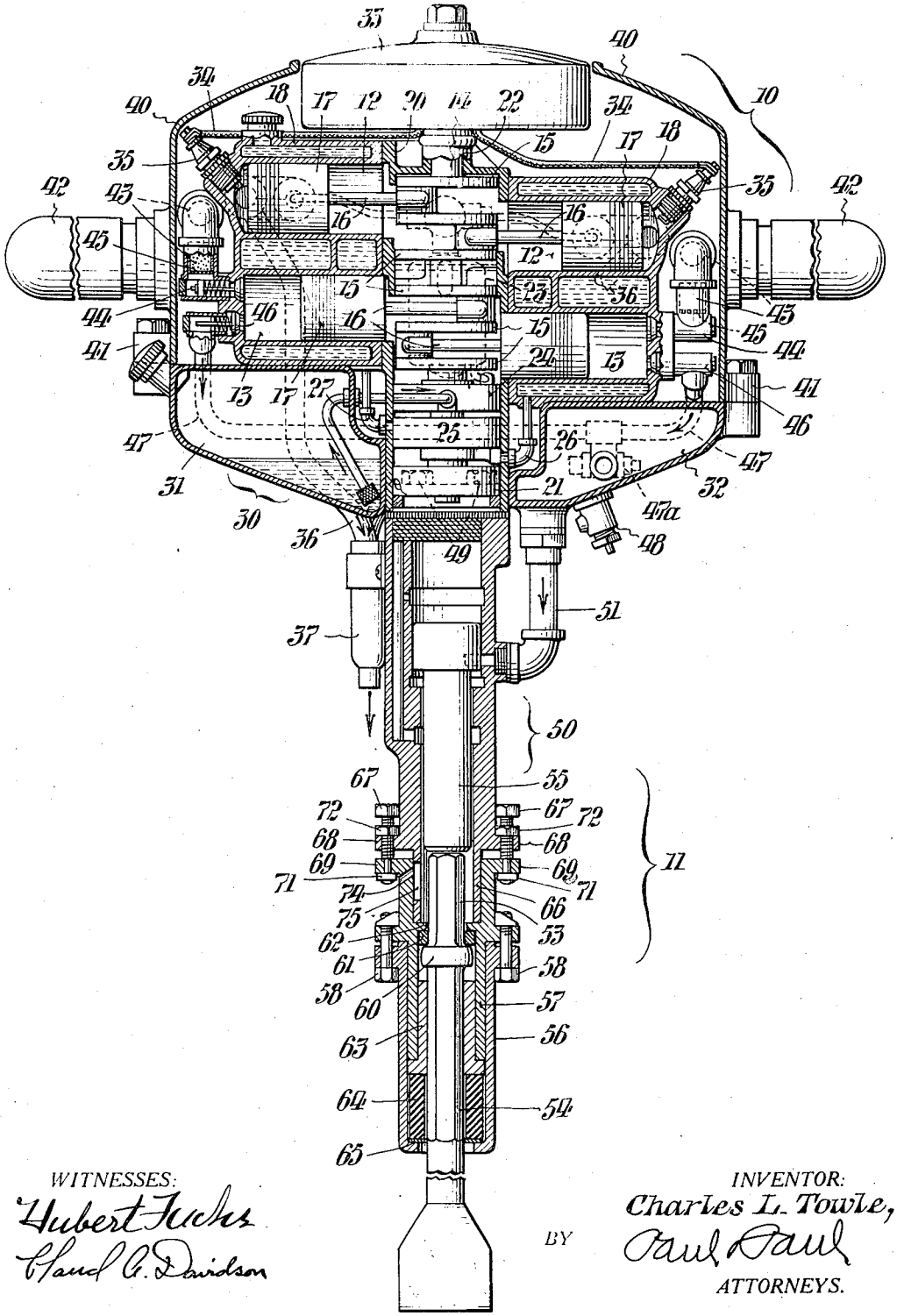
Oct. 31, 1939. C. L. TOWLE 2,178,246

PNEUMATIC PERCUSSION TOOL

Filed Dec. 2, 1937



WITNESSES:

Hubert Fuchs

Paul C. Davidson

BY

INVENTOR:

Charles L. Towle,

Paul & Paul

ATTORNEYS.

Patented Oct. 31, 1939

2,178,246

UNITED STATES PATENT OFFICE

2,178,246

PNEUMATIC PERCUSSION TOOL

Charles L. Towle, Philadelphia, Pa.

Application December 2, 1937, Serial No. 177,689

8 Claims. (Cl. 60—19)

This invention relates to percussion tools, one of its purposes being to provide in one unit an independently powered or self-powered tool that can be made compact and light enough for portability, and for convenient operation by a workman. Another object of the invention is to combine the advantages of an internal combustion engine as the ultimate source of power with the flexibility of action and other well-known characteristics of pneumatic actuation. A further advantage is that of being able to fabricate the tool, if desired, mainly by combining mechanisms and parts already commercially available, with a minimum of alterations and of special parts and accessories. This allows of a relatively low cost of manufacture, even in producing the tools on a relatively small scale. Still other features and advantages of the invention will appear from the following description of one species or form of embodiment, and from the drawing. All the features and combinations shown and described are, indeed, of the invention, so far as novel over the prior art.

The invention is particularly applicable to tamping tools, adapted, amongst other uses, for tamping railroad ties, and it is here illustrated and explained in a form of embodiment well suited for this purpose.

The drawing shows a vertical axial section through a tool conveniently embodying the invention.

The tool here illustrated comprises as its principal components a gas-engine mechanism 10 similar to that of an "outboard motor" for small boat propulsion, and a pneumatic mechanism and tool 11 like those of a well-known pneumatic tamper. The particular engine 10 shown is that of an "Evinrude" four-cylinder, two-cycle motor, and the pneumatic mechanism and tool 11 are those of an "Ingersoll MT–1, MT–2, or MT–3 tie tamper". As these are commercially well-known devices, no complete description thereof is required. Only the two (upper) cylinders 12, 12 are used as engine cylinders for developing power, while the other two (lower) cylinders 13, 13 are used as compressor cylinders for supplying compressed air to operate the tamper mechanism 11. In other words, the (larger) cylinders 12, 12 form a two-cylinder two-cycle gasoline engine driving directly a two-cylinder air compressor formed by the (smaller) cylinders 13, 13, the original engine crank-shaft 14, cranks 15, connecting rods 16, and pistons 17 remaining unchanged.

The cylinder block 18 containing the cylinders 12, 12 and 13, 13 has a central bore wherein is mounted a hollow structure 20, securely attached to the block, which serves as a frame for mounting other parts, and also in a manner as a crank-case containing the crank-shaft 14. The lower shaft bearing 21 is mounted in the hollow structure 20; and the upper shaft bearing 22 and an intermediate bearing and carburetor structure 23 may (or may not) form part of the structure 20, or be mounted therein. Other parts that may be mounted in the structure 20 include fuel supply and water circulating pumps 24 and 25, whose respective suction and delivery connections 26, 27 are also shown. These parts are shown just as when the engine 11 is used for its original purpose. Around the lower portion of the structure 20 there is shown a housing and reservoir structure 30, including fuel and compressed air compartments 31, 32, which may be attached to the structure 20 or to the cylinder block 18, or both. The engine and compressor cylinders 12, 12 and 13, 13 are cooled by the original water jacket and cooling arrangements, just as if they were still operated as a four-cylinder gasoline engine. Other original engine accessories that are retained include the fly-wheel magneto 33, with connections 34 to spark plugs 35 in cylinders 12, 12, and the exhaust piping 36 to muffler 37. An upper sheet metal housing 40, shown as bolted to the structure 30 at 41, coacts with this structure 30 to enclosure most or all of the parts already mentioned (excepting the muffler 37), but is readily removable for access to any of the parts. Handles 42, 42 for manipulating the tamper may be attached to the housing 40.

Air to be compressed may be taken in independently for the two cylinders 13, 13, by means of intakes 43, 43 that open through the casing walls 40 and are connected to the suction check-valves 44, 44. As shown, air filters 45, 45 are interposed in these intakes 43, 43. From the cylinders 13, 13, the compressed air is delivered through discharge check-valves 46, 46 and pipes 47, 47 to the reservoir compartment or tank 32, which serves to equalize the air pressure and flow, and also affords radiating surface to cool the air somewhat after compression. An additional check-valve 47a is shown in the pipe 47 adjacent the reservoir 32, to preclude back flow of air to the cylinders 13, 13. The air reservoir tank 32 may be equipped with a safety valve 48, to prevent excessive pressure from building up in this tank under any circumstances.

To the lower end of the frame structure 20 is attached (as by bolts 49) the upright cylinder and

guide or tool holder structure 50 of the pneumatic mechanism 11, which is coaxial with the shaft 14 and the structure 20. From the tank 32, air under pressure is supplied to this pneumatic mechanism 11 through a pipe 51. The lower portion of the structure 50 affords a guide and holder for the (hexagonal) shank 53 of the tamping tool 54, whose upper end is struck by the pneumatic piston 55 on its downstrokes. As here shown, the tool-guiding and holding means include a tool retainer sleeve 56, internally flanged at its lower end, which is removably fitted on a reduced extension 57 of the pneumatic cylinder or barrel 50, and is detachably secured thereto by bolts 58 as usual. The tool shank 53 has the external enlargement or flange 60 for coacting with the superjacent retaining washer (or "fixed nozzle") 61—that engages under the internal flange or shoulder 62 of the barrel extension 57—and also for coacting with the subjacent two-part sleeve (or "loose nozzle") 63, which engages under the lower end of the part 57 and abuts against the split elastic (rubber) buffer collar 64, above the split steel washer 65 in the lower end of the retainer.

Besides the features already described, which correspond essentially to those of the aforementioned Ingersoll tie tampers, the pneumatic mechanism here shown includes provisions for varying its action between a light, fast blow and a slow heavy blow, by adjustment that can easily be made without taking the mechanism apart. For this purpose, the extension part 57 is shown as a sleeve separate from the main cylinder or barrel part 50, and fiting adjustably on a reduced lower portion 66 of said part 50. Any suitable means may be provided for adjusting the part 57 up and down on the barrel portion 66, such as (hexagonal headed) screws 67 threaded through ears or lugs 68 on the barrel 50 and having their reduced lower ends engaged and free to turn in ears or lugs 69 on the part 57. As shown, the ears 69 are snugly engaged between shoulders on the screws 67 and separate heads 71 suitably secured to the lower extremities of the screws. Locknuts 72 are shown on the screws 67, for locking the part 57 in any desired up and down position relative to the barrel 50. Through the wall of the part 57 extends an exhaust port 74, which opens into an exhaust slot 75 in the wall of the barrel portion 66. This slot 75 is of such length that the port 74 opens into it in all up and down positions of the part 57.

By adjusting the part 57 up and down, the tool shank 53 is also adjusted up and down relative to the main barrel or cylinder 50, so that the piston 55 shall hit the tool and rebound after traveling downward a greater or less distance in the cylinder. At the extreme upper adjustment, this results in a rapid succession of relatively light blows, and at the extreme lower adjustment in a slower succession of heavier blows, with blows of intermediate force and rapidity at intermediate adjustments.

Having thus described my invention, I claim:

1. A self-powered percussion tool comprising in one portable unit an internal combustion engine and a compressor, an upright crank shaft driven by the engine and driving the compressor, and an upright downward-acting pneumatic percussion mechanism beneath the said engine and compressor, attached to them at one end and loaded with their weight to hold its tool against the work, and supplied with motive fluid from said compressor.

2. A self-powered percussion tool comprising in one portable unit an internal combustion engine and a compressor, an upright crank shaft driven by the engine and driving the compressor, an upright downward-acting pneumatic percussion mechanism beneath the said engine and compressor, attached to them at one end and loaded with their weight to hold its tool against the work, and supplied with motive fluid from said compressor, and a housing around said engine and compressor, attached to them and carrying handles at its periphery for manipulating the tool in use.

3. A self-powered percussion tool comprising in one portable unit an internal combustion engine and a compressor, with a common crank-shaft driven by the engine and driving the compressor, a common cooling system and a frame structure for said engine and compressor, a fuel pump for said engine and a cooling fluid circulating pump for said system, both driven by the aforesaid crank-shaft, a reservoir structure around said crank-shaft, including fuel and compressed fluid compartments or reservoirs supplying said engine and supplied by said compressor, respectively, and a pneumatic percussion mechanism attached to said frame structure and supplied with motive fluid from said compressed fluid reservoir.

4. A self-powered percussion tool comprising in one portable unit a horizontally arranged internal combustion engine, a horizontally arranged compressor attached to said engine, an upright crank shaft driven by said engine and driving said compressor, and an upright vertically-acting pneumatic percussion mechanism attached to said engine and compressor substantially in line with their said crank shaft, and supplied with motive fluid from said compressor.

5. A self-powered percussion tool comprising in one portable unit an internal combustion engine and a compressor, including engine and compressor cylinders, with an upright crank-shaft driven by the engine and driving the compressor, a central hollow frame structure whereto the engine and compressor cylinders are attached, and in which said crank-shaft is mounted, and a pneumatic percussion mechanism comprising an upright cylinder and tool holder structure attached at its end to the end of said frame structure, and supplied with motive fluid from said compressor.

6. A self-powered percussion tool comprising in one portable unit an internal combustion engine and a compressor, including a cylinder block with horizontal engine and compressor cylinders therein; a hollow frame structure attached to said cylinder block; an upright crankshaft mounted in said hollow frame structure, driven by said engine and driving said compressor; a reservoir structure mounted around said hollow frame structure adjacent said cylinder block, and including fuel and compressed air compartments supplying said engine and supplied by said compressor, respectively; a pneumatic percussion mechanism supplied with motove fluid from said compressed air compartment and comprising an upright cylinder and tool holder structure attached at one end to the end of said frame structure; and a housing around said cylinder block coacting with said reservoir structure to enclose the engine and compressor.

7. A self-powered percussion tool comprising in one portable unit an internal combustion engine and a compressor, an upright crank shaft

driven by the engine and driving the compressor, an upright vertically-acting pneumatic percussion mechanism supplied with motive fluid from said compressor and comprising a barrel or cylinder attached at its end to said engine and compressor, substantially in line with their said crank shaft, and a tool holder carried by said barrel adjustable lengthwise thereof, to vary the action of the percussion mechanism on the tool.

8. A self-powered percussion tool comprising in one portable unit an internal combustion engine and a compressor, an upright crank shaft driven by the engine and driving the compressor, an upright vertically-acting pneumatic percussion mechanism supplied with motive fluid from said compressor and comprising a barrel or cylinder attached at its end to said engine and compressor, substantially in line with their said crank shaft, and having an extension with an exhaust opening in its wall, and a tool-holder adjustable lengthwise of said barrel on said extension and having an exhaust port through its wall, communicating with said exhaust opening in all positons of adjustment of said tool-holder.

CHARLES L. TOWLE.