Nov. 5, 1935. F. B. HAMERLY 2,019,964

CUSHION MEANS FOR TOOLS

Filed Feb. 20, 1933

Fig. 1.

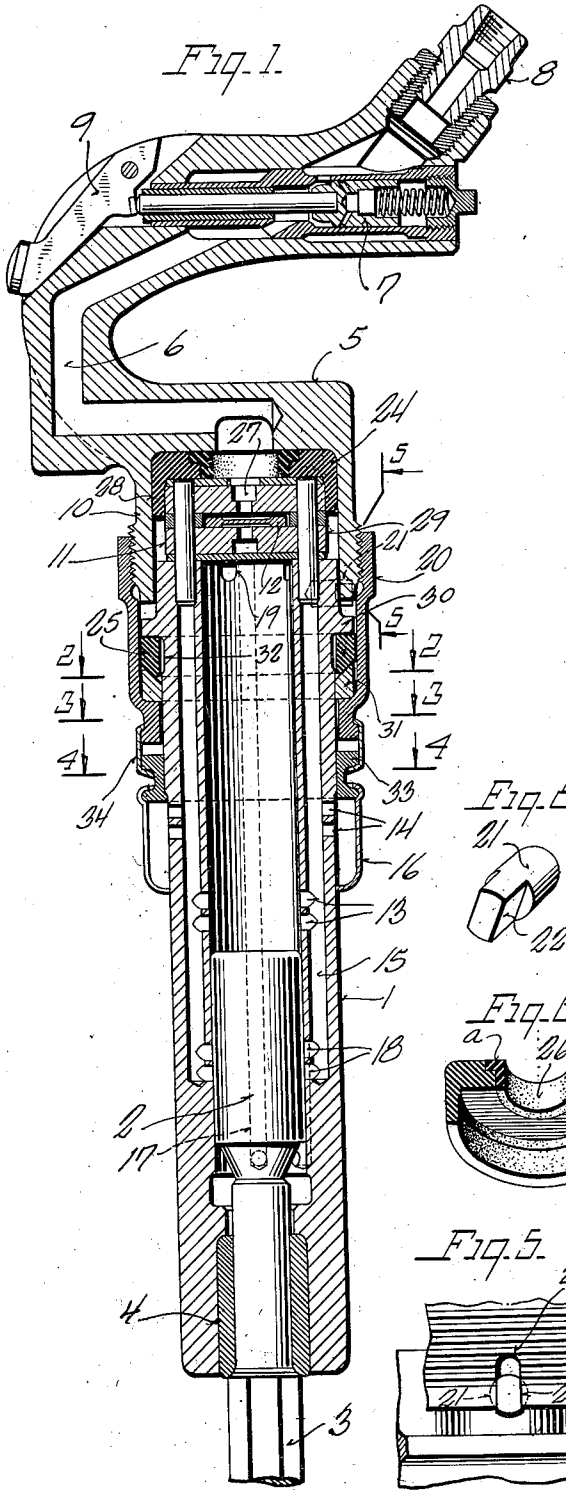

Fig. 2.

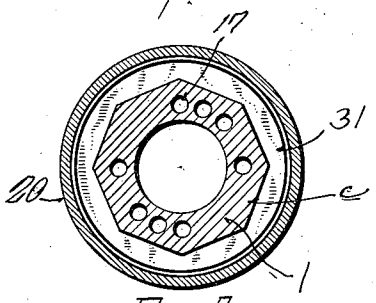

Fig. 3.

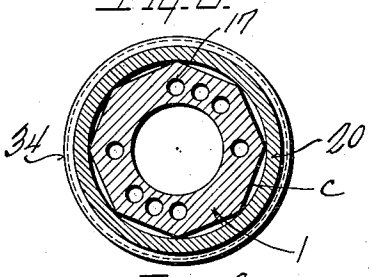

Fig. 4.

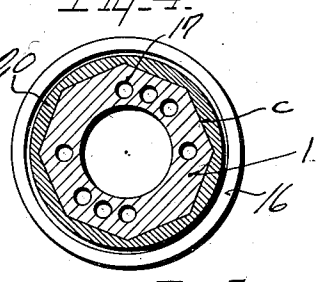

Fig. 8.

Fig. 6.

Fig. 7.

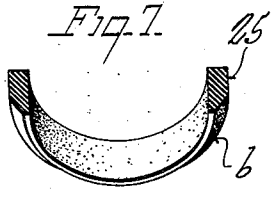

Fig. 5.

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CUSHION MEANS FOR TOOLS

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5 Claims. (Cl. 121—36)

This invention relates to cushion means for portable power actuated impact tools, such as riveting hammers, chipping hammers and the like, to relieve the hands of the operator holding such tools, when in use, of vibration and sting.

In tools of this character, the hammering piston or other impact rendering element is operated at high speeds. The blows delivered on the working member at the front end of the tool are rapid and of considerable force. Consequently, with the handles of the tools rigidly connected with the barrels thereof as heretofore, the vibrations produced in the operation of the tools are translated directly to the handles with annoyance and sting to the hands of the operator holding the tool. This is not only objectionable, but tires the operator when being required to handle and use a tool over long periods, as in the course of a day's work. This is especially fatiguing in the larger size tools where the blows have considerable force, as for instance in those tools used for riveting structural steel and for breaking concrete and other hard solid substances.

The general purpose and object of my invention is to relieve the operator of these vibrations, as much as possible, and also lessen, if not entirely eliminate, the sting. To accomplish this result, I provide in the tool, as a part of its structure, cushion means, as for example, in the form of resilient rubber or equivalent members so constructed and arranged to absorb or lessen the shocks and jars produced by the vibrations due to the actuation and impacts of the pistons before they reach the handles and thus relieve the hands of the operator grasping the handles of such shocks and jars and their resultant sting.

Broadly, my invention contemplates any type of cushion means for the purpose. In one form of my invention, I provide cushion members in the tool in the connection of the handle with the barrel and have the connection of such a character that the handle and barrel have relative axial movement under shocks and jars so that the resilient cushion means may respond thereto and absorb or so spend them that they are not transmitted to the handles with any objectionable effect.

In the accompanying drawing illustrating the specific embodiment of my invention:

Fig. 1 is a longitudinal sectional view of a pneumatic hammer equipped with cushion means in accordance with my invention;

Figs. 2, 3 and 4 are transverse sectional views taken on lines 2—2, 3—3 and 4—4, respectively, of Fig. 1;

Fig. 5 is a plan view taken on line 5—5 of Fig. 1;

Fig. 6 is a perspective section of one of my improved cushion members;

Fig. 7 is a similar view of the other of the cushion members; and

Fig. 8 is a perspective view of a holding key to be hereinafter described.

In the drawing, 1 indicates the barrel of the tool providing a cylinder for the impact rendering piston or element 2. The piston is reciprocated in the barrel by a pressure fluid, such as compressed air, for imparting the necessary blows on a chisel or other working element 3 at the front end of the barrel. Element 3 is supported in a nozzle 4 fitted in the front end of the barrel as in tools of this general character.

The handle 5 for the tool is fitted to the rear end of the barrel, that is, the end opposite the nozzle 4. The handle 5 may be of the open or other grip type and has a main supply passage 6 for the pressure fluid. The handle 5 has a manually operable throttle valve 7 for controlling the flow of pressure fluid to the tool through the passage 6. An inlet nipple 8 is secured to the handle at the entrance end of the passage 6 and provides means whereby the supply hose (not shown) may be attached to the tool. The valve 7 is closed by a spring and is opened by depressing a lever 9 carried by the handle and readily accessible to the thumb of the hand of the operator grasping the handle.

The handle 5 has a tubular extension 10 fitting over the rear end of the barrel and providing a chamber for the valve block 11 and one of the cushion members of my invention. The valve block controls the admission of pressure fluid to the opposite ends of the barrel for reciprocating the piston. The block or assembly is made in accordance with the disclosure embodied in the patent to Reinhold A. Norling, No. 1,881,886, granted October 11, 1932. The block 11 contains a plate valve 12 which as explained in said patent is shifted laterally in a chamber in the block by the action of the pressure fluid on its opposite sides. The present invention is not concerned with the particular manner in which the piston is reciprocated in the barrel and consequently I will not enter into a detailed description of the action of the control valve shown in the accompanying drawing. Briefly, I may say that the porting arrangement is such that when

the valve plate is in the position shown in Fig. 1, the rear end of the barrel is open to the atmosphere through ports 13 and 14 and connecting passages 15. Ports 14 are in the outer wall of the barrel and are normally covered by an exhaust deflector 16 having an opening at one point in its circumference to direct the exhaust laterally from the tool. This deflector is mounted on the tool in such a manner that it may be turned about the barrel for adjusting the position of the exhaust opening.

The several figures of the Norling patent supra show the ports as controlled by the plate valve when the latter is in the position shown in Fig. 1 in the present drawing. Due to the release of pressure on the upper side of the plate valve when the parts are in the position shown in Fig. 1, the plate valve is shifted by the pressure on its underside to supply pressure fluid to the front end of the barrel for driving the piston rearwardly or on its return stroke. The porting arrangement for accomplishing this is shown in Fig. 11 of the Norling patent. In the present drawing, 17 indicates one of the passages in the barrel for furnishing pressure fluid to the front side of the piston. As soon as the piston in its rearward movement uncovers ports 18, the portion of the cylinder in front of the piston is open to the exhaust through ports 14. The pressure is thus reduced on the underside of the plate valve and the pressure fluid is admitted to the rear end of the barrel for driving the piston forward. One of the ports for admitting fluid pressure to the rear end of the barrel is indicated at 19 in Fig. 1.

In accordance with my invention, the connection between the handle and barrel includes a sleeve 20 surrounding the barrel adjacent the handle and having a threaded connection with the tubular extension 10 thereof as shown in Fig. 1. The threaded end of the sleeve overlaps the outer side of the extension so that a pin or key 21 may be employed to prevent rotation of the handle with respect to the barrel when the tool is assembled. The pin, as shown in Fig. 1, is fitted in a recess in the barrel and has a flat sided outer end, as at 22 in Fig. 8, to engage in a slot 23 in the extension 10 as best shown in Fig. 5. Slot 23 extends axially of the extension so as to allow for relative axial movement between the handle and the barrel under vibration.

The cushion means of my invention comprises a pair of cushion members 24, 25. The member 25 is located in the extension 10 between the same and the valve block 11 as shown. Cushion 24 overlaps the upper end of the block and has a centrally disposed port 26 connecting the main inlet passage 6 in the handle with the inlet port 27 in the block as shown in Fig. 1. Cushion 24 fills the space between the block and the handle and being of resilient material, such as live rubber, relieves the handle of vibration produced by the reciprocation and impacts of the piston in the operation of the tool. Cushion 24 may expand or elongate axially when compressed due to its marginal flange 28 fitting in the space 29 between extension 10 and the side of the valve block. Cushion 24 may expand radially into the center port 26. Cushion 24 may be made in one piece if desired. I have shown it made in two pieces, the main or body part being of ordinary rubber and the portion *a* surrounding the port 26 of synthetic rubber. The latter is used because it is not affected by oil which is present in the inlet air. It is, of course, within the contemplation of my invention to make the cushion member in one part, either of synthetic rubber or some other flexible material adaptable for the purpose and which is not destroyed or deteriorated by the presence of the oil in the inlet air.

The other cushion 25 is about the barrel in advance of, but seating against a shoulder 30 thereon. Cushion 25 is also made of resilient rubber or other equivalent flexible material and is in the form of a ring having an inwardly tapered or inclined lower edge *b* as shown in Figs. 1 and 7. Cushion 25 is held against its seat 30 by a collar 31. The latter surrounds the barrel in advance of the cushion and is shaped to fit a hexagonal or other polygonal section *c* on the barrel to prevent turning of the collar so that it will not twist the cushion 25 when clamped against the same. The collar 31 has a tapered or inclined upper edge to coact with the taper on the cushion as shown.

The collar is clamped against the cushion by the sleeve 20, the latter having its outer end extending inwardly under the collar as shown. The sleeve 20 fits freely about the hexagonal portion *c* of the barrel and thus may be turned with respect to the barrel for clamping the lower cushion against the shoulder 30 and the upper cushion between the valve block and the handle. The portion of the barrel surrounded by the cushion 25 is recessed or grooved as at 32 providing a relief chamber for the cushion when compressed.

To prevent turning of the sleeve 20 after the parts have been assembled and clamped, I provide a lock comprising interengaging teeth on the outer end of the sleeve and a collar 33. The latter fits the hexagonal section *c* of the barrel to hold it from turning and is held in engagement with the sleeve by a spring clip 34 in a manner similar to the lock shown and claimed in the John T. Nelson Patent 1,677,199 granted July 17, 1928. The clip 24 fits about the collar and the adjacent end of the sleeve 20 over the teeth thereof and has its marginal flanges engaging in grooves in respective parts. The exhaust deflector 16 is carried by the collar 33.

By the construction shown and described, the cushion means relieves the hand of the operator grasping the handle of vibrations produced in the actuation of the tool and avoids the resultant sting and fatigue.

The principle of cushioning an impact tool for the purposes stated is novel and I claim it broadly and specifically.

I claim as my invention:

1. In a portable power actuated impact tool, in combination, a barrel, an impact member operable in the barrel, a handle having an end wall and a tubular extension forming a socket to receive the inner end of the barrel, said extension having a slidable, but non-rotative connection with the barrel, a control valve for the tool in a block disposed in said socket and supported on the inner end of the barrel, a shoulder on the barrel beyond the extension, upper and lower cushion members of resilient rubber, the upper cushion member being located in the socket between the end wall of the handle and the block and having angularly disposed connected portions overlapping the side and the top portions of the block, the lower cushion member surrounding the barrel in advance of the shoulder, a sleeve having threaded connection at one end with the extension and extending over the lower cush-

ion member and cooperating therewith on securing the handle to the barrel to clamp the lower cushion member against the shoulder and the upper cushion member between the handle and the block.

2. In a portable power actuated impact tool, in combination, a barrel, an impact member operable in the barrel, a handle having an end wall and a tubular extension forming a socket to receive the inner end of the barrel, said extension having a slidable, but non-rotative connection with the barrel, a control valve for the tool in a block located in the socket and supported on the inner end of the barrel, a shoulder on the barrel beyond the extension, upper and lower cushion members of resilient rubber, the upper cushion member being located in the socket between the end wall of the handle and the block and having angularly disposed integral portions overlapping the side and the top portions of the block, the lower cushion member surrounding the barrel in advance of the shoulder, a sleeve having threaded connection at one end with the extension and extending over the lower cushion member and co-operating therewith on securing the handle to the barrel to clamp the lower cushion member against the shoulder and the upper cushion member between the handle and the block, said sleeve having an inwardly extending portion at its outer end beyond the lower cushion member, and a ring surrounding the barrel between the lower cushion member and the inwardly extending portion of the sleeve to transmit the clamping pressure of the sleeve to the lower cushion member, said ring being slidably, but non-rotatably mounted on the barrel, whereby the ring will not turn to twist the lower cushion member on being clamped against the same by the sleeve.

3. In a portable power actuated impact tool, in combination, a barrel, an impact member operable in the barrel, a handle having an end wall and a tubular extension forming a socket to receive the inner end of the barrel, said extension having a slidable, but non-rotative connection with the barrel, a control valve for the tool in a block located in the socket and supported on the inner end of the barrel, a cushion member of resilient material disposed in the socket between the handle and the block and having angularly disposed connected portions overlapping the top and the side portions of the block and in contact with the adjacent portions of the end wall of the handle and the socket, and means for securing the handle to the barrel and clamping the cushion member between the handle and the block to relieve the handle of vibrations during the operation of the tool.

4. In a portable pneumatically actuated impact tool, in combination, a barrel, an impact member operable in the barrel, a handle having an end wall and a tubular extension forming a socket to receive the inner end of the barrel, said extension having a slidable but non-rotative connection with the barrel, a control valve for the tool in a block located in the socket and supported on the inner end of the barrel, a cushion member of a resilient rubber composition disposed in the socket between the handle and the block and having connected angularly disposed portions overlapping the top and the side portions of the block and in contact with the adjacent portions of the end wall of the handle member and its tubular extension, respectively, said handle and cushion member having registering ports whereby the pressure fluid for operating the tool may be supplied to the valve through the cushion member, the portion of the cushion member about its port being made of a synthetic rubber composition whereby the cushion member will not be affected by the presence of oil in the pressure fluid passing through its port, and means co-operating with the barrel and the tubular extension of the handle for securing the handle to the barrel and clamping the cushion member between the handle and the block to relieve the handle of vibrations during the operation of the tool.

5. In a portable pneumatically actuated impact tool, in combination, a barrel, an impact member operable in the barrel, a handle having an end wall and a tubular extension forming a socket to receive the inner end of the barrel, said extension having a slidable but non-rotative connection with the barrel, a control valve for the tool in a block located in the socket and supported on the inner end of the barrel, a cushion member of a resilient rubber composition disposed in the socket between the handle and the block and having connected angularly disposed portions overlapping the top and the side portions of the block and in contact with the adjacent portions of the end wall of the handle member and its tubular extension, respectively, said handle and cushion member having registering ports whereby the pressure fluid for operating the tool may be supplied to the valve through the cushion member, the portion of the cushion member about its port consisting of an inserted ring having an interlocking connection with the cushion member and made of a synthetic rubber composition whereby the cushion member will not be affected by the presence of oil in the pressure fluid admitted through its port, and means co-operating with the barrel and the tubular extension of the handle for securing the handle to the barrel and clamping the cushion member between the handle and the block to relieve the handle of vibrations in the operation of the tool.

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