United States Patent

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[54] **PERCUSSION TOOL**
5 Claims, 3 Drawing Figs.

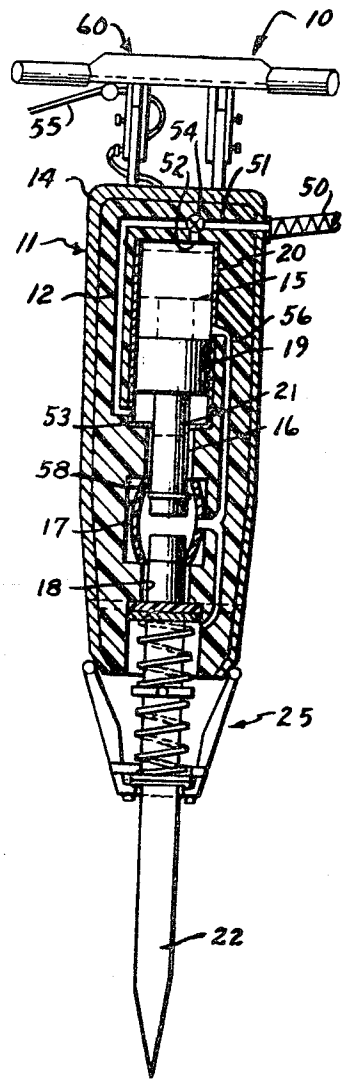
[52] **U.S. Cl.** **173/137,** 173/139
[51] **Int. Cl.** **B25d 9/04,** B25d 17/24
[50] **Field of Search** 173/132, 133, 137, 139

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ABSTRACT: A percussion tool such as an air hammer having a spring-supported mounting for the operating chisel in which said chisel is adjustably affixed to the center of said spring to permit a setting for an ideal cyclic rhythm of tool operation and in which the tool has sound deadening or absorption components throughout the tool to provide a minimum of noise during operation.



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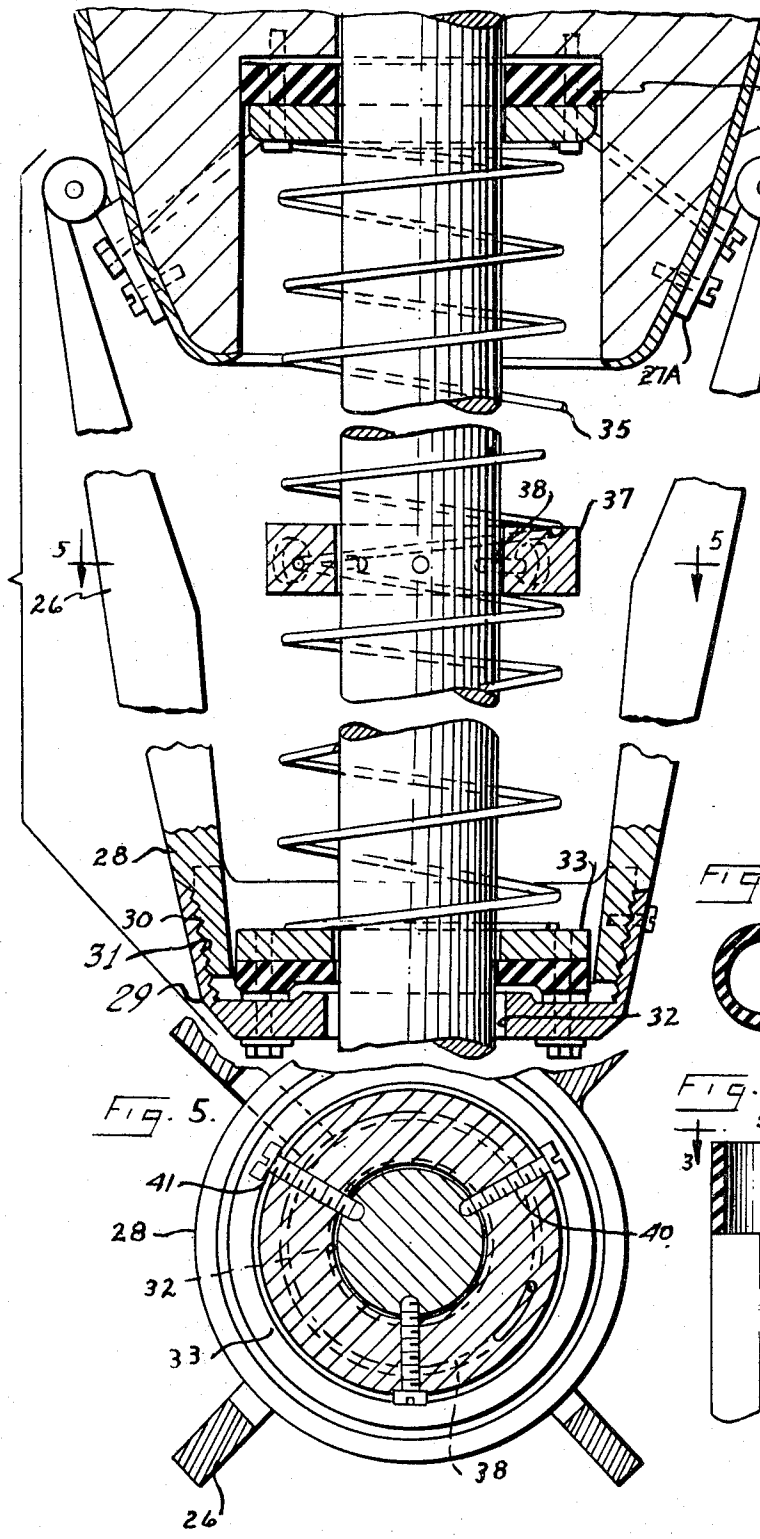


Fig. 4.

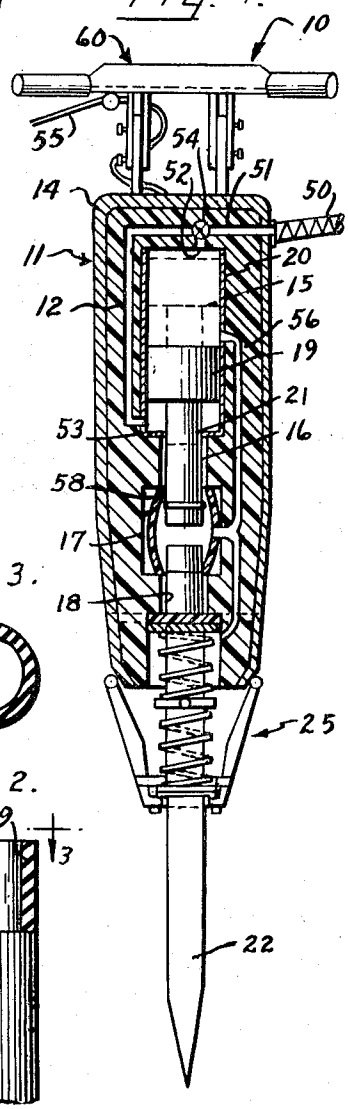


Fig. 1.

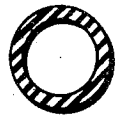


Fig. 3.

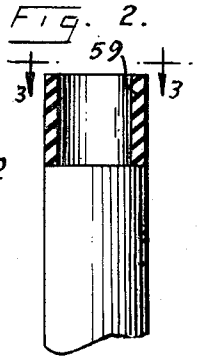


Fig. 2.

Fig. 5.

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PERCUSSION TOOL

This invention relates to power-driven percussive tools and particularly to means for absorbing the operating sound and reducing the operating sound level.

The presently known power-driven percussive tools whether driven by an electric motor or by compressed air are extremely noisy due to the terrific pounding of the piston on the chisel head.

It is an object of this invention to reduce operating noise level of a power-driven percussive tool.

It is a further object to provide sound-dampening means and vibration absorption means in and around the operating parts of a percussive tool.

It is a further object to provide the mounting of the chisel in a power-driven percussive tool upon the central portion of a single spring within the tool to resiliently absorb the reciprocating stroke and maintain an even rhythm of operation.

A still further object is to provide an adjustable mounting of the chisel in a power-driven percussive tool that is mounted upon a single spring within the tool to provide a variation in setting of the chisel in relation to the stroke.

Other objects of this invention shall be apparent by reference to the accompanying detailed description and the drawings in which:

FIG. 1 illustrates a cross-sectional view of a percussive tool of the compressed air-driven type;

FIG. 2 illustrates an enlarged detail of the chisel head partially in cross section;

FIG. 3 is a plan view taken on line 3–3 of FIG. 2;

FIG. 4 is an enlarged detail of the lower portion of the tool shown in FIG. 1 shown partially in cross section; and

FIG. 5 is a cross-sectional view taken on line 5–5 of FIG 4.

Referring to the drawings and particularly FIG. 1, there is illustrated a typical percussive tool such as an air hammer or chisel **10** which includes a main body portion **11** which may be constructed of metal or the central portion of the body **12** may be formed with a plastic preferably a hard tough resinous polyester and sheathed externally with a strong metal case or shell **14** which may be of steel or any strong alloy. The body **12** is formed with a central piston chamber **15** which is provided with a steel liner **20** and body **12** is also provided with a piston rod bore **16** and percussion chamber **17** and chisel bore **18**. The bores **18** and **16** are centrally positioned in alignment with the center of chambers **17** and **15** so that a piston **19** may be mounted in chamber **15** and its connected piston rod **21** mounted in bore **16** and the end of piston rod **21** extending into percussor chamber **17**. A chisel **22** is mounted at one end through bore **18** so the head of chisel **22** extends into the percussor chamber **17** to meet with the end of piston rod **21**. The lower end of body **12** is provided with a spring supporting cage **25**. Cage **25** may take various forms, however in this embodiment, it is provided as illustrated in FIGS. **4** and **5** in which there are four supporting struts **26** equally spaced about the end of body **12** and attached to the external shell **14**. The attachment **27** may be a pivotal mounting in which one leg **27A** of the pivot **27** is bolted to the shell **14** while the opposite leg or strut **26** extends downward to support the lower spring-supporting element **29**. The lower end of the struts **26** are joined in an integral end **28** which is provided with an external thread **30**. The spring supporting element **29** is provided with an internal thread **31** to match with and be affixed to thread **30** of the integral end **28**. The spring supporting element **29** is provided with a central aperture **32** to permit the chisel **22** to pass therethrough. Spring supporting element **29** supports a reinforced rubber washer **33** which is bolted to element **29**. A spring **35** is mounted to rest upon washer **33** surrounding chisel **22** and extending upward to abut with a second reinforced rubber washer **36**, washer **36** being affixed to the end of the body **12** to thus retain spring **35** in a slightly compressed position. A collar **37** with an internal bore **38** to match the configuration of spring **35** is positioned with the spring inserted through the bore and by turning collar **37**, the collar is moved to a central position between the two ends of spring **35**. With the collar **37** in this position, it is then affixed to the shaft of chisel **22** by means of a plurality of threaded setscrews **40**, the setscrews **40** passing through collar **37** and the end of the setscrew fitting into a threaded socket in the shaft of chisel **22**. The setscrews **40** are provided with a lock washer **41** to thus insure the retention of the setscrew when it has been affixed to the shaft of chisel **22**. Thus with collar **37** mounted as described, the movement of chisel **22** will be permitted in reciprocal rhythm of movement but the shock of this movement will be absorbed in both the upstroke and the downstroke to suppress vibration in the tool. It is apparent that, with this type of mounting, collar **37** may be rotated in either direction to adjust its position on spring **35** moving it slightly up or slightly down until a perfect rhythm of movement is established for the tool.

Referring again to FIG. **1**, the tool **10** is illustrated as an air-operated hammer or chisel in which the air hose **50** is connected to a rubber tubing **51** that passes through body **12**. The rubber hose **51** is connected to a port **52** for the downstroke of the piston and to a port **53** for the upstroke of the piston. A valve **54** is positioned in the hose **51** to control the supply of compressed air furnished, this being an oscillating valve which is automatically tripped back and forth with the movement of piston **19** to thus supply the air in the direction required to provide the reciprocating motion of the piston **19**. An operating lever **55** is provided to control the supply or shutoff of the air supply. This operating mechanism is not shown but is common to all such devices. With the reciprocating movement of piston **19** there is also provided the exhaust tubing **56** which permits the discharge of compressed air at the end of the downstroke of the piston while the tubing **56** also provides the exhaust for the upstroke of the piston when it reaches the upper end of its travel. The tubing **56** is directed into the percussor chamber and extends to the bottom area of the tube for discharge. The percussor chamber **17** is provided with a rubber baglike liner **58** which surrounds both ends of the operating shafts, that is, piston shaft **21** at the upper end and the end of shaft **22** at the lower portion. To insure a quiet operation and sealing for the shaft, there is provided an "O" ring mounted on shaft **21** to reciprocate in bore **16**. To also absorb sound and vibration, there is provided a rubber collar **59** surrounding the upper end of the shaft of chisel **22**. Thus in operation, the percussive tool **10** may be held by means of a handle **60** that is affixed to the body **12** and shell **14**. With the chisel **22** positioned against the work, the operating lever **55** is moved to open the valve supplying compressed air and the compressed air will force piston **19** downward and upward in a rhythmic reciprocation. Thus piston **19** and its piston shaft **21** will abut with the upper end of the shaft of chisel **22** pounding chisel **22** in a repeating movement and chisel **22** being retained and its motion absorbed through the spring **35** to reduce vibration and sound to provide a reciprocating chisel for work with a minimum of sound from the operation.

Although the percussive tool **10** illustrated and described has been shown as operated by compressed air, the tool may be similarly operated by electricity, by steam or as any of the percussive tools are now operated without departing from the spirit of this invention and that is, the tool is provided with as much vibration absorbing material and sound-deadening material as is plausible to provide a quiet-operating tool. It is also to be noted that the chisel or operating end of the percussive tool is mounted to a single spring with a variable or adjustable mounting to permit adjusting the mounting to provide the ideal rhythmic motion of the tool during operation and the tool is also mounted by means of vibration absorbing collars to deaden the vibration and the sound or noise generally produced by this type of tool.

We claim:

1. A percussive tool which includes a rigid body portion having a central piston chamber with a piston, said piston connected through a first central bore to a piston rod, and a percussive chamber into which the piston rod extends, a second

central bore extending from said percussive chamber to one end of said rigid body to support the shank of a chisel that is mounted to abut with said piston rod, said piston chamber being connected at the top and at the bottom to an air line, said air line provided with a reversing valve that is automatically actuated with the full movement of the piston to direct a flow of compressed air supplied to said percussive tool to provide a rhythmic oscillation of said piston, said piston rod abutting and driving said chisel downward for the full stroke of said piston, said chisel connected to a spring at about its center, said spring held in a stationary-supported position by a cagelike structure that is affixed to the lower end of said rigid body, said spring absorbing the shock of the downward stroke of the chisel and with its compression providing the power to return said chisel to position the end of the chisel in the percussion chamber for the next cycle of movement of the driving piston rod, a hand operated valve and a handle for holding and controlling the operation of said tool and an exhaust line connected to said piston chamber to empty the area above or below said piston when said piston completes its stroke upward and downward.

2. In a percussive tool according to claim 1 in which said rigid body is comprised of a nylon body sheathed in a metal shell and said piston chamber is provided with a steel liner.

3. In a percussive tool according to claim 1 in which the absorption spring is connected to the chisel with an adjustable connection to raise or lower the central support of said chisel and adjust the rhythmic operation of the chisel.

4. In a percussive tool according to claim 1 in which sound and vibration absorbing material are used which include a rubber air supply line and exhaust line and a rubber collar around the tip of said chisel where the piston rod abuts with it on its power stroke downward and a lining within said percussion chamber to surround both the lower end of said piston rod and the upper end of said chisel and a pair of rubber washer supports for the top and bottom of said spring.

5. In a percussive tool according to claim 1 in which said cagelike supporting structure for said shock-absorbing spring is threadably secured to said tool and adjustable to increase the power return of said chisel when said spring's elasticity relaxes.