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K. BASSLER

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INTERNAL COMBUSTION ENGINE

Filed Dec. 26, 1929

Fig. 1.

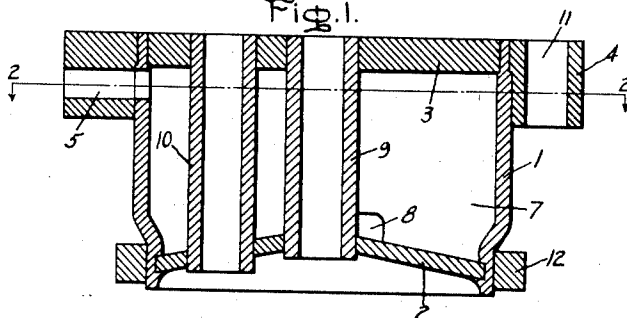


Fig. 3.

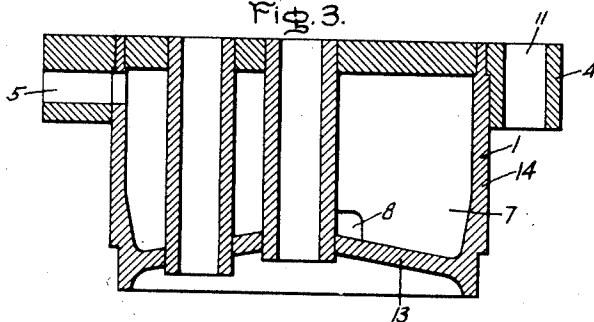
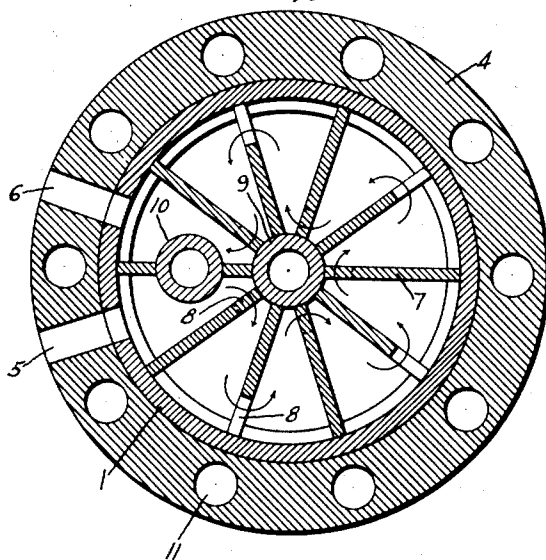


Fig. 2.



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UNITED STATES PATENT OFFICE

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INTERNAL COMBUSTION ENGINE

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The present invention relates to internal combustion engines and especially to cylinder parts, for instance cylinder heads and pistons for such engines.

5 These cylinder parts as heretofore constructed frequently develop cracks during the operation, which are not caused by improper shaping but rather by the selection of the material from which they
10 are made, which selection influences the shape of the parts. For instance, in the case of cast iron cylinder heads, the walls for large cylinders must be very strong because of the small tensile and bending strength of
15 cast iron and this, in turn, has the effect that the surfaces which face the combustion chamber and are exposed to the heat therein assume very high temperature during operation, while the other water-cooled walls do
20 not become so hot. The cracks which frequently manifest themselves very rapidly are the result of the heat stresses caused by these temperature differences. Cast steel cylinder heads and pistons likewise have not been able
25 to withstand the stresses; also in the manufacture of cast steel heads there is considerable loss because of the frequent occurrence of flaws in the castings.

30 The object of my present invention is to provide improved cylinder heads and pistons and a method of manufacturing the same, whereby the above difficulties are overcome, and for a consideration of what I believe to be novel and my invention, attention is directed to the following specification and the
35 claims appended thereto.

The drawings show by way of an example a cylinder head manufactured according to the invention.

40 In the drawings, Fig. 1 is a sectional view of the cylinder head; Fig. 2 is a sectional view taken on line 2—2 of Fig. 1; and Fig. 3 is a view similar to Fig. 1 of a modification.

45 According to my invention, I form the cylinder head of a number of individual parts which are united by means of brazing. The brazing operation is carried out preferably by introducing of a suitable metal, for instance copper, between the surfaces of the
50 parts pressed tightly together at a high tem-

perature and in the presence of hydrogen, so that the copper is drawn into the joints by the capillary effect. However, my invention is not limited necessarily to this particular method. By the use of the brazing process
55 for uniting the several individual parts I am enabled to utilize materials having the most advantageous properties and having a thickness best adapted for the conditions to which they are subjected. For example, the parts
60 which are exposed directly to the interior of the cylinder may be of comparatively thin material and if desired, a material having a high heat conductivity whereby such wall may be effectively cooled. At the same time
65 other parts may be made of material of high strength and of a thickness such that it is capable of withstanding the stresses to which it is subjected. For example, the parts
70 which are exposed to the greatest heat may be made of a metal such as copper which has a high heat conductivity, whereas the parts which are least subjected to heat can be made
75 of material having a high strength such as ingot iron or cast steel. Also, by the use of the brazing process for uniting the parts, there is obtained a construction which is permanently tight and not likely to develop leaks in operation.

Referring first to Figs. 1 and 2 of the drawings, the cylinder head comprises a tubular
80 part 1, a lower disk 2 which is directed toward the interior of the cylinder, an upper closing disk or cover 3 and a flange ring 4. The flange ring 4 is provided with an opening
85 5 through which cooling water is supplied to the head, and an opening 6 through which the cooling water is discharged from the head. Inside tubular part 1 are a series
90 of spaced radially extending webs 7 which serve to brace and strengthen the part 1 and also to distribute the cooling water, the webs being provided alternately with radial inner and outer openings 8 which serve to effect
95 a flow of the cooling water after the manner indicated by the arrows in Fig. 2. In the cylinder head is a central sleeve 9 to which the webs 7 are connected and which may serve for instance either as a casing for a
100 fuel valve or as a stuffing box housing for a

piston rod, depending upon the type of engine with which the head is used. At 10 is a second sleeve which may serve, for instance, as a housing for an exhaust valve. In flange ring 4 are openings 11 through which bolts may extend for fastening the cylinder head in place on a cylinder.

During the brazing operation it is necessary that the parts be held closely in contact with each other in order to insure a satisfactory braze. In the case of the upper portion of the head the flange ring 4 may be shrunk into place during the initial assembling of the structure, thereby tightly holding these parts together. In the case of the lower part of the cylinder head, a ring 12 may be shrunk around tubular part 1 to hold it tightly against disk 2 during the brazing operation, the ring 12 being removed after the brazing operation is completed.

The arrangement shown in Fig. 3 is similar to that shown in Fig. 2, except that the lower disk 13 corresponding to the disk 2 of Fig. 1, is formed integral with the tubular part 14, corresponding to the tubular part 1 of Fig. 1. Otherwise, the construction shown in Fig. 3 may be the same as that shown in Figs. 1 and 2.

By my invention, it will be seen that I provide a cylinder head construction formed of several parts which are permanently united by means of brazing, whereby, as stated above, I am enabled to select for the various parts materials best suited to withstand the conditions under which they are required to operate.

In carrying out the brazing operation, I may with advantage place at suitable points inside the tubular part 1 additional copper which during the brazing operation will spread out and coat the inner surfaces of the cylinder head, thereby protecting them against corrosion by the cooling water.

In accordance with the provision of the patent statute, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative and that the invention may be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. A cylinder head for internal combustion engines comprising a tubular part which forms the outer wall, upper and lower disks in said tubular part, and a flange ring surrounding the tubular part, said tubular part, disks and flange ring being united to each other by brazing.

2. A cylinder head for internal combustion engines comprising a tubular part, upper and lower disks in said part, a flange ring surrounding the tubular part, and radially extending strengthening webs inside the tu-

bular part, said tubular part, disks, ring and webs being united to each other by brazing.

3. A cylinder head for internal combustion engines comprising a tubular side wall, an inner disk of relatively thin material in said side wall, an outer disk of relatively heavy material in said side wall, and a flange ring surrounding said side wall; said side wall, disks, and ring being united by brazing.

4. A cylinder head for internal combustion engines comprising a tubular side wall, an inner disk of relatively thin material in said side wall, an outer disk of relatively heavy material in said side wall, and a flange ring surrounding said side wall; said side wall, disks and ring being united by brazing, said inner disk being formed from material of relatively high heat conductivity.

In witness whereof, I have hereunto set my hand this 29th day of November, 1929.

KURT BASSLER.