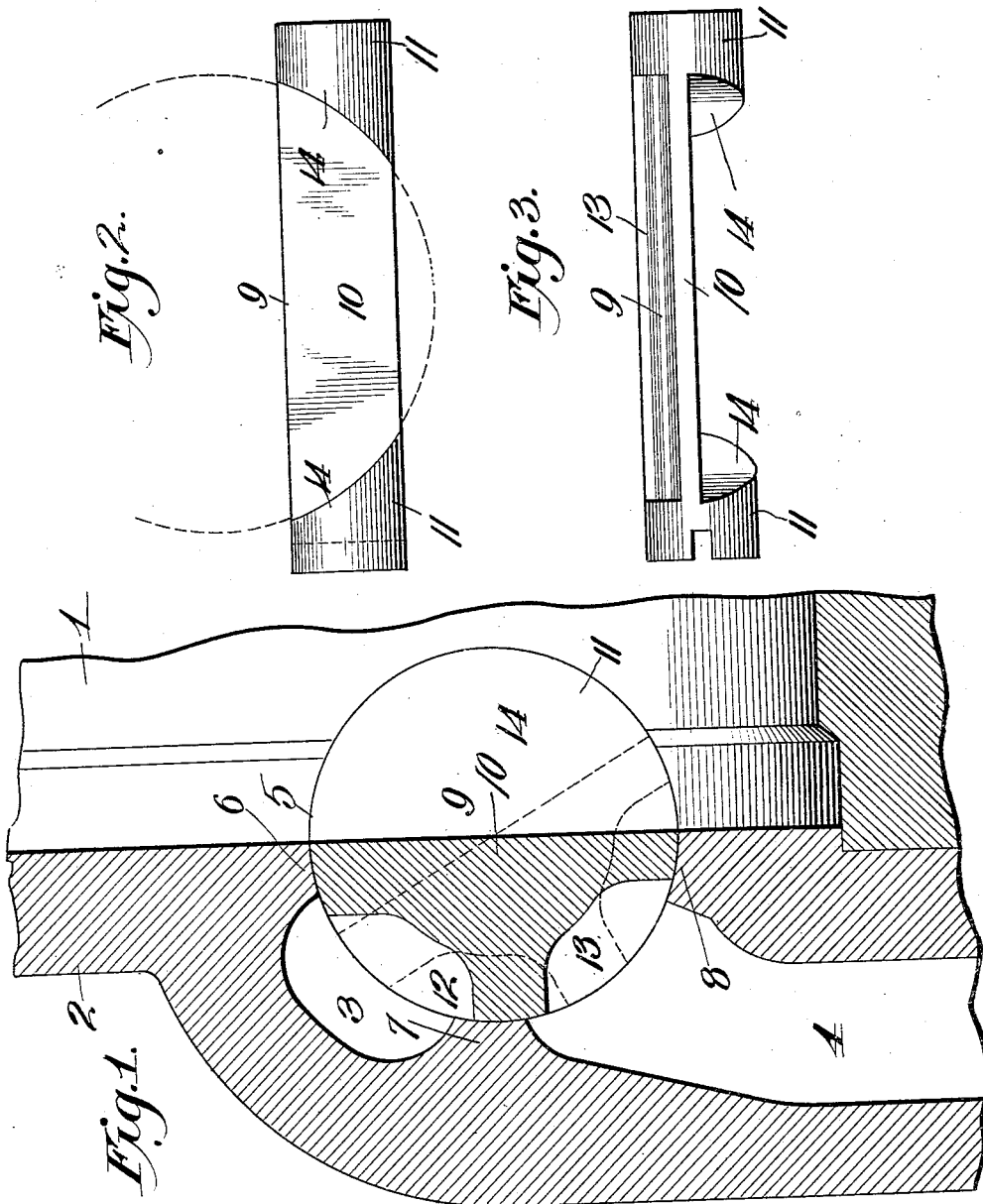


H. O. HEM.
EXHAUST VALVE FOR STEAM ENGINES.
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Witnesses
Frank R. Glon
H. C. Rodgers

Inventor
H. O. Hem
By George J. Thorpe, Atty.

UNITED STATES PATENT OFFICE.

HALVOR O. HEM, OF KANSAS CITY, MISSOURI.

EXHAUST-VALVE FOR STEAM-ENGINES.

1,050,537.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HALVOR O. HEM, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Exhaust-Valves for Steam-Engines, of which the following is a specification.

This invention relates to engines and more especially to that class in which the piston movement is effected by fluid pressure.

Heretofore a large portion of the steam entering the cylinder of an engine has been condensed upon coming in contact with the internal surface of the cylinder, whose temperature has been approximately reduced to that of the exhaust steam. To minimize this loss of steam by condensation is desirable and my primary object is to produce a cylinder and valve which presents a surface for contact with the exhaust steam of less area than any other engine of equal capacity of which I have knowledge.

A further object is to produce a cylinder and valve of such construction that the pressure of the fluid shall be utilized in maintaining a tight joint between the cylinder and valve for the purpose of preventing loss of power through leakage of fluid.

Another object is to provide a valve having a plurality of ports so that it shall need to move but a short distance to open fully and permit the exhaust fluid to quickly escape from the cylinder.

With these objects in view, the invention consists in certain novel and peculiar features of construction and organization as hereinafter described and claimed, and in order that it may be fully understood, reference is to be had to the accompanying drawings, in which—

Figure 1, is a fragmentary vertical section of a cylinder and valve embodying my invention. Fig. 2, is an inner face view of the valve on a reduced scale, a part of the cylinder being shown in dotted lines. Fig. 3, is a plan view of the valve when in its closed position.

In the said drawings, 1 indicates the body of the cylinder and 2, a head thereof, said head being provided with a chamber 3, and an exhaust passage 4. Formed conjointly in the head and cylinder are alined circular

journal openings or sockets 5 and the head between said sockets is cut away to provide upper, lower and intermediate bridges 6, 8, and 7 respectively, the faces of said bridges being flush with and of the same curvature as the sockets 5. The chamber 3, lies between the upper and intermediate bridges and the exhaust passage 4 communicates with the space between the lower and intermediate bridges.

9 is the valve having a body portion 10, of T-shape in cross section, and cylindrical trunnions 11. The valve is arranged with its ends journaled in sockets 5, and when it is closed the opposite ends of the head of the T-shaped body engage the bridges 6 and 8 and close communication between the interior of the cylinder and chamber 3 and exhaust passage 4, and the outer end of the stem of the body engages the intermediate bridge 7 and closes communication between said chamber and the exhaust passage, it being also noted that the flat or inner face of the head of the T-shaped body lies in the plane of the axes of the trunnions 11, and therefore when the valve is closed, is flush with and forms part of the inner face of said cylinder head 2, and thus reduces the area of the surface cooled by exhaust steam and diminishes loss by condensation to a proportionate degree.

The spaces lying between the ends of the valve and at opposite sides of the stem of the T-shaped body thereof, are numbered 12 and 13, and respectively constitute peripheral pockets for establishing communication when the valve is open, between the chamber 3 and the exhaust passage 4, and the interior of the cylinder and said exhaust passage, so that fluid may pass by two paths from the cylinder to the exhaust passage. Preferably the inner ends of the trunnions 11 are dished at 14, so that, when the valve is closed, said dished portions shall lie flush with and constitute portions of the inner surface of the cylinder, the arrangement being such that when the valve is closed, the piston, not shown, may enter the space of the valve lying between said dished portions 14.

When the piston approaches the head, the valve is opened substantially as indicated by dotted lines, Fig. 1, so that fluid in advance of the piston is free to escape above

and below the valve, the fluid which passes above the valve entering chamber 3, and thence passing through pocket 12 to the passage 4, and the fluid escaping below the valve passing through pocket 13 into passage 4. It will thus be seen that the fluid can escape rapidly at the proper time, the valve of course closing at a suitable time before the piston completes its stroke to retain a suitable amount of steam in the cylinder for compression. The body of the valve is T-shaped in cross section so that when the valve is closed its inner face lies in the same vertical plane as and forms a part of the cylinder head.

The ends or trunnions are preferably dished so that when the valve is closed the dished portions form an integral part of the inner surface of the cylinder and thus avoid the production of any pockets or unnecessary surface which would have a tendency to increase cylinder condensation. When this valve is used as an inlet valve on air or gas compressors the piston can closely approach the cylinder head and effect the completest possible evacuation of air or gas so as to get the greatest volumetric efficiency possible. The dishing of the inner portions of the trunnions is not necessary when the valve is used on a steam cylinder, as the trunnions can be cut away in any manner to avoid interference with the piston as it approaches the cylinder head.

It will be observed that when the valve is closed the pressure of fluid against its inner surface tends to wedge it tightly against the bridges, 6, 7, and 8 because it tapers outwardly from the upper and lower margins of its flat or inner face, and this wedging action continues to exist as the valve and bridges wear under service. It will also be understood that eventually the wear may be such that fluid may leak between bridge 6 and the valve into chamber 3 and peripheral pocket 12, but such leakage is not seriously objectionable because the valve under the downward and outward pressure of the fluid is held with a fluid tight joint against bridges 7 and 8. Furthermore if steam leaks into chamber 3 and pocket 12, it escapes upon the following opening movement of the valve and cannot pass back into the cylinder and by mixing with the steam therein tend to condense it, it being obvious that the greatest pressure upon the valve is downward and outward as above stated because the pressure is naturally toward the exhaust passage opposite the unbalanced area or surface of the valve.

From the above description it will be apparent that I have produced an engine embodying the features of advantage enumerated as desirable, and I wish it to be understood that while I have illustrated and described the preferred embodiment of the in-

vention, I do not desire to be restricted to the exact details of construction shown and described as obvious modifications will suggest themselves to one skilled in the art.

I claim:

1. A cylinder provided with a head having an exhaust port and an oscillatory valve controlling said exhaust port, and provided with a flat face; said valve being so arranged that its face when the exhaust port is closed, lies approximately flush with and in effect forms a part of the inner face of the cylinder head.

2. A cylinder provided with a head having a chamber, an exhaust passage, a bridge between the interior of the cylinder and said chamber, a bridge between the interior of the cylinder and the exhaust passage, and a bridge between the said chamber and the exhaust passage, and an oscillatory valve suitably journaled and bearing against said bridges and provided with a peripheral pocket communicating with the said chamber and with a peripheral pocket communicating with the exhaust passage.

3. A cylinder provided with a head having a chamber, an exhaust passage, a bridge between the interior of the cylinder and the exhaust passage, and a bridge between the said chamber and the exhaust passage, and an oscillatory valve suitably journaled and bearing against said bridges and provided with a peripheral pocket communicating with the said chamber and with a peripheral pocket communicating with the exhaust passage; said valve also having a flat inner face which when the valve is closed, lies approximately flush with and forms an integral part of the inner face of the said cylinder head.

4. A cylinder provided with transversely extending aligned circular sockets formed conjointly in its body and its head and in the latter with a chamber and an exhaust passage, the head being provided between the chamber and the interior of the cylinder with a bridge and between the exhaust passage and the interior of the cylinder with a second bridge and between said chamber and the exhaust passage with an intermediate bridge, and a valve provided with cylindrical trunnions journaled in said sockets and with a T-shaped body between said trunnions, the head of said body having a flat inner face in the plane of the axes of said trunnions and its ends normally engaging the first pair of bridges mentioned, and the stem of said body normally engaging the said intermediate bridge and forming a partition between the said chamber and the exhaust passage, the said trunnions being dished at their inner ends to accommodate the piston when the same has completed its stroke toward the valve and the latter occupies its closed position.

5. A cylinder provided with a head having an exhaust port, and an oscillatory valve controlling said exhaust port and of substantially semicircular form in cross section, the rounded or curved face engaging the head at opposite sides of the exhaust port and having a pocket normally between said points of engagement and in communication with said exhaust port and when the valve

is open establishing communication between the interior of the cylinder and the exhaust port. 10

In testimony whereof I affix my signature, in the presence of two witnesses.

HALVOR O. HEM.

Witnesses:

HELEN C. RODGERS,
G. Y. THORPE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."