



# UNITED STATES PATENT OFFICE.

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## VALVE MECHANISM FOR INTERNAL-COMBUSTION ENGINES.

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Specification of Letters Patent

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*To all whom it may concern:*

Be it known that I, HERBERT AUSTIN, engineer, a subject of the King of Great Britain, residing at Berwood Grove, Chester Road, in the city of Birmingham, England, have invented certain new and useful Improvements in Valve Mechanism for Internal-Combustion Engines, of which the following is a specification.

This invention has for its objects improved means of a simple character by which the area of opening of an air-valve of an internal-combustion engine may be readily varied and improved means of carrying a portion of the mechanism used in connection with an air-valve or air-valves of a single, double, or multiple cylinder internal-combustion engine which enable such portion of the mechanism to be removed and replaced without being taken to pieces.

The part of the invention by which the object first-above named is effected consists, broadly stated, in regulating the area of opening of the valve by moving inward or outward, as required, the fulcrum of the lever through the medium of which the rod which is moved by a cam opens the valve. This lever is fulcrumed within a slider which is capable of movement in suitable guides in a direction to move the fulcrum outward, or in the opposite direction, to move it inward. According to a convenient method of operating the slider it is constantly pressed in an outward direction by a spring which presses against one end thereof and is moved in the opposite direction against such pressure by a screw which presses against the other end of the slider. The screw is preferably quick-threaded, so that a very partial turn will be sufficient to move the slider the maximum distance which can at any time be required, and the screw may be readily turned through the medium of a sideway-arm thereof, connected through the medium of a rod with the hand or governor mechanism by means of which the regulation is to be effected.

The means according to this invention by which the object second-above stated is effected comprises in the case of a single motor-cylinder a mounting which is fitted around the outer end of the air-valve box and is held thereupon by pillar-screws from the breech

end of the cylinder and comprises, in the case of two or more motor-cylinders, similar mountings formed integral with one another, and which consequently bridge across from one valve-box to another. This mounting, whether single, double, or multiple, as the case may be, carries the lever or levers which are operated by the rod or rods which are themselves operated by the cam or cams and has the guide or guides for such rod or rods formed therein, and the slider aforesaid or each slider is conveniently carried to slide within guides formed in opposite sides of the mounting, and the spring therefor is carried within a recess formed in the mounting. The screw for the slider or each slider is screwed within a cross-piece which bridges across the space between and joins the said sides at their outer edges or tops. The mounting may be removed without disconnecting therefrom the lever or levers or the spring or springs or screw or screws.

In the drawings which illustrate my invention, Figure 1 shows, as to the left-hand half thereof, a vertical section through the air-valve chamber for one of the cylinders of a vertical-cylinder engine and the means by which the area of the opening of the valve is regulated and the means of carrying parts of the air-valve mechanism and, as to the right-hand half, a corresponding outside elevation in relation to the other cylinder. Fig. 2 is a plan view of the parts shown by Fig. 1. Fig. 3 is a transverse section taken in the plane indicated by the line *x x* of Fig. 1 of the mounting by which a portion of the air-valve mechanism is carried; and Fig. 4 is a transverse section through such mounting and through the means for regulating the area of air-valve opening, taken in the plane indicated by line *y y* of Fig. 1.

In the several views such parts only are shown as are necessary to make the invention clear.

Describing first the means of regulating the area of air-valve opening, the pivot-pin A, upon which each valve-lever B is respectively fulcrumed, is mounted within a bridle C, the opposite sides of which are fitted to slide within vertically-slotted openings *a*, formed through opposite sides of a mounting D, which is rigidly connected with the breech

end of the cylinder. The breech ends E of the cylinders, which are marked by broken lines, Fig. 1, are shown only by such figure. Each bridle C is constantly pressed in an upward direction by means of a spiral spring b, which is largely contained within a recess formed down within the mounting D for such purpose, and each bridle may be moved down against the pressure of the spring and retained against such pressure in any desired position by means of a screw c, which is screwed through a bridge-piece d, which passes across above the bridle C and is rigid with the mounting D, being formed conveniently integral with the sides k of the mounting. The height of the fulcrum center of a lever B, and consequently the area of opening of the corresponding air-valve F, may be readily regulated through the medium of the screw c. The regulation may be effected either through the medium of a rod m from a governor, as will be readily understood, or by hand, conveniently through the medium in either case of an arm e of the screw. In the arrangement illustrated the boss f of each lever B is just an easy fit between faced portions g of the opposite sides of the mounting D and is also just an easy fit between the opposite sides of the bridle C, whereby the bridle is prevented from sidewise movement in relation to the mounting D.

The mounting D is fitted around turned portions h of the outer ends of the air-valve boxes G and is held thereupon by pillar-screws H from the breech ends E of the cylinders. This mounting not only carries the levers B, but has formed therewith the upper guides for the valve-rods i, through the medium of which the valve-levers B are operated from the cams. The mounting D may be removed from the valve-boxes and pillar-screws without disconnecting therefrom the levers B or the springs b or screws c. If a mounting, such as D, is required for a single-cylinder engine only, it is similarly constructed as when required for a two-cylinder engine, but is of course shortened. If the mounting is to be used with an engine having more than two cylinders, it is made with the portions for each cylinder integral with one another and is supported by a pillar-screw from each breech end or otherwise by as many of such screws as may be desirable. In the case of a horizontal engine the screws H, herein described as "pillar-screws," would of course themselves be horizontal.

It will be obvious that the means of carrying the fulcrum of the lever B to enable its position to be regulated for the purpose above shown may be varied, and I do not limit myself, therefore, to the particular means of doing this which are described and illustrated, though these are the means I prefer for the purpose.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. Means of regulating the area of opening of an air-valve of an internal-combustion engine which comprise a lever through the medium of which the valve is operated, means for actuating said lever, a bridle within which the lever is fulcrumed, guides within which such bridle may move in an inward and outward direction, a spring which tends to move the bridle in one direction along its guides, and a screw device by which the bridle may be moved in the opposite direction against the pressure of the spring, substantially as set forth.

2. An internal-combustion engine with a plurality of motor-cylinders, having valve-boxes, mountings which are integral with each other and fit detachably about the outer ends of the said valve-boxes, breech-end pillar-screws which aid in supporting said mountings on the cylinders, and valve-actuating mechanism of the cylinders carried by and removable with said mountings, substantially as set forth.

3. An internal-combustion engine, having two motor-cylinders disposed side by side, and provided with valve-boxes on their respective breech ends, a mounting extending across and fitting detachably about the respective valve-boxes, pillar-screws between the ends of the respective cylinders and the ends of said mounting, and valve-actuating mechanism of the cylinders carried by the said mounting and removable therewith, substantially as set forth.

4. An internal-combustion engine, having a valve-box on its cylinder, a mounting which is fitted detachably about the outer end of said valve-box, breech-end pillar-screws so disposed as to act as additional supports for said mounting, and valve-actuating mechanism carried by said mounting and removable therewith.

5. Means for regulating the area of opening of an air-valve of an internal-combustion engine, which comprise a lever through the medium of which the valve is operated, means for actuating said lever, an inwardly and outwardly adjustable fulcrum for such lever, a spring device tending to move the fulcrum in one direction, and an adjustable stop by means of which the fulcrum may be moved in the opposite direction, substantially as set forth.

In witness whereof I have hereunto signed my name, this 17th day of August, 1904, in the presence of two subscribing witnesses.

HERBERT AUSTIN.

Witnesses:

ROBERT G. GROVES,  
ETHEL M. WILLIAMS.