

Dec. 1, 1942.

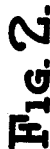
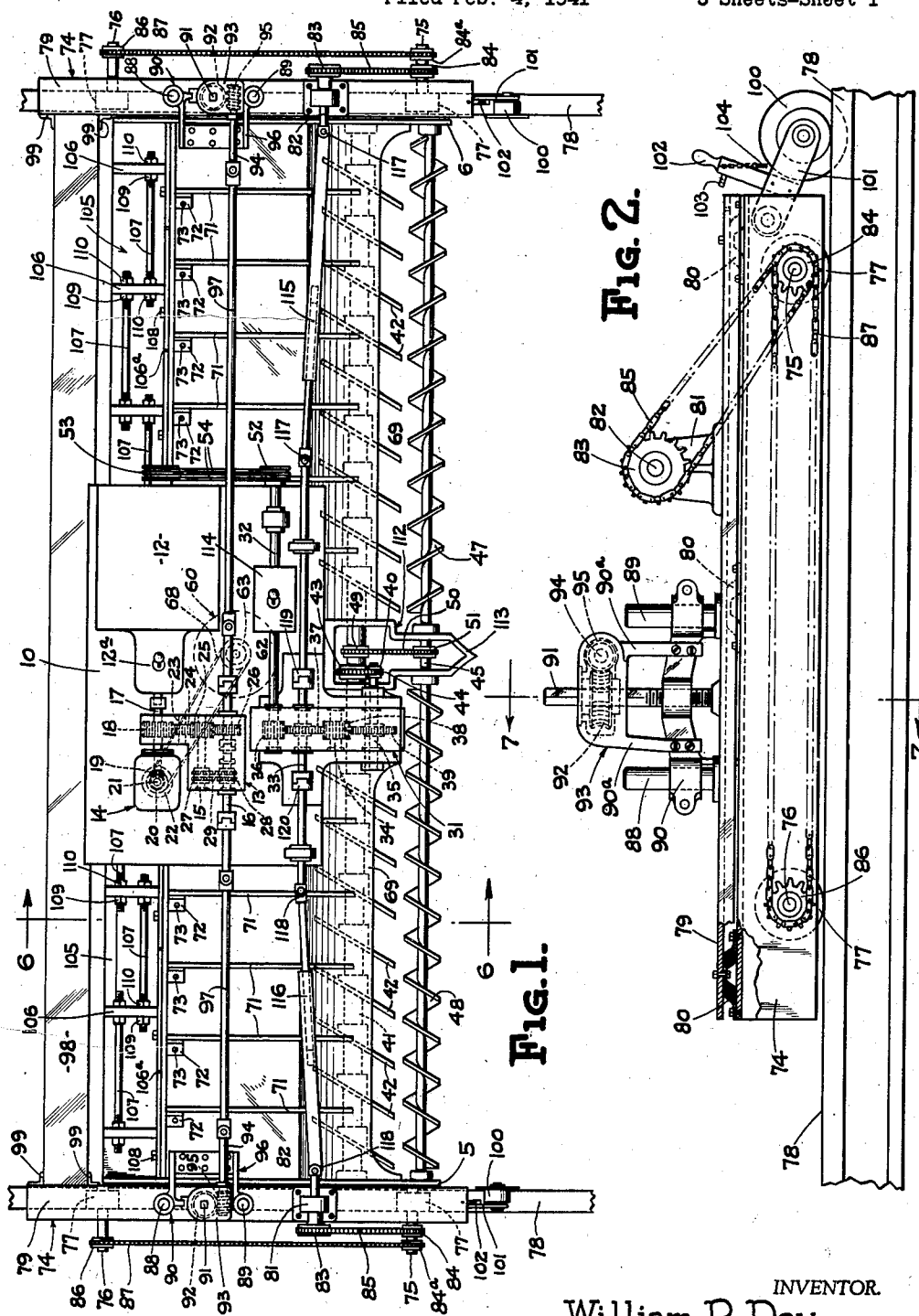
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2,303,336

APPARATUS FOR EMLACING CONCRETE

Filed Feb. 4, 1941

3 Sheets-Sheet 1



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APPARATUS FOR EMPLACING CONCRETE

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3 Sheets-Sheet 2

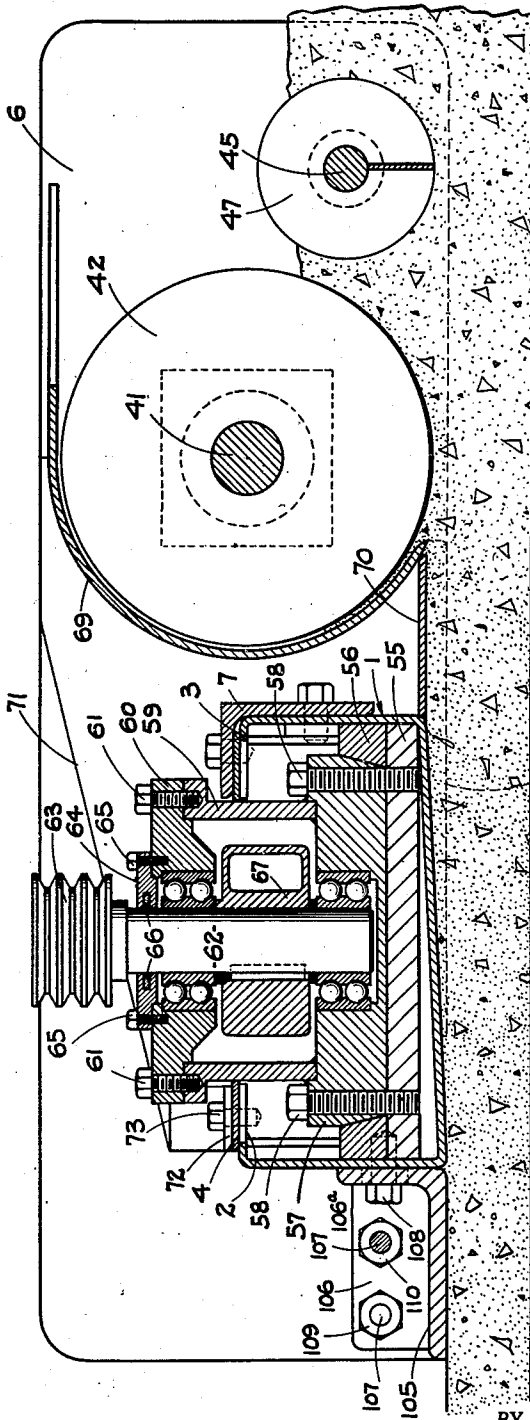


Fig. 3.

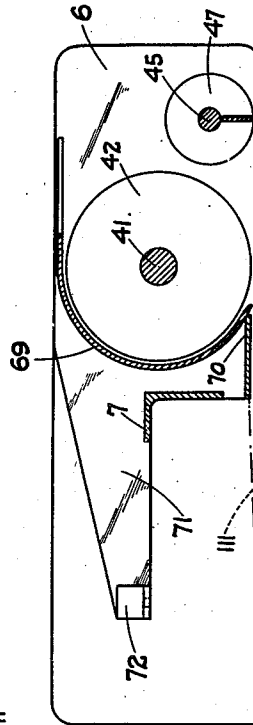


Fig. 5.

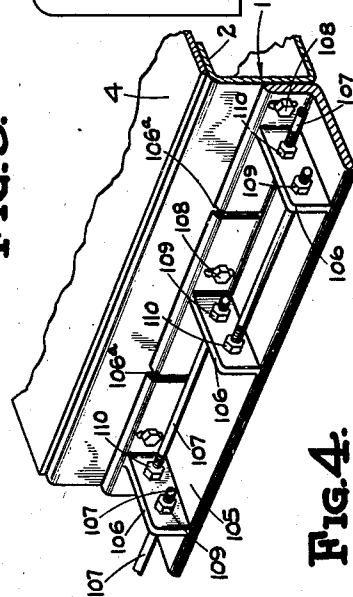


Fig. 4.

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3 Sheets-Sheet 3

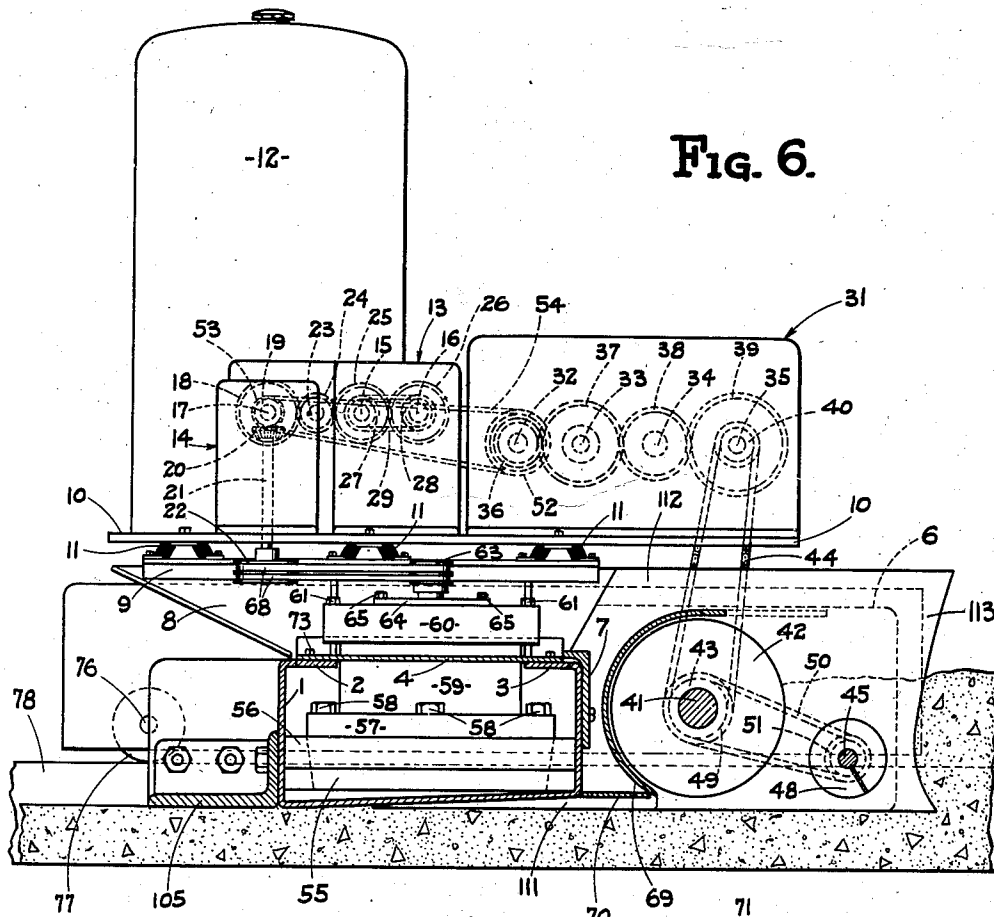


FIG. 6.

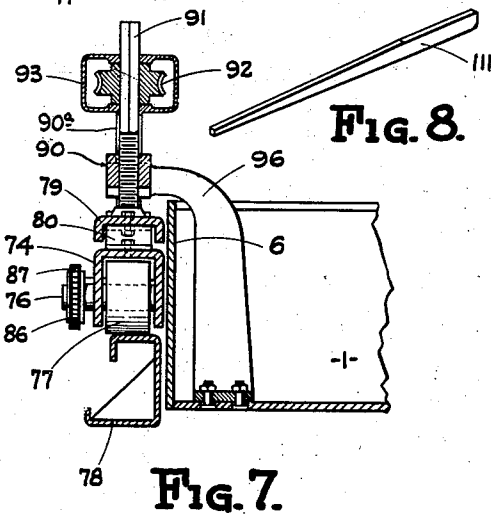


FIG. 7.



UNITED STATES PATENT OFFICE

2,303,336

APPARATUS FOR EMLACING CONCRETE

William P. Day, Cleveland Heights, Ohio

Application February 4, 1941, Serial No. 377,330

6 Claims. (Cl. 94—46)

This invention relates to a method and apparatus for laying or emplacing concrete which are particularly well adapted for emplacing concrete in a sidewalk, road, street, highway, building floors, or the like.

One of the objects of the invention is to provide an apparatus for laying concrete which subjects the concrete to a vibrating pressure whereby to increase the density of the mass of concrete and to reduce to a minimum the tendency of the concrete to crack or to spall at the surface thereof.

A further object of the invention is to provide a method of laying concrete which consists in first emplacing or laying a relatively thick bottom layer of concrete of the desired depth and consistency and simultaneously subjecting the same to rapid and violent vibrations and then, preferably before such layer has hardened or set, applying thereto a relatively thin surface layer of concrete and condensing and compressing such surface layer into a thinner layer while applying rapid and violent vibrations thereto.

A still further object of the invention is to provide a method and apparatus for laying concrete which permits the use of a very stiff concrete mix which contains a minimum quantity of water.

Another object of my invention is to provide an apparatus for practicing the method herein described which is well adapted for the purpose intended and which can be produced at a low cost and which also reduces to a minimum the manual labor required.

It is desirable to use as little water as possible in excess of the water necessary to carry out the chemical action required. The setting or hardening of concrete is a chemical process in which water combines with the cement accompanied by certain physical changes in the structure of the material. The extent to which the concrete will shrink during the initial setting period depends largely upon the amount of excess moisture present. The more water present in excess of that necessary for the chemical action, the more shrinkage will occur. Wet mixtures shrink a great deal more than do dry mixtures and most of the shrinkage occurs during the first few hours and therefore much attention should be given to the curing procedure during this period. It is therefore desirable that there be present only a sufficient amount of excess water to secure the desired workability of the mix. If there is excess water present, there is a tendency for the formation of laitance which is a mixture of

the floury part of the cement and water which is brought to the surface and forms a scum or thin layer of whitish material which tends to prevent a proper bonding of the surface layer of concrete with the bottom layer and constitutes a plane of weakness. Laitance can only form from an excess amount of water which rises to the top as a result of the vibration.

In order to overcome this difficulty, I propose to first lay or emplace a layer of concrete of desired consistency and of a depth of approximately 1 to 3 inches less than the desired depth of the finished road, such bottom layer being subjected to pressure and to rapid and violent vibrations while it is being spread or laid. The mix used for this bottom layer contains about four to five gallons of water per sack of cement. After this bottom layer has partially set, I then apply thereto a surface layer of the same mix and of a depth of about 1 to 3 inches. This surface layer should contain the strongest and best grade of materials and has only a sufficient amount of water to obtain the desired chemical action and workability. This surface layer as well as the bottom layer may be applied to the road by means of apparatus such as shown in my prior Patent No. 2,180,198 but preferably by means of the apparatus herein disclosed. Rapid and violent vibrations are imparted to the surface layer while it is being laid preferably in a plane generally parallel to the surface of the first layer. Due to the fact that this surface layer is comparatively thin, there is very little tendency for the lighter and less dense particles to rise to the top.

The apparatus for practicing the method consists essentially of a screed, the bottom face of which is so shaped and designed as to cooperate with the underlying surface to provide a tapered restricted passageway through which the concrete is caused to flow, the inlet end of said passageway being of greater depth and capacity than the outlet end thereof, whereby the concrete flowing through the passageway is subjected to a vibrating pressure. Carried by the screed and disposed forwardly of and adjacent the inlet end of the passageway is a shaft on which is rigidly secured a plurality of puddling disks which are somewhat ovoid in shape. These disks are so disposed and arranged as to impart an oscillatory motion to the concrete as it enters the inlet end of the passageway. Rapid and violent vibrations are imparted to the entire screed, and to the disks. The bottom of the screed is provided with a plurality of spaced fins which extend

into the mass of concrete and which are also subjected to vibrations. The motion of the disks and the vibrations imparted thereto tend to cause a part of the mortar and the more fluent portions of the mix to be released so as to secure the desired workability and the proper finish. Disposed in front of the puddling disks and preferably carried by the screed are a pair of screws which serve to spread the mass of mix in front of the puddling disks. The pair of screws, being carried by the screed, are also subjected to vibrations. Carried by the main screed or connected therewith and disposed at the rear thereof is a finishing screed or surfacer which may be bent or deflected so as to impart the desired shape to the surface of the finished road. This surfacer is preferably subjected to the vibrations.

With this apparatus and method, the entire mass of concrete is subjected to pressure vibration which produces a stronger and more durable concrete than has been heretofore obtainable with known methods of emplacing and finishing concrete. This method and apparatus make it possible to use a concrete mix having a slump of $\frac{1}{2}$ inch to 1 inch and which shows no tendency for the formation of laitance and in which no water gain takes place. The surface of the concrete so laid shows a marked absence of all of the undesirable features heretofore associated with regularly emplaced concrete pavements. Very little hand finishing is required and the surface can be covered almost immediately, thus preventing loss of moisture. The low water-cement ratio increases the strength of the concrete and also reduces the shrinkage. Excess or over-vibration, which has heretofore been a source of trouble, is practically eliminated according to this method. Actual tests show that the average compressive strength of pressure-vibrated cores runs as high as 23% above non-vibrated concrete. Results of freezing and thawing tests of pressure-vibrated concrete emplaced according to the method herein described show a definite trend in the direction of greater surface durability. Laboratory tests of specimens show substantially no surface defects or loss at the end of twenty-four freezing and thawing cycles, whereas non-vibrated concrete tends to scale and spall considerably and disintegrates with considerable loss of weight.

The screed carries a power unit which operates the vibrator unit, and also serves to provide the power for moving the screed both forward and backward and for raising and lowering the same. The power unit is preferably insulated from the screed proper by means of vibration dampers which tend to prevent the vibration being imparted to the power unit. The apparatus is preferably driven at the rate of about 6 to 10 feet per minute. The concrete is dumped in front of the screed from the concrete mixer and is spread over the road by the screws. The screed is supported upon trucks which ride upon suitable form boards and which are also insulated from the screed by means of vibration dampers. A typical mixture of mix contains about one part cement, two parts sand, three and one-half parts stone or slag and four to five gallons of water per bag of cement. Such a mixture has a slump of about $\frac{1}{2}$ inch to 1 inch and is very stiff and will not flow without being subjected to vibration.

In most cases, it is desirable to reinforce the road bed with a reinforcing mesh or grid which is preferably applied to the bottom layer immediately after it is laid and before it has set.

The bottom layer, when laid in the manner hereinbefore described, possesses sufficient density and strength, immediately after it is laid, to support the weight of a workman. After the reinforcing grid or mesh is placed on the top of the bottom layer, the surface layer is then applied in the manner hereinbefore described before the bottom layer has completely set.

In the accompanying drawings Fig. 1 is a top plan view of one form of a concrete emplacing apparatus which will practice the method herein described and accomplish the objects of the invention as hereinbefore set forth; Fig. 2 is an end view of the apparatus shown in Fig. 1, certain parts being omitted and other parts broken away and shown in section to more clearly disclose the construction; Fig. 3 is a vertical sectional view of the screed proper; Fig. 4 a detail perspective view disclosing the manner of securing the crown former or finisher to the screed; Fig. 5 is a detail view partly in section and partly in elevation disclosing the interior construction; Fig. 6 is a vertical sectional view on the line 6—6 of Fig. 1; Fig. 7 is a vertical sectional view on the line 7—7 of Fig. 2; Fig. 8 is a detail perspective view of one of the fins which is secured to the bottom of the screed; Fig. 9 is a detail view partly in elevation and partly in section disclosing one of the reinforcing members; and Figs. 10 and 11 are an end view and a front view, respectively, of one of the disks.

Referring now to the drawings, the preferred form of emplacing apparatus consists essentially of a screed which is made up of a channel-shaped member 1 having inwardly overhanging flanges 2 and 3 and to which is secured a plate or cover member 4. The channel member 1 extends transversely of the screed and is secured at its opposite ends to a pair of end plates 5 and 6. Extending transversely of the apparatus and fitting over the forward edge of the channel member 1 is an angular supporting member 7 which is secured at its opposite ends to the end plates 5 and 6 by being welded thereto and is also rigidly secured to the channel member 1. Disposed at the ends of the screed and secured to the plate 4, preferably by being welded thereto, are a pair of supporting brackets 8, one of which is shown in Fig. 6. Secured to each of the supporting brackets 8 is an angle iron 9. Extending transversely of the apparatus is a platform or plate 10 which is secured to the angle iron 9 by means of a plurality of vibration dampeners 11 which are formed partly of rubber and partly of metal, the purpose of which will hereinafter appear. Mounted on the platform 10 is a motor or engine 12 which may be either in the form of a gasoline motor or an electric motor. Also mounted on the platform 10 is a housing 13 of the shape shown most clearly in Fig. 1. Also carried by the platform 10 is a housing 14. Journalled in the housing 13 are a pair of shafts 15 and 16. Extending from the motor 12 is a shaft 17 which extends through the housing 13 and into the housing 14. The shaft 17 has thereon a gear 18 and a gear 19. The gear 19 meshes with and drives a gear 20 carried by a vertically disposed shaft 21 which is journalled in the housing 14 and on one end of which is mounted a pulley 22. Mounted in the housing 13 is a countershaft 23 to which is secured a gear 24 which meshes with the gear 18 and also with a gear 25 carried by shaft 15. The gear 25 meshes with and drives a gear 26 carried by the shaft 16. Also carried by the shaft 15 is a sprocket 27 which drives a

sprocket 28 on shaft 16 through the medium of a chain 29. Also carried by the platform 19 is a housing 31 in which are journaled shafts 32, 33, 34 and 35. Carried by the shaft 32 is a gear 36 which meshes with and drives a gear 37 on the shaft 33 which gear in turn drives a gear 38 on the shaft 34. The gear 38 meshes with and drives a gear 39 on the shaft 35. Also carried by the shaft 35 is a chain sprocket 40. Extending transversely of the apparatus and journaled in suitable bearings is a shaft 41 on which are non-rotatably secured a plurality of disks 42 which are somewhat ovoid in shape. The shaft 41 carries a sprocket 43 which is driven from the sprocket 40 through the medium of a chain 44. Carried by the screed and extending transversely thereof is a shaft 45 which is journaled in suitable bearings and on which are mounted a pair of screws 47 and 48 of opposite pitch. Carried by the shaft 41 is a sprocket 49 which receives thereover a chain 50 which engages the sprocket 51 on the shaft 45 and drives the same. The shaft 32 extends transversely of the screed and has mounted on one end thereof a pulley 52. Extending rearwardly from the engine is a shaft which carries a pulley 53 which drives the pulley 52 on shaft 32 through the medium of a pair of belts 54.

Carried by the channel 1 and disposed substantially centrally thereof and welded thereto is a supporting plate 55. Mounted on the supporting plate 55 and disposed within the channel member 1 is a member 56 which has an annular tapered opening therein. Received within the member 56 is a casting 57 which is secured to the supporting plate 55 by means of bolts 58. Resting on the casting 57 is an annular casting 59 which is welded to the casting 57. The member 59 has an overhanging flange and secured thereon is a cover plate 60 held in place by bolts 61. Journaled in suitable bearings in the cover member 60 and the casting 57 is a shaft 62 to the upper end of which is secured a pulley 63. A plate 64 surrounds the shaft and is secured in place by bolts 65 and is provided with a packing 66 for preventing leakage about the shaft. Carried by the shaft 62 and keyed thereto is a fly-wheel 67 which is weighted at one side. The shaft 62 is driven from the pulley 22 through the medium of a belt 68 which connects with the pulley 63. The chamber formed by these parts is adapted to be filled with oil. The mechanism just described constitutes the vibrator unit, the utility and function of which will hereinafter appear.

Extending transversely of the screed and secured at its opposite ends to the end plates 5 and 6 is a curved plate or member 69 which extends partially over the disks 42, as shown in Figs. 1, 5 and 6. This member 69 is preferably welded to the end plates 5 and 6. Also extending transversely of the screed is a plate 70 which is welded to the member 69 and also to the channel member 1 and to the end plates 5 and 6. Secured to the screed are a plurality of reinforcing members 71 (shown in detail in Fig. 5) which are welded to the members 69 at their front end and which are provided with apertured flanges 72 at the rear end thereof. Each of the reinforcing members 71 is secured to the channel member 1 at the rear side thereof by means of bolts 73.

The screed proper is supported upon trucks which in turn rest upon the form boards. The

trucks are shown in detail in Figs. 2 and 6 and each comprises a channel member 74 in which are journaled a pair of shafts 75 and 76. Mounted on the shafts 75 and 76 are wheels or rollers 77 which rest upon the form boards 78. Carried by each of the channel members 74 is a plate 79 which is secured to the channel members by means of a plurality of vibration dampeners 80 which are formed partly of rubber and partly of metal. Carried by the plate 79 is a bracket 81 in which is journaled a shaft 82 which carries a sprocket 83. Carried by the shaft 75 is a sprocket 84 which is driven from the sprocket 83 by means of a chain 85. Mounted on the shaft 76 is a sprocket 86 which is driven from the sprocket 84 through the medium of a chain 87. Carried by each of the plates 79 are a pair of posts 88 and 89. Rotatably secured to the plate 79 and extending upwardly therefrom is a rod or post 91 which is threaded at its lower portion and the upper end of which is square in cross section. Fitting loosely but non-rotatably over the squared upper end of the post 91 is a worm gear 92. This worm gear is enclosed within a housing 93 which is rigidly secured to a web portion 90 of the screed supporting bracket 96 by supporting arms 90^a as clearly illustrated in Fig. 2. The housing 93 also has a worm 95 journaled therein which meshes with and drives the worm gear 92. The screed supporting brackets 96 are disposed at opposite sides of the screed and bolted to the latter as shown in Figs. 1 and 7. It is through these brackets that the screed is adjustably carried by the end trucks. The brackets 96 have drilled bosses to slidably receive the posts 88-89 and a central threaded boss to receive the threaded portion of post 91. Each of the shafts 94 is connected with and driven from the shaft 16 through the medium of shaft sections 97 which include universal joints which take care of any misalignments of the shaft sections.

Each of the shafts 82 is driven from the shaft 33. The connections between the shaft 82 and the shaft 33 include slidable connections and universal joints which allow for any lengthening of the driving connection as a result of raising and lowering the screed with respect to the trucks which support it. The pair of channel members 74 are connected at the rear ends thereof by means of a reinforcing bar 98 which is secured thereto by means of angle irons 99. Carried by each of the channels 74 is a guiding roller 100 which engages the forms 78 and which is pivotally secured to the channel 74 by means of a pair of links 101. These rollers 100 may be lifted and secured in the elevated position by means of a post 102 which has an apertured flange 103 thereon. The flange 103 is moved over an opening provided in the plate 79 and may be secured in the raised position by means of a pin 104.

Secured to the rear side of the channel 1 is the crown-former or surfacer which imparts the desired shape to the surface of the finished road or layer. This crown former is shown in Fig. 4 and consists of a bar or plate 105 which is L-shaped in cross section and which is provided with web portions 106. Intermediate the web portions the bar is provided with a plurality of vertically disposed slots or cut-out portions 106^a. The web portions are connected together by threaded rods 107. The angular bar 105 is secured to the channel member 1 by means of bolts 108 which engage in slots provided therein so that the bar may be bent or deflected in such a

manner as to impart the desired shape to the surface of the road, and then locked in place by means of nuts 109 and 110.

Secured to the bottom side of the channel member 1 and disposed in spaced relation are a plurality of fins 111 one of which is shown in detail in Fig. 8. These fins are arranged in spaced parallel relation and it will be noted that they taper from front to rear thereof. The fins are welded to the bottom of the channel 1 and to the plate 70. It will be noted that the bottom of the channel 1 is slightly tapered or disposed at an angle with respect to the horizontal. The bottom of the plate 70 constitutes a continuation of the bottom side of the channel 1 with the result that a tapered restricted passageway is provided which has greater capacity at the inlet end thereof than at the outlet end thereof. The concrete mix is caused to flow through this passageway and to be subjected to rapid and violent vibrations as well as to compression. The front end of the tapered passageway is slightly greater in depth than the rear end of the passageway, that is to say, the front end is disposed about one inch higher than the discharge end thereof. The discharge end of the passageway is disposed at the level of the finished layer while the inlet end of the passageway is disposed slightly higher so that the concrete passing through the passageway is subjected to a vibrating pressure. It will thus be seen that a thick layer of concrete mix is compressed into a thinner layer while being subjected to rapid and violent vibrations.

Disposed centrally of the screed and at the front thereof is a casting 112 which is welded to the plates 69 and through which the shafts 41 and 45 extend. This casting has the front portion thereof shaped to provide a plow 113 which serves to deflect the mix toward the screws 47 and 48.

When it is desired to emplace a layer of concrete, the apparatus is supported upon the form boards and the screed adjusted to the desired height so that the bottom of the crown former 105 is disposed at the desired level of the finished layer as will appear from Fig. 6. The engine is then started and a clutch 12^a is provided for forming a driving connection with the shaft 17. The vibrator unit is driven from the shaft 17 through the medium of gear 19 which drives gear 29 on shaft 21 which carries a pulley 22 which drives the pulley 63 through the medium of the belt drive 58. The size of the gears and the ratio of the pulleys is such that the vibrator shaft 63 is driven at a high rate of speed preferably from 6,000 to 10,000 revolutions per minute. The shafts 41 and 45 are also driven by the motor through the medium of pulley 53, belt 54, pulley 52, shaft 32, gear 36, gear 37 on shaft 33, gear 38 on shaft 34, gear 39 on shaft 35, sprocket 40 also on shaft 35, chain 44, and sprocket 43 on shaft 41. The shaft 41 also carries a sprocket 49 which drives the shaft 45 through the medium of the chain 50 and sprocket 51.

A clutch mechanism 114 serves to make and break the driving connections to the gear 36. The shaft 33 is operatively connected with the pair of shafts 82 disposed on the trucks, respectively. This drive includes slidable connections 115 and 116 and universal joints 117 and 118 which allow for any misalignment of the shaft sections and for a lengthening or shortening of the shaft sections due to the raising and lowering of the screed with respect to the trucks. A pair of clutches 119 and 120 are provided for connecting or disconnecting the driving connection with

the shafts 82. The shafts 82 drive the shafts 75 and 76 through mechanism hereinbefore described.

The shafts 94 which carry the worms 95 are driven from the shaft 17 in either direction. This driving connection comprises gear 18 which meshes with and drives the gear 24 on shaft 23 which in turn drives the gear 25 on shaft 15. The gear 25 meshes with and drives the gear 26 on the shaft 16. Clutching mechanism is provided for disconnecting this driving connection. The shaft 16 is driven in the opposite direction through the medium of sprocket 27 which drives sprocket 28 through the medium of chain 29 which drives the shaft 16 in the opposite direction. The vibration dampeners 11 and 80 serve to prevent vibrations of the vibrator unit being transmitted to the platform 10 which supports the motor and the driving mechanism. It will be noted that the entire screed including the disks and the pair of screws are subjected to rapid and violent vibrations.

When it is desired to lay a concrete road of say eight inches in depth, the machine is set up on the form boards and the height of the same adjusted until the bottom of the crown former or surfacer is disposed at a height of about two inches less than the desired height of the finished road. Concrete mix of the desired consistency is then delivered in front of the screed and the screed moved forward at the rate of six to ten feet per minute. The pair of screws serve to spread the mix in front of the screed and the disks serve to agitate and puddle the mix and to cause sufficient mortar to be released to obtain the desired workability and finish of the mix. The mix passes through the restricted passageways provided at the bottom of the screed and the relatively thick layer is compressed into a much thinner layer while being subjected to rapid and violent vibrations. After the first layer is emplaced, it has sufficient strength to support the weight of workmen. The screed is then lifted and moved backward to the starting position. Usually a reinforcing mesh or grid is then placed upon the top of the bottom layer. The machine is then operated in the same manner to apply to the bottom layer a surface layer of the necessary depth. This surface layer is applied in the same manner as the bottom layer. This surface layer preferably comprises a mix of the same consistency as the bottom layer, although in some cases it may be desirable to use a slightly different mix; but it is desirable that both layers of mix contain only sufficient water to obtain the desired chemical action and workability. The surface layer may, if desired, contain a better grade of material such as granite screenings or the like which will provide a harder wearing surface.

Should there be any tendency for concrete to accumulate excessively adjacent the form boards or end trucks, I contemplate the use of additional power operated screws disposed above and spaced from the lower pair of screws and which are so pitched as to move any excess concrete toward the center of the apparatus and away from the end trucks.

In some cases it may be desirable to apply the surface layer after the lower layer has set and hardened. In fact the machine is adapted for applying a surface layer to an old road the surface of which is defective.

It will now be clear that I have provided a method and apparatus for emplacing concrete

which will accomplish the objects of the invention as hereinbefore stated. It is of course to be understood that the embodiment of the invention herein disclosed is to be considered merely as illustrative and not in a limiting sense, as slight changes may be made both in the method and in the apparatus without departing from the spirit of my invention. It is also to be understood that the method herein described may be practiced and performed with apparatus different from the specific apparatus herein disclosed. The method herein described may also be employed for emplacing concrete floors or, if an unusually thick mass of concrete is desired, it may be laid in three or more layers. The invention is therefore limited only in accordance with the scope of the appended claims.

Having thus described my invention, what I claim is:

1. An apparatus for emplacing concrete comprising a screed including a plate, the bottom surface of which is tapered to provide a restricted passageway through which the mix is caused to flow as the screed is moved forwardly over the road, a rotary shaft, on said screed in front of said plate, spaced discs fixedly carried by said shaft and extending diagonally thereof, means to rotate said shaft to cause said discs to wobble and thereby impart oscillatory motion to the mix in front of the tapered plate, and means for rapidly vibrating said screed plate and discs.

2. An apparatus for emplacing concrete comprising a screed including a plate, the bottom surface of which is tapered to provide a restricted passageway through which the mix is caused to flow as the screed is moved forwardly over the road, a rotary shaft, on said screed in front of said plate, spaced oval discs fixedly carried by said shaft and extending diagonally thereof, means to rotate said shaft to cause said discs to wobble and thereby impart oscillatory motion to the mix in front of the tapered plate, and means for rapidly vibrating said screed plate and discs.

3. An apparatus for emplacing concrete comprising a screed including a plate, the bottom surface of which is tapered to provide a restricted passageway through which the mix is caused to flow as the screed is moved forwardly over the road, a plurality of fins on said plate projecting downwardly into said mix—a rotary shaft, on said screed in front of said plate, spaced discs fixedly carried by said shaft and extending diagonally thereof, means to rotate said shaft to cause said discs to wobble and thereby impart oscillatory motion to the mix in front of the

tapered plate, and means for rapidly vibrating said screed plate and discs.

4. An apparatus for emplacing concrete comprising a screed including a plate, the bottom surface of which is tapered to provide a restricted passageway through which the mix is caused to flow as the screed is moved forwardly over the road—a rotary shaft on said screed in front of said plate, spaced discs fixedly carried by said shaft and extending diagonally thereof, screw means extending across said screed in front of said discs, means to rotate said disc carrying shaft to cause said disc to wobble and thereby impart oscillatory motion to the mix in front of the tapered plate, means to rotate the screw means for spreading the mix in front of said discs and means for rapidly vibrating said screed plate, discs and screw means.

5. An apparatus for emplacing concrete comprising a screed including a plate, the bottom surface of which is tapered to provide a restricted passageway through which the mix is caused to flow as the screed is moved forwardly over the road, a plurality of fins on said plate projecting downwardly into said mix—a rotary shaft on said screed in front of said plate, spaced discs fixedly carried by said shaft and extending diagonally thereof, screw means extending across said screed in front of said discs, means to rotate said disc carrying shaft to cause said disc to wobble and thereby impart oscillatory motion to the mix in front of the tapered plate, means to rotate the screw means for spreading the mix in front of said discs and means for rapidly vibrating said screed plate, discs and screw means.

6. An apparatus for emplacing concrete comprising a screed including a plate, the bottom surface of which is tapered to provide a restricted passageway through which the mix is caused to flow as the screed is moved forwardly over the road, a plurality of fins on said plate projecting downwardly into said mix—a rotary shaft on said screed in front of said plate, spaced discs fixedly carried by said shaft and extending diagonally thereof, screw means extending across said screed in front of said discs, means to rotate said disc carrying shaft to cause said disc to wobble and thereby impart oscillatory motion to the mix in front of the tapered plate, a member disposed rearwardly of said screed and rigidly attached thereto for imparting the desired shape to the surface of the road, and means for rapidly vibrating the screed including the discs, screw means and shaping means.

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