Oct. 27, 1959 C. JACKSON 2,909,970

VIBRATORY COMPACTOR FOR ASPHALTIC AND OTHER MATERIALS

Filed Jan. 11, 1954 2 Sheets-Sheet 1

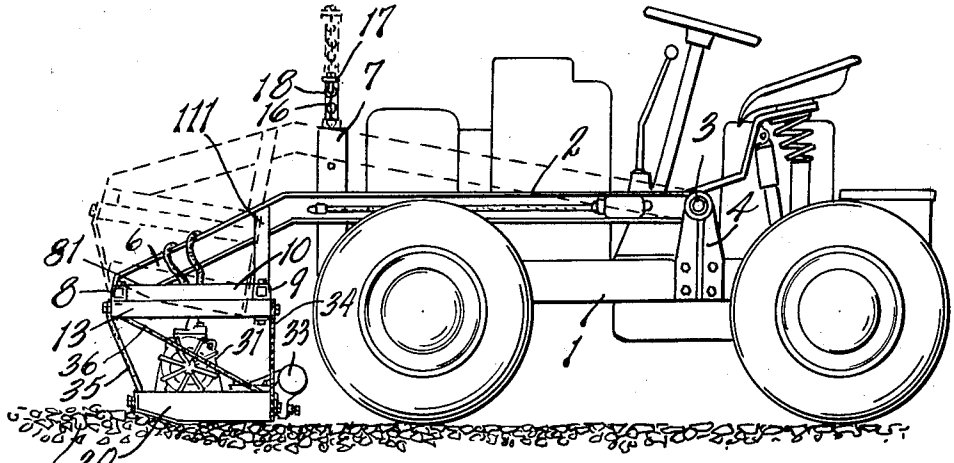


FIG. 1.

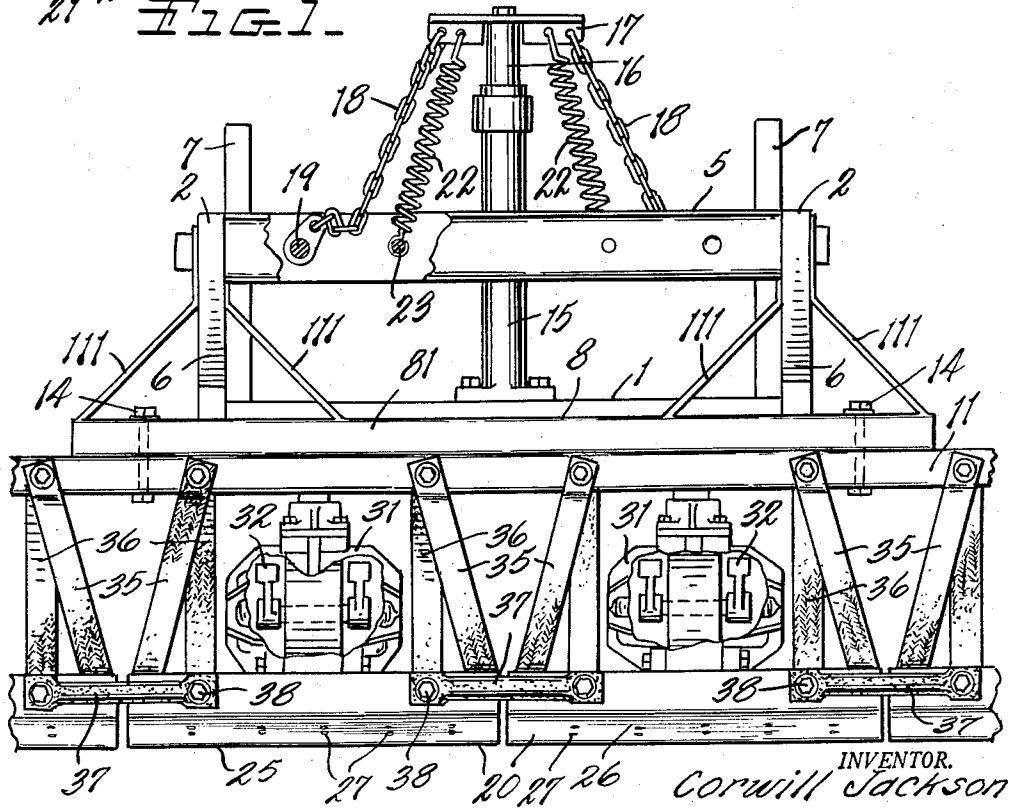


FIG. 2.

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VIBRATORY COMPACTOR FOR ASPHALTIC AND OTHER MATERIALS

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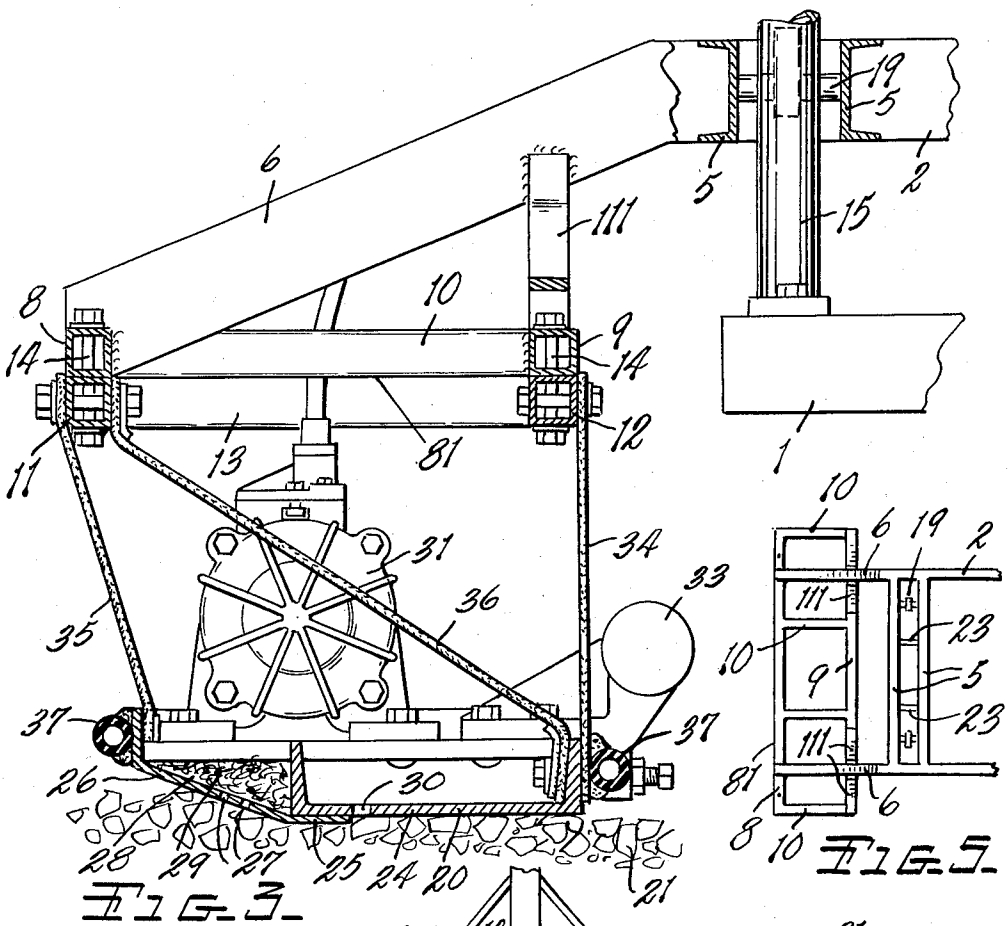


FIG. 3

FIG. 5

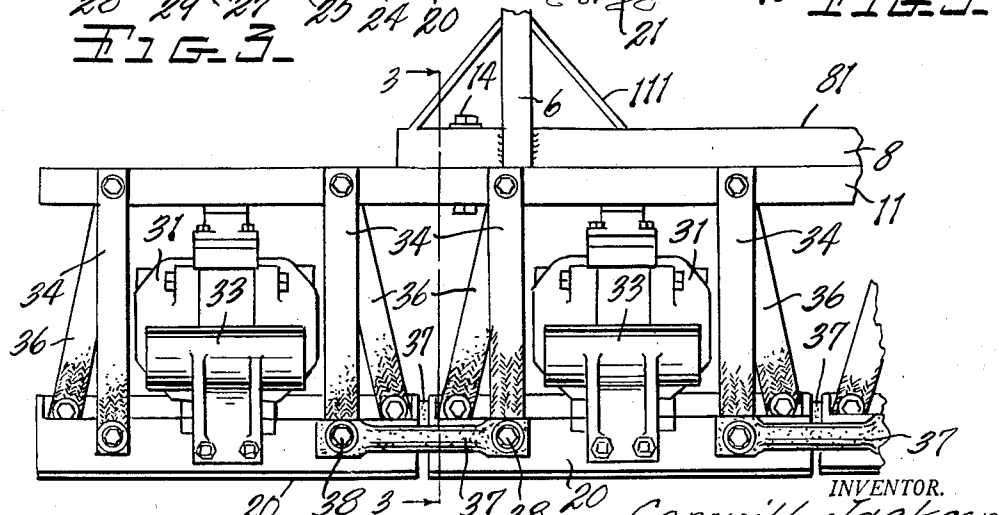


FIG. 4

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VIBRATORY COMPACTOR FOR ASPHALTIC AND OTHER MATERIALS

Corwill Jackson, Ludington, Mich., assignor to Jackson Vibrators, Inc., Ludington, Mich., a corporation of Michigan

Application January 11, 1954, Serial No. 403,397

10 Claims. (Cl. 94—48)

This invention relates to a vibratory compactor for asphaltic and other materials. The invention relates particularly to a vibratory compactor adapted for use in compacting asphaltic and various other materials including crushed rock, foundation materials, soil and the like.

The main objects of this invention are:

First, to provide a vibratory compactor including a plurality of shoes which are disposed in adjacent side by side relation and which are independently vibrated and connected to maintain their spaced relation while permitting independent vibration thereof and a substantial degree of independent vertical and tilting movement permitting them to conform generally to a crowned or other nonplaner surface.

Second, to provide a compactor of this type in which the several shoes are supported from a crosshead or common support member permitting substantially free vibration thereof without translating the vibrations to the support member.

Third, to provide means for supporting and translating a vibratory compactor member having vibratory means mounted thereon to be compacted which permits free vibration of the member without subjecting the translating means to such vibrations.

Fourth, to provide a machine of the class described which is comparatively simple and economical in structure and at the same time is highly efficient and very durable in use and one which has a very wide range of use.

Objects relating to details and economies of the invention will appear from the description to follow. The invention is defined and pointed out in the claims.

A preferred embodiment of the invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a side elevational view of a compacting machine embodying my invention shown in operative relation to a surface being compacted in full lines and in inoperative position by dotted lines.

Fig. 2 is a fragmentary front elevational view.

Fig. 3 is an enlarged fragmentary vertical section on a line corresponding to 3—3 of Fig. 4.

Fig. 4 is a fragmentary rear elevational view of the vibratory unit.

Fig. 5 is a fragmentary plan view showing details of the crosshead.

The embodiment of my invention illustrated embodies certain features of my invention illustrated in my application for Letters Patent, Serial No. 251,281 filed October 15, 1951, Patent No. 2,723,608, November 15, 1955, and which discloses a multiple compactor machine and features of my application also embodies certain features of my invention illustrated in my application Serial No. 346,887 filed April 6, 1953, Patent No. 2,771,012.

The embodiment of my invention illustrated in the accompanying drawing comprises a self-propelling carriage designated generally by the numeral **1**. As the details of the carriage proper form no part of this invention they are not further described herein.

The crosshead supporting arms **2** are pivotally mounted

at their rear ends at **3** on the upwardly projecting brackets **4** on the carriage. These arms **3** are connected adjacent their forward ends by the spaced crosspieces **5** extending between them.

The arms **2** have downwardly and forwardly inclined portions **6** at their front ends which project forwardly beyond the carriage. Vertical guides **7** are mounted on the carriage in lateral side thrust sustaining relation to the arms **2**.

The crosshead designated generally by the numeral **81** is disposed in front of and transversely thereof. This crosshead includes a supporting frame including front and rear members **8** and **9** connected by the crosspieces **10**. The front member **8** is secured to the downwardly inclined ends **6** of the bars **2** while the rear member **9** is connected to the arms **2** by the braces **111**. These parts are desirably formed of metal structural material and connected by welds only a few of which are indicated.

A sub-crosshead frame comprising front and rear longitudinal bars **11** and **12** connected by crosspieces **13** to form a unit is provided. The bars **11** and **12** are detachably secured to the crosshead bars **8** and **9** by means of bolts **14** disposed through the superimposed front and rear member of the crosshead and sub-crosshead as is shown in Fig. 3.

The hydraulic actuating means comprises a cylinder **15** mounted on the carriage and arranged between the connecting crosspieces **5** of the arms **2**, and a coacting plunger member **16** which is provided with a crossarm **17** which is connected by the chains **18** to the crosspieces **5** at **19**, see Figs. 2 and 3.

The compactor shoes designated by the numeral **20** are shown in Figs. 1 and 3 in operative relation to the material **21** being compacted. In this position the lift chains **18** are slack as indicated in Fig. 2 and the crosshead is counterbalanced or yieldingly supported by the coil springs **22** which are connected to the plunger crossarm **17** and crosspieces **23**, see Fig. 2.

In the embodiment of my invention illustrated in my said Patent No. 2,723,608, the crosshead is adjustably supported to impart thrust to the compacting shoes carried thereby. In my present invention the crosshead does not deliver any downward thrust upon the vibratory shoe. The vibratory units each comprise a shoe including a flat rear portion **24** and a flat horizontally disposed front impact portion **25** and an upwardly inclined front portion **26** having openings **27** therein for discharging lubricant from the chamber **28** having a lubricant holder of fibrous material **29** therein.

The shoe is provided with openings **30** at the rear of the impact portion **25** to direct air against the motor housing **31** as described in my said application 346,887.

The motor **31** is provided with an unbalancing rotor **32**, the axis of which is disposed transversely of the shoe and substantially in advance of the transverse center of the shoe. The shoe is provided with a weight **33**, the center of gravity being substantially to the rear end of the shoe. This arrangement of parts is substantially as described in my last referred to application and is the subject matter of claims therein.

The vibratory units are arranged in side by side relation. I have only illustrated four of the vibratory units but the number may be varied. One advantage of having the crosshead bars **11** and **12** detachably mounted is to provide convenient means for adapting to the desired number of vibratory units.

The vibratory units are supported for independent vibration and without imparting such vibration to the crosshead. Each shoe is provided with laterally spaced pairs of flexible rear hanger straps **34** secured to the rear ends of the shoes and to the rear crosshead bar **12**. Each shoe is also provided with a pair of downwardly diverg-

ing rearwardly inclined flexible front hanger straps **35** which are connected to the front crosshead bar **11** to depend therefrom and to the front end of the shoes. Pairs of flexible draft straps **36** are connected to the shoe at the rear thereof and to the front crosshead bar **11**. The straps **35** and **36** are of flexible non-elastic material such, for example, as belting material.

To maintain the vibratory shoes in their spaced relation while permitting a substantial degree of independent vertical and tilting movement of the shoes, adjacent shoes are connected by the flexible coupling members **37**. These are secured to the front and rear ends of adjacent shoes by means of the bolts **38** and they act to keep adjacent shoes from contacting each other at the same time permitting independent vibrations of the shoes and the independent movement thereof to a substantial degree as has been described. The coupling members **37** are desirably of flexible non-elastic material such as hose, belting or the like.

By arranging the vibrating means substantially at the front of the transverse center of the shoes and weighting the rear ends of the shoes the front ends of the shoes have a considerable amplitude of vibration or a vibratory stroke of considerable length while at the rear of the shoe there is relatively little amplitude of vibration. This results in a highly efficient compacting action on various kinds of materials. I have illustrated crushed rock but it will be understood that when the machine is used for compacting crushed rock, soil and various other materials a lubricant is not required. However, lubricant is highly desirable when the machine is used for compacting and surfacing asphaltic materials.

By supporting and propelling the shoes as by means of the flexible hanger and draft members substantially no vibration is translated from the shoes to the crosshead and there is no restraining action of the crosshead upon the vibrations of the shoes.

The hanger and draft straps may desirably be of strips of belting but it will be understood that other flexible material which is substantially non-elastic may be used.

I have illustrated and described my invention in an embodiment which I have found to be very satisfactory.

I have not attempted to illustrate or describe other embodiments which I contemplate as it is believed this disclosure will enable those skilled in the art to embody or adapt my invention as may be desired.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A machine of the class described comprising a carriage, a shoe support member carried by said carriage, a vibratory material compacting shoe having a rearwardly and downwardly inclined front portion, vibratory means carried by said shoe and comprising an electric motor mounted on said shoe and having an unbalanced rotor disposed with its axis transversely of and in advance of the transverse center of the shoe, a weight mounted on the shoe with its center of gravity spaced rearwardly relative to the rear end of the shoe, flexible and collapsible front and rear hanger straps depending from said support member and connected to the front and rear of the shoe respectively, and a flexible and collapsible draft member connected to said support member and to said shoe.

2. In a machine of the class described, the combination with a carriage, of a crosshead disposed transversely of the path of travel of the carriage and mounted thereon for manually controlled vertical adjustment, a plurality of vibratory units, each comprising a shoe, means for vibrating the shoe at high frequency, comprising an electric motor mounted on the shoe and having an unbalanced rotor disposed with the axis transversely of the shoe and in advance of the transverse center thereof, weighting means disposed at the rear end of the shoe, laterally spaced flexible and collapsible hanger straps connecting the rear end of the shoe to said crosshead, laterally spaced flexible and collapsible downwardly diverging front hanger straps connecting the front end of the shoe to said crosshead, laterally spaced rearwardly inclined flexible and collapsible draft straps connected at their upper ends to said crosshead and at their lower ends to the shoe adjacent the rear end thereof, said vibratory unit shoes being disposed in aligned relation and with their side edges in closely adjacent but noncontacting relation, said shoes being supported by their said hanger and draft straps to permit substantial vertical and tilting movement relative to each other, and flexible substantially non-extensible and non-collapsible front and rear coupling members for the front and rear ends of the shoes of adjacent vibratory units connected to the front and rear edges of the shoes in substantially spaced relation to the adjacent edges of the shoes, whereby independent vibratory movement of the shoes and substantial tilting movement relative to each other is permitted while maintaining them in laterally spaced relation to each other.

3. In a machine of the class described, the combination with a carriage, of a crosshead disposed transversely of the path of travel of the carriage and mounted thereon for manually controlled vertical adjustment, a plurality of vibratory units, each comprising a shoe vibrated at high frequency, laterally spaced flexible and collapsible hanger straps connecting the rear end of the shoe to said crosshead, laterally spaced downwardly diverging flexible and collapsible front hanger straps connecting the front end of the shoe to said crosshead, laterally spaced rearwardly inclined flexible and collapsible draft straps connected at their upper ends to said crosshead and at their lower ends to the shoe adjacent the rear end thereof, said vibratory unit shoes being disposed in aligned relation and with their side edges in closely adjacent but noncontacting relation, said shoes being supported by their said hanger and draft straps to permit substantial vertical and tilting movement relative to each other, and flexible substantially nonextensible and non-collapsible front and rear coupling members for the front and rear ends of the shoes of adjacent vibratory units connected to the front and rear edges of the shoes in substantially spaced relation to the adjacent edges of the shoes, whereby independent vibratory movement of the shoes and substantially tilting movement relative to each other is permitted while maintaining them in laterally spaced relation to each other.

4. In a machine of the class described, the combination with a carriage, of a crosshead disposed transversely of the path of travel of the carriage and mounted thereon for vertical adjustment, a plurality of vibratory units each comprising a shoe, means for vibrating the shoe at high frequency comprising an electric motor mounted on the shoe and having an unbalanced rotor disposed with the axis transversely of the shoe and in advance of the transverse center thereof, weighting means disposed at the rear end of the shoe, flexible and collapsible hanger and draft straps connecting the shoe to said crosshead, said vibratory unit shoes being disposed in aligned relation and with their side edges in adjacent but noncontacting relation, said shoes being supported by their said hanger and draft straps to permit substantial vertical and tilting movement thereof relative to each other, and substantially non-extensible and non-collapsible coupling members for the shoes of adjacent vibratory units connected to the front and rear end edges thereof in substantially spaced relation to the adjacent side edges thereof, said coupling members including flexibly resilient portions maintaining the connected shoes in laterally spaced relation to each other while permitting substantial tilting movement of the shoes relative to each other as they are translated over and in supported relation to the material worked, the flexibly resilient portions of said coupling member being such that the vibratory movement of one shoe of a connected pair is not translated to the other shoe of the pair.

5. In a machine of the class described, the combination with a carriage, of a crosshead disposed transversely of the path of travel of the carriage and mounted thereon for vertical adjustment, a plurality of vibratory units each comprising a shoe vibrated at high frequency, flexible and collapsible hanger and draft straps connecting the shoe to said crosshead, said vibratory unit shoes being disposed in aligned relation and with their side edges in adjacent but noncontacting relation, said shoes being supported by their said hanger and draft straps to permit substantial vertical and tilting movement thereof relative to each other, and substantially non-extensible and non-collapsible coupling members for the shoes of adjacent vibratory units connected thereto in substantially spaced relation to their adjacent edges and including flexibly resilient portions, said coupling member maintaining the connected shoes in laterally spaced relation to each other while permitting substantial tilting movement of the shoes relative to each other as they are translated in supported relation upon the material being worked.

6. In a machine of the class described the combination with a carriage of a support member mounted on said carriage for adjustment vertically relative to the surface over which the carriage is translated, a plurality of vibratory units each comprising a shoe provided with vibrating means, flexible and collapsible hanger and draft members connecting each shoe to said support member, said shoes being disposed in aligned relation and with their edges in adjacent but non-contacting relation, said shoes being supported by their said flexible hanger and draft members for substantial independent vertical and tilting movement of the shoes relative to each other, coupling members for adjacent shoes connected thereto in spaced relation to their adjacent edges, said coupling members being substantially non-extensible and non-collapsible and including flexibly resilient portions maintaining the connected shoes in laterally spaced relation to each other while permitting an independent tilting and vibratory movement thereof.

7. In a machine of the class described the combination with a carriage of a support member mounted on said carriage for adjustment vertically relative to the surface over which the carriage is translated, a plurality of vibratory units each comprising a shoe provided with vibrating means, flexible and collapsible hanger and draft connections connecting the shoe to said support member, said shoes being disposed in aligned relation and with their edges in adjacent but non-contacting relation, said shoes being supported by their said flexible hanger and draft members for substantial independent vertical and tilting movement of the shoes relative to each other, and flexible and non-collapsible coupling members connecting the adjacent ends of the adjacent shoes, said coupling members being angularly movable relative to said shoes permitting substantial independent tilting movement of the shoes relative to adjacent shoes while maintaining the shoes in their laterally spaced relation to each other.

8. In a machine of the class described the combination with a carriage of a support member mounted on said carriage for vertical adjustment relative to the surface

over which the carriage is translated, a plurality of aligned vibratory units each comprising a shoe vibrated at high frequency, flexible and collapsible hanger means connecting each shoe to said support member permitting independent vertical and tilting movement of the shoes relative to other shoes, said shoes being disposed with their corresponding side edges adjacent but in non-contacting relation, and flexible and non-collapsible coupling members for the adjacent ends of adjacent shoes connected thereto in substantially spaced relation to their adjacent edges, said coupling members being angularly movable relative to said shoes thereby permitting substantial independent tilting vibratory movement of the shoes relative to each other while maintaining them in their laterally spaced relation.

9. In a machine of the class described the combination with a carriage of a support member mounted on said carriage for vertical adjustment relative to the surface over which the carriage is translated, a plurality of aligned vibratory units each comprising a shoe vibrated at high frequency, flexible and collapsible hanger means connecting each shoe to said support member permitting independent vertical and tilting movement thereof relative to said support means and other shoes, said shoes being disposed with their corresponding side edges adjacent but in non-contacting relation, and coupling members for the adjacent ends of adjacent shoes connected thereto, said coupling members being substantially non-extensible and non-collapsible longitudinally thereof and including flexibly resilient portions permitting substantial independent tilting movement of the shoes relative to each other while maintaining them in their laterally spaced relation, said coupling members being such that the vibratory movement of one shoe of a connected pair is not translated to the other shoe of the pair.

10. In a machine of the class described the combination with a carriage, of a support member mounted on said carriage for vertical adjustment relative to the surface over which it is translated by the carriage, a vibratory unit comprising a shoe, means mounted on the shoe for vibrating it at high frequency comprising an electric motor having an unbalanced rotor mounted thereon with its axis transversely of the shoe, laterally spaced flexible and collapsible rear hanger straps connecting the rear end of the shoe to said support member, laterally spaced downwardly diverging flexible and collapsible front hanger straps connected to the support member and to the front end of the shoe, and a pair of rearwardly inclined flexible and collapsible draft straps connected at their upper ends to said support member and at their lower ends to the shoe adjacent the rear end thereof.

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