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Overby

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[54] **PNEUMATIC VALVE CLOSING MECHANISM**

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[51] **Int. Cl.** **F01l 9/02**
[58] **Field of Search** 123/90.14, 90.12, 92, 90.27

[56] **References Cited**

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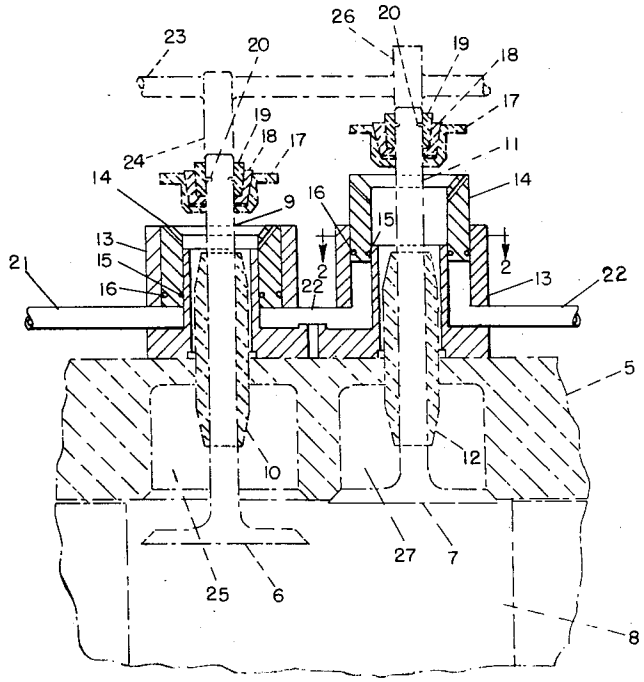
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[57] **ABSTRACT**

This invention consists of an air cylinder that encompasses the upper portion of each valve stem and guide on an internal combustion engine. The air cylinders are provided with annular pistons. The upper end of each valve stem is provided with a dish-shaped washer that will rest on the top of a piston when the valve is open and will be forced upward by the top of the piston by the air in the cylinder to urge the valve toward its closed position.

3 Claims, 2 Drawing Figures



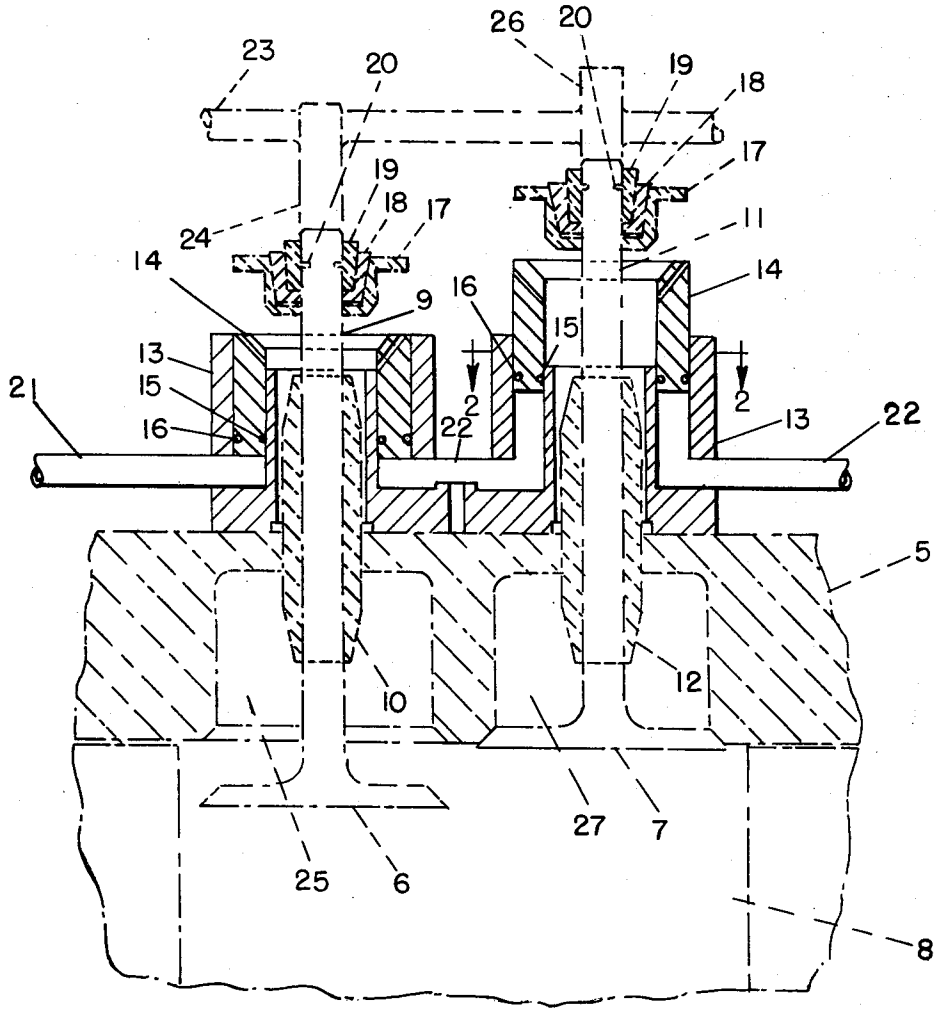


FIG. 1

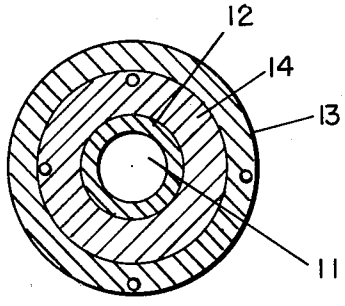


FIG. 2

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PNEUMATIC VALVE CLOSING MECHANISM

This invention relates to internal combustion engines; more particularly, to the valve-operating mechanism of internal combustion engines; still more particularly, to that part of the valve-operating mechanism that closes the valves of an internal combustion engine.

There are a number of different types of valve-operating mechanisms depending on the type of valves the engine has. There are the overhead valves and the L-head valves to name only two of the most popular valves that are in use today. Overhead valves are operated by a camshaft driven by gear mechanism while L-head valves are either mechanically-operated mechanism or a combination of mechanical and hydraulic mechanism. Any of the mechanisms now in use require valve springs; a mechanical element that requires replacement from time to time either by reason of wear or because of breakage.

It is well known by those experienced in the internal combustion engine art that a condition known as floating valves occurs when an engine is speeded up to a certain R.P.M. Where the steel valve springs no longer fully open and close the valves, the engine misfires and unused fuel goes out the exhaust. This lack of complete burning of all of the fuel admitted to the cylinders results not only in the slowing down of the engine but also in causing the engine to run rough and not at its maximum efficiency.

It is therefore the principal object of this invention to provide a pneumatic valve closing mechanism that does not employ any valve springs or the like.

Another object of this invention is to provide a pneumatic valve-closing mechanism that does not have any moving parts other than those already embodied in the valve mechanism, thus reducing the maintenance cost to a minimum.

Another object of this invention is to provide a pneumatic valve-closing mechanism that is noiseless in operation and will therefore contribute to a more quiet overall running of the engine.

Still another object of this invention is to provide a pneumatic valve-closing mechanism that can be adapted to any internal combustion engine having valve springs merely by removing the springs and inserting the hereinafter described air cylinders on top of the valve guides and over the valve stems which will now project up through the center of each air cylinder.

These and other objects and advantages of this invention will become more apparent as the reading of this description of the invention proceeds when taken in conjunction with the accompanying drawing in which:

FIG. 1 is a sectional view of a cylinder head of a typical internal combustion engine showing two of its valves and this invention for lifting the same.

FIG. 2 is a sectional view of this invention, taken substantially along line 2—2 of FIG. 1, and viewed in the direction indicated by the arrows.

Directing ones attention to FIG. 1 of the accompanying drawing it will be seen that there is herein illustrated a portion of a typical internal combustion engine showing a part of the cylinder head 5 that is provided with an intake valve 6 and an exhaust valve 7 that is located in the aforesaid cylinder head 5 on the top of each cylinder 8. The stem 9 of the aforesaid intake valve 6 slidably passes through the valve guide 10, while the valve stem 11 of the exhaust valve 7 slidably passes through the like valve guide 12. It must be realized at this time that the parts of an internal combustion engine that have so far been described are typical of any internal combustion engine and are not an actual part of this invention which I will now describe in detail. Since with one exception, this invention embodies two identical details for each cylinder of an internal combustion engine, like parts are indicated by like reference numbers. The reference number 13 indicates the air cylinders in which are located the pistons 14 having internal piston rings 15 and external piston rings 16. The aforesaid piston rings can be of the O-ring type, if it is so desired.

The dish-shaped washer 17, its keeper 18, sleeve 19, and lock-ring 20 are all standard parts of the internal combustion engine on which this novel invention is placed. An air pipe 21 connects the end air cylinder to an air gauge on the instrument panel of the internal combustion engine. The air gauge is not shown in any of the views of the accompanying drawing. Air pipe 22 connects the often-mentioned air cylinders 13 together, thereby insuring a flow of air between all of the air cylinders.

It will be noted on reading the above description of this invention that the invention does not contain any valve springs whatsoever. This is one of the major features of this entire invention whose operation will now be described.

When the internal combustion engine is running, the camshaft 23 will rotate and thus cause the intake valve cam 24 to depress the aforesaid intake valve 6 in the cylinder head 5 and thereby permit the combustible mixture to flow into the cylinder 8 through the intake port 25. When the piston starts its upward travel, air in the aforesaid air cylinder 13 that fits over the stem 9 of the intake valve 6, forces the piston 14 upward and thereby lifts the aforesaid washer 17 off the top of the air cylinder 13. Since the aforesaid stem 9 of the intake valve 6 is secured to the just-mentioned washer 17, the intake valve will now be lifted to its closed position and thus shut off the flow of fuel through the intake port 25. At the proper second, the exhaust valve cam 26 on the camshaft 23 will force the exhaust valve 7 to open and the burned gas in the aforesaid cylinder 8 will escape out through the exhaust port 27 of the engine.

It is to be realized by those experienced in the internal combustion engine art that when the valves are closed, the washer 17 of each valve will be closed tightly on top of the air cylinder of the valve and that no air in the cylinder can escape out of the top of the cylinder. It will also be realized that the periphery of the inside upper edge of the aforesaid pistons 14 is chamfered as is the periphery of the lower edge of the aforesaid washers 17. This chamfering of the two parts of the engine permits the lower end of the washers 17 to enter the top of the pistons 14 with ease as the up and down movement of the aforesaid valve stems 26 happens many thousand times per minute when the internal combustion engine is running.

From the foregoing, it is seen that I have herein provided a new and novel means of closing the valves of an internal combustion engine without the use of springs

or other mechanism that among other things is noisy in operation.

This invention can be adapted to any internal combustion engine having valves that are normally closed by means of springs or the like. However, my accompanying drawing illustrates this invention on an engine having an overhead cam shaft. The use of this invention on an internal combustion engine will permit the R.P.M. of the engine to be increased by one third, and the lowering of the gear ratio with the resultant saving of one third of the fuel with the same torque horsepower. The use of this invention will permit racing engines to be run at greater speeds than is now possible. The maintenance of this invention is extremely simple. Air for the cylinders can be obtained at any service station. If, by chance, the O-rings **15** or **16** should develop a small leak, you simply let all of the air out of the cylinders, remove the washers and keepers with your fingers and install new O-rings. Although it has not been previously mentioned, nor illustrated in the accompanying drawing, the end air cylinder is provided with an ordinary tire valve for the charging of the cylinder with 100 to 200 pounds of air.

What I now claim as new and desire to secure by Letters Patent is:

1. Pneumatic valve-closing mechanism arranged for operative association with a standard engine valve, its valve stem, guide, and washer which comprises

an air cylinder encompassing the valve stem and guide and forming an annular chamber in concentric relation therewith,

an annular piston mounted for movement in the annular chamber of said air cylinder, and

a source of air pressure in communication with said air cylinder to urge said piston against said washer thus to urge the valve toward its closed position.

2. Pneumatic valve-closing mechanism according to claim **1** wherein said piston constitutes the only element operative to effect valve closure.

3. Pneumatic valve-closing mechanism according to claim **1** which comprises

a plurality of said cylinders and pistons, each associated with one of the plurality of valves of an engine, and

means connecting said air pressure source in common to all of said cylinders.

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