Aug. 17, 1965 B. L. SHEAFFER 3,200,838

REED VALVES

Filed Dec. 31, 1962

Fig. 1.

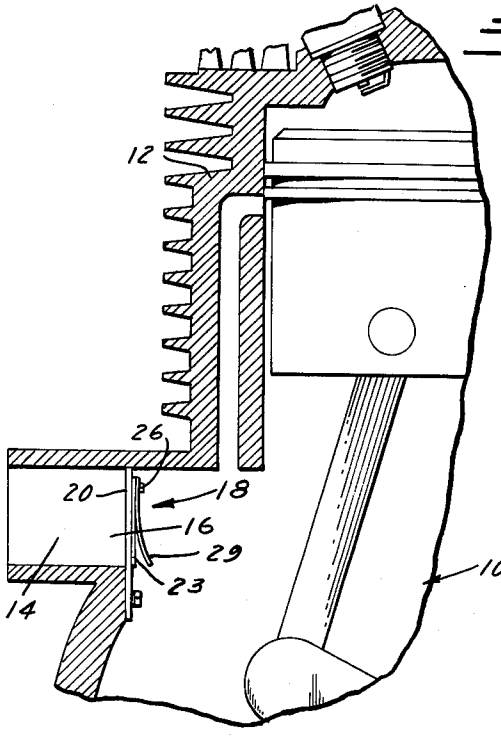


Fig. 2.

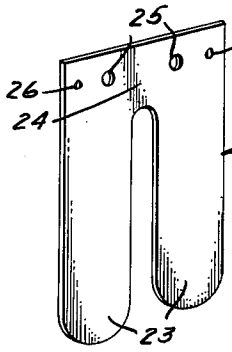


Fig. 3.

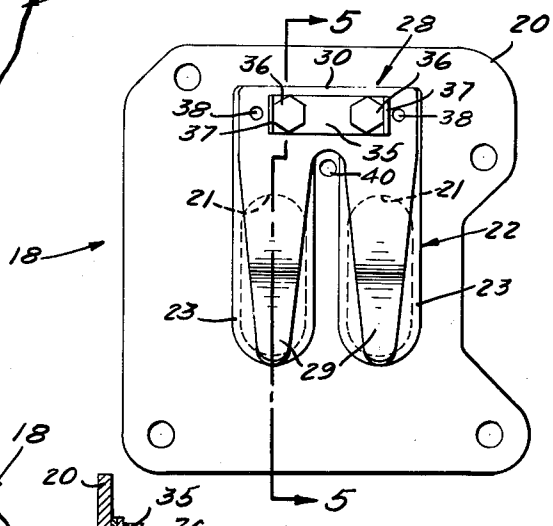


Fig. 4.

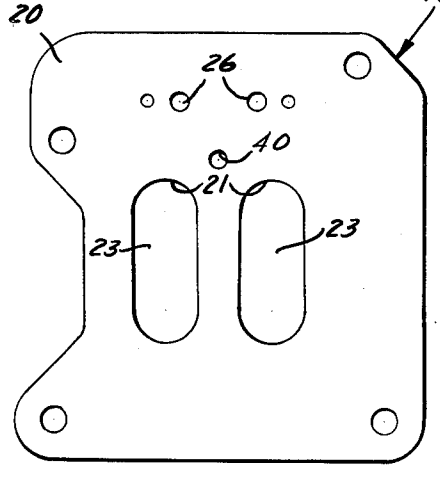
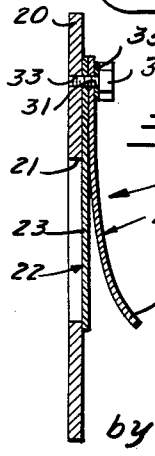


Fig. 5.



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REED VALVES

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1 Claim. (Cl. 137—512.15)

This invention relates generally to internal combustion engines and relates more particularly to inlet valves therefor.

While the invention has particular utility in connection with two-cycle internal combustion engines, and is shown and described in such connection, it is to be understood that its utility is not confined thereto.

Certain well known difficulties and problems are encountered in inlet valves for two-cycle internal combustion engines and it is an object of the present invention to overcome these difficulties and solve said problems.

It is another object of the present invention to provide a reed valve arrangement which will result in materially improved performance of the engine.

It is still another object of the invention to provide reed valves of this character whereby the power output of the engine is materially increased.

It is still another object of the invention to provide valve means of this character having relatively long life.

It is a further object of the invention to provide valve means of this character which, should breakage thereof occur, will not result in damage to the engine.

It is a still further object of the invention to provide valve means of this character that is simple in construction and reliable in operation.

It is another object of the invention to provide valve means of this character that is relatively inexpensive to manufacture.

The characteristics and advantages of the invention are further sufficiently referred to in connection with the following detailed description of the accompanying drawings, which represent one embodiment. After considering this example, skilled persons will understand that many variations may be made without departing from the principles disclosed, and I contemplate the employment of any structures, arrangements or modes of operation that are properly within the scope of the appended claims.

Referring to the drawings, which are for illustrative purposes only:

FIG. 1 is a sectional view of the inlet portion of a two-cycle internal combustion engine with the reed valve assembly operably disposed for controlling said inlet;

FIG. 2 is the perspective view of the reed valve, per se;

FIG. 3 is a front view of the valve assembly;

FIG. 4 is a back view thereof; and

FIG. 5 is a sectional view taken on line 5—5 of FIG. 3.

Referring more particularly to FIG. 1, there is schematically shown a portion of a two-cycle internal combustion engine having a crank case **10** with a cylinder **12** connected therewith, and an air inlet passage **14** terminating at its inner end in an inlet port **16**. A reed valve assembly, indicated generally at **18**, is attached to the inner side of the crankcase for controlling the inlet port **16**.

The reed valve assembly **18** comprises a block or plate **20** having a pair of elongated inlet openings **21** therein, said openings being adjacent to and parallel with each other.

These inlet openings are controlled by a reed valve element, indicated generally at **22**, which is formed of a suitable plastic material of suitable thickness.

While various plastic materials may be used for the reed valve element, such material should be hard, dense, and homogeneous. More specifically, for example, it has been found that a laminated material gives very good results and such material may consist of a fibrous sheet filler, such as cotton or glass fabric, layers or laminations of the filler being impregnated with a thermosetting resin binder and secured together in the usual well known manner. The material, when cured, is transformed into a solid mass which will not delaminate and which will not be resoftened by the application of heat.

The particular reed element comprises a fine weave cotton fabric base with a phenolic binder. Another material may comprise a continuous filament woven glass fabric impregnated with epoxy resin.

Valve element **22** has a pair of flexible fingers **23** which are spaced apart in parallel relationship to each other and connected at one end by a connecting portion **24**, which may be called the base portion. There is a pair of openings **25** in the base portion, said openings being spaced apart transversely of the valve element and are adapted to receive screws therein whereby the element is attached to the block **20**. Outwardly of the screw holes or openings **25** are openings **26**, the purpose of which will be described hereinafter.

The valve element **22** is disposed on base plate **20** with the fingers **23** disposed over the inlet openings **21**.

A reed guard, indicated generally at **28**, is disposed over the reed valve element **22**, as best shown in FIGS. 1, 3 and 5, and is formed of stiff sheet metal or other suitable material. Guard **28** also has a pair of parallel laterally spaced apart fingers **29**, which taper toward their smaller ends and are rounded at such ends. At the opposite end the fingers are connected together by a connecting portion **30** which is provided with openings **31** therein aligned with the openings **25** of the reed valve element and are adapted to receive screws **36** therein which pass through the openings **31** provided therefor in said guard and through the openings **25** in the reed valve element. The screws are threadably disposed in tapped openings **33** provided therefor in the base plate **20**, said tapped openings being in alignment with the openings **25** in the valve element **22** and with the openings **31** in the guard **28**.

Means for locking the screws **36** is provided and comprises a strip **35** disposed on the outer side of the connecting portion **30** of the guard **28**, and having openings therein aligned with the openings **31** of the connecting portion **30**. The screws **36** pass through said openings in the strips **35** and the heads **36** of said screws are held against rotation by upturned end portions **37** of the strip **35**.

Nibs **38** are pressed in the connecting portion **30** of guard **28**, said nibs being aligned with the openings **26** in the valve element **22** and project into said openings **26** to securely position the guard **28** in proper alignment with the valve element **22**.

As best shown in FIGS. 1 and 5, the fingers **23** of the reed valve element lie against the adjacent surface of the base plate **20**, while the fingers of the reed guard curve away from the fingers of the valve element from the connecting portions **30** of said guard. The fingers **29** of the guard are so curved and positioned as to serve as stop means limiting opening movement of the fingers **23** of the reed valve element, as the fingers **23** of the reed valve element curve away from the base plate from the connecting portion **24** of the element when air is drawn into the crankcase of the engine, said fingers curving away from base plate **20** into progressive engagement with the adjacent fingers **29** of the guard.

When air ceases to be drawn into the crankcase the fingers **23** of the reed valve element return to their normal position in engagement or substantial engagement with the adjacent side of the base plate and prevent reverse flow

of air through the ports or openings 21 and the inlet port 16.

While the arrangement shown has inlet holes in the base plate with respective fingers 23 controlling same, there may be but a single inlet opening controlled by a single finger or there may be more than two openings controlled by respective additional fingers.

In the engine shown herein, air is drawn into the crankcase and the intake of air is controlled by a reed valve assembly arrangement, above described. However, it is to be understood that a fuel mixture may be drawn into the crankcase through the inlet 14 and the openings 21 of the reed valve assembly. It is also to be noted that there is an air compensating hole 40 for the idling system.

The invention and its attendant advantages will be understood from the foregoing description and it will be apparent that various changes may be made in the form, construction and arrangement of the parts of the invention without departing from the spirit and scope thereof or sacrificing its material advantages, the arrangement hereinbefore described being merely by way of example, and I do not wish to be restricted to the specific form shown or uses mentioned except as defined in the accompanying claim, wherein various portions have been separated for clarity of reading and not for emphasis.

I claim:

A reed valve device for use with a two cycle internal combustion engine having a crank case with an air inlet passageway connected to said crank case and terminating at its inner end in an inlet port, comprising a base plate having four corner portions and two flat surfaces and being of a size and shape to close the port of said inlet passageway, said plate having a pair of elongated openings in parallel side by side spaced apart relationship to each other, openings provided through the corner portions of said base plate for the reception of means which will retain the same in the port of said inlet passageway, said base plate further characterized in that it has aligned openings therein spaced to one side of one pair of longitudinal ends of said elongated openings for the reception of means which will retain and maintain a movable element of said reed valve against said plate, said plate further having a compensating hole through the central portion thereof between said elongated openings and aligned openings thereof, a flat movable laminate element of phenolic resin binder and a fine weave cotton fabric base, said laminate having a bifurcated shape with the two extensions thereof being of a size and shape larger than the size and shape of said elongate openings, said element having aligned openings therein of a size and shape identical with the aligned openings in said plate, said bifurcated element being of such a size and shape that when the same is retained on said plate with its aligned openings positioned over the aligned openings of said plate, the compensating hole in said plate will lie between the extensions of said element, a reed valve guard of rigid sheet material of bifurcated shape having a pair of fingers overlying the extensions of said element, each finger having an outer portion of lesser width than the extensions of said valve element, said guard further characterized in that it has aligned openings therein of identical size and shape as said aligned openings of said valve element and plate, the fingers of said guard curving away from said element and plate when said guard is positioned over said element and plate, said guard in said position with its aligned openings above the aligned openings of said plate is spaced from the compensating hole in the plate, means for maintaining and retaining said element against said plate comprising nibs formed in the connecting portion of the guards, said nibs being aligned with the aligned openings in the element and projecting into said openings to securely position the guard in proper alignment with the element, other components of said means being positioned through said aligned openings of said plate element and guard to secure the same in assembled and aligned relationship.

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