June 9, 1959 P. L. E. GUILLEMIER 2,889,811

PERCUSSION TOOLS

Filed Aug. 5, 1957 2 Sheets-Sheet 1

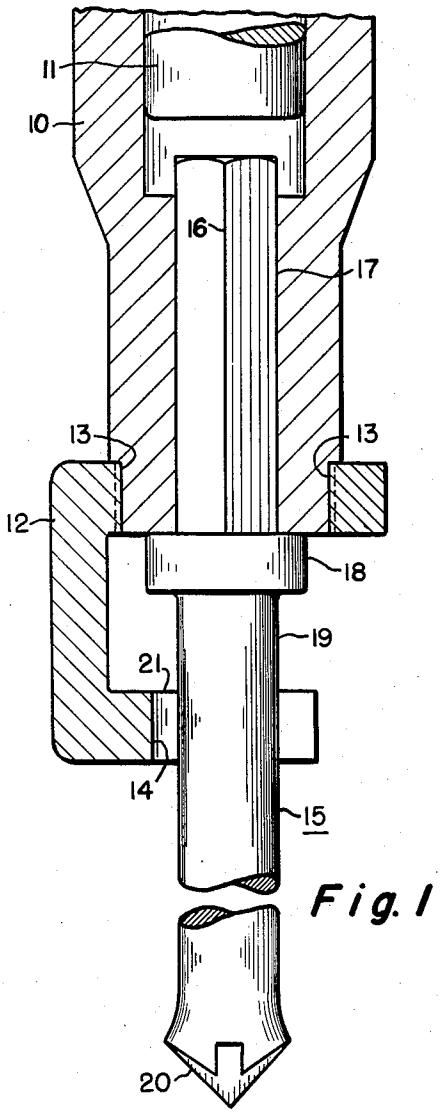


Fig. 1

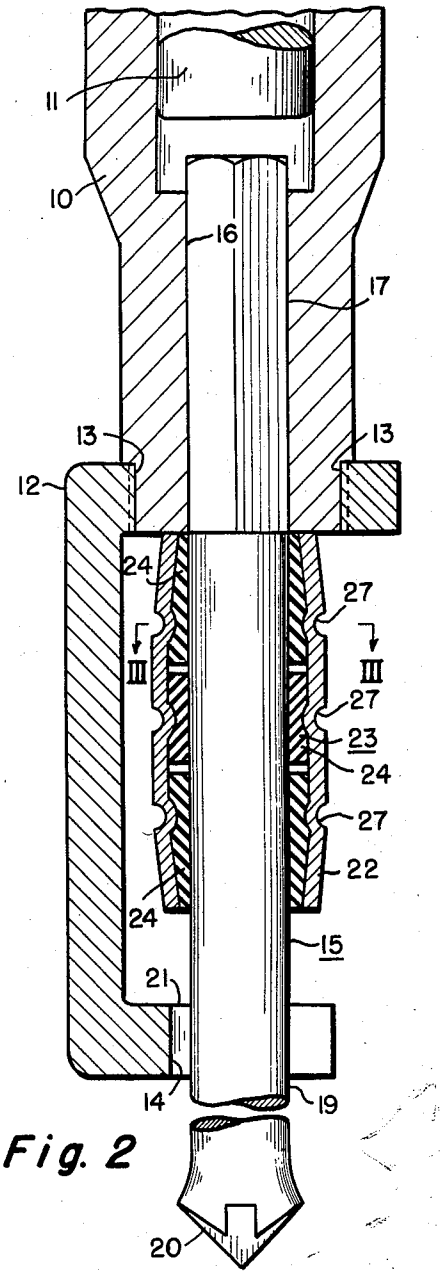


Fig. 2

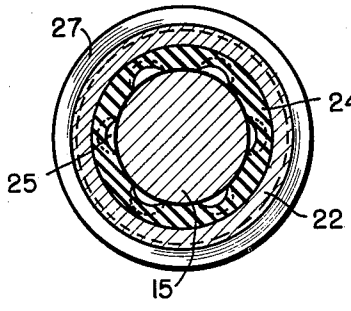


Fig. 3

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PERCUSSION TOOLS

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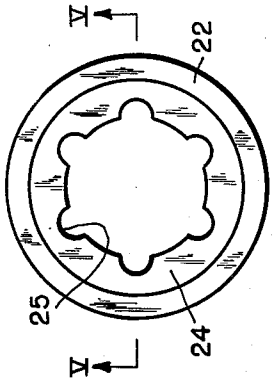


Fig. 4

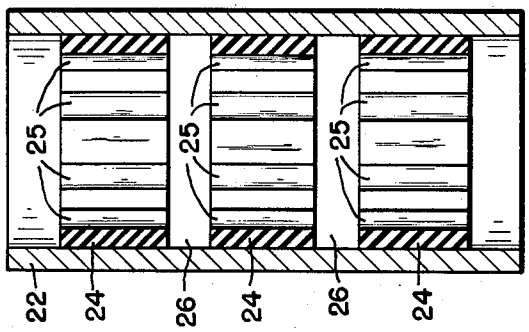


Fig. 5

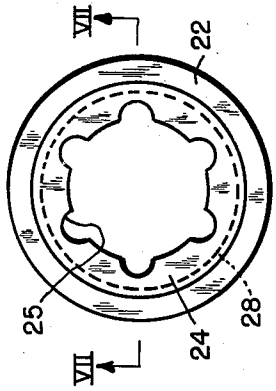


Fig. 6

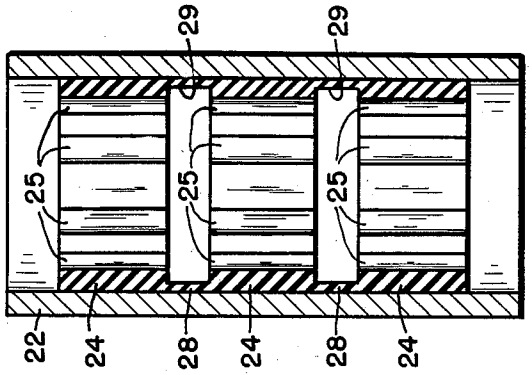


Fig. 7

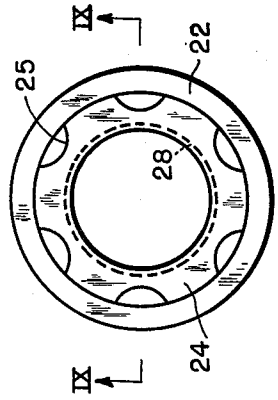


Fig. 8

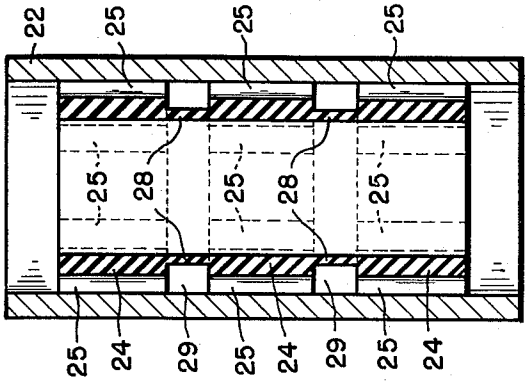


Fig. 9

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2,889,811

PERCUSSION TOOLS

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Application August 5, 1957, Serial No. 676,330

Claims priority, application France August 10, 1956

7 Claims. (Cl. 121—32)

The present invention relates to percussion or vibrating tools, such as mine drills, chisels, concrete breakers and riveting stamps or dies for pneumatic, electric or drop hammers.

The percussion tools of the present invention are of simple construction, economical to fabricate and so constructed that breakage due to metal fatigue of certain parts is reduced and thus repairs of the tools are less frequent.

It is known that percussion tools which fit on a pneumatic cylinder have a flange which is integrally forged with the tool. This flange prevents the tool from being inserted too far into the socket of the hammer cylinder and also maintains the tools in a limited path during operation. The flange on the tool contains internal stresses from the forging operation even though the tool is subsequently submitted to thermal treatments. These stresses ulimately result in premature breaking of the flange and necessitate frequent repairs and replacements of the tool.

To prevent this disadvantage, I have replaced the one-piece forged flange on the percussion tool with an attachable flange comprising a metallic outer ring or sleeve and an inner ring or sleeve of resilient material constructed and arranged to insure damping of the energy remaining in the tool after each impulsion of the percussion tool. Thereby, a substantial decrease in metal fatigue is obtained by the use of my attachable flange.

However, for the percussion tool to operate effectively, it is necessary that a large part of the energy of the piston be transmitted to the tool. Thus it is extremely important that the flange position on the tool be maintained rigid and not slip due to the vibrations and impacts to which the tool is subjected. I have devised a unique system of grooves in the resilient part of my flange which maintain the flange rigid relative to the tool.

In the drawings, I have illustrated a present preferred embodiment of my invention in which:

Figure 1 is a side view, partly in cross section, of a well-known percussion tool with a forged flange;

Figure 2 is a side view, partly in cross section, of a percussion tool according to the present invention;

Figure 3 is a cross section of the flange of the present invention taken on line III—III of Figure 2;

Figure 4 is an end cross section of the flange according to the present invention in unswaged condition;

Figure 5 is a cross section view of the flange taken on line V—V of Figure 4;

Figure 6 is an end cross section of a modified form of flange according to the present invention;

Figure 7 is a cross section of the modified flange taken on line VII—VII of Figure 6;

Figure 8 is an end cross section of a second modified form of flange according to the present invention; and

Figure 9 is a cross section of the second modified flange taken on line IX—IX of Figure 8.

Briefly, the present invention consists of a flange attachable to the shaft of a percussion tool. The flange

consists of an outer metallic ring or sleeve which surrounds an inner resilient ring or sleeve. Preferably, the inner resilient ring is comprised of several resilient elements distributed longitudinally along the percussion tool shaft. Each of the elements has internal or external grooves extending longitudinally of the element and parallel to the shaft of the percussion tool. The resilient elements may also have internal or external grooves extending transversely of the shaft of the percussion tool. The purpose of the grooves and the spacing of the elements apart is to allow room for the resilient material to expand when placed under tension or compression; thereby the resilient material does not lose its elastic characteristics. If the resilient material was fabricated as one continuous sleeve, without any grooves, the material would quickly lose its elastic properties during operation of the tool and the flange would have to be replaced. The grooves also result in the resilient members having a better grip on the shaft of the percussion tool.

The well-known percussion tool, as shown in Figure 1, consists of a cylinder housing **10** containing a movable piston **11**. This piston is motivated in a well-known manner; for example, as shown in Model PB8A, Paving Breaker and Pile Driver manufactured by the Ingersoll-Rand Company. A shifter **12** is affixed within grooves **13** in the lower end of the cylinder housing **10** in any desirable manner; for example: by bolts or set screws (not shown). The shifter **12** consists of a bent plate having an opening **14** there-through to permit the passage of a tool **15**. The tool **15** consists of a fitting piece **16** on the upper end having any desirable shape to prevent turning; for example: hexagon shaped. This fitting piece is slid into an opening **17** in the cylinder housing **10**. The opening **17** has the same shape as the fitting piece **16**. Below the fitting piece **16** is a forged flange **18** and below that a shaft **19** containing an integral work head **20**.

In operation, the piston **11** strikes the upper end of the fitting piece **16**, thereby propelling the tool **15** downwardly in Figure 1. The flange **18** comes in contact with the top side **21** of the shifter **12**, thereby stopping the movement of the tool downwardly in Figure 1. The tool **15** is returned to its upward position as shown in Figure 1 by the operator of the tool pressing down on the cylinder housing **10** by means of a handle in a well-known manner. Then the piston **11** again strikes the upper end of the fitting piece and the cycle is repeated.

The flange **18** has stresses therein due to the forging operation. These stresses cannot be entirely relieved by heat treatment and consequently, the flange **18** is very susceptible to breakage due to repeated impulsion against the shifter **12**. The present invention is primarily directed to overcoming this disadvantage.

As shown in Figure 2, the present invention is constructed substantially in the same manner as the well-known device shown in Figure 1 with the exception that the shaft **19** is continuous and contains no forged flange **18**. In place of the flange **18** is a metallic ring or sleeve **22** extending a substantial distance along the shaft **19** and completely encompassing the same. The metallic sleeve has a resilient ring or sleeve **23**, preferably rubber, underneath it. The rubber sleeve completely encircles the shaft **19** and consists of three resilient elements **24** having longitudinally extending grooves **25** on their inner surfaces. The resilient elements **24** are separated from each other by spaces **26** of sufficient width to enable the resilient material to expand when under tension or compression.

In fabricating the device of the present invention, the resilient elements **24** are placed on the shaft **19**; the metallic ring **22** is placed over them as shown in Figures 4 and 5, and the metallic sleeve **22** is swaged in the

manner shown in Figure 2 by bending the longitudinal end edges inwardly toward the axis of revolution of the sleeve and indenting the metallic ring at least three places 27. The indentations 27 are continuous around the whole periphery of the sleeve. The resilient material located radially inwardly toward the shaft 19 under indentations 27 is compressed, and thus the bond between the metallic ring and the resilient material is increased and the bond between the resilient material and the shaft 19 is likewise increased.

Figure 6 illustrates a modification of the resilient sleeve of the present invention in that the elements 24 are joined together by a thin bridge of resilient material 28 located at the outer periphery of the resilient elements. Thus, the rubber sleeve is a continuous element but subdivided by grooves 29 located at the one-third point of the sleeve.

The resilient sleeve shown in Figures 6 and 7 can be split along the line VII—VII to form two half cylinders which facilitates fabrication of the flange.

The metal sleeve shown in Figures 6 and 7 is swaged in the same manner as shown in Figure 2 after assembly on the shaft 19.

Figures 8 and 9 show a further modification of the resilient sleeve in that the longitudinal grooves are located on the outer periphery of the sleeve and the grooves 29 are likewise located on the outer periphery with resilient bridges 28 forming a continuous inner surface next to shaft 19.

The metal sleeve shown in Figures 8 and 9 is swaged in the same manner as shown in Figure 2 after assembly on the shaft 19.

The preferred material of construction for the sleeve 23 is rubber; however, it is within the scope of the present invention to fabricate this sleeve from any material having sufficient resiliency to produce the result desired.

It is further understood that the present invention may be applied to all shapes of percussion tool shafts, whether they be cylindrical, prismatic, etc.

While I have described a present preferred embodiment of my invention, it is to be understood that it may be otherwise embodied within the scope of the following claims.

I claim:

1. A percussion tool having an elongated shaft having a work head on one end thereof, means to reciprocate the shaft longitudinally, a resilient sleeve having grooves therein positioned around said shaft; said grooves insuring adherence between the sleeve and the shaft such that the sleeve does not slide along the shaft; said grooves further being of sufficient size to provide areas into which portions of the sleeve may move upon force being applied to the sleeve; and a rigid metal sleeve concentrically and rigidly mounted around the resilient sleeve.

2. A percussion tool as recited in claim 1 wherein some of said grooves extend transversely of the shaft and other of said grooves extend longitudinally of the shaft.

3. A percussion tool as recited in claim 1 wherein said grooves extend transversely of the shaft.

4. A percussion tool comprising an elongated shaft having a work head on one end thereof, means to reciprocate the shaft longitudinally, a plurality of resilient sleeves positioned around and spaced longitudinally along said shaft; each of said sleeves having grooves therein to maintain the sleeves stationary on the shaft and provide areas into which portions of the sleeves may move upon forces being applied to the sleeves; and a rigid sleeve concentrically mounted around the resilient sleeves.

5. A percussion tool described in claim 1 wherein said grooves in the resilient sleeves extend longitudinally.

6. In a percussion tool including a housing, means reciprocal within the housing, a shifter plate affixed to the lower end of the housing, an elongated shaft passing through an opening in the shifter plate and having its upper end fitted into and movable longitudinally in the lower end of the housing, a work head on the lower end of the shaft, said reciprocal means being engageable with the upper end of the shaft to move the shaft longitudinally, a plurality of resilient sleeves positioned around and spaced from each other along said shaft between the housing and the shifter plate, said sleeves having internal longitudinally extending grooves; and a single metal sleeve concentrically mounted around all the resilient sleeves, the metal sleeve being indented radially to insure adhesion between the metal sleeve and the resilient sleeves and between the resilient sleeves and the shaft.

7. In a percussion tool including a housing, means reciprocal within the housing, a shifter plate affixed to the lower end of the housing, an elongated shaft passing through an opening in the shifter plate and having its upper end fitting into and movable longitudinally in the lower end of the housing, a work head on the lower end of the shaft, said reciprocal means being engageable with the upper end of the shaft to move the shaft longitudinally, a continuous resilient sleeve positioned around said shaft between the housing and the shifter plate, said sleeve having internal separate transversely extending and longitudinally extending grooves, and a metal sleeve concentrically mounted around the resilient sleeve, the metal sleeve being indented radially to insure adhesion between the metal sleeve and the resilient sleeve, and the resilient sleeve and the shaft.

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