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AIR REGULATOR

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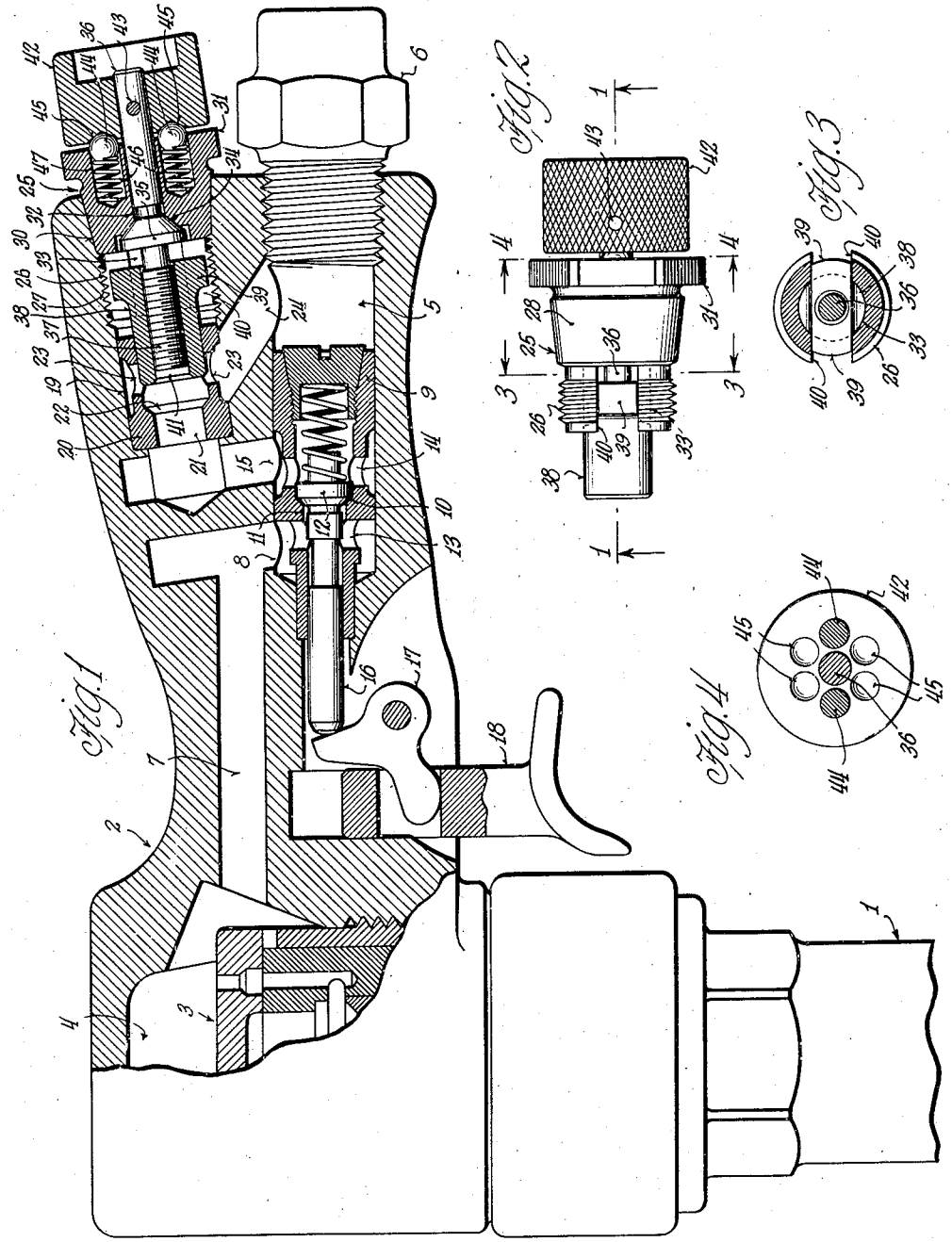


Fig. 1

Fig. 2

Fig. 3

Fig. 4

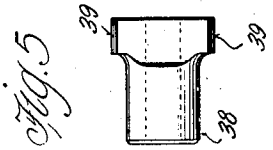


Fig. 5

INVENTOR.
FRITHIOF P. FORSS
BY
ATTORNEY.

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AIR REGULATOR

Frithiof P. Forss, Aurora, Ill., assignor to Independent Pneumatic Tool Company, Chicago, Ill., a corporation of Delaware

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3 Claims. (Cl. 251—163)

This invention relates to improvements in air regulators for portable pneumatic tools and more particularly for relatively light, fast hitting chipping and riveting hammers.

The general purpose and object of my invention is to provide an air regulator of a construction which is normally sealed against air leakage at all times to prevent the objectionable hissing of the air through the regulator when the tool is under pressure and lying idle as in the previous constructions.

A further object of my invention is to provide the air regulator shaft which adjusts it with a valve member which by spring means is normally seated to prevent air leakage along the shaft in any position of adjustment of the regulator.

A further object of my invention is to provide the valve member and its seat of a tapered, circular construction whereby a leak proof connection is maintained between the valve and its seat in the lapping action which occurs in turning the valve member by the shaft in adjusting the regulator.

A further object of my invention is to employ the spring means which normally seats the valve as a part of the check construction which holds the shaft element against accidental turning to maintain the adjustment of the regulator.

The invention consists further in the features of construction hereinafter described and claimed.

In the accompanying drawing—

Fig. 1 is a view showing the air regulator of my invention embodied in a handle member of a relatively light, fast hitting chipping or riveting hammer, the upper portion of the barrel of which is shown, the handle member and the regulator being shown in the longitudinal section along approximately line 1—1 of Fig. 2;

Fig. 2 is a side elevational view of the air regulator removed from the tool to show the unitary nature of the regulator fixture;

Fig. 3 is a sectional view taken on line 3—3 of Fig. 2;

Fig. 4 is a sectional view taken on line 4—4 of Fig. 2; and

Fig. 5 is a side view of the regulator plunger to be later described.

In the accompanying drawing, 1 indicates the barrel of a portable, relatively light, fast hitting chipping or riveting hammer and in which barrel reciprocates a hammering piston to generate the power blows produced by these tools. Screwed on the upper or inner end of the barrel is a handle member 2, which as shown in Fig. 1, is in the form of a casting extending to one side of the barrel in substantially right angular relation thereto and mounting a throttle valve for controlling the flow of compressed air to the barrel for reciprocating the hammering piston therein as in tools of this character. The handle member 2 where it is connected with the upper end of the barrel encloses a distributing valve structure 3 which automatically controls the admission of compressed air to the opposite ends of the barrel or the cylinder which the barrel provides for the hammer piston. The handle 2 provides an air supply chamber 4 for the distributing valve 3 and said chamber 4 is supplied with compressed air from the handle member 2 through a main supply passage therein next to be described.

The main supply passage in the handle member 2 extends longitudinally therethrough and is comprised of two interconnected off-set sections, an outer section 5 to which the inlet nipple 6 for the air hose (not shown) is connected at the outer end of the handle, and an inner section 7 which leads to the supply chamber 4 at the distributing valve 3. The passage sections 5, 7 are interconnected intermediate the ends of the handle member 2 by a cross-port 8 at their adjacent ends as shown in Fig. 1.

Located within the outer section 5 of the main supply passage is a throttle valve assembly comprising a bushing 9 having a valve seat 10 at a port 11 for a normally seated, spring biased valve member 12 as shown in Fig. 1. The bushing 9 has two sets of ports 13, 14 on opposite sides of the valve member 12, the ports 13 connecting with the port 8 and the ports 14 connecting with a cross-passage 15 in the handle member 2 for the air regulator to be next described. The throttle valve 12 has a stem element 16 engaged by a lever 17 fulcrumed on the handle member and operable by a depressible trigger 18 to unseat the throttle valve 12 from the exterior of the tool.

To mount the air regulator, the handle member 2 is provided with a bore 19 off-set from the outer section 5 of the main supply passage and arranged at a slight inclination thereto as shown. The bore 19 extends inwardly from the outer end of the handle member to and connects with the cross-passage 15 as shown. Located with a tight fit in the bore 19 in advance of the cross-passage 15 is a bushing 20, the bore 21 of which connects with the cross-passage 15 and has an internal shoulder 22 providing a stop for the plunger or air flow controlling member of the regulator to be presently described.

The bushing 20 has ports 23, 23 on the advance side of the stop 22, and these ports connect with

a cross-passage 24 within the handle member between the bore 19 and the main supply passage section 5. In this respect, the passage 24 connects the bore 19 with the portion of the supply section 5 between the throttle valve assembly and the inlet nipple 6 as shown in Fig. 1. By this arrangement, the air flow to the barrel 1 through the throttle valve may be controlled by the air regulator to provide for either a hard and fast or a light and slow hitting stroke for the hammering piston within the barrel. In this manner, the hitting power of the tool may be adjusted to accord to the rivet sizes to be upset and more perfect heading results. For a hard and fast hitting action, the bushing ports 23 are opened to the extent desired, while for a slower and lighter hitting action the ports are closed to the extent desired. The tool may be set for the job to be performed and in instruction in riveting schools the stroke may be adjusted to the very minimum.

The air regulator of my invention comprises the complete fixture shown in Fig. 2. Here, and also in the other views, the regulator comprises a body or plug portion 25 having a screw threaded section 26 at its outer end to secure the regulator within the bore 19 by engagement with the internal threads 27 therein as detailed in Fig. 1. To the rear of the threaded section 26, the plug element 25 has a tapered section 28 which fits within the tapered section 30 at the outer end of the bore 19 and tightly closed therein against air leakage when the plug element is drawn tightly into place by the engaged threads 26, 27. The plug element has a flat sided wrench engageable flange 31 at its outer end for turning and tightening the regulator in the bore 19.

The plug member 25 has a central bore 32 extending through its tapered portion 28 and this bore opens through the outer end of the plug member at the flange 31 and connects at its inner end with a cylindric chamber 33 which the threaded section 26 provides. Between the bore and the chamber 33, the plug member 25 has a tapered valve seat 34 for a tapered valve member 35 fixed on a shaft element 36. The latter is journaled in the bore 32 and turns the valve member 35 when adjusting the regulator. The shaft element 36 continues beyond the valve member 35 into a threaded section 37 to mount the air flow controlling member or plunger 38.

The plunger 38 is fitted within the cylinder 33 and has side wings or keys 39, 39 which engage in key slots 40, 40 in the threaded section 26 of the plug member to translate the turning movement of the shaft element 36 into an endwise movement for the plunger to open and close the ports 23 in the bushing 20. The bore 41 of the plunger 38 is internally threaded to engage the threaded section 27 of the shaft element 36 to provide for the action mentioned. A right-hand turning of the shaft element 36 adjusts the plunger 38 to close the ports 23, whereas a left-hand turning of the shaft element adjusts the plunger to open said ports. The outer end of the plunger 38 comes to rest on the shoulder 22 at the extreme of its outward adjustment.

To turn the shaft element, I provide the regulator with a turnable head member 42. This head member may be milled on its outer side to facilitate grasping it and is fixed to the shaft element by a cross-pin 43 as shown in Fig. 1. The opening in the head member for the pin extends therethrough so that the pin may be reached for disassembly.

Interposed between the head member 42 and the plug member 25 are a number of ball checks 44, 44 pressed into countersinks 45, 45 arranged in a circle in the head element at its inner end about the axis of the shaft member 36. These ball checks serve to hold the head member 42 against accidental rotation and thus maintain the plunger at its adjusted positions. The spring members 46, 46 which hold the ball checks in place are mounted in recesses 47, 47 in the plug member and also hold the valve member 35 normally tightly closed against its seat 34 to prevent air leakage through the regulator along the shaft element in any adjusted position of the plunger 38. Hence, hissing of the regulator is prevented when under air pressure. The valve member 35 and its seat have a ground fit to prevent leakage when closed. Being circular and fixed to the shaft element 36, the valve member 35 is turned with the shaft in adjusting the plunger 38 and the lapping action which occurs maintains a leak proof joint.

The structure shown and described operates as follows:

For a full volume operation of the tool, the air regulator is adjusted with the plunger 38 completely opening the ports 23. For operating the tool at a lesser air volume, the head member 42 is turned against the resistance of the ball checks to extend the plunger further into closing relation with the ports 23. It will be noted that the springs 46 also serve to hold the valve member tightly closed against its seat and hence with the construction disclosed no opportunity is afforded for air leakage at the regulator. This provides a quiet acting fixture and the objectionable hissing of the previous regulators is avoided.

The details of construction and arrangement of parts shown and described may be variously changed and modified without departing from the spirit and scope of my invention, except as pointed out in the annexed claims.

I claim as my invention:

1. An air regulator for pneumatic tools comprising, a body member for mounting the regulator in its place of use, a shaft element journaled in the body member and extending therethrough, an air flow controlling member connected to one end of the shaft element for adjustment thereby, a turnable head member connected to the opposite end of the shaft element for turning the same, a valve member carried by the shaft element between the air flow controlling and body members, a seat on the body member about the shaft element for the valve, check elements on opposite sides of the shaft element and co-acting with the body and head members for holding the head member against accidental turning, and spring means, one for each check element, for holding the check elements in operative relation to the head member and acting on the head member on opposite sides of the shaft element for normally seating the valve member to prevent air leakage through the body member along the shaft element.

2. An air regulator for pneumatic tools comprising, a body member for mounting the regulator in its place of use, a shaft element journaled in the body member and extending therethrough, an air flow controlling member connected to one end of the shaft element for adjustment thereby, a turnable head member connected to the opposite end of the shaft element for turning the same, a valve member carried by the shaft element between the air flow controlling and body members, a seat on the body member about the

shaft element for the valve, ball checks mounted in recesses in the body member on opposite sides of the shaft element and engageable with countersinks in the head member for holding the latter against accidental turning, and spring elements in said recesses, one for each said ball check, for holding the ball checks in the countersinks and acting on the head member on opposite sides of said shaft element for normally seating the valve member to prevent air leakage through the body along the shaft element.

3. An air regulator for pneumatic tools comprising, a plug-like body member adapted to be inserted into an air supply passage of the tool and having connected cylindrical and tapered sections, said cylindrical section having screw threads for engaging screw threads in the passage for mounting the body member therein and drawing the tapered section of the body member into closing relation with the passage on screwing the body member into the same, a shaft element journalled in the tapered section of the body member and extending therethrough and having an end portion in said cylindrical section, a plunger constituting the air flow controlling member of the regulator slidably mounted in said cylindrical section and having screw threaded connection with the shaft element for adjustment thereby, key members on the plunger engaging in slots in the cylindrical section of the body member for holding the plunger from rotation, a head member fixed to the outer end of the shaft element for turning the same, a valve member carried by the shaft element between the plunger and the tapered section of the body member, a seat on the body member for the valve about the shaft element, and spring means acting on the head member for normally seating the valve member to prevent air leakage from the body member along the shaft element and for holding the latter against accidental turning.

FRITHIOF P. FORSS.