device, selected to illustrate the invention, is but one of many possible concrete embodiments of the same. It is not, therefore, to be restricted to the precise details of the structure shown and described.

What is claimed is:

1. An electromagnetic vibrator comprising: a housing including a base, a peripheral sidewall projecting axially from said base and a radially outwardly extending flange on said sidewall near the end thereof opposite the base, said housing being constructed and arranged for securement to a hopper or the like for inducement of vibrations therein; a ferromagnetic core secured in said housing; a wire coil received on said core facing outwardly of said housing base and constructed and arranged for connection to a supply of pulsating electric current; a metal plate; an armature secured to the underside of said metal plate in the central region thereof, said metal plate extending laterally beyond said armature at least throughout a portion of the perimeter thereof; resilient means securing said metal plate, peripherally of said armature, to said housing flange for limited oscillation of the plate and armature toward and away from the coil and core; said resilient means including at least one body of resilient material received between said metal plate and said flange; means defining an opening axially through said flange; a longitudinally advanceable-retractable element received through said opening and engaging the body of resilient material between the flange and metal plate in a sense to force the body of resilient material against the plate; adjustment means for advancing and retracting said adjustment element from exteriorly of the housing for varying the resilient force with which the body of resilient material engages the plate, thereby providing tuning means for the vibrator easily operable exteriorly of the housing thereof.

2. The electromagnetic vibrator of claim **1** wherein the housing further comprises a dust cover removably secured to the remainder of the housing and extending from the outer periphery of said flange, over the plate and armature, thereby closing the opposite end of the housing from said base.

3. The electromagnetic vibrator of claim **1** wherein the resilient means includes at least one second body of resilient material received between the plate and flange at points on the plate and housing generally diametrically opposite the first-mentioned, tuning means providing, body of resilient material; and fastening means secured to said flange, clamping the metal plate against the second body of resilient material to provide a resilient hinge about which said plate and armature rotate during tuning.

4. The electromagnetic vibrator of claim **1** further including a body of resilient material mounted on the housing above the plate and constructed and arranged for abutment with the opposite side of the plate from the armature to limit excursion of the plate from the coil.

5. The electromagnetic vibrator of claim **1** wherein the body of resilient material comprises a coil spring in compression.

6. The electromagnetic vibrator of claim **5** further including means defining a socket in the underside of said metal plate, opening toward said flange, one end of said spring being received in said socket and abutting the metal plate therein.

References Cited

UNITED STATES PATENTS

2,439,219	4/1948	O'Connor	310—29
2,458,313	1/1949	Stevens	310—190 X
2,472,637	6/1949	Weyandt	310—29
2,539,391	1/1951	Alvord	310—29
3,155,853	11/1964	Spurlin et al.	310—29
3,167,670	1/1965	Spurlin	310—29

MILTON O. HIRSHFIELD, *Primary Examiner.*

D. F. DUGGAN, *Assistant Examiner.*