Aug. 13, 1929. J. M. HEINRICH 1,724,836

CONSTRUCTION OF VALVE CONTROL RODS IN INTERNAL COMBUSTION ENGINES

Filed Nov. 25, 1924

Fig. 1

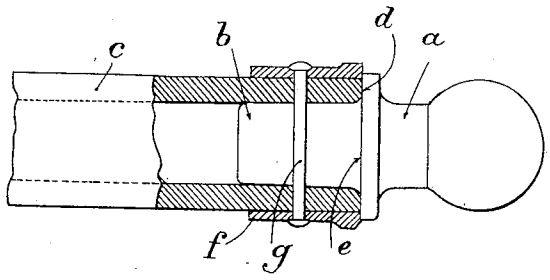
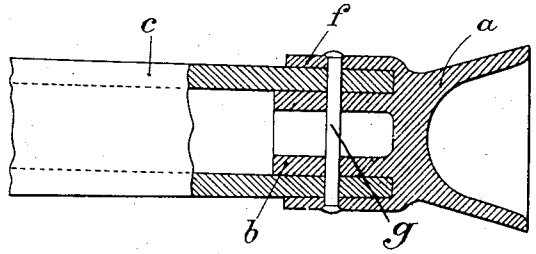


Fig 2



Inventor
J. M. Heinrich

by
Langner Parry Card & Langner.
Atty's.

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UNITED STATES PATENT OFFICE.

JEAN MARIÈ HEINRICH, OF PARIS, FRANCE, ASSIGNOR TO SOCIÉTÉ DES MOTEURS SALMSON (SYSTÈME CANTON-UNNÉ), OF PARIS, FRANCE.

CONSTRUCTION OF VALVE-CONTROL RODS IN INTERNAL-COMBUSTION ENGINES.

Application filed November 25, 1924, Serial No. 752,218, and in France December 26, 1923.

The invention relates to a novel and improved arrangement for mounting tips of hard metal at the ends of hollow valve control rods in internal combustion engines in which the valves are controlled by means of rods of light metal and rocking levers in order to secure the maximum lightness, this being of particular importance with engines operating at high speed, such as aeroplane engines.

The light metals in current use, such as duralumin, for instance, although possessing a sufficient strength, have however a very low elastic limit so that the light metal rod is pounded down or loosened at its points of contact with the two hard members or tips which are secured at its ends and which respectively cooperate with the corresponding rocking lever for the valve and with a small plunger actuated by a revolving cam.

The present invention has for its object to provide an arrangement whereby the deformation or pounding down of the relatively deformable metal constituting the control rod is utilized in order to provide an increased resistance of the assembly between the rod and its tips.

In the appended drawing:

Fig. 1 shows in partial section the end of a control rod which is fitted with a ball-shaped tip adapted to cooperate with a spherical recess formed at the end of a valve controlling rocking lever.

Fig. 2 is a like view of a modification, showing a hollow tip adapted to cooperate with the ball-shaped end of an actuating plunger operated by the valve controlling cam.

As shown in the drawing, the hard metal core *b* of the tip *a* provided with a shoulder *e* is inserted with tight friction into the hollow valve control rod *c*: The bore of the rod and the tip may be slightly tapered, but without an excessive diminution of the surface of contact of the end *d* of the rod with the shoulder *e* of the tip. A sleeve *f* of hard metal is frictionally mounted upon the end of the rod, the length of said sleeve being substantially equal to the length of the core *b*; the said sleeve engages the shoulder *e*, and a small cross pin *g* of hard wire extends through the sleeve, the rod and the core; said pin may in certain cases be dispensed with.

The ball-shaped tip *a* is adapted to fit in a spherical recess formed at the end of the valve controlling rocking lever (not shown) in a manner well known in the art.

In the construction shown in Fig. 2, the sleeve *f* is formed integral with the tip *a* which latter is made hollow with a conical portion merging into a spherical portion adapted to bear on the ball-shaped end of a plunger (not shown) adapted to be actuated by the valve controlling cam, as is well known.

The shocks which take place at the end of each stroke between the tips *a* and the rocking lever and plunger, due to the rapid reciprocating motion of the valve control rod will tend to expand the relatively deformable metal of the rod between the sleeve *f* and the core *b* and cause the tip to be held still more tightly within the rod. The arrangement according to the invention will thus afford a very strong assembly in a very simple manner. On the other hand, the portion of the tip in contact with the rod may be comparatively short and hence lighter than usual, thus reducing the inertia of the control rod and the intensity of the shocks.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

A joint for the tips of hollow valve control rods of light and deformable metal, comprising a rod having an opening at one end thereof, a tip of hard metal having a smooth part fitted in said opening of said rod, the inner end of said smooth part having no contact with said rod, said tip having a shoulder against which said end of said rod bears, whereby axial shocks are transmitted from said rod to said tip through said rod end and said shoulder exclusively, a sleeve of hard metal tightly engaging said rod end, and a transverse rivet extending through said sleeve, rod end and tip.

In testimony whereof I have signed my name to this specification.

JEAN MARIÈ HEINRICH.