Feb. 10, 1942. W. McGIBBON 2,272,686

APPARATUS FOR CLEANING VALVES

Filed Nov. 2, 1939 2 Sheets-Sheet 1

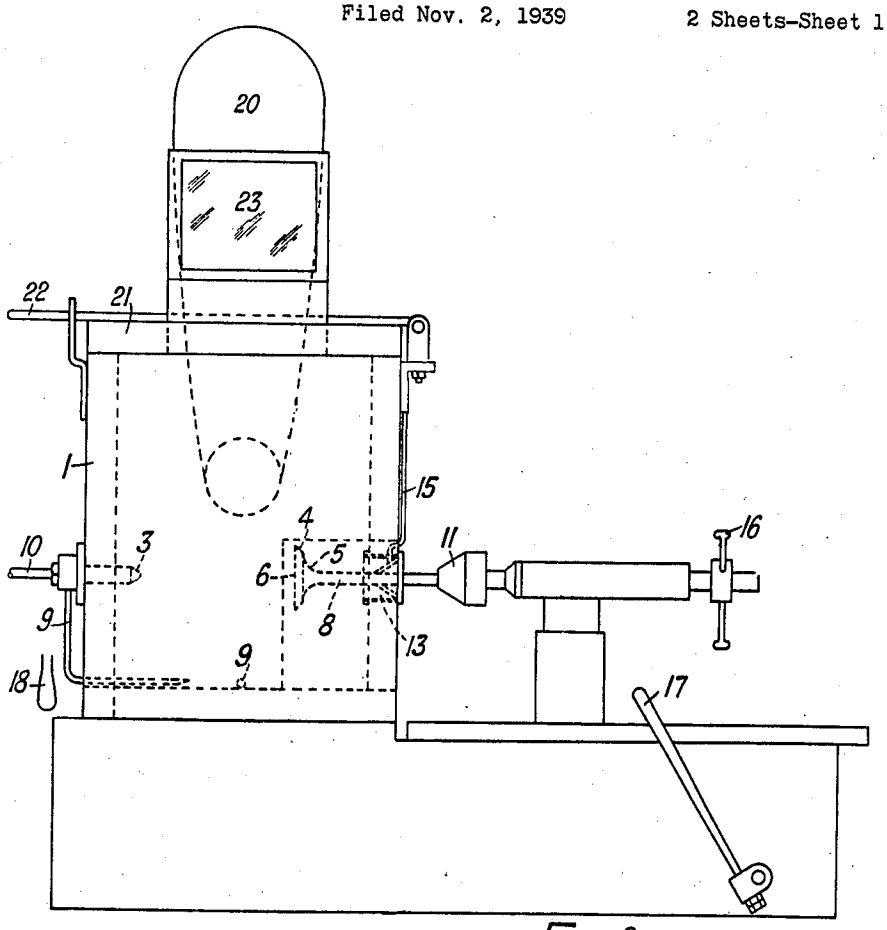


FIG. 2.

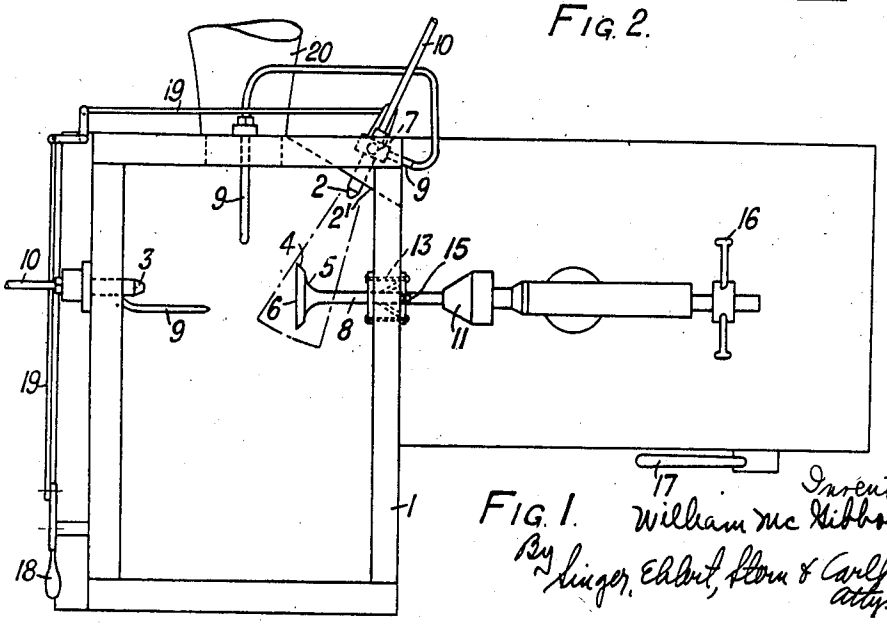


FIG. 1.

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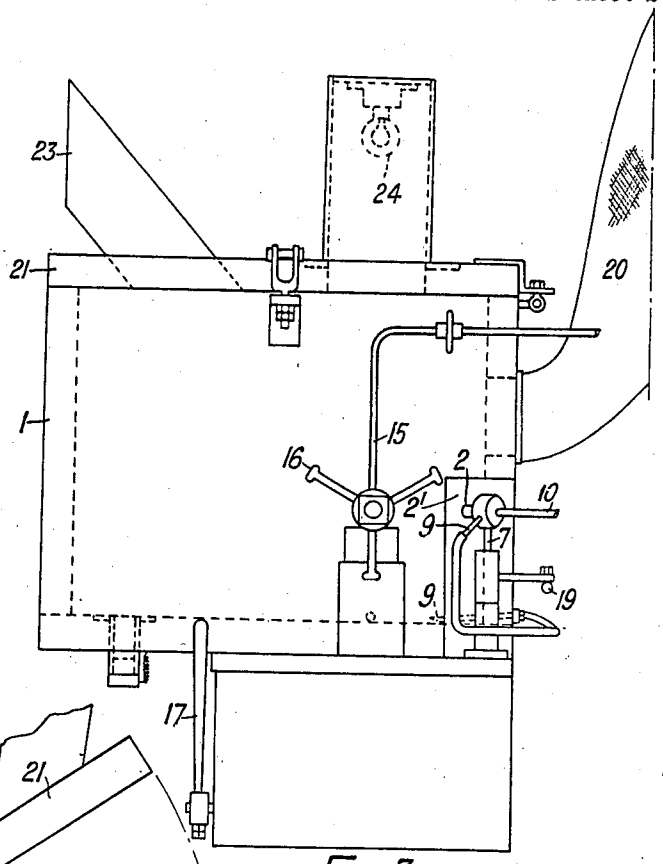


FIG. 3.

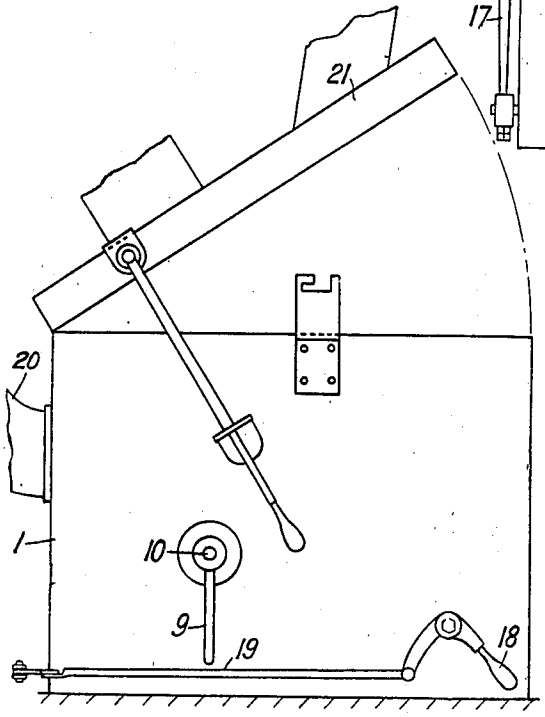


FIG. 4.

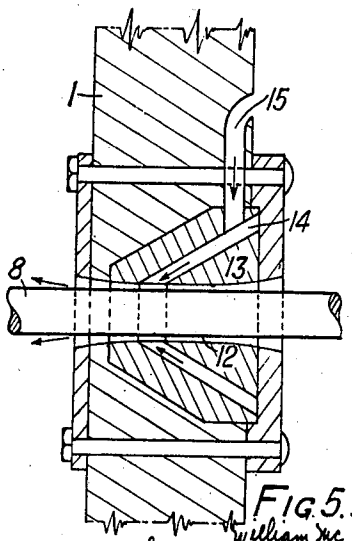


FIG. 5.

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UNITED STATES PATENT OFFICE

2,272,686

APPARATUS FOR CLEANING VALVES

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Application November 2, 1939, Serial No. 302,615
In Great Britain December 12, 1938

3 Claims. (Cl. 51—15)

This invention relates to improvements in apparatus for removing carbon deposit from the valves of internal combustion engines.

As is understood, the use of modern liquid fuel mixture in internal combustion engines is accompanied by the formation of carbon deposit, more particularly on the exhaust valves, which is extremely difficult to remove by ordinary mechanical methods such as, for example, the usual method of chucking the valve in a lathe or other machine tool and acting on the rotating valve with wire brushes or other scrapers.

Apparatus according to the invention includes a casing within which project or are located at least two nozzles arranged to direct high velocity blasts of shot, grit or other abrasive particles on to the face and neck, and on to the crown, respectively, of a valve located wholly or partially within said casing and adapted to be rotated about its axis during the blasting operation, whereby, due to the bombardment of the valve with said particles, hard carbon deposit on the valve is quickly and efficiently removed without deleterious action on the valve.

A nozzle which bombards the valve face and neck is preferably arranged to swivel so that the blast issuing therefrom sweeps a zone including the valve face, the valve neck fillet at the junction of the head with the stem, and the portion of the stem adjoining the head.

Another nozzle is preferably disposed with its axis parallel to, but slightly offset from, the projection of the axis of the valve, so that the blast issuing therefrom is effectively distributed over the full area of the valve crown in the rotation of the valve.

The function of each of the nozzles referred to in the two last preceding paragraphs may be performed by a plurality of nozzles.

The nozzles may be energised by compressed air or other pressure fluid and are of injector construction, each being provided with a lateral inlet pipe for shot or grit of which the inlet end is buried in a mass of shot or grit contained in the bottom of the casing so that, in operation, the shot or grit induced into the nozzle by the flow of air therethrough is discharged with the air in the form of an abrasive high velocity blast. The rear ends of the nozzles extend exteriorly of the casing and are coupled to tubes leading to a controlled source of compressed air or other fluid.

Conveniently, there is located externally of the casing a manually or otherwise rotatable and axially movable chuck adapted to grip the tappet end of the stem of the valve to be decarbonised, the valve being introduced into the casing and its stem being passed through a bore in the wall of the casing so that the externally projecting end of the stem may be gripped in the chuck.

In order to prevent egress of blasting shot or grit through the clearance space between the bore and the valve stem, said bore is preferably presented by a gland incorporating an annular passage surrounding the bore and converging towards the inner end of the bore. To this annular passage compressed air or other pressure fluid is supplied so that the inwardly directed stream of fluid issuing from the inner end of the bore effectively prevents egress of shot or grit therethrough.

The chuck may be mounted for rotation about a horizontal axis, and may be rotatable by means of a hand wheel or otherwise, and axially movable by manipulation of a lever.

Movement of the swivelling nozzle may be controlled by means of a handle located in a convenient position and operatively connected to said nozzle.

The pressure fluid vacates the casing through the medium of a filter fitted over an opening in the casing and constituted conveniently as a filter bag of woven fabric.

The casing is provided with a hinged fluid-tight lid fitted with quick-operating fastening means, and preferably incorporates a glazed inspection opening and a lamp which illuminates the interior of the casing.

Apparatus according to the invention is illustrated in the accompanying drawings in which Fig. 1 is a plan view of the apparatus with the lid of the casing omitted in order to show the interior of the casing; Fig. 2 is a front elevation; Figs. 3 and 4 are elevations at right angles to Fig. 2; and Fig. 5 is a fragmentary sectional view of a gland fitted to the casing.

The apparatus shown includes a casing 1 within which are located two nozzles 2, 3 arranged to direct high velocity blasts of shot, grit or other abrasive particles on to the face 4 and the neck 5, and on to the crown 6, respectively, of a poppet valve located mainly within the casing 1 and adapted to be rotated about its axis during the blasting operation, whereby, due to the bombardment of the valve with said particles, hard carbon deposit on the valve is quickly and efficiently removed without deleterious action on the valve.

The nozzle 2 which bombards the valve face 4

and the valve neck 5 is arranged at 7 to swivel about a vertical axis so that the blast issuing therefrom sweeps a zone including the valve face 4, the valve neck fillet 5 at the junction of the valve head with the valve stem 8, and the portion of the stem 8 adjoining the head.

The nozzle 3 is preferably disposed with its axis parallel to, but slightly offset from, the projection of the axis of the valve, so that the blast issuing therefrom is effectively distributed over the full area of the valve crown 6 in the rotation of the valve.

The nozzles 2, 3 may be energised by compressed air or other pressure fluid and are of injector construction, each being provided with a lateral inlet pipe 9 for shot or grit of which the inlet end is buried in a mass of shot or grit contained in the bottom of the casing 1 so that, in operation, the shot or grit induced into the nozzle by the flow of air therethrough is discharged with the air in the form of an abrasive high velocity blast. The rear ends of the nozzles extend exteriorly of the casing 1 and are coupled to tubes 10 leading to a controlled source of compressed air or other fluid. The swivelled nozzle 2 projects into the casing 1 through a flexible rubber diaphragm 2'.

Located externally of the casing 1 is a manually rotatable and axially movable chuck 11 adapted to grip the tappet end of the stem 8 of the valve to be decarbonised, the valve being introduced into the casing 1 and its stem 8 being passed through a bore 12 in the wall of the casing 1 so that the externally projecting end of the stem 8 may be gripped in the chuck 11.

In order to prevent egress of blasting shot or grit through the clearance space between the bore 12 and the valve stem 8, the bore 12 is arranged in a gland 13 incorporating an annular passage 14 surrounding the bore 12 and converging towards the inner end of the bore 12. To the annular passage 14 compressed air or other pressure fluid is supplied by way of a duct 15, so that the inwardly directed stream of fluid issuing from the inner end of the bore 12 effectively prevents egress of shot or grit therethrough.

The chuck 11 is mounted for rotation about a horizontal axis and is rotatable by means of a handwheel 16, being also axially movable by manipulation of a lever 17.

Movement of the swivelling nozzle 2 is controlled by means of a handle 18 located in a convenient position and operatively connected by links 19 to the nozzle 2.

The pressure fluid vacates the casing through the medium of a filter 20 fitted over an opening in the casing 1 and constituted conveniently as a filter bag of woven fabric.

The casing 1 is provided with a hinged fluid-tight lid 21 fitted with quick-operating fastening means 22, and preferably incorporates a glazed inspection opening 23 and a lamp 24 which illuminates the interior of the casing.

What I claim and desire to secure by Letters Patent of the United States of America is:

1. Apparatus for removing carbon deposit from the valves of internal combustion engines, including a casing provided with an aperture through which the stem of a valve to be decarbonised is adapted to project outwardly, a manually rotatable and axially movable chuck mounted externally of said casing for gripping the outer end of the outwardly projecting stem of said valve so as to support the valve during the removal of the carbon deposit, at least two nozzles projecting into said casing and positioned to direct high velocity blasts of shot, grit or other abrasive particles onto the face and neck and onto the crown respectively, of a valve whose valve stem passes outwardly through said aperture and is gripped by said chuck, a swivel mount for one of said nozzles, and manually operable means for swiveling said last named nozzle.

2. Apparatus for removing carbon deposit from the valves of internal combustion engines, including a casing provided with an aperture through which the stem of a valve to be decarbonised is adapted to project outwardly, a manually operable chuck mounted externally of said casing for gripping the outer end of the outwardly projecting stem of said valve so as to support the valve during the removal of the carbon deposit, and two nozzles projecting into said casing and positioned to direct high velocity blasts of shot, grit or other abrasive particles onto the face and neck and onto the crown respectively, of a valve whose valve stem passes outwardly through said aperture and is gripped by said chuck, the nozzle bombarding the face and neck of said valve being arranged to swivel, while the nozzle which bombards the crown of the valve is mounted with its axis parallel, but only slightly offset with respect to the longitudinal axis of the valve.

3. Apparatus as claimed in claim 1 in which the valve stem is passed through a bore arranged in a gland fitted to the casing and incorporating a passage which joins the bore near the inner end of the bore and through which pressure fluid is supplied, to oppose and counteract the pressure produced in said casing by said nozzles.

WILLIAM McGIBBON.