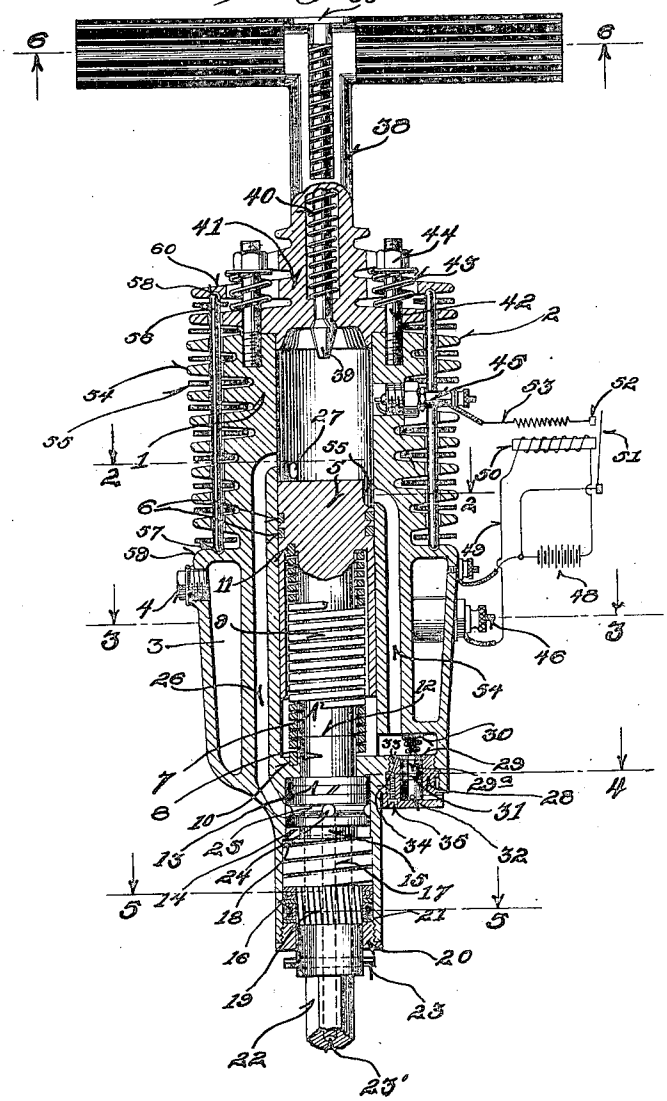
July 31, 1923. 1,463,595

S. R. SAUNDERS

AIR COOLED CYLINDER

Filed Nov. 17, 1921 2 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

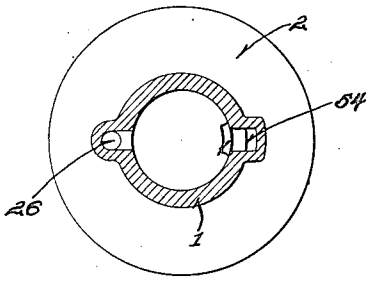


Fig. 3.

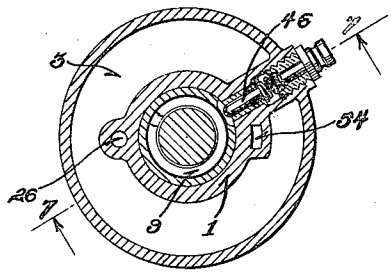


Fig. 4.

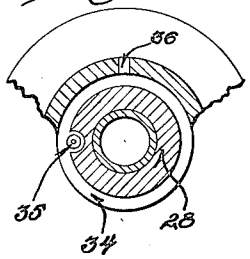


Fig. 5.

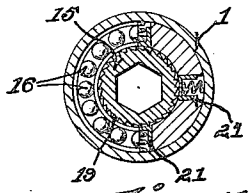


Fig. 7.

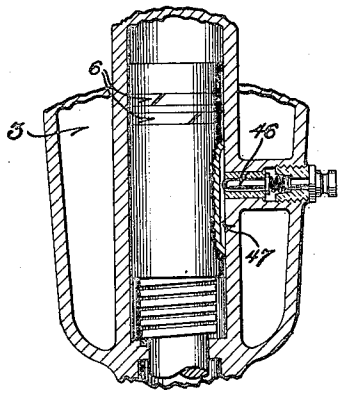
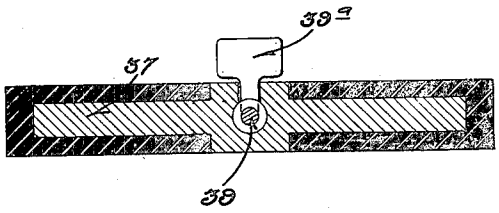


Fig. 6.



Witness!
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Patented July 31, 1923. 1,463,595

UNITED STATES PATENT OFFICE.

SAMUEL R. SAUNDERS, OF GREEN BAY, WISCONSIN, ASSIGNOR OF ONE-HALF TO JOSEPH HENDRICKS, OF SOUTH KAUKAUNA, WISCONSIN.

AIR-COOLED CYLINDER.

Application filed November 17, 1921. Serial No. 516,004.

To all whom it may concern:

Be it known that I, SAMUEL R. SAUNDERS, a citizen of the United States, and resident of Green Bay, in the county of Brown and State of Wisconsin, have invented certain new and useful Improvements in Air-Cooled Cylinders; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to improvements in air-cooled cylinders in which a tool holding anvil is exposed to the impacts of a piston hammer. The invention constitutes an improvement of the gas hammer described in my prior Patent No. 1,237,827.

It is an object of the invention to provide a gas hammer with an air cooled cylinder of novel structure by means of which the same is more efficiently cooled than has heretofore been possible.

With these and other objects in view which will readily be apparent upon perusal of the specification, the invention comprises the means hereinafter described and particularly pointed out in the appended claims.

In the accompanying drawings:—

Figure 1 is a vertical section of the device constructed in accordance with my invention.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is a section on the line 3—3 of Figure 1.

Figure 4 is a section on the line 4—4 of Figure 1.

Figure 5 is a section on the line 5—5 of Figure 1.

Figure 6 is a section on the line 6—6 of Figure 1, and

Figure 7 is a section on the line 7—7 of Figure 3.

Referring to the drawings, 1 designates a casting provided at its upper portion with a plurality of circumferential ribs 2 so as to facilitate air cooling of the casting which constitutes a cylinder of a combustion engine. A fuel chamber 3 is secured in the lower portion of the casting 1 and is filled with liquid fuel through an aperture closed by a removable screw plug 4. The casting 1 is centrally bored for the reception of a reciprocating piston 5 equipped with a plurality of piston rings 6 and formed integral with or secured to the shaft 7 and adapted to execute hammer blows on a coacting anvil 8. A spring 9 surrounds the hammer shaft 7 within the piston 5 and is anchored with its end in apertures 10, 11, respectively disposed in the casting and in the solid portion of the piston 5. This arrangement precludes rotation of the spring during operation of the device.

The anvil 8 engages at 12 the hammer shaft 7 and is formed with a head 13 mounted to reciprocate in a bore 14 of the casting. To the anvil head 13 a shaft 15 is secured in any appropriate manner or if preferred the shaft may be formed integral with the head. At a suitable distance from the head 13 a ball bearing 16 is interposed between the casting wall and the shaft 15 and forms an abutment for the lower end of a coil spring 17 encircling the anvil shaft and engaging at its upper end a shoulder 18 formed on the casting wall. The shaft 15 is formed intermediate its ends with spiral teeth 19 and in mesh therewith are a plurality of spring impelled catches 21 arranged in the bore 14 and supported by a nut 20 closing the lower end of the casting.

Upon each stroke of the piston the anvil 8 is quickly thrown downwardly whereby the catches 21 are unmeshed but are again urged into mesh with the spiral teeth 19 under the action of their springs. As the renewed engagement between the teeth and the catches takes place almost immediately after unmeshing the catches mesh with the spiral teeth in a different location with the result that in a subsequent upward movement of the anvil, the latter will execute a slight rotation in which movement the parts secured to the anvil participate.

The tool 22 of suitable construction and length is inserted in the hollow anvil shaft 15 and is retained therein by a pin 23 extending through the tool and the shaft. The tool 22 is provided with an axial bore 23′ extending throughout its length and communicating at the upper end with a transverse bore 24 opening into a peripheral groove 25 of the anvil head. This groove is in registry with a longitudinal duct 26 leading to the upper end of the cylinder so that a part of the spent gases may escape through the duct 26, the groove 25, the bores 24, 23, and out through the tool to remove dust and other foreign substances accumulating there-

in. Apertures 27 in the cylinder wall constitute additional exhausting means for the products of combustion.

The carbureter for the device comprises a nut 28 in threaded engagement with the casting wall as shown in Figure 1. The nut is hollow to provide a chamber 31 and the upper end is normally closed by a valve 29 urged into closing position by a spring 30. The chamber 31 opens into a plurality of horizontal ducts 32 leading to the exterior and permitting the ingress of air. The horizontal direction of the ducts preclude the entry of dust into the valve chamber whereby the operation of the carbureter would be impaired. A fine bore 33 leads to the valve 29 and is closed thereby when the latter is in normal position. The bore 33 opens into a circumferential groove 34 of the nut 28 and within this passage a screw valve 35 is arranged controlling the communication between the passages 33, 34, and adapted to be adjusted by rotation of its head. A plurality of apertures 36 establish communication between the chamber 3 and the groove 34.

The handle 37 of the device is covered with rubber to absorb shocks engendered by the constant impacts between the hammer shaft and the anvil. The handle stem 38 is hollow and receives a pin 39 maintained in the position shown in Figure 1 by a spring 40. The pin is depressed to initiate movement of the piston 5 upon starting. The stem 38 forms an extension of the cylinder head 41 secured to the cylinder 1 by studs 42, screwed into the cylinder wall and loosely projecting through apertures in the head 41. Springs 43 are interposed between nuts 44 and the head, to retain the latter resiliently in engagement with the cylinder. The springs 43 effectively absorb shocks which otherwise would reach the upper parts of the device and eventually would cause destruction of the same. The ignition circuit includes a spark plug 45, and insulated contact pin 46 located at the side of the cylinder (Figs. 3 and 7) and extending into a longitudinal groove 47 of the piston. Upon reciprocation of the piston the end of the grooves contacts with the pin to close the circuit. The battery 48 is connected by a wire 49 to the contact pin and this wire is wound around the core 50 to energize the same and to thereby cause contact between the vibrator 51 and a terminal 52, causing the secondary circuit 53 to produce a spark between the terminals of the spark plug 45.

The cylinder is provided with peripheral ribs 54 as is usual in air-cooled cylinders. Between these ribs I have provided thin annular disks 55 which are loosely held on spindles 56 which extend through the ribs and disks parallel to the axis of the cylinder and are held at their ends in opposing recesses 57 and 58 formed in the shoulder 59 on the cylinder casting and the flange 60 formed on the cylinder head. These disks are vibrated by the explosions in the cylinder and cause a continuous agitation of the air and the consequent radiation of the heat from the cylinder.

In starting the device the piston 5 is moved downwardly by means of the projection 39ª attached to the starting pin 39 and a partial vacuum is formed above the piston. The latter compresses the explosive mixture beneath the same. Upon reaching the lowermost position, the duct 54 is opened wherethrough the compressed charge passes through the explosive chamber above the piston. The incoming charge deflected by the wall of the recess 55 formed in the piston scavenges the explosion chamber and forces the air therein through apertures 27 and the ducts 26 through the tool. The upward movement of the piston is obtained by the spring 9. During this stroke the gasoline or other liquid fuel stored in the chamber 3 is drawn through openings 36, passages 34, 33, upwardly together with the supply of air obtained from the openings 32 and by virtue of lifting the valve 29 the air passes through the openings 29ª and is mixed with the gas and this mixture accumulates in the explosion chamber beneath the piston 5. As the piston moves upwardly the ends of the groove contact with the pin 46 whereby the ignition circuit is closed and a spark generated at the electrodes of the spark plug 45 which ignites the fuel mixture partially compressed within the explosion chamber. The explosion forces the piston downwardly against the tension of the spring 9 whereby the mixture underneath the piston is compressed and forced upwardly above the piston by way of the duct 54. The products of combustion are ejected by the incoming charge through the apertures 27 and through the passage 26 to remove the foreign substances accumulating in front of the tool. It is to be noted that the upper end of the duct 26 is in communication with the interior of the cylinder at a point higher than the apertures 27 so as to receive the exhaust under high pressure, thereby causing a greater velocity of the exhaust coming out at the end of the tool.

The downward movement of the piston 5 imparts a blow to the anvil and tool. When the device is running idle, i. e., when a tool is not secured thereto such as occurs in the interim when one tool is exchanged for another, the spring 17 is relied upon to take up and absorb the force of the downwardly moving piston.

While the drawing indicates the preferred embodiment of the invention, vari-

ous changes and alterations may be made within the scope of the invention. I, therefore, do not limit myself to the exact constructional features as shown but want to avail myself of any modifications which come within the scope of the invention as defined by the appended claims.

I claim:—

1. An air cooled cylinder having annular peripheral ribs, spindles extending through the ribs parallel to the axis of the cylinder and thin annular disks surrounding the cylinder between the ribs and loosely held by said spindles.

2. An air cooled cylinder having annular peripheral ribs, a head having a peripheral flange, spindles extending through the ribs parallel to the axis of the cylinder, the cylinder casting and flange of the head having opposed recesses in which the ends of the spindles are held and thin annular disks surrounding the cylinder between the ribs and loosely held by said spindles.

In testimony that I claim the foregoing I have hereunto set my hand at Green Bay, in the county of Brown and State of Wisconsin.

SAMUEL R. SAUNDERS.