Jan. 24, 1956 W. W. SIMMONDS 2,731,892

ROAD WORKING AND DITCHING MACHINE

Filed Aug. 20, 1952

2 Sheets-Sheet 1

Fig. 6.

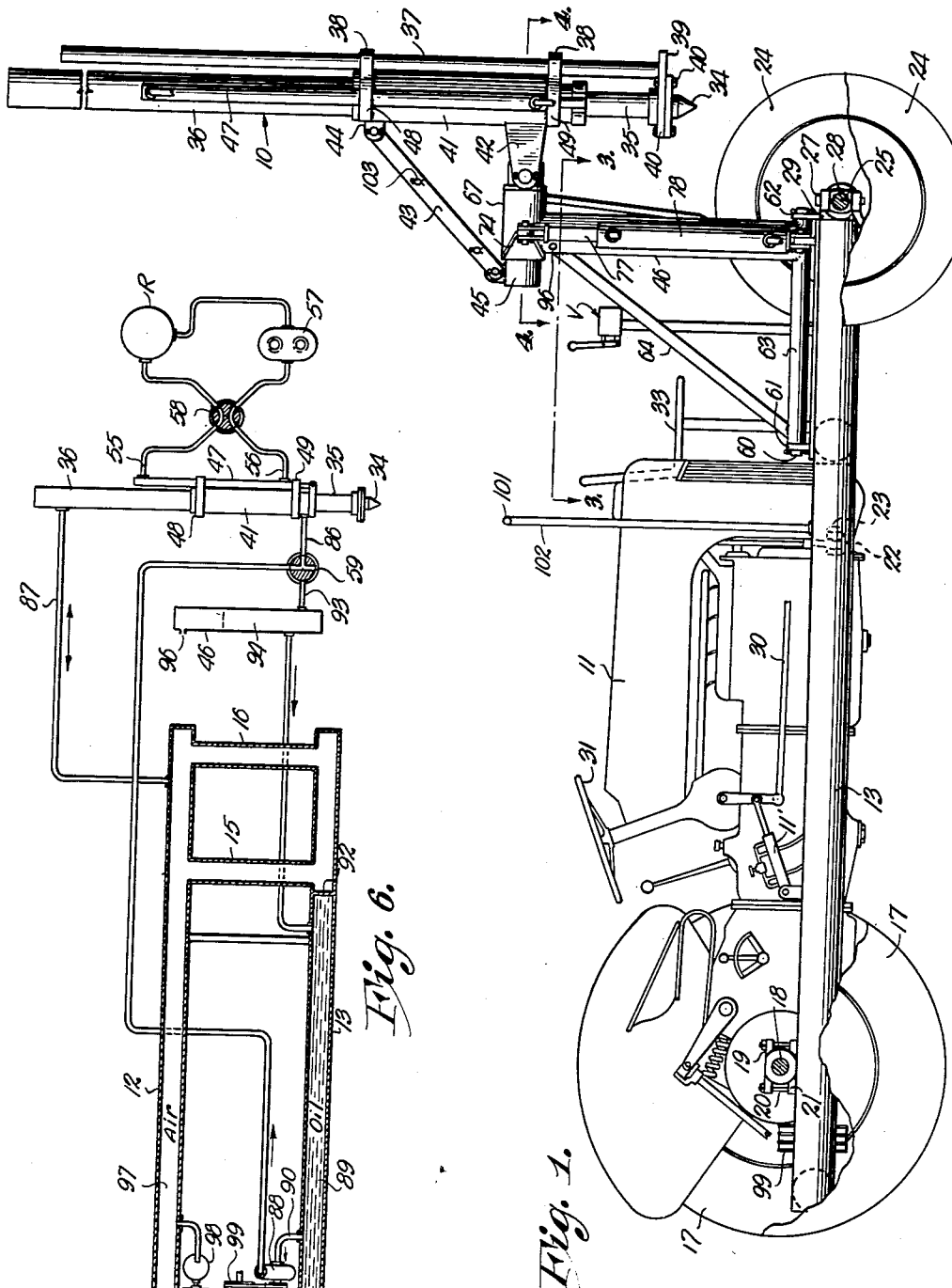

Fig. 1.

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2 Sheets-Sheet 2

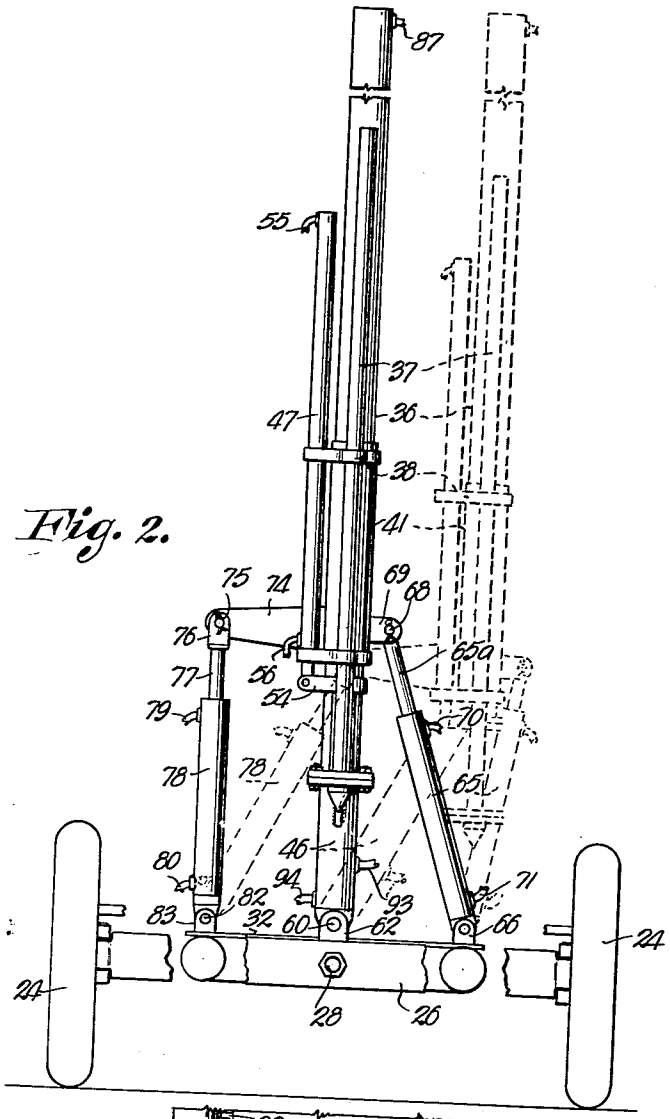

Fig. 2.

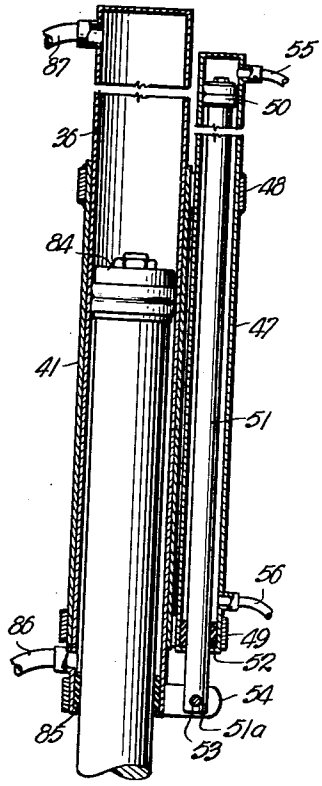

Fig. 5.

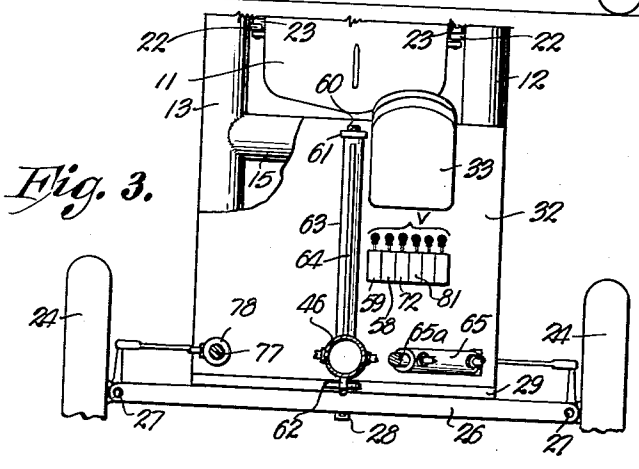

Fig. 3.

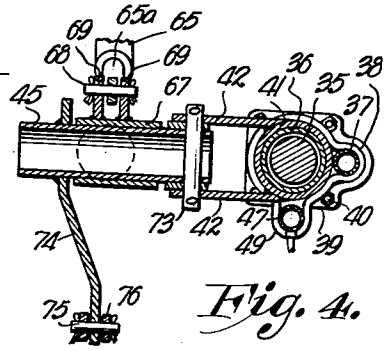

Fig. 4.

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2,731,892

ROAD WORKING AND DITCHING MACHINE

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Application August 20, 1952, Serial No. 305,349

4 Claims. (Cl. 94—49)

This invention relates to power hammers of the type generally used for breaking concrete slabs or other relatively hard road surfaces or for tamping earth fills, digging trenches, and other like tasks.

It is a principal object of the invention to provide a reciprocating hammer suitable for the above purposes which is powered by a unique combination of hydraulic and pneumatic forces, and which, as a result, has a greatly improved operational efficiency.

It is another object of the invention to provide a power hammer mounted upon a traveling carriage which can be driven to the site of operations and maneuvered with relative ease while the hammer is being used. In this connection, it is a further object to provide a unique means for mounting the hammer on the carriage so that the hammer may be adjusted from side to side with respect to the normal path of travel of the carriage and yet maintained in an upright position. Means are also provided for pivoting the hammer with respect to the carriage so that the hammer can be tilted to any desired position independent of the disposition of the carriage. This finds primary advantage in situations where the carriage is resting on uneven terrain or on inclined surfaces.

Still another object is to provide a frame which can be mounted on a conventional tractor to convert the tractor into a suitable carriage for the hammer, the parts of the frame also serving as reservoirs for storing the hydraulic and pneumatic fluids which are utilized as power sources for the hammer. It is also an object to provide suitable pumps on the frame which can be driven concurrently from the power take-off unit of the tractor.

Other and further objects, together with the features of novelty appurtenant thereto, will appear in the course of the following description.

In the accompanying drawings which form a part of the specification and are to be read in conjunction therewith, and in which like reference numerals indicate like parts in the various views,

Fig. 1 is a side elevational view of a preferred embodiment of my invention, the outer wheels being broken away for purposes of illustration;

Fig. 2 is a front elevational view of the hammer mechanism and support frame, the tractor not being shown;

Fig. 3 is a view taken along the line 3—3 of Fig. 1 in the direction of the arrows;

Fig. 4 is a cross-sectional view taken along the line 4—4 of Fig. 1 in the direction of the arrows;

Fig. 5 is a longitudinal sectional view through the hammer cylinder and vertical adjustment cylinder; and

Fig. 6 is a schematic diagram showing the hydraulic-pneumatic system for the hammer, and the independent hydraulic system for the vertical adjustment cylinder.

Referring to the drawings, and more particularly to Fig. 1, the hammer mechanism, generally indicated at **10**, is carried at the forward end of a support frame adapted to be affixed to a tractor **11**, the latter being conventional except that the front wheels have been removed. The

basic construction of the frame is shown schematically in Fig. 6, and consists principally of two elongated side members **12** and **13** (in the form of hollow, cylindrical tubes) which are joined to one another fore and aft of the tractor by cross-members **14**, **15**, and **16** to provide a rigid, unitary structure. These cross-members are also hollow, cylindrical tubes, and communicate with the side members to form a continuous, air-tight cell which, as will be hereinafter shown, is partitioned and utilized as storage tanks for both the hydraulic fluid and the compressed air used to operate the hammer.

The side members **12** and **13** are disposed on opposite sides of the tractor **11** inside the rear wheels **17** and as shown clearly in Fig. 1, are hung from the rear tractor axle **18** by means of an upper clamping bar **19** resting on top of the axle and connected with the frame member **13** by bolts **20**. The bolts **20** are carried by a bar **21** welded or otherwise affixed to the top of the frame member **13** and bearing against the underside of the axle. It will be understood that while in Fig. 1 only one side of the unit is shown, the method of attachment just described is the same on both sides.

The second point of attachment of the frame with the tractor is located just rearward of the nose of the latter, and, as in the case of the rear mounting, may be of any suitable construction. The preferred form I have adopted is to weld support brackets **22** to side members **12** and **13**, and attach these brackets by bolts or otherwise to the downwardly extending legs **23** of the axle on which the wheels of the tractor are normally mounted.

To replace the front wheels of the tractor and support the unit at its forward end are two wheels **24** mounted on pin axles **25** which in turn are secured to the ends of a main axle **26** through king pins **27**. Axle **26** is centrally pinned to the forward cross tube **16** by means of a pin **28**. A plate **29** (see Fig. 3) spans the side members **12** and **13** intermediate the axle **26** and the cross tube **16**, being welded or otherwise secured at its ends to the side members. This plate serves as additional support for pin **28**, which passes therethrough, and also as a bearing plate against which the axle **26** will rub when the unit is passing over rough ground. While not shown in detail, the tractor steering rods **30** are connected with wheels **24** through suitable extensions to provide directional control of the unit by operation of the tractor steering wheel **31**.

The forward part of the frame ahead of the nose of the tractor **12** is provided with a flat deck **32** which rests upon and is secured to the side members **12** and **13** and the forward cross tube **16** to form a floor or platform for the operator of the hammer. A seat **33** is mounted on this platform and within easy reaching distance of the seat is a bank of valves, generally indicated at V, through which operation of the unit is controlled. As will be described later, those valve in valve bank V which are identified by specific reference numerals play a part in the positioning and operation of the hammer mechanism **10**; the remaining valves are connected with other hydraulic cylinders, for example, such as that seen at **11'** in Fig. 1, which are utilized to provide control over the steering mechanism and transmission of the tractor from the operator's chair **33**. However, inasmuch as these latter features form no essential part of the present invention, they will not be dealt with in detail.

Supported at the front end of the frame and between the wheels **24** is the hammer mechanism **10**. While the construction and mode of operation of the hammer will be set forth in more detail hereinafter, it should perhaps be noted here that the mechanism comprises a hammer head **34** secured to the lower end of a piston shaft **35** which, in operation, is vertically reciprocated in a cylinder **36** to cause the hammer head **34** to deliver a series of im-

pacts to the surface being worked. A guide rod 37 is spaced laterally from the hammer piston 35 and extends upwardly alongside cylinder 36 where it is slidably received in vertically-spaced guide members 38. The lower end of guide rod 37 is rigidly secured to a plate 39 which in turn is secured to piston 35 and hammer head 34 by bolts 40; thus it reciprocates with the piston and serves to maintain the latter in proper alignment with cylinder 36.

It will be seen from Figs. 1, 4 and 5 that the hammer cylinder 36 is not rigidly attached to the supporting structure rising from the front of the frame, but is carried inside a coaxial cylindrical sleeve 41 which is supported in an upright position by laterally projecting brackets 42 welded to its lower end and a two-part diagonal brace member 43 connected to an ear 44 affixed to its upper end. Brace 43 and brackets 42 are attached to the opposite ends of a horizontal spindle 45 which is carried at the upper end of a post unit 46 mounted on the frame, and the hammer is thus normally stabilized in an upright position.

Referring now more particularly to Figs. 5 and 6, positioned alongside sleeve 41 and paralleling the hammer cylinder 36 is a double-acting hydraulic cylinder 47 through which vertical adjustment of the hammer cylinder with respect to sleeve 41 may be obtained. The adjusting cylinder 47 is rigidly affixed to sleeve 41, preferably by means of upper and lower collars designated respectively at 48 and 49, and slidably received therein is a piston head 50 from which extends a piston shaft 51. Shaft 51 extends through the lower end of cylinder 47 through a pressure-tight packing 52, and is provided at its lower end with a flattened portion 51*a* bolted at 53 to an ear 54 extending laterally from and secured to the lower end of the hammer cylinder 36. Hydraulic lines 55 and 56 communicate respectively with the interior of adjusting cylinder 41 above and below the piston 50, and fluid for actuating the piston head is supplied from the standard hydraulic pump unit 57 (Fig. 6) of the tractor 12 through a conventional four-way valve 58. To shift the hammer cylinder 36 downwardly with respect to sleeve 41, valve 58 is positioned to introduce fluid above the piston 50 through line 55 and allow withdrawal through line 56; conversely, upward shifting of the hammer cylinder 36 is accomplished by reversing the hydraulic flow, fluid entering through line 56 and withdrawn through line 55.

It will be understood that valve 58 is located in the valve bank V (Fig. 3). All of the remaining valves in the bank, with the exception of valve 59, are similar four-way valves connected by means of a common manifold to the same hydraulic pump unit 57 installed as standard equipment in most conventional tractors, and the return lines are likewise connected to a single receiver R, as is schematically shown for the cylinder 47 in Fig. 6. Valve 59, the exception referred to above, operates the hammer mechanism proper, and forms a part of a hydraulic-pneumatic system which is completely independent of that just described and which will be discussed more fully hereinafter.

The entire hammer mechanism 10 is carried at the top of the upwardly extending hollow post unit 46 which is pivoted, as shown in Fig. 2, about an axis substantially in line with the path of travel of the tractor. The pivotal support for the post unit 46 comprises an elongated pivot pin 60 supported at its ends in brackets 61 and 62, these being attached respectively to the deck 32 and the cross-brace 29 spanning the front of the frame. The post unit 46 is mounted on pin 60 by means of an elongate tube 63 which rotatably fits with pin 60 and has a length substantially equal to the spacing between brackets 61 and 62. Tube 63 is secured at its forward end to the lower end of post unit 46, preferably by welding, and a diagonal brace 64 extends from the rearward end of the tube to the upper end of the post unit to give the structure additional strength.

Positioned to one side of post unit 46 and serving as an adjustable link by which the post may be inclined to either side of the vertical is another double-acting hydraulic cylinder 65 (Fig. 2). Cylinder 65 is pivotally connected at its lower end with a bracket 66 welded or otherwise secured to the deck 32, and the piston shaft 65*a* emerging from the upper end of the cylinder is hingedly connected with a horizontal sleeve 67 welded to the top of a post to form therewith the post unit 46. As shown in Fig. 4, the pivotal connection of the piston shaft 66 with sleeve 67 is by means of a pin 68 carried between two legs 69 secured to the side of the sleeve. It will be understood that hydraulic cylinder 65 is similar in construction to the vertical hammer adjustment cylinder 47, hydraulic lines 70 and 71 being provided for supplying fluid on either side of the piston under control of a four-way valve 72 located in the valve bank V previously described.

To maintain the hammer mechanism 10 in a vertical position with respect to the ground plane upon sidewise swinging of post 46, and also to provide an independent means for inclining the line of impact of the hammer, I have developed the following arrangement. As hereinbefore noted, the vertical sleeve 41 within which the hammer cylinder 36 is carried is connected directly to a horizontal spindle 45 rotatably supported at the top of post unit 46 in sleeve 67. As will be particularly noted from Fig. 4, the spaced parallel brackets 42 extending laterally from the hammer carrying sleeve 41 provide the primary connection to the spindle 45, the brackets 42 lying on opposite sides of the spindle and being pivotally pinned thereto by a pin 73. Spindle 45 extends through its sleeve 67, and affixed to the other end is a laterally extending arm 74. As may best be seen in Fig. 2, the outer end of arm 74 is pivotally connected at 75 with a yoke 76 carried at the upper end of a reciprocable piston shaft 77 extending upwardly from a double-acting hydraulic cylinder 78. Cylinder 78 is identical in construction to those previously described, having hydraulic lines 79 and 80 for controlling the displacement of the piston shaft 77 in either direction through the operation of valve 81 (Fig. 3). The lower end of the cylinder 78 is pivotally connected as at 82 with a bracket 83 rigidly affixed to the deck 32 by any suitable means, preferably welding.

It will be understood that with valve 81 set in a neutral position, piston shaft 77 is immobilized within cylinder 78, and thus the shaft and cylinder in this condition serve as a rigid, articulating link serving to maintain the hammer mechanism 10 in a relatively vertical position despite pivoting of the post 46 in either direction. This can be best appreciated by referring to Fig. 2, wherein the hammer mechanism 10 is shown in broken lines as shifted to one side of the centerline of the tractor 12. The cylinder 78 forms one side of an articulated parallelogram linkage which has for its opposite side the pivotal post 46, the remaining sides being defined by arm 74 and the deck 32. As the post unit 46 is shifted, the arm 74 is maintained parallel to the deck 32 by cylinder 78; this has the effect of causing relative rotation between spindle 45 and its journal sleeve 67 and allowing the post 46 to swing to its inclined position without disturbing the relative disposition of the hammer mechanism 10 with respect to the ground plane. On the other hand, it will be obvious that under the control of cylinder 78, the hammer mechanism 10 can be rotated about the axis of the spindle 45 independently of the shifting of the post unit 46. The particular advantages of this latter feature will be made clear presently.

Turning now to a detailed description of the construction and mode of operation of the hammer mechanism 10, and referring particularly to Figs. 5 and 6, the hammer piston shaft 35 is affixed at its upper end to a piston 84 carried inside the hammer cylinder 36. An annular packing 85 surrounds shaft 35 at the lower end of cylinder 36 to provide a pressure-tight seal, and a fluid inlet line 86 communicates with the annular space thus formed be-

tween the piston and the packing. A second line **87** is connected into the top of cylinder **35** to communicate with the space above the piston **84**.

The hydraulic and pneumatic system supplying the hammer is shown in Fig. 6. Line **86** at the lower end of cylinder **36** is connected with a three-way valve **59** to which hydraulic fluid, such as oil, is pumped by a conventional pump **88** located at the rear of the tractor. The pump **88** draws the fluid through line **90** as needed, from a reservoir **89** which is formed by the tubular frame member **13**. It will be noted that reservoir **89** extends only between cross-members **15** and **16**, pressure-tight partitions **91** and **92** being located adjacent the cross-members to form an enclosed compartment wholly within the frame member **13**. A return line **93** leads from valve **59** to a secondary reservoir **94** formed by the hollow interior of the hammer-carrying post unit **46**, and another line **95** leads from reservoir **94** to the main oil reservoir **89**. An air vent **96** is provided near the upper end of the post unit **46**, to permit free fluctuation of the fluid level therein, the advantage of which will be pointed out hereinafter.

Line **87**, which is connected into the upper end of the hammer cylinder **36**, communicates at its other end with an air tank **97** formed by the frame side member **12** and the cross-members **14**, **15**, and **16**. Compressed air is supplied to tank **97** by a compressor **98** located at the rear of the tractor adjacent the hydraulic pump **88**; as is conventional the compressor preferably has a built-in pressure-controlled valve which serves automatically to maintain the pressure in tank **97** at the desired value, approximately 150 p. s. i. Both the compressor and the hydraulic pump are mounted at the rear of the tractor on opposite sides of the conventional power-take-off pulley **99** and are driven by belts **100** connected therewith.

In describing the operation of the hammer, it will be assumed that the hammer head **34** has been raised to its uppermost position, as shown in Figs. 1 and 6, and that it is ready for the sharp, downward impact stroke. In this condition, piston **84** is located at the upper limit of its displacement in the hammer cylinder **36**, valve **59** having been positioned to supply hydraulic fluid directly from the pump **88** to the line **86** communicating with cylinder **36** below the piston. By virtue of the open communication through line **87**, the compressed air in tank **97** exerts pressure on the top of the piston **84** tending to drive the hammer downwardly; however, it will be understood that the pressure of the hydraulic fluid on the underside of the piston is more than sufficient to maintain the hammer in the upraised position.

To produce the hammer blow, valve **59** is turned 90° counterclockwise from its Fig. 6 position, which opens communication between the cylinder **36** and post unit **46** through lines **86** and **93**. At the same time, the flow from the pump **88** is also diverted into the return line **93**, and accordingly, the pressure inside the cylinder below the piston **84** is completely released.

Under the influence of the air pressure above the piston **84**, the shaft **35** now is driven sharply downward at high speed to cause the hammer head **34** to strike the ground surface or pavement with a hard and sustained impact. The hydraulic fluid originally present in the annular space surrounding shaft **35** is forced outwardly through line **86** by the downward movement of the piston **84** and into the vertical post unit **46**. The primary reason for providing this intermediate reservoir is to eliminate the flow resistance which would otherwise be encountered should line **86** return directly to the oil reservoir **89** in frame member **13**. In other words, the efficiency of the hammer depends in large measure on the rapidity of the downstroke which can be attained. Any resistance to withdrawal of the fluid from cylinder **36** has the ultimate effect of slowing down the action of the hammer, and obviously, a long return line would, by virtue of the frictional flow resistance therein, serve to amplify this undesirable effect. By providing an intermediate reservoir such as the interior of post unit **46**, the fluid leaving the cylinder **36** is allowed to accumulate therein after traversing the distance represented by lines **86** and **93**, and then to flow by gravity through line **95** into the reservoir **89** from whence it can be drawn by pump **88** as needed. Since the post unit **46** is vented to atmosphere at **96**, the sole resistance to flow out of cylinder **36** is the frictional resistance in lines **86** and **93** and the relatively small hydrostatic head developed in the post as the fluid accumulates.

To raise the hammer for the next stroke, valve **59** is returned to its Fig. 6 position to direct the flow from pump **88** into the cylinder **36** through line **86**. The hydraulic pressure displaces the piston **84** upwardly until its fully raised position is reached and the hammer ready for another impact.

As has been pointed out hereinbefore, through the mounting of the hammer mechanism **10** on the pivotal post **46**, the hammer may be swung from side to side during its operation while still maintained substantially vertical. Thus successive impacts can be produced over a relatively great width without disturbing the line of travel of the tractor itself.

It is also possible to adjust the inclination of the hammer mechanism **10** with respect to the ground level or the post **46** by actuating the hydraulic cylinder **78** in the manner hereinbefore described. With this feature, two main advantages over previously known hammers of this general type are obtained. The first is fairly obvious, and rests in the ability to align the hammer in a true vertical line even though the tractor is resting on an incline, i. e., where the wheels on one side of the tractor are at a higher level than those on the other. The second, and less obvious, is that by use of cylinder **78**, the hammer head **34** can be given a sidewise movement after being imbedded in the ground on the downstroke to rip and tear the earth or break down the walls of a cavity which the hammer is being used to form. In other words, once the hammer head **34** is imbedded, the operator, through operation of valve **81**, can cause cylinder **78** to force the complete hammer mechanism **10** to rotate about the axis of the horizontal spindle **45** and thus impart a sidewise movement to the hammer head **34**. This feature has particular merit where the hammer head **34** is replaced with another type of tool, such as a spade head or digging bucket. In the case of the digging bucket, the sidewise motion of the hammer produces the scooping effect necessary to remove the earth.

It will be understood that my hammer unit is particularly suited to digging trenches of substantial depth. The vertical adjustment of the hammer cylinder **36** within its sleeve **41** allows the hammer to be repositioned to a lower level as the dirt is removed from the trench. In other words, as the depth of the cavity increases, the hammer cylinder **36** can be lowered by actuating the vertical adjustment cylinder **47** positioned alongside sleeve **41**. The sleeve **41**, of course, remains stationary, the hammer cylinder **36** sliding therein as the piston shaft **51** is displaced downwardly in the adjusting cylinder.

During the transit of the unit from one location to another, and when the hammer is not in operation, the hammer mechanism **10** can be laid over in a horizontal position with the upper part of the cylinder **36** resting on a cradle **101** which is supported by legs **102** rising from the frame on opposite sides of the tractor hood. This is accomplished by removing the retaining pin **103** from the two-part brace member **43**, and swinging the hammer cylinder **36** rearwardly and downwardly about the pin **73** which connects the hammer mechanism to the spindle **45**. To ready the hammer for operation, the hammer mechanism **10** is returned to its Fig. 1 position, and pin **103** reinserted in the brace to lock the hammer in its normally upright position.

From the foregoing it will be seen that I have provided

a mobile hammer unit having both highly efficient operation and unusual adaptability to various situations which may be encountered in use. Through the unique method of mounting the hammer on the carriage and providing a hydraulic-pneumatic system for operating the hammer independently of the hammer positioning means, a high degree of flexibility in operation is obtained, making the unit readily adaptable to an infinite variety of tasks which have heretofore required specially designed units not capable of use for more than one purpose. My unit is also compact and simple, and as a result extremely economical to manufacture and maintain in repair.

From the foregoing it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth together with other advantages which are obvious and which are inherent to the structure.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the claims.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. An apparatus mounting a portable hammer unit on a vehicle having a wheel supported frame and a source of fluid pressure thereon, said portable hammer unit having a hammer carrying structure and mechanism for effecting up and down movement of said hammer in a fixed path relative to the hammer carrying structure; a post unit having an upright post and a sleeve thereon, means pivotally mounting the post on the frame for swinging movement of the post from side to side, said sleeve being horizontally arranged and fixed adjacent the upper end of the post with the axis of said sleeve substantially parallel to the pivotal axis of the post, a spindle rotatably mounted in said sleeve, means pivotally mounting the hammer carrying structure on the spindle for swinging movement of said structure about a substantially horizontal axis arranged transversely to the axis of the sleeve, brace means having one end connected to the hammer carrying structure and the other end to the spindle for retaining the hammer carrying structure in operative position and at fixed angularity relative to the axis of the spindle, extensible means operated by fluid pressure and having one end pivotally connected to the post unit and the other end pivotally connected to the frame for swinging the post unit about the axis of the pivotal mounting thereof, and second extensible means operated by fluid pressure having one end pivotally connected to the frame and the other end pivotally connected to the spindle for swinging movement of the hammer carrying structure about the axis of the sleeve whereby operation of the first named extensible means and second named extensible means effect bodily movement of the hammer carrying structure and tilting of the hammer carrying structure.

2. An apparatus mounting a portable hammer unit on a vehicle having a wheel supported frame and a source of fluid pressure thereon, said portable hammer unit having a hammer carrying structure and mechanism for effecting up and down movement of said hammer in a fixed path relative to said hammer carrying structure; a post unit having an upright post and a sleeve thereon, means pivotally mounting the post on the frame for swinging movement of the post from side to side about an axis extending substantially longitudinally of the vehicle, said sleeve being horizontally arranged and fixed to the upper end of the post with the axis of said sleeve longitudinally of the vehicle, a spindle rotatably mounted in said sleeve, means mounting the hammer carrying structure on the spindle, extensible means operated by fluid pressure and having one end pivotally connected to the post unit and the other end pivotally connected to the frame for swinging the post unit laterally of the vehicle, and second extensible means operated by fluid pressure having one end connected to the frame and the other end connected to the spindle for swinging movement of the hammer carrying structure about the axis of the sleeve whereby operation of the first named extensible means and second named extensible means effect bodily movement of the hammer carrying structure laterally of the vehicle and tilting of the hammer carrying structure laterally of the vehicle.

3. An apparatus mounting a portable hammer unit on a vehicle having a wheel supported frame and a source of fluid pressure thereon, said portable hammer unit having a hammer carrying structure and mechanism for effecting up and down movement of said hammer in a fixed path relative to the hammer carrying structure; a post unit having an upright post, means pivotally mounting the post adjacent one end of the frame for swinging movement of the post from side to side about an axis extending substantially longitudinally of the vehicle, a spindle mounted at the upper portion of the post for rotation about an axis extending longitudinally of the vehicle, means pivotally mounting the hammer carrying structure on one end of the spindle for swinging movement of said structure about a substantially horizontal axis arranged transversely of the vehicle, brace means having one end connected to the hammer carrying structure and the other end to the spindle for retaining the hammer carrying structure in operative position and at fixed angularity relative to the axis of the spindle, extensible means operated by fluid pressure and having one end pivotally connected to the post unit and the other end pivotally connected to the frame for swinging the post unit laterally of the vehicle, and second extensible means operated by fluid pressure having one end pivotally connected to the frame and the other end pivotally connected to the spindle for swinging movement of the hammer carrying structure about the axis of the spindle whereby operation of the first named extensible means and second named extensible means effect bodily movement of the hammer carrying structure laterally of the vehicle and tilting of the hammer carrying structure laterally of the vehicle respectively.

4. An apparatus mounting a portable hammer unit on a vehicle having a wheel supported frame and a source of fluid pressure thereon, said portable hammer unit having a hammer carrying structure and mechanism for effecting up and down movement of said hammer in a fixed path relative to the hammer carrying structure; a post unit having an upright post and a sleeve thereon, means adjacent the lower end of the post pivotally mounting same at one end of the frame for swinging movement of the post from side to side about an axis extending substantially longitudinally of the vehicle, said sleeve being horizontally arranged and fixed to the upper end of the post with the axis of said sleeve longitudinally of the vehicle, a spindle rotatably mounted in said sleeve and extending from the ends thereof, means pivotally mounting the hammer carrying structure on one end of the spindle for swinging movement of said structure about a substantially horizontal axis arranged transversely of the vehicle, brace means having one end connected to the hammer carrying structure and the other end to the spindle for retaining the hammer carrying structure in operative position and at fixed angular relation to the axis of the spindle, extensible means operated by fluid pressure and having one end pivotally connected to the post unit and the other end pivotally connected to the frame in spaced relation to the post unit for swinging the post unit laterally of the vehicle, and second extensible means operated by fluid pressure having one end pivotally connected to the frame in spaced relation to the post unit and the other end pivotally connected to

the spindle for swinging movement of the hammer carrying structure about the axis of the sleeve whereby operation of the first named extensible means and second named extensible means effect bodily movement of the hammer carrying structure laterally of the vehicle and tilting of the hammer carrying structure laterally of the vehicle respectively.

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