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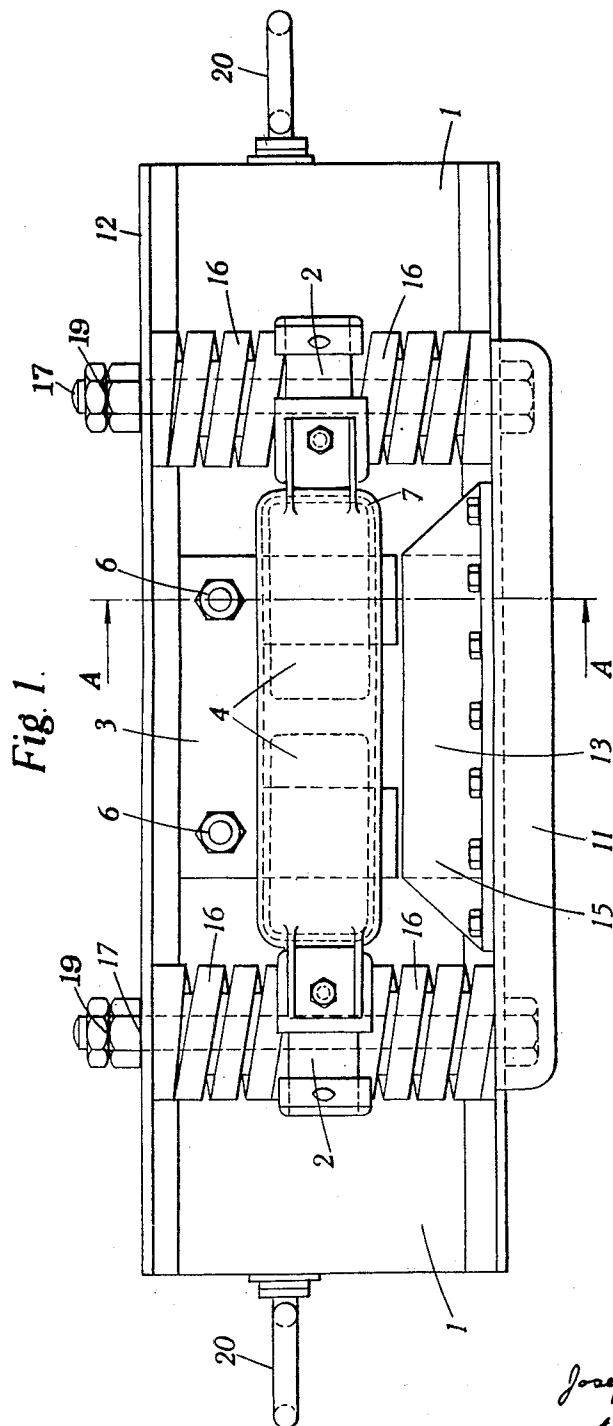
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2,163,249

MEANS FOR VIBRATING SCREENS AND THE LIKE

Filed June 30, 1937

4 Sheets-Sheet 1



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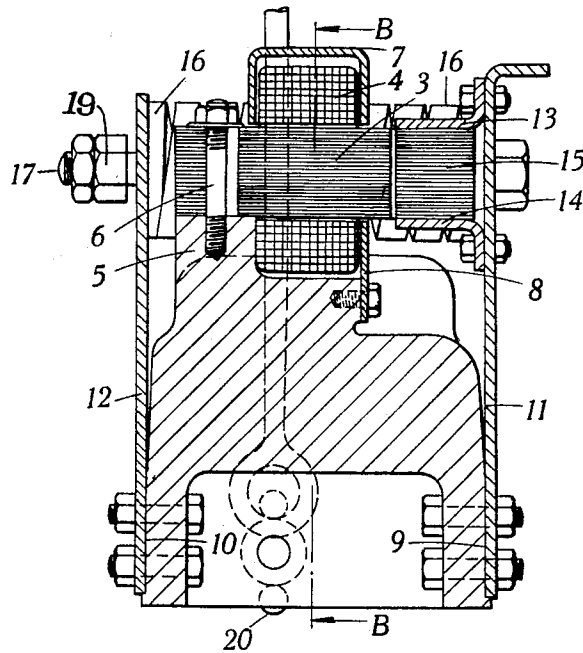
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Fig. 2.



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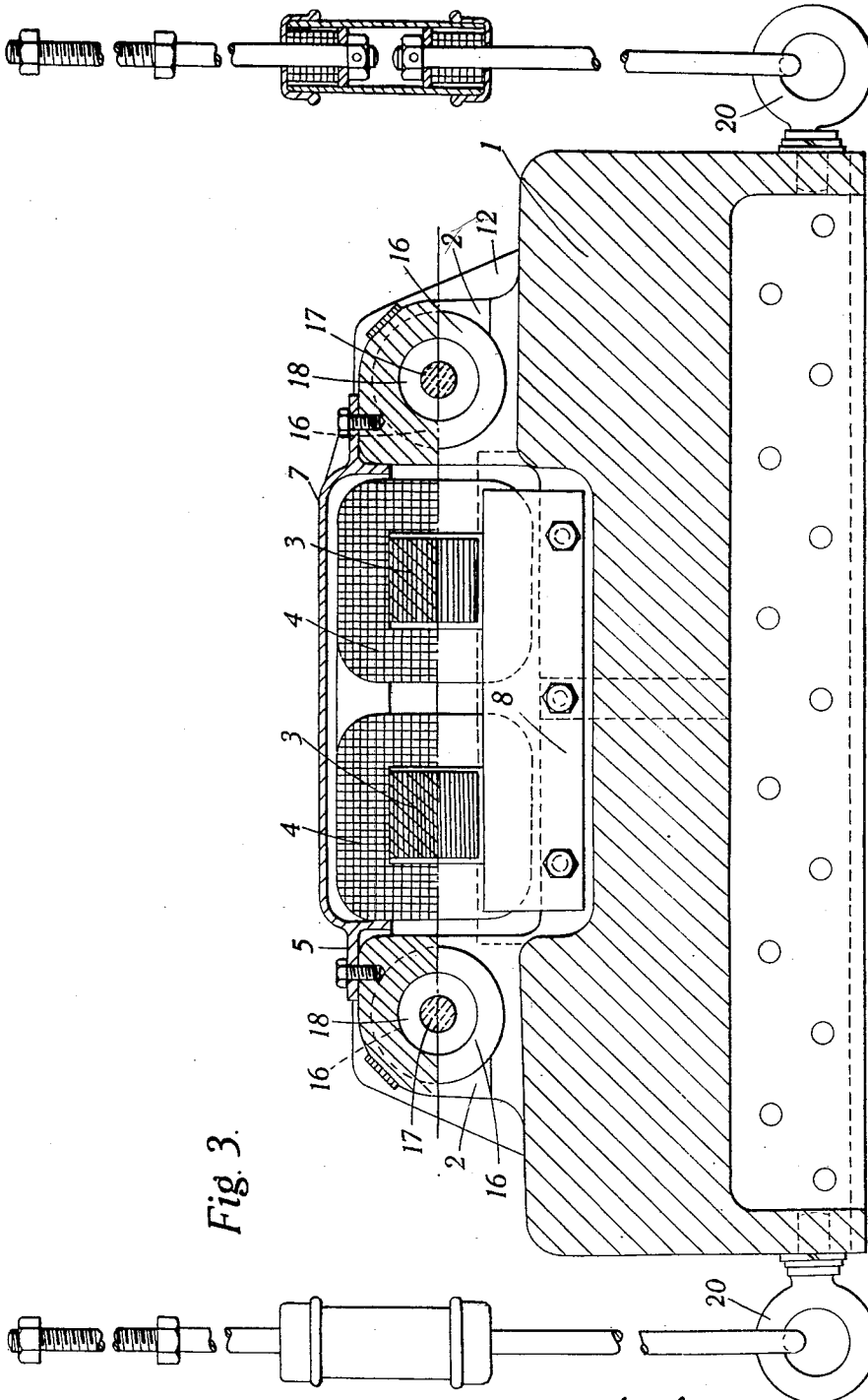


Fig. 3.

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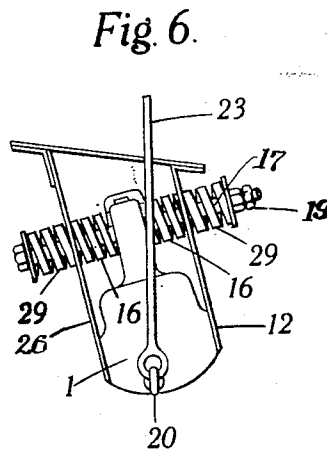
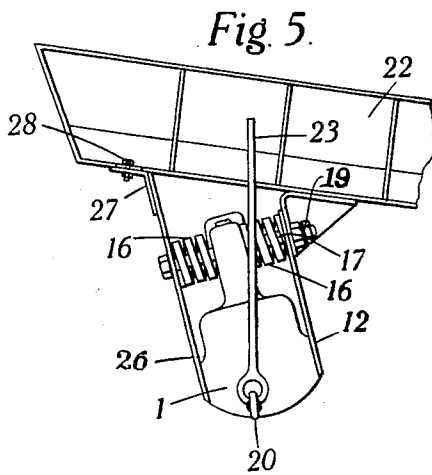
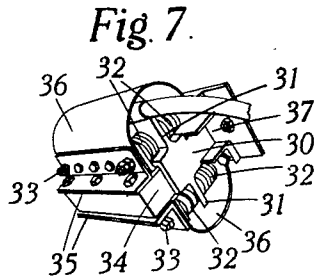
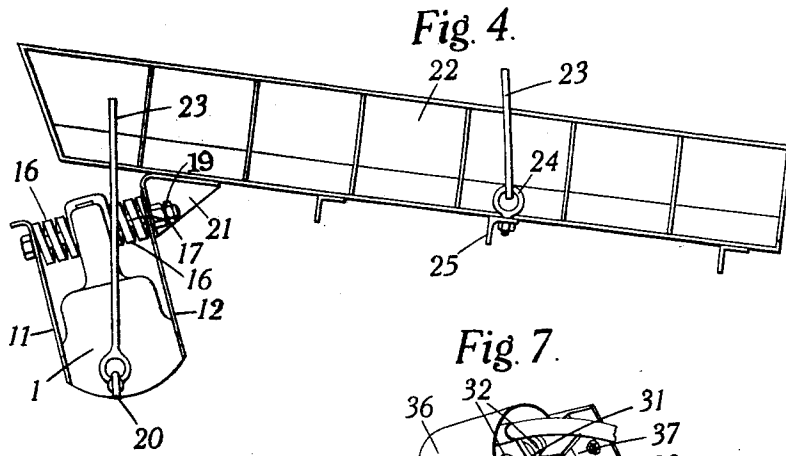
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UNITED STATES PATENT OFFICE

2,163,249

MEANS FOR VIBRATING SCREENS AND THE LIKE

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Application June 30, 1937, Serial No. 151,088
 In Great Britain July 7, 1936

7 Claims. (Cl. 209—368)

This invention relates to driving means for concentrating, sifting, conveying, moulding, pulverising, crushing and similar apparatus comprising a table, screen, tray or the like adapted to be vibrated by vibrating means such as the armature of electromagnetic means supplied with intermittent current.

It has been usual hitherto to connect the said vibrating means to the table, screen, tray or the like by rigid means such as bolts, and it has been found that on account of the intense vibration and the slight bending at each stroke, these bolt means will break even if they are made of an expensive steel.

The object of the invention is to provide an improved driving arrangement which does not necessitate the provision of such rigid bolt means.

According to the invention driving means for concentrating, sifting, conveying, moulding, pulverising, crushing or similar apparatus comprising a table, screen, tray or the like adapted to be vibrated by vibrating means, such as the armature of electromagnetic means supplied with intermittent current, comprises resilient means associated with said vibrating means and adapted to be connected to said table or the like whereby the vibrations of the driving means may be imparted to the said table or the like through a resilient connection. The said resilient means may comprise coiled springs and/or leaf springs. Preferably adjustable constraining means are provided for said resilient means wherewith the natural frequency of vibration of the vibrating means may be adjusted. It is found to be preferable that this frequency should accord with the frequency of energization of the said vibrating means.

The invention will now be particularly described with reference to the accompanying drawings which show examples of construction.

Figure 1 of the drawings shows a plan view of one form of driving means; Figure 2 a section on the line AA in Figure 1; and Figure 3 a section on the line BB in Figure 2. Figure 4 shows a side elevation of a vibrating feeder with a driving means, as shown in Figures 1, 2 and 3, affixed to the feeder. Figure 5 shows a part side elevation corresponding to that in Figure 4 but with a modified form of driving means. Figure 6 shows yet a further modification which may be made to the driving means shown in Figures 1, 2 and 3. Figure 7 shows a perspective view of another modified form of driving means.

Referring to Figures 1, 2 and 3, the driving means comprises a metal casting 1, formed with

symmetrical upstanding shoulder portions 2, the space between the shoulder portions being occupied by a U shaped laminated core 3, the limbs of which carry coils 4. The core 3 is secured to a supporting surface 5 of the casting by bolts 6. Cover plates 7 and 8 are provided for the coils 4.

Curved faces 9 and 10 are provided at the back and front of the casting and to the lower end of these faces respectively are clamped the lower edge portions of resilient plates 11 and 12. The plate 11 carries at its top edge portion clamping plates 13 and 14 for a laminated armature 15.

Four coiled springs 16 are arranged between the shoulder portions 2 and the plates 11 and 12 respectively; each of the two bolts 17 extends through the two plates 11 and 12, through two of the coiled springs and through a hole 18 in the associated shoulder portion. The bolts are provided with a head at one end and an adjustable locked nut 19 at the other. By adjusting the nut 19 on each bolt the compression of the springs 16 and the free length of plates 11 and 12 from the curved faces 9 and 10 can be adjusted; and therefore the natural frequency of vibration of the armature and plates 11 and 12 can be regulated.

Eyebolts 20 are provided at the ends of the casting by which the apparatus may be suspended. These eyebolts are preferably situated at or near the axis which is found in practice to rotate rather than to vibrate. The position of this axis is related in some way, though complex, on account of the complex nature of the driving force, with the centre of percussion of the apparatus. The approximate position of the said axis may be located easily by experiment. The points at which the eye bolts are fixed will be referred to hereinafter as "dead" points.

One method of attachment of the driving means is shown in Figure 4. Here an angle plate 21 is rigidly attached to the plate 12 by means of the bolts 17, and to the feeder 22 by some form of securing means (not shown) or by welding.

The whole combination is suspended by four rods 23 (of which two only are shown) one pair being attached to the eyebolts 20 in the casting 1 and the other pair being attached to eyebolts 24 affixed to an angle cross-piece 25 welded or otherwise fixed to the base of the feeder. Shock absorbers may be provided in the rods in known manner; but by positioning the supporting bolts in the manner above described, there is no real need for shock absorbers.

On account of the choice of the "dead" points for the points of suspension the vibration is trans-

mitted as by a lever, acting about the axis passing through these points.

It will be seen that in the arrangement shown in Figure 4, the armature 15 is coupled to the feeder through the springs 16 and that the motion of the armature is transmitted to the feeder wholly through these springs, so that the bolts 17 will not be subject to fatigue during vibration. If desired one or more additional driving means 10 may be connected to the feeder.

In the arrangement shown in Figure 5, the plate 11 is replaced by a larger plate 26 the upper end of which is secured to an angle plate 27, this plate 27 being fixed to the base of the feeder through an adjustable fixture; this fixture may suitably comprise fixing bolts 28 extending through slots in the base of the feeder. Here the connection of the armature 15 to the feeder is through the resilient plate, and again the bolts 20 17 are not subject to the strains hereinbefore referred to when the feeder is being vibrated. In this arrangement, if the fixing for the angle plate 27 is sufficiently adjustable, the bolts 17 may be removed after fixing.

Referring to Figure 6, the arrangement of further coiled springs 29 between the plates 26 and 12 and the ends of the bolts 17. Tuning of the frequency of vibration may be effected, as before, by adjusting the degree of compression of the springs 16 and 29.

Referring now to Figure 7, a casting 30 is formed, in a similar manner to the casting 1, with shoulder portions 31 against which coiled springs 32 abut. Here however, shoulder portions extend on either side of the casting and eight coiled springs with compression bolts 33 are provided. The casting 30 carries an electromagnetic core (not visible but similar to core 3) which is adapted to be energised to attract the armature 34. The armature is clamped between angle brackets 35 to which are secured resilient curved plates 36. The other end of each plate 36 is secured to a base member 37 carrying the casting 30.

The base member 37 is adapted to be secured to a table, screen, mould or the like adapted to be vibrated, and intermittent energisation of the coils on the core results in attraction and release of the armature and the reaction on the springs 32 causes the base 37 to vibrate. Here the armature is connected to the table or the like through the resilient plates and coiled springs. If the coils are compressed to a suitable extent by the bolts 33, the vibrating system can be tuned to vibrate with a frequency resonant with that of the supply to the energising coils.

Suitable arrangements for energising the coils of the electromagnets are described in British Patent Specifications Nos. 421,657 and 441,733.

I claim:

1. Means for vibrating screens and the like comprising a member to be vibrated, a body portion, connecting means between said member and the body portion for supporting said member for vibration, an electromagnet fixedly mounted on said body portion and arranged to cooperate

with an armature resiliently supported by the body portion for vibration relative to the magnet when the latter is intermittently energized, means for supporting said body portion for oscillatory movement about a relatively fixed axis when said magnet is intermittently energized for vibrating the armature, and coil springs interposed between said armature and the body portion and between said body portion and the connecting means for transmitting vibrations to said member to be vibrated.

2. Means for vibrating screens and the like, as in claim 1 wherein means is provided for adjusting the compression of said coil springs so that the natural period of vibration of the armature will conform to the intermittent energization of the magnet.

3. Means for vibrating screens and the like as in claim 1 wherein said body portion is supported for oscillatory movement by depending links pivotally connected to the body portion at opposite ends of said axis of oscillation.

4. Means for vibrating screens and the like comprising a member to be vibrated, a body portion, resilient connections between the body portion and said member for supporting the latter for vibration, an electromagnet fixedly mounted on said body portion, an armature arranged to cooperate with said magnet, resilient connections between said armature and the body portion for facilitating relative vibrations of the armature and magnet, shoulder lugs on said body portion adjacent said magnet, compression coil springs between said shoulder lugs and each of said resilient connections for transmitting relative vibrations of the armature and magnet to said member to be vibrated, means for adjusting the compression of said springs so that the natural period of relative vibration of the armature and magnet may conform with intermittent energization of the magnet, and means for supporting said body portion for oscillation about an axis coinciding substantially with the center of oscillation of said body portion when relative vibrations of the armature and magnet are effected by the intermittent energization of the magnet.

5. Means for vibrating screens and the like as in claim 4 wherein said resilient connections between the armature and said body portion comprises a leaf-spring-like resilient plate extending beyond the armature and connected with said member to be vibrated.

6. Means for vibrating screens and the like as in claim 4 wherein one end of said member to be vibrated is supported by the body portion through said resilient connection and the other end of said member is supported by depending links pivotally connected with said member.

7. Means for vibrating screens and the like as in claim 4 wherein said means for adjusting the compression of said springs comprises bolts extending through said resilient connections and provided with lock nuts for holding the adjustment.

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