Jan. 21, 1936. H. M. COULLING 2,028,138

INTERNAL COMBUSTION ENGINE VALVE MECHANISM

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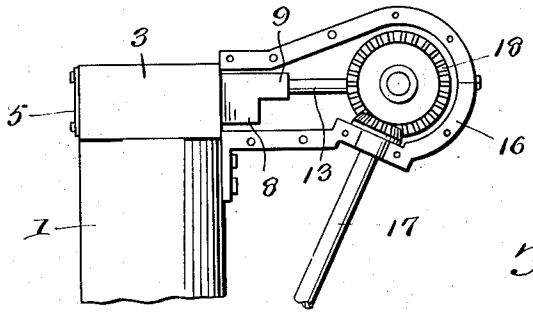


Fig. 1.

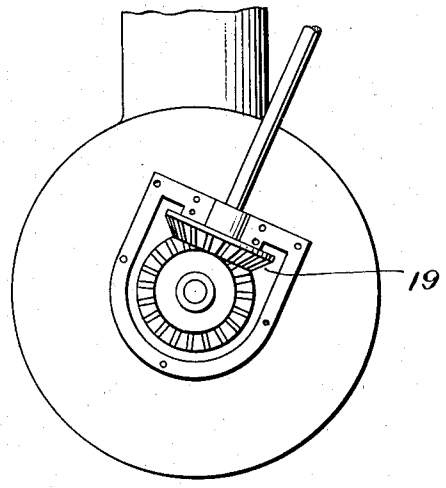
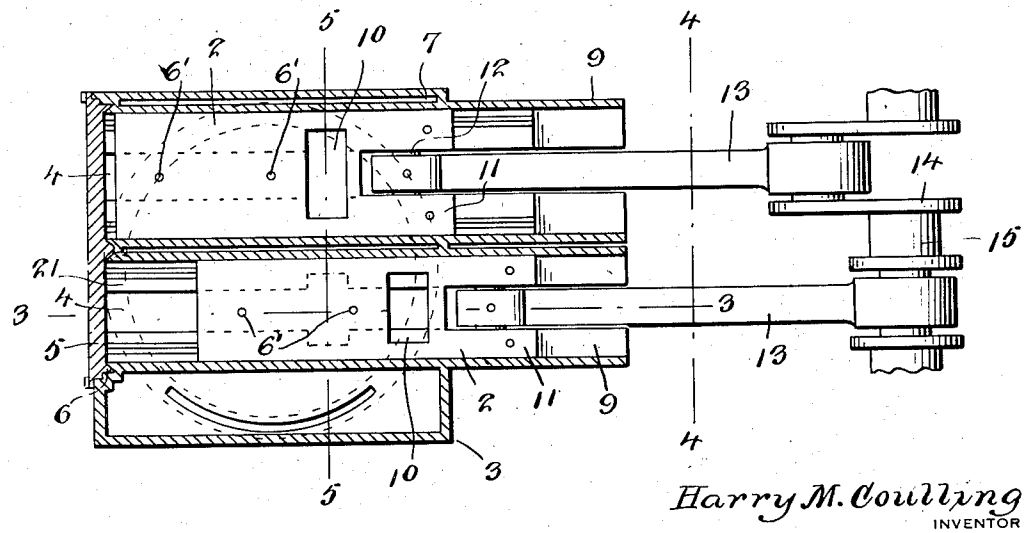


Fig. 2.



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Fig. 3.

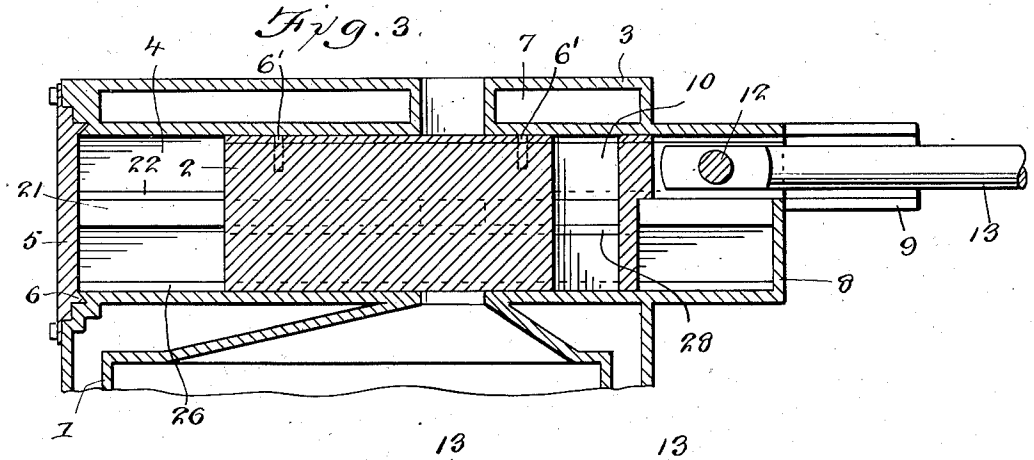


Fig. 4.

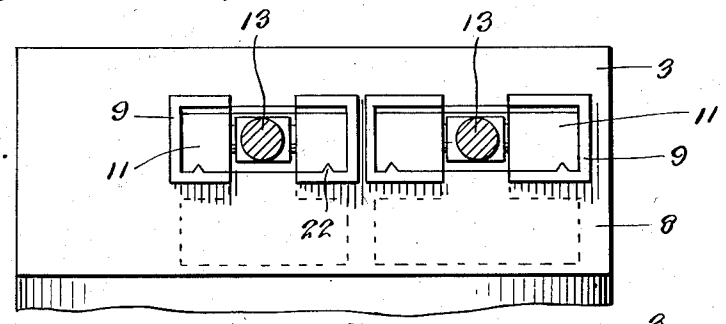


Fig. 5.

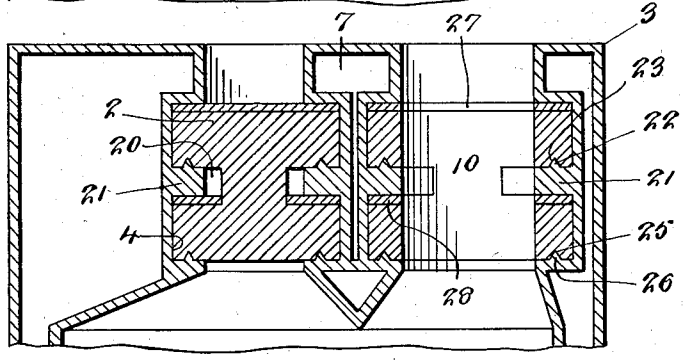
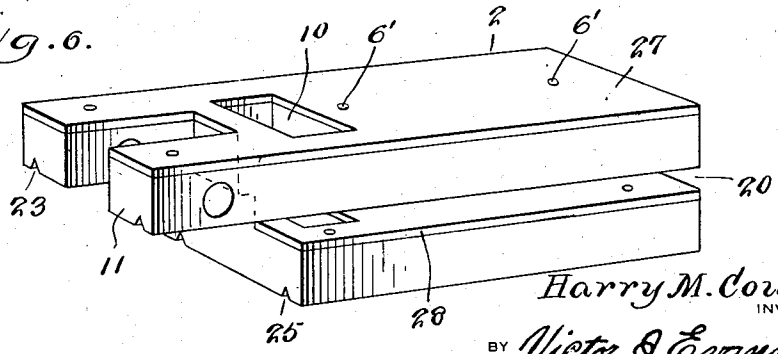


Fig. 6.



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INTERNAL COMBUSTION ENGINE VALVE MECHANISM

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Application May 1, 1934, Serial No. 723,389

2 Claims. (Cl. 123—188)

This invention relates to internal combustion engines and more particularly to means for controlling the intake and exhaust ports of the engine and has for the primary object the provision of an improved and simplified valve mechanism and mounting therefor which will prevent the escape of fuel from the engine while under compression and will permit complete supplying of the engine with fuel at the proper times and scavenging of the engine during other times and thereby assure maximum performance of the engine with minimum consumption of fuel.

With these and other objects in view this invention consists in certain novel features of construction, combination and arrangement of parts to be hereinafter more fully described and claimed.

For a complete understanding of my invention, reference is to be had to the following description and accompanying drawings, in which

Figure 1 is an end elevation illustrating an internal combustion engine with my invention applied thereto.

Figure 2 is a horizontal sectional view showing the valve mechanism forming the subject matter of the present invention.

Figure 3 is a sectional view taken on the line 3—3 of Figure 2.

Figure 4 is a sectional view taken on the line 4—4 of Figure 2.

Figure 5 is a sectional view taken on the line 5—5 of Figure 2.

Figure 6 is a perspective view illustrating one of the valve elements.

Referring in detail to the drawings, the numeral 1 indicates an internal combustion engine of the conventional type to which my invention is applied. The engine disclosed by the drawings is of the one cylinder type and the intake and exhaust ports are controlled by sliding valves 2 constituting a part of my invention and it is to be understood that an engine of a multiplicity of cylinders can have my invention adapted thereto by providing a pair of sliding valves to each cylinder and as this would be merely a duplication of construction of that shown by the drawings it is not thought necessary to describe specifically an engine of this character. The head of the cylinder 1 is indicated by the numeral 3 and has formed therein a pair of non-communicative and longitudinally arranged valve chambers 4 opening outwardly through sides of the head. The chambers at one end are closed by a removable plate 5 provided with flanges 6 fitting within grooves formed in the head so that when the plate is drawn tightly to the head an effective seal will be provided to prevent escape of fuel from the chambers. The head 3 is water-jacketed, as shown at 7, and the water jacket communicates with the usual water jacket of the cylinder. The other ends of the chambers project beyond the cylinder, as shown at 8, and carry guides 9 forming an integral part of the head. The valves 2 are mounted for sliding movement in the valve chambers and each have a passage 10 to be moved into and out of register with the ports of the cylinder. Each valve 2 has extensions or a bifurcated portion 11 apertured to form journals for a wrist pin 12 carried by a connecting rod 13. The connecting rods 13 are connected to cranks 14 of a crank shaft 15. The crank shaft 15 is mounted in a suitable housing 16 carried by the head and cylinder of the engine. A driven shaft 17 is journaled to the housing 16 and to the crank case of the engine 1 and is connected to the shaft 15 by gears 18 and also is connected to the main crank shaft of the engine by gears 19. The gears described are of such a ratio that the valves 2 will be operated or reciprocated at the proper time for opening and closing the ports of the cylinder in accordance with the position of the piston of the cylinder. The guides 9 support the extensions 11 of the valves 2 when the latter are at the limit of their endwise movement in one direction.

Opposite sides of the valves 2 are grooved, as shown at 20, to receive guide ribs 21 formed on opposite walls of the valve chambers and the upper faces of the ribs 21 are provided with tapered ribs 22 fitting in correspondingly shaped grooves 23 formed in the upper walls of the grooves 20 of the valves. The lower faces of the valves are grooved, as shown at 25, to receive ribs 26 formed on the lower wall of the valve chambers. The ribs 22 and 26 fitting within their respective grooves and the ribs 21 fitting in the grooves 20 provide a snug fit between certain walls of the valve chambers and the valves to prevent passing of fuel or gases about said valves. The upper faces of the valves have removably secured thereto wear plates 27 contacting with opposite walls of the valve chambers. Wear plates 28 are secured to the lower walls of the grooves 20 and engage with the ribs 21. The wear plates cooperate with the ribs and grooves heretofore mentioned in providing an effective seal between the valves and the walls of the valve chambers and which will permit said valves to have free sliding movement. The wear plates being removable from the valves obviates the necessity of

valve grinding due to the fact that the wear plates may be replaced by other wear plates when worn. The removal of the valves from the chambers can be easily accomplished after being disconnected from the connecting rods and the removal of the plate 5 from the head 3. It is preferable that the wear plates be secured to the valves by dowel pins 6' so that the plates can be easily detached from the valves when desired.

Valves and valve operating mechanism of the character described when adapted to an internal combustion engine will assure maximum performance of the engine at all times with the minimum consumption of fuel and obviates the necessity of valve grinding and permits the engine to more readily take in fuel and exhaust burnt gases therefrom and further the valves due to their mounting are prevented from overheating and becoming destroyed or injured by excessive temperatures.

Having described the invention, I claim:

1. A valve mechanism for an internal combustion engine comprising a cylinder head having a valve chamber of substantially rectangular shape in cross section and provided with ports in opposite walls thereof, said valve chamber opening outwardly through opposite sides of the head, a plate removably secured to one side of the head and closing one end of the valve chamber, guides integral with the head and aligning with the open end of the chamber, ribs integral with opposite walls of the chamber and extending the full length of the latter, a valve element shaped to engage all walls of the chamber and slidable therein and provided with a port, said valve element having grooves in opposite walls to receive the ribs, extensions at one end of the valve element and slidably supported by the guides, wear plates removably secured to the valve element, and means for reciprocating the valve element and connected to the extensions.

2. In an internal combustion engine, a cylinder head having a substantially rectangular valve chamber extending transversely therethrough and provided with opposed ports in opposite walls thereof, a closure plate removably secured over one end of the chamber, guides integral with said head and aligned with the open end of the valve chamber, ribs of substantially rectangular shape in cross section integral with opposite walls of said chamber and said guides, said ribs extending the full length of said chamber, a valve element slidably engaging all walls of said chamber and having substantially rectangular grooves in opposite walls thereof into which said ribs extend, cooperating V-shaped tongue and groove connections between said ribs and said valve element, respectively, similar connections between the bottom face of said valve element and the bottom wall of said chamber, respectively, said tongue and groove connections packing said valve element against gas leakage, wear plates in said rectangular grooves and engaging said ribs, wear plates between the top of said valve element and the top wall of said chamber, and means for reciprocating the valve element.

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