

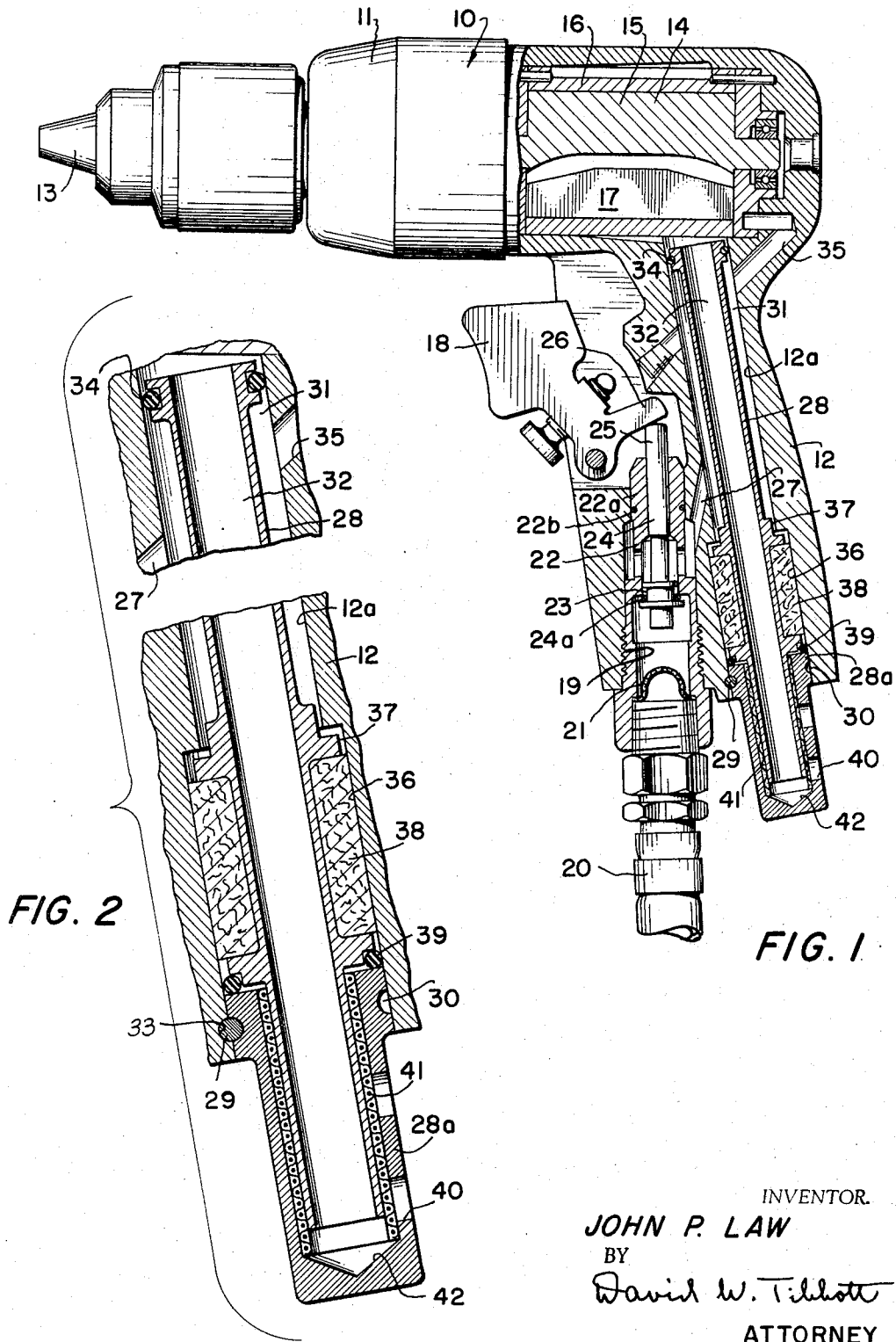
Jan. 24, 1967

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3,299,781

AIR INLET AND EXHAUST MANIFOLD

Filed Dec. 4, 1964



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AIR INLET AND EXHAUST MANIFOLD

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Filed Dec. 4, 1964, Ser. No. 415,982

6 Claims. (Cl. 91—58)

This invention relates to pneumatic hand tools and the like and more particularly to the provision of a new and improved fluid inlet and exhaust manifold for a pneumatic hand tool such as, for example, an air powered drill.

An object of the present invention is to provide a new and improved pneumatic hand tool, fluid inlet and exhaust manifold which both provides effective silencing of the exhaust fluid issuing from the tool and permits directional deflection of said exhaust fluid in substantially any desired direction.

Another object of the invention is to provide a new and improved inlet and exhaust manifold of the type set forth which comprises means for introducing lubricating fluid to the pneumatic motor of the tool immediately upon the initial operation thereof.

Another object is to provide a new and improved manifold of the type set forth which is so constructed and arranged as to maintain the handle of the pneumatic tool at a moderate temperature.

Another object is to provide a new and improved manifold of the type set forth which is readily and speedily connected into operative relation with a pneumatic hand tool by means of outside assembly alone.

Another object is to provide a new and improved manifold of the type set forth which is both simple and economical in construction and operation.

Other objects and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawings. It will be understood that changes may be made in the details of construction and arrangements of parts shown and described as the preferred form of the invention has been given by way of illustration only.

Referring to the drawings:

FIG. 1 is a side elevational view, partially in section, of a pneumatic drill including a manifold constructed in accordance with the present invention; and

FIG. 2 is an enlarged, fragmentary, sectional view illustrating the details of construction of the manifold shown in FIG. 1.

It will be understood that, although the present invention has been herein illustrated and described with reference to a pneumatic drill, such has been done for purposes of illustration only. The scope and spirit of the present invention are not limited to pneumatic drills but rather also embrace other forms of similarly constructed pneumatic hand tools.

Referring more particularly to the drawings wherein similar reference characters designate corresponding parts throughout the several views and with particular reference to FIG. 1, the pneumatic tool illustrated therein comprises a pistol grip type pneumatic drill 10 which is formed to include a casing comprising an elongated barrel 11 and a handle 12 depending from the barrel 11. The handle 12 includes a bore 12a which is adapted to receive a tubular manifold casing 28; and a drill chuck 13 is carried by the barrel 11 at the end thereof opposite the depending handle 12.

The drill 10 is powered by a pneumatic motor 14 which is carried within the barrel 11 adjacent the connection of the barrel 11 to the handle 12. The motor 14 includes a rotor 15 within a stator 16 and is of the vane type, one of the vanes thereof being shown as 17. The motor 14,

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furthermore, is adapted to be actuated by air from a source under pressure upon actuation of the trigger or actuating means 18 by the drill operator.

The handle 12 of the drill 10 includes a fluid passage 19 which communicates through the fluid inlet hose 20 with a source of pressurized air and serves to introduce the pressurized air into the drill 10. An air filter or screen 21 is disposed within the fluid passage 19 and serves to screen or filter air introduced into the drill 10.

A valve 22 is disposed within the fluid passage 19 and controls the quantity of pressurized air admitted into the drill 10 from the hose 20. The valve 22, as illustrated, is a replaceable, self-contained assembly of unitary construction and may be constructed from either brass or steel.

The valve 22, more specifically, comprises the stationary supporting member 22a and the throttle valve stem 24 which is slidably mounted upon a valve seat 23 formed on the supporting member 22a. The throttle valve stem 24 has an end portion 25 which extends into cooperating relationship with the finger 26 of the trigger 18 such that the throttle valve stem 24 is downwardly displaced upon depression of the trigger 18 to admit pressurized air from the fluid passage 19 into the fluid passage 27. The fluid passage 27, as illustrated in the drawings, communicates with the bore 12a for supplying the pressurized air to the bore 12a intermediate the ends of the latter. The sealing ring 24a prevents air leakage through the valve 22 when the valve 22 is closed. The sealing ring 22b prevents air leakage from the passage means 19 when the throttle valve stem 24 is downwardly displaced.

The fluid inlet and exhaust manifold which is provided by the present invention comprises the manifold casing 28 and an end casing or cap 28a which internally receives the lower end of the manifold casing 28 in a fit suitable to permit relative rotation of the casings 28 and 28a. The end casing 28a is pivotally supported within the bore 12a for movement around its longitudinal axis by a lock pin 29 which is disposed within a pivot groove 30 located circumferentially around the end casing 28a and a mating groove 33 formed in the handle 12.

The casing 28 is constructed and arranged to divide the upper end of the bore 12a into concentric air inlet and exhaust passages 31 and 32, respectively. As will be seen from FIG. 1, air inlet passage 31 is annular and is defined by the internal surface of the handle 12 and the external surface of the casing 28 circumferentially around the upper end of the exhaust passage 32 which is defined by the internal surfaces of the casing 28. As will also be seen from FIG. 1, exhaust passage 32 communicates through the open upper end of the casing 28 with the pneumatic motor 14 and extends substantially throughout the length of the casing 28. Inlet passage 31 is sealed from exhaust passage 32 adjacent the upper end of the bore 12a by a sealing member, such as seal ring 34, and is in direct communication with fluid passage 27 in handle 12 such as to receive pressurized fluid passing there-through. An air inlet passage 35 is formed within the handle 12 and barrel 11 of the drill 10 and communicates incoming pressurized air from the inlet passage 31 to the rotor 15 of the pneumatic motor 14 for the operation of said motor.

The casing 28 includes a lubricating oil reservoir 36 below the connection of passage means 27 to inlet passage 31. Reservoir 36 communicates with the inlet passage 31 through a constricted passage 37 and includes oil retention means, such as a retaining felt 38, which is impregnated with lubricating oil. Reservoir 36, furthermore, due to its disposition relative to and communication with the inlet passage 31, receives a portion of the pressurized air entering the inlet passage 31 from the

fluid passage 27 during the operation of the drill 10. Said air is retained within the reservoir 36 throughout the operation of the drill 10 by the fluid pressure of the air entering the inlet passage 31 from the passage 27 and leaks into the inlet passage 31 entrained with particles of lubricating oil only after the drill 10 has been shut off and the pressurized air elsewhere therein has bled off. Thus, when the drill 10 is again operated, this oil entrained flows immediately to the pneumatic motor 14 and provides effective lubrication thereof. A sealing means, such as a sealing ring 39, is provided adjacent the rear of the reservoir 36 and prevents escape of pressurized air therefrom other than through the inlet passage 31.

The exhaust passage 32 within the casing 28 communicates with the pneumatic motor 14 such as to receive exhaust air from the pneumatic motor 14 and extends substantially the entire length of the casing 28. The end casing 28a includes a plurality of ports 40 which are in communication with the exhaust passage 32 for receiving exhaust air from the latter and discharging such exhaust air to the atmosphere. As the end casing 28a is pivotally supported upon the handle 12, the ports 40 are adjustable to direct the exhaust air from the exhaust passage 32 in substantially any desired direction relative to the drill 10.

A cylindrical silencer screen 41 is circumferentially disposed within the end casing 28a intermediate the exhaust passage 32 and the adjustable ports 40 and serves to maintain the noise of the exhaust air passing from the ports 40 at a minimal level. The extreme bottom portion of the end casing 28a includes a tapered surface 42 adapted to direct the exhaust air towards the silencer screen 41 and the ports 40.

In the operation of the drill 10, depression of the trigger 18 urges the throttle valve stem 24 downwardly and allows pressurized air to flow from the passage means 19, through the passage means 27, and into the inlet passage 31. A portion of the air entering the inlet passage 31 flows through the constricted passage 37 to the oil reservoir 36 where it remains entrapped until the trigger 18 has been released and the pressurized air elsewhere in the drill 10 has bled off. After this bleeding off of the remainder of the pressurized air within the drill 10, the air within the reservoir 36 flows therefrom entrained with lubricating oil to the inlet passage 31 where, upon reactivation of the trigger 18, it provides immediate initial lubrication of the motor 14. The majority of the air entering the inlet chamber 31, however, flows therefrom to the pneumatic motor 14 through the passage means 35 and provides propelling fluid for the operation of the motor 14.

Exhaust air from the motor 14 flows therefrom through the exhaust passage 32 and is directed by the tapered surface 42 adjacent the bottom of the end casing 28a through the silencer screen 41 and ports 40 into the atmosphere. As the end casing 28a is pivotally supported upon the handle 12 of the drill 10 this exhaust air issuing from the drill 10 may be directed in substantially any desired direction.

Furthermore, as the casing 28 is provided within the handle 12, it will be seen that effective cooling of the handle 12 is provided. Also, as the end casing 28a is pivotally carried upon the handle 12 by the lock pin 29 and the grooves 33 and 30, it will be seen that the casings 28 and 28a may be mounted upon the handle 12 by means of external assembly only.

From the foregoing, it will be seen that I have provided new and improved means for accomplishing all of the objects and advantages of the invention.

Having described my invention, I claim:

1. In a hand tool comprising a casing formed to include a barrel and a handle connected to said barrel, and having a pneumatically operated motor carried by said barrel, the combination of:

said handle including a bore;

means disposed within said bore dividing said bore into an inner fluid passage and an outer fluid passage extending peripherally around said inner fluid passage;

said bore dividing means comprising a member internally including said inner fluid passage and disposed within said bore such that said outer fluid passage surrounds said member within said bore;

means for connecting said outer fluid passage with a source of pressurized air and with said motor such that pressurized air supplied from said source to said motor passes through said outer fluid passage; and

means for connecting said inner fluid passage with said motor and with the atmosphere such that exhaust air discharged from said motor passes through said inner fluid passage to the atmosphere.

2. A hand tool according to claim 1, wherein said member is of tubular configuration and is disposed within said bore such that said fluid passages are concentric.

3. A hand tool according to claim 2, wherein means are provided for adjusting the direction in which air exhausted through said inner fluid passage is discharged to the atmosphere, said adjusting means comprising a member internally receiving said tubular member and including an exhaust port for communicating said inner fluid passage with the atmosphere, said latter member being movable relative to said handle to vary the position of said exhaust port relative to said handle.

4. A hand tool according to claim 3, wherein a silencing means is disposed intermediate said exhaust port and said inner fluid passage for silencing exhaust air exhausting to the atmosphere.

5. A hand tool according to claim 1, wherein a reservoir containing a lubricant is disposed within said bore and connected to said outer fluid passage such that a portion of the pressurized air flowing through said outer fluid passage to said motor is entrapped in said reservoir during the flow of pressurized air from said source to said motor.

6. A hand tool according to claim 1, wherein said outer fluid passage connecting means communicates with said outer fluid passage for supplying pressurized air to the latter intermediate the ends of said bore, and an annular sealing member is disposed within said bore circumferentially around said member for sealing said inner fluid passage from said outer fluid passage.

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