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RESONANT OSCILLATING DEVICE

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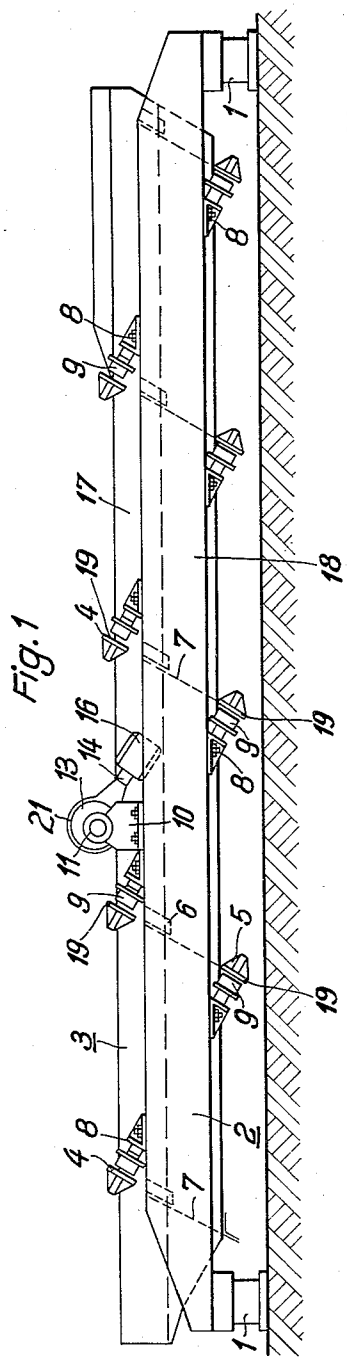


Fig. 1

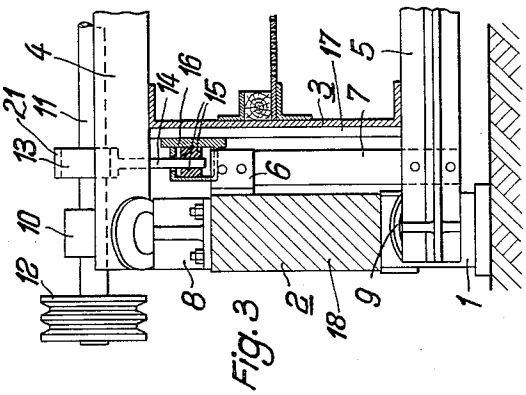


Fig. 3

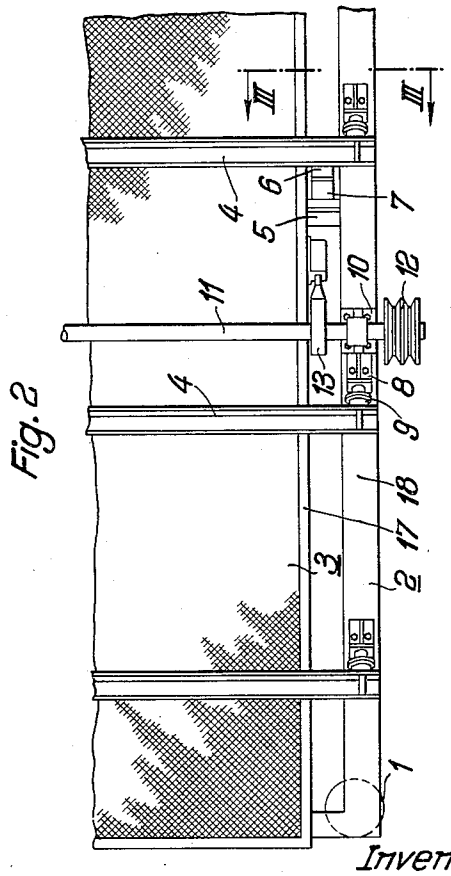


Fig. 2

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RESONANT OSCILLATING DEVICE

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The present invention relates to resonant oscillating means, particularly, a vibrating screen device, comprising two masses oscillating in opposite directions and being connected to each other by springs, whereby a kinetic coupling is provided between these masses of which one constitutes the supporting frame.

In a known device of this kind, the two masses oscillating in opposite directions are arranged one above the other, so that the resulting structure is relatively high. Moreover, in such cases, the devices supplying and discharging the materials to be treated have to be arranged relatively high and, therefore, are expensive. In some instances, particularly, in case of the installation in existing plants, the space available for devices with oscillating masses arranged above one another is limited in height. However, even in cases where the height of the available space is sufficient, it is desirable to keep the height of such oscillating devices as low as possible, because they are then better accessible for servicing and maintenance.

Vibrating screens with screening boxes and two laterally arranged masses oscillating in opposite directions with respect to the screening boxes have been known, whereby the driving shafts with their eccentrics are journalled in these lateral masses and are connected to the screening boxes by means of connecting rods. In these known screening devices, the springs are arranged in window-like cutouts. The provision of these window-like cutouts results in complicated and expensive designs and renders difficult the assemblage and disassemblage or the access to the springs in case of repair or exchange jobs.

It is an object of the present invention to provide a resonant oscillating device having a relatively low structure and to avoid the above disadvantages by arranging the supporting frame adjacent the oscillating mass or screening box, to attach to this oscillating mass holding means extending across and partially above and partially below this supporting frame, and to provide between these holding means and the supporting frame, partially above and partially below thereof, springs which cooperate in pairs or groups in the oscillating directions.

It is a further object of the present invention to mount a number of these springs on the supporting frame at certain distances from one another and to design the side pieces of the supporting frame as uniformly extending supporting members. Thus, a uniform distribution of the oscillating forces is obtained so that undesired and disturbing bending moments in the vibrating masses cannot occur. The springs may be made smaller, if their number is increased, resulting in a lower temperature and a superior heat convection. Such device is less sensitive to disturbances when a spring should become defective. In addition, assembling, disassembling and exchange of the springs is facilitated.

It is a still further object of the present invention to provide the holding means for the springs as unitary pieces extending across the entire width of the device, so

that they serve simultaneously to reinforce the oscillating mass.

It is an additional object of the present invention to design the springs as rubber buffers and to assemble the same without biasing at such distance from their respective counter-surface that they will strike these counter-surfaces with great force.

Still further objects and the entire scope of applicability of the present invention will become apparent from the detailed description given hereinafter; it should be understood, however, that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

Referring in details to the drawings,

Figure 1 shows a side view of a resonant vibrating screen device embodying the present invention;

Figure 2 illustrates a part of the swinging screen of Figure 1 in top view; and

Figure 3 is a section through the screen device of Figure 2 along the lines III—III on an enlarged scale.

A supporting frame **2** is mounted on spring means **1** resting on the ground or a relatively stationary base, said spring means comprising rubber or other material having similar elastic or resilient properties. A screening box **3** is inserted in this supporting frame **2** in such a way that sde members **17** of this screening box **3** are spaced from side members **18** of the supporting frame **2**. Transverse bars or members **4** are attached at certain distances to the top and transverse bars **5** to the bottom of the side members **17** of the screening box **3**, said transverse bars or members **4** and **5** extending across this screening box **3**, whereby the ends of these transverse bars or members **4** and **5** project at both sides beyond the side members **17** of the box **3** to respectively lie over or under the side members **18** of the supporting frame **2**. Mounting means or brackets **6** are secured to the inner top edge of the side members **18** of the frame **2**. The upper ends of inclined leaf springs **7** are mounted on these brackets **6**, while the lower ends of these springs **7** are attached to the transverse bars **5**, so that the screening box **3** is oscillatorily suspended in and by the supporting frame **2**. The side members **18** of the supporting frame **2** are equipped at the top and at the bottom with blocks **8**, each being provided with a resilient buffer **9**. These blocks **8** are arranged in such a manner that one upper and one lower block are oppositely facing each leaf spring **7** and that the lines of symmetry through these blocks are perpendicular to a plane through the leaf springs, i. e., pairs of these blocks **8** are lying in oscillating direction. The projecting ends of the transverse bars **4** and **5** on top and bottom of the side members **18** of the frame **2** are provided with abutment faces **19** which are parallel with respect to the front faces of the buffers **9**. The distance between these abutment faces **19** of each two cooperating transverse bars **4** and **5** is slightly larger than the distance of the front faces of the buffers **9** therebetween, so that a gap is left between each abutment face **19** and the front face of the adjacent buffer **9** when the device is at rest. Thus, the supporting frame **2** and the screening box **3** can carry out oscillatory vibratory movements with respect to one another, whereby the front faces of the resilient buffers **9** will engage the abutment faces **19** at each oscillation, if the amplitude of such oscillation exceeds the width of said gap.

The vibrating or oscillating device is driven in a manner known per se with the aid of a kinetic coupling means which is constructed as follows. A bearing block with bearing **10** is mounted on each of the two side members

18 of the supporting frame 2. A shaft 11 is rotatably mounted in the two bearings 10, this shaft 11 extending across the screening box 3. A pulley 12, adapted to be driven by a V-belt, is secured to one of the ends of the drive shaft 11. Two eccentrics or cams 13 are fixedly mounted on the shaft 11, each preferably close to one of the shaft ends, each of said eccentrics or cams being surrounded by a head or follower 21 forming one end of a connecting rod 14, disposed in the gap between the side members 17 and 18 of the supporting frame 2 and the swinging screen, respectively. The longitudinal axes through the two connecting rods 14 are perpendicular with respect to the plane of the leaf springs 7. The other end of each of the connecting rods 14 is mounted between two oppositely disposed rubber pieces 15 which are joined to the rod end by vulcanization. The outer surfaces of these rubber pieces 15 are secured to a housing 16 mounted on the side member 17 of the screening box 3.

The rubber pieces 15 are deformed during the movement of the connecting rods 14. This deformation is the greatest at the beginning of the vibrating operation of the screening box 3, while during the normal operation, the deformation rate corresponds merely to the damping of the vibrating screening box 3. It is possible to provide the drive mechanism on the screening box 3 rather than on the supporting frame 2, though the arrangement on the supporting frame 2 is preferable, because the latter has to be made as heavy as possible, such heavy design being required by the oscillatory operation of the device.

I claim:

1. A resonant oscillatory device, comprising a body to be vibrated, a frame structure somewhat larger than and around said body, said frame structure being resiliently mounted on a relatively stationary base, means to suspend said body for vibratory movement in and adjacent said frame structure, kinetic coupling means between said body and said frame structure, said body and said frame structure forming masses oscillating in opposite directions when subjected to vibratory actions via said coupling means, a plurality of mounting members on said body, the ends of some of said members extending over the top of the respective sides of said frame structure, and the ends of the others of said traverse members extending below said sides, a pair of elastic organs being inserted between said member ends and said frame structure, one half of said pair being on top and the other half below said frame structure, whereby said elastic organs of each pair cooperate in the oscillating directions.

2. A device according to claim 1, characterized in that the elastic organs are of a resilient material having spring properties.

3. A device according to claim 1, wherein said elastic organs are of resilient rubber.

4. A device according to claim 1, wherein said body is a screening box.

5. A device according to claim 1, wherein a plurality of pairs of said organs are distributed over the length of said device.

6. A device according to claim 1, wherein said frame structure comprises two uniformly extending supporting members forming the sides of said structure.

7. A device according to claim 1, wherein said mounting members are transverse bars spacedly secured to said body, each of said bars extending across and beyond said body.

8. A device according to claim 1, wherein said elastic organs are inserted without biasing at a distance from their respective counter-surfaces.

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