

March 4, 1941.

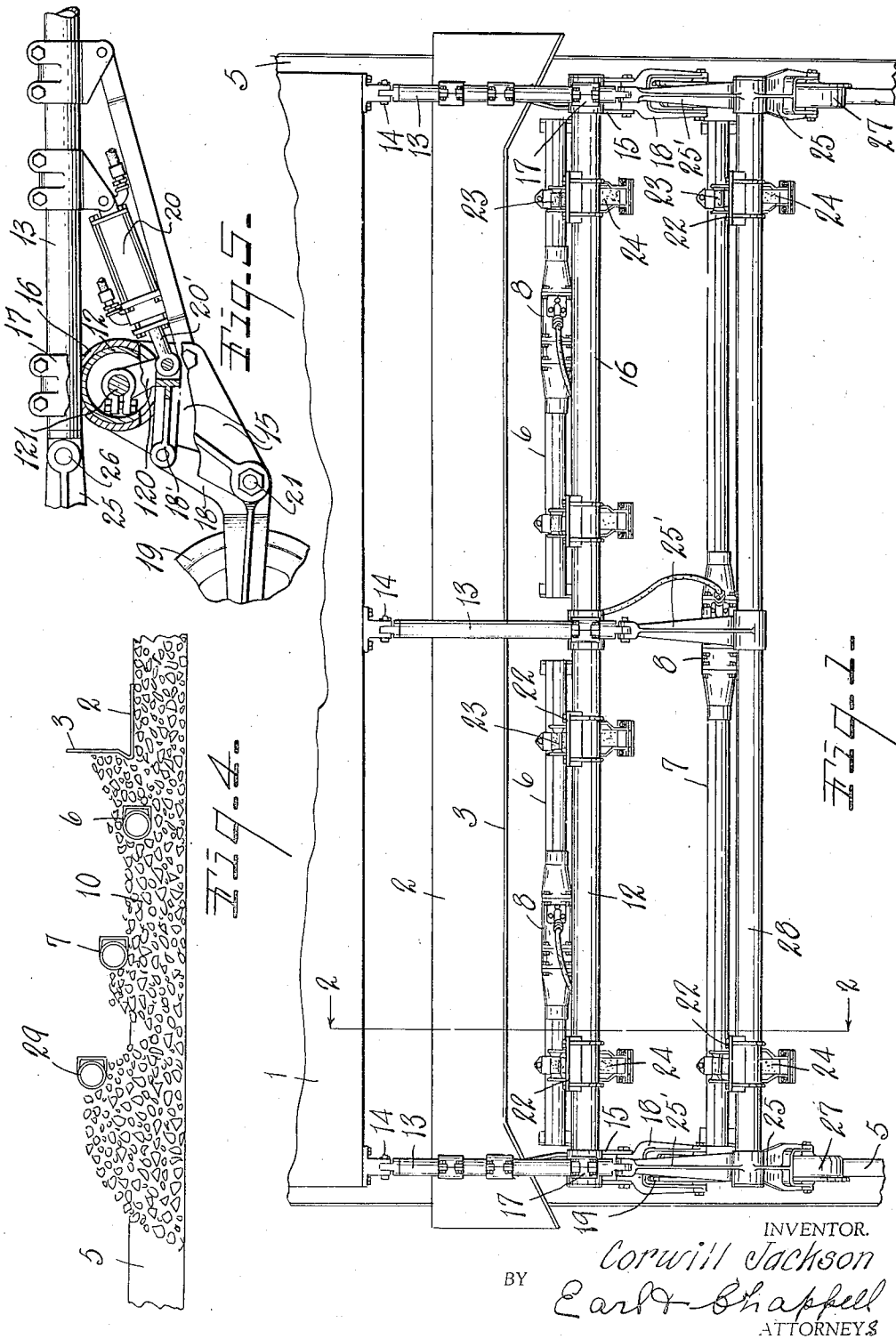
C. JACKSON

2,233,833

CONCRETE PLACEMENT APPARATUS .

Filed Nov. 5, 1938

2 Sheets-Sheet 1



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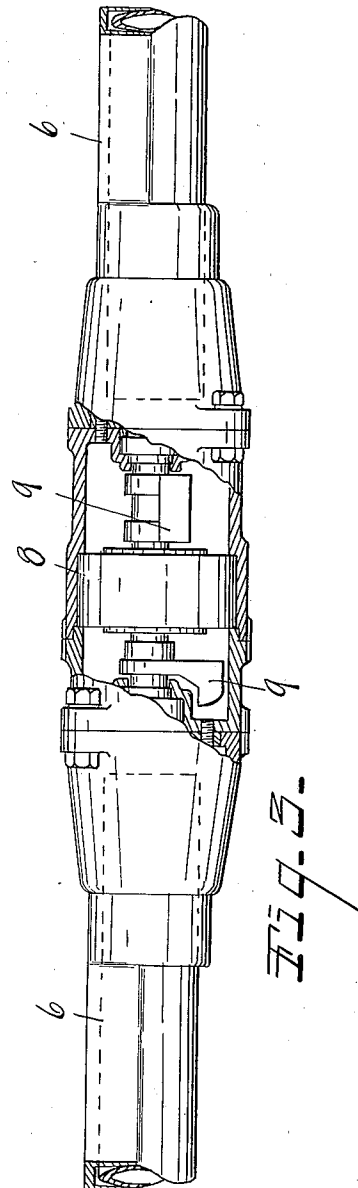
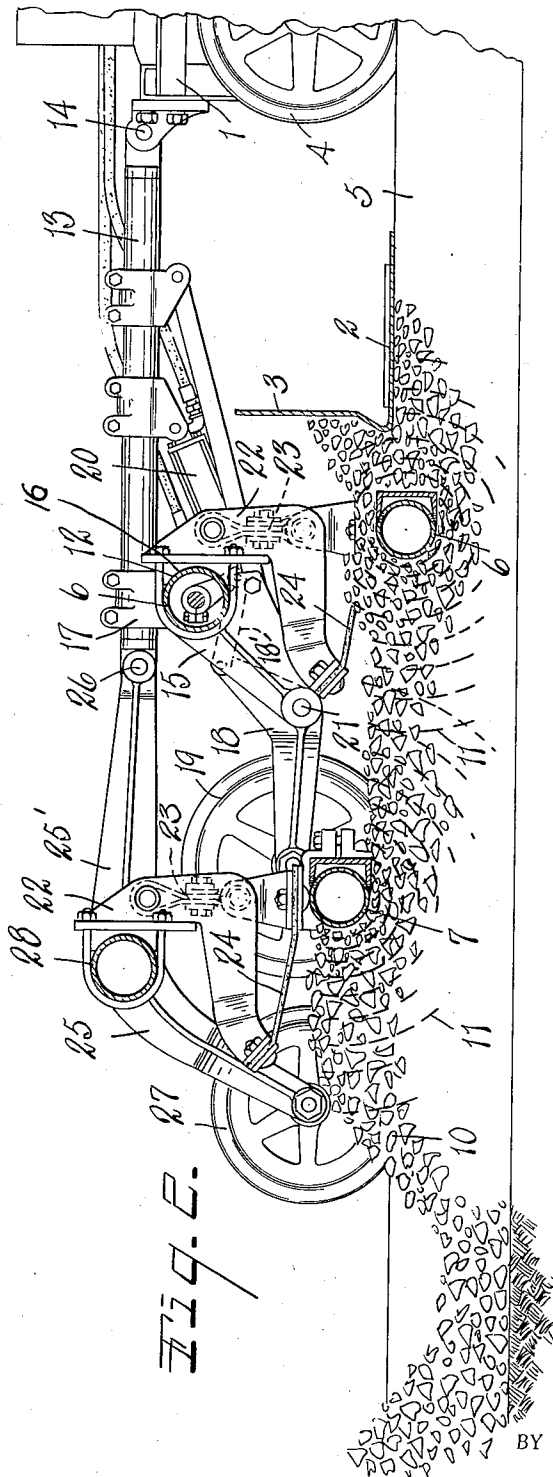
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2 Sheets-Sheet 2



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2,233,833

CONCRETE PLACEMENT APPARATUS

Corwill Jackson, Ludington, Mich.

Application November 5, 1938, Serial No. 238,964

11 Claims. (Cl. 94—48)

This invention relates to improvements in concrete placement apparatus.

The main objects of this invention are:

First, to provide a concrete placement machine or apparatus for the placement of concrete such as pavement, concrete slabs, walls of ditches or conduits, and the like which is of large capacity and highly efficient.

Second, to provide a machine or apparatus of this character which is particularly well adapted for the placement of concrete having very low water content and the practicing of the method of my Patent 1,787,449 issued January 6, 1931 for Method of forming and molding concrete.

Third, to provide a machine or apparatus of the character described minimizing manual labor.

Fourth, to provide a machine or apparatus of the character described which results in a superior treatment and placement of concrete and insures that the entire mass of concrete is effectively subjected to vibrations necessary to practice my said method patent.

Fifth, to provide an improved method of placing concrete pavements and similar slabs.

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 plan view of a machine or apparatus embodying my invention in operative relation to pavement forms, various parts of the machine or apparatus being omitted for convenience in clarity of illustration, other parts being conventionally shown for the same reason and for the sake of clarity.

Fig. 2 is a fragmentary view partially in vertical section on line 2—2 of Fig. 1 showing a preferred form of my invention or apparatus in operative relation to a mass of concrete being treated and placed, certain parts being again conventionally illustrated and other parts omitted for the sake of convenience and clarity of illustration.

Fig. 3 is a fragmentary plan view partially in section showing details of one of the elongated horizontally disposed vibratory elements.

Fig. 4 is a diagrammatic view illustrating a modified form or embodiment of my invention in which there are a series of three of the vibratory elements disposed in trailing or tandem relation.

Fig. 5 is a view partly in vertical section showing structural details of the means for raising and lowering the main vibratory element carrying frame.

The embodiment of my invention illustrated embodies various features of the structure shown in my application for Letters Patent filed October 14, 1938, Serial No. 234,918 and I have accordingly illustrated only such features of a completed machine as I deem necessary to illustrate a practical embodiment of the invention of this application.

It is now quite widely recognized that concrete resulting from the practice of the method of my patent above referred to is highly desirable for pavements, and the specifications of many States for example, specify the placement by the method disclosed in my patent. Such concrete is very difficult to handle manually even in the matter of fairly uniform placement on the foundation—that is, it is commonly dumped in piles from the mixer, each batch of the mixer being delivered more or less in a pile, the mixer being operated in advance of the paving machine. Large capacity mixers are now on the market. The low water content of the concrete mixture frequently with aggregate of considerable size is not only difficult to spread manually but offers very great resistance to the advancement of the paving machine in which the vibratory element is operated in submerged relation—for example, as shown in my said application for Letters Patent.

My present invention has for one of its objects the minimizing or substantial elimination of the manual labor in the spreading of the concrete mix to be treated, also the increasing capacity of the paving machine, the reducing of the power necessary to operate the machine, and insuring that all of the concrete mix is effectively vibrated.

In the embodiment illustrated, 1 represents the carriage of a paving machine provided with a screed 2 having a face plate 3 adapted to support a substantial mass of concrete as is indicated in Figs. 2 and 4. The mountings for the screed are not illustrated as such mountings form no part of this invention. It will be understood that the screed is advanced with the advancement of the carriage 1.

The carriage 1 is provided with carrying wheels 4 adapted to travel on the longitudinal pavement form members 5. Elongated horizontally disposed vibratory members designated generally by the numerals 6 and 7 are preferably of the type described in my said application for

Letters Patent and they preferably include the motors 8, the shafts of which are provided with unbalancing weights 9. These motors are adapted to produce high frequency vibrations of the vibratory elements, preferably at least 3600 R. P. M., and they are preferably supported for vibratory movement in an orbital path. It will be understood that large amplitude vibrations are not required nor do I consider them desirable.

The vibratory members 6 and 7 are disposed in spaced relation so as to be advanced forwardly against the mass of concrete being treated, indicated at 10, and they are supported in spaced relation, the spacing being preferably such that the vibrations, indicated by the concentric dotted lines 11, merge.

The vibratory element 6 is so spaced or positioned relative to the screed that the screed acts not only to support part of the material while acted upon by the element 6 but acts upon the material while it is subject to the vibrations of the element 6. The space between the elements 6 and 7 is open or unobstructed so that the material is free to move between them which it normally does in action with a boiling-like agitation.

The first or advance vibratory element is disposed in a plane substantially above the plane of the trailing vibratory element and is advanced into the harsh concrete mixture, serving to partially reduce it to initially workable form and to spread or level it so that the work required of the trailing vibratory element is much reduced and this permits a more rapid advancement of the machine as well as avoiding manual labor which is otherwise necessary for the fairly uniform spreading of the concrete mass and, as stated, this is very difficult owing to its harsh or low water content. If any spreading is desired after the material has been subjected to the action of the first vibratory element, it may be done without severe manual labor.

The rear vibratory element is preferably mounted for vertical adjustment—first, in order to insure that it be properly positioned to thoroughly vibrate the mass and properly support it in submerged position relative to the screed, and second, that it is necessary to raise and lower it to pass the transverse joints of the pavement and the operating position so far as elevation is concerned is sometimes determined by the reinforcing elements within the concrete.

The main vibrating element carriage designated generally by the numeral 12 is that illustrated in my said application and comprises the push rods 13 which are pivotally mounted at 14 on the carriage 1 for vertical swinging movement. The frame further comprises the end members 15 and the tubular cross member 16, the end members being mounted on the push rod by means of clamps 17. The end members carry the bellcrank-shaped wheel support 18 having wheels 19 on their forwardly projecting arms adapted to travel on the forms 5. These supports 18 are connected by the links 18' to the hydraulic actuating means designated generally by the numeral 20 and adapted to rock the wheel supports on their pivots 21 thereby raising or lowering the frame and consequently the vibratory elements carried thereby. The plunger rod 20' is connected to the link 18' and to the arm 120 on the rock shaft 121, the rockshaft having an arm 120 at its other end connected to the wheel support 18 through a link 18' so that a single hydraulic unit serves to actuate

both wheel supports 18 simultaneously and uniformly.

There are preferably two of the vibratory elements 6 disposed in end to end relation as shown in Fig. 1. These are mounted on the brackets 22 by means of the flexible non-resilient hangers 23 and the flexible non-resilient draft members 24 so that when vibrated as a result of the unbalanced rotor, the vibratory elements are free to vibrate in an orbital path and at high frequency. This specific mounting is the subject matter of claims in my said application.

The vibratory member 7 which for convenience I designate as an auxiliary vibratory member is mounted on a carriage designated generally by the numeral 25 and provided with rearwardly projecting arms 25' pivotally mounted at 26 on the forward end of the push bars 13. The auxiliary carriage 25 is provided with wheels 27 adapted to travel on the form members 5. The auxiliary carriage is provided with a cross member 28 and carrying brackets 22 from which the vibratory element 7 is suspended as has been described for the element 6.

With the parts thus arranged, the vibratory elements act successively upon the material treated as has been described, the first element serving to partially vibrate and reduce the material to a spreadable condition and to spread the same so that the material is uniformly acted upon by the following vibratory element.

In the embodiment shown in Fig. 3, a third vibratory element 29 is provided, that being supported to be advanced in a plane somewhat above the element 7.

With this arrangement of the vibratory elements, I provide a machine or apparatus which may be operated very rapidly—that is, may be advanced rapidly to the work and at the same time the material is effectively treated. The machine or apparatus further practically eliminates the very arduous labor that has been required to partially level off the piles of concrete as they are normally discharged upon the foundation either from a truck or from the mixer.

I have not attempted to illustrate or describe various modifications or adaptations of my improvements as it is believed that this disclosure 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 an apparatus of the class described, the combination with a main carriage adapted to travel on form members, of a screed propelled with said carriage and provided with a face plate adapted to support a substantial mass of the material treated, a vertically adjustable vibratory element carrying frame comprising push bars pivotally mounted on said main frame to project forwardly therefrom, said frame being provided with wheels adapted to travel on the form members, an elongated submersible main vibratory element disposed horizontally in front of said screed, means on said frame for supporting said main vibratory element, means for vibrating said vibratory element at high frequency, a wheeled auxiliary frame adapted to travel on the form members and pivotally mounted on the forward ends of said push bars, a horizontally disposed auxiliary vibratory element disposed in front of said main vibratory element, means for supporting said auxiliary vibratory element on said auxiliary frame, and means for vibrating

said auxiliary vibratory element, said vibratory elements being spaced relative to each other so that the main vibratory element acts upon the material while it is in a fluid condition as a result of the action of the auxiliary vibratory element upon the material and the main vibratory element being spaced relative to the screed so that the screed acts upon the material while it is in a fluid condition as a result of the action of the vibratory elements thereon.

2. In an apparatus of the class described, the combination with a main carriage, of a screed propelled with said carriage and provided with a face plate adapted to support a substantial mass of the material treated, a vertically adjustable vibratory element carrying frame, an elongated submersible main vibratory element disposed horizontally in front of said screed, means on said frame for supporting said main vibratory element, means for vibrating said vibratory element, an auxiliary frame articulated to said vibratory element carrying frame, a horizontally disposed auxiliary vibratory element disposed in front of said main vibratory element, means for supporting said auxiliary vibratory element on said auxiliary frame, and means for vibrating said auxiliary vibratory element, said vibratory elements being spaced relative to each other so that the main vibratory element acts upon the material while it is in a fluid condition as a result of the action of the auxiliary vibratory element upon the material and the main vibratory element being spaced relative to the screed so that the screed acts upon the material while it is in a fluid condition as a result of the action of the vibratory elements thereon.

3. In an apparatus of the class described, the combination of an elongated horizontally disposed submersible main vibratory element mounted for vertical adjustment, means for vibrating said vibratory element, an elongated horizontally disposed auxiliary vibratory member disposed in front of said main vibratory element and mounted for advancement at a predetermined elevation relative to said main vibratory element, and means for vibrating said auxiliary vibratory element, said auxiliary vibratory element being adapted to act upon the mass in advance of the main vibratory element and in such relation thereto that the vibratory impulses of the material of the main and auxiliary vibratory elements merge.

4. In an apparatus of the class described, the combination of an elongated submersible main vibratory element disposed transversely to its path of travel and for vibration in a substantial range of vertical adjustments, and an auxiliary horizontally disposed elongated vibratory element disposed in advance of said main vibratory element and disposed transversely of its path of travel and in a plane substantially above an operative plane of the main vibratory element and in such relation thereto as to act upon the material treated in advance of the action thereon of the main vibratory element, said main and auxiliary vibratory elements being spaced relative to each other so that the main vibratory element acts upon the material treated while it is still subject to the vibratory impulses of the auxiliary vibratory element.

5. In an apparatus of the class described, the combination of a plurality of elongated vibratory elements disposed horizontally and transversely of the path of travel thereof for advancement in different planes relative to the vertical, one of

said vibratory elements being mounted for vertical adjustment relative to the plane of advancement of the other vibratory element, and means for vibrating said vibratory elements at high frequency and in orbital paths, said elements being in such relation to each other that the vibratory impulses imparted to the material treated by the vibratory elements merge.

6. In an apparatus of the class described, the combination of a plurality of elongated vibratory elements disposed horizontally and transversely of the path of travel thereof for advancement in different planes relative to the vertical, one of said vibratory elements being mounted for vertical adjustment relative to the plane of travel of the other vibratory element, and means for vibrating both of said vibratory elements at high frequency, the spaced relation of said vibratory elements being such that the trailing vibratory element acts upon the material acted upon by the first vibratory element while the material is in the fluid or semi-fluid condition produced therein by the first vibratory element.

7. In an apparatus of the class described, the combination with translating means, of a plurality of tubular vibratory elements disposed horizontally and transversely of the path of travel for simultaneous advancement and in a predetermined relation one in advance of another to each other, and vibrating means carried by each element, the trailing vibratory element being mounted for vertical adjustment and being adapted to operate in a plane substantially below the plane of the leading vibratory element and so that it acts upon the material treated immediately after the leading vibratory element has acted thereon and prior to the material coming to a state of rest.

8. An apparatus for treating concrete of low water content in situ comprising a plurality of elongated vibratory elements disposed horizontally and transversely of the path of travel for simultaneous advancement, one in advance of the other, the trailing vibratory element being submersible in the material treated and mounted for vertical adjustment and operation in different positions of vertical adjustment, and means for independently vibrating said vibratory elements at high frequency, said vibratory elements being spaced relative to each other so that the trailing vibratory element acts upon the material treated while it is still in the fluid or semi-fluid condition induced therein by the action of the first element upon the material.

9. In an apparatus for making concrete pavements and the like, the combination of a series of elongated horizontally disposed vibratory elements mounted for simultaneous advancement in different horizontal planes, at least one of said members being submersible, and means for simultaneously vibrating the elements at high frequency, the elements being so spaced relative to each other than one vibratory element acts upon the material acted upon by the preceding vibratory element while the material is in a fluid or semi-fluid condition as a result of the action thereon of the preceding element, there being an unobstructed space between the vibratory elements to permit free movement of the material between them.

10. In an apparatus of the class described, the combination of a screed provided with a face plate adapted to support a substantial mass of the material treated, an elongated submersible main vibratory element disposed horizontally in

front of said screed, means for vertically adjusting said main vibratory element relative to said screed and supporting it for vibratory action in its adjusted positions, means for vibrating said
 5 main vibratory element, an elongated submersible horizontally disposed auxiliary vibratory element disposed in front of said main vibratory element, means for supporting said auxiliary vibratory element for vertical adjustment and for
 10 vibratory action in its adjusted positions, means for vibrating said auxiliary vibratory element, said auxiliary vibratory element being adapted and acting to produce a fluid or semi-fluid condition in the mass treated and said main vibra-
 15 tory element being so spaced relative to the auxiliary vibratory element and to the screed that the main vibratory element acts upon the material acted upon by the auxiliary vibratory element while the material is in the fluid or semi-
 20 fluid condition produced therein by the auxiliary vibratory element and the screed acts upon the material acted upon by the vibratory elements while it is in the fluid or semi-fluid condition produced therein by the combined action of said vibratory elements.

11. In an apparatus of the class described, the combination of a screed provided with a face plate adapted to support a substantial mass of the material treated, an elongated submersible
 5 main vibratory elements disposed horizontally in front of said screed, means for vibrating said main vibratory element, an elongated submersible horizontally disposed auxiliary vibratory element disposed in front of said main vibratory element,
 10 and means for vibrating said auxiliary vibratory element, said auxiliary vibratory element being adapted and acting to produce a fluid or semi-fluid condition in the mass treated and said main
 15 vibratory element being so spaced relative to the auxiliary vibratory element and to the screed that the main vibratory element acts upon the material acted upon by the auxiliary vibratory
 20 element while the material is in the fluid or semi-fluid condition produced therein by the auxiliary vibratory element and the screed acts upon the material acted upon by the vibratory elements while it is in the fluid or semi-fluid condition produced therein by the combined action of said vibratory elements.

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