July 7, 1942. J. S. TOWNSEND 2,289,153

PISTON

Filed Dec. 18, 1939

FIG. 1.

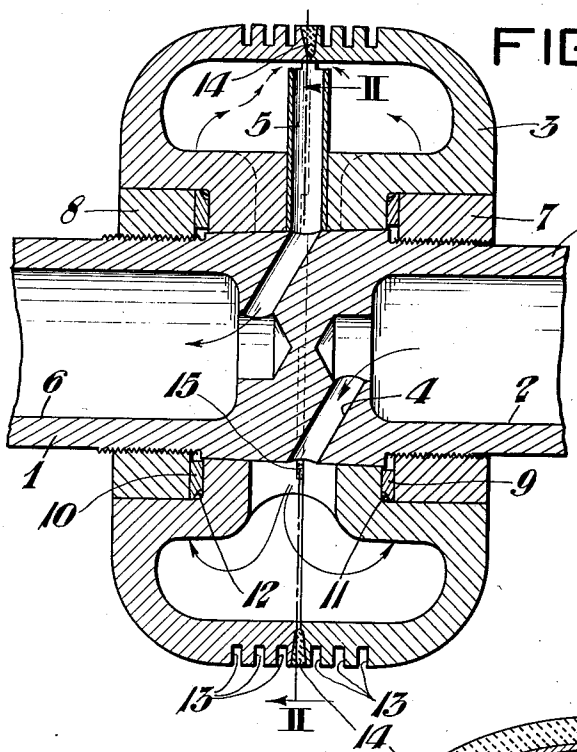


FIG. 4.

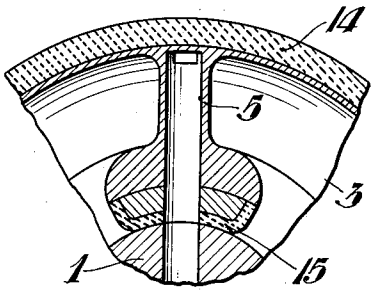


FIG. 2.

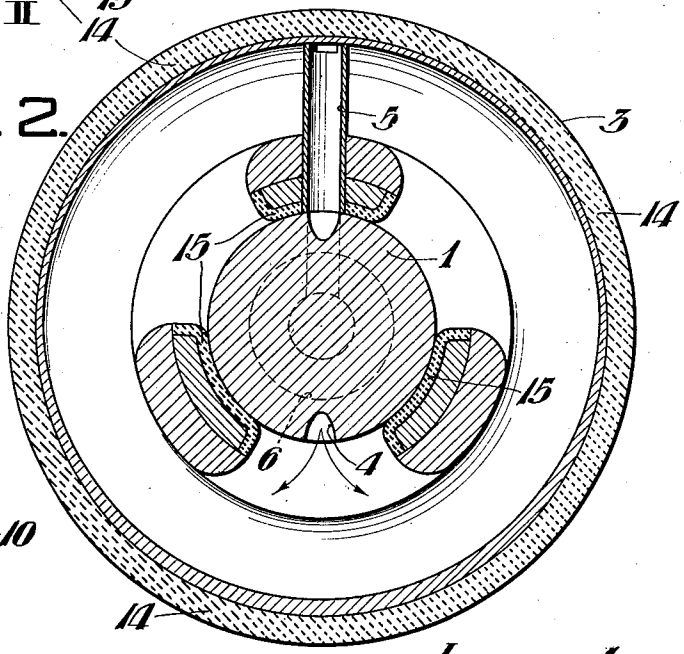
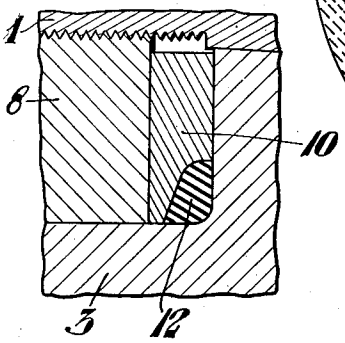


FIG. 3.



Inventor:
JOHN S. TOWNSEND,
by: John E. Jackson
his Attorney.

Patented July 7, 1942 2,289,153

UNITED STATES PATENT OFFICE

2,289,153

PISTON

John S. Townsend, Chicago, Ill.

Application December 18, 1939, Serial No. 309,881

3 Claims. (Cl. 123—176)

This invention relates to internally cooled gas engine pistons such as are used in blast furnace blowing engines.

The object of the inventor is to provide a piston which may be manufactured economically and which will withstand the usual strains of operation for a longer period than pistons heretofore used. Other objects may be inferred from the following.

Heretofore, pistons for such large horizontal gas engines have been cast with an annular cored-out center section to provide space for cooling water. This construction is satisfactory on smaller sizes of engines but has not given satisfactory performances on larger engines due to the increased load, shock, temperature variations and vibration. Failure of the pistons occurs by cracks in the piston wall allowing leakage of the cooling fluid into the gas engine cylinder.

A piston constructed according to the present invention is made in the form of two halves. These halves are easily produced in the foundry, internal strains are eliminated and they may be inspected for defects on their inner walls, repair of such defects being possible. The two halves are joined by welding, this producing a piston which will withstand the explosion of gas in the cylinder and the consequent thermal expansion and contraction in the walls of the piston. Specific examples of the piston embodying the principles of the inventor are illustrated in the accompanying drawing, in which:

Figure 1 is a longitudinal section;

Figure 2 is a cross section taken from the line II—II in Figure 1;

Figure 3 is an enlargement taken from Figure 1; and,

Figure 4 is a modification of details shown in Figure 2.

More specifically, the drawing shows a piston rod 1 having an internal passage 2 for the introduction of cooling fluid into the piston 3. The cooling fluid, which is generally water under a pressure of 50 to 100 pounds per square inch, circulates as shown by arrows in Figure 1, traveling from the internal passage 2 through a downwardly directed passage 4, then dividing and traveling around the piston and upwardly into the upper section of the same and finally exhausting through a vertical exhaust passage 5 opening from the top of the piston, the water discharging through a passage 6 in the extending piston rod.

The piston 3 is clamped to the piston rod 1 by means of two nuts 7 and 8 which fit on threaded portions of the piston rod and are drawn tight against washers 9 and 10 and rubber packing rings 11 and 12.

The exit passage 5 is provided with such clearance between its top and the inside of the pistons as to allow a measured pasage of the cooling fluid therebetween. By properly regulating the size of this passage and the volume of the cooling fluid, the upper surface of the piston is kept wet and cooled.

As previously mentioned, the piston 3 is made in two halves, these halves being generally produced by casting, although forging may be used in some instances, the metal being generally cast steel, although castings of iron or alloys of iron are indicated under some conditions. The piston 3 is provided with a series of piston ring grooves 13, these grooves accommodating the piston rings. The wall of the lower half of the piston is thickened at the bottom to allow for internal wear or erosion caused by the cooling fluid.

The main weld holding the two parts together is shown at 14, smaller welds 15 inside of the piston serving to provide a seal between the inside portions of the halves. The exist passage 5 is shown as comprising a pipe section welded in position. However, this exit passage 5 may be formed by integral parts of the castings of the two halves, as shown by Figure 4, the longitudinal seams of the passage being closed by welding. Such an integral construction is impossible when the piston is cast as one piece.

I claim:

1. A piston for a horizontal cylinder, comprising a hollow form having a water inlet and a water outlet opening from near the top of the inside of said form so as to insure the same being completely filled with circulating water.

2. A piston for a horizontal cylinder, comprising a hollow form having a water inlet and a water outlet opening from near the top of the inside of said form so as to insure the same being completely filled with circulating water, the wall of said form being thicker at the bottom of the same to accommodate erosion.

3. A piston for a horizontal cylinder, comprising a hollow form having a water inlet and a water outlet, the wall of said form being thicker at the bottom of the same to accommodate erosion.

JOHN S. TOWNSEND.