R. E. VELTUM.

PNEUMATIC TOOL.

APPLICATION FILED OCT. 24, 1914.

1,193,318.

Patented Aug. 1, 1916.

2 SHEETS—SHEET 1.

Fig: 1.

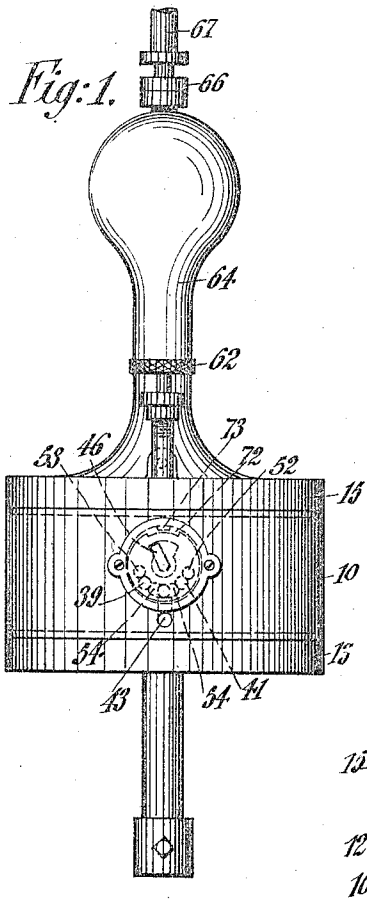


Fig: 2.

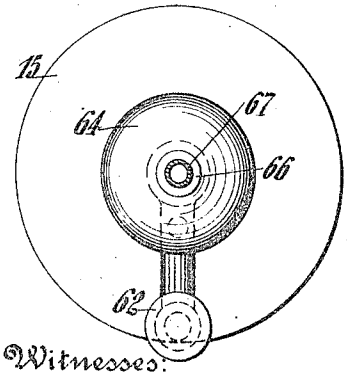
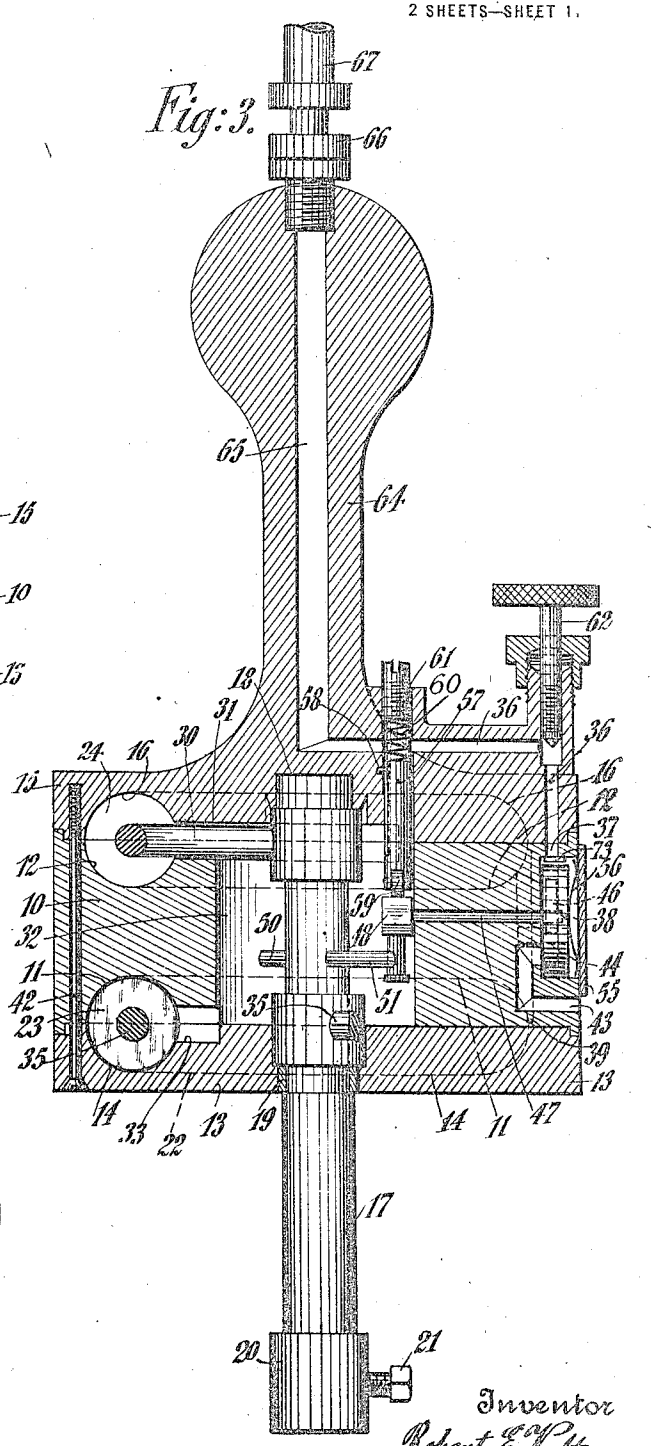


Fig: 3.



Witnesses:

F. Hogg.

Jean Pinbaro.

Inventor

Robert E. Veltum

By his Attorney Carl P. Goepel

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2 SHEETS—SHEET 2.

Fig: 4.

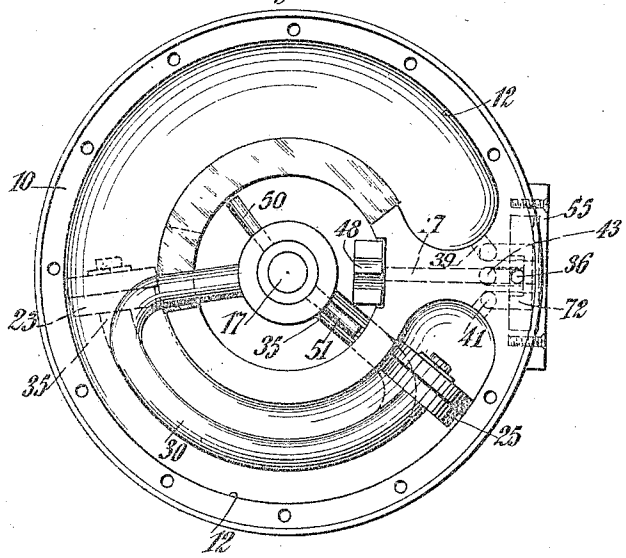


Fig: 5.

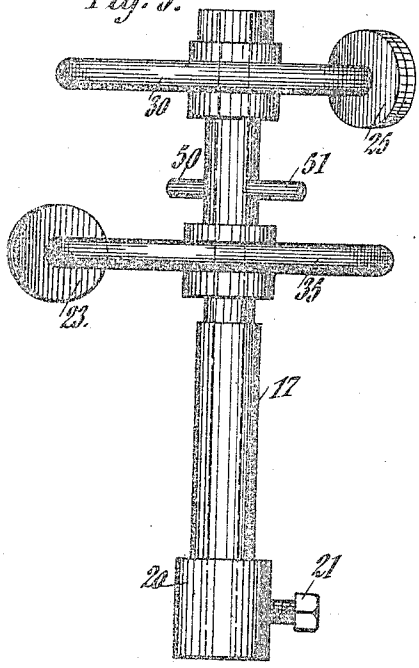


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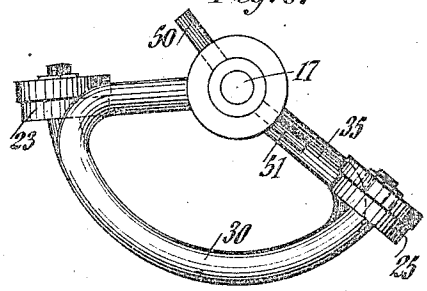


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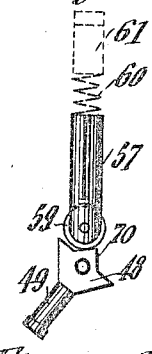
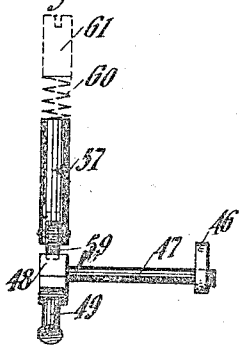


Fig: 8.



Witnesses:

F. Dorr

Jos. Rothwell

Fig: 9.

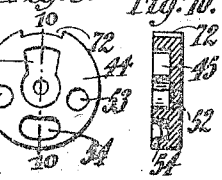


Fig: 10.

Fig: 11.

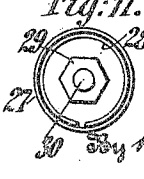
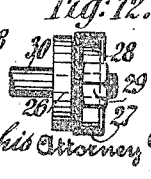


Fig: 12.



Inventor

Robert E. Veltum

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UNITED STATES PATENT OFFICE.

ROBERT E. VELTUM, OF EUGENE, OREGON.

PNEUMATIC TOOL.

1,193,318. Specification of Letters Patent. Patented Aug. 1, 1916.

Application filed October 24, 1914. Serial No. 868,460.

To all whom it may concern:

Be it known that I, ROBERT E. VELTUM, a citizen of the United States, residing in Eugene, in the county of Lane and State of Oregon, have invented certain new and useful Improvements in Pneumatic Tools, of which the following is a specification.

The object of this invention is to furnish an improved portable tool, operable by compressed air or other fluid under pressure, whereby an oscillating motion of the working head is produced, so that the machine is suitable for grinding valves, operating a ratchet drill, or other purposes requiring a rapid to-and-fro motion. For accomplishing this object two arcuate cylinders are provided, with a piston in each, both pistons being connected to a common driving shaft and oppositely arranged, so that when one piston is at one end of its stroke the other is at the other end of its stroke, whereby impulses in opposite directions are given alternately to the shaft. A suitable valve-mechanism controls the fluid supply so as to produce the reversal of movement of the pistons at the proper times.

In the accompanying drawings, Figure 1 is an elevation of a machine embodying the invention, Fig. 2 is a top view of Fig. 1, Fig. 3 is a vertical central section through the machine of Fig. 1, on a larger scale, Fig. 4 is a top view of one of the members of the machine in which one of the cylinders is partly formed, Fig. 5 is an elevation of the driving shaft and the pistons connected therewith, Fig. 6 is a top view of the pistons, shaft and connecting rods, Fig. 7 is a side view of a part of the valve-controlling devices, Fig. 8 is a view at a right angle to Fig. 7. Figs. 9 and 10 are details of the valve, Fig. 10 being a section on line 10—10 of Fig. 9, and Figs. 11 and 12 are details of one of the pistons.

Similar reference characters indicate the same parts throughout the figures.

Referring to the drawings, the main-block 10 of the tool has therein two arcuate grooves 11, 12, one at the front face and one at the rear face of the same. The front-plate 13 has at its rear face a corresponding groove 14, and the rear-plate 15 has a corresponding groove 16, said grooves forming when the plates are secured in place on the main-block, arcuate channels of cylindrical cross-section, each extending nearly the full circumference of a circle, as shown in Fig. 4. Screws 42 of which one is shown, secure the plates and main-block 10 together.

A driving-shaft 17 is journaled at its inner end in a socket 18 in the rear-plate 15, and extends through a central opening 32 in the block 10, and is journaled in a bearing 19 in the front-plate 13. It extends forwardly beyond the front-plate and at its outer end is provided with a clamping-socket 20 having a screw 21, whereby any desired work-tool can be secured to the shaft.

In the front cylinder 22 is located a piston 23, and in the rear cylinder 24 is located a piston 25. Each piston comprises a head 26, a cup-shaped washer 27 of leather or other suitable material, and an expansion spring 28 within the cup-shaped washer. The head 26 is secured at the end of a connecting rod which extends forward beyond the head and is screw-threaded and receives a nut 29 by which the piston washer 27 is retained in place against the head. The connecting rod 30 of the piston 25 extends therefrom in the cylinder 24 for a greater distance than the length of the stroke of the piston, and is then bent at an angle and connected at its inner end with the shaft 17. In order to reach said shaft, the rod passes through a slot 31 which is formed between the main block 10 and the rear plate 15 by cutting away a portion of the metal of each between the cylinder 16 and the central opening 32 of the main block. The connecting rod 35 of piston 23 is of like curved form and extends in the cylinder 22 in like manner, a distance greater than the length of the stroke of the piston, and then extends inwardly through a slot 33 to the driving shaft 17. The two pistons are oppositely disposed, that is to say, they are oppositely directed in their respective cylinders and so located that when one is at one end of its stroke, the other is at the other end of its stroke.

The air supply duct 36 is located in the rear plate 15 and connects with a corresponding duct 37 in the main block 10, which communicates with a valve-chest 38 in said main block. From said valve-chest 38 extends a duct 39 to the cylinder 22, and a duct 41 to the cylinder 24. A main exhaust channel 43 extends from the valve-chest to the outside of the block. In the valve-chest is located a valve 44 of circular form, and having a recess 45 in which is located a

finger 46 which is secured to the end of a valve stem 47. The valve stem extends in the main block to the central opening of the same, and is there provided with a knuckle 48 having an antifriction roller 49 located in the path of two pins 50, 51, respectively, which extend radially from and are spaced apart upon the shaft 17. The valve is provided with a port 52 adapted to place the valve-chest 38 in communication with one of the supply ducts to one of the cylinders, and with a port 53 adapted to place said valve-chest in communication with the supply duct for the other cylinder, and with a duct 54 for making the proper connection of either of said air-supply ducts with the main exhaust duct 43, the ducts 39 and 41 serving alternately for inlet and exhaust. A plate 55 closes the valve-chest 38 at the outside of the main block. A flat spring 56 between said plate and the valve retains the valve properly seated in the valve-chest, and gives sufficient friction so that it holds whatever positoin it may be given by the finger 46. The valve is provided at its periphery with a recess 72. An abutment projects from the main block 10 into said recess and limits the movement of the valve in either direction. A pawl is provided for properly locating the knuckle at each time that the latter is thrown by one of the pins 50, 51, and for assisting in the movement of the knuckle and valve. Said pawl comprises a main member 57 sliding in an opening in the rear plate 15 and guided therein by a slot and pin 58, and carrying at its knuckle-engaging end an antifriction roller 59. A compression-spring 60 bears inwardly upon the member 57, and is itself capable of adjustment as to pressure by an adjusting screw 61 having its head exposed at the outside of the rear plate. A throttle-valve 62 is provided on the rear plate 15, whereby the supply of air passing through the duct 36 may be readily controlled. A handle 64 extends rearwardly from the rear plate and is provided with a duct 65 communicating with the duct 36. A swivel-connection 66 at the rear end of the handle permits the attachment of the hose 67 by which the compressed air or other motive fluid may be supplied to the machine.

In Fig. 1, the valve is shown in median position. In operation, the valve being for example at one end of its motion, the port 53 is in register with the supply duct 39 and permits air to flow from the valve-chest 38 to cylinder 22, and move the piston 23 in driving direction therein. At the same time piston 25 is being moved on its return stroke in cylinder 24, and the air in front of the same is escaping through duct 41, exhaust duct 54 of the valve, and exhaust duct 43 in the main-block 10, to the atmosphere. Motion of the pistons and of the driving-shaft continues until pin 51 strikes roller 49 of the valve-tripping device, and moves the knuckle 48 so that the high point 70 of the same passes under the roller 59. The pawl then by pressure on the knuckle, throws it quickly to the limit of its movement and retains it there. During the first part of the knuckle movement, when it is impelled by the pin 51, the finger 46 plays in the socket 45 of the valve, and no movement of the valve is caused. During that further part of the knuckle motion, when the knuckle is impelled by the pawl, the finger 46 bears against the socket-wall and moves it sharply into its new position. A quick and reliable action of the valve is thus secured, the speed of which may be regulated by regulating the actuating spring-power acting on the pawl, which is at all times readily controlled from the outside of the machine by the adjusting-screw 61.

In the new position of the valve, port 52 is in register with duct 41 leading to cylinder 24, whereby air is permitted to pass from the valve-chest to the cylinder 24 and drive the piston 25 forward. At the same time exhaust escapes from cylinder 22 through duct 39, valve-duct 54 and exhaust duct 43 to the atmosphere. Near the end of the stroke, pin 50 engages roller 49 of the valve-tripping device, and the valve is again thrown in the manner before described, but in opposite direction, into the position first assumed. The admission of air alternately to both cylinders, and exhaustion of the same therefrom, and the resulting rapid motion of the pistons and driving-shaft, first in one direction and then in the other continues until the supply of air or other driving-fluid is cut off. The speed of the tool may be reduced whenever desired by screwing down the throttle-valve 62, whereby the air-supply duct 36 is partially closed, or may be increased from a low speed to full speed by fully opening the valve, to the position shown in Fig. 3.

The machine described provides a compact and powerful motor, of simple construction, light weight, and ready application. It is especially adapted for use in valve-grinding, and ratchet-drill operation, but is not limited to these uses, and may be employed for any and all purposes requiring that the working tool be given a rapid oscillating motion.

The invention is not limited to the particular structure described, but changes may be made therein without departing from the spirit of the invention as set forth in the appended claims.

I claim:

1. A portable motor comprising a main block having two arcuate cylinders, oppositely disposed pistons within said cylinders, so that when one is at one end of its work-

ing stroke, the other is at the opposite end of its working stroke, and a shaft adapted to be oscillated by the working of said cylinders, a valve chest on the main block, means for supplying air to said chest, inlet ducts from said chest to said arcuate cylinders, an exhaust duct, a valve within said chest adapted to be oscillated, and provided with inlet ports adapted to alternately register with the said inlet ducts, and an exhaust port adapted to alternately register with said ducts and said exhaust port, and means for oscillating the said valve.

2. A portable motor comprising a main block, having two arcuate cylinders, oppositely disposed pistons within said cylinders, so that when one is at one end of its working stroke, the other is at the opposite end of its working stroke, a shaft adapted to be oscillated by the working of said pistons, and radial projections on the said shaft, a valve chest on said main block, means for supplying air to said valve chest, ducts from said valve chest to said arcuate cylinders adapted to alternately supply and exhaust air into and out of said cylinders, an exhaust duct, a valve within said chest adapted to be oscillated and provided with inlet ports adapted to alternately register with said inlet ducts to supply air to the cylinders, an exhaust port adapted to register with said ducts and said exhaust duct to exhaust air from the said cylinders, and a valve-stem adapted to be alternately engaged by the projections of the said oscillating shaft, to oscillate the said valve.

3. A portable motor comprising a main block having a central opening, a front plate and a rear plate, a shaft in said opening journaled in said front plate and rear plate, means adapted to be alternately operated to oscillate the said shaft, an air valve mounted to oscillate on the main block, and having a stem extending to the central opening of the said main block, a valve tripping device in said opening adapted to oscillate said valve-stem, an air-supply duct in the main block leading to the said valve, ducts from the valve to the said means for oscillating the shaft, an exhaust passage from the valve to the outside of the main block, means on the rear plate for regulating the supply of air through the air-supply duct therein, a handle extending rearwardly from the rear plate, and having an air conduit connecting with the air-supply duct of the rear plate, a swivel hose coupling at the end of the handle, a tool clamp on the exposed end of the shaft, and detachable means securing said main block, front plate and rear plate together in operative alinement.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

ROBERT E. VELTUM.

Witnesses:

LOUIS E. BEAN,

ARLONE ROCKWELL.