

April 11, 1944.

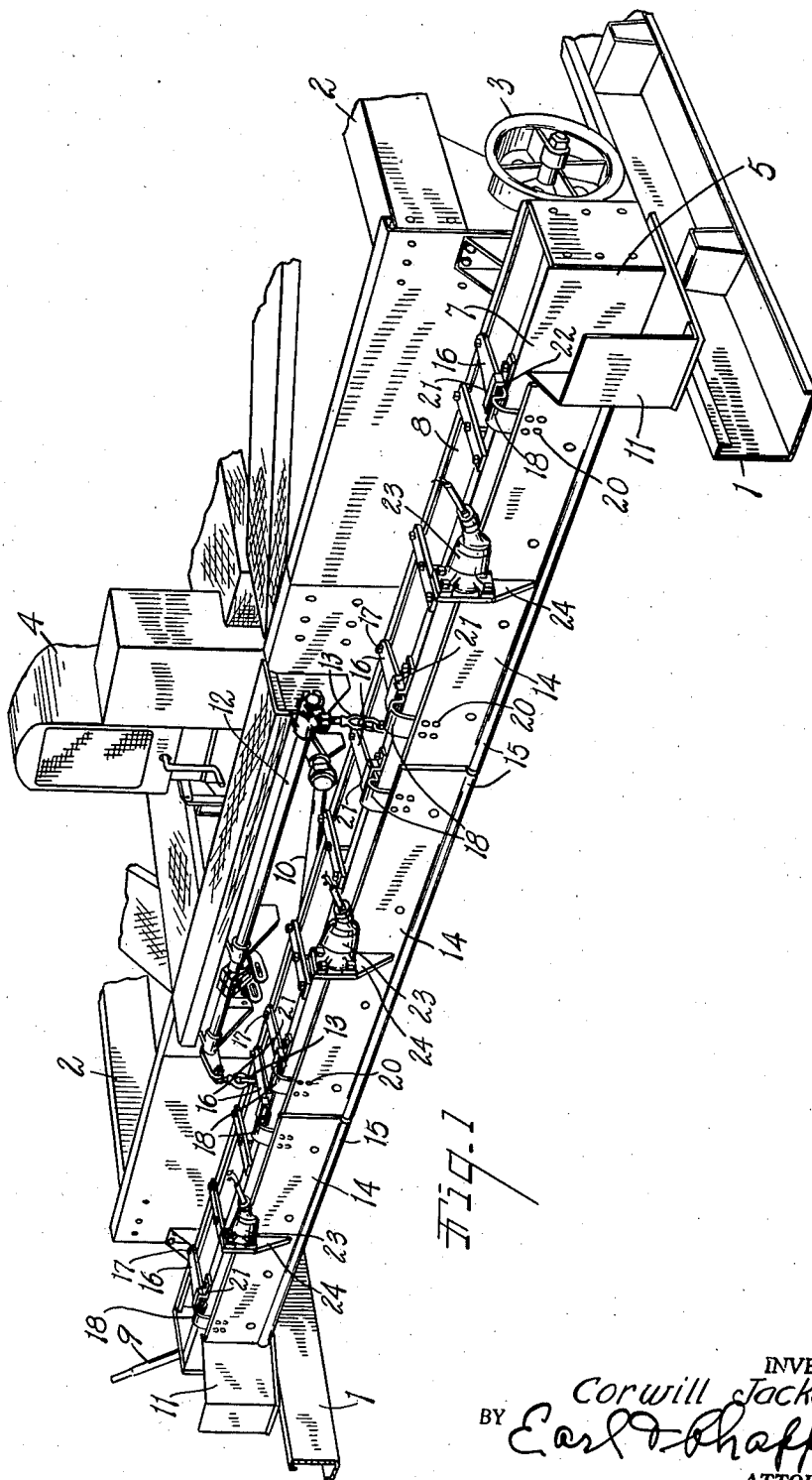
C. JACKSON

2,346,378

CONCRETE PLACING MACHINE

Filed May 5, 1941

3 Sheets-Sheet 1



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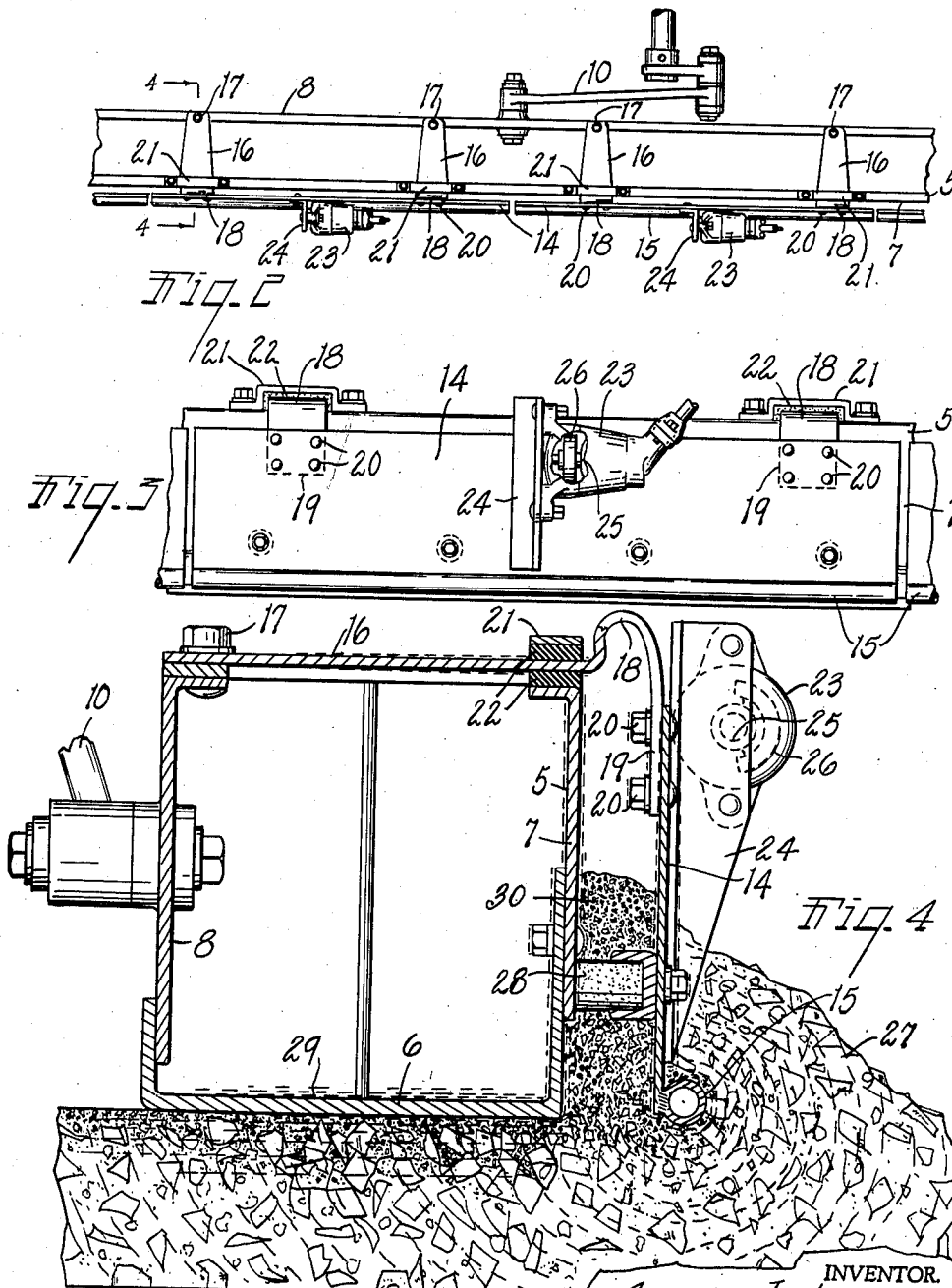
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CONCRETE PLACING MACHINE

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3 Sheets-Sheet 2



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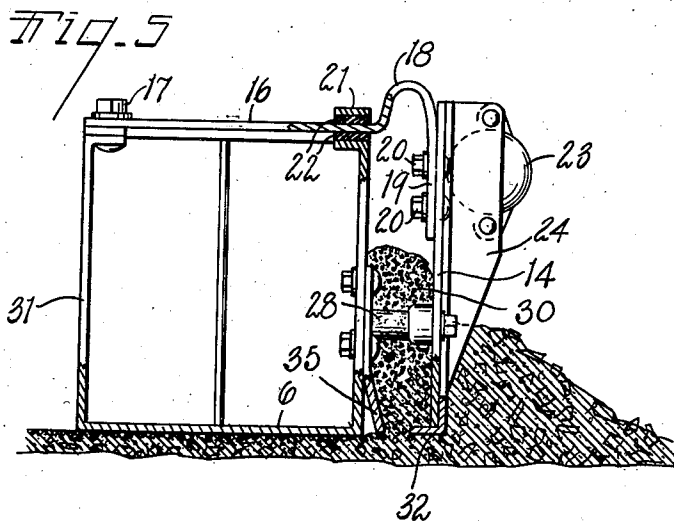
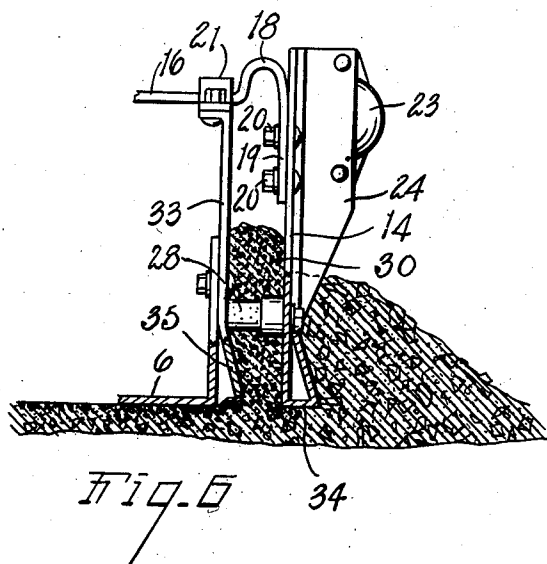
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CONCRETE PLACING MACHINE

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,346,378

CONCRETE PLACING MACHINE

Corwill Jackson, Ludington, Mich.

Application May 5, 1941, Serial No. 391,922

12 Claims. (Cl. 94—48)

This invention relates to improvements in concrete placing machines.

The main objects of this invention are:

First, to provide a machine or apparatus for the placement of concrete slabs, particularly pavements, which is of very large capacity and highly efficient.

Second, to provide a machine of this character of the reciprocating vibrated screed type in which it is unnecessary to vibrate the screed proper to such an extent or degree as to materially affect the durability or life thereof.

Third, to provide a machine or apparatus of the character described which is highly suitable for the placement of concrete mixes having very low water content.

Fourth, to provide means for placing concrete pavements which may be effectively embodied in relatively long screeds.

Fifth, to provide a method of placing concrete of low water content and having relatively coarse aggregate which provides effective filling of the voids and a desirable surface composed mainly of the fines.

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

Preferred embodiments of the invention are illustrated in the accompanying drawings, in which:

Fig. 1 is a fragmentary front perspective view of a paving machine embodying my invention, the carriage being partially broken away and certain details omitted for convenience in illustration.

Fig. 2 is a fragmentary plan view of the screed and the vibratory members associated therewith.

Fig. 3 is a fragmentary front elevation.

Fig. 4 is a fragmentary vertical section on line 4—4 of Fig. 2, the vibratory impulse in the material treated being indicated by dotted lines, the parts being shown in the position occupied when in use.

Fig. 5 is a fragmentary view of the parts in normal unworking position, that is, when the machine is not being advanced against a mass of concrete, and also showing a slightly modified form of vibratory member.

Fig. 6 is a fragmentary view partially in section similar to that of Fig. 5 showing another form of vibratory member.

In the embodiment of my invention illustrated in the accompanying drawings, 1 represents the side forms for the concrete to be placed, these constituting rails or tracks for the paving ma-

chine carriage 2 which is provided with flanged wheels 3. The machine is driven by a suitable engine or motor shown conventionally at 4.

The screed 5 is preferably fabricated from relatively heavy metal sections and comprises a bottom 6, a front member or plate 7, and a rear plate 8, these parts being suitably braced and reinforced. Means are commonly provided, however, for adjustment of the bottom of the screed to the desired crown of the pavement. These means are not illustrated as they form no part of this invention. It will be understood that the bottom is not rigidly fixed to the screed frame structure but is connected, as stated to permit the crowning adjustment. The lever 9, shown at the left of Fig. 1, is the means for manually adjusting the crown of the screed.

The screed is supported for sliding advancement on the rails and for reciprocating movement transversely of the path of forward travel. This transverse reciprocation is effected by the pitman 10. The driving connections for the pitman to the motor are not illustrated.

The screed is provided with wings 11 for retaining the mass being treated—that is, preventing its overflowing the rails as it is vibrated and also these wings serve as scrapers to clean the rails. The screed is raised and lowered from the rockshaft 12 having arms connected to the screed by the flexible connections 13.

My Patent 2,219,246, issued October 22, 1940, discloses a reciprocated vibrated screed in which the vibrating means is mounted on the screed. Paving machines embodying this feature have been successfully used and meet certain requirements but the demand for increased speed in placement, vibration of the screed with sufficient intensity to accomplish the desired results and speed, results in an undesirable short life of the screed owing to the severe vibration, and crystallization of the bolts and other parts. Further, the vibration of these very heavy screeds is likely to settle the forms and of course this destroys the desired grade. My present invention effectively remedies these difficulties or objections that have been met and enables the effective placement of very dry concrete mixtures at high speed and without the undesirable results noted.

I provide a plurality of vertically disposed plate-like vibratory members 14 disposed vertically in end to end relation and in forwardly spaced relation to the screed. These vibratory members, in the embodiment shown in Figs. 1 to 4 inclusive, are provided with reinforcing tubular bars 15 which are welded to the bottom edges thereof to pro-

ject forwardly. These bars also increase the surface of the vibratory members at this point.

The vibratory members are supported for vibratory action by means of the blade springs 16 which are bolted at their rear ends, as 17, to the rear portion of the screed and have goose-necks 18 at their front ends terminating in downturned arms 19 which are fixedly bolted to the tubular parts of the vibratory members at 20.

Intermediate the point of attachment to the screed and the vibratory members are the resilient or cushioning supports for the springs consisting of the clips 21 having cushioning blocks 22 of resilient material disposed above and below. These cushioning blocks may be satisfactorily formed of fabric reinforced rubber. The clips also serve to sustain the thrust load as the screed is reciprocated, it being understood that the vibratory members are reciprocated with the screed.

In the preferred embodiment, the vibratory members are vibrated by means of the vibrating units 23 mounted on the brackets 24 on the vibratory members, these units comprising electric motors having rotors 25 provided with unbalancing weights 26. It will be noted that the axes of the rotors are disposed parallel with the vibratory members.

In Fig. 4 I indicate the concrete material at 27. The vibratory units set up high frequency vibrations in the vibratory members and this assumes an orbital path at the bottom of the vibratory members. The vibrations are imparted to the material as I have indicated by the circular dotted lines. The vibratory members are adapted to support a substantial mass of the concrete material treated as they are advanced against the same. The thrust of the material forces the vibratory members rearwardly so that the resilient thrust members 28 are brought into contact with the screed as shown in Fig. 4, these members 28 being of resilient material, fabric reinforced rubber having been found quite suitable.

These resilient thrust members do not objectionably dampen the movement of the vibratory members, and this connection and engagement with the screed results in imparting to the screed a modified vibration, that is, modified as compared to the intensity or amplitude of the vibrations imparted to the vibratory members. This modified vibratory action is indicated by the dotted lines 29, Fig. 4, the bottom of the screed being substantially vibrated as well as its front wall.

The space between the front plate of the screed and the vibratory member is open at the bottom and as the machine is advanced against the mass of concrete indicated at 27 it accumulates or "boils up" in front of the vibratory member, the vibration or action of which causes the concrete to become highly workable or semi-fluid. The larger portions of the aggregate are roughly struck off by the tubular portion 15 of the vibratory member to approximately the height of the forms. As the machine progresses an accumulation of concrete mortar or fines and some small aggregate occurs between the vibratory member and the face of the screed as indicated at 30, Fig. 1. This accumulation of concrete is of fluid-like consistency due to the vibratory action of the screed and the vibratory member which constitute walls for a relatively narrow reservoir or hopper. Due to the fluid-

like condition the material is under hydrostatic head with reference to the bottom of the screed.

As the screed advances voids are formed between the coarse aggregate which tend to settle to the bottom of the slab on account of the vibratory action of the vibratory member. The accumulated fine concrete in the reservoir tends to flow by gravity assisted by the vibration imparted by the screed member and the vibratory member to fill voids that may exist, providing a very effective surfacing composition. This feature of my invention is of particular value in the placement of paving slabs in which the mixture includes coarse aggregate. The result is that it is satisfactory to place very dry concrete mixtures or mixtures having substantially no-slump water content and including coarse aggregate, as stated.

In the embodiment shown in Figs. 5 and 6 the face plate of the screed is provided with strike-off blades 35 disposed in a forwardly inclined relation and terminating at their lower edges somewhat above the bottom of the screed.

With this arrangement of parts, the concrete material is so effectively vibrated that the machine may be operated rapidly and the vibrations of the screed proper are such that they do not injure the screed or cause displacement of the forms. As stated, the result is a machine of very large capacity.

In the embodiment shown in Fig. 5, the screed 31 has the vibratory unit 14 mounted thereon, this vibratory unit having an angle iron reinforcing bar 32 disposed with the horizontal arm projecting rearwardly.

In the embodiment shown in Fig. 6, the screed designated generally by the numeral 33 has the vibratory member 14 mounted thereon, this vibratory member having its lower edge bent forwardly and upwardly to provide a reinforcing bar or member 34. It will be understood that in addition to the reinforcement, these bars provide additional surface.

My concrete placing machine is of very large capacity—that is, the machine may be operated at higher speeds than has been found practical with machines embodying the invention of my Patent 2,219,246 in which the vibrating unit is mounted directly on the screed, the limitations of that machine being mainly in the demand for larger and heavier equipment and, as stated, the increased capacity or speed at which the machine travels.

The additional features of my present invention are of great importance.

I have illustrated certain adaptations or embodiments of my invention and it is believed that these disclosures will enable those skilled in the art to embody or adapt my improvements 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 of a screed adapted for forward advancement and reciprocating movement transversely of the path of forward travel, the screed comprising a bottom and a front member, a vibratory member disposed in front of and in spaced relation to the screed and adapted to support a substantial mass of material treated as the vibratory member is advanced, the space between the front member of the screed and said vibratory member being open at the bottom to permit the entry to and discharge therefrom of portions of

the material treated, means for vibrating said vibratory member at high frequency, supporting means for said vibratory member carried by said screed, and a resilient thrust member disposed between and engageable by said screed and said vibratory member whereby the vibratory member is advanced and reciprocated as the screed is advanced and reciprocated and said screed is also vibrated.

2. In a machine of the class described, the combination of a screed adapted for forward advancement and reciprocating movement transversely of the path of forward travel, a vibratory member disposed in front of and in spaced relation to the screed and adapted to support a substantial mass of material treated as the vibratory member is advanced, means for vibrating said vibratory member at high frequency, supporting springs for said vibratory member carried by said screed, and a resilient thrust member disposed between and engageable by said screed and said vibratory member whereby the vibratory member is advanced and reciprocated as the screed is advanced and reciprocated and said screed is also vibrated.

3. In a machine of the class described, the combination of a screed, a vibratory member disposed in front of and in spaced relation to the said screed and adapted to support a substantial mass of material treated as the vibratory member is advanced, means for supporting said vibratory member on said screed permitting vibration thereof, thrust means interposed between said vibratory member and screed, and means for vibrating said vibratory member at high frequency, said thrust means engaging the vibratory member and screed to transmit vibrations from said vibratory member to said screed.

4. In a machine of the class described, the combination of a screed, a vibratory member disposed in front of and in spaced relation to said screed and adapted to support a substantial mass of material treated as the vibratory member is advanced, supporting means for said vibratory member carried by said screed, means for vibrating said vibratory member mounted thereon, and vibration transmitting means interposed between and engaging said screed and said vibratory member in thrust transmitting relation thereto whereby the vibratory member is advanced as the screed is advanced and the screed is vibrated through vibrations transmitted from said vibratory member.

5. In a machine of the class described, the combination of a screed, a vibratory member disposed in front of and in spaced relation to the screed and adapted to support a substantial mass of material treated as the vibratory member is advanced, spring supporting means for said vibratory member carried by said screed, and resilient means between said vibratory member and screed and thrustingly engageable therewith for transmitting vibrations from said vibratory member to said screed.

6. In a machine of the class described, the combination of a screed, a plate-like vibratory member disposed in front of said screed adapted to support a substantial mass of material treated as the screed is advanced, means for supporting said vibratory member permitting vibratory movement thereof, means for imparting high frequency vibration to said vibratory member, and means interposed between said vibratory member and said screed and thrustingly engageable therewith whereby said screed is vi-

brated at substantially less amplitude than said vibratory member.

7. In a structure of the class described, the combination of a horizontally disposed plate-like vibratory member adapted to support a substantial mass of material treated as the vibratory member is advanced, said vibratory member having a forwardly projecting reinforcing bar secured to the lower edge thereof, a support for said vibratory member, supporting springs for said vibratory member mounted on said support, said springs being secured to said vibratory member adjacent the upper edge thereof, means for vibrating said vibratory member at high frequency, and a resilient thrust member disposed between said vibratory member and its said support whereby when the support is advanced the vibratory member is advanced and vibratory action of the vibratory member is permitted.

8. In a machine of the class described, the combination of a screed, a vibratory member disposed in front of said screed in spaced relation and adapted to support a substantial mass of material treated as the vibratory member is advanced, supporting springs for said vibratory member permitting its vibration, means for vibrating said vibratory member at high frequency, and a resilient thrust member disposed between said screed and said vibratory member whereby the vibratory member is advanced as the screed is advanced and the screed is also vibrated, the screed being provided with a face adapted to support a substantial mass of the material treated.

9. In a machine of the class described, the combination of vibrated screed, provided with a face plate vibratory member disposed in front of and in spaced relation to said screed and adapted to support a substantial mass of concrete treated as the vibratory member is advanced, supporting means for said vibratory member permitting vibration thereof, and means for vibrating said vibratory member at high frequency, the width of the space between said screed and vibratory member being of the order of six inches and open at the bottom and constituting a reservoir in which fines of the concrete mixture treated accumulate in a fluid-like condition and subject to the vibrations of said screed and said vibratory member to provide a substantial head and from which reservoir they are discharged as the screed is advanced.

10. In a machine of the class described, the combination of a screed, a vibratory member disposed in front of and in spaced relation to said screed and adapted to support a substantial mass of concrete treated as the vibratory member is advanced, supporting means for said vibratory member permitting vibration thereof, means for vibrating said vibratory member at high frequency, and vibration transmitting means between said vibratory member and said screed whereby the screed is vibrated through vibrations transmitted from said vibratory member, the space between said screed and vibratory member being open at the bottom and constituting a reservoir in which fines of the concrete mixture treated accumulate in a fluid-like condition to provide a substantial head and from which they are discharged as the screed is advanced.

11. In a machine of the class described, the combination of a screed adapted to be supported by and reciprocated on forms for the material treated as the screed is advanced, said screed be-

ing provided with a face plate, a vibratory member disposed in front of and in spaced parallel relation to the screed and also adapted to rest upon the form as it is advanced and reciprocated, said vibratory member being adapted to rearwardly support a substantial mass of material treated as it is advanced against the material, means for supporting said vibratory member for advancement and reciprocation with said screed and to permit high frequency vibration thereof while it is being advanced and reciprocated, means for vibrating said vibratory member at high frequency, and means for transmitting modified vibrations from said vibratory member to said screed, the space between the face plate of the screed and the said vibratory member constituting a narrow reservoir open at the bottom and extending substantially the length of the screed and in which the fines of the concrete mixture treated accumulate in a fluid-like condition to provide a substantial head of fines for the screed surface.

12. In a machine of the class described, the

combination of a vibrated screed, said screed being provided with a face plate adapted to rearwardly support a substantial mass of material treated as it is advanced, a vibratory member disposed in front of and in spaced parallel relation to the screed, said vibratory member being adapted to rearwardly support a substantial mass of material treated as it is advanced against the material, means for supporting said vibratory member for advancement with said screed and to permit high frequency vibration thereof while it is being advanced and reciprocated, and means for vibrating said vibratory member at high frequency, the space between the face plate of the screed and the said vibratory member constituting a narrow reservoir open at the bottom and extending substantially the length of the screed and in which the fines of the concrete mixture treated accumulate in a fluid-like condition to provide a substantial head of fines for the screed surface.

CORWILL JACKSON.