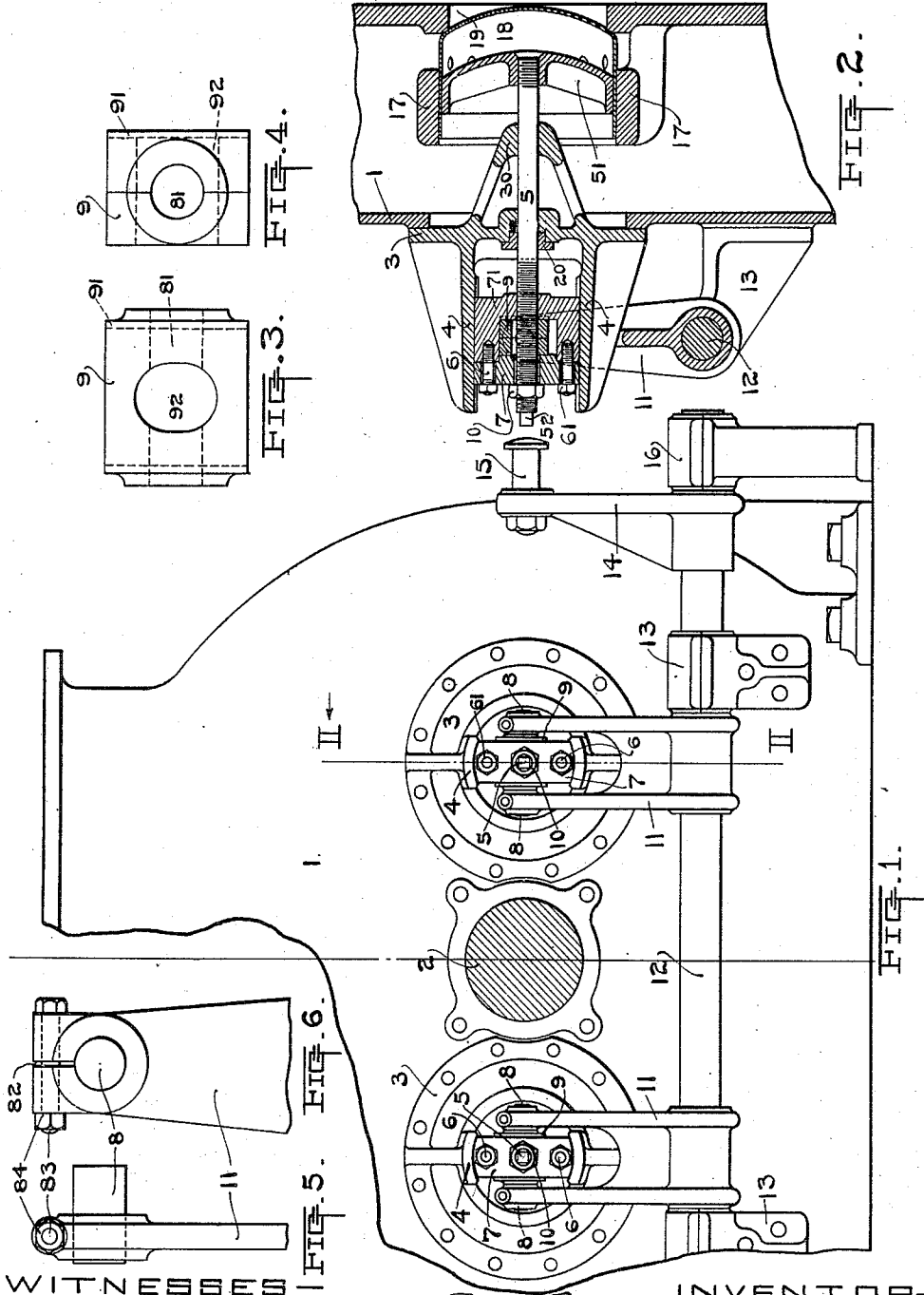


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VALVE GEAR.

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995,229.

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VALVE-GEAR.

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To all whom it may concern:

Be it known that I, DAVID P. DAVIES, a citizen of the United States, residing at Racine, in the county of Racine and State of Wisconsin, have invented a certain new and useful Improvement in Valve-Gears, of which the following is a specification.

This invention relates to improvements in the construction of valve gears and particularly to improvements in the construction of valve gears for blowing engines.

The object of the invention is to provide a valve gear for blowing engines which is simple in construction, efficient in operation, and in which the adjustment and proper setting of the valve plunger or valve stem can be accomplished during the normal operation of the engine and without danger of injury to the operator, the last named features being the result of the accessibility of the adjusting means.

A clear conception of one embodiment of the invention can be obtained by referring to the accompanying drawing in which like reference characters designate the same or similar parts in like or different views.

Figure 1 is a fragmental end view of a blowing engine cylinder showing the discharge valve gear and connections therefor. Fig. 2 is a fragmental vertical sectional view through one of the valves, valve gear and cylinder head of the device shown in Fig. 1, the section being taken on the line II—II of Fig. 1 looking in the direction of the arrow. Fig. 3 is an enlarged end view of one of the blocks looking toward the elongated opening formed therein. Fig. 4 is a side view of the block shown in Fig. 3. Fig. 5 is an end view of a fragment of one of the actuating or vibrating arms and pin. Fig. 6 is a side view of the device shown in Fig. 5.

The blowing engine cylinder 1 is of the well known Slick type in which the air taken into the cylinder during the suction stroke of the engine is drawn in through ports or passages formed through a reciprocating cylinder. The discharge valves 18 which are of the ordinary cup valve type, control discharge ports 19 formed in the head of the cylinder 1. The valves 18 are guided by cylindrical guides 17 and are prevented from leaving the ends of the guides 17 by means of valve plungers 51.

The valve plunger 51 is mounted upon an operating stem 5, which stem passes through the bonnet 3 and is guided in guides 30 formed at the inner end of the bonnet. The gland 20 serves to prevent leakage of air from within the cylinder head past the operating stem 5. The bonnet 3 which coacts against the outer portion of the head of the cylinder 1, is fastened thereto by any suitable means, such as bolts, not shown.

As disclosed in Fig. 1, the cylinder 1 is provided with two discharge valves 18, one on either side of the piston rod 2. This, however, is not essential since any number of valves might be used.

The bonnets 3 are provided with guides 4 which project perpendicularly outward from the end of the cylinder 1. Crossheads 71, having caps 7 fastened to their outer ends by means of studs 6 which screw into the crossheads 71, and nuts 61 which coact against the outer surfaces of the caps 7 and with the ends of the studs 6, are adapted to slide between the guides 4 of the bonnets 3. The operating stems 5 of the plungers 51 extend through the crossheads 71 and project outwardly therebeyond. Screw thread coaction between the crossheads 71 and the operating stems 5 permits the longitudinal adjustment of the stems 5 relative to the crossheads 71. The outwardly projecting ends of the stems 5 are provided with square portions 52, the square formation of which provides means for turning the operating stem 5 relative to the crossheads 71. Lock nuts 10 which are screwed over the ends of the stems 5, coact against outer surfaces of the caps 7, thus serving to lock the stems 5 in adjusted position relative to the crossheads 71. It will be noted that the stems 5 have screw thread coaction with the crossheads 71 only, passing freely through the crosshead caps 7 and contacting therewith only through the lock nuts 10.

The transversely slidable blocks 9 having elongated openings 92 formed therethrough, are slidably mounted between the crossheads 71 and crosshead caps 7. The stems 5 which extend through the crossheads 71 and caps 7, pass freely through elongated openings or holes 92 formed in the blocks 9, the elongation of these holes permitting transverse sliding of the blocks 9 without interference with the stems 5. The blocks 9 are prefer-

ably formed in two parts, one of these parts having projecting guides 91 formed thereon which retain the blocks 9 in position within the crossheads 71. Holes 81 pass through the blocks 9 with axes at right angles to the axes of the elongated holes 92.

The actuating shaft 12 which is supported in suitable bearings 13 mounted on the end of the cylinder 1, has its overhanging end supported in an additional bearing 16 which is mounted on the engine foundation. The rocker arm 14 is fixed to the shaft 12 near one end thereof, and has an outwardly projecting pin 15 fixed to its end by means of which the arm 14 can be vibrated by an eccentric or other suitable means connected to the engine driving shaft. The actuating or vibrating arms 11, each consisting of two parallel projecting portions, are fixed to the shaft 12 opposite the stems 5 of the plungers 51. Each of the parallel projecting portions of the arms 11 has a pin 8 clamped therein, see Figs. 5 and 6, by means of bolts 83 and nuts 84 coacting therewith, the end being bored and slotted to the bore and both pins on each arm 11 being coaxial. The coaxial pins 8 take into the holes 81 of the blocks 9, and extend inwardly to within a short distance of the stems 5.

During the operation of the engine, the arm 14 is given a vibratory motion by means of the eccentric or other suitable means driven by the main engine shaft. This motion is transmitted through the shaft 12 to the actuating arms 11. The vibration of the arms 11 causes the pins 8 carried at the ends thereof to swing through arcs of circles having the axis of the shaft 12 as a center. In thus swinging through the arcs of circles, the pins 8 move a slight distance through the plane passing through the axes of the stems 5 parallel to the guides 4. As the pins 8 fit closely in the holes 81 of the blocks 9, the angular motion of these pins relative to the stems 5 must be provided for, being taken care of by the transverse sliding of the blocks 9 within the crossheads 71. The vibratory movement of the arms 11 causes the crossheads 71 to slide along the guides 4 formed on the bonnets 3. As the crossheads 71 move backward and forward within the guides 4, the stems 5, and hence the plungers 51, are reciprocated. The driving gear of the mechanism is so timed that the forward movement of the stems 5 will cause the plungers 51 to coact against the inner surfaces of the valves 18 and positively seat the valves 18 at the end of the stroke and that there is entire freedom of the valves 18 to open, the driving gear having vibrated the plungers 51 away to permit the valves 18 to be freely opened by the compressed air within the cylinders.

In assembling the valve gear it is difficult to adjust the stems 5 to such a position that

the plungers 51 will exactly touch or coact against the valves 18 when seated. Provision must therefore be made to permit adjustment of the stems 5 after the engine is in operation. Such provision is made by the adjustment formation which consists of the squared portions 52 at the ends of the stems 5 and the screw coaction of the stems 5 and crossheads 71, and the lock nuts 10 which coact with the stems 5 and the caps 7 of the crossheads 71. If it is desired to lengthen or shorten one of the stems 5 projecting from the crosshead 71 at the plunger side thereof, the lock nut 10 is withdrawn from coaction with the cap 7 and the stem 5 is rotated by the application of a wrench or other suitable means to the squared portion 52. After the stem 5 has been adjusted in the crosshead 71 to any desired position, the nut 10 is again brought forward to coact with the cap 7, thereby locking the stem 5 into adjusted position. Such adjustment of the stem 5 relative to the crosshead 71 can easily be made during normal operation of the engine on account of the accessibility of the adjusting means. The accessibility of the operating means is made possible since the stems 5 extend through the crossheads 71 projecting therebeyond, while the squared portions 52 at the ends of the stems and the lock nuts 10 are located as far away from the working parts of the mechanism as it is possible to place them.

It is not essential that a lock nut 10 be used for the purpose of fixing the stem 5 relative to the crosshead 71, as any other suitable means could be substituted therefor without affecting the efficiency of the device. The portion 52 need, moreover, not be formed square as any other shape, such as a hexagon, would answer the same purpose. The plunger 51 and valve 18 might also be replaced by a valve carried directly by the stem 5 if such construction were desirable.

It should be understood that it is not desired to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

It is claimed and desired to secure by Letters Patent,

1. In a valve gear, a crosshead slidable on guides, a block slidable in said crosshead transversely to the direction of sliding of said crosshead, an operating stem extending from said crosshead at a portion thereof accessible at all positions of said valve gear, means for adjustably locking said stem to said crosshead adjacent said accessible portion, and means engaging said block for vibrating said stem.

2. In a valve gear, a crosshead slidable on guides, a block slidable in said crosshead transversely to the direction of sliding of said crosshead, an operating stem screwing

into said crosshead and passing through a transversely elongated opening in said block, a nut screwing on the end of said operating stem projecting accessibly from said cross-
5 head, said nut locking said stem to said crosshead, and means engaging said block for vibrating said stem.

In testimony whereof, I affix my signature in the presence of two witnesses.

DAVID P. DAVIES.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents
Washington, D. C."
