

No. 675,886.

Patented June 11, 1901.

H. E. EBBS.

MEANS FOR COOLING PISTONS AND PISTON RODS OF GAS OR OTHER MOTORS.

(Application filed Dec. 20, 1899.)

(No Model.)

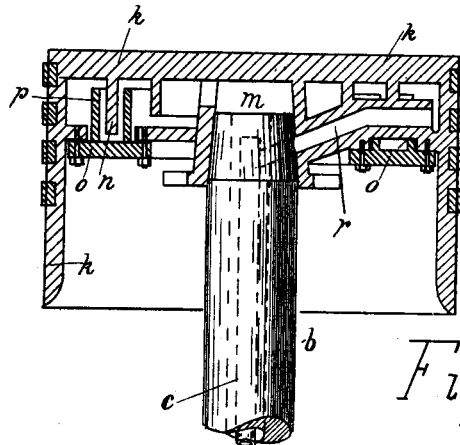


Fig. I

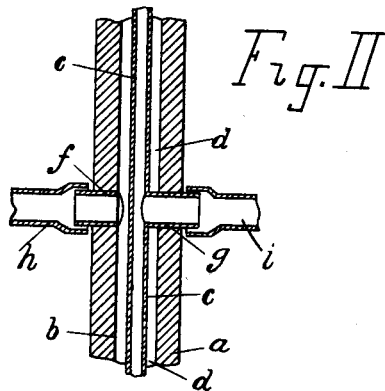


Fig. II

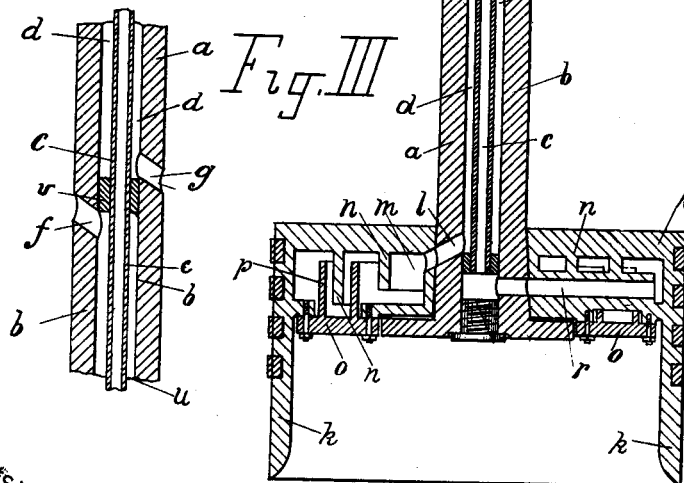


Fig. III

WITNESSES:

Alfred L. Hutchinson.  
Albert L. Hechters.

INVENTOR

Hermann E. Ebbs

BY Briesen & Knauth

his ATTORNEYS

# UNITED STATES PATENT OFFICE.

HERMANN EDGAR EBBS, OF NUREMBERG, GERMANY, ASSIGNOR TO THE FIRM OF VEREINIGTE MASCHINENFABRIK AUGSBURG UND MASCHINENBAUGESELLSCHAFT NÜRNBERG ACTIEN-GESELLSCHAFT, OF SAME PLACE.

MEANS FOR COOLING PISTONS AND PISTON-RODS OF GAS OR OTHER MOTORS.

SPECIFICATION forming part of Letters Patent No. 675,886, dated June 11, 1901.

Application filed December 20, 1899. Serial No. 740,965. (No model.)

*To all whom it may concern:*

Be it known that I, HERMANN EDGAR EBBS, a subject of the Queen of Great Britain, residing at Nuremberg, Bavaria, German Empire, have invented a certain new and Improved Means for Cooling the Pistons and Piston-Rods of Gas or other Motors, of which the following is a description.

The present invention consists of means for cooling the pistons and piston-rods of gas and other motors, as hereinafter particularly set forth, and pointed out in the claims.

In order to render the present specification easily intelligible, reference is had to the accompanying sheet of drawings, in which my invention is represented and in which similar letters of reference denote similar parts throughout the several views.

Figure 1 is a sectional elevation of two pistons and their connecting piston-rod as arranged for a tandem motor. Fig. 2 is a partial sectional elevation showing the means for feeding the cooling-water to and drawing it off from the piston-rod, and Fig. 3 is a similar section showing a modified structure for the same purpose.

The difficulty which has hitherto been experienced in constructing twin gas and petroleum motors as tandem engines was to be found in the great heat to which the piston-rod was subjected in the front cylinder, which increased the friction in the glands and caused the same to become loose, influencing the stuffing-boxes generally in a very disadvantageous manner. These disadvantages are obviated in the present invention by providing efficient cooling means for the piston-rods and the pistons. In order to attain this end, the piston-rod *a* is provided with a boring *b* throughout its length, within which a pipe is arranged, as at *c*, to form an interior cylindrical passage and an outer annular passage *d*. At a suitable point at or near the middle of the piston-rod an inlet-opening *f* to the annular space *d* is provided, and at the opposite side of the said rod an outlet-opening *g*, leading direct to the inner tube *c*, is also arranged. Both of these openings communicate with flexible tubes *h* and

*i*, by means of which water is fed to and withdrawn from the said spaces. There are various ways of arranging the circulation of the water in the piston-rod and through the hollow pistons, two being shown in the present drawings. The water may enter the annular space *d* by tube *h* at *f* (see Fig. 2) and pass along the hollow rod in both directions—*i. e.*, toward both pistons *kk*—the water passing out of a laterally-arranged opening *l* (lower end of Fig. 1) into the hollow interior chamber *m* of the piston. Here it enters a space consisting of a series of concentric chambers formed by concentric ribs *n* on the piston-head, projecting between intervening concentric ribs *p*, formed on the removable cover *o*, and is gradually conducted to the outer parts of the hollow piston. The ribs *n* on the piston-head are concentric and are so spaced as to enter the channels formed between the concentric ribs *p*, formed on the spindle-plate or removable cover *o*. By this means there is formed a series of concentric channels across which the cooling fluid flows from the center to the edge of the piston-heads, where it passes into a passage *r* in each piston-head, which passages conduct it into the center tube *c*, whence it passes out of the structure by passage *g*. The piston heads and rods will thereby be efficiently cooled.

At the upper end of Fig. 1 a somewhat different arrangement is shown from the arrangement shown at the lower end, the water entering the annular chamber *d*, passing into the central chamber *m*, thence along the spaces between the ribs *n* and *p* toward the periphery of the piston, and from the outermost part of the latter along the canal *r* direct to the inner tube *c* and back to the outlet *g i*. In both these cases the inlet and outlet for the water are arranged as shown at Fig. 2. If the arrangement is made as illustrated in Fig. 3, the two devices shown in connection with Fig. 1 may be combined and the water caused to flow first to one piston and then back to the other and then out at *g*. In this case the piston-rod *a* is provided with an annular partition *v*, which separates the annular space into two cham-

bers *d* and *u*, dividing the water-inlet from the outlet. In this construction the water entering at *f* flows along the annular chamber *u*, through *l* into the piston-chamber *m*, between the ribs of the piston-chamber to the periphery of the piston at the lower end of Fig. 1, through the canal *r* to the inner tube *c*, throughout the whole length of this tube to the left-hand-end piston, out at the end of the tube through *r* to the periphery of this piston, back through the piston-chamber in the opposite direction to that taken in the other piston into the chamber *m*, and back into the annular chamber *d*, from which it runs off at *g*.

I claim as my invention—

1. A piston for combustion-engines comprising a hollow piston-rod having a fluid-inlet and a fluid-outlet and a piston-head in liquid communication with the hollow piston-rod and chambered for the reception of cooling fluid, the said chamber being formed by continuous ribs in two sets, one set of ribs intermeshing with the other set of ribs so as to cause the fluid to flow in the piston-head in a serpentine path.

2. A piston-head chambered for the reception of a cooling fluid and provided with con-

tinuous intermeshing ribs and a piston-rod provided with inlet and outlet apertures and in liquid-conducting communication with the chambered piston-head.

3. A piston for use in combustion-engines consisting of a plurality of piston-heads, a hollow piston-rod connecting the said piston-heads, each of the said piston-heads being chambered, in liquid-conducting communication with the hollow piston-rod and provided with intermeshing ribs to cause the fluid to flow in the chambers of the heads in a tortuous path.

4. A chambered piston-head comprising in its structure a series of concentric ribs extending longitudinally of the said piston-head, a second series of concentric ribs extending longitudinally of the said piston-head and intermeshing with the first set or series of concentric ribs, the space between the said ribs being available for the circulation of cooling fluid.

In witness whereof I have hereunto set my hand in presence of two witnesses.

HERMANN EDGAR EBBS.

Witnesses:

ANDREAS STICH,  
OSCAR BOCK.