

Jan. 6, 1942.

C. JACKSON

2,269,109

CONCRETE PLACEMENT APPARATUS

Filed Sept. 1, 1939

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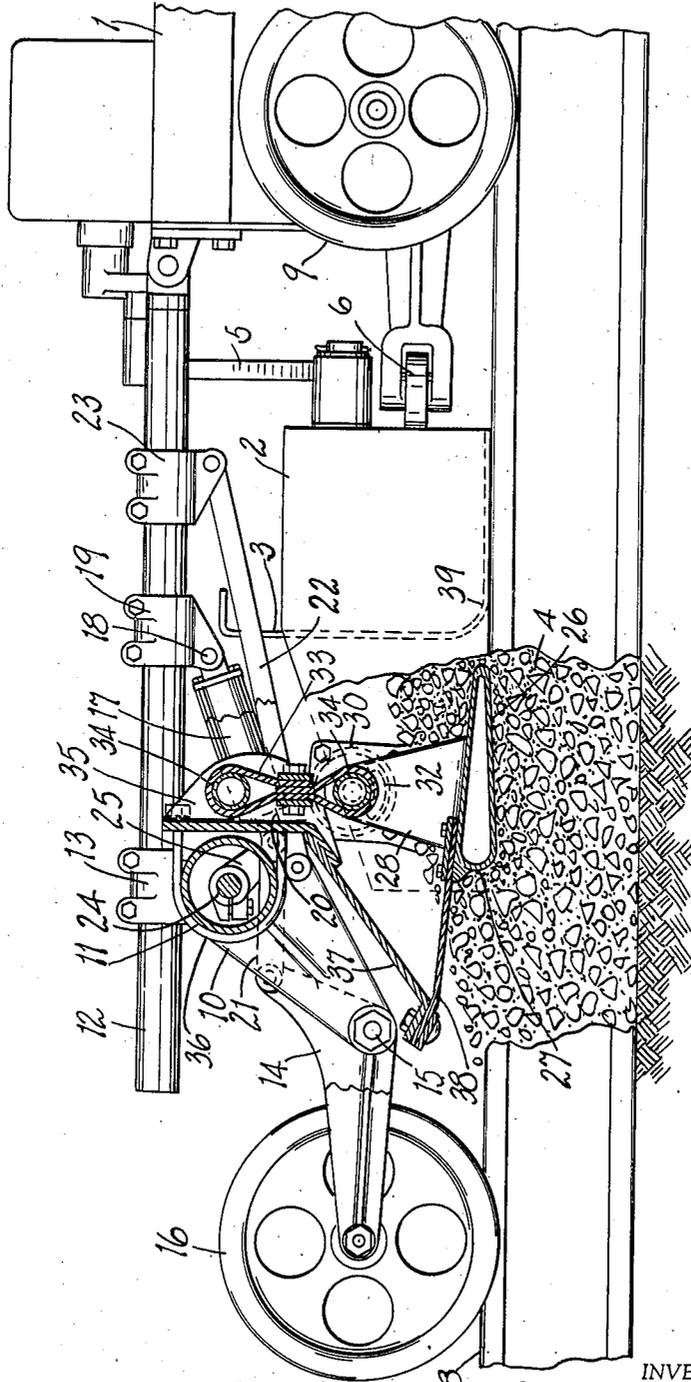


Fig. 1.

INVENTOR.
Corwill Jackson
BY *Earl & Shappell*
ATTORNEYS

Jan. 6, 1942.

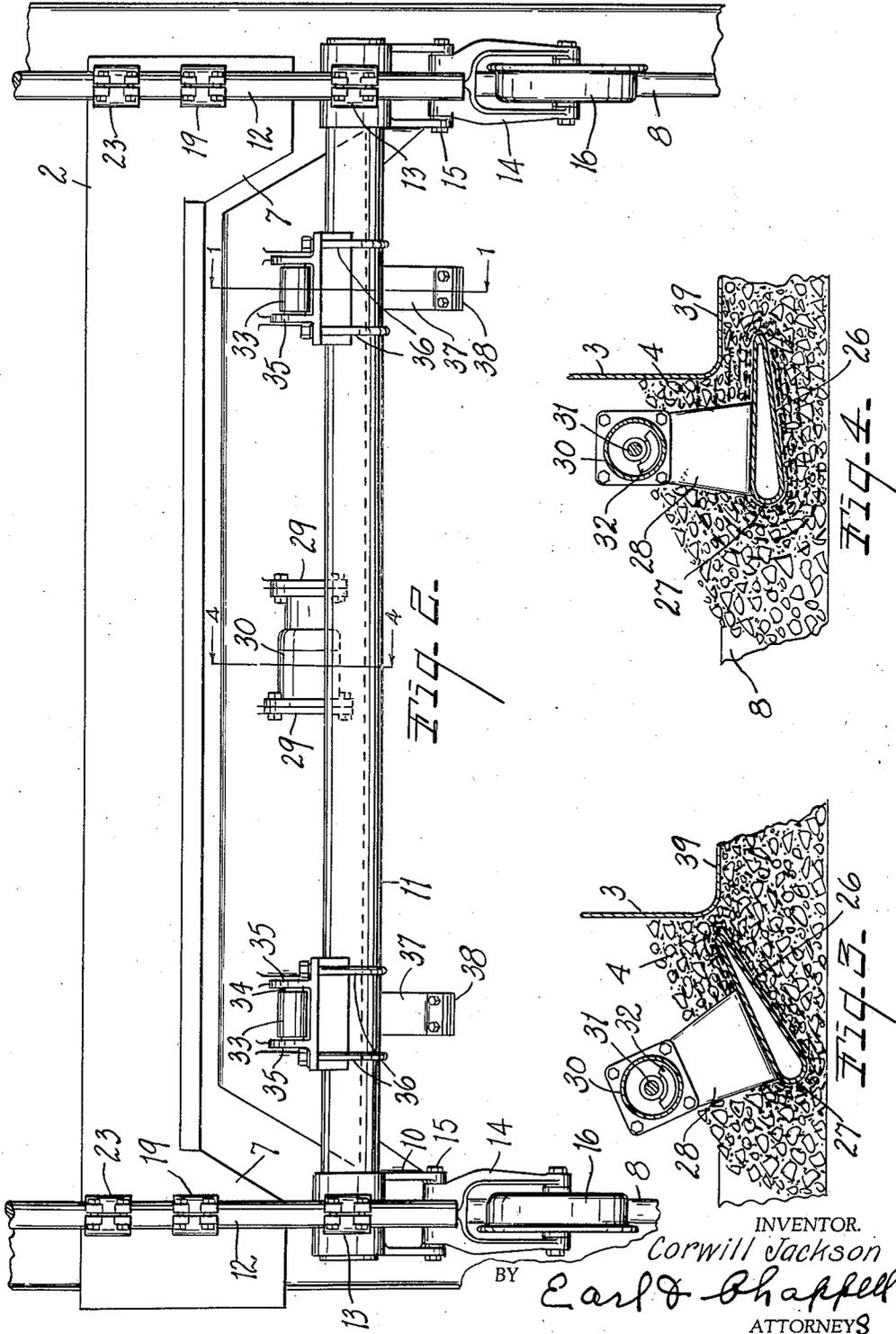
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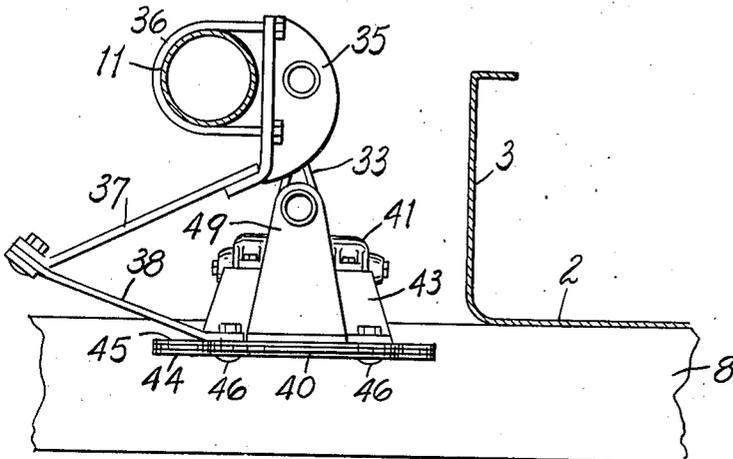


Fig. 5.

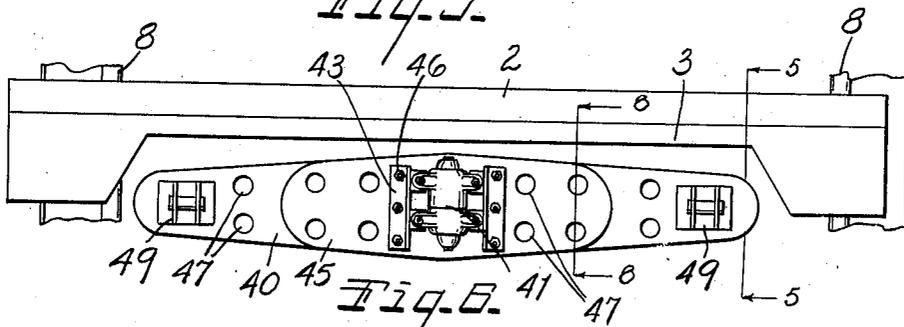


Fig. 6.

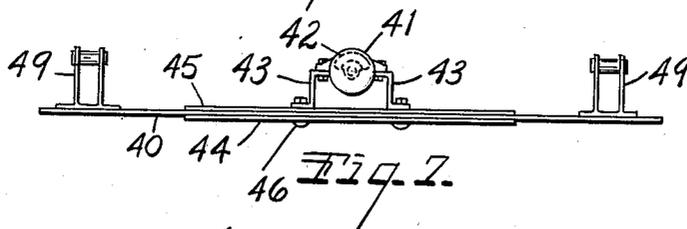


Fig. 7.

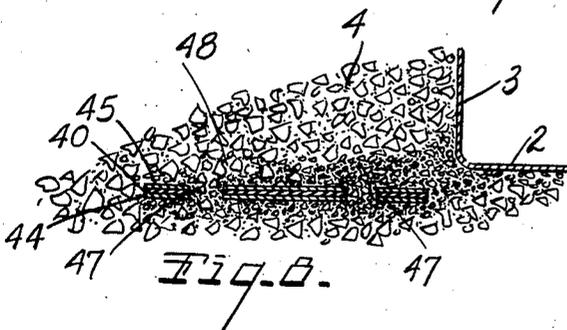


Fig. 8.

INVENTOR.
Corwill Jackson
BY Earl T. Shappell
ATTORNEYS

UNITED STATES PATENT OFFICE

2,269,109

CONCRETE PLACEMENT APPARATUS

Corwill Jackson, Ludington, Mich.

Application September 1, 1939, Serial No. 293,048

15 Claims. (Cl. 94—46)

The main objects of this invention are:

First, to provide a machine or apparatus for the placement of concrete such as pavements, concrete slabs, walls of ditches, conduits, or the like which is well adapted for use in the placement of concrete having relatively large aggregate and a relatively small amount of "fines" particularly where the concrete mixture is of relatively low water content.

Second, to provide a machine of this character which is capable of a wide range of adjustment for adaptation to placement of concrete of different formula as to aggregate, "fines," cement, and water contents and to meet various engineering specifications.

Third, to provide an apparatus of this character which is simple in its adjustment and highly efficient.

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 drawings, in which:

Fig. 1 is a fragmentary view partially in longitudinal section on line 1—1 of Fig. 2 of a concrete placement machine or apparatus embodying the features of my invention.

Fig. 2 is a fragmentary plan view of a machine or apparatus in operative relation to the side forms of a pavement or the like which constitute tracks for the machine.

Fig. 3 is a vertical fragmentary section showing one of the several possible positions of adjustment of the vibratory element, the vibratory action being indicated by dotted lines.

Fig. 4 is a fragmentary section on a line corresponding to line 4—4 of Fig. 2, showing another possible position of the vibratory element, the vibratory action being indicated by dotted lines.

Fig. 5 is a fragmentary view partially in vertical section on line 5—5 of Fig. 6 of a modified form or embodiment of my invention, the modification being in the structure and form of the vibratory element.

Fig. 6 is a fragmentary plan view showing the details of the vibratory element and its relation to the screed.

Fig. 7 is a front elevation of the vibratory element.

Fig. 8 is a fragmentary view sectioned on line 8—8 of Fig. 6 showing the vibratory element in one operation relation to a mass of concrete being treated.

The present invention relates to the type of concrete placement machines illustrated in my Patent No. 2,150,325 issued March 14, 1939, and it also embodies certain features of and is in some respects an improvement upon the structure shown in my Letters Patent, No. 2,199,074 of April 30, 1940. My present invention is especially desirable for use in the placement of low water content concrete having a relatively large aggregate, a relatively small amount of "fines" as is usual where the specification requires a relatively high cement ratio.

In the placement of such concrete mixtures by vibratory methods, there appears to be a tendency for separation of the mortar from the aggregate. By my improvements I am enabled to handle concrete mixes of such character without objectionable displacement or segregation of the aggregate. I also provide an apparatus which is capable of a very wide range of adjustment and adaptation to meet varying conditions as to concrete mixes and specifications as to placement.

In the embodiment of my invention illustrated in Figs. 1 to 4, inclusive, 1 represents the main carriage of a paving machine provided with a reciprocating screed 2 having a face plate 3 of substantial width and adapted to support a very substantial amount of concrete as indicated at 4 in the drawings. The means for reciprocating and advancing the screed form no part of this invention, but the reference numeral 5 represents a connecting rod from a suitable screed reciprocating crank and 6 indicates one of the thrust rollers so that the screed is advanced with the advancement of the machine.

The screed is provided with forwardly projecting rearwardly converging wings 7. These wings overhang the sides of the forms 8 which serve as tracks for the carrying wheels 9 of the main carriage.

I provide an auxiliary vibratory element carrying frame which in this embodiment comprises the end or side members 10 and the tubular transverse member 11. These side members are secured to the push bars 12 by means of clamps 13 so that the vibratory element to be described, carried by this frame, may be adjusted towards and from the screed. The auxiliary carriage is provided with wheeled supports 14 pivoted at 15, its wheels 16 being also adapted to travel on the side forms 8.

The means for adjusting the wheeled supports to raise and lower the frame, that is, swinging them on their pivots, comprise the hydraulic

cylinders 17 which are pivoted at 18 on the bracket 19 on the push bars 12 and provided with pistons having piston rods 20 connected by the links 21 to the wheeled supports 14, see Fig. 1. Brace rods 22 are provided for the frame side members, these brace rods being connected to the push bars by the clips 23.

A single hydraulic cylinder is provided and it will be noted that it is connected through the link 21 directly to one wheeled support member, the other being connected through a rockshaft 24 having an arm 25 thereon connected to the plunger rod. This arrangement is substantially that shown and described in detail in my above mentioned application for Letters Patent Serial No. 234,918.

The vibratory element 26 of the embodiment of my invention shown in Figs. 1 to 4, inclusive, is disposed horizontally and designed to be submerged on or lifted from the concrete mass to be treated and operated in various positions of adjustment. This vibratory element is of flattened cross section and of substantial width, and in this embodiment it is of rearwardly tapered streamlined section having a rounded nose 27. The vibratory element is provided with hanger brackets 28 and also with motor supporting brackets 29. These motor supporting brackets are disposed centrally relative to the length of the vibratory element and support.

The vibratory means in this embodiment consists of an electric motor 30 disposed with its shaft 31 longitudinally of the vibratory element and provided with an unbalancing weight 32. The electrical connections for the motor are not illustrated. The flexible non-extensible hangers 33 are engaged at their upper ends with the cross pieces 34 on the hanger brackets 35 which are rotatably clamped to the transverse frame member 11 by means of the U-bolts 36. By adjustment of these brackets the vibratory element may be supported in a transversely tilted position as shown in Fig. 3.

The brackets 35 are provided with forwardly and downwardly projecting arms 37 to which the flexible non-extensible draft members 38 are secured, the draft members being connected at the forward edges of the brackets 13 and 23 on the push bars, the position of the vibratory element relative to the screed may be adjusted; that is, it may be adjusted to and from the screed in addition to its vertical and tilting adjustment, and it is possible with the mechanism illustrated to adjust it to a position shown in Fig. 4 in which a portion of the vibratory element is below the shoe 39 of the screed.

This supporting means permits the vibration of the vibratory element in an approximately orbital path, such movement being induced by the vibrating means illustrated. It will be understood that it is desirable to vibrate the vibratory element at high frequency, from 3500 vibrations per minute on upwards, and also that a large amplitude of vibrations is not required.

In the embodiment of my invention shown in Figs. 5 to 8, inclusive, the vibratory element comprises a main plate 40 of steel, this being somewhat tapered toward its ends and formed of steel of suitable gauge to provide sufficient rigidity so that vibrations are translated from centrally disposed vibratory means designated generally by the numeral 41.

The vibratory means in this embodiment illustrated is an electric motor, the rotor of which is

provided with an unbalancing weight indicated by the dotted lines 42, Fig. 7. This vibrating unit is carried by the centrally disposed brackets 43. The plate 40 is provided with motor attaching plates 44 and 45 arranged on opposite sides of the main plate and clamped thereto by means of the motor bracket securing bolts 46. The plates 44 and 45 are preferably oppositely bowed somewhat prior to clamping these parts together so that the members 44 and 45 are in clamping relation to the member 40 throughout their length.

This vibratory element is provided with a plurality of holes 47 of such size and number as to permit the passage therethrough of the concrete mortar or paste to the top of the vibrating element and thus counterbalance or compensate for the segregation of the "fines" and larger aggregate which is more pronounced in the upper part of the mass being treated. I have attempted to conventionally illustrate this at 48 in Fig. 8, but it will be understood that accuracy in illustration is not attempted. It is a demonstrated fact, however, that substantial amounts of the mortar or excess paste does pass through these openings in the vibratory element. I have not attempted in the drawings to show these in the number, location relative to each other, or the size thereof in proportion to the size of the element illustrated.

The vibratory element is provided with hanger brackets 49 at the ends thereof to which the flexible non-extensible hangers 33 are secured. The vibratory element is also provided with flexible non-extensible draft members 38 connected at their forward ends to the arms 37 as in the structure previously described. The adjustments and possible positioning of the vibratory element are, of course, the same as those of the embodiments of Figs. 1 to 4 as I have used the same supporting and adjusting means.

In the embodiment shown in Figs. 1 to 4 the axis of the unbalanced rotor is disposed longitudinally of the vibratory element. In this embodiment it is disposed transversely and there are certain advantages in this transverse disposition of the rotor, particularly with the type of vibratory element shown in Figs. 5 to 8.

I have illustrated and described my improvements in embodiments which are capable of very wide range of adjustment and which are particularly well adapted for the placement of concrete having a low water content with a relatively small amount of "fines" and a correspondingly high amount of cement. In the placement of such material it is desirable to avoid separation of the mortar from the aggregate, and by proper adjustment I am able to meet a wide range of requirements. I have not attempted to illustrate various other modifications and adaptations which I contemplate as it is believed this disclosure will enable those skilled in the art to embody 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. In a machine of the class described, the combination with a main carriage, of a screed advanced with said main carriage and having a face plate adapted to support a substantial amount of material to be treated and provided with forwardly projecting inwardly converging wing portions at the ends thereof, an auxiliary carriage provided with a transverse frame member, means for vertically adjusting said transverse frame member, a submersible horizontally

disposed vibratory element of horizontally flattened cross section and of substantial width and having rearwardly beveled ends, said vibratory element being disposed to extend between said wings, means for supporting said vibratory element from said transverse frame member permitting vibratory movement thereof, motor supporting brackets disposed centrally of said element, and an unbalanced rotor mounted on said brackets.

2. In a machine of the class described, the combination with a screed having a face plate adapted to support a substantial amount of material to be treated and having forwardly projecting inwardly converging wing portions at the ends thereof, of a vibratory element supporting means advanced with the said screed and provided with means for vertical adjustment thereof, a horizontally disposed submersible vibratory element carried by said supporting means for vertical adjustment therewith, said vibratory element being of horizontally flattened cross section and being of substantial width, the ends of the vibratory element being rearwardly beveled, said vibratory element being disposed to extend between said wings, and means for imparting high frequency vibrations to said vibratory element comprising an unbalanced rotor mounted on said vibratory element.

3. In a machine of the class described, the combination with a screed having a face plate adapted to support a substantial amount of material to be treated, a horizontally disposed submersible vibratory element supporting means advanced with the said screed and provided with means for vertical adjustment thereof, a vibratory element carried by said supporting means for vertical adjustment therewith, said vibratory element being of flattened rearwardly tapered streamlined cross section and being of substantial width, means for imparting high frequency vibrations to said vibratory element, and means for supporting said vibratory element from said support permitting transverse tilting adjustment of the vibratory element relative to the plane of the shoe of the screed, said supporting means being adjustable to position the vibratory element below the plane of the bottom of the screed and with the rear edge of the vibratory element extending below the screed.

4. In a machine of the class described, the combination with a screed having a face plate adapted to support a substantial amount of material to be treated, a horizontally disposed submersible vibratory element supporting means advanced with the said screed and provided with means for vertical adjustment thereof, a vibratory element carried by said supporting means for vertical adjustment therewith, said vibratory element being of relatively flat cross section and being of substantial width and length substantially in excess of the overall vertical dimension or thickness thereof, means for mounting said vibratory element for edgewise advancement before said screed, means for imparting high frequency vibrations to said vibratory element, and means for supporting said vibratory element including means for the lateral tilting adjustment of the vibratory element relative to the plane of the shoe of the screed.

5. In a machine of the class described, the combination of a horizontally disposed elongated submersible vibratory element of rearwardly tapered cross section and having a rounded nose

portion, a vertically adjustable support for said vibratory element, hanger brackets on said vibratory element, flexible non-extensible hangers connecting said brackets to said support, flexible non-extensible draft members connected to the forward edge of said vibratory element, motor supporting brackets disposed centrally of said vibratory element, and an unbalanced rotor mounted on said brackets.

6. In an apparatus of the class described, the combination with a screed having a face plate adapted to support a substantial amount of material to be treated, of a submersible vibratory element of relatively flat cross section, the width and length of said element being substantially in excess of the overall vertical dimension or thickness thereof, means mounting said element for edgewise advancement in front of said screed, means for adjusting said element vertically relative to said screed and to and from said screed and to a position below said screed with a rear portion of the vibratory element below the shoe of the screed, and means for vibrating said vibratory element at high frequency.

7. In an apparatus of the class described, the combination of an elongated submersible vibratory element of flattened rearwardly tapered streamlined cross section of substantial width, vibratory means connected to the element and imparting high frequency vibrations to said vibratory element, and translatable means connected to said element for advancing the same edgewise in a horizontal plane in submerged relation to the material treated.

8. In an apparatus of the class described, the combination with a screed having a face plate adapted to support a substantial amount of material to be treated, of a submersible vibratory element of flat cross section and of substantial width, means connected to said screed, to which means said element is secured for supporting the element in front of the screed for edgewise advancement therewith, a tiltable connection for the element to said last named means enabling tilting thereof relative to the screed, and vibratory means connected to the element for vibrating said vibratory element at high frequency.

9. In a machine of the class described, the combination of a horizontally disposed elongated submersible vibratory element of flattened cross section and of substantial width, said member comprising a main body plate and a shorter plate disposed in superimposed relation thereto and clamped thereto at a central point, rotor supporting brackets secured to said superimposed plates, an unbalanced rotor mounted on said brackets with its axis in transverse relation to the vibratory element, flexible non-extensible hangers connected to the main plate adjacent the ends thereof, and a vertically adjustable support for said hangers.

10. In a machine of the class described, the combination of a horizontally disposed elongated submersible vibratory element of flattened cross section and of substantial width, said member comprising a main body plate and a shorter plate disposed in superimposed relation thereto and clamped thereto at a central point, means for vibrating said vibrating element at high frequency, flexible non-extensible hangers connected to the main plate adjacent the ends thereof, and a vertically adjustable support for said hangers.

11. In a machine of the class described, the combination of a radially disposed submersible

vibratory element of flattened cross section and of substantial width having a plurality of holes therethrough permitting the passage of the mortar or the smaller particles of the mass being treated, means for adjustably supporting said vibratory element permitting high frequency vibration thereof, and means for imparting high frequency vibration to said vibratory element comprising an unbalanced rotor mounted on said vibratory element with its axis in transverse relation thereto.

12. In a machine of the class described, the combination of a radially disposed submersible vibratory element of flat cross section and of substantial width, translatable means to which said element is adjustably connected for advancing the same edgewise in a horizontal plane, and vibratory means connected to said element for imparting high frequency vibration to said vibratory element comprising an unbalanced rotor mounted on said vibratory element with its axis in transverse relation thereto.

13. In a machine of the class described, the combination of a radially disposed submersible vibratory element of flattened cross section and of substantial width having a plurality of holes therethrough permitting the passage of the mortar or the smaller particles of the mass being treated, means for adjustably supporting said vibratory element permitting high frequency vibra-

tion thereof, and means for imparting high frequency vibration to said vibratory element.

14. In an apparatus of the class described, the combination of an elongated submersible vibratory element of relatively flat section the length and width of which are substantially in excess of the overall vertical dimension or thickness thereof, vibratory means connected to said element for imparting high frequency vibrations thereto, and a translatable support for said element to which the same is connected for advancing said vibratory element edgewise in a horizontal plane in a direction transverse of its length, there being adjustable means connecting said element to said support enabling vertical adjustment and lateral tilting adjustment of the element relative to the support.

15. In an apparatus of the class described, the combination of an elongated submersible vibratory element of relatively flat section the length and width of which are substantially in excess of the overall vertical dimension or thickness thereof, vibratory means connected to said element for imparting high frequency vibrations thereto, and a translatable support for said element to which the same is connected for advancing said vibratory element edgewise in a horizontal plane in a direction transverse of its length.

CORWILL JACKSON.