A. BIE.

ENGINE CYLINDER.

APPLICATION FILED FEB. 16, 1916.

1,251,627. Patented Jan. 1, 1918.

Fig. 1.

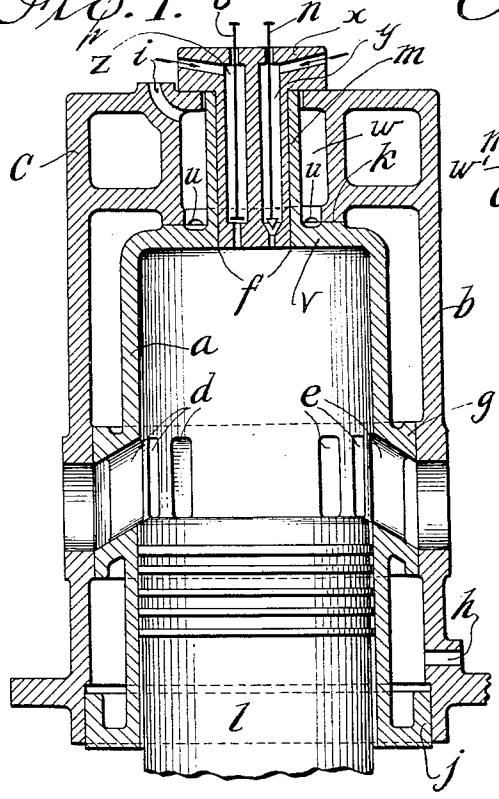


Fig. 3.

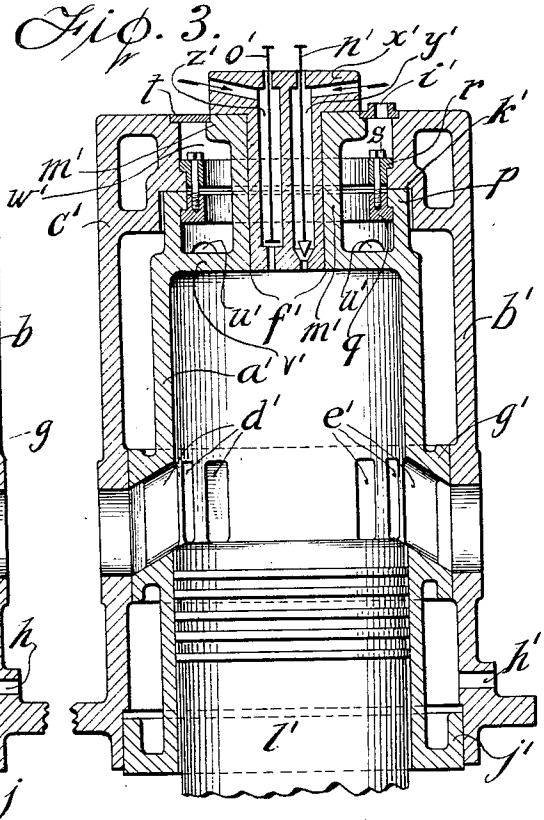


Fig. 2.

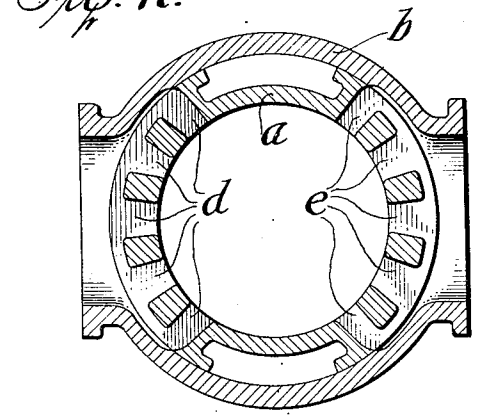
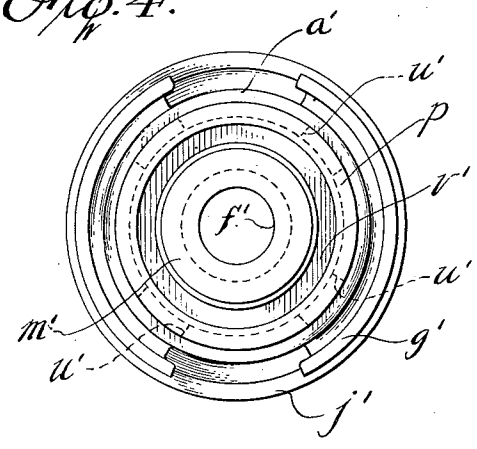


Fig. 4.



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ENGINE-CYLINDER.

1,251,627. Specification of Letters Patent. Patented Jan. 1, 1918.

Application filed February 16, 1916. Serial No. 78,579.

To all whom it may concern:

Be it known that I, ALBERT BIE, a subject of the Kingdom of Norway, residing at Winterthur, Canton of Zurich, Switzerland, have invented certain new and useful Improvements in Engine-Cylinders, of which the following is a full, true, and complete specification.

The invention concerns the construction of cylinders for internal combustion engines and more particularly the relation of the liners thereof to the outer jacket or casing, whereby such liners are insertible through the crank-shaft end of said casing and into abutting relation to the permanent head structure thereof, and whereby the valve structure in engines operating by fuel injection may be directly mounted in the liner, and whereby other advantages are obtained, as will be made apparent below.

In the accompanying drawings illustrating the invention in two of its embodiments:

Figure 1 is a longitudinal section through one form of the cylinder;

Fig. 2 is a cross section through the exhaust and scavenging ports thereof;

Fig. 3 is a longitudinal section through the other form; and

Fig. 4 is a top or end plan of the liner element of that form.

The jacket *b* and the head *c* may be a single casting, and the latter is formed with water chambers and a central opening. The liner *a*, with which the piston *b* has contact, is inserted through the lower or crank-shaft end of the jacket and is provided with radial enlargements *g* and *j* fitting against the machined sides of the jacket and an end wall *v* abutting against the machined face of a seat-ring *k* projecting from the inside of the jacket head and surrounding the opening therein. The said end wall is also provided with a central opening, designated *f*, and formed in a neck *m* which is circular in cross-section and concentric to the axis of the liner body so that the whole liner element is thus adapted to be turned in a lathe. The neck *m* contains the valve housing *x* which can be inserted therein from the top and may contain one or more valve chambers, such as, *y* and *z* for valve members *n* and *o*, controlling the admission of fuel and starting air, respectively. These valves are shown schematically in the drawings, but are to be understood as representing suitable or usual injection valve structures, and it is also to be understood that the liner is appropriately secured to the jacket cylinder by means not necessary to be shown.

The ports *d* for scavenging air and ports *e* for the exhaust extend through the enlargements *g* and corresponding port openings in the outer cylinder. The water-jacket space between the jacket and liner, which serves for the circulation of cooling water, is provided with an inlet at *h*, and communicates with the space *w* around the valve stud through openings *u* in the seat *k*, the water finding its outlet at the opening *i*, but the method of circulating the water may of course be varied according to the preference of the maker.

In the construction shown in Figs. 3 and 4, wherein corresponding parts are designated by the same reference characters plus a prime mark, the central opening in the head structure *c'* is larger than in the form first described, and the seat-ring *k'* is formed as a rabbet in such structure, which receives and makes a joint with the end of a circular flange *p* projecting from the end wall *v'* of the liner, near its outer margin. This flange is screwed to its seat by the bolts *s* and the clamp rings *q* and *r*, which may be either formed as parts of the jacket and liner, or as separate sectional rings in shouldered engagement therewith as indicated in the drawings. The openings *u'* connecting the space *w'* around the neck with the main water jacket space, between liner and jacket, are formed through the base of the flange *p*, in this case the top of the space *w'*, being closed by a ring *t* or by any other suitable means.

In both forms, above described, it will be noted that while the liner is readily assembled through the crank shaft end and easily secured to the jacket, it is also capable of manufacture in large sizes with great accuracy and at low manufacturing cost, and when installed in the engine is relatively free from uneven strains due to its symmetrical form and entirely secure against leakage due to the length of the tubular neck.

What I claim as new is:

1. A cylinder for internal combustion engines comprising a jacket, and a liner in-

sertible from the crank-shaft end of the jacket and having abutment against the head end thereof, the said liner being formed with a single concentric neck containing air starting and fuel injection valves.

2. A cylinder for internal combustion engines comprising a jacket casting having an integral or permanent hollow water-cooled head structure provided with an opening therethrough, a liner fitted to the interior of said casting and provided with a single central tubular neck extending to the exterior of the jacket through the said opening therein, and a plurality of injection valves mounted in said neck.

3. An internal combustion engine cylinder, comprising a jacket and a liner insertible from the crank-shaft end of the jacket and having abutment against the head end thereof, in combination with a tubular neck formed concentrically with the liner, a housing inserted in said neck and containing a plurality of valve chambers, and starting and fuel valve members in said chambers.

4. In an internal combustion engine, the combination of a jacket having a head provided with a concentric opening, a liner having lateral contact with the jacket and abutting against the head thereof to form an intervening water space with said jacket, a tubular neck formed concentrically with the end of the liner and disposed in the opening of the head, the said opening affording a water-jacket space encircling the neck, and having means of communication between said space and the main water-jacket space, and a plurality of injection valves contained in said neck.

5. A cylinder for internal combustion engines comprising a jacket, and in combination therewith a liner having an end wall formed with a concentric valve-receiving neck and a concentric flange projecting from the end wall, the said flange encircling a water space about the neck and abutting against the head portion of the jacket.

6. A cylinder for internal combustion engines, comprising a jacket having a centrally open head, a liner insertible from the crank-shaft end of the jacket and having an end wall provided with a concentric valve-receiving neck and an encircling flange, said flange and neck being separated by a water space, and means for drawing the flange to an abutment against the head.

7. In a cylinder for internal combustion engines, the combination of a jacket having a centrally open head, a liner insertible from the crank-shaft end of the jacket and having an end wall formed with a concentric neck and an encircling flange having abutment against the head, the flange and neck being separated by a water space, and openings through said flange placing the water space around the neck in communication with the main water space between the jacket and liner.

In testimony whereof, I have signed this specification.

ALBERT BIE.

Witnesses:
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