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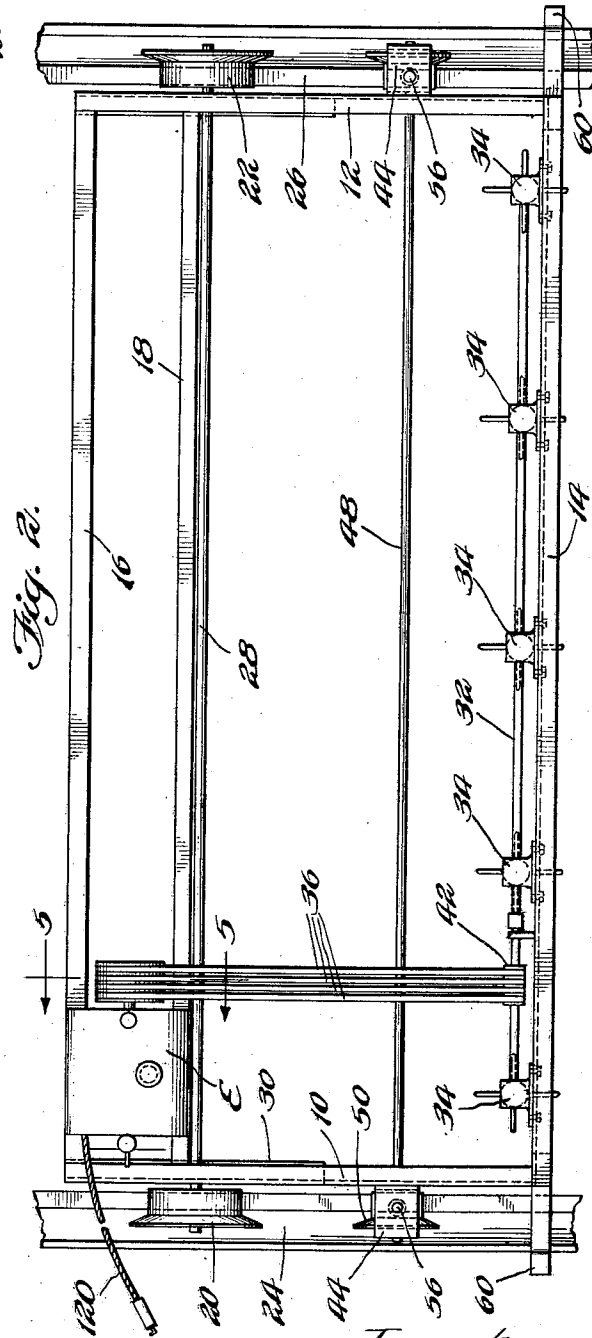
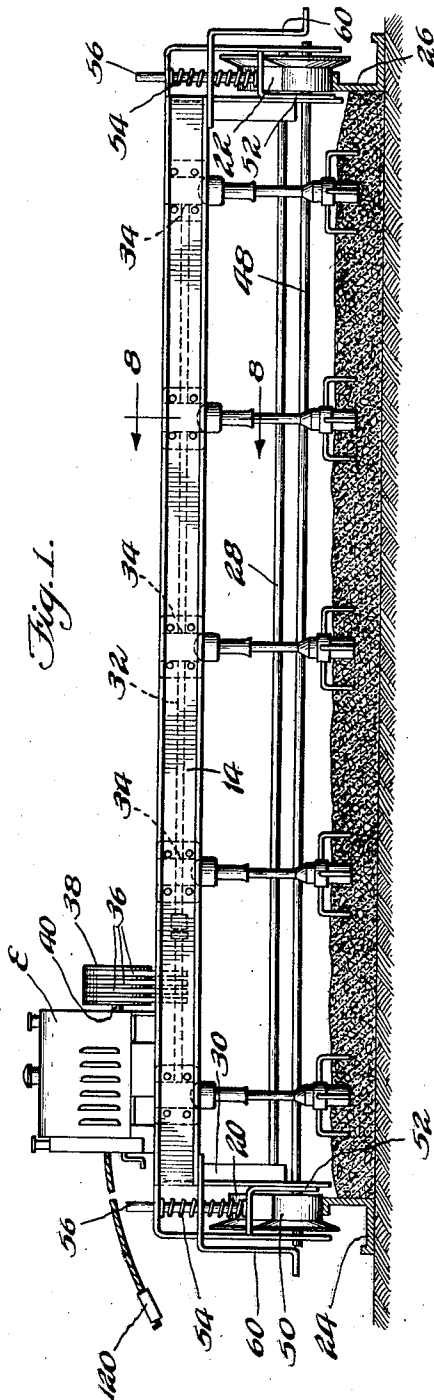
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2,223,733

GANG VIBRATOR CONSTRUCTION

Filed April 6, 1938

4 Sheets-Sheet 1



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Dec. 3, 1940.

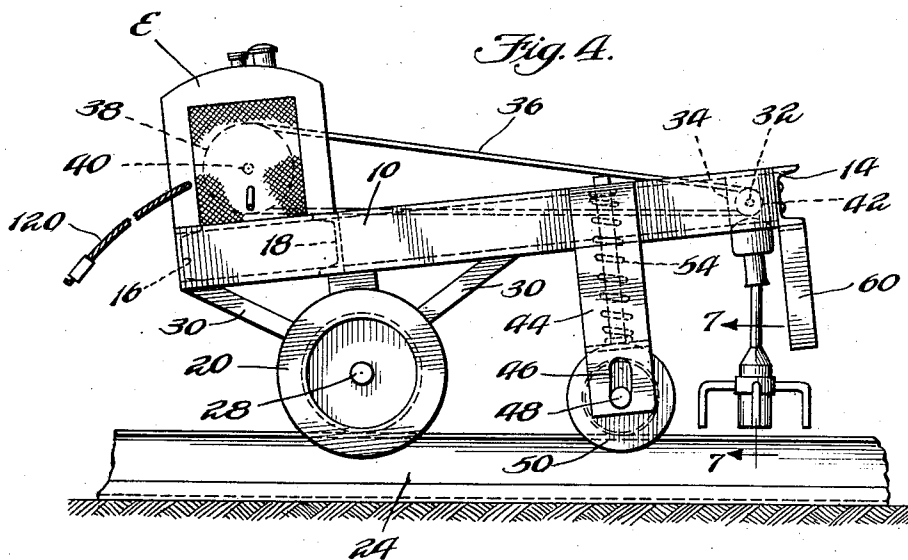
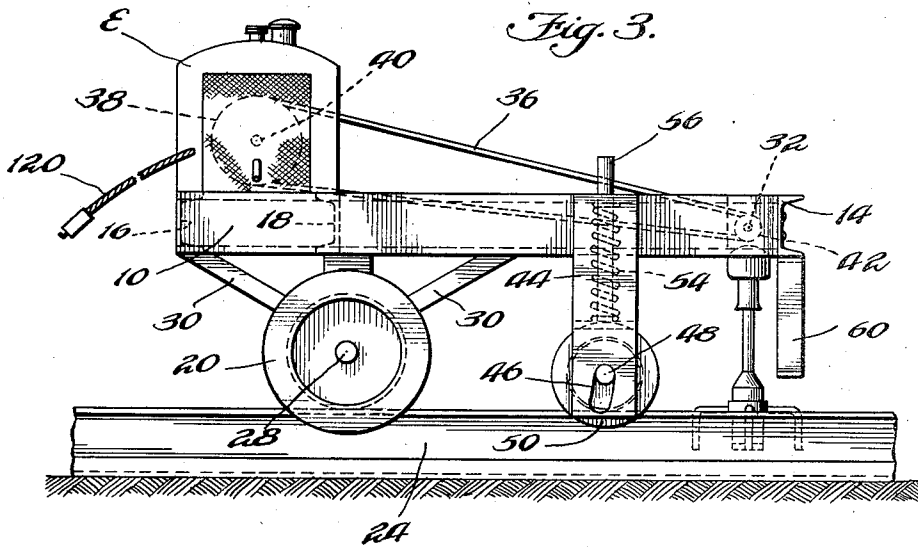
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GANG VIBRATOR CONSTRUCTION

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4 Sheets-Sheet 2



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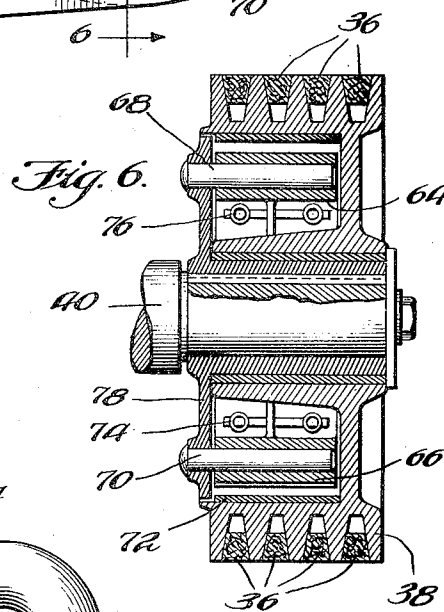
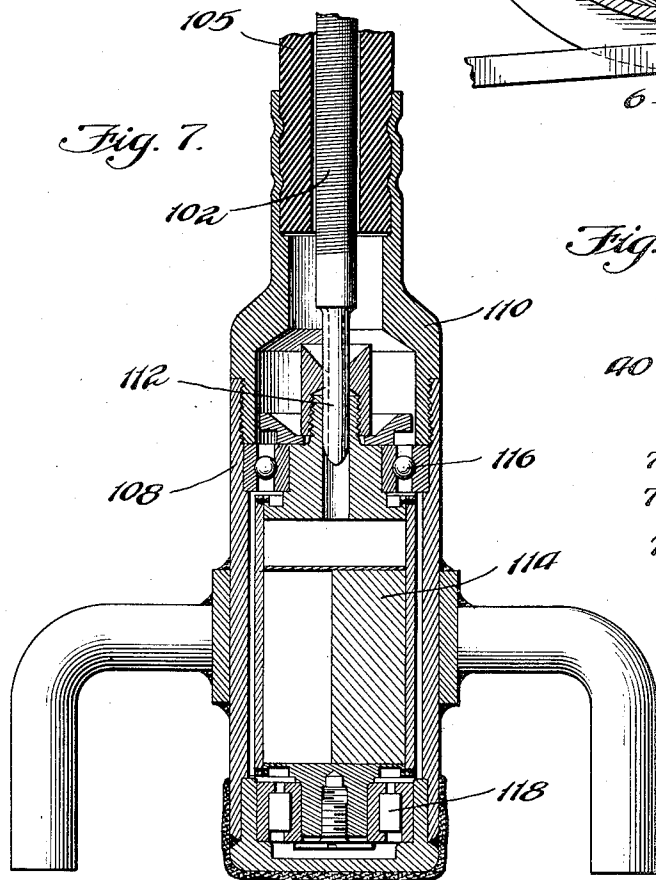
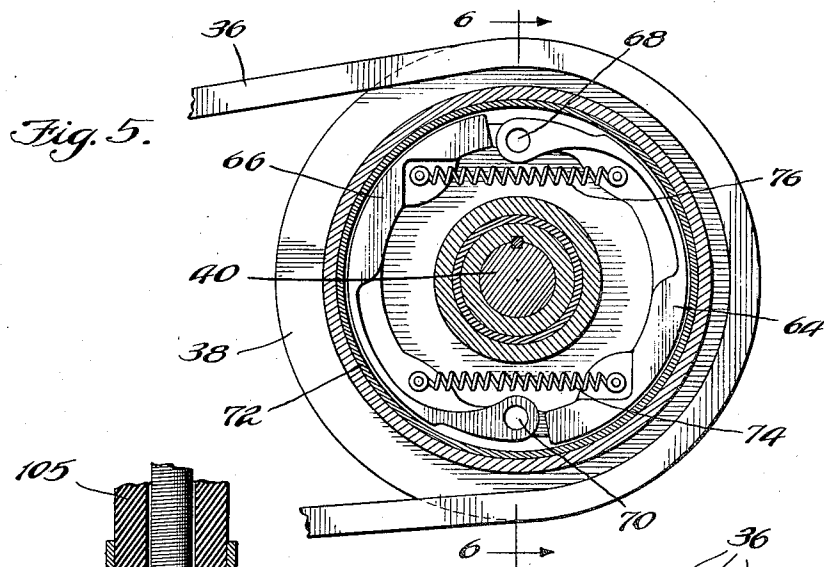
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GANG VIBRATOR CONSTRUCTION

Filed April 6, 1938

4 Sheets-Sheet 3



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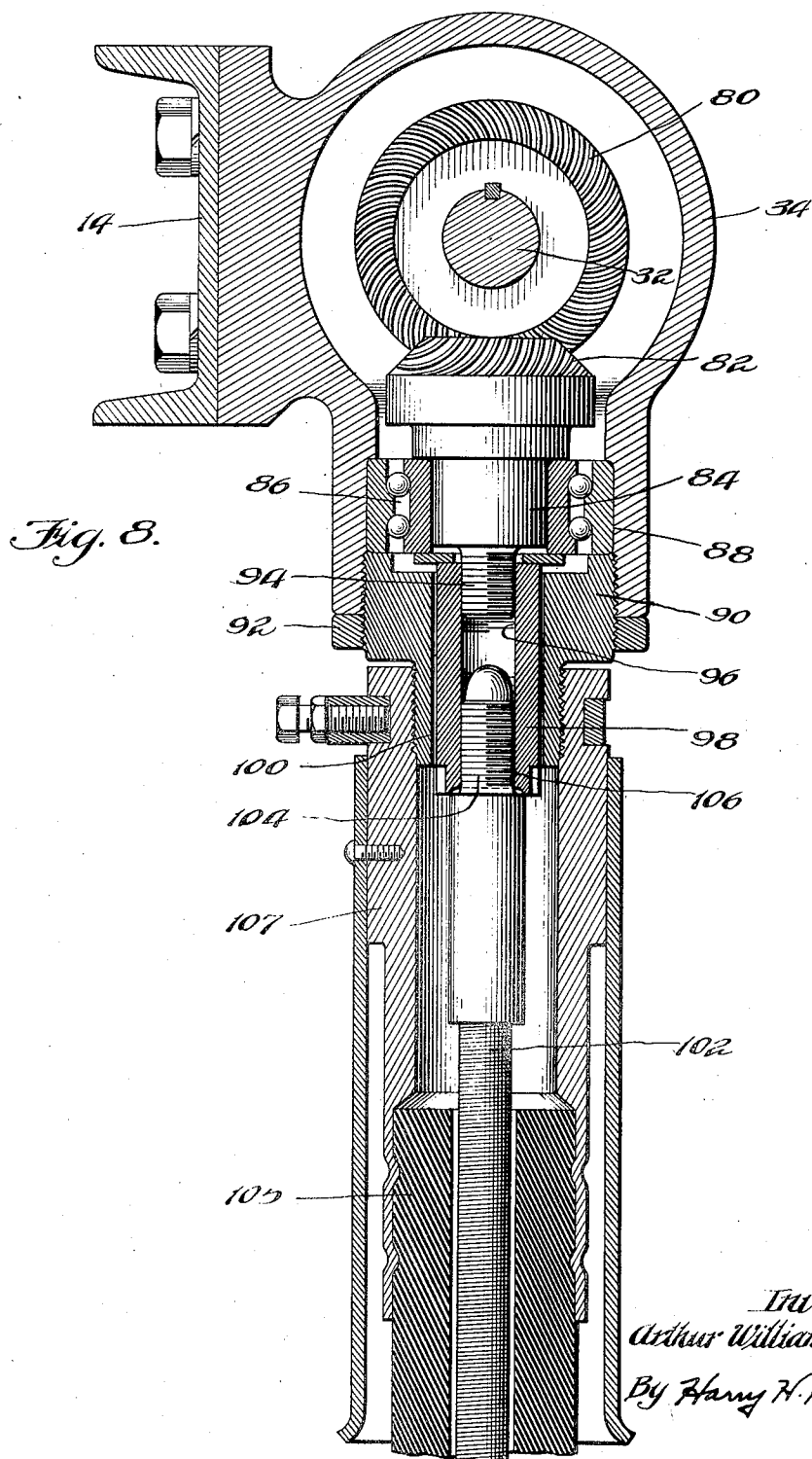
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2,223,733

GANG VIBRATOR CONSTRUCTION

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4 Sheets-Sheet 4



UNITED STATES PATENT OFFICE

2,223,733

GANG VIBRATOR CONSTRUCTION

Arthur William Mall, Chicago, Ill.

Application April 6, 1933, Serial No. 200,443

16 Claims. (Cl. 94—48)

My invention relates to gang vibrators and similar devices.

My invention relates more particularly to gang vibrators for compacting unset masses of concrete, particularly in places such as roads, highways and large concrete floors.

The principal object of the present invention is to provide an improved gang vibrator capable of independent operation in association with road building machinery and capable of following the same and compacting unset concrete in volume and in an extremely rapid manner as the same is being poured.

A further object of the present invention is to provide an improved gang vibrator of the type described capable of operation by a single operator and capable of manipulation to dip the gang vibrators in and out of the unset concrete at desired intervals as the same is moved forward over the unset concrete.

A further object of the present invention is to provide an improved gang vibrator of the class described furnished with a plurality of individual vibrator units adapted to be driven by a single gasoline engine or other source of power.

A further object of the invention is to provide an improved gang vibrator of the class described provided with a single gasoline engine, a single line drive shaft and a plurality of transmission housings arranged to have individual vibrator units suspended therefrom and capable of immersion into the unset concrete to compact the same.

A further object of the invention is to provide in combination with the drive for the above mentioned group of individual vibrator units, an improved centrifugal clutch mechanism whereby the starting and stopping of the same will have no deleterious effect upon the gasoline engine or other parts of the driving mechanism.

Other objects and advantages will be more apparent from the following description wherein reference is had to the accompanying four sheets of drawings, upon which

Fig. 1 is a front elevational view of my improved gang vibrator shown mounted upon the side rails of a road under construction;

Fig. 2 is a plan view of the same;

Fig. 3 is a side elevational view thereof with the vibrators immersed in the unset concrete;

Fig. 4 is a side view similar to Fig. 3 with the parts shown in a changed or raised position;

Fig. 5 is a cross sectional view through the drive shaft of the engine and centrifugal clutch

mechanism, taken generally on the line 5—5 of Fig. 2;

Fig. 6 is a cross sectional view through the clutch mechanism taken on the line 6—6 of Fig. 5;

Fig. 7 is a vertical sectional view through one type of vibrator unit employed in connection with my improved gang vibrator taken generally on the line 7—7 of Fig. 4, and

Fig. 8 is a vertical sectional view through the transmission housing and upper end of the flexible shaft housing of the vibrator taken generally on the line 8—8 of Fig. 1.

In the embodiment of the invention which I have chosen to illustrate I have shown my improved gang vibrator constructed of a channel member frame having the inwardly turned side channel members 10 and 12 and the front and rear channel members 14 and 16 respectively. I provide a second channel member 18 adjacent and parallel to the rear channel member 16 to provide a place and to afford a support for the gasoline engine E which furnishes the power to drive the series of vibrator units.

The frame may be supported adjacent and generally below the channel member 18 by a pair of wheels 20 and 22 that ride upon the side rails 24 and 26 of the road under construction. The wheels 20 and 22 are mounted upon the horizontal axle 28 which is rigidly secured to the frame of the unit by bearing members 30. I provide a horizontal line shaft 32 supported adjacent the front frame member 14 and provided with a plurality of transmission housings 34. Power from the engine E may be transmitted to the line shaft 32 by means of the V-belts 36 which are trained about the drive pulley 38 mounted on the engine shaft 40 and the driven pulley 42 mounted on the line shaft 32.

I provide a pair of brackets 44 mounted on the side frames 10 and 12 adjacent the forward end of the machine. The brackets 44 may be formed at their lower end with arcuately shaped elongated openings 46 to receive the axles 48 of a pair of wheels 50. The axle 48 may be carried in a pair of sliding brackets 52 normally held in a downwardly disposed position by the compression spring members 54 which surround a guide rod 56 that extends through an opening 58 in the brackets 44. A pair of foot levers 60 are secured at opposite ends of the frame below the front frame member 14 and thus when desired, by stepping upon the same, the entire frame may be pivotally tilted up and down as shown in Figs. 3 and 4, the downward motion be-

ing effected by manual pressure upon the levers 60 and the upward motion being derived from the compression spring members 54. Thus the spring members tilt the forward end of the frame upward thereby supporting the vibrating members in a normally inoperative position relative to the concrete mass. Downward manual pressure on the foot lever 60 brings the vibrating members into operative contact with the concrete mass.

The centrifugal clutch which I have previously mentioned and which is adapted to be connected to the drive shaft 40 of the engine may include a pair of pivotally mounted clutch shoes 64 and 66 mounted upon the pivot pins 68 and 70 respectively. The shoes are normally held from contact against the friction lining 72 by the compression springs 74 and 76. Thus as shown in Fig. 6, the shaft 40 of the engine is keyed to the clutch hub 78 which carries the clutch shoes 64 and 66 upon the pivot pins 68 and 70. When the speed of the drive shaft of the engine reaches a sufficient or required R. P. M., the spring members 76 and 74 are overcome and by means of the friction lining 72 the drive pulley 38 is revolved.

The drive pulley 42, as previously described, may be rigidly connected to the line shaft 32 and in each of the transmission housings 34 have a worm wheel 80 keyed thereto. The worm wheel 80 may mesh with a bevel gear type of worm 82 which is driven thereby. The gear 82 is formed with a reduced hub portion 84 and is supported in a suitable ball bearing 86 secured in a downwardly projecting chamber 88 of the housing 34. A screw-threaded locking member 90 and a lock nut 92 securely hold the parts in the position shown. The lower end 94 of the hub 84 may be screw threaded and engage in the upper tapped opening 96 of a tubular stub shaft 98. The stub shaft 98 may be directed downwardly in the bore 100 of the lock member 90. A flexible shaft 102 is provided with a screw threaded upper tip member 104 which is in screw threaded engagement with the tapped opening 106 in the lower end of the tubular shaft 98. The flexible shaft 102 is generally contained in the flexible housing 105 that is provided with the collar 107 which rigidly connects at its upper end with the lock member 90. Since the flexible shaft which I employ may be of any well known desirable type at present on the market, the same will not be described in any further detail.

As shown in Fig. 7 the vibrator units which I employ are generally provided with a cylindrical casing 108 which has an upper end 110 screw-threadedly connected thereto. The lower end of the flexible shaft housing 105 is adapted to be rigidly secured to the upper end of the vibrator unit and enclose the flexible shaft 102 which extends downwardly into the casing 108 and by means of the tip 112 is in driving engagement with an off-balance weight 114 mounted in the casing and provided at the upper and lower ends of the same with the bearings 116 and 118. The vibrator which I employ may be of any suitable or desirable type at present on the market and is preferably of the type shown and described in my pending application, Serial No. 200,444, and in my Patent No. 2,073,393.

From the above and foregoing description it will be apparent to those skilled in the art that I have provided a vibrating machine for internal vibration of unset concrete particularly adapted for use in road construction. I have provided a plurality of aligned vibrators mounted at the

forward end of a framework so arranged that the source of power for the vibrators acts as a counter-weight for the entire frame and provides in effect a floating front end. This is desirable so that a single operator can raise or lower the forward end of the machine where the vibrators are located, thus permitting the vibrators to be lowered and raised into and out of the unset concrete as desired. I also provide a remote control 120 for the engine, so that the control of the engine may be effected from a point adjacent the front of the machine, and thus it can be seen that a single operator can move the mechanism back and forth upon the rails of the road, operate the gang of vibrators and have absolute control over the speed at which the engine is running.

I have found by experience that a preferable speed at which to vibrate unset concrete in road building is approximately 7000 R. P. M. This, however, may be increased or decreased according to the type of materials employed and the other surrounding conditions. In the preferred form of my invention I have employed a 4-cylinder, 12 to 16 horsepower gasoline engine, as I have found this sufficient for a gang of from 5 to 9 vibrators.

While I have illustrated and described a specific embodiment of my invention, it will be apparent to those skilled in the art that changes and modifications can be made in the exact details shown and I do not wish to be limited in any particular; rather what I desire to secure and protect by Letters Patent of the United States is:

1. A gang vibrator adapted to ride upon a pair of parallel rails comprising a frame, an axle supporting said frame, a pair of wheels upon opposite ends of said axle engaging said rails, a resilient support at the forward end of said frame engaging said rails, a motor mounted on said frame adjacent one side thereof, a horizontal driveshaft in said frame adjacent the other side thereof, a driving connection between said motor and said driveshaft and a plurality of aligned vertically suspended vibrator units driven from said lineshaft, said driving connection having a centrifugal clutch therein whereby said vibrators are only operated over a pre-determined speed of said motor.

2. A gang vibrator adapted to ride upon a pair of parallel rails comprising a frame, an axle supporting said frame, a pair of wheels upon opposite ends of said axle engaging said rails, a resilient support at the forward end of said frame engaging said rails, a motor mounted on said frame adjacent one side thereof, a horizontal driveshaft in said frame adjacent the other side thereof, a driving connection between said motor and said driveshaft and a plurality of aligned vertically suspended vibrator units driven from said lineshaft, said driving connection having a centrifugal clutch therein whereby said vibrators are only operated over a pre-determined speed of said motor, and remote control means for determining the speed of said motor.

3. Apparatus of the class described capable of being supported upon a pair of spaced rails including a generally rectangular frame member, an axle supporting one side of said frame member, a pair of wheels on said axle adapted to ride on said rails, a motor mounted on said frame near said axle, a horizontal lineshaft mounted between the ends of said frame adjacent the other side thereof, a driving connection between said motor and said driveshaft, a plurality of vibrator units

vertically suspended in a line below said driveshaft and in driving connection therewith, and a pair of vertically positioned wheel members in close proximity to said vibrator units adapted to ride on said rails and resiliently connected to said frame so as to support the same for yielding up and down movement under manual operation.

4. Apparatus of the class described capable of being supported upon a pair of spaced rails including a generally rectangular frame member, an axle supporting one side of said frame member, a pair of wheels on said axle adapted to ride on said rails, a motor mounted on said frame near said axle, a horizontal lineshaft mounted between the ends of said frame adjacent the other side thereof, a driving connection between said motor and said driveshaft, a plurality of vibrator units vertically suspended in a line below said driveshaft and in driving connection therewith, and a pair of vertically positioned wheel members in close proximity to said vibrator units adapted to ride on said rails and resiliently connected to said frame so as to yieldingly support the same, and handle means on said frame for manually transmitting to said frame an up and down movement.

5. Apparatus of the class described capable of being supported upon a pair of spaced rails including a generally rectangular frame member, an axle supporting one side of said frame member, a pair of wheels on said axle adapted to ride on said rails, a motor mounted on said frame near said axle, a horizontal lineshaft mounted between the ends of said frame adjacent the other side thereof, a driving connection between said motor and said driveshaft, a plurality of vibrator units vertically suspended in a line below said driveshaft and in driving connection therewith, and means associated with said frame in close proximity to said vibrator units capable of transmitting to said frame an up and down movement, said means including vertically positioned coil springs forming part of means supporting the said other side of the frame and foot levers secured to said other side of the frame.

6. Apparatus of the class described capable of being supported upon a pair of spaced rails including a generally rectangular frame member, an axle supporting one side of said frame member, a pair of wheels on said axle adapted to ride on said rails, a motor mounted on said frame near said axle, a horizontal lineshaft mounted between the ends of said frame adjacent the other side thereof, a driving connection between said motor and said driveshaft, said connection including a centrifugal clutch, a plurality of vibrator units vertically suspended in a line below said driveshaft and in driving connection therewith, and a pair of wheel members in close proximity to said vibrator units adapted to ride on said rails and resiliently supporting said frame for yielding up and down movement under manual operation.

7. Apparatus of the class described capable of being supported upon a pair of spaced rails including a generally rectangular frame member, an axle supporting one side of said frame member, a pair of wheels on said axle adapted to ride on said rails, a motor mounted on said frame near said axle, a horizontal lineshaft mounted between the ends of said frame adjacent the other side thereof, a driving connection between said motor and said driveshaft, a plurality of vibrator units vertically suspended in a line below said driveshaft and in driving connection therewith, a pair of wheel members in close proximity to said

vibrator units adapted to ride on said rails, spring means for raising said wheels from said rails in a rocking motion and said engine so located as to act as a counterbalance for said rocking motion.

8. A vibrating apparatus for compacting concrete masses of substantial area comprising a frame adapted to ride upon forms containing the concrete, a power unit mounted at one side of the frame, a horizontal line shaft mounted at the other side, a plurality of vibratory members carried by the frame, operatively connected to the line shaft and adapted to be driven thereby, a pair of vertically positioned wheel members resiliently supporting the frame and adapted to ride upon the forms whereby up and down movement of the frame by manual operation may be obtained.

9. A vibrating apparatus for compacting concrete masses of substantial area comprising a frame adapted to ride upon forms containing the concrete, a power unit mounted at one side of the frame, a horizontal line shaft mounted at the other side, a plurality of vibratory members carried by the frame, operatively connected to the lineshaft and adapted to be driven thereby, and means resiliently supporting said frame capable of transmitting an up and down movement to said frame, said means including a coil spring forming part of means supporting said frame and a foot lever carried by said frame.

10. A vibrating device for compacting concrete masses of substantial area comprising a frame having supporting members adapted to ride upon forms containing the concrete, a power unit mounted on said frame, a plurality of vibrating members carried by said frame and operatively connected to said power unit, means associated with said frame for yieldably supporting the vibrating members in a normally inoperative position relative to the concrete mass, said means including a spring operatively interposed between the frame and the said supporting members.

11. A vibrating device for compacting concrete masses of substantial area comprising a frame having supporting members adapted to ride upon forms containing the concrete, a power unit mounted on said frame, a plurality of vibrating members carried by said frame and operatively connected to said power unit, means associated with said frame for yieldably supporting the vibrating members in a normally inoperative position relative to the concrete mass, said means including a spring operatively interposed between the frame and the said supporting members, whereby the frame is supported in a yielding extended position with relation to the supporting members.

12. A vibrating device for compacting concrete masses of substantial area comprising a frame having supporting members adapted to ride upon forms containing the concrete, a power unit mounted on said frame, a plurality of vibrating members carried by said frame and operatively connected to said power unit, means associated with said frame for yieldably supporting the vibrating members in a normally inoperative position relative to the concrete mass, said means including a spring operatively interposed between the frame and the said supporting members, and means for overcoming the yielding resistance of the spring whereby the vibrating members are brought into operative contact with the concrete mass.

13. An apparatus as defined by claim 10 wherein the power unit is positioned on the frame so

as to provide a counterbalancing weight, said weight cooperating with the spring in maintaining the vibrating members in a normally inoperative position.

- 5 14. A vibrating device for compacting concrete masses of substantial area comprising a frame having supporting members adapted to ride upon forms containing the concrete, a power unit
10 members carried by said frame and operatively connected to said power unit, and means associated with the frame for yieldably supporting the vibrating members in a normally inoperative position relative to the concrete mass.
- 15 15. A vibrating device for compacting concrete comprising a supporting member having a power unit associated therewith, a vibratory mechanism also associated with the supporting member and adapted to be forcibly immersed into the con-

crete, and means normally opposing the forcible immersion of the vibratory mechanism and tending to effect withdrawal of said vibratory mechanism out of the concrete, and said withdrawal being effected by said opposing means upon re- 5 lease of the immersive force.

16. A vibrating device for compacting concrete comprising a supporting member, a vibratory mechanism associated with the supporting member, means for manually forcing said vibratory 10 mechanism into an immersed position in the concrete, and means normally opposing the forcible immersion of the vibratory mechanism and tending to effect withdrawal of said vibratory mechanism out of the concrete, said withdrawal 15 being effected by said opposing means upon release of the immersive force.

ARTHUR WILLIAM MALL.