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K. FEILNER

CYLINDER HEAD FOR INTERNAL COMBUSTION ENGINES

Filed June 29, 1921

Fig. 1.

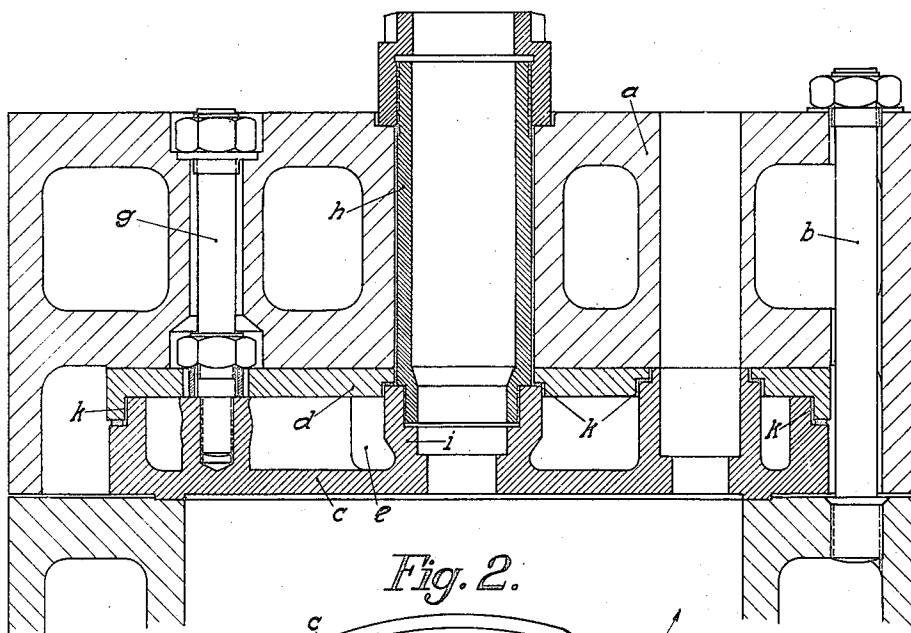
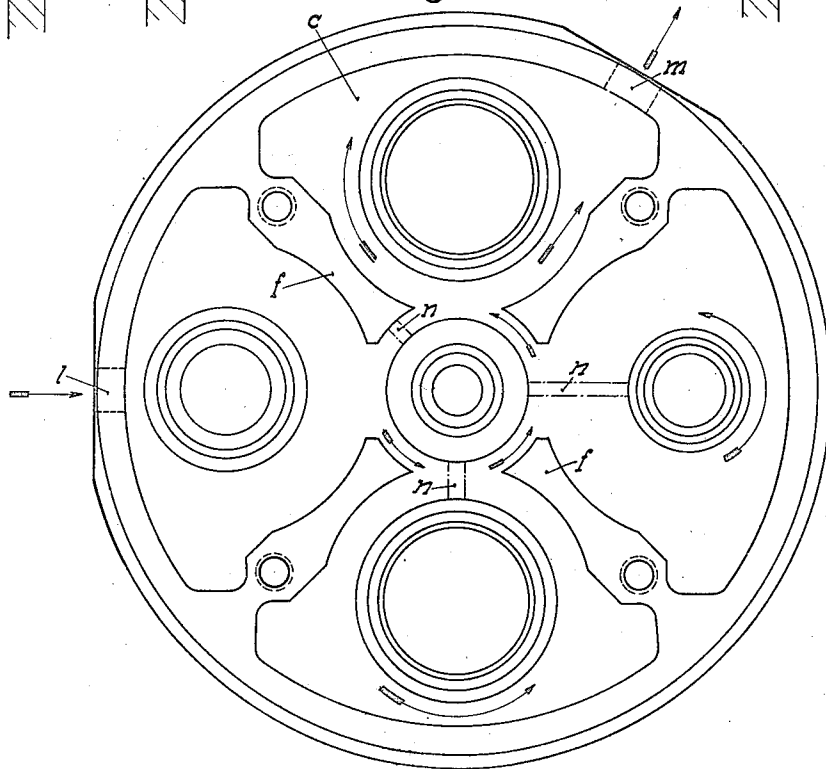


Fig. 2.



Inventor: Karl Feilner.

UNITED STATES PATENT OFFICE.

KARL FEILNER, OF AUGSBURG, GERMANY, ASSIGNOR TO MASCHINENFABRIK AUGSBURG-NUERNBERG, AKTIENGESellschaft, OF AUGSBURG, GERMANY, A CORPORATION OF GERMANY.

CYLINDER HEAD FOR INTERNAL-COMBUSTION ENGINES.

Application filed June 29, 1921. Serial No. 481,303.

(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

To all whom it may concern:

Be it known that I, KARL FEILNER, a citizen of the German Republic, residing at Augsburg, Germany, have invented certain new and useful Improvements in Cylinder Heads for Internal-Combustion Engines (for which I have filed application in Germany June 22, 1914, Patent No. 286,319, Aug. 3, 1915), of which the following is a specification.

It is known to construct the cylinder heads of internal combustion engines to consist of two distinctly separate parts, of which the one—i. e. the external part—serves to receive the working stresses of the engine, or the pressure of the fastening down bolts, and which is therefore made sufficiently strong to withstand these stresses, whereas the other—i. e. the internal part—serves in the first place for the conduction of the heat, and its configuration must therefore be such as will best serve this purpose.

Up to the present it has been usual to make these parts of cast material, with the disadvantage, that casting stresses frequently occurred in the finished pieces which gave rise to the walls cracking, and to cause, in this way, serious disturbances in the working of the engine.

In order to avoid this serious disadvantage the inner part, according to the invention, is made of wrought iron and, to absolutely ensure complete freedom from casting stresses, it is made of two parts, of which the one is machined, i. e. turned and milled respectively, out of a thick and solid plate of material. The other piece consists of an ordinary cover plate and both parts are tempered in addition.

This method of production offers the great advantages, that all thicknesses of the walls may be produced with utmost accuracy, that they can be exactly measured and that one may rest assured to have only the best material, as any faults which may be present in the material would immediately show during the treatment of the parts.

The accompanying drawing diagrammatically illustrates the invention by way of ex-

ample, the part shown representing a cylinder head for an upright single acting engine.

Fig. 1 is a vertical cross section and Fig. 2 a plan view of Fig. 1.

In this drawing *a* denotes the external part of the cylinder head which serves to take up the working and other stresses and which is a strong piece made out of the usual materials, cast iron or cast steel, and connected with the cylinder proper by means of the holding down bolts *b*. The internal part serving for the conduction of the heat is made in two separate parts namely, a lower part *c* and a cover plate *d*. Cooling spaces *e* are provided between these two parts, which are subdivided into narrow passages by means of ribs or webs *f* in the lower part *c*, through which passages the cooling water is caused to circulate at great speed. Owing to the fact, that the plate *d* may at any time be easily and completely removed, proper accessibility for cleaning and other purposes is ensured.

As stated above, the lower part *c* is turned and milled out of a strong solid plate of wrought iron, the requisite guides for the valves as also the aforesaid ribs or webs for guiding the cooling water being left standing during the process of machining.

The upper part *d* is in the shape of an ordinary cover plate adapted to rest upon the lower part *c*. Turned packing surfaces between which suitable packing rings, for example rubber rings, may be applied serve to tightly close up the cooling spaces, whilst at the places of the ribs or webs the cover plate is in direct contact with the lower part, as these places do not necessitate a special packing.

The connection of the heat conducting parts *c*, *d* with the head portion *a* adapted to take up the working stresses is effected partly by bolts *g* and partly by sleeves *h*, which are passed through the bosses *i* serving as guides for the valves in the lower part *c*.

In the arrangement of the said sleeves *h* and the bolts *g* care is being taken, that the whole of the lower heat conducting part

may expand radially in relation to the upper part *a*, and the said sleeves and bolts are therefore passed through the part *a* with a certain amount of play. Also the two portions *c* and *d* of the heat conducting part are mutually so united as to enable an expansion of the lower part *c*, which is subjected to the high temperatures of the combustion space, in relation to the flat cover plate *d*. For this purpose the clearances *k* which are to be seen in the drawing are provided around the packing places.

The circulation of the cooling water in the construction shown is such that the water must follow a definite course of circulation inasmuch as the cooling spaces are formed into a long narrow passage, in which owing to the large quantity of water and the narrow cross section of the passages a high circulating speed of the water is obtained, which very favourably influences the cooling action. For the proper circulation of the water the separately fixed partitions *n* are provided as shown in dot and dash lines in Fig. 2. The water enters the device for example at *l* and leaves it at *m*.

It is evident, that similar to the illustrated example of a single acting upright engine, the construction of the cylinder head, or of the internal heat conducting part of the same respectively, may be the same in connection with double acting and horizontal engines, and it is also evident, that the advantages obtained will be the same in both cases.

What I claim is:

1. In an internal combustion engine a cylinder head made in two parts, an outer part to take up the working stresses and an inner part to conduct the heat from the combustion chamber, the latter consisting of two parts, one being machined from a solid piece of wrought iron, whilst the other is in the shape of a wrought iron cover plate.

2. A cylinder head for internal combustion engines made in two main parts and having in combination an external part to take up the working stresses, and a bipartite internal part consisting of two separate wrought iron pieces machined and united so as to form water spaces between them.

3. A cylinder head for internal combustion engines having in combination an external part, a bipartite wrought iron internal part surrounded by said external part, cooling water spaces between the two members of the internal part, partitions and webs in the said cooling spaces to restrict the passages and to direct the flow of water, bosses and valve guides in the said internal part

and means to mutually unite the various parts of the cylinder head.

4. In a cylinder head for internal combustion engines, an external part to take up the working stresses, a cavity at the bottom of said external part, an internal part machined out of a solid blank of wrought iron so as to provide for cooling water spaces, bosses and valve guides within said internal part, a cover plate to said internal part having perforations to correspond to the valve guides, both the internal part and the cover plate being arranged in the cavity of the said external part, and means to mutually unite the various parts of the cylinder head.

5. In a cylinder head for internal combustion engines, an external part to take up the working stresses, a cavity at the bottom of said external part, an internal part machined out of a solid blank of wrought iron so as to provide for cooling water spaces, bosses and valve guides within said internal part, a cover plate to said internal part having perforations to correspond to the valve guides, packing spaces provided at the internal part and its cover plate and adapted to fit each other with a certain amount of play, both the internal part and the cover plate being arranged in the cavity of the said external part.

6. In a cylinder head for internal combustion engines, an external part to take up the working stresses, a cavity at the bottom of said external part, an internal part machined out of a solid blank of wrought iron so as to provide for cooling water spaces, bosses and valve guides within said internal part, a cover plate to said internal part having perforations to correspond to the valve guides, packing spaces provided at the internal part and its cover plate and adapted to fit each other with a certain amount of play around the packing spaces, both the internal part and the cover plate being arranged in the cavity of the said external part, connection sleeves screwing into the valve guides and connection bolts, being arranged to unite the various parts of the cylinder head, and a certain amount of play around the connection sleeves and bolts in the external part.

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

KARL FEILNER.

Witnesses:

PAUL DREY,
RICHARD LINK.