United States Patent [19]

Wilson

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[54] SOIL COMPACTOR

[76] Inventor: **Robert Glen Wilson,** 706 Aho-Carson Road, Woodland, Wash. 98674

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[52] **U.S. Cl.** **404/117**

[51] **Int. Cl.** **E01c 19/28**

[58] **Field of Search** 94/48, 50

[56] **References Cited**

UNITED STATES PATENTS

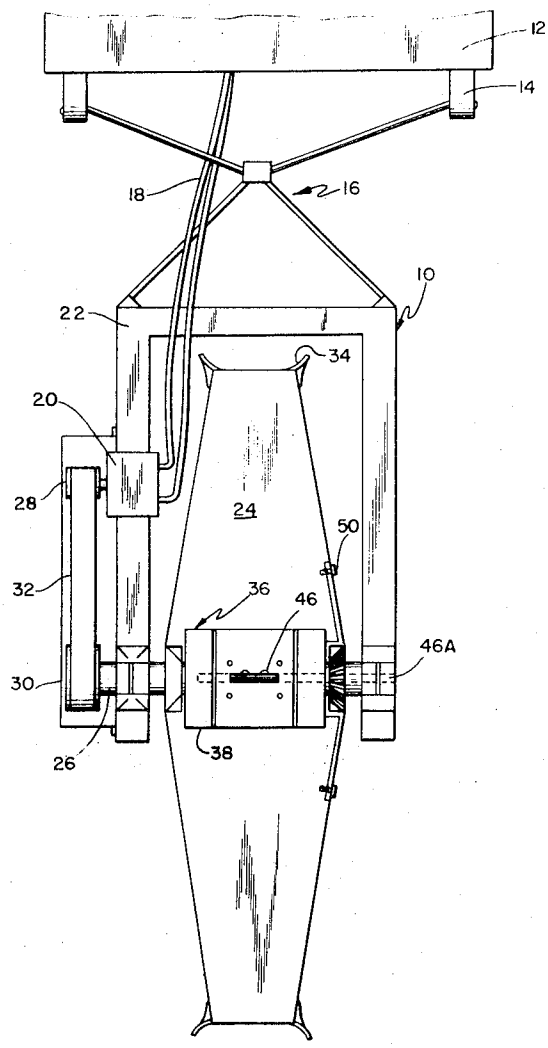
3,427,940	2/1969	MacDonald	94/50 V
3,145,631	8/1964	Green	94/48 X
1,302,275	4/1919	Ashmore et al	94/50 R
1,153,348	9/1915	Segee	94/50 R
1,012,612	12/1911	Davier	94/50 R
2,146,101	2/1939	Weber	94/48
3,616,730	11/1971	Boone	94/50 V
3,053,157	9/1962	Martin	94/50 V
3,670,631	6/1972	Gaylord	94/50 V

Primary Examiner—Nile O. Byers, Jr.
Attorney—David H. Semmes

[57] **ABSTRACT**

A soil compactor more specifically a soil compacting device to expedite compaction of soil backfill in ditch work. The device consists of a wheel having a concave rim, adapted to be drawn by a towing vehicle in operative positionment in a ditch being backfilled. The compaction wheel is designed to have a vibratory action and includes mechanism for adjusting vibration frequencies and amplitudes to attain maximum density. For adjusting the vibrating action an adjustable eccentric is operatively associated with a revolving center shaft of the wheel.

7 Claims, 3 Drawing Figures



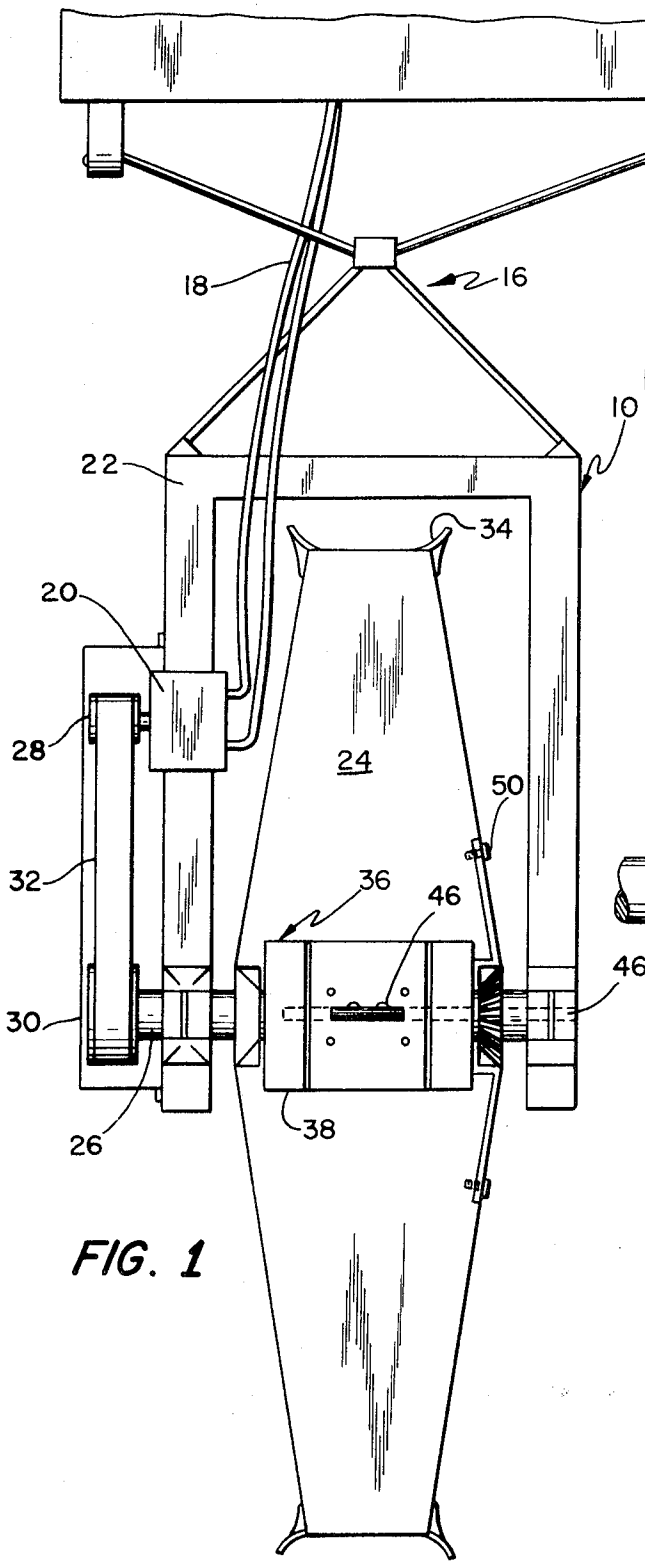


FIG. 1

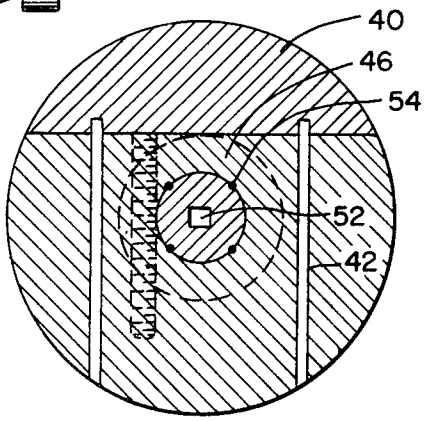


FIG. 3

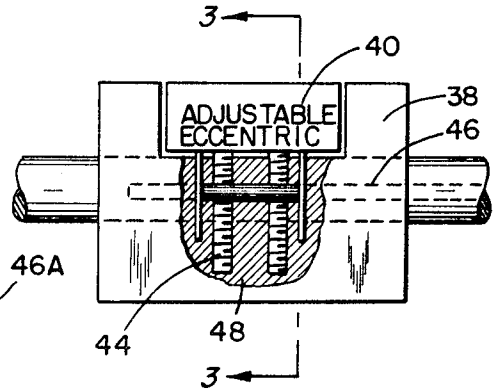


FIG. 2

INVENTOR
ROBERT G. WILSON

David K. Semmes

ATTORNEY

SOIL COMPACTOR

BACKGROUND OF THE INVENTION

Trenches and ditches are frequently dug in connection with utility and other installations. Subsequent to such installations, the ditches must be filled or backfilled and the soil or earth compacted therein. Such compacting has in the past been accomplished primarily through the use of jack hammers or the like. This is a time consuming and expensive operation and frequently the attained results are not optimum in nature. The present invention constitutes an improvement over methods heretofor used in compacting backfill in such trenches and ditches.

BRIEF DESCRIPTION OF THE INVENTION

The present invention provides a soil compactor especially suitable for compacting soil and earth in backfilling of trenches adapted to be drawn behind a tow vehicle. The compactor device consists of a rotatable wheel preferably having a concave rim and with means for vibrating the compacting wheel to expedite the compaction. The unit is provided with an adjustable eccentric means to enable an operator to change the amplitude and frequency of the vibrations to adapt the vibrations and amplitudes to meet the requirements pertaining to cohesion, cohesiveness or plasticity of soils and to attain a maximum density.

To achieve maximum compaction, the vibratory action of the roller or wheel is adjustable from the outside of the machine without disassembling the machine and the operator can in effect tune the vibratory compacting device to the optimum combination of forces to achieve maximum density in optimum time.

Additional objects and advantages of the invention will be more readily apparent from the following detailed description of an embodiment thereof when taken together with the accompanying drawings in which:

FIG. **1**, is a top plan view of the compactor of the invention shown connected to a tow vehicle, schematically shown;

FIG. **2**, is a fragmentary view, partly in section, showing an adjustable eccentric for varying impact vibration; and

FIG. **3**, is a sectional view of the eccentric mechanism in greater detail taken on line **33** of FIG. **2**.

Referring now in more detail to the drawings there is shown, in FIG. **1**, the soil compactor of the invention generally indicated at **10** appropriately attached to a drawing vehicle **12** through tow bar **14** of a usual type and by means of, for example, a three point hitch schematically indicated at **16**. This type of hitch is desirable for large compactor units to assist in maintaining the apparatus in vertical operative position by using the outboard lift rods as stabilizers. The tow vehicle can be of any appropriate type and size but for purposes of the invention includes a hydraulic power system for reasons hereinafter set forth. Hydraulic lines **18** interconnect the hydraulic system of the tow vehicle and an appropriate hydraulic motor **20** mounted on frame **22** of the compactor unit **10**.

A compacting wheel **24** is mounted on supporting shaft **26** approximately journaled in frame **22** by means of bearings and the like. Shaft **26** is operatively connected to hydraulic motor **20** through pulleys **28, 30** and belt drive or the like **32**.

The compacting wheel **24** has a concave designed rim **34** to expedite compaction of backfill in a ditch in which the compacting wheel **24** is drawn in a readily understandable manner.

It has been found that various combinations of soils demand different vibrations and amplitudes to attain maximum density in compaction thereof. To this end the soil compacting apparatus of the invention consists of the wheel with the concave rim designed to expedite compaction of backfill in ditch work. To achieve maximum compaction a vibratory action is imparted to the wheel. This mechanism consists of a a vibrator unit generally designated **36** including a cylindrical main portion **38** appropriately secured to compacting wheel **24** for rotation therewith. Vibrator unit **36** additionally includes an adjustable eccentric portion **40** of substantial mass and geometrically sized and configured to interleave with the periphery of main body portion **38** when in retracted non-vibrating position as shown in the drawings. Under these conditions, fluid pressure from the pump of the tow vehicle is imparted to the hydraulic motor which imparts rotation to shaft **26** and theoretically there will be no vibration and very little load on the hydraulic motor.

The adjustable eccentric **40** is mounted with respect to main body portion **38** by means of a plurality of pins **42**, as shown four in number, attached to adjustable eccentric **40** and slidably mounted in main body portion **38.** Also attached to eccentric **40** are toothed racks **44** slidable with respect to body portion **38.** A pinion shaft **46** having a pinion gear portion **48** extends through shaft **26** to the exterior of frame **10** as indicated at **46A**. A removable plate **50** contains a bearing for the wheel and vibratory mechanism for operative mounting. A square hole or the like **52** is provided in the external end of pinion shaft **46** for operative engagement by adjusting wrenches operable from the exterior of frame **10.** A plurality of locking bolts **54** interengage pinion shaft **46** and bearing or drive shaft **26.** The locking bolts fixedly position the pinion shaft **46** and the adjustable eccentric **40** with respect to main body portion **38.**

As pointed out above in the position shown in the drawings, the adjustable eccentric theoretically will provide no vibration. To impart vibration to the wheel **24**, the four locking bolts **54** are removed and the pinion shaft **46** is turned clockwise one-fourth turn for example and by so doing the rack extends the adjustable eccentric with respect to the main shaft. Thereafter, upon replacing the four locking bolts and starting the hydraulic power there is a vibrating force imparted to the wheel **24.**

It will be understood that to achieve maximum compaction the vibratory action on the wheel can be adjusted from the outside of the machine by turning the pinion shaft. By means of the rack and pinion the eccentric can be moved in or out, i.e., toward or away from the revolving center shaft, thus increasing or decreasing the amplitude or vertical force. If a constant flow of hydraulic fluid to the power is maintained the changing of the position of the eccentric will also increase or decrease the frequency of vibration, in other words, if the power to the hydraulic pump is manually controlled and the throttle is fixed, then any change in demand for power from the pump will either slow or increase the speed of the engine. An increase in vibrating force through adjustment of the eccentric also requires more power to turn the shaft so that the engine

will slow down. Therefore, the operator can, in a sense, tune the vibratory compacting device to obtain the optimum combination of forces to achieve maximum density in optimum time. All of this adjustment can be done without the requirement of disassembling or tearing down the machine.

Manifestly, minor changes in details of construction can be effected within the shown and described embodiment without departing from the spirit and scope of the invention as defined in and limited solely by the appended claims.

I claim:

1. A soil compactor comprising:

A. a frame adapted to be drawn by a tow vehicle;

B. a compactor wheel;

C. an axle rotatably mounting said compactor wheel on said frame;

D. a compactor wheel vibrator unit operatively associated with said axle including:

i. a cylindrical shaped main body coaxial with said axle;

ii. a separable segment of said main body constituting an eccentric member adjustably mounted in said main body and radially adjustably movable away from or toward said main body and the axis of rotation thereof; and

iii. means for selectively adjustably moving said segment away from or toward said main body to a selected eccentric position with respect to the axis of rotation thereof, and

E. drive means for said axle operable upon selected eccentric adjustment of said segment to impart selected vibration forces to said compactor wheel through said axle.

2. A soil compactor as claimed in claim **1,** wherein the eccentric adjusting means is actuatable exteriorally of said wheel and said frame without disassembling the compactor mechanism.

3. A soil compactor as claimed in claim **2,** wherein said compactor wheel includes a concave rim adapted for compacting soil and earth in backfilling of trenches.

4. A soil compactor as claimed in claim **3,** said adjustable segment being of substantial mass and geometrically sized and configured to interleave with and conform in shape to the periphery of said main body when in a retracted position.

5. A soil compactor as claimed in claim **1,** wherein said adjusting means includes a bore in said axle, a toothed pinion shaft extending into said bore from the exterior end of said axle and rotatable therein, said main body having inwardly extending openings therein, rack means secured to said adjustable segment movably mounted in said openings and in operative engagement with said toothed pinion shaft, and mating guide pins and holes interengaging said adjustable segment and said main body, whereby upon rotation of said pinion shaft from the exterior end of said axle said pinion and rack means operate to extend or retract the adjustable segment into the selected eccentric relationship with respect to said main body for vibratory adjustment of said wheel.

6. A soil compactor as claimed in claim **5,** and further including removable locking bolts intergaging said main body and said pinion shaft.

7. A soil compactor as claimed in claim **6,** said axle drive means comprising a hydraulic motor adapted for operative connection with fluid pressure from a pump of a tow vehicle hydraulic system

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