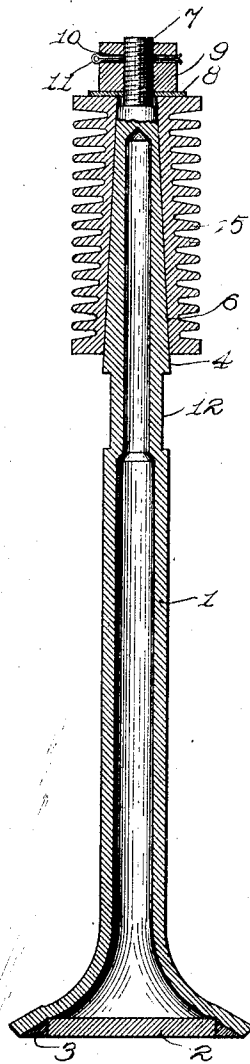


A. O. DADY.
VALVE FOR INTERNAL COMBUSTION ENGINES.
APPLICATION FILED JAN. 2, 1918.

1,306,175.

Patented June 10, 1919.



Witnesses;
Andrew McIntire
Albin C. Ahlberg.

Inventor
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Attys

UNITED STATES PATENT OFFICE.

ARTHUR O. DADY, OF NEW YORK, N. Y., ASSIGNOR TO PFANSTIEHL COMPANY, INCORPORATED, OF NORTH CHICAGO, ILLINOIS, A CORPORATION OF NEW YORK.

VALVE FOR INTERNAL-COMBUSTION ENGINES.

1,306,175.

Specification of Letters Patent. Patented June 10, 1919.

Application filed January 2, 1913. Serial No. 209,889.

To all whom it may concern:

Be it known that I, ARTHUR O. DADY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Valves for Internal-Combustion Engines, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to improvements in valves for internal combustion engines, and is particularly concerned with hollow exhaust valves of the so-called mercury cooled type in which a small quantity of mercury held in the head of the valve is vaporized when the valve head becomes heated, the vapor being condensed upon the walls of the valve stem and returned to the valve head. In order to insure the most efficient cooling action in valves of this type it is necessary to provide means for quickly radiating the heat from the valve stem. Various expedients have been employed for this purpose, and the objects of my invention are, first, to provide a radiator having intimate contact with the valve stem, whereby the resistance to the radiation or conduction of heat is reduced to a minimum; second, to provide a radiator adapted to be detachably connected with the valve stem; third, to provide a radiator of the class described which will not materially increase the weight of the valve. Further objects will appear as the description progresses, reference being had to the accompanying drawing, in which my improved valve is shown in central longitudinal section.

Referring to the drawing, the reference character 1 indicates a hollow valve stem which is flared at one end and closed by a metal disk 2, which is brazed or otherwise secured in place as indicated at 3. The opposite end of the valve stem is tapered as shown at 4. Seated upon the tapered portion of the valve stem is a radiator provided with a plurality of spaced annular ribs 5, and a tapered bore 6 for receiving the tapered portion of the valve stem, so that the inner wall of the radiator is in intimate contact with the tapered portion of the valve stem throughout its length. A threaded stud 7 projects from the valve stem adjacent the smaller end of the tapered

portion. The metal washer 8 surrounds the threaded stud 7 and rests against the adjacent end of the radiator, being held in place by a nut 9. The nut 9 is provided with a slot 10 for receiving a cotter pin 11, which extends through a suitable hole in the threaded stud and locks the nut in place. At 12 I have indicated an annular groove, which is adapted to receive the mechanism for actuating the valve.

I preferably construct the valve head and stem of my improved valve from steel or steel alloys, and the radiator from aluminum. By using aluminum for the radiator the weight of the valve is not materially increased, which is of considerable mechanical importance. Aluminum, however, has a co-efficient of expansion approximately twice that of steel or the steel alloys which I prefer to employ, and consequently when in use the valve stem and radiator become heated, the radiator expands in diameter approximately twice the diametrical expansion of the valve stem. This would tend to establish a minute air space between the valve stem and the radiator, which would impede the conduction of the heat from the valve stem to the radiator. At the same time, however, that the radiator expands in diameter, it also expands or increases in length. Inasmuch as the end of the radiator adjacent the smaller end of the tapered portion of the valve stem is held by the nut which acts as an abutment for this end of the valve, the expansion must necessarily all take place toward the larger end of the tapered portion. This means that all along the length of the radiator bore smaller portions of the bore are urged toward larger portions of the tapered part of the valve stem, thereby maintaining the inner wall of the radiator in intimate contact with the valve stem and compensating for the differences in expansion between the valve stem and the radiator.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A valve comprising a hollow stem, one end of said stem being flared to form a hollow head and the other end of said stem being tapered in combination with a detachable radiator having a tapered bore seating on the tapered portion of said stem, and a nut at the smaller end of the tapered

portion of said valve stem having screw-threaded engagement with said valve stem and bearing against said radiator, the metal of said radiator having a larger co-efficient of expansion than the metal of said valve stem.

2. A valve comprising a stem having a tapered portion in combination with a radiator having a tapered bore seating on said tapered portion, and an abutment adjustably secured to said stem at the smaller end of said tapered portion, bearing against said radiator, the metal of said radiator having

a larger co-efficient of expansion than the metal of said valve stem.

3. A valve comprising a steel stem having a tapered portion in combination with an aluminum radiator having a tapered bore seating on the tapered portion of said valve.

In witness whereof, I hereunto subscribe my name this 21st day of December, 1917.

ARTHUR O. DADY.

Witnesses:

J. E. LOWE,
V. A. DADY.