

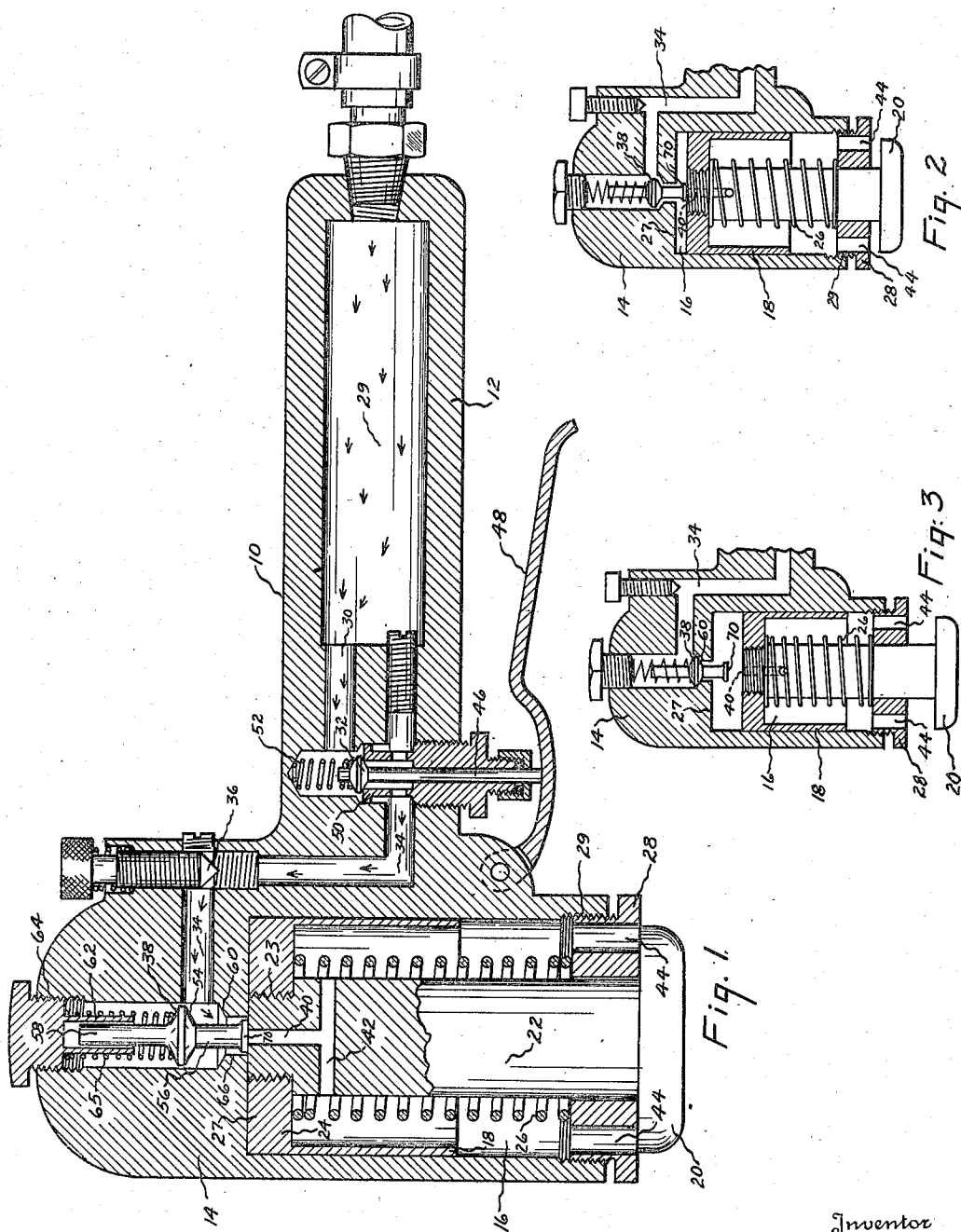
June 21, 1938.

E. J. SEIDEN

2,120,992

PNEUMATIC TOOL

Filed Aug. 29, 1935



Inventor

Elmer J. Seiden

33y *Bearman & Langford*
Attorneys

UNITED STATES PATENT OFFICE

2,120,992

PNEUMATIC TOOL

Elmer J. Seiden, Jackson, Mich.

Application August 29, 1935, Serial No. 38,398

7 Claims. (Cl. 121—3)

The present invention relates to improvements in pneumatic tools and the like. While the invention has general application, it has particular reference to pneumatic hammers for contouring sheet metal over a dolly or form.

Primary objects of my improvements are, first, to provide a pneumatic hammer which may be used in a manner similar to the conventional hand hammer for contouring sheet metal; second, to provide a pneumatic hammer in which reciprocation of the working head is initiated out of engagement with the work and the intensity and rapidity of the blow may be regulated; and third, to provide a compact, inexpensive, durable pneumatic hand hammer.

Other objects and advantages of the invention residing in the arrangement, combination, and construction of parts will appear from a consideration of the following description and the annexed claims.

In the accompanying drawing, wherein a preferred form of the invention is illustrated,

Fig. 1 is a longitudinal cross-sectional view of the tool and

Figs. 2 and 3 are fragmental diagrammatic cross-sectional views showing the piston and hammer head in different positions.

Referring to the drawing, the invention in pneumatic tools is disclosed in connection with a hammer adapted to be held in either or both hands of the operator. While it is not my purpose to limit the invention to a tool for a particular use, the illustrated hammer is particularly constructed to be used in repair and refinishing shops for straightening the fenders and bodies of automobiles. Although pneumatic hammers have heretofore been used in such work, they have not been fully satisfactory, with the result that at the present time a manually swung hammer is the generally accepted form of tool for obtaining satisfactory work. According to the present invention, a compact, readily handable hammer 10 is provided by casting the handle 12 and body 14 as an integral unit, the hammer being capable of delivering controlled blows of great rapidity to one side of the sheet metal being reformed over a dolly held in the operator's hand and applied to the other side of the metal. Within the body 14 is machined a bore 16 to receive the piston 18, carrying the hammer head 20. As shown, the hammer head 20 is supported by a shaft 22 threaded at 23 into the wall 24 of the otherwise hollow piston 18. The shaft 22 and head 20 may be machined from a single piece of metal or connected in any suitable manner, de-

pending generally upon the characteristics of the head 20 desired. For repairing automobile fenders and bodies a soft steel head is found most desirable, as it produces a smoother finish and reduces the rebound following the metal to metal blows of the head. A relatively heavy coil spring 26 is housed within the piston 18 and held under compression by a collar 28 threaded at 29 into the outer end of the body 14. Preferably, the shaft 22 is freely embraced by the collar 28, whereby the hammer head 20 and rod 22 are entirely free from any guiding or aligning action by the collar 28. The spring 26 normally urges the piston 18 against the inner end 27 of the bore 16.

Compressed air is admitted into the conduit 29 defined in the handle 12 and passes through a drilled hole 30 past the manually controlled valve 32 through the conduit 34, past the adjustment valve 36, and hence into the bore 16 past the piston actuated valve 38. From the bore 16 the air is exhausted through the port 40 in the wall 24 and communicating ports 42 and 44 in the shaft 22 and collar 28. To describe in detail the valve mechanism for regulating the passage of compressed air just described, the valve 32 comprises a rod 46, which is actuated by a lever 48 to remove the valve from its seat 50 against the tension of the spring 52. When the lever 48 is released, the air pressure and spring 52 act jointly to close the valve 32, shutting off the flow of air. The adjustment valve 36 takes the form of a conical pointed screw, which through axial adjustment regulates the air passing through the conduit 34. It is to be understood that both the valves 32 and 36 may take innumerable forms and their specific construction forms no part of the present invention. The construction and function of the valve 38, however, do constitute an important feature of the present invention, and the valve 38 comprises a head portion 54 disposed between stem portions 56 and 58. A seat 60 for the head 54 is defined in the body 14, the head 54 being guided to its seat by the stem portion 58, which is in turn guided within a removable sleeve 62 threaded into the body 14 at 64. A spring 65 normally tends to urge the valve 38 to a closed position. The forwardly extending stem portion 56 extends through the port 66 in the end 27 of the bore 16, and the end 70 thereof engages the end of the piston 18 and closes the exhaust port 40 in the wall 24 when the piston is at the inner end of its stroke as viewed in Fig. 1.

The operation of the tool heretofore described follows: With the tool connected to a suitable

source of air pressure, prior to opening the valve 32 by actuating the stem 46 through movement of the lever 48, the spring 26 will position the piston 18 against the end 27 of the bore 16, holding the valve 38 open, as shown in Fig. 1. When the lever 48 is depressed, air is directed against the piston 18 which moves toward the other end of its stroke. The exhaust port 40 in the piston 18 is held closed by the head 70 which follows the initial movement of the piston due to the action of the spring 65, as shown in Fig. 2. Movement of the valve 38 is, however, arrested prior to the end of the stroke of the piston 18 through engagement with the seat 60 shutting off the air being directed against the piston, as shown in Fig. 3. Relative movement between the end 70 of the valve 38 and the piston 18 results in the exhaust port 40 being opened and the pressure reduced behind the piston. The momentum of the piston 18 is cushioned by the spring 26 at the end of its outward stroke and returned to the inner end of its stroke by the spring 26 upon the reduction of air pressure resulting from opening the exhaust port 40. Movement of the piston toward the end 27 closes the exhaust port 40 and opens the valve 38, resulting in the cycle of operation being automatically repeated. The incoming compressed air, as well as the air trapped between the piston and end 27 of the bore 16, upon closing of the exhaust port 40 cushions the piston at the end of its inner stroke. In operation, the hammer head 20 and piston 18 are vibrated at a high rate of speed within the bore 16 as long as the lever 48 is depressed. Through regulation of the valve 32 more or less air is directed against the piston 18, and it is possible in this manner to vary the rapidity and intensity of the blows of the hammer. This ability to regulate the hammer blows, coupled with the fact that the hammer head is capable of vibration out of contact with the work, makes the use of the same in connection with metal finishing exceedingly successful.

Having described my invention, what I claim and desire to protect by Letters Patent is:

1. In a pneumatic hammer, an integral body and handle portion, a bore defined in said body portion, a piston reciprocatably mounted in said bore, a hammer head, means connecting said head and piston for reciprocating as a unit, a collar connected to one end of said bore through which said means extends, a spring interposed between said collar and piston, valve mechanism for directing compressed air against one end of said piston imparting movement to said head and compressing said spring, and exhaust mechanism, including passages defined in said piston, for exhausting the air directed against said piston, whereby the same is returned by said spring.

2. In a pneumatic hammer, a body and handle portion, a bore defined in said body portion, a reciprocating hammer structure comprising a head and piston, said piston being disposed within and said head without said bore, a collar structure disposed between said head and piston and located at one end of said bore, a spring interposed between said collar and piston, said spring being compressed when said piston moves toward one end of its stroke and acting to return said piston to the other end of a stroke, and valve mechanism, including a movable inlet valve structure and a passage in said hammer structure closed by said valve structure during periods of air inlet, for intermittently admitting

and exhausting compressed air in one end of said bore.

3. In a fluid pressure tool, a cylinder, a piston located in said cylinder, operating structure associated with said piston, valve mechanism actuated by movement of said piston for admitting fluid pressure into said cylinder, exhaust mechanism, including passages in said piston, regulated by movement of said piston relatively to said valve mechanism for exhausting fluid pressure in said cylinder, and mechanical means for automatically returning said piston to its initial position following the exhausting of fluid pressure.

4. In a fluid pressure tool, a body portion defining a cylinder, a piston supported in said cylinder for reciprocating movement, an inlet valve, continuously urged in a closing direction, engaging with said piston and adapted to be held open directly by said piston at one end of its stroke, exhaust means associated with said piston, means closing said exhaust means at said end of the piston stroke, movement of said piston from one end of its stroke to the other acting to open said exhaust means and close said inlet, and automatic means actuated by movement of said piston from one end of its stroke to the other for returning said piston to its initial position opening said inlet and closing said exhaust.

5. In a fluid pressure tool, a vibratory member, an inlet valve, mechanical means normally urging said inlet valve to a closed position, said member in one position directly holding said inlet valve open and in another position permitting said inlet valve to be closed by said means, an exhaust port associated with said member and closed with said member in a position opening said inlet valve, and means compressed upon movement of said member from said position for returning the same following the opening of said exhaust valve.

6. In a fluid pressure tool, a vibratory member, an air inlet valve, means normally urging said valve in a closing direction, said valve being held open directly by said member when it is in one position, a source of fluid pressure, manually operating means for connecting said inlet valve to said source of fluid pressure, means for regulating the amount of flow of fluid pressure to said inlet valve, an exhaust port, said port being opened upon movement of said member from said position, permitting said inlet valve to be closed by said means, and means for returning said member to its initial position opening said air inlet and closing said exhaust port.

7. A pneumatic hammer characterized by the fact that the operating member thereof is capable of vibration out of contact with the work piece, comprising a member supported for vibratory movement, spring mechanism tending to urge said member to its initial position, said spring being placed under compression upon movement of said member out of its initial position, and an air inlet valve directly held open by said member in its initial position, means for closing said valve upon movement of said member out of its initial position, exhaust mechanism opened upon movement of said piston out of its initial position with the closing of said inlet, said spring mechanism upon the closing of said inlet and the opening of said exhaust acting to return said member to its initial position, directly closing said exhaust and opening said inlet for repetition of the cycle of operation.

ELMER J. SEIDEN.