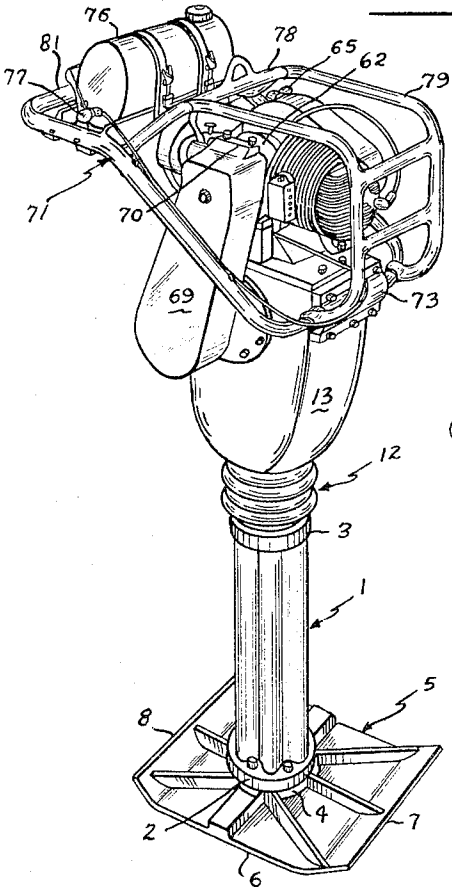
Oct. 11, 1966 A. G. HORVATH ETAL 3,277,801

TAMPER

Original Filed March 19, 1962 3 Sheets-Sheet 1

Fig-1



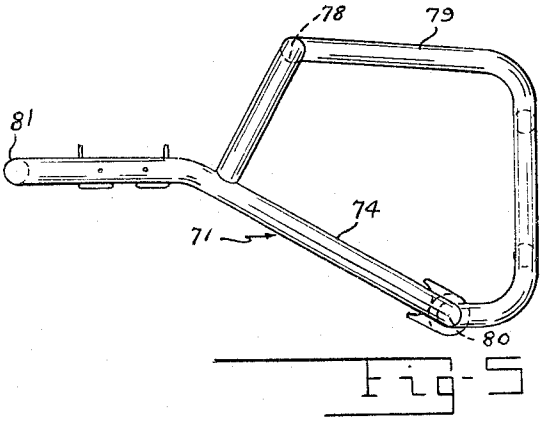


Fig-5

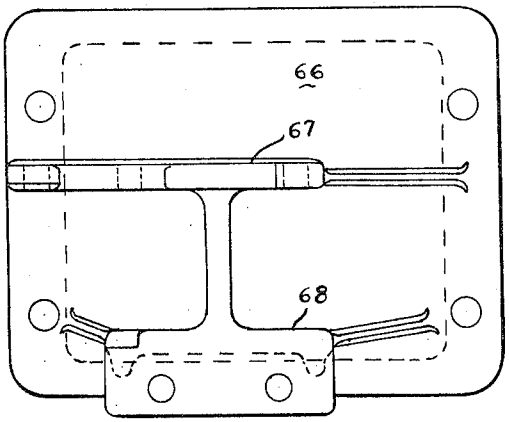


Fig-8

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TAMPER

Original Filed March 19, 1962 3 Sheets-Sheet 2

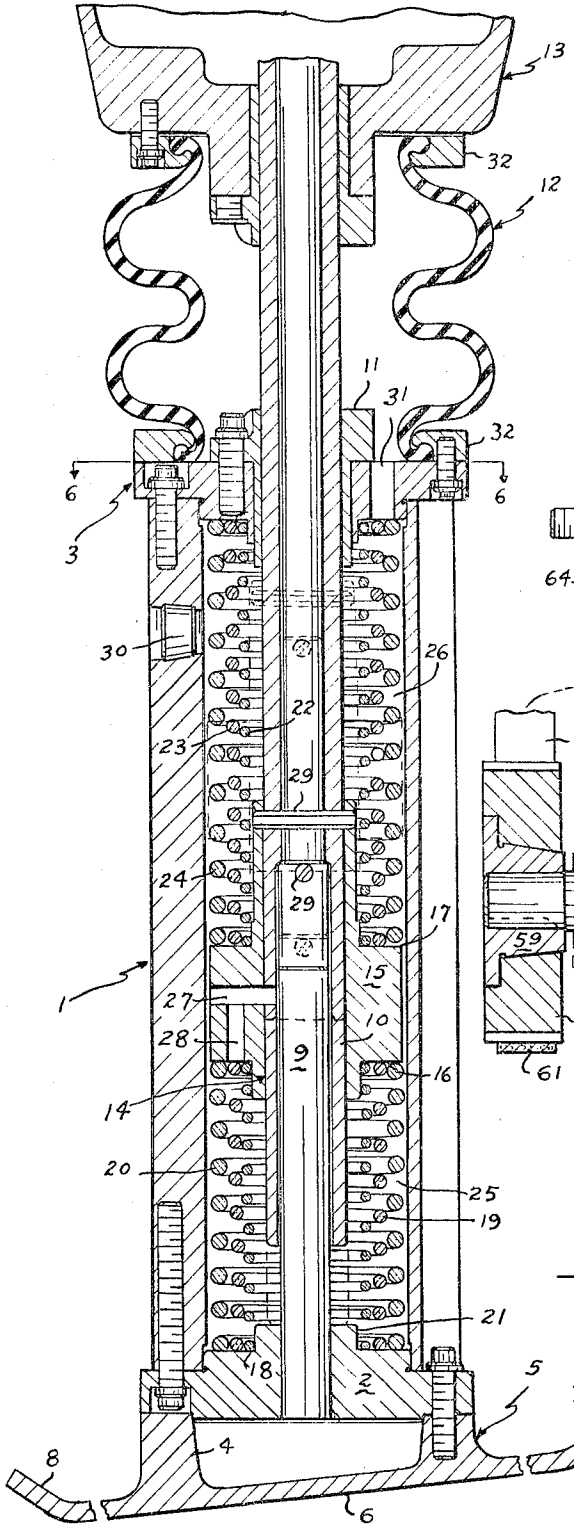


Fig-2

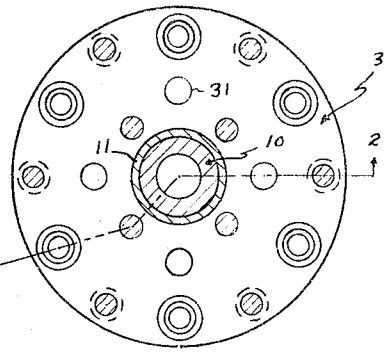


Fig-6

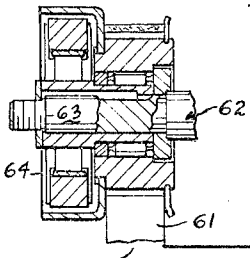


Fig-7a

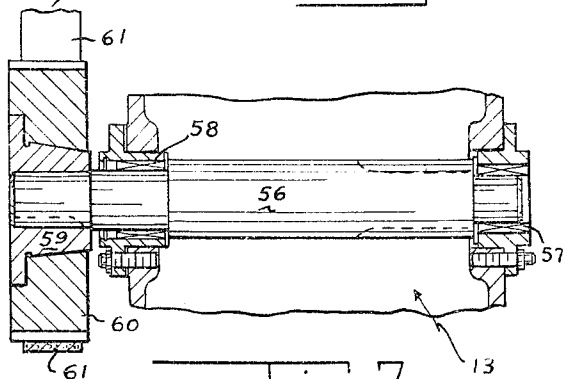


Fig-7

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Original Filed March 19, 1962 3 Sheets-Sheet 3

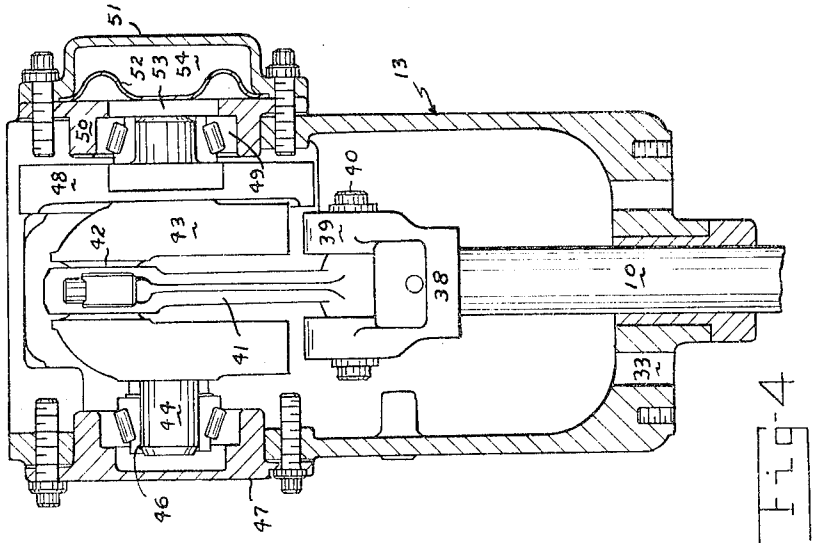


Fig-4

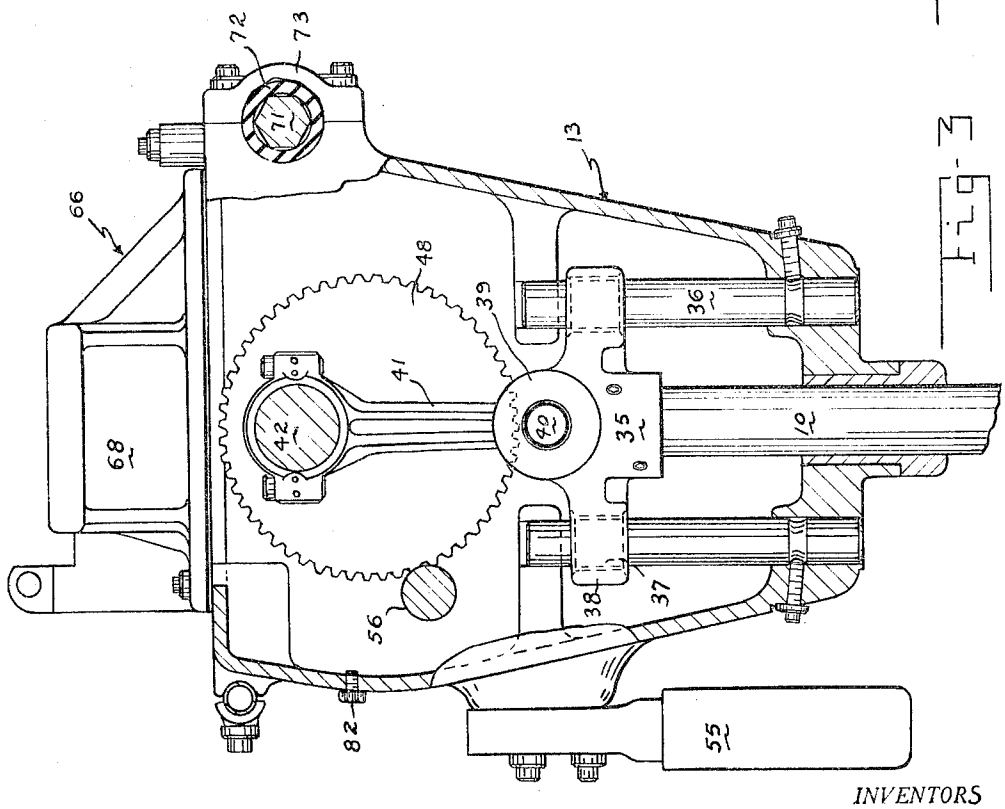


Fig-3

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United States Patent Office 3,277,801 Patented Oct. 11, 1966

3,277,801

TAMPER

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Continuation of application Ser. No. 180,891, Mar. 19, 1962. This application July 29, 1965, Ser. No. 478,529
15 Claims. (Cl. 94—49)

This is a continuation of application Serial No. 180,891, filed March 19, 1962, now abandoned.

This invention relates to imrpovements in tampers.

A preferred embodiment provides a novel pedestal type tamper unit which is not only portable but self-propelled. Its structural components are so correleated to make the device both rugged and durable in operation. It provides features of balance which renders it easy to manipulate and effective in operation. Moreover, invention embodiments require minimum maintenance since they include a hermetically sealed oil system and are so designed as to be self-lubricating. A primary object of the invention is to provide improvements in tamper units rendering them economical to fabricate, more efficient and satisfactory in use, adaptable to a wide variety of applications and unlikely to malfunction.

Another object of the invention is to provide a tamper unit which is not only portable but self-propelled.

A further object of the invention is to provide a tamper unit having a power stroke directly on its center of gravity.

An additional object of the invention is to provide a novel tamper unit which is self-lubricating in operation.

Another object of the invention is to provide a tamper unit the structural components of which are so integrated to render it rugged and durable in operation.

An additional object of the invention is to provide a tamper unit of a pedestal type so balanced to render it easy to manipulate.

Another object of the invention is to provide an improved tamper unit having a novel shock mounted operating handle which also serves to cage its controls.

An additional object of the invention is to provide a tamper unit possessing the advantageous structural features, the 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 of the drawings is a perspective view of a preferred embodiment of the invention;

FIG. 2 is a sectional view of the pedestal portion of the device shown in FIG. 1 taken on line 2—2 of FIG. 6;

FIG. 3 is a vertical sectional view of the crankcase of the device of FIG. 1, taken in a sense from front to rear thereof, including details of the operating components contained therein;

FIG. 4 is a sectional view of the crankcase taken generally at right angles to the view shown in FIG. 3;

FIG. 5 is a view taken in elevation of the operating handle assembly incorporated in the device of FIG. 1;

FIG. 6 is a view taken on line 6—6 of FIG. 2;

FIGS. 7 and 7*a* present, in combination, a fragmentary generally schematic view of the drive controls relating the engine and operating components of the device of FIG. 1; and

FIG. 8 is a top view of the engine mounting plate employed in the device of FIG. 1.

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

The invention can be best described with particular reference to the accompanying drawings. The tamper shown in FIG. 1 is in its upright or operating position and includes the following. A cylinder 1 provides a hollow column the lower end of which has a cap 2 and the upper end a cap 3. The bottom cap 2 has an exterior cylindrical projection which nests in a tubular projection 4 on the upper or mounting face of a tamper shoe 5. The cap 2 is secured to the cylinder 1 and the shoe 5 to the cap 2. The bottom or operating face of the shoe 5 includes a central flat 6, an upwardly inclined forward end 7 and an upwardly inclined trailing end 8. The cylinder 1 so mounts to be laterally centered and offset toward the trailing edge of the shoe 5 which forms its pedestal. It is to be noted from FIG. 2 of the drawings that the mounting face of the projection 4 lies in a plane so inclined to the flat 6 that in the vertical position of cylinder 1 the rear portion of the flat will seat to a surface to be compacted while its forward portion angles upwardly therefrom.

The upper face of the cap 2 includes a cylindrical plug portion which mounts a seal for the lower end of the cylinder 1. A rod 9 (FIG. 2), fixed to one end in the center of cap 2, projects inwardly and coaxial of the cylinder 1. Rod 9 guides and provides a bearing for the lower end of the tube 10. The tube 10 is oriented concentric with the longiudinal axis of cylinder 1 to extend through a bearing 11 in the cap 3, a bellows 12 and a crankcase 13 in vertical sequence.

A sleeve or spool 14 is fixed about the tube 10 at a position adjacent and spaced from its lower end. The sleeve includes the radially projected portion 15 positioned intermediate its extremities and offset towards its lower end. The portion 15 provides shoulders 16 and 17 respectively opposed to its bottom cap 2 and top cap 3. The diameter of the portion 15 is slightly less than the interior diameter of the cylinder 1. The sleeve so formed provides a spring spool. The lower portion of sleeve 14 nests in the center of three concentric coiled springs 18, 19 and 20 which abut the shoulder 16 to one end. The opposite ends of these springs abut the cap 2 to position concentrically about a cylindrical projection 21 thereon. The upper portion of spool 14 nests in the center of three concentric coiled springs 22, 23 and 24 which abut the shoulder 17 to one end and the cap 3 to their upper ends to be confined therebetween. The cap 3 includes a cylindrical projection which centers the relatively abutting ends of the springs 22, 23 and 24. In this manner it is provided that the spool 14 including its radially expanded portion 15 is balanced by opposed spring sets, the lowermost set being of a heavier gauge. The balance of the speel 14 in turn establishes a normal balance of the connected tube 10 with a portion of its lower end in bearing relation to the rod 9 in its inoperative position. It will be seen that the sleeve portion 15 in effect defines a chamber 25 therebelow with the end cap 2 and a chamber 26 thereabove with the end cap 3 of the cylinder 1. Mating radial passages 27 in the tube 10 and sleeve portion 15 are in direct communication with the chamber 25 through axial passages 28 in the sleeve portion 15 for purposes to be further described. It is to be noted from FIG. 2 of the drawings that the passages 27 are so oriented in the normally inoperative position of the tube 10 to be intercepted by the upper end of the rod 9 which bears therein. It may also be observed from FIG. 2 of the drawings that the sleeve 14 is secured to the tube 10 by diametrically positioned spaced pins 29.

An aperture in the cylinder 1 to one side and adjacent

its upper end provides an inspection port which is closed by a plug **30**. Viewing FIG. 6 of the drawings, it is important to note that the end cap **3** has apertures **31** to provide communication therethrough with the chamber **26**.

Ring clamps **32** respectively secure the respective reinforced ends of the bellows diaphragm **12** to the outer peripheral portion of the exterior surface of the end cap **3** and the bottom of crankcase **13**. The bellows **12** provide a seal about the tube **10** in generally concentrically spaced relation thereto and outwardly of apertures **31** in end cap **3** to one end and apertures **33** (FIG. 4) in the bottom of crankcase **13** to its other end. The apertures **33** and **31** provide direct communication between the interior of crankcase **13** and the interior of cylinder **1**. The bellows **12** provide an oil seal and accommodates relative motion between the crankcase **13** and cylinder **1** as will be further described.

A yoke **35** is fixed about the upper end of the tube **10** within the crankcase **13**. A pair of pins **36** are fixed in crankcase **13** in parallel spaced relation to opposite sides of the tube **10** to project through apertures **37** in ears **38** laterally projected from the yoke **35**. The pins **36** provide guides for the yoke **35** to insure a straight line reciprocation of the tube **10** in a manner to be further described. The uppermost portion of yoke **35** includes bifurcations **39** having aligned apertures accommodating the respective extremities of a wrist pin **40** on the dependent extremity of a connecting rod **41**. The uppermost extremity of the connecting rod **41** consists of semicircular relatively clamped portions which bearingly accommodate the crank pin **42** of a crankshaft **43**. Coaxial mounting pins **44** project from either end of the crankshaft **43** in offset parallel relation to the crank pin **42**. The one mounting pin **44** is contained in a bearing **46** seated in a cap **47** which serves to plug an aperture in one side of the crankcase **13**. The other pin **44** fixedly mounts a gear **48** thereabout and its projected extremity is accommodated in a bearing **49** nested in a centrally apertured cap **50** which plugs an aperture in crankcase **13** coaxial with the aperture plugged by the cap **47**. A dome shaped coverplate **51** is fixed externally of the cap **50** to confine a diaphragm **52** to bridge the central aperture **53** in the cap **50**. The inner side of the diaphragm is thereby exposed to pressure in the crankcase **13** through the aperture **53** in the cap **50** while its outermost side forms a sealed chamber **54** with a dome shaped cap **51**. The purpose of the diaphragm **52** will become more obvious in further description of the invention embodiment.

It may be seen with reference to FIG. 3 of the drawing that the rearmost surface of the crankcase **13** is provided with a fixed dependent handle **55** oriented generally parallel to the tube **10**.

A shaft **56** projects across the crankcase **13** immediately to the rear of the gear **48** and provides a pinion gear in mesh therewith. The one end of the pinion shaft **56** nests in a bearing **57** (FIG. 7) fixed in one side of the crankcase **13**. Its other relatively reduced extremity projects through a bearing **58** in the opposite side of the crankcase. The projected extremity of shaft **56**, whcih is exterior to the crankcase **13**, mounts a bushing **59**, keyed thereto. Fixed about the bushing **59** is a gear belt pulley **60**. A continuous drive belt **61** having teeth at its internal surface is positioned to establish its lower run about the pulley **60**, in mesh therewith. The upper run of the belt **61** extends about and in meshing engagement with a gear bearing on the drive shaft **63** of an engine **62**. This last mentioned gear forms part of a clutch assembly **64**. The details of this assembly **64** will not be described since they may be of any conventional nature. The engine **62** is provided with a pulley type starter conventionally operable by manipulation of the handle **65** which may be observed in FIG. 1 of the drawing.

Bolted to the top of crankcase **13**, coextensive therewith, is a plate **66** which serves to mount the engine **62**. The plate **66** includes spaced parallel vertically projected plate portions **67** and **68**. The upper edges of the plate portions **67** and **68** serves to seat the engine **62**. The seating edge of the engine mounting plate **68** includes a horizontal flange portion which projects outwardly of the side of the crankcase adjacent to which is positioned the drive belt **61**. Ths flange provides the base support to which the engine **62** is bolted.

A receptacle type cover **69** is fixed to enclose the drive belt **61** and its associated drive structure to the one side of the crankcase **13**. The lower end of the cover **69** is fixed to the side of the crankcase **13** immediately below the lower run of the belt **61**. Its upper end includes a flange **70** which directly overlies the body of the engine **62** in vertically spaced parallel relation to the engine mounting flange on the plate **68**. Bolts connect the flange **70** to the engine, thereby effecting a rigid containment of the engine to the crankcase **13**.

The engine and its controls are enclosed within a frame **71** which serves both as a guard and a control medium. The base of the frame has a generally rectangular configuration and forms a peripheral bumper about the superstructure on crankcase **13**. Its one end **80** is lowermost and confined in a rubber torsion bushing **72** (FIG. 3) nested in a recess across the forward upper extremity of the crankcase **13**, clamped therein by a plate **73**. The sides **74** of the frame base are angled upwardly and rearwardly from its end **80**, about the sides of the crankcase **13** and the structure mounted thereto to a point immediately to the rear of the engine **62**, from which point they are bent to a generally horizontal position and their extremities bridged by a handle **81**. The rear horizontal portions of sides **74** are also bridged by a pair of plates which serve to mount a fuel tank **76**. Suitable connections are provided between the tank **76** and the engine **62**. A throttle **77**, schematically illustrated to one side of the fuel tank in FIG. 1 of the drawings, is also conventionally connected to the engine **62**. No further detail of the engine and its controls need be described since they are conventional and may be of any suitable nature.

Side portions **74** of the frame base are bridged immediately forward of the tank **76** by a bar **78** which curves up and over the engine **62**. Parallel bars **79** connect at one end to the bar **78** and curve over the engine structure and down at their forward extremities which connect thereunder to the lower frame portion **80**, to either side of the clamp **73**. Thus, the engine is suitably encased by a light, open, effective framework. Moreover, as will be described, the handle portion **81** provides means to the rear of the tank **76** for guiding the tamper unit. It is to be noted that the frame **71** has a single resilient torque mount to the crankcase **13** at its forward upper edge. This enables easy manipulation of the entire tamper structure. Bars **78** and **79** of the frame **71**, and bridging elements thereof, provide convenient hand grips for lifting the tamper unit.

An aperture at the rear of upper portion of crankcase **13** is closed by the plug **82**. This plug must be removed to introduce a charge of hydraulic fluid to complete the invention embodiment. On introduction the hydraulic fluid runs down the sides of the crankcase, through apertures **33** in its bottom, bellows **12**, and enters the cylinder **1** through the apertures **31** in the cap **3**. The hydraulic fluid which enters the cylinder **1** flows down through chamber **26** to move past the spring spool **14** to the chamber **25** and up between the rod **9** and tube **10** to the interior of tube **10**. The hydraulic fluid is introduced in an amount sufficient to fill the cylinder **1** and the tube **10** to the level of the plug **30** which serves to close the inspection port.

When the tank **76** is filled with the necessary fuel mixture and the engine controls are manipulated to condition the engine to start, the tamper unit is ready for operation. On manipulating the throttle control **77** sufficiently to

cause engagement of the clutch **64** with reference to the drive gear on the engine drive shaft, the belt **61** is thereby engaged in driven relation to the engine drive shaft. This actually places the tamper in operation.

To use the tamper, the operator may lightly grip the bar **81** of the operating handle **71** to orient the cylinder **1** in a generally vertical position with reference to the surface to be compacted. The drive of the belt **61** provides for drive of the gear **48** through the medium of the shaft **56**. The drive of the gear **48** in turn produces a drive of the crankshaft **43** and, consequently, a circular movement of the pin **42** in the crankcase **13**. The circular movement of the pin **42** is transmitted through the connecting rod **41** and its wrist pin **40** to effect a reciprocating movement of the tube **10**, due to the bearing relation of the pin **40** in the yoke **35**. Since the movement of the yoke **35** is controlled by the guide pins **36**, it is insured that the circular movement of the pin **42** is translated into a direct and straight line movement of the tube **10** perpendicular to the surface being compacted, generally through the center of gravity of the entire tamper unit.

In its reciprocating movement the tube **10** is caused to move downwardly on the rod **9** which forms a piston projecting in its lower end. Since the spool **14** is connected with the tube **10**, it moves therewith. The movement of the tube **10** and spool **14** is damped by the hydraulic fluid in the chamber **25** and the relatively heavier set of springs **18**, **19** and **20** which are compressed in the process. Thus, both the hydraulic fluid and the springs serve to provide a shock absorbing function as well as a stabilizing influence. On the downward stroke of the tube **10**, the fluid in the chamber **25** is placed under compression and caused to thereby seek to move about the portion **15** of the spring spool to escape to the chamber **26** and through the passages **28** and **27** in the spool to the interior of the tube **10**. As the tube and spring spool reach a lowermost point of travel at the end cap **2**, the lower set of springs is conditioned through the medium of the spool **14** to give impetus to the upward movement of the tube **10**. Moreover, in the process of the downward movement of the tube **10**, the rod **9** has a piston effect on the oil thereabove, in the interior of the tube, causing a quantity of the hydraulic fluid to be injected through the open upper end of the tube **10** and squirted through the yoke **35** to spray the interior of the crankcase and the components therein. In this manner, on the downward stroke of the tube **10** a splash lubrication of all parts of the tamper unit is effected. Subsequent to this, the lubricating hydraulic fluid injected in the crankcase runs back down through apertures **33**, bellows **12** and apertures **31** in cap **3** to the cylinder **1**.

As the tube **10** is moved upward under the influence of the crankshaft **43**, the spring spool **14** moving with the tube commences to compress the weaker set of springs in the chamber **26**. The upward movement of the tube is damped by the hydraulic fluid in the chamber **26** but to lesser extent than effected by the fluid in the downward movement. Moreover, as the movement of the tube upwardly is commenced, the energy stored in the compressed lower springs produces an upward thrust as compression thereon is released which is additive to the effect of the movement of the crankshaft and sufficient to cause the entire pedestal and column structure to jump or hop vertically and in a forward direction, influenced by the form of the tamper shoe **5**. Similarly, on the return downstroke of the tube **10**, the upper set of springs in cylinder **1** provide an additional downward surge effect on the spring spool and thereby enhance the downward vertical impact of the piston stroke referenced to the shoe **5** and transmitted through the cap **2**.

It is to be noted that the guide of the tube by the upwardly projected piston in the base of the column provides for an optimal dynamic balance thereof and regulation of its direction. Thus, it is doubly insured that the power stroke will be directed through the center of gravity of the pedestal type tamper unit provided. It may be seen that with the use of the piston guided tube the action and reaction of the spring sets to opposite sides of the spool **14** is direct and significant in the jumping jack vertical tamping stroke transmitted through the invention embodiment. The tamping action is direct and thereby optimum and the entire unit is self propelled controlled only by a light grip by the hands of the operator.

It may be observed that the engine assembly **62** is ruggedly integrated to the crankcase **13** by means of the direct clamping action of the cover **69** through the medium of the flange **70**. This minimizes the effect of the jumping jack action of the tamper unit. It may also be observed that the configuration of the operating handle and its torsion mount to the upper forward edge of the crankcase **13** is such to enable a simple direct control of the forward motion of the tamper unit with a minimum of effort. The torsion bushing **72** provides a mount of the handle **71** which readily accommodates shock and minimizes assembly and maintenance thereof. As fabricated, the structure incorporated in the handle **71** provides an effective, simple and economical protective guard for the engine **62** and its operating components.

As above described, the invention unit is provided with a hermetically lubricating system wherein the diaphragm **52** in communication with the interior of the crankcase **13** provides a pressure equalizing device which permits the engine to stroke freely. The sealed system avoids the possibility of air being drawn into the system and deterioration of the hydraulic fluid. It is believed obvious that the diaphragm **52** pulses with each stroke of the tube **10**.

Observing the bellows **12**, it will be seen that this element provides an oil seal and also a connection between the crankcase and the cylinder **1** which accommodates their relative movement which is inherent under the influence of the reciprocation of the tube **10** and the jumping jack action of the tamper unit which results under the influence of the spring sets in the cylinder **1**.

The vertical superposed relation of the entire tamper structure is contrasted to the prior structural concepts for tamper units and produces the most effective of tamping strokes. Moreover, in this case there is achieved, as has been made obvious, what constitutes a dynamic balance of a single hollow column on the spring spool **14** by means of the reciprocating tube **18** as related to its guiding piston. There is no containment of the tamping column and its connection with the crankcase is otherwise limited to a single bellows sleeve as shown and described.

In summary a novel pedestal type tamper unit is enabled by the present invention wherein an optimal vertical tamping action is provided effectively controlled under the influence of hydraulic fluid and spring balance. The structure as provided is so correlated to accommodate the jumping jack action which results on operation of the invention unit without damage thereto or deterioration thereof. The tamping stroke, as indicated, is directed through the center of gravity of the entire unit and thereby provides maximum compaction effort with a minimum of investment being necessary for either the fabrication or operation of the tamper. The invention embodiment is obviously easy to assemble and disassemble and thereby economical to maintain, if maintenance is required.

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 involve or sacrificing any of its advantages.

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 tamper unit the lower end of which is defined by a hollow column, a tamping shoe providing its pedestal, piston means fixed in said column to project upwardly from the bottom thereof concentrically of said column, a housing spaced vertically above said column and defining the upper end of the tamper unit, a tube projected from said column and having one end thereof telescopically nesting said piston means, the other end of said tube being received in said housing, means positioning said housing and tube relative said column and resiliently interconnecting said tube and column, said last named means including a spring device interposed between said column and an abutment on said tube, means connected in said housing operatively related to reciprocate said tube relative said piston means, the said device reacting to said tube reciprocation to induce a responsive vertical reciprocating action of said column and shoe therewith, the tamping action of said shoe being vertical and generally oriented in line with the center of gravity of said tamping unit.

2. A tamper unit as in claim 1 wherein said column and tube accommodate a charge of hydraulic fluid, and said tube has openings in respective communication with said charge of fluid in said column and the interior of said housing whereby on reciprocation of said tube, said piston means operates on fluid therein to produce a splash injection thereof in said housing.

3. A tamper unit as in claim 2 characterized by further resilient means spaced about said tube and interconnecting said housing and said column, said housing and column having communicating openings for fluid to drain from said housing back to said column about said tube.

4. A tamper unit including a column forming a hollow chamber and having a tamping shoe forming its pedestal, piston means fixed in said column, a tubular element the lower end of which telescopes about said piston means and the upper end of which projects vertically from said column, radial projecting means on the lower end of said tubular element in said column, spring means in said column bearing respectively on opposite faces of said radial projecting means to one end and having their opposite ends bearing respectively on remote end portions of said column, said spring means normally balancing said tube to a nesting relation with said piston means, a housing for the upper end of said tube, means in said housing connected with said tube and normally balanced therewith relative said piston means and column, said means connected with said tube being operable to reciprocate said tube, the balancing springs reacting to produce a direct vertical responsive jumping jack action of said column and said shoe therewith in a dynamic balanced relation to said tube, resilient sleeve means connecting said housing and column about said tube and accommodating the relative movement therebetween on occurrence of said jumping jack action, said column accommodating a charge of hydraulic fluid, and passages formed to communicate the interior of said tube above said piston means with said charge in said column to provide thereby for a splash of fluid interiorly of said housing on vertical movement of said tube on said piston means, said housing and column providing openings to said sleeve means for drain of fluid in said housing to said column.

5. A tamper unit including a hollow column, a tamping shoe providing a base for said column, a tube one end of which is dependent in said column, a piston fixed in said column to project in and guide the dependent extremity of said tube, a charge of hydraulic fluid in said column and tube, means providing passages communicating the fluid in said column and tube, a housing providing a crankcase immediately above said column mounting crank means connected to reciprocate said tube, a resilient sleeve above said tube connecting said crankacse and column to provide a hermetic seal of the tamper unit, apertures in the lower part of said crankcase and the upper part of said column providing communication of their interiors through said sleeve, opposed resilient means in said column and interposed between said column and tube cooperating to normally provide a dynamic balance of said tube and its associated structure with respect to said column and a hop of said column and shoe therewith on reciprocation of said tube, said piston operating on the downstroke of said tube to project hydraulic fluid therethrough to the interior of said crankcase to splash lubricate its interior and drain back to the interior of said column through said sleeve

6. A tamper unit as set forth in claim 5 and means for equalizing pressure in said housing to accommodate the reciprocation of said tube and permit it to stroke freely.

7. A tamper unit, including a cylindrical column having a shoe at the lower end thereof and a closure at its upper end, a piston fixed in said column, a tubular member telescoping over said piston and extending upwardly above said column, a casing spaced above said column and receiving the upper end of said tubular member, means in said casing for reciprocating said tubular member, said casing being connected to said column by a resilient sleeve to form a fluid chamber, a spool on the lower end of said tubular member dividing said column into upper and lower chambers, resilient means above and below said spool and in contact with the respective ends of said column, said lower end of said tubular member having a port extending through said spool and communicating with said lower chamber, the lower end of said casing being provided with a port permitting fluid to drain into said sleeve, and a port in said upper column closure to permit fluid communication between the sleeve and said upper chamber whereby downward movement of said tubular member forces fluid into the interior of the casing to splash lubricant into its interior to thereafter drain back into said cylindrical column.

8. A tamper unit, including a cylindrical column containing a liquid for motion damping and lubricating purposes and having a shoe at the lower end and a closure at its upper end, a piston fixed in said column at its lower end, a tubular member telescoping over said piston and extending upwardly above said column through said closure, aperture means admitting liquid from said column to said tubular member, a crankcase spaced above said column and receiving the upper end of said tubular member, crank mechanism in said crank case connected to said tubular member for reciprocation thereof, resilient means interposed between said tube member and said column utilizing the motion of said tubular member to reciprocate said cylindrical column, motion of said tubular member in one direction forcing liquid upward therein to splash on said crank mechanism, and a flexible tubular connection between said crankcase and said cylindrical column providing a channel for draining liquid from said crankcase back into said column, said crankcase and column having openings providing for such draining of liquid to said column.

9. A tamper unit according to claim 8, characterized in that said last named connection comprises a bellows-like sleeve extending between and interconnecting said column and said crankcase in surrounding spaced relation to said tubular member, there being openings in the bottom of said crankcase and in the upper end of said column permitting the described drainage through said sleeve.

10. A tamper unit, including an upper housing providing a crank case, crank means therein, a lower housing having a tamping shoe at the bottom thereof, a sustantially rigid hollow tube received at its one end in said crank

case where it is pivotally connected to said crank means for reciprocation thereby, the other end of said shaft being received in said lower housing, abutment means on said shaft in the portion thereof received in said lower housing, spring means in said lower housing interposed between said housing and said abutment means on said shaft to achieve a spaced elevated position of said upper housing relative to the lower, reciprocation of said shaft alternately compressing and releasing said spring means to cause the entire lower housing to execute hopping movements relative to the upper housing, means for guiding said shaft for relative reciprocating motion in said housings, said last named means including upstanding post means installed in the bottom of said lower housing to extend upward therein, the said other end of said shaft having a telescopic connection with said post means, and a flexible bellows interconnecting said housings in enclosing relation to the portion of said tube extending therebetween, adjacent ends of said housings having openings therein, a lubricating fluid in said crank case draining through said bellows into said lower housing and being admitted between the shaft and said post, said post acting as a piston in a downward thrust of said tube to force lubricating fluid upward in said tube to spray on said crank means.

11. A tamper unit the lower end of which consists of a hollow column, a tamping shoe providing its pedestal, said shoe having a rigid connection to said column, a housing forming the upper end of said tamper unit and spaced in its entirety vertically above said column, said housing having an element of rod-like configuration projected therefrom to depend interiorly of said column, guide means fixed interiorly of said column and positioning said rod-like element for a reciprocating movement in a sense coaxial with said column, means supporting said housing and rod-like element relative said column and forming a resilient interconnection therebetween positioning said housing spaced above said column, said last named means including a spring device interposed between a portion of said column and abutment means on said rod-like element, means connecting said housing and rod-like element and operatively related to reciprocate said rod-like element relative said guide means, said spring device reacting to reciprocation of said rod-like element to induce a responsive vertical reciprocating action of said column and shoe therewith, the tamping action of said shoe being vertical and generally oriented in line with the center of gravity of said tamping unit.

12. A tamper unit as in claim **11** characterized by said housing and said column being interconnected by means of a resilient sleeve.

13. A tamper unit the lower end of which consists of a hollow column, a tamping shoe providing its pedestal, a housing forming the upper end of said tamper unit and spaced in its entirety vertically above said column, crank means connected in said housing, said crank means and the bottom of said column being interconnected by a pair of telescoped relatively reciprocable elements, one of said elements being a rod-like means and the other a tube element, said rod and tube elements forming the sole guide for relative movement of said housing and said column, a spring device interposed between said column and the one of said telescoped elements connected to said crank means, said spring device thereby supporting said housing in a position spaced above said column and establishing a balance of said housing and interconnected elements relative said column and means connected in said housing for energizing said crank means and producing a reciprocation of the element connected to said crank means, the spring device reacting thereto to induce a responsive vertical reciprocation of said column and shoe therewith, the tamping action of said shoe being vertical and generally oriented in line with the center of gravity of said tamping unit.

14. A tamper unit the lower end of which consists of a hollow column, a tamping shoe fixed to said column and providing its pedestal, a housing forming the upper end of said tamper unit and spaced in its entirety vertically above said column, said housing having projected therefrom in vertically dependent relation thereto an elongated member of rod-like form which depends interiorly of and coaxially of said hollow column, guide means for said rod-like member in said column, means connected in said housing for reciprocating said rod member, the reciprocating movement being constrained by said guide means to be coaxial with said column and spring means within said column interposed between abutment means fixed to said rod means and said column to thereby support said housing in a position spaced above said column and provide per se a balance of said housing and rod member relative to said column whereby on reciprocation of said rod member to produce a vertical reciprocating action of said column and shoe therewith and a tamping action of said shoe which is vertical and oriented generally in line with the center of gravity of the entire tamping unit.

15. A tamper unit as in claim **14** characterized by further resilient means interconnecting the upper end of said column and said housing.

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