P. HENTSCHKE.

CYLINDER HEAD.

APPLICATION FILED FEB. 19, 1917.

1,326,501. Patented Dec. 30, 1919.

Fig. 1.

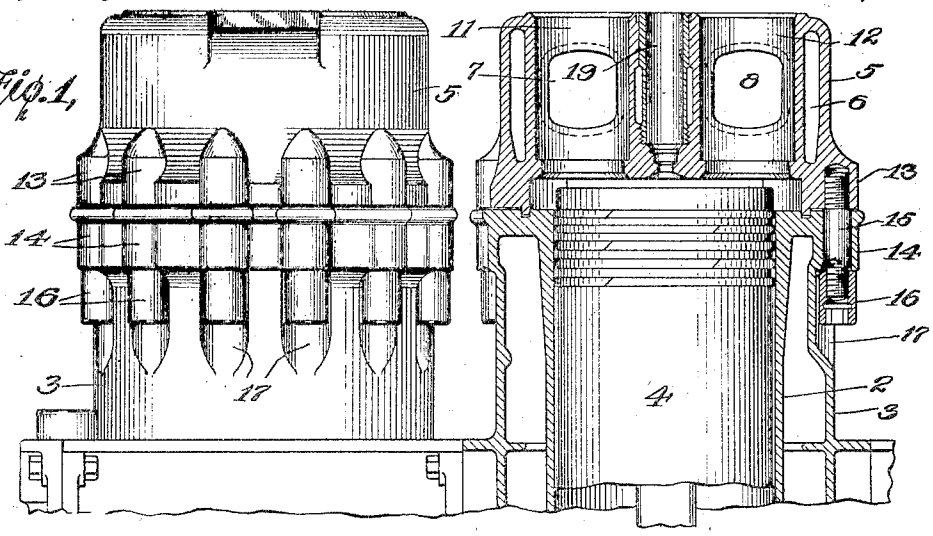
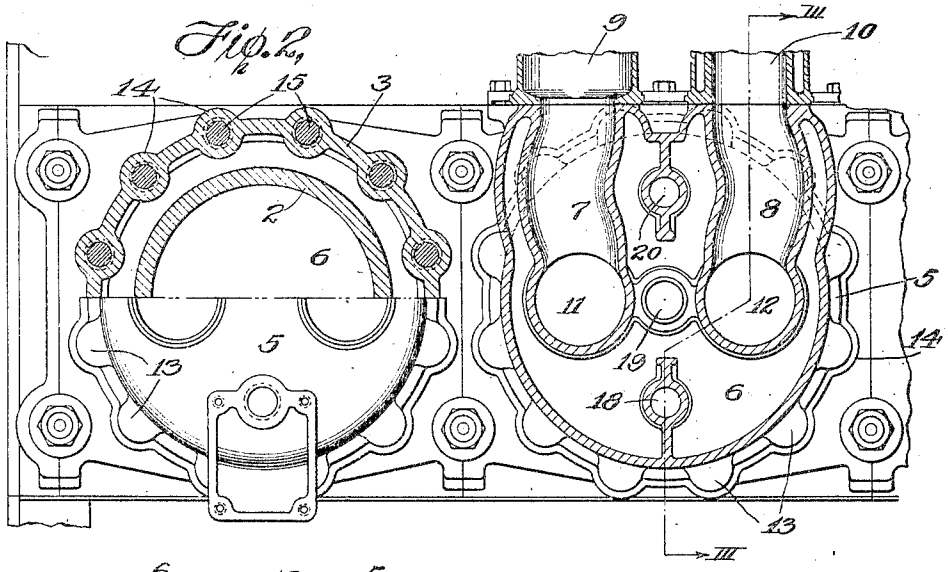


Fig. 2.



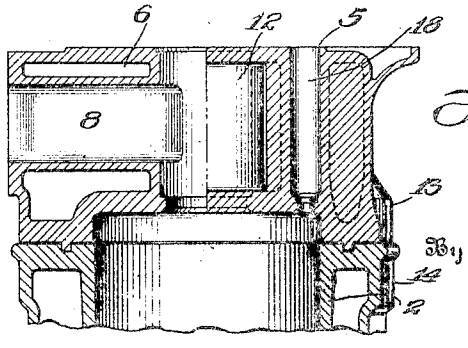


Fig. 3.

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CYLINDER-HEAD.

1,326,501. Specification of Letters Patent. Patented Dec. 30, 1919.

Application filed February 19, 1917. Serial No. 149,406.

To all whom it may concern:

Be it known that I, PAUL HENTSCHKE, a citizen of Germany, residing in St. Louis, Missouri, have invented the following described Improvements in Cylinder-Heads.

The purpose of the invention is to secure a stronger and safer head construction for water-cooled internal combustion engines, which is accomplished by a virtual separation in the head casting of the parts which carry the ports or passages for intake and exhaust and the parts which serve for the clamping of the head to the end of the cylinder, so that the mechanical and thermal strains are substantially confined to different regions and their effects thereby rendered less severe. Such separation also permits the said passages to be in the form of free pipes, disposed as desired, and surrounded at all sides by the water of the cooling jacket or other cooling medium and united only at their ends with the head, whereby they are unrestricted in respect not only to their thermal expansions and contractions, and are adequately cooled, but also in respect to their shrinkage strains after casting. The design and location of the lateral ports of a multi-cylinder engine are, thus, unrestricted by the exigencies of the clamping means, which, for its part, can be constructed with a view to lightness, strength and compactness without limitation by the form of the ported zone. Other features and advantages will appear from the following description in connection with the embodiment illustrated in the accompanying drawings, wherein:

Figure 1 is an elevation and vertical section of two adjoining cylinders and their heads, of a multi-cylinder engine and illustrating the preferred embodiment of the principle of the invention;

Fig. 2 comprises a partial plan and horizontal sections of the same taken in different planes; and

Fig. 3 is a vertical section on the irregular line III—III of Fig. 2.

Each of the separately cast cylinders 2 has a water-jacket shell 3 shown as integral with its inner wall wherein operates the piston 4. The heads 5 are integral hollow castings, the interiors of which form water spaces 6. Within this space in each head are lateral passages 7 and 8 for intake and exhaust, in the present case, the same being formed by interior walls of the casting and constituted as free pipes with uniformly thin walls and surrounded at all sides by the water-jacket space and united integrally at their outer ends with one of the side walls of the casting, to which the exhaust and intake pipes 9 and 10 may be bolted, and at their inner ends to the walls of valve chambers 11 and 12, which intersect the cylinder head and open into the combustion space.

Below the zone of the lateral passages just described, that is to say, toward the crank-shaft, not shown, the head is formed with a belt of socket lugs 13, having closed tops in the present case, corresponding to which are other lugs 14 arranged in a belt upon the exterior of the engine cylinder or its water-jacket, this zone being of greater diameter than the zone of the lateral port passages. Stud bolts 15 passed through the lugs 14 are screwed into the lugs 13, with nuts 16 upon their cylinder ends and accommodated in recesses 17 in the outside wall of the water-jacket, serve to draw the head to the cylinder with the requisite clamping pressure.

The passages 7 and 8, it will be observed, are above the clamping region denoted by the location of the belt of bolt holes and are consequently free from stresses set up by the clamping pressure and do not superadd their expansion and contraction strains, due to the thermal changes, to the normal mechanical strain of the clamping means. Each part of the head is thus independent of the other so far as its internal stresses are concerned and the structure as a whole is therefore relieved of the complex strains which have been the cause of rupture in heads of common design. The slight offset or bowing of the pipe passages 7 and 8 as shown in Fig. 2, is for the purpose of giving them a certain flexibility in the cooling of the casting when it is made, so as to avoid as far as possible internal strains due to the process of manufacture.

The head may also be provided with additional, vertical chambers or passages 18, 19 and 20, to be equipped with valves of different kinds forming no part of the invention. It will also be apparent that the separation of the functions of the head parts as above described may be applied to various kinds of cylinder heads, of different purpose and appearance from that herein shown with the benefit of the results above

described and within the scope of the invention.

It will be observed that it becomes possible not only to form the passages in the most beneficial manner, but also to dispose them in the relation deemed most favorable for the purposes of a multi-cylinder engine, while on the other hand the attaching means is also of superior character, the elements of the design being reconciled in a unitary structure, to the advantage of each and the improvement of the whole.

What I claim as new is:

1. In an internal combustion engine, and in combination with a water-jacketed cylinder, a water-cooled head comprising a hollow casting containing a water space traversed by lateral port passages in the nature of free pipes integral at both ends with the casting, and clamping bolt and socket means disposed in a zone at the end of the cylinder and the base of the head below the zone containing said free pipe ports, whereby the regions of thermal and clamping strain are substantially distinct.

2. A water-cooled cylinder head for internal combustion engines, comprising a hollow casting with gas passages in a zone in its interior water space, and a belt of socket lugs around said head forming a zone of greater diameter on the cylinder side of the zone of said gas passages and serving as clamp means for securing the head to the cylinder.

3. In an internal combustion engine, the combination of a water-cooled head comprising a hollow casting having laterally-extending gas passages in its interior and a belt of closed-top socket lugs around its lower portion below the zone of said passages, a water-cooled cylinder having a belt of complementary socket lugs around the upper portion of its water-jacket, stud bolts passed through the cylinder sockets and screwed into the head sockets, and nuts on the lower ends of the stud bolts accommodated in external recesses in the outer wall of the water-jacket.

4. In an internal combustion engine, the combination of a water-jacketed cylinder, a water-cooled cylinder head comprising a hollow casting forming an end-wall closure to the piston space and containing a water space traversed by one or more lateral port passages in the nature of free integral pipes and clamping bolt and socket means for said head disposed around the cylinder end thereof and separate from the zone containing said free pipe ports whereby the regions of thermal and clamping strain are substantially distinct.

In testimony whereof I have signed this specification.

PAUL HENTSCHKE.