United States Patent

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[54] **COMPACTOR**
7 Claims, 3 Drawing Figs.

[52] U.S. Cl. 94/49
[51] Int. Cl. E01c 19/30
[50] Field of Search 94/49, 48

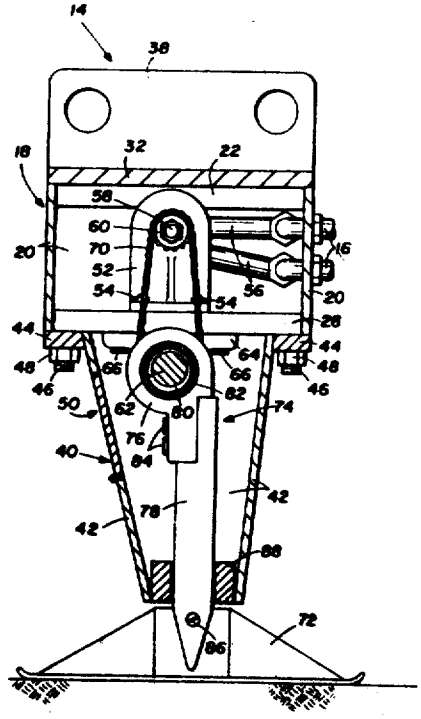
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ABSTRACT: A material compactor for use with backhoes and the like. The compactor includes a box frame adapted for attachment to a backhoe and a hydraulic motor rigidly supported within the box frame. A shaft is rotatably supported on the frame beneath the motor. The shaft extends horizontally and is directly coupled to the motor by a chain and sprocket drive. A pair of connecting rod assemblies are eccentrically mounted directly on the shaft and extend downwardly therefrom to a pair of compactor shoes.



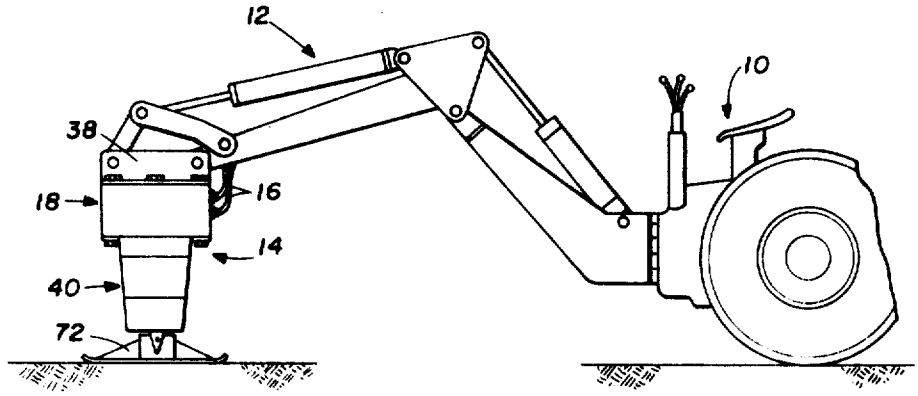


FIG. 1

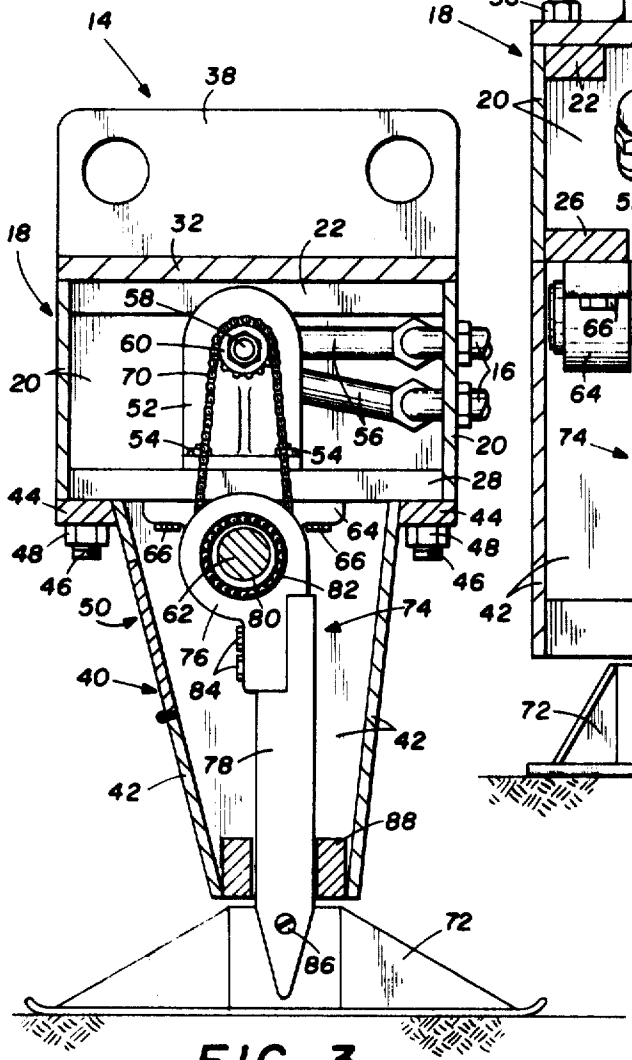


FIG. 3

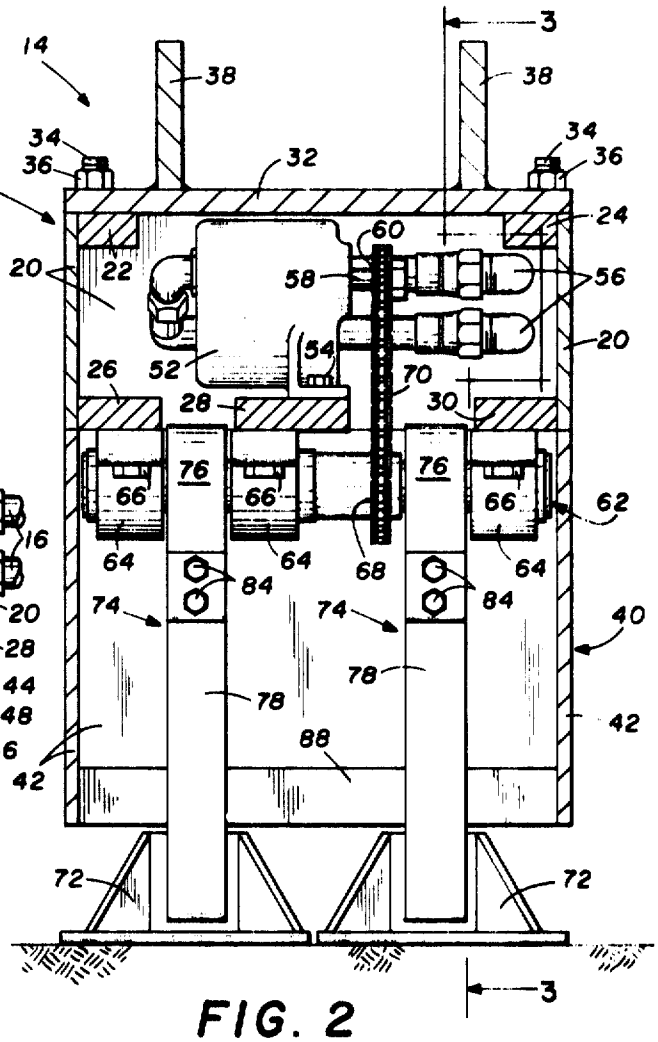


FIG. 2

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COMPACTOR

BACKGROUND OF THE INVENTION

In the construction industry, compactors are used to compress earth, sand, and other relatively loose materials prior to paving or similar operations. The various compactors that have been used heretofore have operated satisfactorily but have been relatively complicated in design and therefore expensive to purchase. Also, many commercially available compactors have been unsuited for use with backhoes and the like and, accordingly, have been difficult to transport and operate in the field.

SUMMARY OF THE INVENTION

In the preferred embodiment this invention comprises a frame adapted for attachment to a backhoe or the like, a motor mounted on the frame, a shaft directly coupled to the motor and at least one compactor shoe directly coupled to the shaft. Preferably, the frame is a box frame and the motor is positioned within the frame. Also, there are preferably two compactor shoes which are coupled to the shaft by offset eccentrics.

DESCRIPTION OF THE DRAWING

A more complete understanding of the invention may be had by referring to the following Detailed Description when taken in conjunction with the drawing, wherein:

FIG. 1 is a side view of a compactor employing the invention showing the compactor in use;

FIG. 2 is an enlarged end view of the compactor shown in FIG. 1 in which certain parts have been broken away more clearly to illustrate certain features of the invention, and

FIG. 3 is a sectional view taken along the line 3–3 in FIG. 2 in the direction of the arrows.

DETAILED DESCRIPTION

Referring now to the drawing, like reference numerals designate like parts throughout the several views. Referring particularly to FIG. 1, there is shown a backhoe **10** having a hydraulically operated boom **12**. A compactor **14** employing the invention is mounted on the end of the boom **12**. The backhoe **10** serves to transport the compactor **14** and includes hydraulic pumps which supply hydraulic fluid under pressure to the hydraulically operated boom **12**. Hydraulic fluid is also supplied from the backhoe **10** to the compactor **14** through a pair of hydraulic lines **16**. The boom **12** serves to raise and lower and to apply pressure to the compactor **14**. By operating the backhoe **10** and the boom **12** the compactor **14** can be positioned at virtually any desired angle and can be preloaded with virtually any desired pressure.

Referring now to FIGS. 2 and 3, the details of the compactor **14** are shown. The components of the compactor **14** are supported on a box frame **18** including a plurality of side plates **20**. A pair of beams **22** and **24** extend across the top of the box frame **18** and are secured to the side plates **20** by welding. Similarly, three beams **26**, **28** and **30** extend across the bottom of the box frame **18**. Like the beams **22** and **24**, the beams **26**, **28** and **30** are secured to the side plates **20** by welding.

The upper portion of the box frame **18** is closed by a top plate **32**. The top plate **32** is secured to the box frame **18** by the cooperation of a plurality of studs **34** which extend into the beams **22** and **24** of the frame **18** and a plurality of nuts **36** which are threadedly engaged with the studs **34**. A pair of support plates **38** are secured to the top plate **32** by welding and extend upwardly therefrom. The compactor **14** may be secured to the boom of a backhoe by attaching a boom to the support plates **38** of the top plate **32**.

The bottom of the box frame **18** is closed by a housing **40** comprised of a plurality of side plates **42**. The side plates **42** are secured to a pair of bars **44** by welding. The bars **44** are in

turn secured to the beams **26**, **28** and **30** of the box frame **18** by the cooperation of a plurality of studs **46** which extend into the beams **26**, **28** and **30** and a plurality of nuts **48** which are threadedly engaged with the studs **46**. A door **50** is formed in one of the side plates **42** to provide access to the interior of the compactor **14**.

The compactor **14** is operated by a hydraulic motor **52** mounted within the box frame **18**. The motor **52** is positioned on the beam **28** and is secured thereto by a pair of bolts **54**. Hydraulic fluid is supplied to and removed from the motor **52** by a pair of pipes **56** which extend through the interior of the box frame **18** from the hydraulic lines **16**. When hydraulic fluid under pressure is supplied to the motor **52** through the pipes **56**, the motor **52** rotates a shaft **58** extending from the motor **52**. The shaft **58** in turn rotates a sprocket **60** supported on the shaft **58**.

A horizontally extending shaft **62** is supported below the frame **18** by a plurality of pillow blocks **64**, each of which is secured to one of the beams **26**, **28** and **30** by means of a pair of bolts **66**. The pillow blocks **64** are of the antifriction type and are press-fitted onto the shaft **62**. A sprocket **68** is also press-fitted onto the shaft **62**. The shaft **62** is rotated by the motor **52** by means of a chain **70** extending around the sprocket **60** and the sprocket **68**.

Rotation of the shaft **62** serves to vibrate a pair of compactor shoes **72** positioned at the bottom of the compactor **14**. The compactor shoes **72** are supported on the shaft **62** by a pair of connecting rod assemblies **74**. As is best shown in FIG. 3, the connecting rod assemblies **74** are each comprised of an upper member **76** and a lower member **78**.

The upper member **76** of each assembly **74** is eccentrically connected to the shaft **62** by an eccentric **80** press-fitted onto the shaft **62** and an antifriction bearing **82** press-fitted onto the eccentric **80** and into the upper member **76**. The lower member **78** of each connecting rod assembly **74** is connected to the upper member **76** thereof by means of a pair of bolts **84** and is in turn connected to one of the compactor shoes **72** by a pin **86**. The lower members **78** of the connecting rod assemblies **74** are guided by a pair of guide members **88** positioned in the housing **40**.

In the preferred embodiment, all of the structural elements of the compactor **14** are formed from ordinary cold-rolled steel with the exception of the guide **88** and the lower members **78** of the connecting rod assemblies **74** which are formed from cast 4330 steel. The eccentrics **80** which connect the connecting rod assemblies **74** to the shaft **62** are preferably offset 180° with respect to each other and preferably provide an eccentricity of one-eighth inch so that the total stroke of the compactor shoes **72** is one-quarter inch. Preferably, one-sixteenth inch clearance is provided between the guide **88** and the lower members **78** of the connecting rod assemblies **74**. A compactor so constructed is suitable for use with any of the various commercially available backhoes and similar devices and, when so used, serves to compact material positioned beneath the compactor shoes **72** of the compactor **14**.

The compactor illustrated in the drawing differs from most prior compactors in that the motor is directly coupled to the shaft which is in turn directly coupled to the compactor shoes. This dispenses with the use of reaction masses, springs and the like which have commonly been employed in prior compactor designs. The resulting compactor is less expensive, more straightforward in design, and simpler in operation.

The direct coupling of the motor to the shaft and the direct coupling of the shaft to the compactor shoes also results in a more versatile compactor design. That is, the compactor shown in the drawing may be employed in many work situations in which compactors constructed according to prior designs are useless. For example, the illustrated compactor may be operated at any desired angle, including horizontal. Thus, the compactor may be used to impact a wall or other vertical surface. Also, the compactor can be operated under any desired load, including no load. This permits use of the compactor in situations wherein relatively fragile structures,

such as pipes, etc., are buried under the material being compacted. Furthermore, by controlling the flow of hydraulic fluid to the hydraulic motor, the operating frequency of the compactor can be controlled. This is also advantageous in situations requiring control of the compacting force.

In addition to affording control over compacting attitude, load and frequency, the illustrated compactor design is versatile in that it may be employed as an impacting device as well as a compacting device. When the compactor is so used, the compactor shoes are replaced with spikes. The resulting impacting device is very useful in breaking up concrete and the like.

Although only one embodiment of the invention is shown in the drawing and described in the foregoing specification, it will be understood that the invention is not limited to the embodiment disclosed but is capable of rearrangement, modification and substitution of parts and elements without departing from the spirit of the invention.

What we claim is:

1. A compactor comprising:
a backhoe having a boom;
a substantially closed hollow box mounted on the boom of the backhoe;
a motor positioned within the box;
a plurality of bearings mounted on the box;
a shaft supported in the bearings for rotation about a horizontal axis;
means directly coupling the shaft to the motor for rotation thereby;
a pair of connecting rods eccentrically mounted to the shaft for reciprocatory movement out of phase with each other in response to rotation of the shaft, and
a pair of members, one mounted on each of the connecting rods, for alternative reciprocatory movement relative to the housing in response to operation of the motor.

2. The compactor according to claim 1 further including a housing extending from the box for enclosing the shaft and the connecting rods and further including guide means positioned in the housing for guiding the connecting rods.

3. The compactor according to claim 1 wherein the motor is a hydraulic motor and further including means for transferring hydraulic fluid from the backhoe into the box and hence to the motor.

4. The compactor according to claim 1 wherein the means for directly coupling the motor and the shaft comprises a sprocket driven by the motor, a sprocket mounted on the shaft and a chain extending around the sprockets.

5. A compactor mechanism comprising:
a frame;
a pair of members mounted on the frame for alternate reciprocatory movement in a predetermined direction;
a shaft supported on the frame for rotation with respect thereto;
a pair of eccentric mechanisms each mounted to the shaft and each for reciprocating one of the members upon rotation of the shaft;
a motor mounted on the frame for rotating the shaft;
a vehicle for supporting and transporting the frame and operatively connected to the motor for supplying power thereto, and
a boom mounted on the vehicle for supporting and positioning the frame and for applying a force thereto in the predetermined direction, whereby, upon operation of the motor, the members superimpose a hammering action on the force applied by the boom.

6. The compactor mechanism according to claim 5 wherein the members are compactor feet, wherein the eccentric mechanisms are supported on the shaft and further including a pair of connecting rods each extending between one of the eccentric mechanisms and one of the compactor feet.

7. The compactor mechanism according to claim 5 wherein the frame is a hollow box, wherein the motor is a hydraulic motor mounted within the box, and further including a housing supported on the motor and surrounding the shaft and the eccentrics.