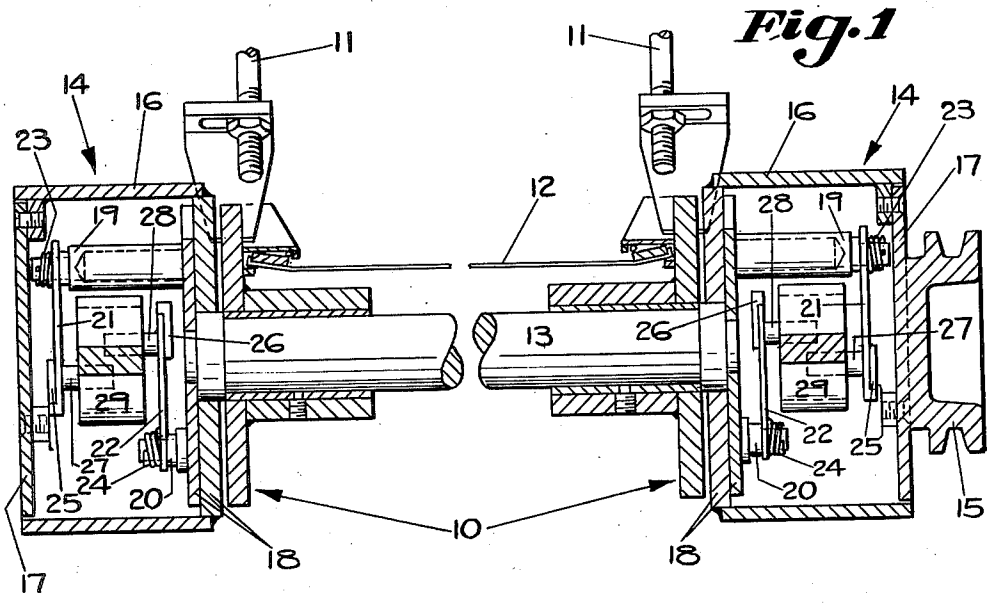
Sept. 6, 1949. O. R. STRAWN 2,481,174

VARIABLE UNBALANCED WEIGHT MECHANISM FOR MECHANICAL VIBRATING SCREENS AND THE LIKE

Filed Jan. 3, 1949

Fig. 1



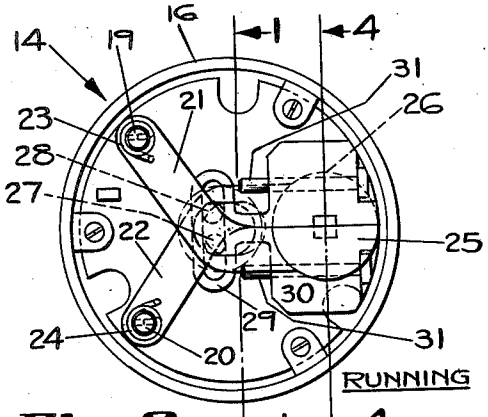


Fig. 2

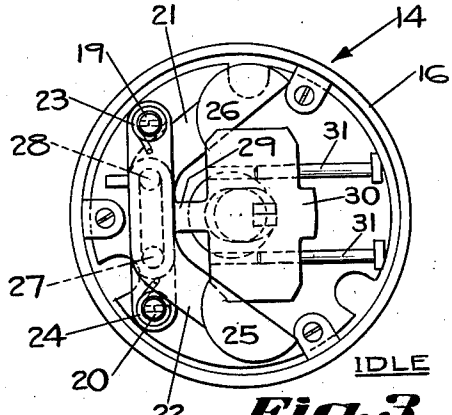


Fig. 3

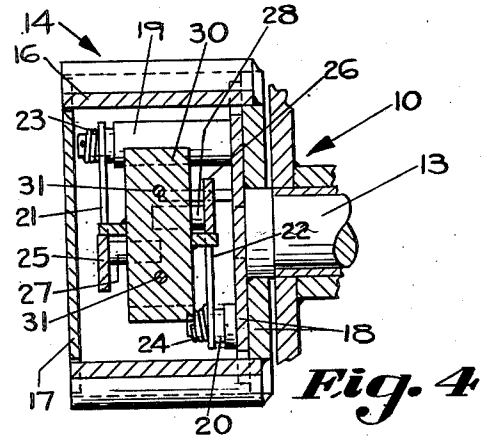


Fig. 4

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VARIABLE UNBALANCED WEIGHT MECHANISM FOR MECHANICAL VIBRATING SCREENS AND THE LIKE

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2 Claims. (Cl. 74—87)

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This invention relates to an unbalanced weight mechanism for vibratory screens or other vibrating apparatus, and an object of the invention is to provide an improved and efficient mechanism of the above mentioned type, in which the effective weight as well as the effective lever arm of the unbalanced weight is adjusted automatically in response to speed variations to reduce undesirable violent vibrations or jouncing during starting and stopping of the vibratory mechanism.

Other objects of the invention will appear hereinafter, the novel features and combinations being set forth in the appended claims.

In the accompanying drawings,

Fig. 1 is a sectional view through a screen incorporating the features of my invention, the sectional view of the unbalanced weight mechanism being taken on the line 1—1 of Fig. 2, looking in the direction of the arrows;

Fig. 2 is an end view of one of the unbalanced weight mechanisms, the enclosing cover for the housing thereof being removed, with the parts shown in the running position;

Fig. 3 is a view similar to Fig. 1, with the parts shown in the idle position; and

Fig. 4 is a sectional view taken on the line 4—4 of Fig 2, looking in the direction of the arrows.

In the embodiment of my invention, as illustrated particularly in Fig. 1 of the drawings, there is a screen deck 10 which is preferably mounted on four flexible hangers, two of which are seen at 11, 11. The deck 10 is provided with a screen cloth 12. Extending transversely of the deck 10 and on a horizontal axis is a rotating shaft 13 carried in appropriate bearings on said deck 10. At each end of the shaft 13 there is an unbalanced weight mechanism 14, the two mechanisms 14 being of substantially the same construction, except that the one on the right, as viewed in Fig. 1, is provided with a drive pulley 15 by which the two interconnected unbalanced weight mechanisms 14 are driven.

Each of the mechanisms 14 includes a generally cylindrical casing 16 having a removable cover plate 17, one of which plates carries the pulley 15. The casing 16 includes an integral upright inner wall or base 18 which is rigidly attached to the shaft 13. Extending outwardly from the wall 18 is a pair of pivot pins 19 and 20, each of which is rigidly attached at its bottom to said wall or base 18. The axes of the pivot pins 19 and 20 are parallel to each other and to the axis of the shaft 13 and in one position of adjustment of the parts, as illustrated for example in Figs. 2 and 3 of the drawings, the pins 19 and 20 are equidistant from a plane passing through the axis of shaft 13. At their outer ends the pivot pins 19 and 20 carry pivoted arms 21 and 22, respectively.

Interconnecting each of the pivot pins 19 and 20

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with its associated arms 21 and 22 is a helical spring, which springs urge the two arms 21 and 22 in reverse directions, urging the arm 21 in a clockwise direction and the arm 22 in a counterclockwise direction, as viewed in Fig. 2 of the drawings, or, stated another way, urging the arms 21 and 22 to their idle positions as illustrated in Fig. 3 of the drawings. The spring interconnecting pin 19 and arm 21 is designated 23, and the spring interconnecting pin 20 and arm 22 is designated 24.

At their free ends the arms 21 and 22 carry weights or masses 25 and 26, respectively. Intermediate their ends the arms 21 and 22 carry oppositely extending pins 27 and 28, respectively, which overlap each other and, which is of more significance, they are received in a loop type linkage 29 which is connected to a weight or mass 30 mounted for rectilinear reciprocatory motion on a pair of spaced pins 31 rigidly attached to the interior cylindrical surface of casing 16. The loop type linkage or bracket 29 provides for swinging movement of the arms 21 and 22 about the pins 19 and 20, respectively, while interconnecting said arms and their associated weights 25 and 26 with the rectilinearly movable weight 30.

The above mentioned plane which equally separates the pivot pins 19 and 20 not only passes through the axis of shaft 13 but is parallel with the rectilinear axis of movement of the weight or mass 30. In fact, the center of gravity of said weight 30 is preferably always in this plane.

It is, of course, evident that when the unbalanced weight mechanisms 14 rotate, every part thereof which has weight is a factor in determining the overall or total effective unbalanced weight. Furthermore, the distance between the center of gravity of each total unbalanced weight and the spin axis of the mechanism determines the amount of energy available to vibrate the deck 10.

Each of the similar unbalanced weight mechanisms 14 is so constructed that the effective weight or mass of the resultant unbalanced weight, as well as the distance of the center of gravity thereof from the spin axis, vary as the parts move from the idle position to the running position, and vice versa. This variation in both the effective mass and the effective lever arm through which it works is employed to prevent jouncing or severe uncontrolled vibration of the unit during starting and stopping which is a known characteristic of fixed mass and fixed lever arm unbalanced weight mechanisms.

When the parts are in the idle position, as illustrated in Fig. 3, it is evident that the unbalanced weight provided by the arms 21 and 22 and the pins 19 and 20 is to the left of a vertical plane which passes through the geometrical axis of the shaft 13. On the other hand, the center of gravity

of the weight 30 is to the right of this vertical plane. The centers of gravity of the weights 25 and 26, considered alone, are very near this plane and may be either to the right or to the left thereof. However, the resultant of all the weights of each unbalanced weight mechanism 14, when it is idle, is that it is slightly eccentric to the geometrical axis of the shaft 13 in the direction in which the rectilinearly movable weight 30 moves as it is moved by centrifugal force upon rotation of the shaft 13.

When the unit is first started the shaft 13 will rotate around its geometrical axis and there will be no significant vibration of the deck 16. The above mentioned effective overall weight of the various parts of each mechanism 14 is sufficient to create a force, in response to said rotation, which will urge the mass 30 rectilinearly outwardly from said geometrical axis. It is particularly significant, however, that during the starting of the unit and likewise during the stopping the distance of this mass from the axis of rotation, be it either the normal spin axis or the geometrical axis of the shaft 13, the distance between which is not of great significance insofar as the particular structure here claimed is concerned, is relatively small and the masses provided by the arms 21 and 22 are on the reverse side of a plane through the axis of rotation, either spin axis or geometric axis of shaft 13, tending to reduce its effective weight or mass.

After the unit has come up to speed the parts will be in the position illustrated in Fig. 2, in which case the distance of the weight 30 from the spin axis will be a maximum, and the effective distance between the combined weights 25 and 26 will be a maximum with respect to the spin axis. Since these weights 25 and 26 are on opposite sides of the geometric axis of shaft 13 as well as its spin axis, they will, of course, tend substantially to counterbalance each other when in their idle positions, while in their running positions and intermediate positions they will, of course, tend to increase the effective weight of the total unbalanced mass.

Obviously those skilled in the art may make various changes in the details and arrangement of parts without departing from the spirit and scope of the invention as defined by the claims hereto appended, and applicant therefore wishes not to be restricted to the precise construction herein disclosed.

Having thus described and shown an embodiment of the invention, what it is desired to secure by Letters Patent of the United States is:

1. Vibratory unbalanced weight mechanism including an unbalanced weight assembly, means mounting said assembly for rotary movement, said unbalanced weight assembly including a first weight, means mounting said first weight for rectilinear movement of its center of gravity toward and from an axis of rotation of said mechanism, a pair of pivoted arms, means pivotally mounting said arms for opposite swinging movement on spaced axes which are parallel with said axis of rotation and substantially equally spaced from a plane passing through said axis of rotation and parallel with the axis of rectilinear movement of said first weight, weights on the free ends of said arms, spring means urging the free ends of said arms and their attached weights away from each other whereby their combined center of gravity moves rectilinearly parallel with the movement of the center of gravity of said first weight and in a direction to counteract the unbalancing weight of said first weight, and a linkage between said first weight and said pivoted arms which moves said first weight to move the center of gravity thereof toward said axis of rotation when the free ends of said arms swing away from each other and which moves the center of gravity of said first weight away from said axis of rotation when the free ends of said arms swing toward each other, the free ends of said arms and their attached weights when swinging toward each other also moving their combined center of gravity away from said axis of rotation in a direction to cooperate with said first weight to increase the total effective unbalanced weight, the total unbalanced weight of the entire assembly being slightly off the axis of rotation in the aforementioned plane in the direction of movement of said first weight when it moves from said normal axis of vibration when the mechanism is at rest, all whereby both the total effective unbalanced weight and the effective distance thereof from the axis of rotation increase as the speed of rotation of said mechanism increases and decreases as the speed of rotation decreases.

2. Vibratory unbalanced weight mechanism including an unbalanced weight assembly, means mounting said assembly for rotary movement, said unbalanced weight assembly including a first weight, means mounting said first weight for rectilinear movement of its center of gravity toward and from an axis of rotation of said mechanism, a pair of pivoted arms, means pivotally mounting said arms for opposite swinging movement on spaced axes which are parallel with said axis of rotation and susbtantially equally spaced from a plane passing through said axis of rotation and parallel with the axis of rectilinear movement of said first weight, spring means urging the free ends of said arms away from each other whereby their combined center of gravity moves rectilinearly parallel with the movement of the center of gravity of said first weight and in a direction to counteract the unbalancing weight of said first weight, and a linkage between said first weight and said pivoted arms which moves said first weight to move the center of gravity thereof toward said axis of rotation when the free ends of said arms swing away from each other and which moves the center of gravity of said first weight away from said axis of rotation when the free ends of said arms swing toward each other, the free ends of said arms when swinging toward each other also moving their combined center of gravity away from said axis of rotation in a direction to cooperate with said first weight to increase the total effective unbalanced weight, the total unbalanced weight of the entire assembly being slightly off the axis of rotation in the aforementioned plane in the direction of movement of said first weight when it moves from said normal axis of vibration when the mechanism is at rest, all whereby both the total effective unbalanced weight and the effective distance thereof from the axis of rotation increase as the speed of rotation of said mechanism increases and decrease as the speed of rotation decreases.

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No references cited.