

May 11, 1937.

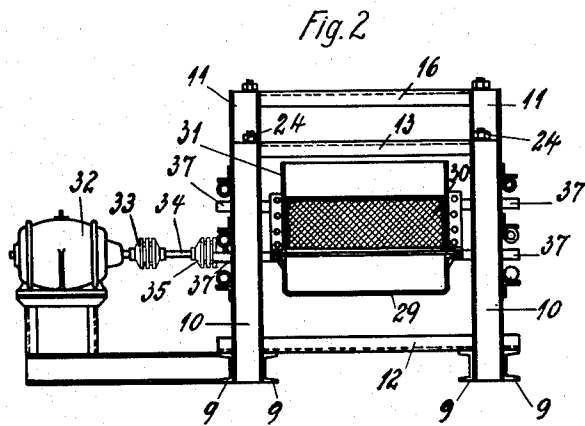
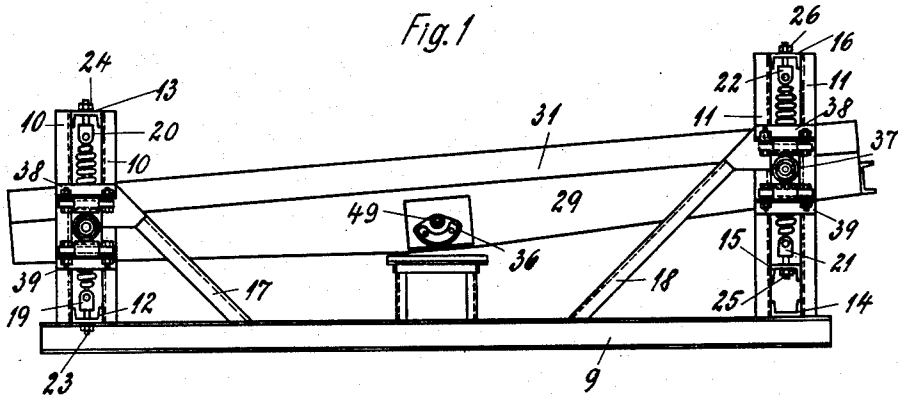
H. HEYMANN

2,079,653

VIBRATING MECHANISM

Filed Nov. 18, 1932

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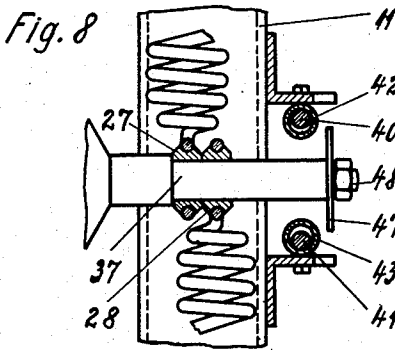
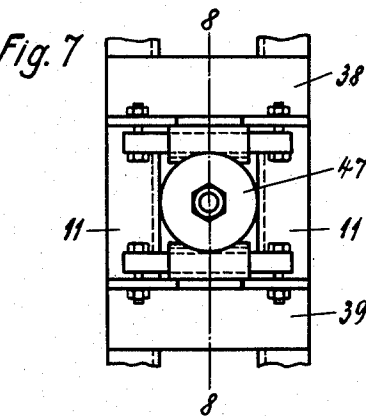
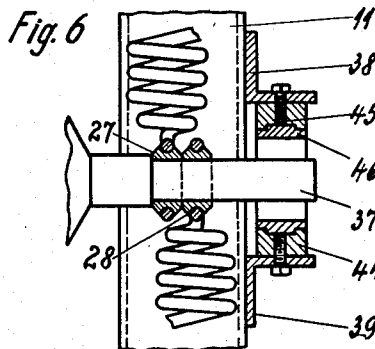
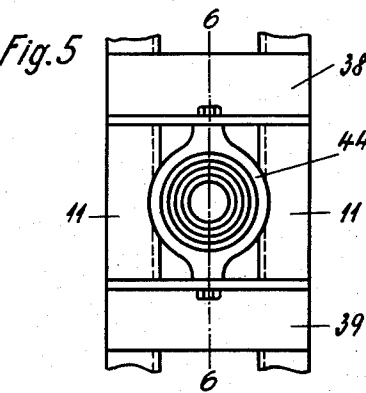
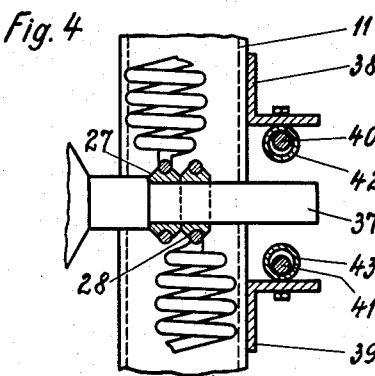
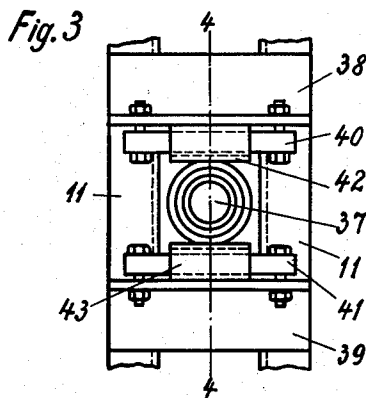
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2 Sheets-Sheet 2



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VIBRATING MECHANISM

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5 Claims. (Cl. 74—26)

The invention relates to vibrating mechanisms such as vibrating screens, vibrating conveyors and similar machines, and more particularly to such vibrating mechanisms which are suspended by coil or spiral springs.

Such vibrating mechanisms, which consist mainly of springs and a mass, have a critical frequency. If excited by periodic powers, the frequency of which corresponds with the critical one, the amplitude of the oscillations grows larger than if excited by other frequencies. Very often it might occur that the amplitude of oscillations will grow so large as to cause the entire plant or at least some parts of same to be damaged. For constructional reasons the normal driving frequency in such vibrating screens is mostly higher than the critical one; consequently, on starting and slowing down of the machine the critical frequency is passed through.

An object of the invention is to provide means for limiting amplitudes of oscillation in such a manner as to overcome dangerous or injurious effects.

Another object of the invention is to arrange these means so as to prevent the oscillating mechanism from being affected by them during the normal driving frequency. Said means only act while passing through the critical frequency.

Further objects of the invention are to provide guidances in a plane parallel to that of oscillations with a view to limit oscillations or motions arising perpendicularly to the normal oscillations.

Other objects and advantages will appear in the following description in which reference is made to the accompanying drawings illustrating preferred embodiments of the invention in connection with the screening mechanism and wherein similar reference numerals designate similar parts throughout the several views.

In the drawings:

Fig. 1 is a side view of a screening device on which are mounted the means according to the invention.

Fig. 2 is a front elevation of the same device.

Fig. 3 is an elevational view of the invention to large scale.

Fig. 4 is a vertical section substantially on the line 4—4 of Fig. 3, with parts shown in elevation.

Fig. 5 is an elevational view of another species of the invention.

Fig. 6 is a vertical section substantially on the line 6—6 of Fig. 5, with parts shown in elevation.

Fig. 7 is an elevational view of a further species of the invention.

Fig. 8 is a vertical section substantially on the line 8—8 of Fig. 7, with parts shown in elevation.

The supporting frame consists of the horizontal beams 9 and the uprights 10 and 11. The uprights 10 are connected one with the other by section irons 12 and 13 and the uprights 11 by section irons 14, 15 and 16. They are braced by lateral beams 17 and 18. The section irons 12, 13, 15 and 16 are provided on each side with suspending contrivances 19, 20, 21 and 22, respectively adjustable by means of screws and nuts 23, 24 and 25, 26, respectively. Attached at one end of each suspending contrivance are springs fixed at the other end to rings 27 and 28 lying two by two on common shafts 37, which are screwed, welded or riveted on a screen box. This screen box consists of a bottom part 29, a frame with screening cloth 30 and a wall 31.

The screen box is driven by a motor 32, the rotation of which is transmitted by means of a coupling device 33, a short shaft 34, another coupling device 35 to a sheave 36 rotatably mounted on each side of the screen box, and fitted with a mass eccentrically placed on same. The entire screen box, which is resiliently mounted on the several springs, is caused to oscillate by the centrifugal forces arising by the rotation of said mass.

On starting, or in other words, if frequency is increased, there will, while approaching the critical frequency as described beforehand, be produced an extraordinarily large amplitude which might cause the springs or parts of the screen box to be injured. The latter, however, will oscillate under normal amplitudes again, if the critical frequency is far enough passed through, or in other words, if the driving frequency is to a certain extent higher than the critical one.

The same will be the case when the machine is slowing down, for the rotary masses do not stop at once. They rather slow down with decreasing frequency due to inertia; consequently, the critical speed is again passed through.

To overcome the aforesaid drawbacks, the oscillating device is provided with stoppers striking against other stoppers connected with a rigid support or another stationary member so as to limit undesirably large amplitudes. It is preferable to have some of these parts made resilient so as to prevent the striking parts from making too hard impacts on account of the amplitude in-

creasing, and thus to cause the motions of the oscillating parts resiliently to be taken up, thereby damping same.

Angle irons 38 and 39 are mounted on the up-
rights 10 and 11. Rods 40 and 41 are bolted on
these angle irons. A short piece of pipe, preferably made of elastic material, such as rubber, surrounds each of said rods. By bolting these rods to the angle irons, the elastic pipe is fastened, too. Two of these elastic pieces are provided close by each of the shafts 37, which serve as stoppers in case of excessive vibration. The distance of the two elastic pieces from the shaft 37 connected with the oscillating part is somewhat larger than the normal oscillation amplitude of the oscillating mechanism, i. e. half the oscillation width. As these elastic pieces of pipe 42 and 43 are placed on both sides of the shafts, they also limit the oscillation of same in these directions, and this in the event of the amplitude growing too large due to passing through the critical frequency.

Another species of the invention is shown in Figs. 5 and 6. To the angle irons 38 and 39, a ring 44 is screwed by means of screws 45 or fixed in any other way. This ring is provided with an elastic ring piece 46 as for instance a rubber lining. In this case, too, the distance from each inner part of the ring to the shaft is somewhat larger than the normal oscillation amplitude of the vibrating screen.

Another arrangement according to the invention may be seen on Figs. 7 and 8. Herein elastic pieces 42 and 43 are arranged in the same manner as shown in Figs. 3 and 4, in order to limit the oscillations perpendicular to the normal oscillation plane. In this case a disc 47 is attached to the shaft 37 by means of nut 48. On looking at Fig. 8, such oscillations would appear as motions going from right to left and vice versa. When moving the shaft 37 to the left, the disc 47 strikes against one of the resilient parts 42 or 43, thereby limiting the motions from right to left. A striking disc fastened to the opposite screen wall, and constructed in exactly the same manner, limits the oscillations in the opposite direction; on looking at Fig. 8, these oscillations seem going from left to right. From this arrangement of the discs and the elastic pieces 40 it results that the oscillating mechanism is restricted to oscillate in or nearly in one plane.

Having described my invention, I claim:

1. In a vibrating mechanism composed of a stationary support and a vibrating part suspended in springs and excited to periodic oscillations by rotating unbalanced weights, a plurality of stops rigidly connected with said vibrating part, each arranged near the suspension springs, resilient stops rigidly connected with the stationary support, and arranged two by two so as to provide between each pair of them and each of the first-named stops a space somewhat greater than the normal oscillation amplitude of the vibrating part.

2. In a vibrating mechanism composed of a stationary support and a vibrating part suspended in springs and excited to periodic oscillations by rotating unbalanced weights, a plurality of stops rigidly connected with said vibrating part, each arranged near the suspension springs, resilient stops rigidly connected with the stationary support, and arranged two by two so as to provide between each pair of them and each of the first-named stops a space somewhat greater than the normal oscillation amplitude of the vibrating part, and guiding means on said vibrating part extending in a plane parallel to the oscillating plane of the vibrating part, but spaced a short distance from the stops connected with the stationary support to limit the oscillations perpendicular to the oscillating plane.

3. In a vibrating mechanism comprising a stationary support, a vibrating part yieldingly suspended thereon for free oscillation in all directions in one plane, and unbalanced driving means positively connected with said vibrating part for oscillating the same; cooperating stop devices secured respectively to said stationary support and to said vibrating part spaced sufficiently from each other to allow unhindered normal oscillation of said vibrating part, but close enough to each other to come in contact when the oscillations of said vibrating part approach an excessive amplitude.

4. A vibrating mechanism as described in claim 3, wherein said stop devices embody resilient means to damp oscillations of said vibrating means beyond a certain limit of amplitude.

5. A vibrating mechanism as described in claim 3, wherein said stop devices embody guide means limiting lateral motion of said vibrating part.

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