

June 23, 1936.

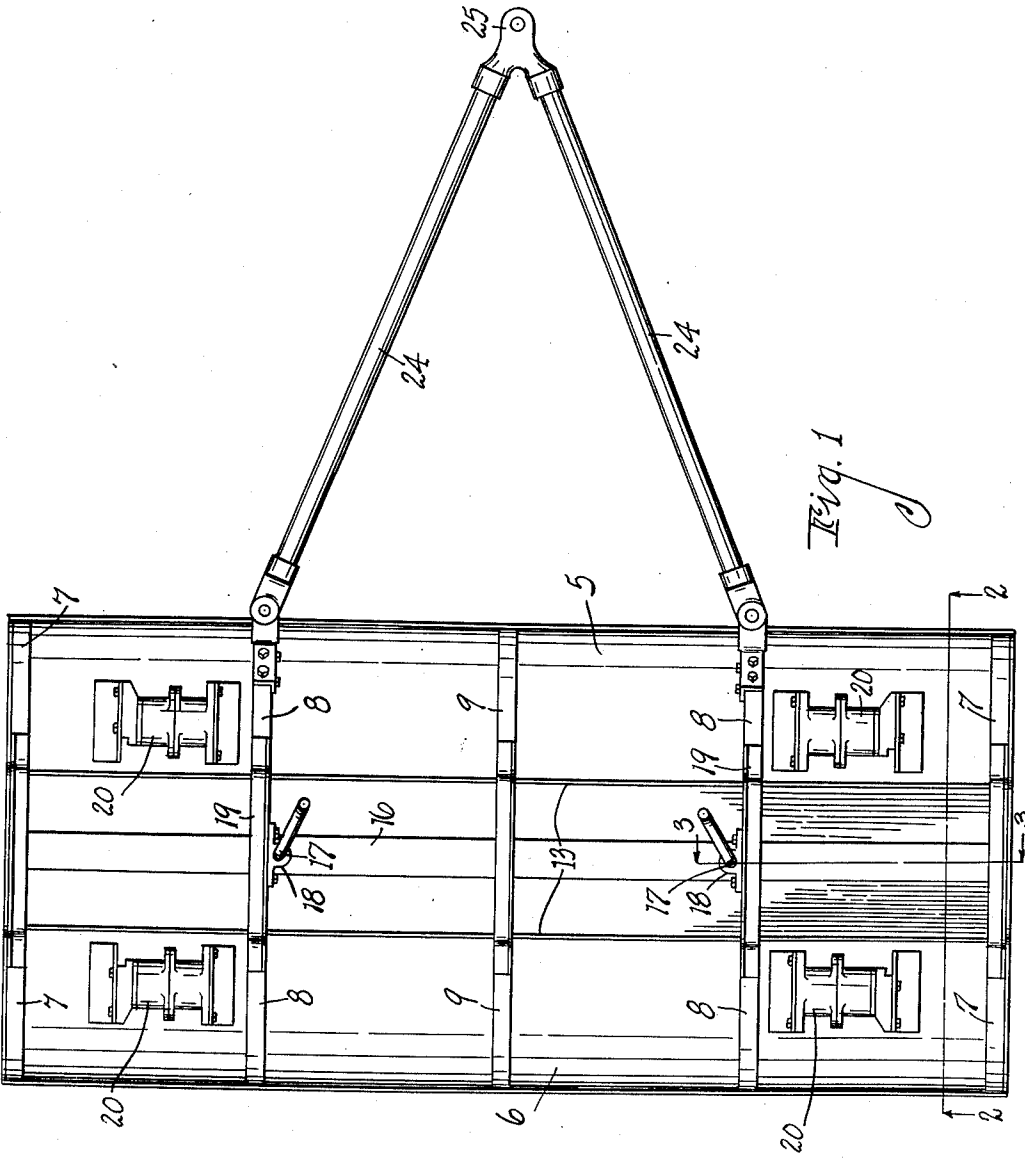
C. JACKSON

2,044,883

PAVING MACHINE

Filed Sept. 5, 1933

4 Sheets-Sheet 1



INVENTOR
Corwill Jackson
BY
Chappell Earl
ATTORNEY S

June 23, 1936.

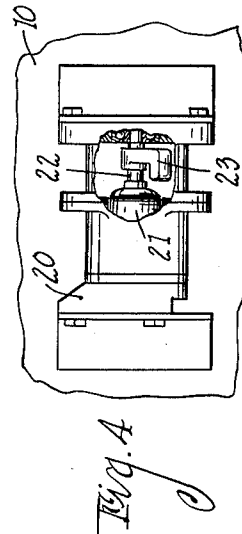
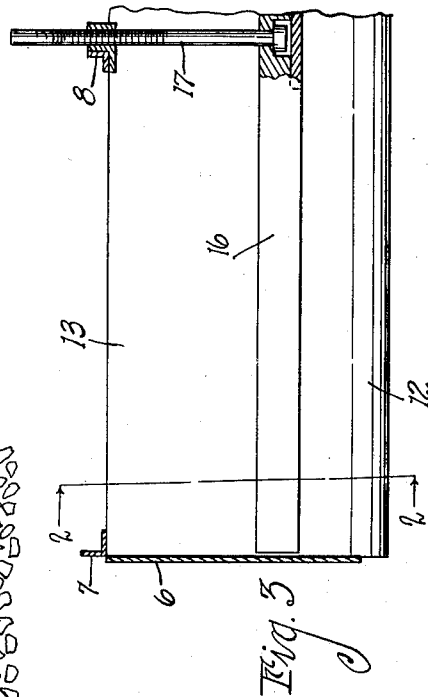
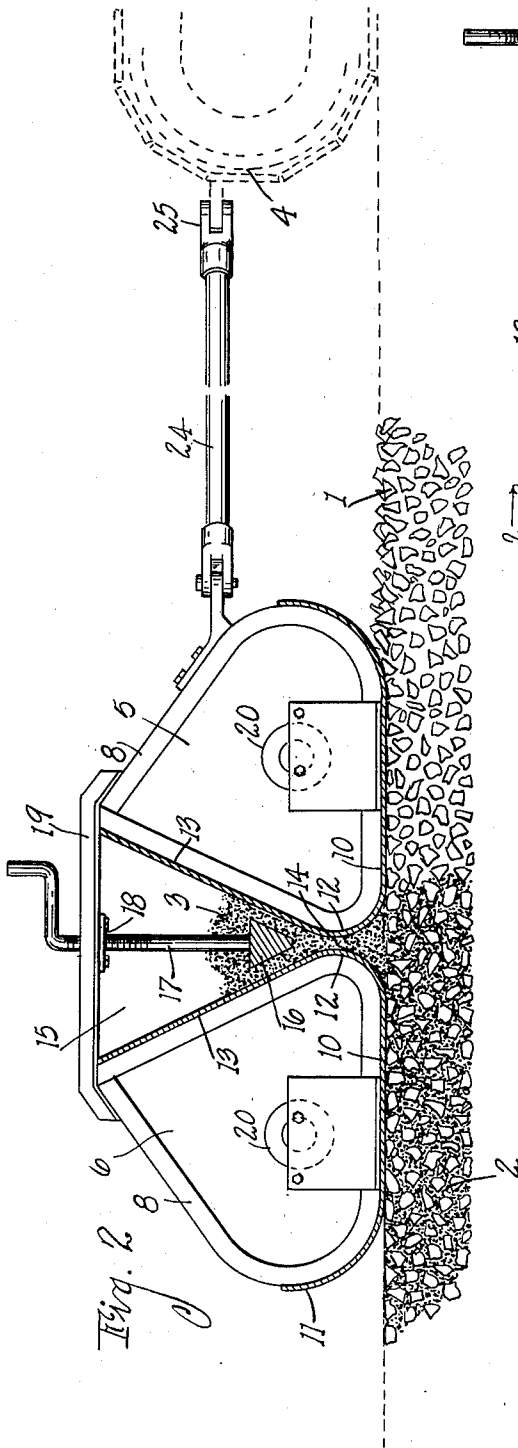
C. JACKSON

2,044,883

PAVING MACHINE

Filed Sept. 5, 1933

4 Sheets-Sheet 2



INVENTOR
Corwill Jackson
BY
Chappell & Carl
ATTORNEYS

June 23, 1936.

C. JACKSON

2,044,883

PAVING MACHINE

Filed Sept. 5, 1933

4 Sheets-Sheet 3

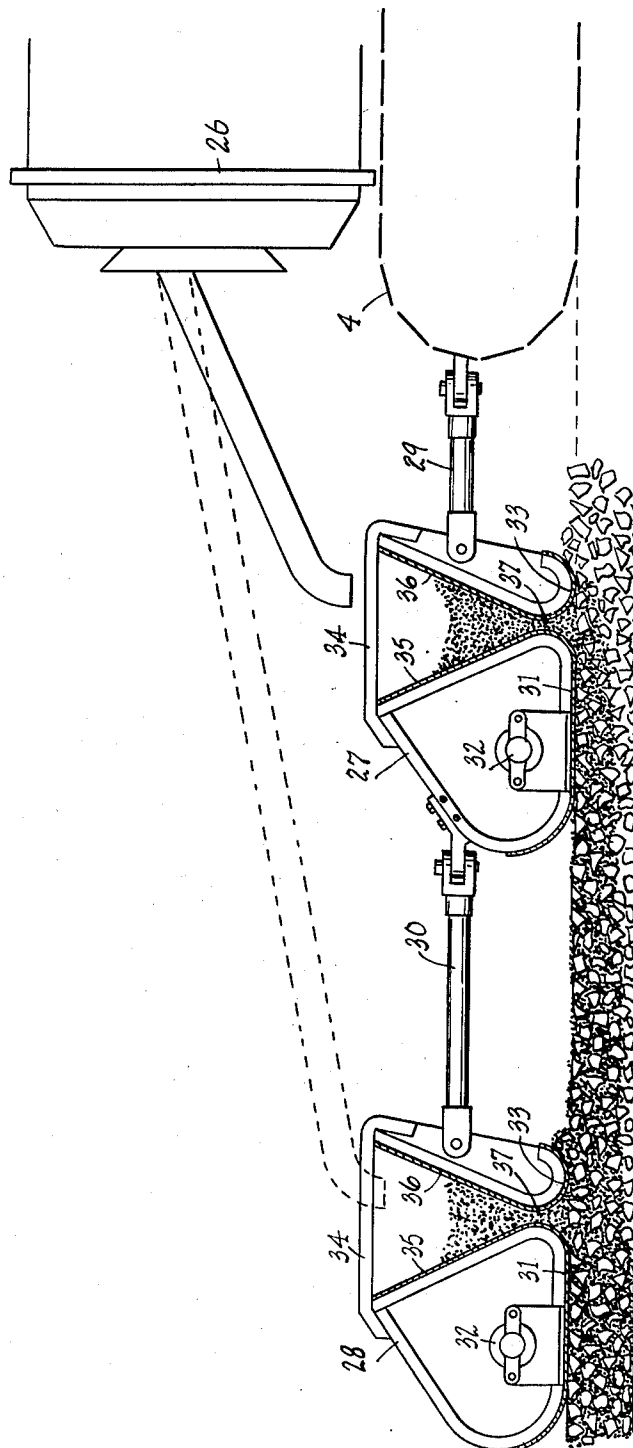


Fig. 5

INVENTOR
Corwill Jackson
BY
Chapell & Carl
ATTORNEYS

June 23, 1936.

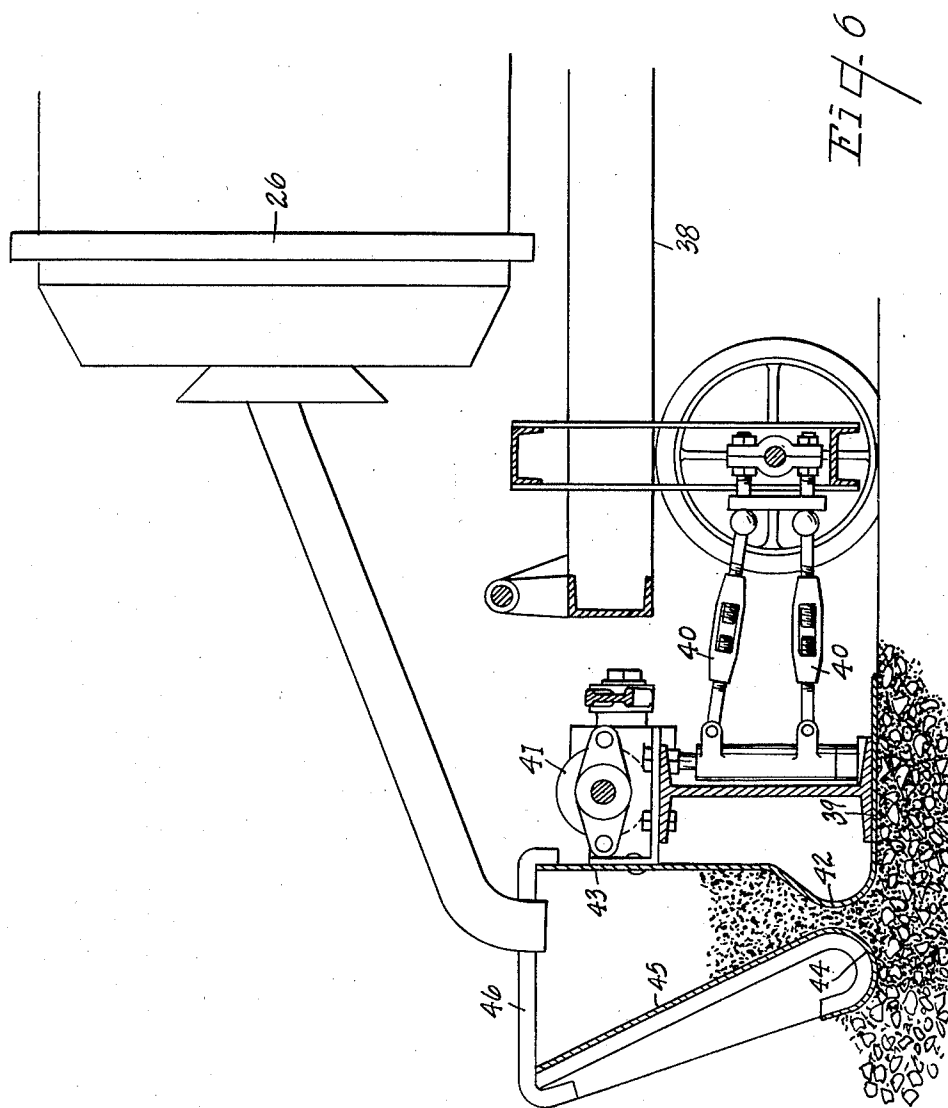
C. JACKSON

2,044,883

PAVING MACHINE

Filed Sept. 5, 1933

4 Sheets-Sheet 4



INVENTOR

Corwill Jackson
BY Chaffell Earl
ATTORNEYS

UNITED STATES PATENT OFFICE

2,044,883

PAVING MACHINE

Corwill Jackson, Ludington, Mich.

Application September 5, 1933, Serial No. 688,125

23 Claims. (Cl. 94—46)

The main objects of this invention are:

First, to provide a method of laying cement bound macadam which is highly efficient and produces a very uniform and superior bed or slab.

Second, to provide a method of bonding aggregate in situ which may be very economically practiced.

Third, to provide a machine or apparatus for bonding aggregate in situ which is of large capacity and very efficient.

Fourth, to provide a machine for laying cement bound macadam for highways and the like which is very simple and economical in structure and operation.

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

A structure embodying the features of my invention is illustrated in the accompanying drawings, in which:

Fig. 1 is a plan view of my improved machine for laying cement bound macadam or applying grout to aggregate in situ.

Fig. 2 is a fragmentary view illustrating my machine or apparatus in operation, a tractor and the materials operated upon being conventionally illustrated and the machine being sectioned on line 2—2 of Figs. 1 and 3.

Fig. 3 is a fragmentary view partially in section on line 3—3 of Fig. 1.

Fig. 4 is a fragmentary plan view of one of the vibrating units.

Fig. 5 is a fragmentary view of a modified form or embodiment of my invention in which means are provided for maintaining a uniform amount or head of grout within the hopper.

Fig. 6 is a fragmentary view of another form or embodiment of my invention in which the screed is reciprocated as well as vibrated.

In the embodiment of my invention illustrated in Figs. 1 to 3 inclusive, 1 represents a bed of crushed rock aggregate and 2 a portion thereof after the cement grout has been delivered thereto and worked throughout the aggregate, the grout being indicated at 3.

The machine is propelled across the bed of aggregate by a tractor or power vehicle conventionally illustrated at 4.

My improvements as illustrated in the embodiment of Figs. 1, 2, and 3 comprises a pair of screeds designated generally by the numerals 5 and 6 disposed in spaced parallel trailing relation. These screed units may be substantial duplicates, as illustrated, arranged in reversed relation and comprise the transverse frame mem-

bers 7, 8, and 9 disposed in spaced relation and having shoes 10 of plate or heavy sheet metal secured thereto. The rivets or securing means are not illustrated.

These shoes have curved upturned outer edges 11 and curved upturned inner edges 12, the upturned inner edges being extended into upwardly diverging hopper walls 13. The upturned curved forward edge 11 of the forward screed constitutes an upwardly curved nose for the forward screed, while the upturned inner edge of the trailing or rear screed constitutes an upwardly curved nose for the rear screed. These upwardly curved inner edges provide a discharge opening 14 for the hopper 15. The discharge opening or throat has downwardly diverging walls which permit the grout to be spread and flow into the aggregate as it is discharged from the hopper.

A gate or valve 16 is supported centrally above the discharge of the hopper, this gate being preferably of V cross section as illustrated and supported by the rods 17 rotatably secured to the gate, the connection not being detailed. These rods have threaded connection with the brackets 18 carried by the connecting cross pieces 19 for the screeds. The connecting cross pieces are secured at their ends to the transverse frame members of the screeds and provide a rigid connection for the screeds to the shoes of the screeds in the same plane.

Each screed is provided with one or more vibrating units designated generally by the numeral 20. A pair of vibrating units is provided for each screed in the embodiment illustrated. These vibrating units are preferably electric motors 21, the rotors of which have shafts 22 provided with unbalancing weights 23 so that the screeds are vibrated at high frequency. Very satisfactory results are had when the frequency of vibrations is from 2500 to 4000 per minute. It is not sought to set up a hammering or tamping action, but to set up a high frequency vibration both in the aggregate before the grout is introduced and to the grout and to the aggregate and grout after the grout is introduced.

By the use of my apparatus, grout of low water content may be successfully placed and worked throughout or thoroughly incorporated with the aggregate, it being possible to successfully place grout of three inch slump, whereas the present methods of working the grout into the rock by steam roller, for example, requires a slump of fully eleven inches which is a very thin flowing mixture. I am enabled to successfully place non-flowing grout; that is, grout too thick to fill the

voids in the rock due to its own gravity flow. The vibrating hopper serves to effectively change the condition of the grout from a non-flowing to a fluid condition and it is caused to flow uniformly through the hopper discharge.

The first screed, setting up vibrations in the aggregate, acts to compact and settle the same into place; that is, reduces the voids therein. It also brings the surface to an approximately level condition and to a very substantial extent moves the aggregate to eliminate sharp projecting edges. The grout is introduced and, as stated, subjected to vibrations, and the aggregate is subjected to vibrations as the grout is introduced thereto, so substantially all voids are eliminated and the grout worked throughout the bed.

The forward screed is provided with draw bars 24 attached to the screed frame members 8 and provided with a coupling 25.

While highly satisfactory results may be obtained by the apparatus shown in Figs. 1, 2, and 3, more uniform results may be obtained when a constant head of grout is maintained within the hopper and in Fig. 5, I illustrate an embodiment of my invention accomplishing this end. In this embodiment, a grout mixer shown conventionally at 26 is mounted upon the tractor 4, this embodiment consisting of a pair of units designated generally by the numerals 27 and 28 disposed in tandem relation, the front unit 27 being connected to the trailer by the draw bar 29 while the rear or trailing unit 28 is connected to the unit 27 by the draw bar 30. These units, which are substantial duplicates, comprise a screed 31 provided with a vibrating unit or units 32. A curved screed or shoe 33 is arranged in advance of the screed 31, these screeds being rigidly connected by frame pieces as 34 so that they are vibrated together. The details of the frames are not illustrated.

The front edge of the screed 31 is extended upwardly into a hopper wall 35 while the screed or shoe 33 is extended upwardly into a hopper wall 36, these walls diverging upwardly and being spaced at 37 to provide a discharge throat for the hopper, the screeds being curved upwardly to this throat, as illustrated, so that the grout is allowed to spread above the aggregate at a point below this throat. This allows the grouting to flow forwardly and spread much more effectively than would be the case if the restricted point of the throat were immediately above the aggregate.

The shoe or screed 33 serves to flatten out the aggregate and, to a considerable degree, vibrate it as results from the forward screed in the embodiment shown in Figs. 1 to 3. By maintaining the grout under a substantial constant head, it is very uniformly discharged and by discharging it into the confined space ahead of the vibrating screed, the grout is prevented from spreading too rapidly under the screeds with a result that deeper penetration in the aggregate is had. The vibrating of the forward shoe results in substantial penetration of the grouting before acted upon directly by the rear screed which results in further penetration. To eliminate backing up the device as might be required under certain conditions, that is, to insure grouting with one passage over the aggregate, I provide the second unit which has the further advantage of thorough grouting at a higher rate of travel of the apparatus.

In the embodiment of my invention illustrated in Fig. 6, the mixer 26 is mounted upon the carriage 38 of a paving machine of a type shown in

my copending application having a screed 39 mounted for reciprocating movement transversely of the path of travel of the screed, the screed supports 40 permitting such movement. The reciprocating means are not here illustrated. The vibrating unit is indicated at 41 and is preferably that of my said application. This screed 39 has a curved nose 42 with a hopper wall 43 extending upwardly therefrom. A curved shoe 44 corresponding to the shoe 33 is provided, this shoe having a hopper wall 45 extending upwardly therefrom. The shoe 44 is connected to the vibrating and reciprocating screed by means of the frame pieces 46 so that the hopper is vibrated as a whole and also reciprocated. The reciprocation of the screed results in a more efficient troweling and smoothing action than is had with the embodiment of my invention shown in Figs. 1 to 5 inclusive; otherwise, the machine functions substantially the same as the embodiment of my invention shown in Fig. 5.

All three forms or embodiments of my invention are highly efficient, enabling the use of grouting of low water content, and at the same time securing effective penetration with the aggregate with such grouting which not only results in reducing costs, but results in a concrete of very great strength and uniformity.

It is to be understood that by non-flowing water content, I contemplate grouting of such lower water content that it will not flow or penetrate the aggregate by gravity, although it should also be borne in mind that by vibrating the grouting in the hopper, its fluidity is greatly increased and I am able to successfully place grouting of a much lower water content than would be possible merely by applying the grouting and subjecting to a vibrating screed.

I have not attempted to illustrate and describe other embodiments of my invention or other forms of apparatus for the practice of my method as it is believed that this disclosure will enable those skilled in the art to embody or adapt my invention as may be desired. The machine illustrated has been found highly practical.

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

1. In a structure of the class described, the combination of front and rear screeds disposed in spaced parallel relation and comprising shoes having rounded noses, the front screed having a rounded heel portion extended into a forwardly inclined hopper wall, the rounded nose of the rear screed being extended into a rearwardly inclined hopper wall, said rounded heel and nose coacting to provide a downwardly expanding hopper discharge throat, a discharge valve adjustably supported centrally above said hopper discharge throat and in coacting relation thereto, and electric motors provided with unbalancing weights mounted on said screeds.

2. In an apparatus for laying cement bonded macadam, the combination of a pair of screed members disposed in spaced parallel relation and comprising shoes having rounded inner edges, said edges of the shoes being extended into upwardly diverging hopper walls, the rounded inner edges being spaced to provide a hopper discharge, a discharge gate adjustably supported centrally above said hopper discharge, and electric motors provided with unbalancing weights mounted on the shoes of both screeds, one of the screeds being provided with a propelling means.

3. In a structure of the class described, the

combination of front and rear screeds disposed in spaced parallel relation and comprising flat-bottomed shoes having rounded noses, the front screed having a rounded heel portion extended into a forwardly inclined hopper wall, the rounded nose of the rear screed being extended into a rearwardly inclined hopper wall, said rounded heel and nose coacting to provide a downwardly expanding hopper discharge throat, and means for vibrating said screeds while in motion.

4. In an apparatus for laying cement bonded macadam, the combination of a pair of screed members disposed in spaced parallel relation and comprising flat-bottomed shoes having rounded outer and inner edges, the rounded inner edges of the shoes being extended into upwardly diverging hopper walls, the rounded inner edges being spaced to provide a hopper discharge, and means for vibrating said screeds while they are being propelled across a bed of aggregate.

5. In a structure of the class described, the combination of front and rear screeds disposed in spaced parallel relation and comprising shoes, the rear edge of the front screed being extended into a forwardly inclined hopper wall, the front edge of the rear screed being extended into a rearwardly inclined hopper wall, the walls being spaced at the bottom to provide an elongated discharge between the screeds, a discharge gate adjustably supported centrally above said discharge and in coacting relation thereto, and motors having rotors provided with unbalancing weights mounted on said screeds.

6. In an apparatus for laying cement bonded macadam, the combination of a pair of screed members disposed in spaced parallel relation and comprising shoes, the adjacent edges of the shoes being extended upwardly to provide diverging hopper walls spaced at the bottom to provide an elongated hopper discharge between the screeds, a discharge gate adjustably supported centrally above said discharge, and motors having rotors provided with unbalancing weights mounted on both screeds, one of the screeds being provided with a propelling means.

7. In a machine for working cement grout into macadam aggregate, the combination of screeds arranged in trailing relation and having cooperating hopper walls providing a hopper discharging between the screeds, and means for vibrating the screeds at high frequency while they are being propelled across a bed of aggregate, said hopper walls being vibrated with the screeds.

8. In a machine for grouting aggregate in situ, the combination of screeds disposed in trailing relation to be translated together across a bed of aggregate, means for vibrating the screeds at high frequency while traveling, means for discharging cement grout at the rear of the front screed and in advance of the trailing screed, the discharge means including a hopper the walls of which are vibrated with said screeds, and an adjustable discharge gate.

9. In a machine for working cement grout into macadam aggregate, the combination of screeds arranged in trailing relation, a hopper discharging between the screeds, and means for vibrating the screeds at high frequency while they are being propelled across a bed of aggregate, said hopper being vibrated with the screeds.

10. In a machine for grouting aggregate in situ, the combination of screeds disposed in trailing relation to be translated together as a unit across a bed of aggregate, means for vibrating the screeds at high frequency while traveling, and means for

discharging cement grout at the rear of the front screed and in advance of the trailing screed.

11. In a machine of the class described, a unit comprising screeds arranged in trailing relation, a hopper discharging between the screeds, and means for vibrating the screeds at high frequency while they are traveling, said hopper walls being vibrated with the screeds.

12. In a machine of the class described, the combination of screeds disposed in trailing relation to be propelled together, means for vibrating the screeds at high frequency while traveling, and means for discharging material at the rear of the front screed and in advance of the trailing screed, the discharge means including a hopper the walls of which are vibrated with said screeds.

13. In a machine of the class described, the combination of screeds arranged in trailing relation, and having shoes the bottoms of which are flat and are disposed in the same horizontal plane, a hopper discharging between the screeds, and means for vibrating the screeds at high frequency while they are traveling as a unit.

14. In a machine of the class described, a unit comprising screeds disposed in trailing relation to be propelled together, means for vibrating the screeds at high frequency while traveling, and means for discharging material at the rear of the front screed and in advance of the trailing screed.

15. In a structure of the class described, the combination of front and rear screeds disposed in spaced parallel relation and provided with downwardly converging hopper walls spaced at their lower edges to provide a narrow discharge, the adjacent parts of screeds being curved upwardly and merging into said hopper walls, and means for vibrating said screeds and the hopper walls at high frequency.

16. In a structure of the class described, a unit comprising front and rear screeds disposed in spaced parallel relation and provided with downwardly converging hopper walls spaced at their lower edges to provide a discharge, and means for vibrating said screeds and the hopper walls at high frequency.

17. In a machine of the class described, the combination of a pair of screeds mounted for reciprocatory movement as they are advanced, the adjacent portions of the screeds being extended into upwardly diverging hopper walls providing a hopper reciprocating with the screeds, and means for vibrating the screeds and hopper at high frequency as they are advanced and reciprocated, and means for discharging grout to the hopper as the machine is advanced to maintain a substantially uniform head of grout.

18. In a machine of the class described, the combination of a pair of screeds mounted for reciprocatory movement as they are advanced, the adjacent portions of the screeds being extended into upwardly diverging hopper walls providing a hopper reciprocating with the screeds, and means for vibrating the screeds and hopper at high frequency as they are advanced and reciprocated.

19. In a machine of the class described, the combination of a screed mounted for reciprocatory movement as it is advanced, a hopper reciprocating with the screed and discharging at the front thereof, means for vibrating the screed and hopper at high frequency as they are advanced and reciprocated, and means for delivering material to the hopper as the machine is advanced.

20. In a machine of the class described, the combination of a screed mounted for reciproca-

tory movement as it is advanced, a hopper reciprocating with the screed and discharging at the front thereof, and means for vibrating the screed and hopper at high frequency as they are advanced and reciprocated as a unit.

21. In a machine of the class described, the combination of a pair of screeds adapted for reciprocatory movement as they are advanced as a unit, a hopper discharging between the screeds, means for vibrating the screeds and hopper at high frequency as they are advanced, and means for delivering material to the hopper as the machine is advanced for maintaining a substantially uniform head therein.

22. In a machine of the class described, the combination of a pair of screeds adapted for reciprocatory movement as they are advanced as a

unit, a hopper discharging between the screeds, and means for vibrating the screeds and hopper at high frequency as they are advanced.

23. In a paving machine, the combination of screed means adapted to rest directly upon the material to be worked and support the paving machine thereon, a hopper operatively associated with said screed means, and means acting to rapidly vibrate the paving machine at high frequency to facilitate the operation of said hopper and screed means and to vibrate the material supporting the paving machine to condition the same throughout its mass before, during and after the delivery of material thereto by said hopper.

CORWILL JACKSON.