

May 29, 1951

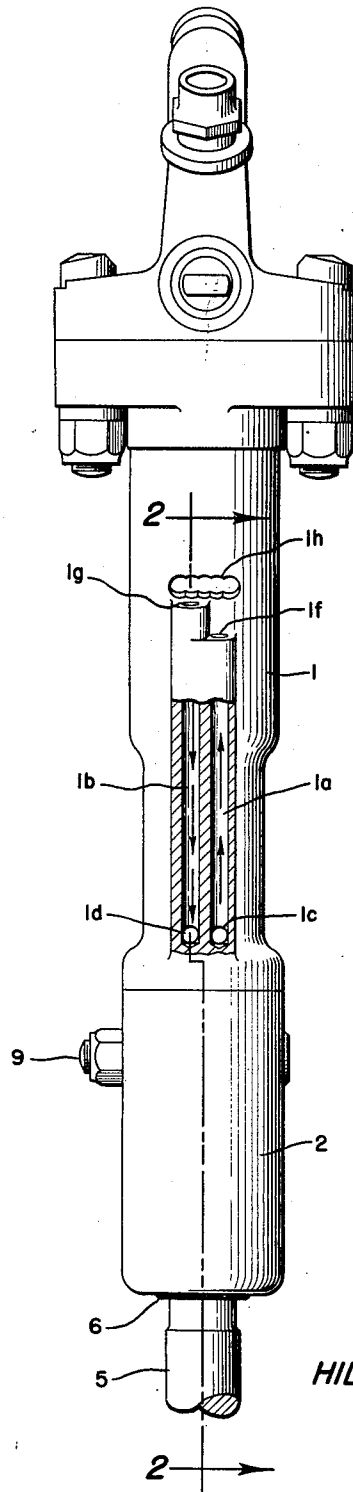
H. A. GILLERSTROM
CLAY DIGGER

2,554,568

Filed July 17, 1946

2 Sheets-Sheet 1

FIG. 1



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2 Sheets-Sheet 2

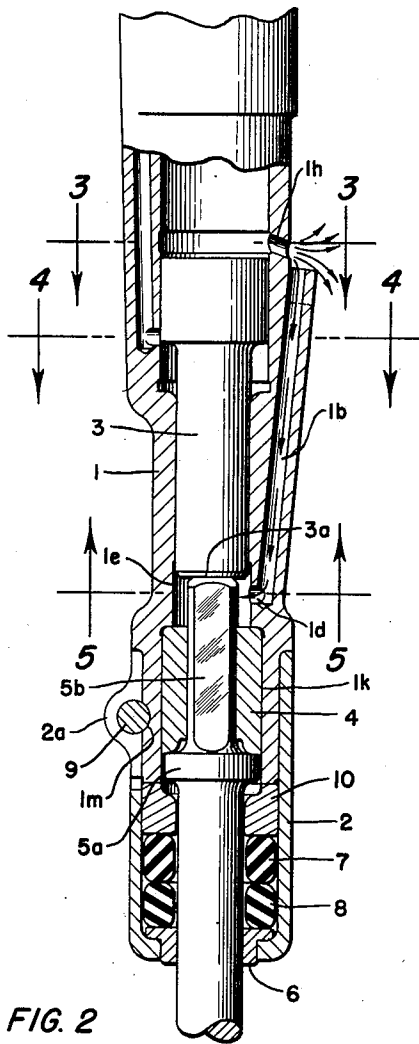


FIG. 2

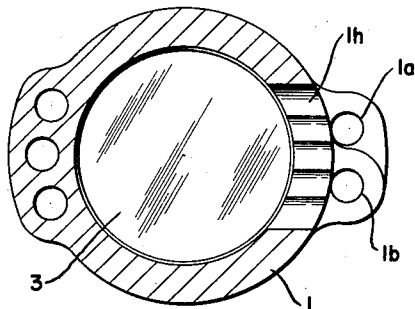
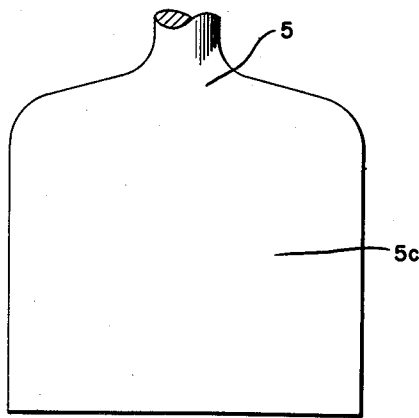


FIG. 3

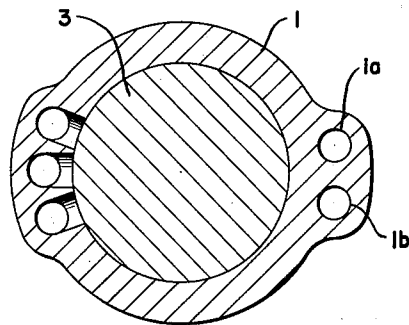


FIG. 4

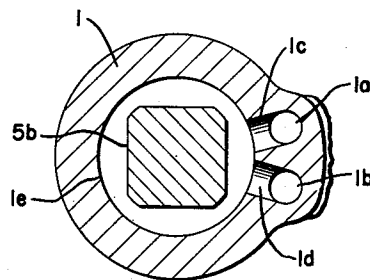


FIG. 5

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CLAY DIGGER

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5 Claims. (Cl. 121-10)

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My invention relates to a clay digger, more particularly of the pneumatically operated type and the objects of my invention are:

First, to provide a clay digger of this class in which the front head of the steel retainer assembly may be forced into clay or sand without danger of the accumulation of foreign matter about the hammer end of the piston adjacent the tool shank;

Second, to provide a clay digger of this class having passages in the side wall of the cylinder thereof, communicating with the breather port in the cylinder at the hammer end of the piston whereby exhaust air from the cylinder is directed into one of said passages causing air to flow into the cylinder bore at the hammer end of the piston which air is exhausted therefrom by aspiration of the air through a separate passage means spaced from the exhaust port of the cylinder causing foreign matter to be carried outwardly of the cylinder bore at the hammer end of the piston therein;

Third, to provide a clay digger of this class having passage means from the cylinder exhaust port to the cylinder bore portion at the hammer end of the piston for conducting exhaust air into the cylinder bore at the hammer end of the piston for cooling the front head assembly of my clay digger;

Fourth, to provide a clay digger of this class having rubber cushion bumpers which effectively dampen vibration of the rapidly reciprocating clay spade collar in the front head of my clay digger;

Fifth, to provide a clay digger of this class having rearwardly extended passage means communicating with the relief port in the cylinder bore portion at the hammer end of the piston which permits the air to ebb and flow at the forward end of the piston whereby said relief port is protected from the entrance of foreign matter therein about the hammer end of the piston;

Sixth, to provide a clay digger of this class which cleans the cylinder bore portion at the hammer end of the piston with each stroke thereof; and

Seventh, to provide a clay digger of this class which is very simple and economical of construction, efficient in operation and which will not readily deteriorate or get out of order.

With these and other objects in view as will appear hereinafter, my invention consists of certain novel features of construction, combination and arrangement of parts and portions, as will be hereinafter described in detail and particularly

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set forth in the appended claims, reference being had to the accompanying drawings and to the characters of reference thereon forming a part of this application, in which:

Figure 1 is a fragmentary side elevational view of my clay digger showing portions broken away and in section to amplify the illustration; Fig. 2 is a fragmentary sectional view taken from the line 2-2 of Fig. 1, showing parts and portions in elevation to facilitate the illustration; Fig. 3 is a transverse sectional view taken from the line 3-3 of Fig. 2; Fig. 4 is a transverse sectional view taken from the line 4-4 of Fig. 2; and Fig. 5 is a transverse sectional view taken from the line 5-5 of Fig. 2.

Similar characters of reference refer to similar parts and portions throughout the several views of the drawing.

The cylinder 1, front head 2, piston hammer 3, chuck bushing 4, spade 5, shank bushing 6, cushion members 7 and 8, steel retainer bolt 9, and the cushion engaging collar 10 constitute the principal parts and portions of my clay digger.

The cylinder 1 is a substantially conventional air hammer cylinder having a substantially conventional reciprocating piston hammer 3 therein, as shown best in Fig. 2 of the drawings. It will be here noted, however, that the cylinder 1 is provided with rearwardly extending hollow passage portions 1a and 1b communicating with relief ports 1c and 1d respectively in the side wall of the cylinder bore portion 1e, at the hammer end portion 3a of the piston hammer 3. The conventional relief port is located in a similar position to the relief ports 1c and 1d but is open directly externally of the cylinder 1 at substantially the location of the relief ports 1c and 1d. The rearwardly extending hollow passage portions 1a and 1b are provided with open end portions 1f and 1g outwardly of the cylinder exhaust opening 1h, as shown best in Figs. 1 and 2 of the drawings. The exhaust opening 1h is directed outwardly and forwardly toward the open end portions 1f and 1g of the hollow passage portions 1a and 1b, as shown by arrows in Fig. 2 of the drawings. As shown in Fig. 1 of the drawings, the open end portion 1g of the hollow passage portion 1b is nearer to the exhaust opening 1h than is the open end portion 1f of the hollow passage portion 1a.

The chuck bushing 4 is arranged to surround the substantially square in cross section shank 5b of the spade 5 and is supported in an enlarged bore portion 1k adjacent the bore portion 1e of the cylinder 1. The cushion engaging collar 10

is positioned in surrounding relation with the shank portion of the spade 5, adjacent the shoulder 5a thereon, and is arranged to engage said shoulder 5a when in reciprocation. At the opposite side of the cushion engaging collar 1c, from the shoulder 5a of the shank 5b are the cushion members 7 and 8 which are preferably made of rubber or other resilient material. Positioned concentrically in the open end of the front head 2 is the shank bushing 6 arranged to guide the shank of the spade 5 in reciprocative movement relatively thereto, as shown best in Fig. 2 of the drawings. The steel retainer bolt 9 is positioned in a boss portion 2a of the front head 2 and engages an arcuate portion 1m in the side wall of the cylinder 1, securing the front head 2 on the cylinder 1 in substantially the conventional manner.

The operation of my clay digger is substantially as follows:

When the blade 5c of the spade 5 is forced into clay or sand, the reciprocating piston hammer 3, hammers the inner end of the shank 5b of the spade 5 forcing the same into said clay or sand. With continued movement of the spade 5, the front head 2 of my clay digger is often forced into the clay or sand whereupon foreign matter tends to work through the chuck. The relief ports 1c and 1d at the hammer end of the piston 3 in the side wall of the bore portion 1e of the cylinder 1, are covered by the backwardly extending hollow passage portions 1a and 1b, whereby foreign matter is prevented from entering the relief ports 1c and 1d during operation of my clay digger when the front head thereof is immersed in the earth. With each stroke of the piston 3, air is exhausted through the angularly disposed port 1h and the air emerging from the port 1h expands very rapidly in a cone-shaped fashion causing considerable pressure at the open end 1g of the hollow passage portion 1b, causing a forced draft through the hollow passage 1b and into the bore portion 1e at the hammer end of the piston 3. Simultaneously the exhaust air emerging from the port 1h passes over the open end 1f of the hollow passage portion 1a aspirating the air from the hollow passage portion 1a which tends to exhaust foreign particles from the bore portion 1e at the hammer end 3a of the piston hammer 3. It will be here noted that the open end portion 1g of the hollow passage portion 1b is sufficiently close to the exhaust port 1h to cause pressure therein to be exerted by rapid expansion of the air being exhausted from the port 1h. The open end 1f of the hollow passage 1a, however, is slightly spaced from the port 1h whereby the draft created by exhausted air from the port 1h causes aspiration of the air from the hollow passage portion 1a. The circulation of air through the bore portion 1e, at the hammer end 3a of the piston hammer 3, by means of the hollow passages 1a and 1b, causes cooling of the adjacent parts which dissipates heat generated by the rapid expansion and contraction of the rubber cushion members 7 and 8. It will be here noted that during reciprocation of the piston hammer 3, that air must ebb and flow freely from the bore 1e of the cylinder 1, at the hammer end 3a of the piston hammer 3. This function is accomplished through the hollow passages 1a and 1b without danger of foreign matter entering the breather ports 1c and 1d during immersion of the front head 2 of my clay digger in the earth.

Though, I have shown and described a particular construction, combination and arrangement of parts and portions, I do not wish to be limited to the particular construction, combination and arrangement, but desire to include in the scope of my invention, the construction, combination and arrangement substantially as set forth in the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a clay digger of the class described, the combination of a cylinder, a piston hammer reciprocally mounted therein, said cylinder having a bore portion at the hammer end of said piston hammer provided with a breather opening therein, said cylinder provided with an exhaust port arranged to be passed by the opposite end of said piston hammer, and a pair of passages having their open ends in spaced relation to each other, hollow passage means communicating with the breather opening in the side wall of the bore portion at the hammer end of said piston hammer, said pair of hollow passages terminating near said exhaust port of said cylinder whereby exhaust from said cylinder passes adjacent the open end of one of said passages, close to said exhaust port, and the open end of the other passage further spaced therefrom.

2. A cylinder, a piston reciprocally mounted in said cylinder, said cylinder provided with an exhaust port adapted to be passed by one end of said piston, the opposite end of said piston provided with a hammer portion, said cylinder provided with a bore portion at said hammer portion of said piston, and passage means having a pair of hollow passages therein and having spaced open ends extending from the interior of said bore portion at the hammer end of said piston to a position near said exhaust opening of said cylinder whereby exhaust from said cylinder emerges adjacent the open ends of said hollow passages, entering one of said passages and by-passing the open end of the other passage in spaced relation thereto, one of said hollow passages terminating near said exhaust port and the other hollow passage in stepped relation therewith slightly spaced from said exhaust port.

3. In a clay digger of the class described, the combination of a substantially conventional pneumatic hammer cylinder, a piston hammer reciprocally mounted therein having a hammer portion at one end thereof, said cylinder provided with an exhaust port in the side wall thereof arranged to be passed by the opposite end of said piston hammer from said hammer portion, said cylinder provided with a bore portion near the hammer portion of said piston hammer, and hollow passage means having a pair of passages therein having spaced open ends at different distances from said exhaust port communicating with said bore portion at the hammer portion of said piston hammer and terminating near said exhaust port of said cylinder whereby exhaust from said cylinder emerges adjacent the open ends of said hollow passages, entering one of said passages and by-passing the open end of the adjacent passage spaced thereto.

4. In a clay digger of the class described, the combination of a substantially conventional pneumatic hammer cylinder, a piston hammer reciprocally mounted therein having a hammer

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portion at one end thereof, said cylinder provided with an exhaust port in the side wall thereof arranged to be passed by the opposite end of said piston hammer from said hammer portion, said cylinder provided with a bore portion near the hammer portion of said piston hammer, and hollow passage means having a pair of passages therein having spaced open ends at different distances from said exhaust port communicating with said bore portion at the hammer portion of said piston hammer and terminating near said exhaust port of said cylinder whereby exhaust from said cylinder emerges adjacent the open ends of said hollow passages, entering one of said passages and by-passing the open end of the adjacent passage spaced thereto, said exhaust port directed outwardly and forwardly toward the open ends of said hollow passage portions.

5. In a clay digger of the class described, the combination of a substantially conventional pneumatic hammer cylinder, a piston hammer reciprocally mounted therein having a hammer portion at one end thereof, said cylinder provided with an exhaust port in the side wall thereof arranged to be passed by the opposite end of said piston hammer from said hammer portion, said cylinder provided with a bore portion near the hammer portion of said piston hammer, and hollow passage means having a pair of passages therein having spaced open ends at different distances from said exhaust port

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communicating with said bore portion at the hammer portion of said piston hammer and terminating near said exhaust port of said cylinder whereby exhaust from said cylinder emerges adjacent the open ends of said hollow passages, entering one of said passages and by-passing the open end of the adjacent passage spaced thereto, said exhaust port directed outwardly and forwardly toward the open ends of said hollow passage portions, one of said hollow passage portions being open at its end in stepped relation with the open end of the other hollow passage portion.

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