

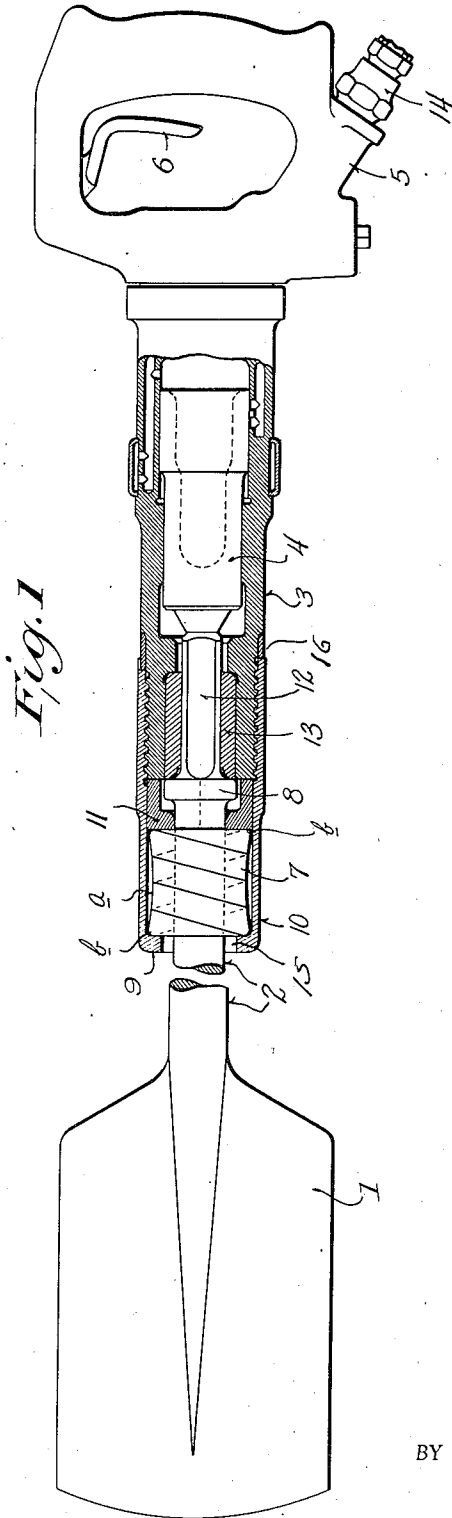
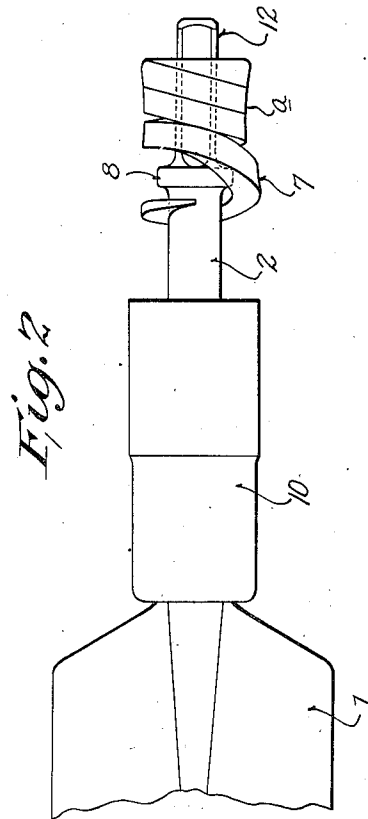
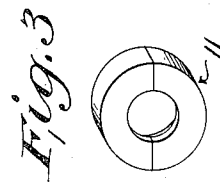
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TOOL RETAINER

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TOOL RETAINER

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This invention relates to tool retainers, and more particularly to tool retainers for percussive tools.

The invention is particularly applicable to pneumatically operated clay diggers or spades, although not necessarily limited to such devices.

In clay diggers or spades of the character referred to, a rubber buffer is employed in the spade retainer to relieve the barrel of the tool, and the retainer of the blows of the piston when the enlargement on the spade shank is forced against the buffer. The latter is held in operative position in the tool assembly by the retainer which is in the form of a tubular member or sleeve enclosing the buffer and screwed on the forward or nozzle end of the hammer barrel.

The practice heretofore has been to make these buffers of solid resilient rubber. Actual experience in connection with these buffers has demonstrated that they heat up unduly under repeated compressions in the operation of the tool, and deteriorate quickly under this heat of operation. These solid rubber buffers also have the objection of allowing fine particles of sand, clay, mud and silt to get into the barrel by way of the retainer because of the lack of a snug fit between the buffer and the tool shank and between the buffer and the retainer sleeve. These buffers must be relatively thick to absorb the blows of the hammer piston, and being in solid form must be so made that they can be readily slipped over the enlargement on the tool shank in the application of the buffer thereto. Thus, the bore of the buffer does not have a sufficiently close fit with the tool shank to prevent dirt entering the barrel of the tool by way of the buffer. It is also necessary to have sufficient clearance in the retainer at the outer diameter of the solid buffer for its lateral expansion when compressed to cushion the blows of the piston in the use of the tool. Thus, the buffer does not have a sufficiently tight fit in the retainer sleeve to prevent the entry of dirt into the barrel between the buffer and the retainer sleeve. This dirt by its abrasive action on the tool parts, not only wears them down very rapidly, but in many cases slows down the tool, and finally stops the operation entirely.

The general purpose and object of my invention is to provide a buffer construction which will entirely eliminate the objections referred to, and thus prolong the life of the tool and cut down the maintenance costs with respect thereto.

In accordance with my invention, the buffer, while of resilient rubber, is in the form of a spiral construction which provides a very close fit

around the tool shank, and also on the inside diameter of the retainer sleeve. Any pressure compressing this spiral buffer causes it to hug the inside and outside diameters so closely that the spiral buffer positively excludes the entry of particles of fine sand, clay, mud and silt into the barrel of the tool. With the retainer in position, there is no way of dirt getting to the working parts of the tool by way of the retainer.

My improved buffer is preferably in the form of a single member in spiral form providing a helix which not only facilitates winding the buffer on the tool shank over the enlargement thereof, but presents a larger number of surfaces to insulate and break up the heat generated in the operation of the tool. Thus, the buffer stays cool, reduces the upkeep of the tool, and, moreover may be readily and easily applied to the tool shank.

Another object of my invention is to give the helix concave form on its outer side to provide the clearance necessary for lateral expansion when under compression.

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

In the accompanying drawing, illustrating the preferred embodiment of my invention—

Fig. 1 is a longitudinal sectional view with parts in elevation of a pneumatically operated clay digger equipped with a resilient buffer of my invention;

Fig. 2 is an elevational view showing the manner in which the spiral buffer member is applied to the shank of the spade; and

Fig. 3 is a perspective view of the separable two-part collar to be hereinafter referred to.

In the drawing, 1 indicates the spade of the tool, 2 its shank, and 3 the barrel into which the shank is inserted as shown in Fig. 1. The barrel 3 contains a reciprocable piston 4 which by compressed air admitted to the barrel through the handle 5 delivers power blows on the shank 2 in the operation of the tool. The handle 5 is secured to the rear end of the barrel 3 and is provided with an inside trigger 6 for controlling the flow of compressed air to the barrel.

The buffer of my invention comprises a one-piece strip 7 of resilient rubber in spiral form as shown in Figs. 1 and 2. The buffer is preferably in the form of a closed helix and fits about the tool shank 2 below its enlargement 8. In the embodiment shown, the buffer 7 has practically three full turns and is rectangular, or substantially so, in cross-section. The end convolutions of the buffer are tapered so as to provide substantially flat end surfaces for the spiral member.

This enables the buffer to seat squarely against the flange 9 at the outer end of the retainer 10 which encloses the buffer and holds it in position to cushion the blows of the piston when compressed thereby.

The retainer 10 is in the form of a sleeve which fits over the forward or nozzle end of the barrel 3, and has screw threaded connection therewith as shown in Fig. 1. The retainer holds the buffer against the two parts of a split collar 11 which fits about the shank 2 immediately below the enlargement 8. The collar 11 is L-shape in section and abutting against the outer end of the barrel 3 provides the necessary working clearance for the enlargement 8 in the reciprocable movement of the tool element 1. The collar 11 is of a rigid material, being preferably of metal to relieve the buffer 7 of direct contact with the enlargement 8.

The blow receiving end portion 12 of the shank 2 above the enlargement 8 is preferably non-circular in shape and fits within a bushing 13 having a pressed or other tight fit in the nozzle end of the barrel 3. The bore of this bushing fits the shank portion 12 and the spade is held from turning with respect to the barrel.

The buffer member 7 is fashioned to normally fit closely about the shank 2 below the enlargement 8 and also against the inner surface of the retainer 10. Thus, any pressure compressing the buffer 7 causes it to hug the shank 2 at its inside diameter and to hug the retainer 10 at its outside diameter. This fit is at all times sufficiently tight or close to positively exclude the entry of fine particles of sand, clay, mud and silt into the barrel of the tool by way of the buffer and its retainer. Thus, the working parts of the tool are protected and excessive and premature wear is prevented. This is an important factor of my invention for these tools are used for digging in hard, soft, wet and all sorts of ground as encountered in tunnels, caisson, and other building and construction work, and the tools are held with their nozzle ends toward the ground and frequently in contact therewith.

With the buffer 7 in spiral form, it may be wound on the shank 2 in the manner shown in Fig. 2, and thus have an inside diameter slightly less than that of the shank to closely fit the shank and prevent the passage of dirt and silt between them. Being in the form of a closed helix, the convolutions of the buffer contact and close the joints between them. The outer cylindrical surface of the buffer is made concave as shown at *a* to provide a clearance space within the retainer 10 for lateral expansion of the buffer when compressed. The opposite end portions of the buffer have an outside diameter fitting the inside diameter of the retainer so that said end portions will normally seat against the inner surface of the retainer as shown at *bb*, to prevent the passage of dirt and silt between the buffer and the retainer.

The tool has plenty of power and is effective in hard, as well as in soft ground. The buffer is sufficiently resilient to absorb the blows of the piston when the enlargement 8 is driven against the collar 11. This occurs when the spade 1 is driven unduly forward as when working in soft ground or when slipping in hard or stoney ground. Moreover, the buffer cushions the blow should the tool be operated when the spade is free of the work. The collar 11 is the first to receive the blow, and thus excessive wear on the softer cushion member is prevented. The collar 11 extends under the enlargement 8 and in con-

junction with the buffer prevents dropping of the spade out of the barrel.

With the buffer 7 in strip form, a large number of heat radiating surfaces are provided, and thus the heat generated in the compressing of the buffer is rapidly dissipated. This keeps the buffer cool and the tool upkeep is materially reduced.

The handle 5 has a fitting 14 whereby an air supply hose (not shown) may be attached to the tool. The trigger co-operates with a throttle valve located within the handle to control the supply of compressed air to the tool. The latter also has a disturbing valve to effect the reciprocation of the piston.

In assembling the parts, the retainer 10 is put on the spade 1 and slipped down its shank 2 as far as the retainer will go. This positions the retainer entirely below the enlargement 8, as shown in Fig. 2. The opening 15 in the retainer at its flange 9 is slightly larger in diameter than the enlargement 8 so that the retainer may be applied to the shank. With the retainer in this lowered position, the buffer 7 is then wound over the enlargement 8, as shown in Fig. 2, and forced down into the retainer. The shank portion 12 above the collar is slightly less in diameter than the shank portion below the collar. This allows the buffer to be readily slipped over the shank portion 12 and then be wound over the enlargement. When the buffer is forced down into the retainer, the split collar 11 is applied to the shank beneath the enlargement 8 and the retainer with the contained buffer is slid up the shank 2 until it holds the collar 11 in place. The spade shank is then inserted into the barrel, whereupon the retainer can be screwed into place as shown in Fig. 1. A locking ring 16 may be employed on the barrel 3 to hold the retainer against accidental rotation.

With plenty of power, these diggers with a chisel point can be used for light demolition work, whereas when equipped with ball end butts, the tools can be used for vibrating concrete in forms by tamping wood or steel frames.

The buffer herein disclosed can also be used with chisels and other percussive tools which employ reciprocable tool elements with a shank.

I claim as my invention:

1. In a percussive tool, a barrel, a piston operable in said barrel, a reciprocable tool member having a shank insertible into the barrel to receive the blows of the piston during the operation of the tool and having an enlargement exteriorly of the barrel, a resilient buffer about the shank in advance of the enlargement, and a retainer sleeve securable on the barrel over the buffer and the enlargement to hold the buffer in position to retain the shank in the barrel and cushion the blows of the piston on the distortion of the buffer by the enlargement, said buffer comprising a one-piece member of resilient non-metallic material in the form of a helix with its convolutions normally in contact and having a snug fit at its inner and outer peripheries about the shank and against the retainer sleeve, respectively, to seal the space between the shank and the retainer sleeve to prevent the entry of dirt, slime and the like into the barrel through the retainer.

2. In a percussive tool, a barrel, a piston operable in said barrel, a reciprocable tool member having a shank insertible into the barrel to receive the blows of the piston during the operation of the tool and having an enlargement exteriorly of the barrel, a resilient buffer about the shank in advance of the enlargement, and a re-

tainer sleeve securable on the barrel over the buffer and the enlargement to hold the buffer in position to retain the shank in the barrel and cushion the blows of the piston on the distortion of the buffer by the enlargement, said buffer comprising a one-piece member of resilient rubber material in the form of a helix with its convolutions normally in contact and having a snug fit along its bore with the shank and a snug fit at its ends with the retainer sleeve to seal the space between the shank and the retainer sleeve to prevent the entry of dirt, slime and the like into the barrel through the retainer, said buffer being reduced in diameter between its ends which engage the retainer sleeve to provide a clearance space therein for the lateral expansion of the buffer on its distortion by the piston.

3. In a percussive tool, a barrel, a piston operable in said barrel, a reciprocable tool member having a shank insertible into the barrel to receive the blows of the piston during the operation of the tool and having an enlargement exteriorly of the barrel, a resilient buffer about the shank in advance of the enlargement, a retaining sleeve securable on the barrel over the buffer and the enlargement and having a shoulder providing a seat for the buffer for holding the buffer in position to retain the shank in the barrel and cushion the blows of the piston on the distortion of the buffer by the enlargement, and a spacer element in the retainer sleeve between the barrel and the buffer for holding the latter against the shoulder and providing a working space for the enlargement, said buffer comprising a one-piece member of resilient rubber-like material in the form of a helix with its convolutions normally in contact and fitting snugly at its inner and outer peripheries about the shank and against the retainer sleeve, respectively, to seal the space between the shank and the retainer sleeve to prevent the entry of dirt, slime and the like into the barrel through the retainer.

4. In a percussive tool, a barrel, a piston operable in said barrel, a reciprocable tool member having a shank insertible into the barrel to receive the blows of the piston during the operation of the tool and having an enlargement exteriorly of the barrel, a resilient buffer about the shank in advance of the enlargement, a retainer sleeve securable on the barrel over the buffer and the enlargement and having a shoulder providing a seat for the buffer to hold the buffer in position to retain the shank in the barrel and to cushion the blows of the piston on

the distortion of the buffer by the enlargement, and a spacer element in the retainer sleeve between and engaging the barrel and the buffer for holding the latter against the shoulder and providing a working space for the enlargement, said spacer having a portion extending between the buffer and the enlargement to prevent direct contact of the enlargement with the buffer, said buffer comprising a one-piece member of resilient rubber-like material in the form of a helix with its convolutions normally in contact and having a snug fit at its inner and outer peripheries about the shank and against the retainer sleeve, respectively, to seal the space between the shank and the retainer sleeve to prevent the entry of dirt, slime and the like into the barrel through the retainer.

5. A tool retainer of the character described comprising, a sleeve securable on the front end of a tool barrel and projecting forwardly therefrom, and a resilient buffer located within said sleeve and held thereby in position to retain the working element used with the tool in the barrel and cushion the blows of the tool piston on the working element through the enlargement on the tool shank, said buffer comprising a one-piece member of resilient rubber-like material in the form of a helix with its convolutions normally in contact and formed to have a snug fit at its ends in the sleeve and a snug fit along its bore with the working element extendible into the barrel through the retainer sleeve to provide a seal for the retainer.

6. A digging tool having a barrel, a piston operable in said barrel, a reciprocable tool member in the form of a spade having a shank insertible into the barrel and a digging blade at the outer end of the shank beyond the barrel, and a retainer securable on the barrel over the shank and containing a buffer to retain the shank in the barrel and cushion the blows of the piston when distorted by the enlargement on the shank, said retainer being at the forward end of the barrel and being sufficiently close to the blade to contact with the material in which the blade is worked in the use of the tool, said buffer comprising a one-piece member of non-metallic resilient material having its convolutions normally in contact and having a snug fit about the shank and in the retainer sleeve to seal the space between the tool shank and the retainer sleeve to prevent the entry of dirt, slime and the like into the barrel through the retainer.

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