

Oct. 18, 1966

E. C. BRIGGS ETAL
COMPACTOR

3,279,338

Filed June 4, 1963

3 Sheets-Sheet 1

Fig-4

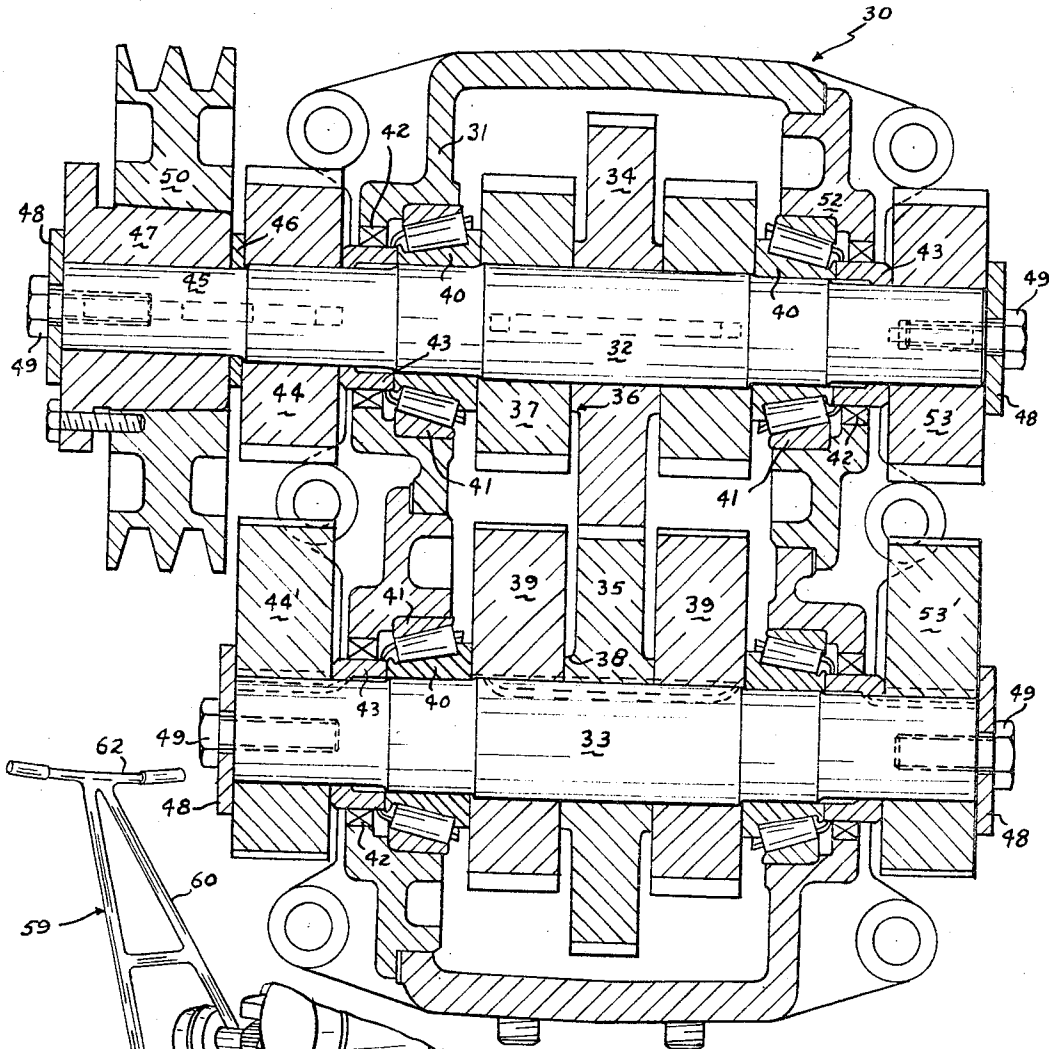
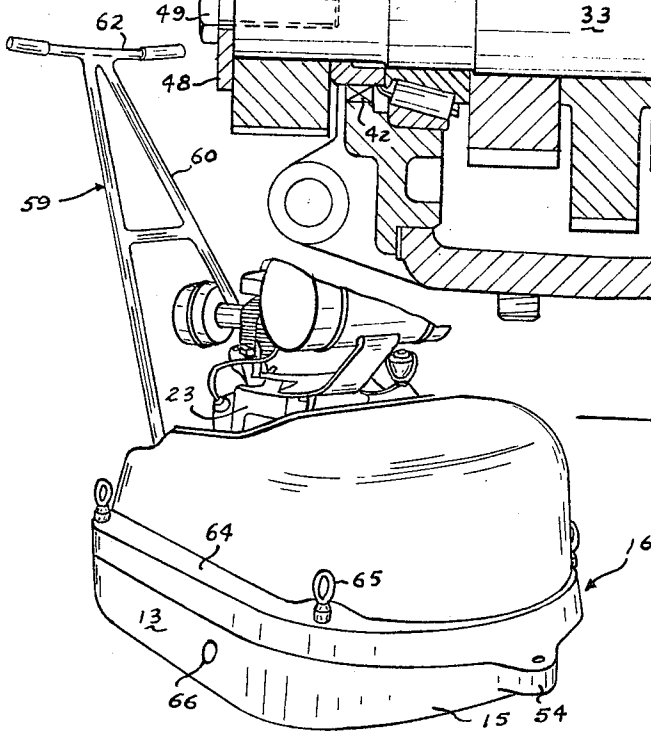


Fig-1



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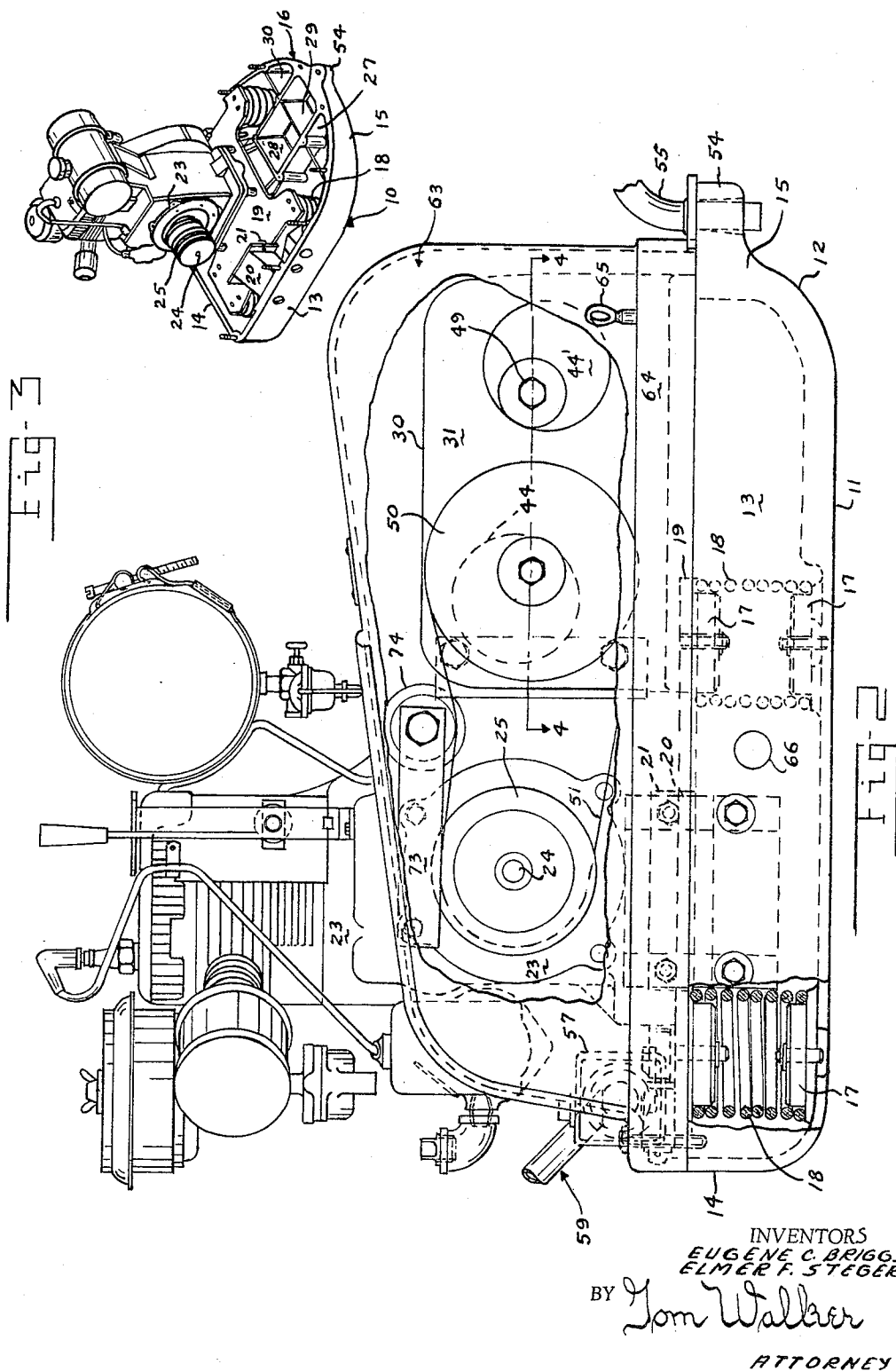
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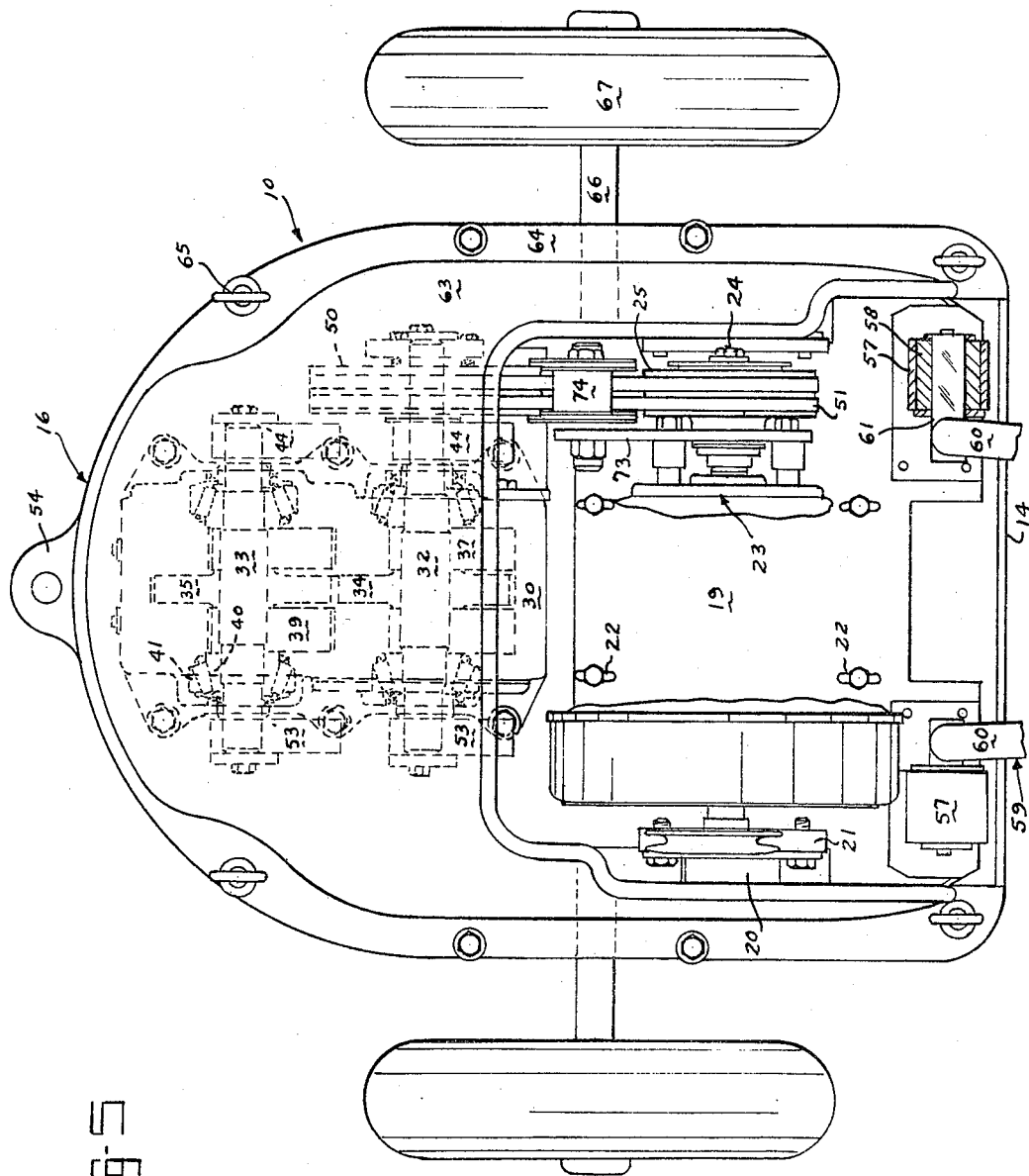


Fig. 5

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3,279,338 COMPACTOR

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This invention relates to compactors and, more particularly, to improvements in vibratory compactors.

A primary object of the invention is to provide a compactor which is economical to fabricate, more efficient and satisfactory in use, adaptable to a wide variety of applications and unlikely to malfunction.

An additional object of the invention is to provide a heavy duty compactor which is relatively light in weight and easy to handle.

A further object of the invention is to provide an improved compactor unit so designed to have a low center of gravity which improves its performance and makes it easier to handle.

Another object of the invention is to provide a heavy duty compactor unit which is self-propelled by counter-rotating weights which orient in a generally horizontal plane with reference to a surface to be compacted.

Another object of the invention is to provide a self-propelled compactor unit wherein the operating components have an improved mount.

A further object of the invention is to provide an improved vibratory compactor unit incorporating synchronized counter-rotating eccentric weights which are horizontally oriented in an out of phase relation to produce a forward motion in conjunction with an application of vibratory compacting force.

An additional object of the invention is to provide a vibratory compactor possessing the advantageous features, inherent meritorious characteristics and the means and mode of operation herein described.

With the above and other incidental objects in view as will more fully appear in the specification, the invention intended to be protected by Letters Patent consists of the features of construction, the parts and combinations thereof, and the mode of operation as hereinafter described or illustrated in the accompanying drawings, or their equivalents.

Referring to the accompanying drawing wherein is shown one but obviously not necessarily the only form of embodiment of the invention,

FIG. 1 is a perspective view of a vibratory compactor in accordance with the invention;

FIG. 2 is a fragmentary side elevation view of the device of FIG. 1 with parts broken away for clarity of disclosure;

FIG. 3 is a fragmentary detail view showing the drive mechanism for the compactor of FIG. 1;

FIG. 4 is a sectional view taken on line 4-4 of FIG. 2; and

FIG. 5 is a fragmentary top view of the device of FIG. 1.

Like parts are indicated by similar characters of reference throughout the several views.

The compactor illustrated includes a boat-shaped shell 10 the base of which provides a compactor plate 11. The plate 11 is generally rectangular and flat except for an arcuately rounded and upwardly curved forward extremity 12. About the periphery of the plate 11 and formed integral therewith are vertically projected side walls 13, a rear wall 14 perpendicular thereto, and an arcuately contoured forward wall 15, all of which form a receptacle which is defined as the shell 10. The outermost

surfaces of the plate extremity 12 and the wall 15 are appropriately contoured to smoothly merge and form a generally rounded nose section 16 on the shell 10.

Rectangularly positioned on the four corners of the flat generally rectangular portion of the plate 11 are spring pads 17. Pads 17 are fixed to mount vertically projected coil springs 18. The springs 18, in turn, support the relatively remote corners of a generally H-shaped engine mounting plate 19 through the medium of further fixed mounting pads 17. The leg portions of the plate 19 are thereby oriented in a sense longitudinally of the shell 10 and in a plane generally common to its upper level.

Each of the sides of the plate 19 respectively adjacent a side wall 13 of the shell 10 is suitably recessed to accommodate one end of a shock mount 20. One end of each shock mount is secured to a mounting bracket 21 on the adjacent edge of the plate 19 while its other end is suitably secured to the relatively adjacent side wall 13. The shock mounts 20 are so designed to prevent a side sway of the mounting plate 19 and to exert a stabilizing influence thereon in a manner to be further described.

Centered between the shock mounts 20 on the plate 19 are longitudinally aligned and transversely spaced slots 22 which accommodate the mounting bolts on the base of an engine 23. Thus, the engine 23 may be centered on the adjusted in a sense longitudinally of the plate 19. The engine 23 is so mounted to have its drive shaft 24 project in a sense at right angles to the shell walls 13 and closely above and in line with the shock mounts 20. Viewing FIG. 3 of the drawings, the extremity of the shaft 24 which is adjacent and immediately inward of the right wall 13 mounts a drive pulley 25 having parallel grooves which are V-shaped in cross-section.

The engine 23 is a variable speed engine. It has conventional controls, the details of which are not pertinent to the disclosure of present invention and therefore will not be described. For purposes of the present disclosure the drive pulley 25 is conventionally driven through the medium of a centrifugal clutch.

Formed in and integral with the shell 10 are parallel plates 27 which project perpendicular to the plate 11 and extend rearwardly from the central portion of the forward wall 15. Plates 27 are equally spaced to either side of the longitudinal center line of the shell 10. Their rear extremities terminate in the recess defined in the adjacent end of the H-shaped engine mounting plate 19 where they are bridged by a plate 28 formed integral therewith. The plates 27 are also bridged intermediate their longitudinal extremities by a shallow reinforcing plate 29 having extensions 30 to the outer sides of the plates 27 which connect to opposite sides of the nose 16. The depth of the plates 27 and 28 is the same as that of the shell 10.

The plates 27 and 28 together with the central portion of the forward wall 15 of shell 10 form a generally rectangular base mounting a generally rectangular gear and weight housing 30. The housing 30, which is suitably fixed to the plates 27, includes side wall sections 31, each of which has a pair of longitudinally spaced apertures, the apertures in the respective wall sections being transversely aligned. In the housing 30, the pair of transversely aligned apertures most adjacent the engine 23 accommodates a shaft 32 while the pair remote therefrom accommodates a shaft 33. The shafts 32 and 33 are so mounted to be parallel to each other and respectively parallel to the engine drive shaft 24.

Keyed to the central portion of shaft 32 in the housing 30 is a gear 34 in mesh with a gear 35 keyed to the central portion of the shaft 33. Keyed to the shaft 32 to either side of the gear 34 and in abutment with a pro-

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jected end of its hub 36 is an eccentrically mounted weight 37 having a disc form. Similarly keyed to shaft 33 to either side of the gear 35 and in abutment with a projected end of its hub 38 is an eccentrically mounted weight 39 having a disc form.

The respectively remote faces of the weights 37 each abut a cone 40 of a bearing assembly which rotatably supports a relatively reduced portion of the shaft 32 in a side wall section 31 of the housing 30. The cone 40 on the one side nests in a bearing cup 41 contained in an outwardly projected portion of the adjacent side wall 31 which defines one of the aligned apertures which accommodate the shaft 32. This aperture is rimmed by a seal 42 which nests a sleeve 43 positioned immediately about a further reduced portion of the shaft 32 which projects outwardly of the housing 30. One end of sleeve 43 abuts the outermost face of the adjacent cone 40 while its other end projects outwardly of the housing 30 to abut one face of a weight 44. The weight 44, which has a disc form, is eccentrically keyed on the outwardly projected portion of the shaft 32, a relatively reduced portion 45 of which extends therebeyond. The shaft portion 45 first accommodates a ring-shaped spacer 46 which abuts the weight 44 and then a taper lock bushing 47 which extends to its projected extremity. The bushing 47 is confined by a washer 48 fixed to the projected extremity of the shaft portion 45 by a screw 49. As is obvious, the washer 48 serves as a clamping medium.

The bushing 47 fixedly mounts a pulley 50 which is positioned thereby in a plane common to that of the pulley 25 on the engine drive shaft 24. The pulleys 25 and 50, which have a similar configuration, are drivingly related through the medium of a pair of V-belts 51.

The cone 40 of the bearing assembly most remote from the pulley 50 on the shaft 32 nests in a bearing cup 41 seated in a recess formed about a central aperture in a bearing cap 52. The cap 52 fills the relatively aligned aperture in the wall section 31 remote from the pulley 50. The central aperture in the cap 52 is lined by a seal 42 which nests a sleeve 43 accommodating a reduced relatively projected portion of the shaft 32. One end of sleeve 43 abuts the adjacent end of the cone 40 while the other projects outwardly of the bearing cap 52 and the housing 30 to abut the inner face of an adjacent weight 53. The weight 53 which is eccentrically fixed to the end of shaft 32 remote from the pulley 50 has a disc form and is clamped in position by a washer 48 fixed to the adjacent end of the shaft 32 by a screw 49.

As above described, the shaft 32 has its maximum diameter within the boundaries of the side walls 31 of the housing 30 where it mounts the gear 34 and the weights 37. It is reduced in diameter at the portions thereof immediately outward of the weights 37 which are bearingly contained by the cones 40 and further reduced at the portions that mount the sleeves 43 and the weights 44 and 53 externally of the housing 30 and immediately to either side thereof.

The shaft 33 is reduced in diameter, similarly to the shaft 32, at its portions immediately outward of the weights 39. These portions extend through aligned bearing units appropriately mounted at the respectively aligned apertures which accommodate the shaft 33 to project through the opposite wall sections 31 of the housing 30. The construction of these bearing units and the means which seat them in the wall sections 31 is similar to that previously described in reference to the shaft 32. The respective ends of the shaft 33 which project externally of the housing 30 are also reduced in diameter as in the case of the shaft 32 and respectively mount a sleeve 43 and, in eccentrically disposed relation thereon, in the one case a weight 44' and in the other case a weight 53'. The weight 44' is similar to the weight 44 and the weight 53' is similar to the weight 53. The weights 44' and 53' are suitably and similarly confined to the shaft 33 in a

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manner believed obvious from FIG. 4 of the drawings.

It is of particular note that the shafts 32 and 33 are so disposed to lie in a horizontal plane generally parallel to that of the compacting surface at the underside of the plate 11. So disposed, they mount the weights 37 and 39 in respectively co-planar relation to either side of the gears 34 and 35 in the housing 30. Externally of the housing 30, the weights 44 and 44' are co-planar as are the weights 53 and 53'. A further fact to be noted is that each of the weights which eccentrically mount on the shaft 33 are so positioned to have a relative angular displacement in reference to the mounting of the respectively co-planar weight on the shaft 32. In the example illustrated, the relative angular displacement of the weights arranged in fore and aft relation on the shafts 32 and 33 is 60°.

Thus, the engine 23 is in driving relation to the shaft 32 through the medium of the pulley 25, belts 51 and pulley 50. The shafts 32 and 33 are interrelated for synchronous counter-rotation through the medium of the meshed gears 34 and 35.

Bolted to the side of the engine 23, adjacent and above the pulley 25 is a mounting bracket 73. The bracket 73 rotatably mounts a roller 74 to bear on and suitably tension the belts 51, as shown in FIG. 2 of the drawings.

Formed integral with and projected from the shell 10 at the center of its nose portion 16 is a towing ring 54. The ring 54 accommodates a tow bar 55.

The one extremity of the H-shaped engine mounting plate 19 remote from the housing 30 lies immediately adjacent the rear wall 14 of the shell 10. Fixed on either corner thereof is a mounting bracket 56 including a tubular housing 57 which is rectangular in cross-section. Each of the housings 57, which are transversely aligned, concentrically nests a similarly formed elastomeric bushing 58. A generally A-shaped handle assembly 59 is provided to include rectangular studs 61 at the lower extremities and outer sides of its divergent leg portion 60. The studs 61 respectively nest in the bushings 58 and are suitably fixed thereto. This provides for a shock resistant and resilient mount of the assembly 59, which is thereby disposed in a position upwardly and rearwardly inclined from the shell 10. The upper end of the assembly 59 terminates in a transversely disposed grip 62.

Thus, the assembly 59 provides a guide handle which connects to the shell 10 through the medium of a resilient connection to the resiliently mounted engine mounting plate 19.

The shell 10 is capped immediately forward of the engine 23 and to either side thereof by a cover 63. This cover is of a nature to keep sand, gravel and other undesirable elements from entering the shell. As should be obvious, this not only prevents damage to the control equipment but enables a stabilized and more effective operation of the compactor as illustrated. It is to be noted that the cover 63 together with the shell 10 provides a configuration to resemble the head of a whale.

Included on the cover 63 are laterally projected flanges 64 which seat on the walls 13 of the shell 10 and are suitably fixed thereto. Spaced longitudinally of the flanges 64 are vertically projected lift eyes 65.

Referring to the shell 10, its side walls 13 include transversely aligned apertures oriented on a line to the rear of the forwardmost springs 18 and below the engine mounting plate 19. These aligned apertures accommodate a shaft 66 which conventionally mounts wheels 67 at its respectively projected extremities. On application of the shaft 66 and the wheels 67, the shell 10 and the structure which mounts thereon is rendered portable.

The above described structure provides a preferred embodiment of a compactor in accordance with the invention. In this embodiment lift, compaction, and forward propulsion of the shell 10 is enabled by the position and the particularly described relation of the weight elements associated with the gear and weight housing 30, both in-

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ternally and externally thereof. The weights are so arranged to provide that the center of gravity of the compactor unit lies immediately above the shell 10 and essentially in the same horizontal plane as that of the supporting shafts 32 and 33. The low center of gravity so provided makes the described compactor easier to handle and enables its optimal performance.

The described embodiment of the invention operates as follows. To begin compacting operations, the variable speed engine 23 is energized and adjusted through its conventional controls to provide a selected optimal rotation of the drive shaft 24. Through the medium of its associated centrifugal clutch the shaft 24 drives the pulley 25 which in turn drives the pulley 50 through the medium of the belts 51. On drive of the pulley 50, the shafts 32 and 33 will be energized to counter-rotate and produce a counter-rotation of the respectively co-planar weights thereon. As previously described, the weights on the respective shafts 32 and 33 are angularly displaced in an out of phase relation and are so related to cyclically produce a resultant force which is upwardly and forwardly inclined relative to the shell 10. The shell 10 is directly lifted and forwardly propelled thereby. Immediately following, the relative cyclical operation of the discs constituting the weight members on the shafts 32 and 33 produces a forward and downward compacting force which is directly imposed on the shell 10. Thus, as the engine 23 drives the shafts 32 and 33 there are successive lift and compacting forces exerted on the shell 10 through the medium of the counter-rotating out of phase weights thereon.

Due to the low center of gravity enabled by the horizontal disposition of the shafts 32 and 33 and the weights thereon, the resultant lifting and compacting forces are optimum.

Although the consequent force and speed of compaction is substantial, the drive components are isolated from the attendant vibration and shock. This is due to mount of engine 23 on the springs 18 in the shell 10. The handle assembly 59 is similarly isolated from the lift and compacting forces and attendant vibration. This last insures that operator fatigue will be an absolute minimum. The handle 59 is in no event necessary for the forward motion of the compactor but merely serves as a medium for guiding the direction of its movement.

The composition of the described compactor is such to enable it to achieve a heavy duty capacity while being assembled in a relatively small and compact package which is light in weight and easy to handle.

A particular feature of the invention is the manner of mounting the engine 23 in the shell 10 not only through the medium of rectangularly positioned springs 18 but in conjunction with shock mounts 20 which inherently prevents side sway. This enables the compactor to be more efficient and satisfactory in use.

As is believed apparent, the shaft and the wheels which render the compactor portable are removed during a compacting operation. In the event that the compactor needs to be moved any particular distance, the shaft and wheels may be readily applied to serve their useful purpose.

The lift eyes 65 allow the compactor to be readily hoisted into a truck or other vehicle, when desired. In addition, the tow bar 55 as engaged in the eye 54 may be effectively utilized in an obvious manner.

A further advantage of the invention design is that the contour of the cover 63 and the shell 10 permits easy turning of the compactor unit for effective use adjacent wall structures.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

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While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown, but that the means and construction herein disclosed comprise but one of several modes of putting the invention into effect, and the invention is therefore claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described our invention, we claim:

1. A compactor unit including parallel shafts, weight means having an eccentric mount on one of said shafts, further weight means having an eccentric mount on the other of said shafts, a base plate having a compacting surface, means rotatably mounting said shaft means on said base plate in a common plane relatively adjacent and generally parallel to that of said compacting surface and rotary driving means mounted on said base plate for rotating said shaft means, said weight means having an out of phase relation whereby on rotation thereof with said shaft means to cyclically and successively apply a lift and a compacting force to said base plate, said weight means on the respective shafts having an angular displacement relative to one another to simultaneously apply, on rotation thereof, a propulsive force to said base plate.

2. A compactor unit comprising, a boat shaped shell forming its base, a plurality of springs seated in longitudinally and transversely spaced relation in said shell, plate means mounted on said springs, an engine connected to said plate means, a drive and weight housing fixed to said base forwardly of said engine relative to opposing ends of said plate means, a pair of shafts rotatably mounted in said housing in longitudinally spaced relation to one another, means providing a drive of said shafts by said engine, said shafts lying in a common plane generally parallel to the plane of the base of said shell and having weights eccentrically connected therewith arranged to operate in an out of phase relation to produce a vibratory influence on said shell on drive of said shafts.

3. A compactor unit as set forth in claim 2 and guide means for said shell having a resilient connection to said engine mounting plate means to thereby isolate said guide means from the vibratory influence applied to said shell.

4. A ground compacting tool including a shell forming its base and having on its underside a ground engaging surface, an engine unit resiliently mounted on said shell toward one end thereof, a drive and weight housing fixedly mounted on said shell toward the other end thereof, a pair of shafts rotatably mounted in said housing and having their ends projecting through and beyond opposing side walls of said housing, said shafts being in a common horizontal plane generally parallel to said ground engaging surface, weights eccentrically mounted on each of said shafts within the housing and outside the housing on projecting ends of said shafts, each weight on one shaft having a corresponding weight on the other shaft and corresponding weights being aligned, corresponding weights being so fixed in a rotative sense on their respective shafts as to assume out of the phase relations to one another, and means for synchronously driving said shafts from said engine.

5. A ground compacting tool including a shell forming its base and having forward and rearward ends, said shell having on its underside a ground engaging surface, an engine mounted on said shell in elevated relation to said ground engaging surface, a handle extending upwardly from said shell rearwardly of said engine, a pair of shafts mounted on said shell forwardly of said engine, said shafts being in a common plane parallel to said ground engaging surface and intermediate said surface and said engine, means for synchronously rotat-

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ing said shafts from said engine, and eccentric weights on said shafts, there being corresponding weights on respective shafts, corresponding weights being fixed to respective shafts in an out of phase relationship providing a net effective lift force during a part of the rotation of the shafts inclining from the vertical forwardly of the shell while maintaining a center of gravity substantially in said common plane of said shafts, said handle being used to guide the tool.

6. A ground compacting tool according to claim 5, characterized in that corresponding weights are offset in a rotary sense relative to one another to achieve a total weight displacement on the order of 60° directing the lifting force approximately 30° forwardly of vertical.

7. A ground compacting tool including a shell forming its base and having on its underside a ground engaging surface, a pair of shafts mounted on said shell, said shaft being in a common plane parallel to and overlying said ground engaging surface, means for synchronously rotating said shafts, and eccentric weights on said shafts, there being corresponding weights on respective shafts, corresponding weights being fixed to respective shafts in an out of phase relationship providing a net effective lift force during a part of the rotation of the shafts inclining from the vertical while maintaining a center of gravity substantially in said common plane of said

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shafts, corresponding weights being offset in a rotary sense relative to one another to achieve a total weight displacement of a magnitude to direct the lifting force along a predetermined angle from the vertical.

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