

[54] **ADJUSTABLE PHASE TWO SHAFT VIBRATOR**

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[52] U.S. Cl. .... **74/61, 209/367, 259/DIG. 42**  
[51] Int. Cl. .... **F16h 33/00**  
[58] Field of Search .... **74/61, 607; 198/220 DB, 220 DD; 259/DIG. 42; 209/366, 366.5, 367**

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**FOREIGN PATENTS OR APPLICATIONS**

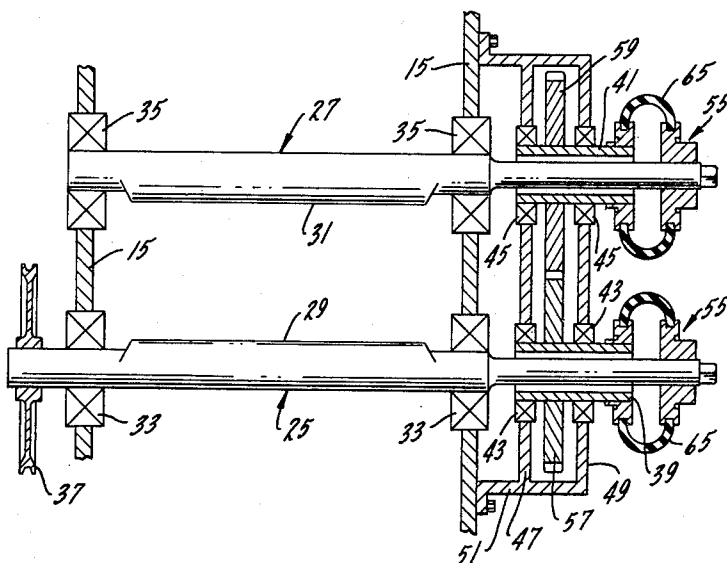
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[57] **ABSTRACT**

A vibrating mechanism for a two-shaft screen. Eccentric shafts are supported by bearings in the side plates of the screen frame or in mounts above or below the side plates. Each shaft has a coaxial torque tube to which it is connected by a flexible elastic coupling. The torque tubes are interconnected by meshing gears. One of the eccentric shafts has a sheave for a drive belt. The flexible elastic couplings permit the shafts to be rotatably adjusted relative to their torque tubes while the screen is stopped. When the screen is started up again, the forces due to the eccentricity of the two shafts bear a new phase relationship. This results in a new direction for the reciprocating motion of the screen.

**7 Claims, 3 Drawing Figures**



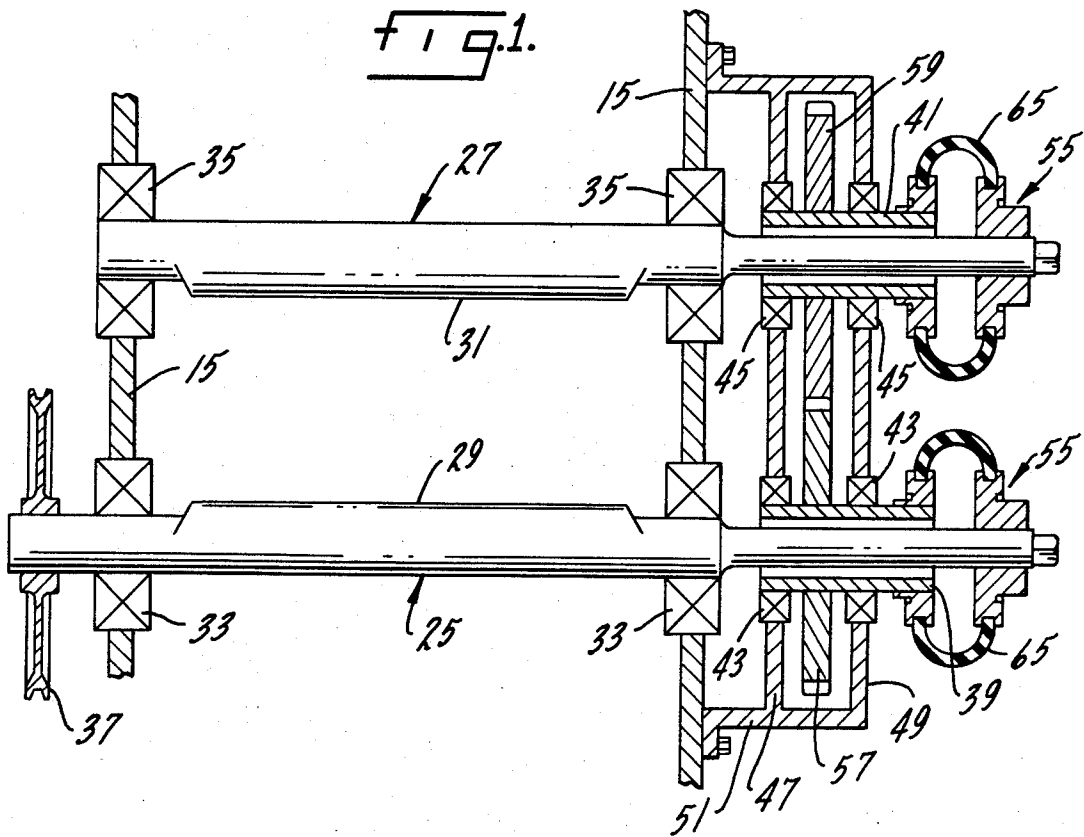
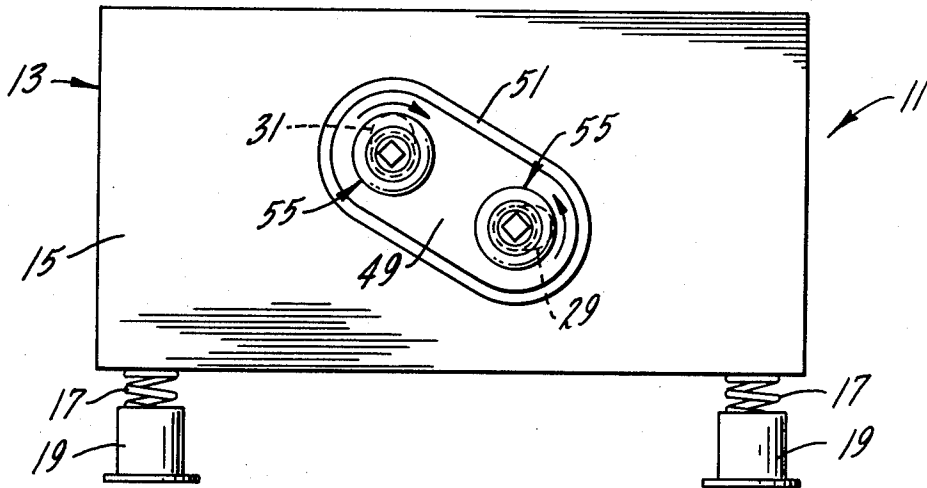
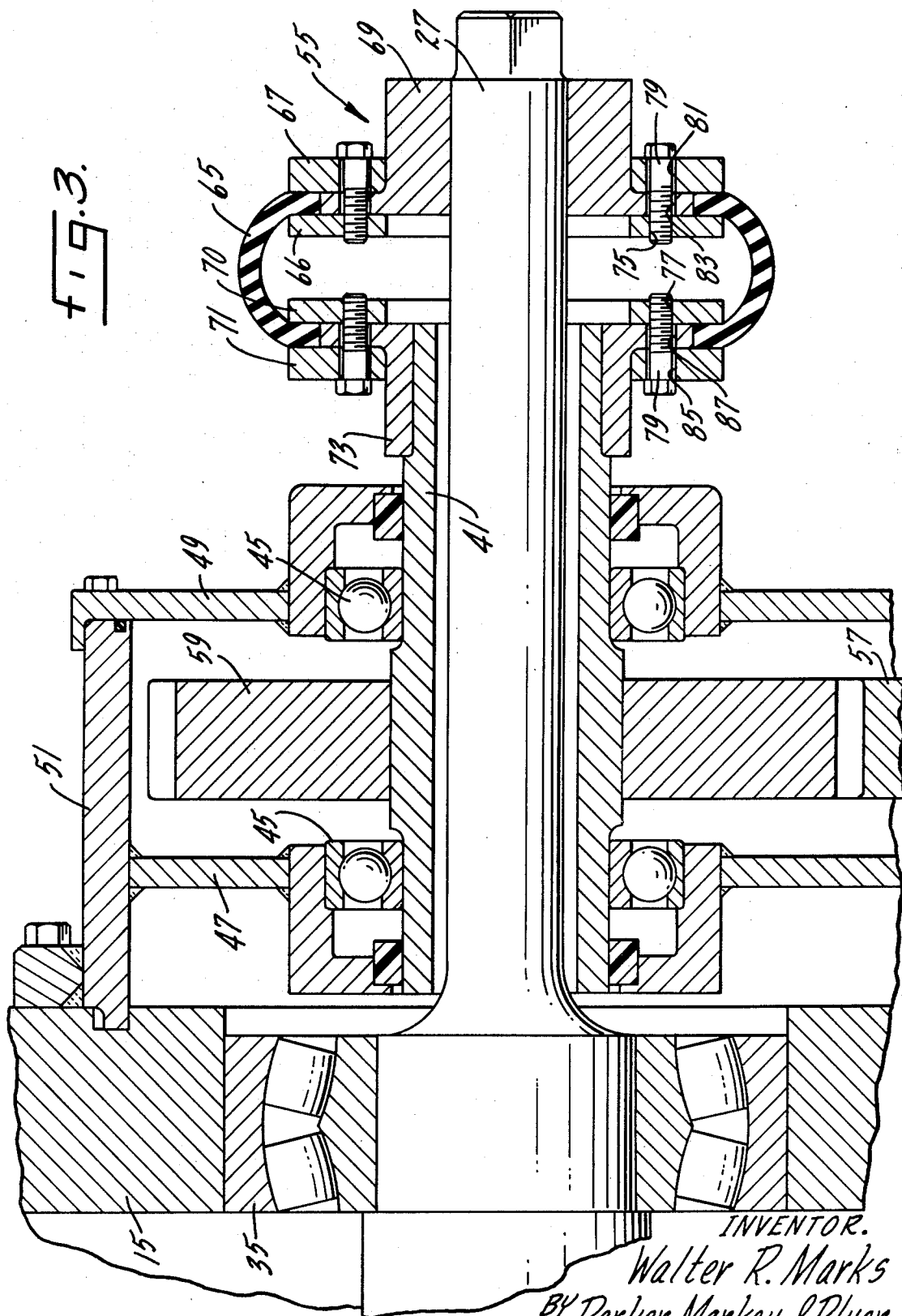


fig. 2.

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fig. 3.



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**ADJUSTABLE PHASE TWO SHAFT VIBRATOR****SUMMARY OF THE INVENTION**

This invention is concerned with a two-shaft vibrating mechanism for a vibrating screen.

An object of this invention is a vibrating screen mechanism in which the screen's direction of motion may be easily changed.

Another object is a vibrating screen of the two-shaft type in which the shafts are interconnected by flexible elastic couplings.

Another object is a vibrating screen of the type having two shafts in which the shafts may be rotatably adjusted relative to each other.

Other objects may be found in the following specification, claims and drawings.

**BRIEF DESCRIPTION OF THE DRAWINGS**

The invention is illustrated more or less diagrammatically in the following drawings wherein:

FIG. 1 is a partial, sectional view of the vibrating mechanism of this invention mounted on the side plates of a vibrating screen;

FIG. 2 is a side, elevational view of a vibrating screen utilizing the vibrating mechanism of this invention; and

FIG. 3 is an enlarged partial cross-sectional view of one end of an eccentric shaft of FIG. 1.

**DESCRIPTION OF THE PREFERRED EMBODIMENT**

FIG. 2 shows a side elevation of a vibrating screen 11. The vibrating screen includes a frame 13 having side plates 15. The frame 13 is supported on springs 17 carried by pedestals 19. Screening surfaces, which are not shown, are supported by the side plates 15 through intermediate members, also not shown.

Eccentric shafts 25 and 27 (FIG. 1), having separate and/or integral eccentric weights 29 and 31, extend transversely across the frame 13 and are respectively supported by two sets of bearings 33 and 35 which are held in the side plates 15. Shaft 25 extends outwardly beyond the side plates 15 on both sides of the frame while shaft 27 extends outwardly beyond a side plate on only one side of the frame. A drive sheave 37 is attached to one end of the shaft 25 outwardly of the frame 13.

Torque tubes, or sleeves, 39 and 41 are respectively mounted around and coaxial to the portions of the shafts 25 and 27 which are located outwardly of a side plate 15 of the frame 13. The torque tubes are respectively mounted in bearings 43 and 45 supported by inner and outer side walls 47 and 49 of a housing 51 which is bolted to a side plate 15 of the frame 13.

Each torque tube is connected to its respective shaft by a flexible elastic coupling 55. The Dodge Corporation of Mishawaka, Indiana manufactures couplings of this type under the trade name PARA-FLEX. Gears 57 and 59 are attached respectively to the torque tubes 39 and 41 and mesh with each other to provide a driving connection between the torque tubes.

The drawing of FIG. 3 shows in enlarged detail the eccentric shaft 27, its torque tube 41 and a flexible elastic coupling 55 connecting the shaft and the torque tube. Since the flexible elastic coupling connecting the shaft 25 and its torque tube 39 is identical, only one will

be described in detail. The flexible coupling includes a flexible element 65 which is fastened by bolted ring clamps 66 and 67 to a flange 69 affixed to the shaft 27 and by bolted ring clamps 70 and 71 to a flange 73 affixed to the torque tube 41. The inner ring clamps 66 and 70 have threaded holes 75 and 77 respectively which receive and engage bolts 79 which pass through aligned openings 81, 83 and 85, 87 in the outer rings and flanges 67, 69 and 71, 73 respectively.

The use, operation and function of this invention are as follows:

The vibrating mechanism of this invention is intended for use with a vibrating screen in which the vibrations of the screening surfaces move the material from the feed end to the discharge end of the screen. The vibrating mechanism of this invention permits easy adjustment of the magnitude and direction of forcing. In addition, the characteristic shape of the envelope of resultant forcing vectors through a cycle may be easily adjusted. The forcing direction of the vibrator may be changed by rotating either shaft 25 or 27 relative to its respective torque tube 39 or 41 to vary the alignment of the eccentric weights 29 and 31 relative to each other. This can easily be accomplished in this invention by loosening the bolts 79 of the bolted ring clamps 66, 67 of the flexible coupling 55, rotating the eccentric shaft relative to its torque tube, and then retightening the bolts. The forcing characteristic shape may be changed by varying the relative magnitude of the eccentric weights 29 and 31. The forcing amplitude may be changed by increasing or decreasing the eccentric weights 29 and 31 by the same proportion or by changing the rotational speed.

The vibrating mechanism is driven by a V belt (not shown) which is connected to the drive sheave 37. Rotation of the sheave rotates the shaft 25 which in turn rotates its torque tube 39 through its flexible coupling 55. Rotation of the torque tube rotates spur gear 57 which rotates spur gear 59 in the opposite direction. The torque tube 41 rotates with its spur gear 59 and in turn rotates eccentric shaft 27 through its flexible coupling 55. Thus, the eccentric shafts 25 and 27 are rotated in opposite directions.

In common with conventional two-shaft vibrators, the forces produced by the rotation of eccentric weights 29 and 31 on shafts 25 and 27 respectively are totally additive twice and totally subtractive twice during each cycle for the conventional one-to-one gear ratio. This forcing yields an envelope of resultant force vectors which is linear or elliptical and is inclined towards the discharge end of the screen. Unlike common two-shaft vibrators, the inclination of the forcing line or ellipse can be changed at will. This adjustment is easily accomplished by the previously described procedure for changing the angular position of either torque tube relative to the shaft which runs through it. By changing the forcing direction and hence the direction of screen motion, it is possible to retain material on the screening surfaces longer or to move the material through the screen faster.

The flexible coupling between each eccentric shaft and its torque tube reduces wear on the meshing gears 57 and 59. The flexible couplings absorb the deflections of the eccentric shafts and prevent the deflections from loading the torque tubes thereby allowing the torque tubes to maintain proper gear alignments.

In this specification, the eccentric weights have been shown as formed integrally with their shafts. However, it should be understood that these weights may be made separate and attachable to their eccentric shafts so that the magnitude of the weights can be changed to alter the forcing characteristics of the vibrating mechanism. Also, although FIG. 2 shows the vibrator on the center of gravity of the screen, it might be located elsewhere, for example, on the top or bottom of the screen.

Whereas, the preferred form of the invention has been described and shown, it should be understood that there are modifications, alterations and changes which may be made without departing from the teachings of the invention. Therefore, the scope of the invention should be only limited by the claims attached hereto.

I claim:

1. A vibrating mechanism for a vibrating screen including:

a pair of eccentric shafts,

a drive means attached to one end of one of said shafts, and

means connecting the opposite ends of said shafts to rotate said shafts in unison,

said connecting means including:

a torque tube coaxially positioned over each shaft,

a gear attached to each torque tube and meshed with the gear of the other torque tube, and

a flexible coupling joining each torque tube and its respective shaft.

2. The vibrating mechanism of claim 1 further characterized in that said flexible couplings are of the

elastic type.

3. The vibrating mechanism of claim 1 further characterized in that means are provided for rotating the shafts relative to their torque tubes.

4. A vibrating mechanism for a vibrating screen including:

a pair of eccentric shafts each supported on the side plates of a screen frame,

a drive means attached to one end of one of said shafts, and

means connecting the opposite ends of said shafts to rotate said shafts in unison,

said connecting means including means to advance or retard one eccentric shaft relative to the other to alter the forcing direction of the vibrating screen.

5. The vibrating mechanism of claim 4 further characterized in that said connecting means include:

a torque tube coaxially positioned over each shaft,

a gear attached to each torque tube and meshed with the gear of the other torque tube, and

a flexible coupling joining each torque tube and its respective shaft.

6. The vibrating mechanism of claim 5 further characterized in that said flexible couplings are of the elastic type.

7. The vibrating mechanism of claim 5 further characterized in that said means to advance or retard one eccentric shaft relative to the other includes means to rotate said shaft relative to its torque tube.

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