W. E. OAKLEY.

VALVE.

APPLICATION FILED JUNE 12, 1914.

1,175,172. Patented Mar. 14, 1916.

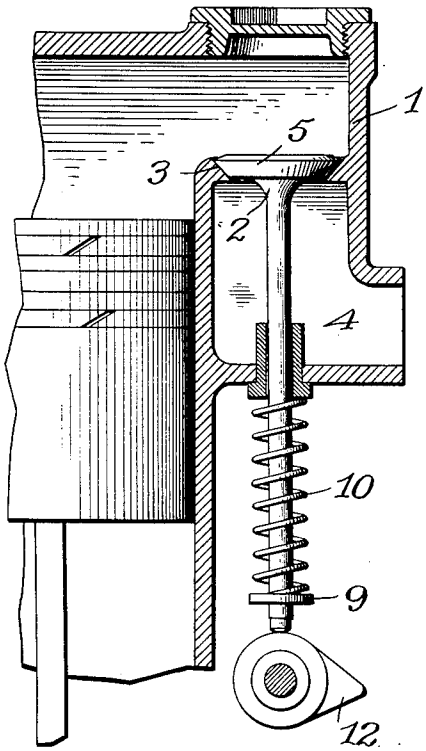


Fig. 1.

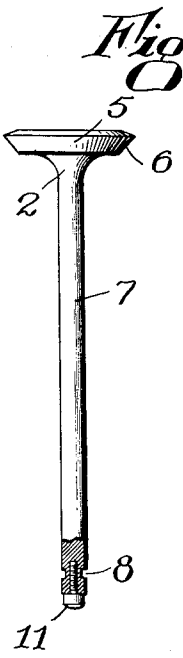


Fig. 2.

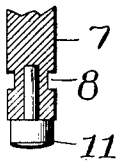


Fig. 3.

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UNITED STATES PATENT OFFICE.

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VALVE.

1,175,172. Specification of Letters Patent. Patented Mar. 14, 1916.

Application filed June 12, 1914. Serial No. 844,796.

To all whom it may concern:

Be it known that I, WILLIAM E. OAKLEY, a citizen of the United States, residing at Bayonne, in the county of Hudson and State of New Jersey, have invented a new and useful Improvement in Valves, of which the following, taken in connection with the accompanying drawings, is a specification.

The present invention relates to valves adapted for use within the cylinders of internal combustion engines, to control the intake of gases thereto, and the exhaust of gases therefrom.

It is an object of the present invention to provide a valve possessing the characteristics of strength and ability to resist high degrees of heat as to render its use in the cylinders of engines of this type free from the attendant difficulties which are common to valves now ordinarily used.

Owing to the high temperatures prevailing in the cylinders of internal combustion engines, it has been the practice heretofore to manufacture such valves from metals or alloys of metals calculated to resist the weakening and distorting effects of heat, and consequently valves made of certain alloys of steel, such as nickel steel and tungsten steel, have largely superseded all others, owing to the superior heat resisting qualities found to be possessed by such alloys. However, even with the use of such alloys, the surface pitting of the valves, due to the gaseous corrosion produced by intense heat, and the deposit thereon of carbon, resulting from imperfect combustion of gases and the burning of lubricants within the cylinder, are still a source of constant annoyance, owing to the imperfect and inefficient seating of the valves when thus affected.

The present invention aims to produce a valve adapted to obviate the above objectionable features, and to this end contemplates the manufacture of such a valve from an alloy not heretofore employed in the manufacture of internal combustion engine valves, but which, it has been discovered, possesses characteristics and properties which render it peculiarly adaptable to such a use. Such an alloy consists of a large percentage of nickel, which metal constitutes the base thereof, a considerable percentage of copper, and a very small percentage of iron, thereby differing radically from the alloys previously employed in the manufacture of such valves, in all of which iron constitutes the base.

I have illustrated one embodiment of my invention in the accompanying drawings, in which—

Figure 1 is a vertical cross section through a portion of an internal combustion engine cylinder, showing the application of a valve to the exhaust port thereof. Fig. 2 is a side view of a valve. Fig. 3 is a fragmentary section through the stem of a valve, showing a modified construction.

Like reference characters are used to designate like parts in the different views.

Referring to the drawings, 1 denotes the cylinder of an internal combustion engine, which may be of any well known type of construction, and 2 represents a puppet valve adapted to control either the inlet of gas to, or the exhaust of gas from the cylinder 1, in the manner common to engines of this type. In the present instance, the valve coöperates with a seat 3, to control communication between the interior of the cylinder and an exhaust passage 4. The raising of valve 2 from its seat, by the action of any valve operating mechanism, ordinarily employed in connection with engines of this type, permits the escape of exhaust gases past said seat and into the passage 4. It is to be understood that the construction above described is equally applicable to the inlet passage of the cylinder, the valves for both inlet and exhaust being identical in construction.

The valve 2 comprises a head 5, having a suitably beveled seating surface 6 and a stem 7 integral with said head. The valve is made from an alloy, the constituents of which are approximately as follows:—

Nickel	About 67%.
Iron	From 1% to 5%.
Copper	Remainder.

Such an alloy contains but a trace of carbon; it has been found to possess a coefficient of expansion under the application of heat substantially identical with that of the steels ordinarily used in the manufacture of gas engine puppet valves, and also with that of cast iron of which the cylinders are usually made. This alloy is distinguished further by its ability to resist the destructive action of high temperatures, and its freedom from the gaseous corrosion ordi-

narily produced in other metals by the heating of the same above a red heat. It has been found that the alloy does not scale, as does steel, under high temperatures, but that the oxid forms a thin adherent coating. When heated to the maximum temperatures attainable in the ordinary operation of gas engines, this alloy retains approximately 80% of its elastic limit and tensile strength as compared with approximately 71% retained by the best high grade steel at such temperatures. Furthermore, the virtual freedom of this alloy from any carbon content, as compared to the appreciable carbon content of all steel and irons used heretofore in the production of valves of this type, has the effect of eliminating a very potent agency in the production of a deposit of carbon on the valve, namely, the tendency of the carbon produced by combustion of the gas to unite with any carbon contained in the highly heated valve.

The stem of the valve is suitably recessed, as at 8, to receive a washer or collar 9 to form a bearing for the spring 10 which maintains the valve on its seat. The end of the stem 7 is drilled to receive the spindle of a button 11, which may be made of case hardened and tempered steel, adapted to resist the wear occasioned by its contact with the cam 12, which is employed to raise the valve against the action of the spring 10.

In the form shown in Fig. 2, the drilled hole in the end of the stem 7 is screw threaded and the spindle of the button is screwed therein. In the form shown in Fig. 3, the spindle of the button is made slightly larger than the hole in the stem, and is shrunk therein, by raising the temperature of the end of the stem to permit insertion of the spindle. In either case the button is removable for replacement when the same becomes worn through continued use.

I claim,

1. A valve for internal combustion engines, made from an alloy comprising a large proportion of nickel, and a small proportion of iron.

2. A valve for internal combustion engines, made from an alloy chiefly consisting of nickel and copper.

3. A valve for internal combustion engines, made from an alloy comprising approximately sixty-seven per cent. of nickel and thirty per cent. of copper.

4. A valve for internal combustion engines, made from an alloy consisting of approximately sixty-seven per cent. of nickel, twenty-eight to thirty-two per cent. of copper, and from one to five per cent. of iron.

5. A valve for internal combustion engines made from an alloy consisting chiefly of nickel, and substantially free from carbon.

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