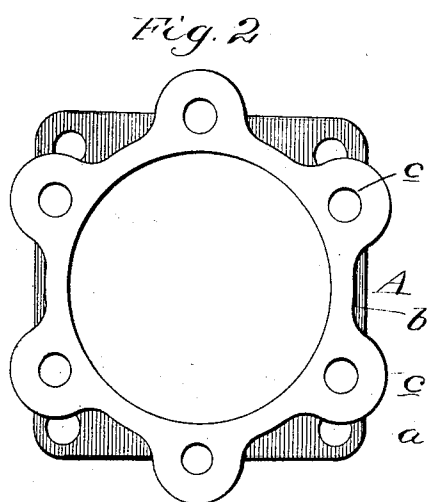
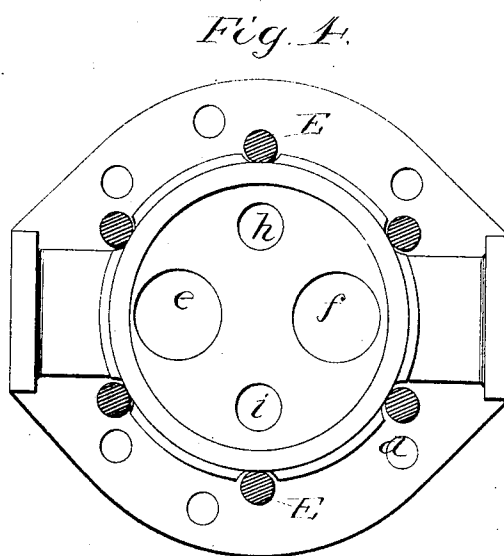
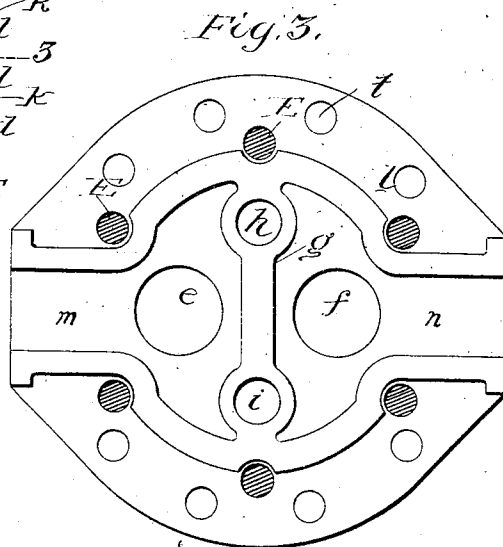
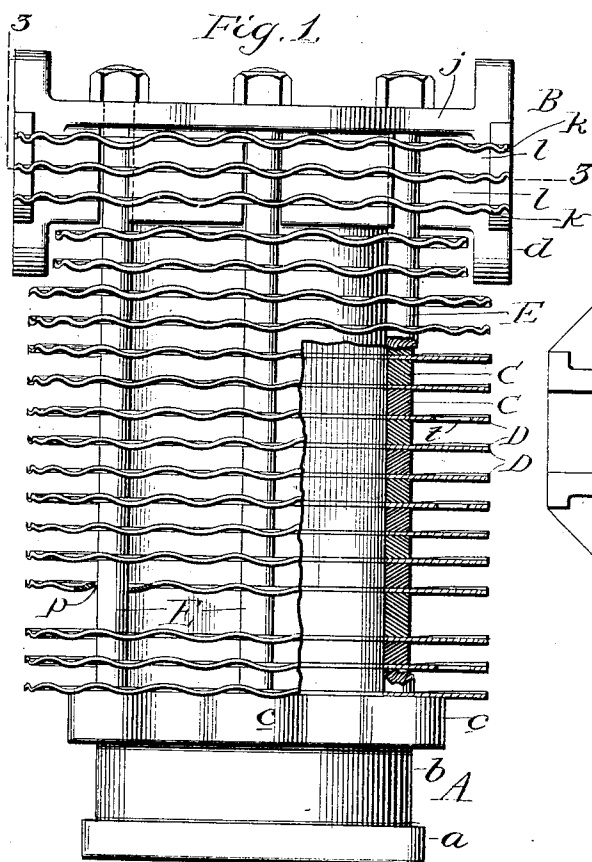


No. 784,636.

PATENTED MAR. 14, 1905.

C. SMITH.
ENGINE CYLINDER.
APPLICATION FILED NOV. 22, 1904.



Witnesses;
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UNITED STATES PATENT OFFICE.

CLEMENT SMITH, OF TOPEKA, KANSAS.

ENGINE-CYLINDER.

SPECIFICATION forming part of Letters Patent No. 784,636, dated March 14, 1905.

Application filed November 22, 1904. Serial No. 233,832.

To all whom it may concern:

Be it known that I, CLEMENT SMITH, a citizen of the United States, residing at Topeka, in the county of Shawnee and State of Kansas, have invented new and useful Improvements in Engine-Cylinders, of which the following is a specification.

My invention pertains to explosive-engine cylinders, more especially explosive-engine cylinders constructed with a view of radiating or giving off the heat due to explosions; and it has for one of its objects to provide an explosive-engine cylinder possessed of high efficiency in radiating heat or dissipating the same in the atmosphere.

Another object of the invention is the provision of an explosive-engine cylinder calculated to attain the desirable end stated and embodying such a construction that it is expedient to minutely examine for flaws each section of metal included in the cylinder precedent to the incorporation of the section in the cylinder and in this way assure the production of a cylinder free from defects.

Other objects and advantages of the invention will be fully understood from the following description and claims when taken in connection with the accompanying drawings, forming part of this specification, in which—

Figure 1 is a view, partly in diametrical section and partly in elevation, of the explosive-engine cylinder constituting the present and preferred embodiment of my invention. Fig. 2 is a plan view of the lower head of the cylinder. Fig. 3 is a horizontal section taken through the upper head of the cylinder in the plane indicated by the line 3 3 of Fig. 1, and Fig. 4 is an inverted plan view of the said upper head.

Similar letters designate corresponding parts in all of the views of the drawings, referring to which—

A is the lower head of the cylinder, which is preferably of cast-iron. The said head comprises a base *a*, adapted to be fixedly connected to a suitable bed, a reduced portion *b*, rising from the base, and six (more or less) lateral lugs extending from the upper portion of the perimeter of the reduced portion and having vertically-disposed apertures *c*.

B is the upper head of the cylinder. This latter head is preferably made up of a lower section *d*, of cast metal, having intake and exhaust ports *e, f* and also having a web *g* and apertures *h* and *i* formed in said web and designed for the connection of a sparking plug and a petcock, respectively, an upper section *j*, also of cast metal, and alternate layers *k* of copper or other metal of high thermal conductivity and layers *l* of cast metal interposed between the lower and upper sections *d* and *j*.

By reference to Fig. 3 it will be noticed that the several parts entering into the construction of the upper head B are formed to afford a passage *m* for the admission of explosive mixture and a passage *n* for the discharge of products of combustion.

C C are annular layers, preferably of cast-iron, interposed between the heads A and B.

D D are annular disks of copper or other metal of greater thermal conductivity than the metal of the layers C, alternating with the said layers C and having apertures *p*, and E E are connecting rods or bolts grouped about the layers C and extending through the apertures *p* of the disks or layers D and secured in any manner compatible with the purposes of my invention to the heads A and B.

In producing my novel cylinder the parts are relatively arranged and connected in the manner described and are preferably, though not essentially, heated, and in this way the body is rendered practically a one-piece body. Subsequent to the connection and heating of the parts and after the same have cooled the cylinder is bored out and machined after the usual manner to adapt it to receive a working piston.

As will be readily observed by reference to Fig. 1 of the drawings, the layers D of copper or other metal of high thermal conductivity extend from the interior of the cylinder, where the explosions take place and heat is generated, out into the atmosphere, and hence the said layers are highly efficient in radiating the heat and dissipating the same in the atmosphere, with a view of precluding undue heating of the cylinder. It will also be observed that the layers D may be extended as far beyond the perimeters of the layers C as

desired and, further, that the said layers D may be readily fluted or corrugated and perforated, as illustrated, so as to increase their radiating-surfaces. While I prefer to corrugate or flute the exposed portions of the layers D, I do not desire to be understood as confining myself to the same, inasmuch as the said exposed portions when flat are highly efficient in giving off the heat conducted from the interior of the cylinder by the layers. I also do not wish to be understood as confining myself to the perforations t in the several layers of high thermal conductivity, as said perforations may obviously be omitted when desired. Moreover, when used the said perforations t may be provided in either fluted or flat layers of high thermal conductivity without departing from the scope of my invention as claimed.

It will be readily appreciated from the foregoing that my novel cylinder, while simple and inexpensive, is highly efficient for general purposes and is well adapted to withstand the usage and strains to which the working cylinders of explosive-engines are ordinarily subjected. It will also be appreciated that by reason of the employment of the alternate layers C and D the builder of the cylinder is enabled to conveniently and minutely examine for flaws each of the layers, particularly the cast-iron layers C, precedent to the incorporation of the layers in the cylinders and in this way assure the cylinder being free from defects.

In addition to the practical advantages which I have hereinbefore ascribed to my novel cylinder it will be noticed that the same is very compact and takes up but little more transverse area than an ordinary cylinder of corresponding capacity.

The term "annular layer" as herein employed is intended to comprehend open layers of any suitable configuration.

I have entered into a detailed description of the construction and relative arrangement of the parts embraced in the present and preferred embodiment of my invention in order to impart a full, clear, and exact understanding of the said embodiment. I do not desire, however, to be understood as confining myself to such specific construction and relative arrangement of parts, as such changes or modifications may be made in practice as fairly fall within the scope of my invention as claimed.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A cylinder comprising alternate layers of cast metal and metal of a higher thermal conductivity than cast metal; the latter layers extending from the interior of the cylinder outwardly beyond the cast-metal layers.

2. A cylinder comprising layers of cast metal, and layers of metal possessed of higher thermal conductivity than the cast metal al-

ternating with the first-mentioned layers and extending from the interior of the cylinder outwardly beyond said first-mentioned layers and having their extended portions corrugated whereby the radiating-surface thereof is increased.

3. A cylinder comprising a head of cast metal, a head made up of cast-metal sections and layers of metal of a higher conductivity than cast metal alternating with the cast-metal sections, annular cast-metal layers interposed between the two heads, annular layers of metal of a higher thermal conductivity than cast metal also interposed between the two heads and alternating with the cast-metal layers, and rods connecting the two heads and arranged outside the cast-metal layers and extending through apertures in extended portions of the other layers.

4. A cylinder composed of a plurality of parts of one kind of metal and a plurality of parts of metal possessed of higher thermal conductivity than the first-mentioned metal; the latter parts extending from the interior of the cylinder outwardly beyond the first-mentioned parts.

5. A cylinder composed of a plurality of parts of one kind of metal and a plurality of parts of metal possessed of higher thermal conductivity than the first-mentioned metal; the latter parts extending from the interior of the cylinder outwardly beyond the first-mentioned parts and having their extended portions corrugated whereby the radiating-surfaces thereof are increased.

6. A cylinder composed of a plurality of parts of one kind of metal and a plurality of parts of metal possessed of higher thermal conductivity than the first-mentioned metal and extending from the interior of the cylinder outwardly beyond the first-mentioned parts; the said parts being bolted together.

7. A cylinder comprising a plurality of annular layers of one kind of metal, and a plurality of annular layers of metal of higher thermal conductivity than the first-mentioned metal extending from the interior of the cylinder outwardly beyond the first-mentioned layers.

8. A cylinder comprising alternate layers of cast metal and metal of a higher thermal conductivity than cast metal; the latter layers extending from the interior of the cylinder outwardly beyond the cast-metal layers and being provided in their extended portions with perforations.

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

CLEMENT SMITH.

Witnesses:

A. B. WHITING,
L. H. GREENWOOD.