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VIBRATORY BACK FILL COMPACTER

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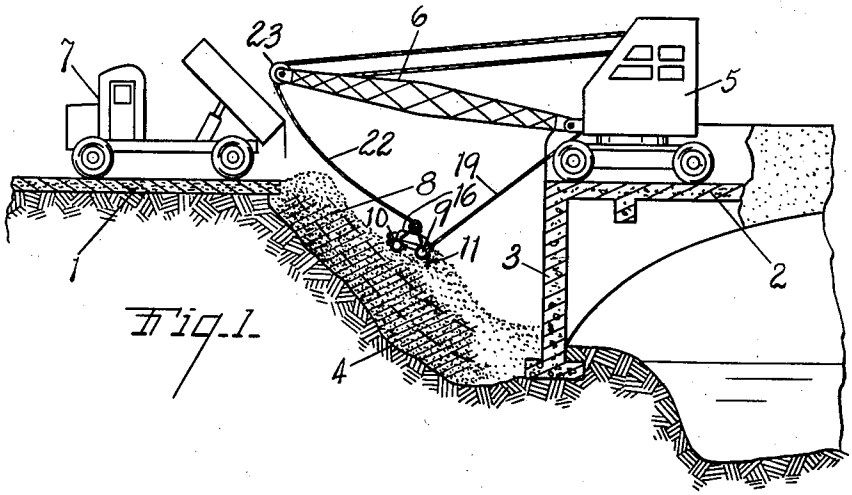


Fig. 1

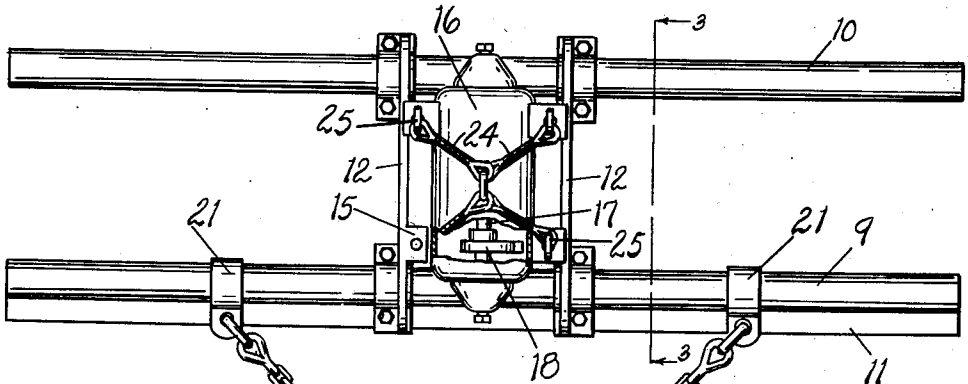


Fig. 2

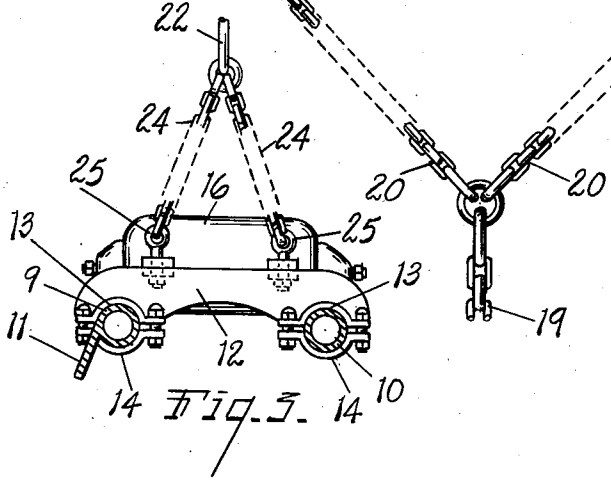


Fig. 3

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VIBRATORY BACKFILL COMPACTER

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16 Claims. (Cl. 259—1)

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This invention relates to improvements in a vibratory back fill compacter.

The main objects of this invention are:

First, to provide a machine which is highly efficient for use in compacting masses of material such as "back fills" and the like.

Second, to provide a machine for the purpose stated which may be effectively operated by a crane.

Third, to provide a compacting machine for loose material which is adapted to spread the material and also compact it in a cavity of substantial size which, at the same time, does not prevent effective use of scrapers and other improvements commonly used in distributing gravel or earth.

Fourth, to provide a machine which has a combined "bull-dozer" and vibratory action on the material worked upon.

Further objects and advantages pertaining to the details and economies of this invention will be apparent from the description to follow. The invention is further pointed out in the claims.

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

Fig. 1 is a fragmentary side elevation of a machine embodying my invention illustrated in operative relation to a mass of back fill material between a highway slab and a bridge abutment.

Fig. 2 is a fragmentary plan view of a machine embodying my invention.

Fig. 3 is a transverse section on a line corresponding to line 3—3 of Fig. 2, the lifting cable being partially broken away.

In the building of bridges and the like it is common practice to make a considerable cavity at the end of the last abutment of the bridge and considerable difficulty has been experienced in placing the back fill material, so called, so that it is not likely to settle and so that it provides a good support for the superimposed paving section. Usually a large amount of hand labor is required in the placement of this back fill material even with the undersirable result or condition stated.

In the accompanying drawings, 1 represents a pavement and 2 a bridge and 3 an abutment or pier at one end of the bridge. The cavity 4 is formed in the highway bed to permit erection of the bridge and particularly the end abutment or pier thereof. 5 represents a crane and 6 the boom thereof. The truck 7 is illustrated to show the manner in which the back fill material 8 is delivered into the cavity 4.

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The machine of my invention comprises front and rear elongated vibratory members 9 and 10 respectively, the front member being provided with a longitudinal blade 11 preferably disposed tangentially thereto and for spreading the earth in advance of the vibratory members. The vibratory members illustrated are formed of pieces or section of pipe and are of cylindrical section. These vibratory members are connected in spaced trailing relation by the cross bars or members 12 having downwardly facing seats 13 therein adapted to receive the vibratory members, the vibratory members being secured in these seats by the clamps 14. The front vibratory member is supported for rotative adjustment whereby the angle of its blade 11 may be varied relative to the vertical. The bars 12 are provided with seats 15 for the motor 16, the rotor 17 of which is provided with an unbalancing weight 18.

In this embodiment illustrated, the axis of the rotor is disposed transversely of the vibratory members. I have not illustrated the electrical connections for the motor which would ordinarily be in the form of a flexible cable. The propelling draft cable 19 is secured to the front vibratory member by means of the rearwardly diverging hitch members 20 connected to the front vibratory member by the clamps or clevises 21 spaced substantially at each side of the longitudinal center of the machine so that the draft cable 19 tends to propel the machine with the vibratory members in right angle relation or transversal to the line of draft. The cable 19 is desirably controlled by a drum or winch in the crane, not illustrated. It will be understood, however, that other means for propelling the machine might be used, but propelling by means of a cable is desirable in view of the uneven and loose character of the material that is to be handled or compacted.

The lifting cable 22 extends over the pulley 23 on the end of the boom 6 and is connected to the machine by means of the four downwardly diverging hitch members 24 which are connected to eyes of the eye bolts 25. These eye bolts in the structure illustrated also serve to secure the motor to the motor seats 15 on the cross bars. This arrangement provides a centered connection for the lifting cable to the machine so that the machine may be lifted or drawn back to the top of the fill as may be desired either to work upon and distribute a fresh load or for repeated passes over the fill material.

The vibratory members are submersible and automatically become substantially submerged in soft material as it is introduced into the fill, the

blade projecting downwardly therein so that the material is worked down toward the bottom of the fill as the machine is propelled forwardly. It will be appreciated that as the material is compacted the tendency of the vibratory members to embed themselves is lessened. The machine is highly efficient in the placement of back fill material and may be employed to substantially eliminate hand labor in the distribution and compacting of the material in the back fill cavity. The material is compacted to such an extent that the pavement may be immediately laid over the material without the likelihood of the pavement becoming displaced as a result of settling of the fill material. The machine is adapated for use in distributing and compacting materials in various other relations where bull-dozing and compacting action is desirable.

I have illustrated and described my invention in a highly practical embodiment thereof. I have not attempted to illustrate or describe certain modifications and adaptations which I contemplate as it is believed that 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. In a machine of the class described, the combination of spaced parallel elongated front and rear vibratory members of cylindrical section, the front member being provided with a downwardly projecting earth digging and spreading blade extending lengthwise said front member and disposed tangentially thereof, cross bars rigidly connecting said vibratory members, said cross bars being spaced longitudinally of the vibratory members and being disposed centrally relative thereto, the front vibratory member being rotatably connected to said cross bars whereby the angle of the blade to the vertical may be varied to vary the digging and spreading action of said blade, a motor provided with an unbalanced rotor mounted on said cross bars with its axis disposed transversely of the vibratory members, a draft cable having rearwardly diverging hitch members connected to said front vibratory member in substantially spaced relation to the longitudinal center thereof, and a lifting cable connected to said cross bars by four diverging hitch members whereby the lifting cable is substantially centered relative to the assembled parts, the unbalanced rotor being disposed within the angle formed by the lines of direction of said diverging hitch members of the draft cable.

2. In a machine of the class described, the combination of spaced parallel elongated front and rear vibratory members, the front member being provided with a downwardly projecting earth digging and spreading blade extending lengthwise said front member, cross bars rigidly connecting said vibratory members, said cross bars being spaced longitudinally of the vibratory members and being disposed centrally relative thereto, a motor provided with an unbalanced rotor mounted on said cross bars, a draft cable having rearwardly diverging hitch members connected to said front vibratory member in substantially spaced relation to the longitudinal center thereof, and a lifting cable connected to said cross bars by four diverging hitch members whereby the lifting cable is substantially centered relative to the assembled parts, the unbalanced rotor being disposed within the angle formed by the lines of direction of said diverging hitch members of the draft cable.

3. In a machine of the class described, the combination of spaced parallel elongated front and rear vibratory members, the front member being provided with a downwardly projecting earth digging and spreading blade extending lengthwise said front member, cross bars connecting said vibratory members, the front vibratory member being adjustably connected to said cross bars whereby the angle of the blade may be varied to vary the digging and spreading action of said blade, a motor provided with an unbalanced rotor mounted on said cross bars, a draft means, and a lifting cable.

4. In a machine of the class described, the combination of spaced parallel elongated front and rear vibratory members, the front member being provided with a downwardly projecting earth digging and spreading blade extending lengthwise said front member, cross bars connecting said vibratory members, a motor provided with an unbalanced rotor mounted on said cross bars, and means for propelling said vibratory members while they are in supported relation to the work.

5. In a machine of the class described, the combination of elongated front and rear submersible vibratory members, the front member being provided with a downwardly projecting earth digging and spreading blade extending lengthwise said front member, cross members rigidly connecting said vibratory members, the front vibratory member being rotatably connected to said cross members whereby the angle of the blade to the vertical may be varied to vary the digging and spreading action of said blade, a motor provided with an unbalanced rotor mounted on said cross members, a draft cable connected to said front vibratory member in draft balancing relation thereto, and a lifting cable connected to said vibratory members in lifting balancing relation thereto.

6. In a machine of the class described, the combination of elongated front and rear submersible vibratory members, cross members rigidly connecting said vibratory members, a motor provided with an unbalanced rotor mounted on said cross members, a draft cable connected to said front vibratory member in draft balancing relation thereto, and a lifting cable connected to said vibratory members in lifting balancing relation thereto.

7. In a machine of the class described, the combination of elongated front and rear vibratory members, the front member being provided with a downwardly projecting earth digging and spreading blade extending lengthwise said front member, cross bars rigidly connecting said vibratory members, the front vibratory member being rotatably connected to said cross bars whereby the angle of the blade to the vertical may be varied to vary the digging and spreading action of said blade, and an unbalanced rotor mounted on said cross bars.

8. In a machine of the class described, the combination of elongated submersible vibratory members connected at spaced trailing relation, the front member being provided with a downwardly projecting earth digging and spreading blade extending lengthwise said front member and being rotatably mounted whereby the angle of the blade to the vertical may be varied to vary the digging and spreading action of said blade,

and means carried by said vibratory members for imparting high frequency vibration thereto.

9. In a machine of the class described, the combination of elongated vibratory members connected at spaced trailing relation, the front member being provided with a downwardly projecting earth digging and spreading blade extending lengthwise said front member, and means carried by said vibratory members for imparting high frequency vibration thereto.

10. In a machine of the class described, the combination of elongated submersible vibratory members connected at spaced trailing relation, the front member being provided with a downwardly projecting earth digging and spreading blade extending lengthwise said front member and being rotatably mounted whereby the angle of the blade to the vertical may be varied to vary the digging and spreading action of said blade, means carried by said vibratory members for imparting high frequency vibration thereto, a draft cable for said vibratory members, and a lifting cable for said vibratory members.

11. In a machine of the class described, the combination of elongated submersible vibratory members connected in spaced trailing relation, one of the members being provided with a downwardly projecting earth digging and spreading blade extending lengthwise said member, means for vibrating said vibratory members, and means for propelling said vibratory members while the machine is supported by the material treated.

12. In a machine of the class described, the combination of elongated submersible vibratory members connected in spaced trailing relation, one of the members being provided with earth digging and spreading means projecting downwardly from said member and disposed lengthwise thereof, and means for vibrating said vibratory members at high frequency.

13. In a machine of the class described comprising an elongated submersible vibratory member of cylindrical section having a downwardly projecting longitudinally extending earth spreading blade disposed tangentially thereon, said vibratory member being mounted for rotative adjustment whereby the angle of the blade to the vertical may be varied to vary the digging and spreading action of said blade, means for vibrating said vibratory member, and flexible means for propelling the member while it is floatingly supported by the material treated.

14. In a machine of the class described comprising an elongated submersible vibratory member having earth digging and spreading means projecting downwardly from said member and disposed lengthwise thereof, means for vibrating said vibratory member, and means for propelling the said member and said digging and spreading means thereon sidewise and with said digging and spreading means projecting downwardly while the member and said digging and spreading means are floatingly supported by the material treated.

15. In a machine of the class described, the combination of elongated vibratory members, one of which is provided with a downwardly projecting earth digging and spreading blade extending lengthwise said member, said members being connected in trailing relation and being adapted to be supported by the material treated, means for vibrating said vibratory members at high frequency carried thereby, means for propelling said vibratory members flexibly connected thereto, and means for lifting said vibratory members flexibly connected thereto.

16. In a machine of the class described, the combination of elongated vibratory members, one of which is provided with a downwardly projecting earth digging and spreading blade extending lengthwise said member, said members being connected in trailing relation and being adapted to be supported by the material treated, and means for vibrating said vibratory members at high frequency carried thereby.

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