

Jan. 9, 1945.

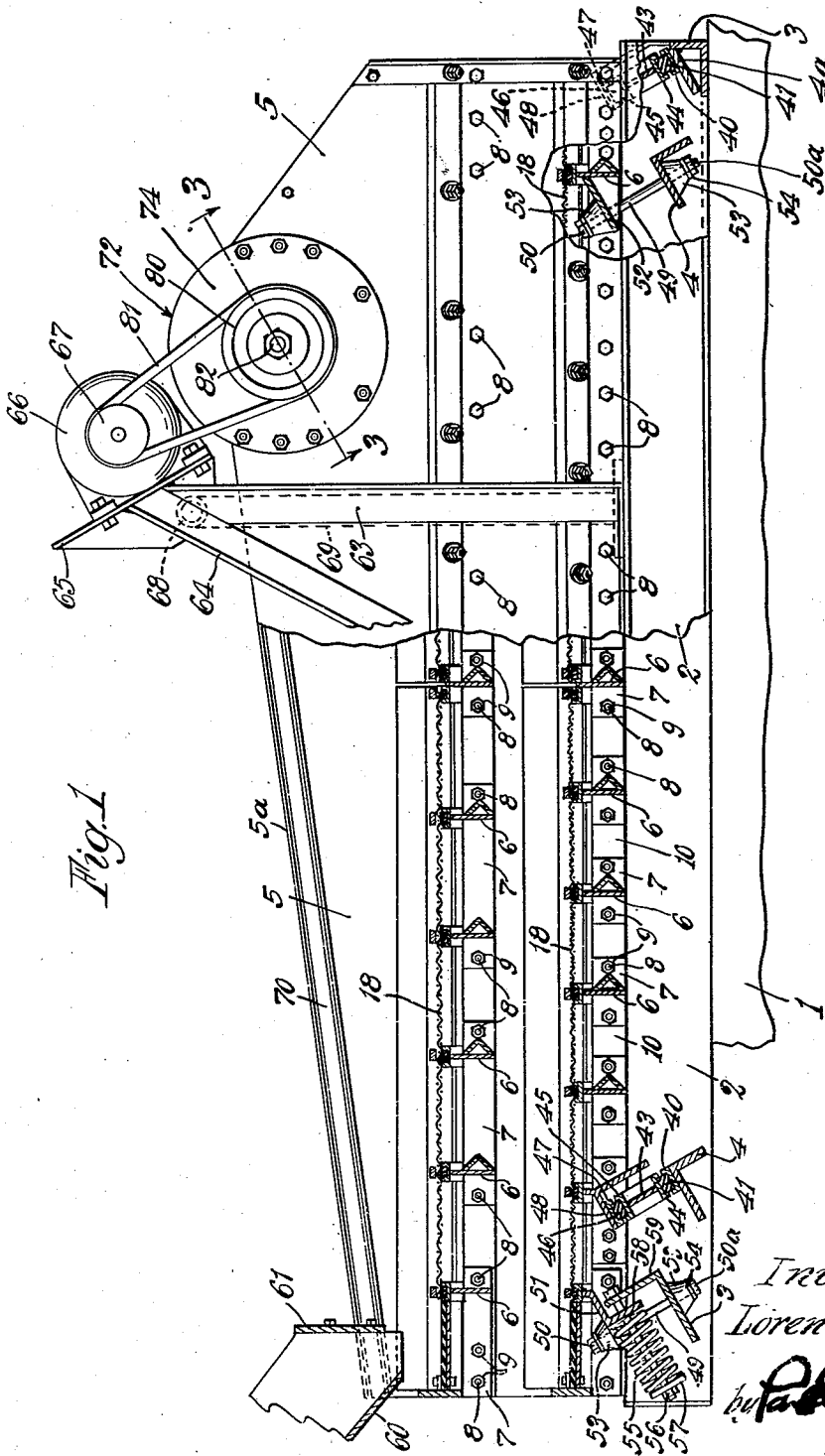
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2,367,070

POWER PLANT FOR VIBRATING SCREENS

Filed Jan. 10, 1941

4 Sheets-Sheet 1



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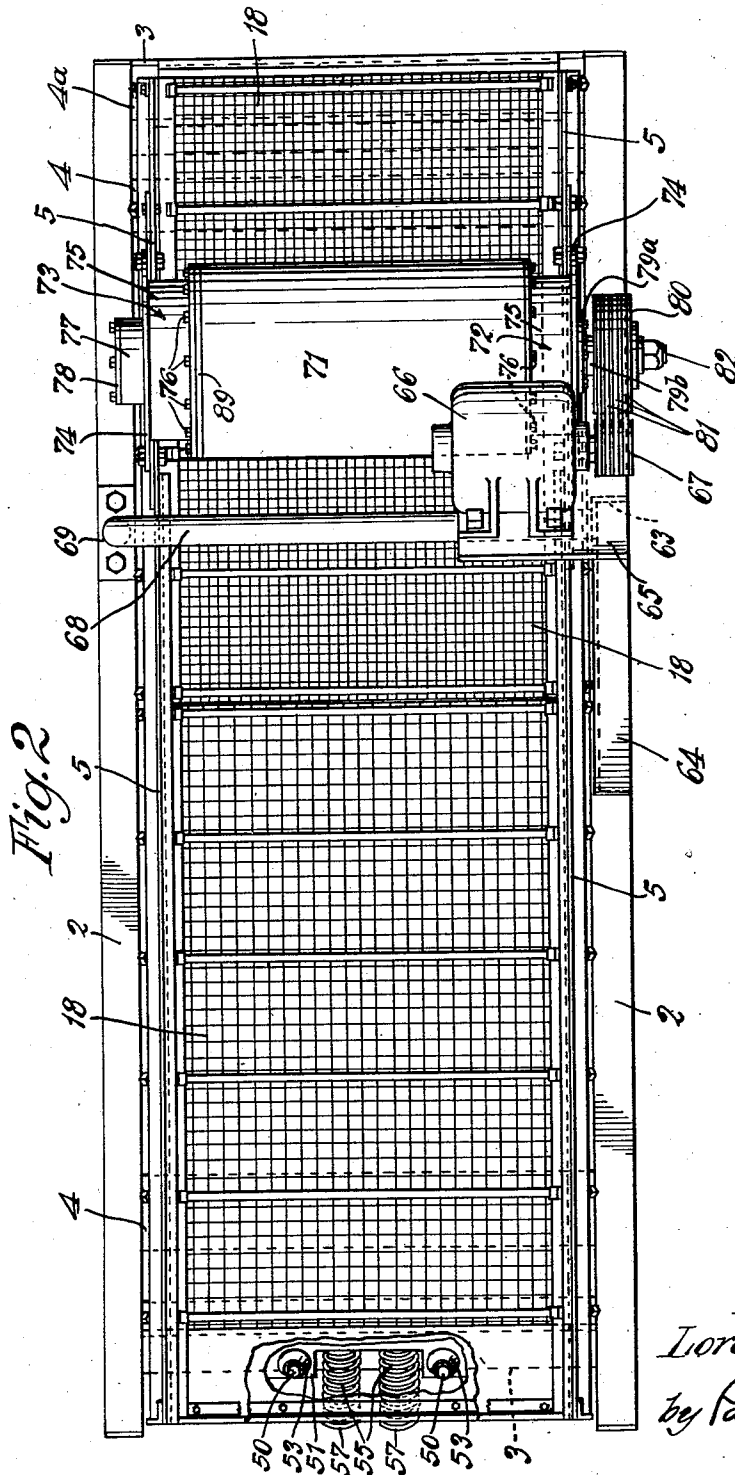
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4 Sheets-Sheet 2



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4 Sheets-Sheet 3

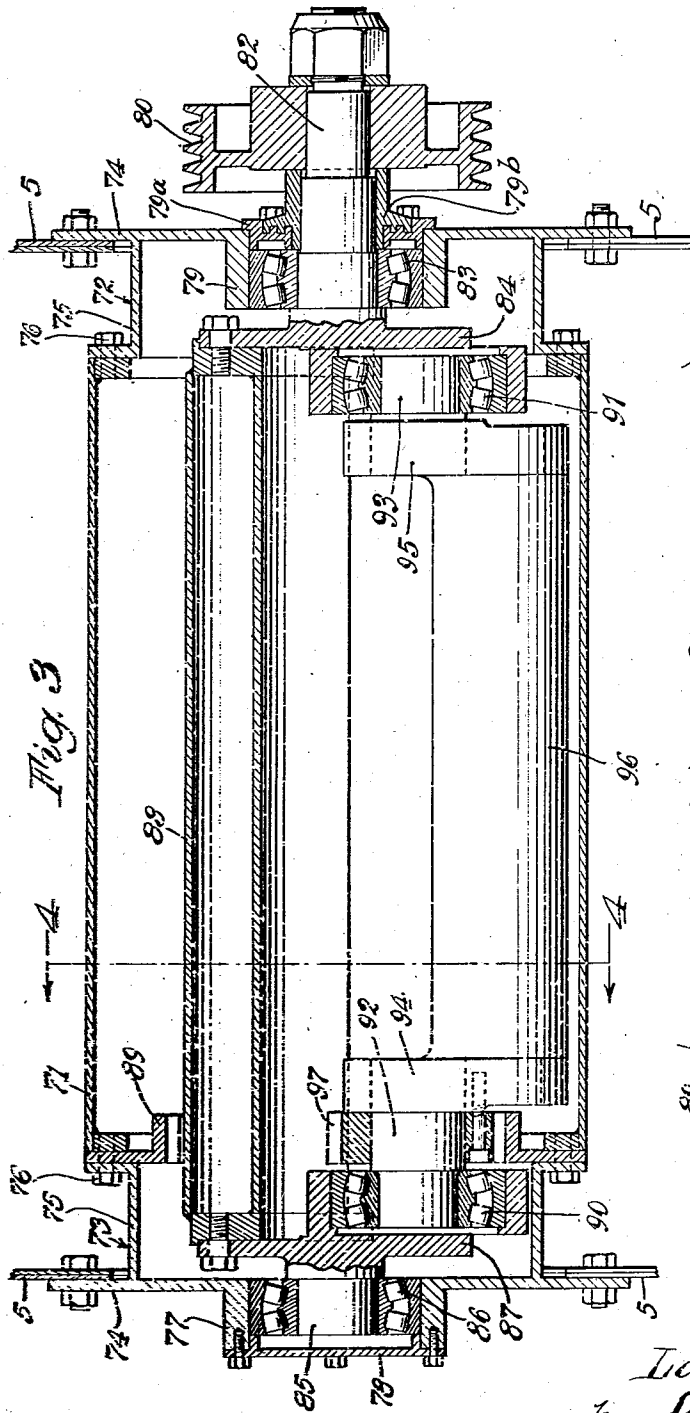


Fig. 3

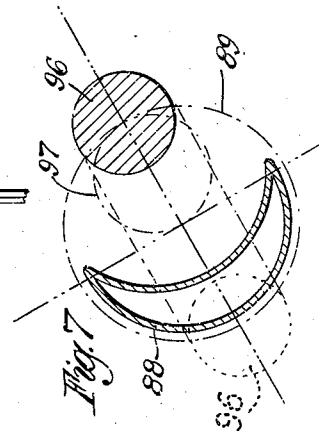


Fig. 7

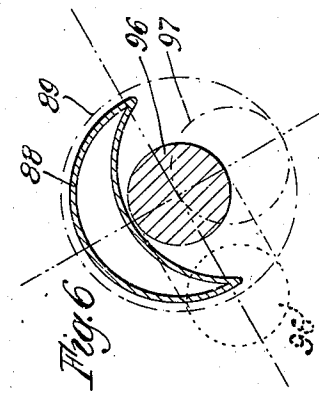


Fig. 6

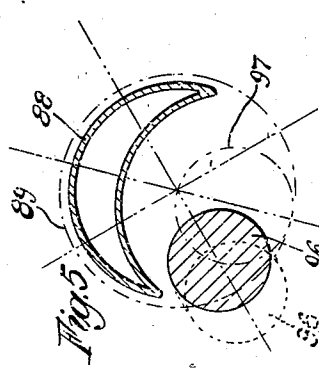


Fig. 5

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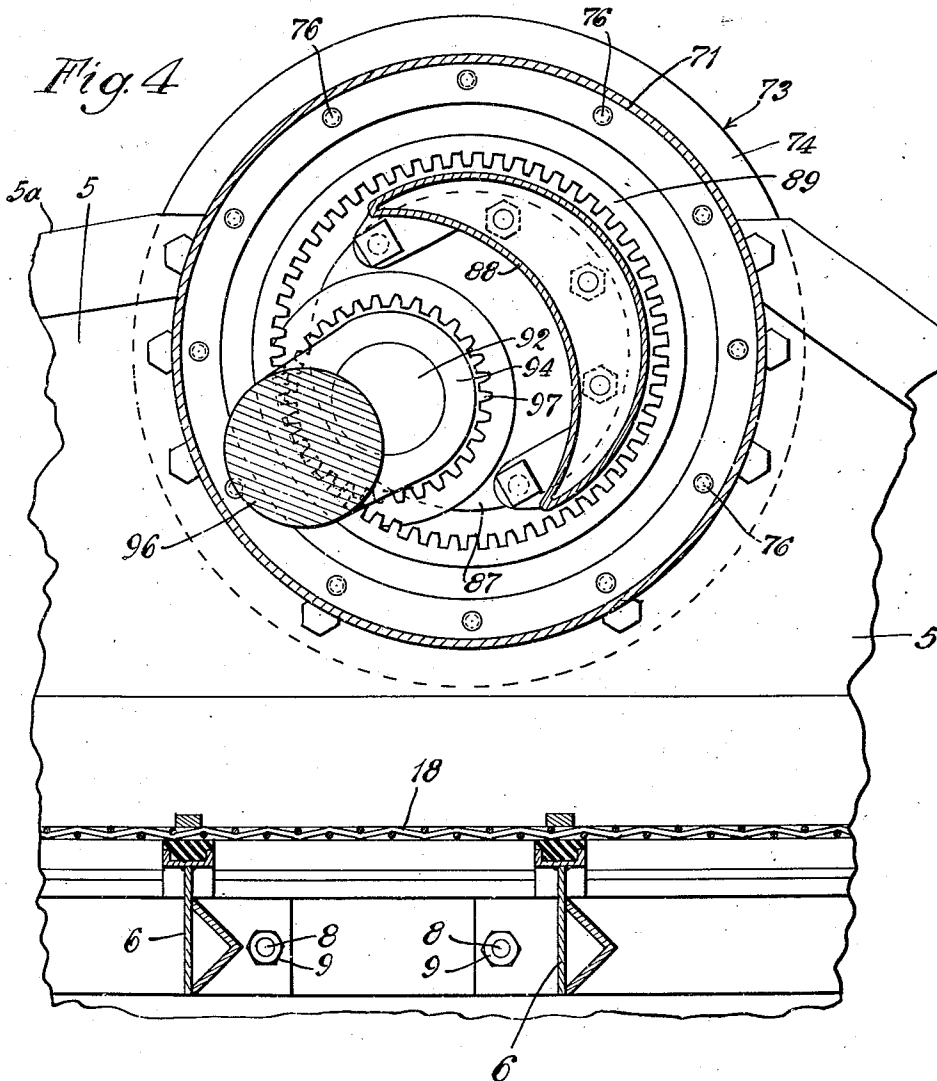
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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POWER PLANT FOR VIBRATING SCREENS

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2 Claims. (Cl. 209—367)

My invention relates to an improvement in screens and has for one purpose the provision of an improved vibrating or driving mechanism for vibrating a screen.

Another purpose is the provision of a driving or vibrating mechanism for a screen which shall have a minimum of bearings and wearing parts.

Another purpose is the provision of an improved vibrating mechanism for such screens in which the vibration is imparted in response to the rectilinear movement of a vibrated weight.

Another purpose is the provision of an improved weight and drive therefor adapted to impart to such a weight on the screen a rectilinear movement in response to a rotary movement of a driving pulley.

Another purpose is the provision of an improved vibrating means for screens in which a relatively small weight is imparted a rectilinear movement of substantial length.

Other purposes will appear from time to time in the course of the specification and claims.

I illustrate my invention more or less diagrammatically in the accompanying drawings wherein:

Fig. 1 is a side elevation;

Fig. 2 is a plan view;

Fig. 3 is a section on the line 3—3 of Fig. 1;

Fig. 4 is a section on the line 4—4 of Fig. 3; and

Figs. 5, 6 and 7 are more or less diagrammatic illustrations of the position of the weight at various points in its path.

Like parts are indicated by like symbols throughout the specification and drawings.

Referring to the drawings, 1 indicates any suitable base upon which the screen is mounted. I illustrate a base frame which may include longitudinally extending parallel channel elements 2, 2. These channel elements may be connected by any suitable transversely extending end frame members or angles 3 and intermediate transversely extending angles 4. It will be observed that the intermediate frame elements and the left end members 3, referring to Fig. 1, are tilted somewhat from the horizontal, as shown for example in Fig. 1.

Vibratably mounted upon this base frame is any suitable deck, which may include for example parallel side plates 5, 5, which may be connected by transversely extending frame members 6, which in turn may be welded to side plates 7, which side plates may be bolted or otherwise secured to the side frame members 5, as by bolts 8 and nuts 9. 10, 10 indicate transversely extend-

ing reinforcing plates interposed between the side plates 5 and the plates 7.

Referring for example to Fig. 1, the plates may be of sufficient length to carry a plurality of the transverse members 6, whereas in the lower part of the deck I illustrate shorter plates 7, each of which is shown as carrying a single transverse member 6. It will be understood, however, that this is a matter of detail and may be varied to suit conditions. Supported upon the transverse members 6 are screens 18, which may be secured in any suitable fashion to the deck structure.

In order to mount the deck for vibration upon the base, I may employ any suitable supporting link structure. I illustrate herein a supporting link structure at each end. Referring to Fig. 1, I illustrate inclined transversely extending angles 4. It is understood that there is a separate link structure at each end of the screen. The link structure proper is shown as including a bottom channel or abutment 40, mounted on one of the members 4 and formed to receive the transversely extending rubber pad 41, which may be in one or more sections, but which preferably extends transversely substantially or entirely across the width of the deck.

43 is an intermediate web or compression member which carries at its lower end the channel 44 and at its upper end the channel 45. The lower channel 44 engages the upper portion of the rubber block 41. The upper channel 45 engages the lower portion of a similar rubber block 46, the upper portion of which in turn is engaged by a channel 47, which is secured to any suitable member, such as the transversely extending deck frame member 48. Any suitable means may be employed for holding the deck down upon the base and for constraining the deck to a vibratory movement, which may be described as having a uniform radius. I illustrate for example compression bolts 49, headed at each end as at 50, 50a. The lower ends may pass, for example, through the transversely extending frame members 3, 4, on the base, whereas the upper ends pass through corresponding frame members 51, 52 on the deck.

Any suitable pads 53 of yielding material may be compressed by the washers 54 against the lower faces of the members 3, 4, and the upper faces of the members 51, 52, respectively. Any suitable compression may be put upon the said compression members. It will be understood, of course, that the apertures through which the bolts 49 pass are of sufficient width to compensate for

vibratory movement of the screen deck and to prevent a metal to metal contact.

I also provide means for normally tending to hold the screen in a predetermined neutral position, which preferably is a position in which the link structure, including the web 43, is generally perpendicular to the engaged faces of the members 4 and 4a. Such means may, for example, include a plurality of springs 55 mounted on the bolts 56, having end washers 57, the upper ends of the bolts passing through a web 58 on the member 51 and through a web 59 on the end member 3. It will be understood that the springs 55 resist the gravital tendency of the deck to tilt the members 43, and in effect push the deck against gravity into its predetermined neutral position, which is shown for example in Fig. 1.

Any suitable means for feeding material to the feed end of the screen may be employed. I illustrate for example a feed chute 60 with a feed limit plate 61. Any other suitable feeding means may be employed, and it will be understood that, if desired, the material may be fed simultaneously to the upper and lower deck, although such disposition is not shown in Fig. 1.

In order to vibrate the screen I illustrate the following structure: Mounted upon the base is an upwardly extending frame structure, which may include for example the vertical frame element 63, the inclined element 64, the motor base 65, secured to the top thereof, the motor 66, and the drive pulley 67 thereof. As shown in Fig. 2, the motor is at one side of the screen structure, and the above described support may be stabilized or held in position by the transversely extending pipe 68, the far end of which extends down to the opposite base frame element, as at 69.

As shown for example in Fig. 1, the side plates 5 have an edge 5a, which inclines upwardly toward the below described power plant. Any suitable reinforcing channel or the like may be employed, as at 70. Connecting the two side plates 5 I illustrate a housing structure, which includes a centrally located tube or tubular housing 71. Fitted upon each end thereof is an annular housing member, generally indicated as 72, 73, each of which has a flange 74, which may be bolted or otherwise secured to the side plates 5. It will be noted from Fig. 3 that the members 72, 73 include inwardly extending cylindrical portions 75, which are secured to the tubular housing by means of bolts 76. The flange or plate 74 of the member 73 carries an outwardly extending cylindrical portion 77, which may be closed for example by a cap or plate 78. The flange 74 of the member 72, which is adjacent or aligned with the motor 66, has an inwardly extending bearing sleeve 79. The open end of the sleeve is partially closed by a plate or ring 79a, which is grooved to cooperate with a dust sealing member 79b.

80 illustrates a driven pulley, which may be driven from the motor pulley 67 by any suitable belt or belts 81. The pulley 80 is secured to a rotor shaft generally indicated as 82, mounted in any suitable bearings 83 and having at its inner end a plate 84 which may be generally circular. At the opposite side of the deck is a shaft 85 in bearings 86, which also has a plate 87. The plates 84 and 87 are connected for example by the crescent shaped member 88. Mounted within or forming part of the tubular housing 71 is the internally toothed ring gear 89. This is fixed in relation to the deck and the tube 71.

Mounted on the plates 84 and 87 are bearings

90, 91, which receive aligned coaxial shafts 92, 93. These shafts are provided with offset or crank portions 94, 95, between which extends any suitable weight 96. 97 is a pinion mounted on or forming part of the shaft 92 and in mesh with the internal ring gear 89. The center of the weight 96 is preferably aligned with the pitch line of the teeth of said pinion 97. As will be clear from Fig. 4, the diameter of the pinion 97 is one-half the diameter of the ring gear 89. The result is that, in response to rotation of the pulley 80, the weight 96 oscillates along a rectilinear path through the various positions shown diagrammatically in Figs. 4, 5, 6 and 7. In other words, although the weight 96 rotates about the center of the shafts 92 and 93, this center rotates about the center of the ring gear 89, and the result is that each tooth of the gear 97 oscillates along a rectilinear path, and from this it results that the weight, which is aligned with the pitch line of the teeth, also oscillates through a rectilinear path.

The support 88 is so formed as to permit the weight to clear at all positions, and it will be understood that the support 88 and the plates 84 and 87 rotate in a counterclockwise direction, referring to the position of the parts in Figs. 4 to 7, while the gear 97 rotates in a clockwise direction about its center.

It will be realized that, whereas I have described and illustrated a practical and operative device, nevertheless many changes may be made in the size, shape, number and disposition of parts without departing from the spirit of my invention. I therefore wish my description and drawings to be taken as in a broad sense illustrative or diagrammatic, rather than as limiting me to my precise showing.

The use and operation of my invention are as follows:

I illustrate a singularly simple vibrating means for vibratory screens. The deck may be mounted in any suitable supports, and the above described flexible supports are merely representative and not restrictive, as the deck may be mounted on springs, rods, or other supporting means.

The linear movement of the weight is obtained by having the center of the weight 96 coincide with the pitch line of the gear 97. Thus a relatively small weight can be given rectilinear movement of substantial amplitude, this movement resulting from the rotation of the gear 97 in relation to the fixed internal toothed gear 89. The weight 96 is so mounted that it is free to rotate and clears the support 88.

When the rotor is rotated in one direction the weight through the gear and pinion connection above described rotates in the opposite direction, the parts being so proportioned that the center of the weight, instead of rotating, moves rectilinearly while the weight itself rotates. The weight moves in one direction, and the reaction of the movement of the weight causes the deck to move in the opposite direction along the same general path. The deck responds to the reaction pressure of the movement of the weight along its linear path, and the deck also takes up a linear vibration along the same path but in an opposite direction, and with a much smaller amplitude of movement than the weight. The parts may be so proportioned as to give, within a reasonable range, any desired amplitude of vibration of the deck, by increasing or decreasing the mass of the weight. It will be understood that any suitable means may be employed for

changing the mass of the weight. Whereas I have illustrated a unitary weight structure, it will be understood, of course, that the weight may be made removable, so that other weights of greater or less mass can be substituted therefor.

I claim:

1. In combination, a screen member, having side frame elements, means for supporting it and for constraining it to generally linear vibratory movement and means for imparting to it a linear vibration parallel with the linear movement to which it is constrained, including an internal circumferential gear fixed on said screen member, a rotor and means for rotating it about an axis concentric with said internal gear, said rotor including end elements located adjacent each of the opposite side frame elements, a fixed connection between said end elements, a sub rotor rotatably mounted on said end elements for rotation about an axis parallel with but eccentric to the axis of rotation of the rotor, said sub rotor having stub shafts at each end, in bearing relationship each with one of the end members of the first mentioned rotor, a planetary gear associated with one of said stub shafts and in mesh with the internal gear, said stub shafts being connected by an offset weight member, the center of mass of which is eccentric to the center of rotation of the stub shafts, the connection between the end members of the main rotor being

located out of the path of movement of said weight.

2. In combination, a screen deck having opposite side frame elements, a base upon which said screen deck is vibratably mounted and means for vibrating said screen deck including a rotor and means for rotating it, said rotor having a stub shaft at each end, and bearing means for each of said stub shafts mounted on one of said side frame members, end elements associated with each stub shaft, a fixed eccentric connection extending between said end elements, a sub-rotor including a stub shaft in bearing relationship with each of said end members, said stub shafts being connected by a weight having a substantially longitudinal extension perpendicular to the direction of movement of the material along the screen, the center of said weight being eccentric to the axis of said sub-rotor, the axis of said sub-rotor being parallel with but eccentric to the axis of the main rotor, a circumferential interior ring gear, fixed in relation to the screen deck, and concentric with the axis of rotation of the main rotor, surrounding said main and sub-rotor, a planetary gear fixed on said sub-rotor and concentric therewith, in mesh with said internal gear, the fixed eccentric connection between the end members of the main rotor being located out of the path of movement of said weight.

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