Sept. 29, 1953 G. LINKE 2,653,702

SWINGING DEVICE FOR VIBRATORY CONVEYERS AND THE LIKE

Filed June 15, 1950

Fig. 1

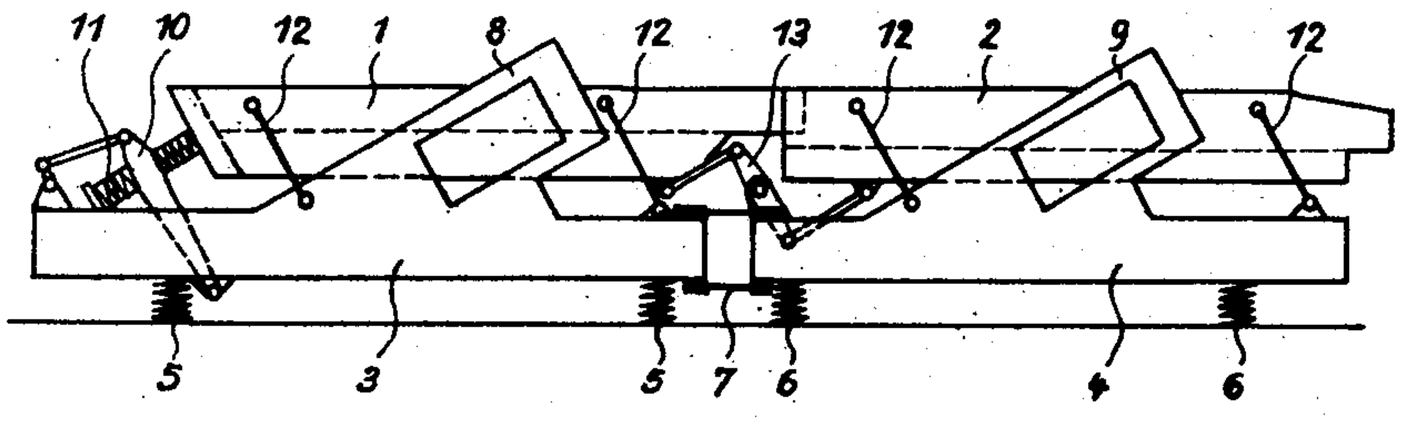
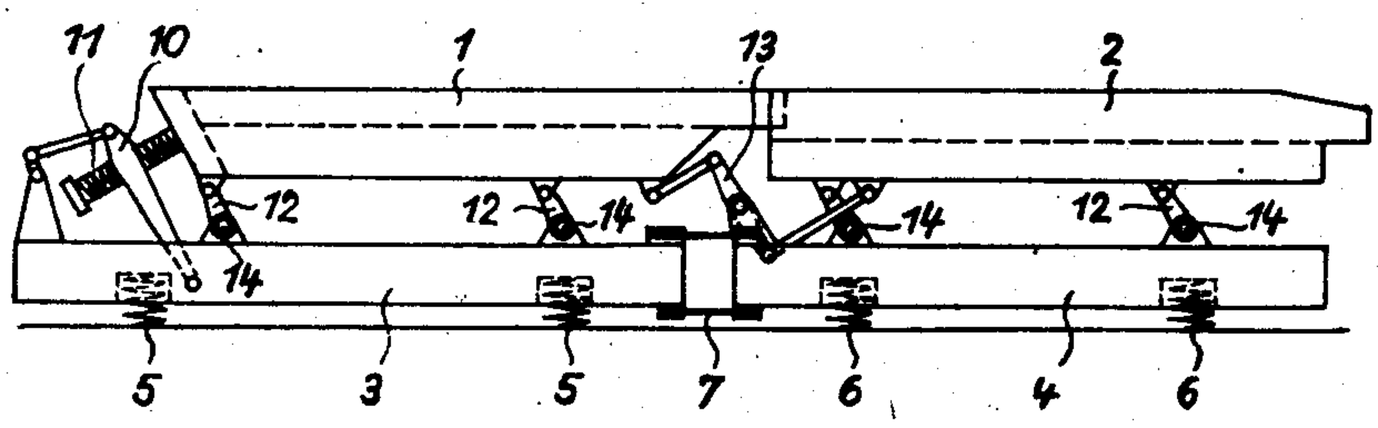


Fig. 2



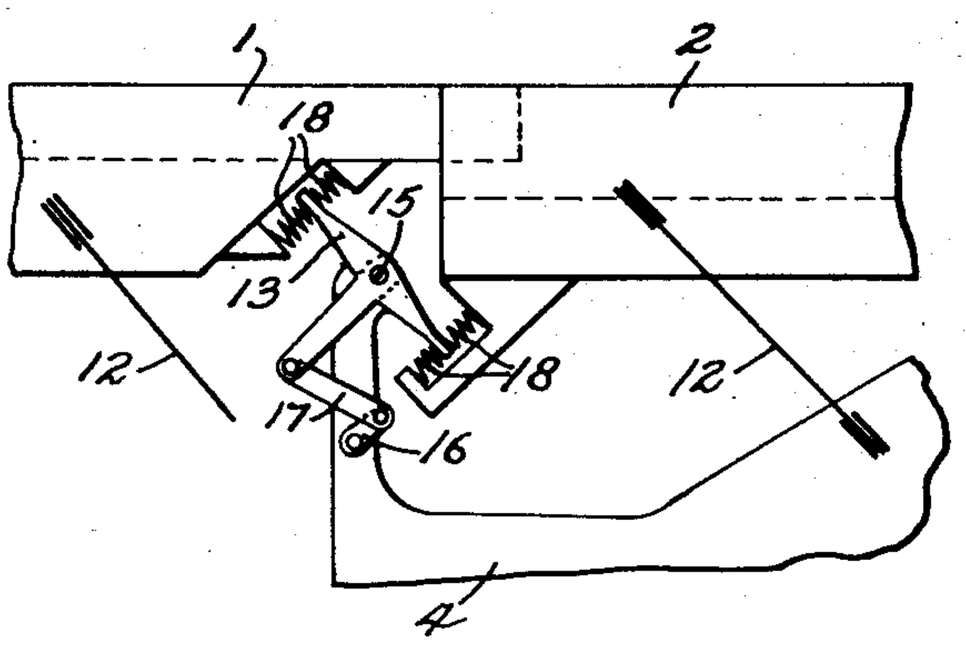


Fig. 3

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SWINGING DEVICE FOR VIBRATORY CONVEYERS AND THE LIKE

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3 Claims. (Cl. 198—220)

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The invention relates to swinging devices, such as swing screens or conveyor troughs, in which a mass oscillates in a direction inclined to the vertical and is arranged on a swingingly mounted supporting frame.

Referring to swinging devices of such kind, it is an object of the invention to balance the horizontal components as well as the vertical components of the inertial forces of the swinging masses.

To this end, and in accordance with the invention, the swinging device is subdivided into a plurality of oscillatory systems, and each two of these systems are coupled with each other so that the horizontal components of the inertial forces due to the masses swinging in an inclined direction are mutually compensated, and the vertical components of these forces are compensated by the mass forces of the swingingly mounted supporting frame.

These and other objects and features of the invention will be apparent from the following description of the embodiments exemplified by the drawing in which Figs. 1 and 2 show respective schematically side views of different swing screens according to the invention and Fig. 3 is a partial side view of another embodiment.

The screen shown in Fig. 1 has its screening box subdivided into two portions 1 and 2 which oscillate mutually inversely and in respective directions inclined toward the vertical. Correspondingly, the supporting frame of the screen is subdivided into two portions 3 and 4 which are arranged on respective springs 5 and 6 and carry the screen box portions 1 and 2 on oscillating levers 12. The two frame halves 3 and 4 are interconnected by coupling members 7 which transmit the horizontal forces occurring when one of the screen box portions moves obliquely upward while the other moves obliquely downward. Attached to the supporting frame halves 3 and 4 are respective frame structures 8 and 9 to accommodate spring means (not illustrated) between the supporting frame portions 3, 4 and the respective box portions 1, 2. The screen drive is disposed in front of the first screen box portion 1 and comprises a crank-driven swinging lever 10 pivoted on frame portion 3 and connected by drive springs 11 with the box portion 1. A swinging lever 13 disposed between the box portions and linked to both of them secures a mutual phase displacement of 180° between the two box portions.

The swinging device shown in Fig. 2 is largely

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similar to that of Fig. 1, and the elements denoted in Fig. 2 by numerals 1 to 13 correspond substantially to the similarly denoted respective elements of the above-described device of Fig. 1. According to Fig. 2, however, the elastic connection between the screen box portions 1 and 2 and the respective supporting frame portions 3, 4 is effected by means of torsional rod springs 14 disposed on the pivot axes of the swing links 12 carrying the box structures.

The subdivision of screening device and supporting frame into individual oscillatory systems, each comprising a screen box portion and an appertaining supporting frame portion, results in permitting the respective horizontal mass forces of the opposingly swinging screen box portions 1, 2 to compensate each other within the supporting frame structure whose two half portions 3 and 4 are interconnected by the coupling members to secure such a compensation. Since the frame portions 3 and 4, for compensating the vertical components of the mass forces of the swinging box portions 1 and 2, oscillate vertically and with a mutual phase displacement of 180°, the coupling members 7 must permit such mutually inverse oscillations. The coupling members consist appropriately of laminated springs or packs of such springs. A compensation of all forces and moments is obtained if the magnitude of the masses, the location of their centers of gravity, and the location of the coupling members are so chosen that within each oscillatory system the mass force of the screen box portion, its horizontal component through the coupling member, and its vertical component intersect in one point and form together a closed force vector diagram.

While the screen box portion 1 swings on its slanted upward stroke and the box portion 2 moves obliquely downward, the oscillatory system of box portion 1 and frame portion 3 moves vertically downward while the system of box portion 2 and frame portion 4 swings upward thus compensating the vertical mass force components. The amplitude of these vertical movements, in which the masses of screen box and supporting frame participate, is small. Generally, the masses of the supporting frame are made so large that the amplitude of these vertical movements is not larger than 2 mm. In this manner, and with a sufficiently soft spring characteristic of the supporting spring, a good oscillatory isolation relative to the foundation is secured.

In swinging devices according to the inven-

tion, it is readily possible to increase the number of oscillatory systems from two to four, six, etc. However, for obtaining a compensation of the horizontal forces, such an increase must always be in pairs of systems with inversely swinging masses. With increasing demands in output of conveying power, the driving or exciting forces in the drive springs will increase accordingly. The operating frequency of the drive may exactly or nearly coincide with the natural frequency of the oscillatory systems.

Drives of various designs and other than shown in Figs. 1 and 2 are applicable. For instance, as shown in Fig. 3 the device may be driven by means of the swing link **13** intermediate the two screen box portions **1** and **2**. To this end, the swing link **13** is reciprocated by a crank mechanism similar to the one shown for lever **10**. The driving crank **16** is revolvably mounted on the frame portion **4** and is connected to swing link **13** by a rod **17**. Preferably, the ends of such a driving swing link **13** are connected with the respective screen box portions by driving springs **18**.

The compensation of horizontal and vertical mass force components in swinging devices according to the invention permits a simpler and less costly design and manufacture of such swinging devices than otherwise possible. The invention is not limited to vibratory screens but is also applicable, for instance, to oscillatory conveyor troughs and other swinging devices.

What I claim is:

1. A swinging device for vibratory conveyors and the like, comprising a stationary support, an oscillatory frame yieldingly connected with said support, an oscillatory mass having an oscillating direction inclined to the vertical and being oscillatorily mounted on said frame independently of said support, said mass and said frame being subdivided into respective pairs of oscillatory portions, the two portions of said mass pair being intercoupled to oscillate inversely to each other, and coupling members interconnecting the two portions of said frame pair, said coupling members being rigid in the horizontal direction and yieldable in the vertical direction.

2. A swinging device for vibratory conveyors and the like, comprising a stationary support, an oscillatory frame yieldingly connected with said support, an oscillatory mass having an oscillating direction inclined to the vertical and being oscillatorily mounted on said frame independently of said support, said mass and said frame being subdivided into respective pairs of oscillatory portions, a swing link pivotally mounted on one of said frame portions, said two mass portions being pivotally joined with said swing link to oscillate in inverse relation to each other, and coupling members interconnecting the two portions of said frame pair, said coupling members being rigid in the horizontal direction and yieldable in the vertical direction.

3. A swinging device for vibratory conveyors and the like, comprising a stationary support, an oscillatory frame yieldingly connected with said support, an oscillatory mass having an oscillating direction inclined to the vertical and being oscillatorily mounted on said frame independently of said support, said mass and said frame being subdivided into respective pairs of oscillatory portions, a swing link pivotally mounted on one of said frame portions, spring means joining said swing link with each of said two mass portions for oscillating said mass portions in mutually inverse relation, and coupling members interconnecting the two portions of said frame pair, said coupling members being rigid in the horizontal direction and yieldable in the vertical direction.

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