Jan. 19, 1960 B. METTETAL 2,921,568

THROTTLE CONTROL VALVE FOR MODEL ENGINE

Filed Feb. 27, 1958

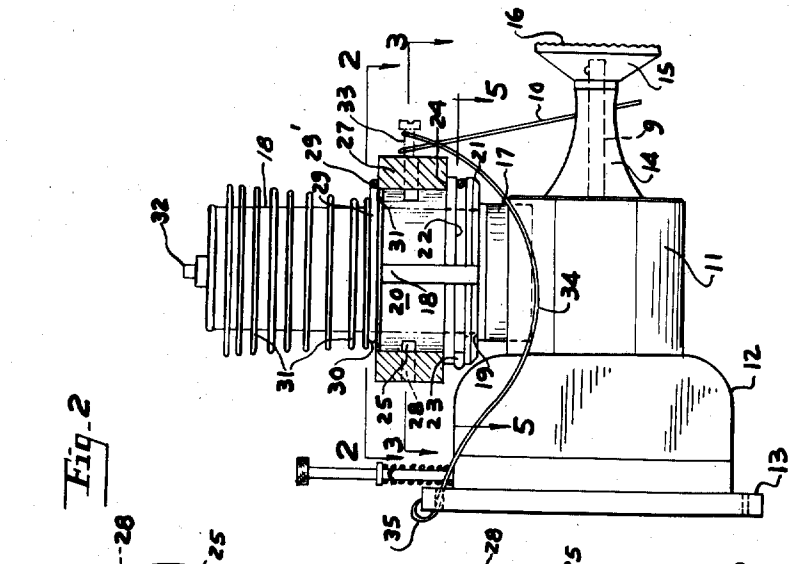


Fig. 1

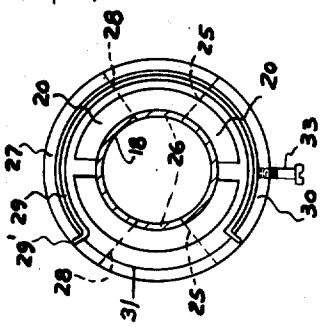


Fig. 2

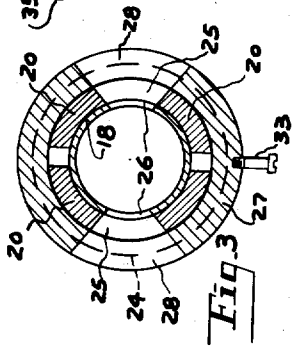


Fig. 3

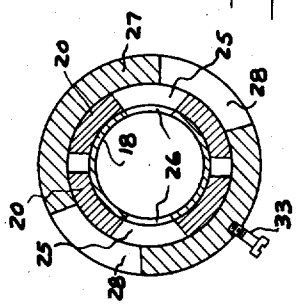


Fig. 4

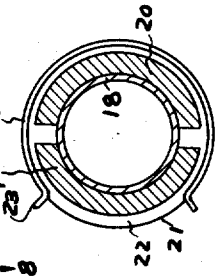


Fig. 5

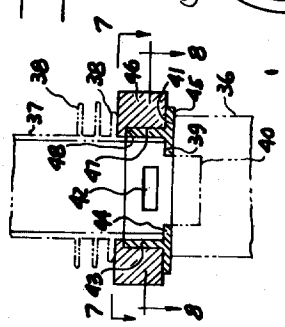


Fig. 6

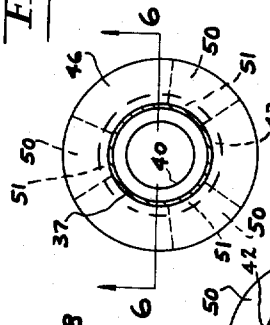


Fig. 7

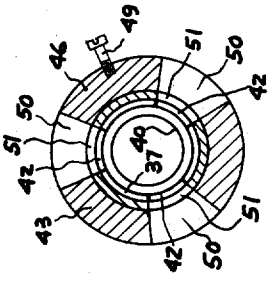


Fig. 8

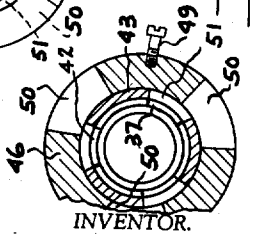


Fig. 9

INVENTOR.
BERT METTETAL

BY Robert A Sloman

ATTORNEY

United States Patent Office 2,921,568
Patented Jan. 19, 1960

2,921,568

THROTTLE CONTROL VALVE FOR MODEL ENGINE

Bert Mettetal, Detroit, Mich.

Application February 27, 1958, Serial No. 717,935

7 Claims. (Cl. 123—107)

This invention relates to model internal combustion engines such as might be used as model airplane engines or for other devices, and more particularly relates to a throttle control valve therefor.

Heretofore various devices have been used for regulating the amount of fuel introduced into the engine for controlling speed, and various difficulties have been experienced in this type of device.

It is the object of the present invention to provide a rotary type of exhaust control valve which may be mounted over and around the engine cylinder for variably regulating the exhaust flow from the engine and accordingly regulating the speed of operation.

It is a further object to provide an exhaust control valve assembly which may be mounted upon an existing engine over the exhaust ports of the cylinder for variably regulating the outflow of exhaust gasses. These and other objects will be seen from the following specification and claims in conjunction with the appended drawing in which:

Fig. 1 is a side elevational view of a model internal combustion engine incorporating the present exhaust throttle control.

Fig. 2 is a section taken on line 2—2 of Fig. 1.

Fig. 3 is a section taken on line 3—3 of Fig. 1.

Fig. 4 is a similar view showing the valves ring in a control position different from Fig. 3.

Fig. 5 is a section taken on line 5—5 of Fig. 1.

Fig. 6 is a fragmentary section of a slightly different form of control valve.

Fig. 7 is a section taken on line 7—7 of Fig. 6.

Fig. 8 is a section taken on line 8—8 of Fig. 6.

Fig. 9 is a similar view fragmentarily showing the valve ring in a different control position.

It will be understood that the above drawing illustrates merely several preferred embodiments of the invention and that other embodiments are contemplated within the scope of the claims hereafter set forth.

Referring to Fig. 1 of the drawing, there is shown a model internal combustion engine such as a model aircraft engine, which includes crankcase 11 and at one end thereof the support housing 12 and mounting flange 13, housing 12 defining a fuel reservoir.

Projecting from the opposite side of the crankcase is the crankshaft receiving boss 14, with crankshaft 9 projecting from the end of said boss and having secured thereon the rotatable hub 15 with serrated end face 16 upon which a propeller or other driven device may be mounted.

The crankcase upon one side thereof threadedly receives the cylinder base 17, and projecting therefrom at a reduced exterior diameter, defining shoulder 19, is the engine cylinder 18, having a series of longitudinally spaced annular cooling fins 31 throughout its length. A conventional firing device 32 is axially arranged upon the outer end face of said cylinder. Member 32 is in the nature of a glow plug.

Adjacent the lower end of said cylinder and formed through opposing walls thereof are a pair of transverse elongated exhaust ports 26, as shown in Fig. 3 which communicate with the combustion chamber within the cylinder.

To provide an exhaust throttle control for the engine a suitable valve body is mounted upon and around said cylinder and retained thereon and has formed therethrough an opposed pair of elongated transverse passages 25 which taper outwardly and register at their inner ends with exhaust ports 26.

In the present preferred embodiment of the invention, the valve body consists of a pair of symmetrical substantially semi-circular valve elements 20 which are positioned around the opposite sides of cylinder 18 and immovably retained thereon, each body having formed transversely therethrough a transverse elongated tapered passage 25.

Each of the valve body elements 20 have semi-circular flanges 21 of increased diameter at the one ends thereof which cooperatively abut cylinder shoulder 19. Said shoulder retains the valve body elements against relative longitudinal movement in one direction. The two flanges have formed therein the semi-circular slots 22 which receive retaining spring clip 23 whose outturned ends 23', Fig. 5, facilitate assembly and disassembly. Spring clip 23 maintains the valve elements against the exterior wall of the cylinder, and against rotation thereon.

The valve body is presently made in two parts so that it may be assembled over an existing cylinder over the exhaust ports therein. The presence of the cylinder base 17 of increased diameter prevents the sliding on of a unitary valve body. The unflanged ends of said body elements are retainingly engaged by the lowermost cooling fin.

The above fins also prevent the valve body from being slid on as a unitary structure. Such a unitary valve body would be possible and could be used if the cylinder 18 was of a constant outside diameter. However, many model engines of this type, already on the market, have this enlarged cylinder base 17.

It will be noted in Fig. 1 that the corresponding ends of valve body elements 20 are spaced apart, whereby they are loosely positioned and retained upon the cylinder. The flanges 21 on valve bodies 20 define at their inner annular edges the shoulders 24. A control ring 27 is rotatively poistioned upon and around both of the valve body elements 20 and upon one side is retainingly engaged by shoulders 24. The sliding fit of the ring also maintains the assembled relation of the valve body elements. Outside diameter of body elements is .690" and inside diameter of ring 27 is .691", for illustration.

Transverse exhaust control ports 28 are formed through opposing walls of ring 27 being outwardly tapered and elongated and adapted for registry with the corresponding passages 25 formed through valve body elements 20, as shown in Fig. 3.

A second spring clip 29 of circular shape and with corresponding outturned end portions 29', Fig. 2, is positioned within an annular slot 30 defined between the lowermost fin 31 and the second fin. The spring clip extensions 29' engage valve ring 27 against endwise movement upon cylinder 18 and with respect to the valve bodies 20. The valve bodies are retained against endwise movement in one direction by the lowermost cooling fin and in the opposite direction of shoulder 19.

The control lever or screw 33 is threaded into or otherwise secured to ring 27 and projects radially outward. Compression leaf spring 34 is anchored at one end at 35

to crankcase flange **13**, and at its other end is secured to control lever **33**.

The exhaust control ports **28** by virtue of the operation of compression spring **34** are normally in registry with the valve body passages **25** permitting full exhaust therethrough and maximum speed of the engine for a given delivery of fuel. When the model aircraft is in flight, the valve ring **27** is rotatable manually by the remotely operated wire **10** or cable, one end of which is suitably connected to control lever **33**, whereas the other end of wire **10** will be in the hands of the operator upon the ground.

By manually regulating the tension in control wire **10** the valve ring **27** may be rotated against the action of spring **34**, to varying positions selectively so that the exhaust control ports **28** might be brought completely out of registry with passages **25** for stopping the engine or brought partially out of registry in varying degrees for controlling the speed of the engine.

Fig. 3 illustrates the relationship of the valve ring **27** to the valve body elements **20** showing the communication from the cylinder exhaust ports **26** through passages **25** and exhaust control ports **28** corresponding to a full throttle position or normal position under the action of compression spring **34**.

Fig. 4 shows an intermediate control position of valve ring **27** restricting the outflow of exhaust from valve body passages **25** producing a reduced speed of engine operation.

Figs. 6, 7, 8 and 9 show a slightly different construction of valve construction wherein the valve body is formed as a unitary ring as at **43** and is mounted around one end of cylinder **37**, whose reduced portion **40** is removably and threadedly fitted into body **36** forming a part of a conventional engine crankcase, such as shown in Fig. 1.

Accordingly as the cylinder lacks the enlarged base **17** of Fig. 1, is may be unthreaded from the crankcase and the valve may be assembled directly upon said cylinder, and the cylinder returned to the assembled position shown in Fig. 7. Said cylinder **37** fragmentarily shown has a series of cooling fins **38** of conventional construction.

The inner end **39** of said cylinder forms a retaining shoulder in view of the reduced diameter of cylinder extension **40**. This shoulder is spaced outwardly from body **36** a short distance to retainingly receive therebetween the internal annular flange **44** of annular valve body **43**.

Cylinder **37** has formed through an end portion thereof through opposing walls a plurality of transverse elongated exhaust ports **42**. Formed through wall portions of valve body **43** are a plurality of transverse elongated passages **51**, which diverge radially and which register with exhaust ports **42**.

Valve body **43** also has an additional annular flange **45** of increased diameter, which on one side bears against the end of body **36** and upon its opposite side provides an annular stop for the annular valve ring **46**. Said ring is rotatively mounted upon the valve body between flange **45** and the lowermost fin **38** on the cylinder.

Ring **46** has formed through opposing wall portions a plurality of exhaust control ports **50** which diverge radially and register with the valve body passages **51**. Valve ring **46** has an internal bore **47** which slidably engages the exterior surface of valve body **43**. This bore terminates at one end in the internal annular flange **48** which registers with the corresponding outer annular edge of valve body **43**.

Flange **48** is also slidably and retainingly engaged by the lowermost fin **38** completing the valve assembly.

Valve ring **46** also has a control lever **49** projecting radially outwardly therefrom as shown in Fig. 8 for regulating the rotative position of valve ring **46** in the same manner, as above described with respect to Fig. 1.

For example, there also will be employed an elongated compression type of spring **34**, Fig. 1, which interconnects lever **49** and some stationary portion of the crankcase for normally maintaining the valve ring **46** with its control ports **50** in fully operative position as shown in Fig. 8.

A similar control cable **10**, as in Fig. 1, is employed for manually regulating the rotated position of valve ring **46**, such as at the intermediate control position of Fig. 9, for restricting the flow of exhaust gasses and accordingly slowing down the engine, for a given fuel intake.

Referring to Fig. 1, it is noted that the diameter of the fins **31** adjacent control ring **27** are less than the internal diameter of said control ring. Accordingly, upon removal of spring clip **29**, the said control ring may be slid axially towards the free end of the cylinder so as to release the valve body elements **20**. By this construction, the valve body elements **20** may be inserted, or replaced, after which control ring **27** may be slid axially into position over the valve body elements, and the spring clip **29** re-inserted.

It is contemplated as a part of the present invention that the respective valve body elements **20** or the valve body **43** may be eliminated, and the cylinder so constructed with exhaust ports therethrough, as to cooperatively receive rotatively thereover a valve ring similar to valve rings **27** and **46**, with the exhaust control ports in said rings in cooperative registry with corresponding exhaust ports formed through the cylinder walls. The operation would be just the same except that the individual valve body element above described would be omitted.

Having described my invention, reference should now be had to the claims which follow.

I claim:

1. A throttle control valve for a model engine having a crankcase and projecting therefrom a cylinder having a series of spaced transversed exhaust ports through the wall thereof, a valve body mounted upon and around said cylinder retained thereon and having a series of transverse passages registering with said cylinder ports respectively, a control ring rotatively positioned upon and around said valve body and having therethrough a series of transverse exhaust control ports normally registerable with said valve body passages respectively permitting full exhaust, and rotatable to varying positions out of and partially out of registry in varying degrees for controlling the speed of said engine, operating means joined to said rings for selectively and rotatively positioning said ring with respect to said valve body and resilient means interposed in compression between said crankcase and said ring normally maintaining said exhaust control ports fully open.

2. A throttle control for a model engine having a crankcase and projecting therefrom a cylinder having a transverse exhaust port through the wall thereof, a valve body mounted upon and around said cylinder, retained thereon and having a transverse passage registering with said cylinder port, a control ring rotatively positioned upon and around said valve body and having therethrough a transverse exhaust control port normally registerable with said valve body passage permitting full exhaust, and rotatable to varying positions out of and partially out of registry in varying degrees for controlling the speed of said engine, operating means joined to said ring for selectively and rotatably positioning said ring with respect to said valve body, and resilient means interposed in compression between said crankcase and said ring normally maintaining said exhaust control port fully open.

3. A throttle control for a model engine having a crankcase and projecting therefrom a cylinder having transverse exhaust ports through opposing walls thereof, a valve body mounted upon and around said cylinder, retained thereon and having a pair of opposing trans-

verse passages registering with said cylinder ports, a control ring rotatively positioned upon and around said valve body and having therethrough a pair of opposed transverse exhaust control ports normally registerable with said valve body passages permitting full exhaust, and rotatable to varying positions out of and partially out of registry in varying degrees for controlling the speed of said engine, operating means joined to said ring for selectively and rotatively positioning said ring with respect to said valve body, and resilient means interposed in compression between said crankcase and said ring normally maintaining said exhaust control ports fully open.

4. A throttle control for a model engine having a crankcase and projecting therefrom a cylinder having transverse exhaust ports through opposing walls thereof, a valve body mounted upon and around said cylinder, retained thereon and having a pair of opposing transverse passages registering with said cylinder ports, a control ring rotatively positioned upon and around said valve body and having therethrough a pair of opposed transverse exhaust control ports normally registerable with said valve body passages permitting full exhaust, and rotatable to varying positions out of and partially out of registry in varying degrees for controlling the speed of said engine, operating means joined to said ring for selectively and rotatively positioning said ring with respect to said valve body, said valve body consisting of a pair of opposed arcuate body halves, and resilient means peripherally and retainingly engaging said body halves relative to said cylinder.

5. A throttle control for a model engine having a crankcase and projecting therefrom a cylinder having a transverse exhaust port through the wall thereof, a valve body mounted upon and around said cylinder, retained thereon and having a transverse passage registering with said cylinder port, a control ring rotatively positioned upon and around said valve body and having therethrough a transverse exhaust control port normally registerable with said valve body passage permitting full exhaust, and rotatable to varying positions out of and partially out of registry in varying degrees for controlling the speed of said engine, operating means joined to said ring for selectively and rotatably positioning said ring with respect to said valve body, said cylinder having cooling fins, means on said cylinder retaining said valve body against endwise movement relative to said cylinder, means on said valve body retaining said ring against endwise movement thereon in one direction, and a spring clip mounted on said cylinder between cooling fins retainingly engaging said valve ring against endwise movement in the opposite direction.

6. A throttle control for a model engine having a crankcase and projecting therefrom a cylinder having a transverse exhaust port through the wall thereof, a valve body mounted upon and around said cylinder, retained thereon and having a transverse passage registering with said cylinder port, a control ring rotatively positioned upon and around said valve body and having therethrough a transverse exhaust control port normally registerable with said valve body passage permitting full exhaust, and rotatable to varying positions out of and partially out of registry in varying degrees for controlling the speed of said engine, operating means joined to said ring for selectively and rotatably positioning said ring with respect to said valve body, means on said cylinder retaining said valve body against endwise movement relative to said cylinder, and means on said valve body retaining said ring against endwise movement thereon, said valve body retaining means consisting of an annular shoulder on said cylinder, and a cooling fin on said cylinder spaced from said shoulder respectively engaging the opposite ends of said valve body.

7. The throttle control of claim 6, there being additional cooling fins on said cylinder, said ring retaining means consisting of a radial flange on one end of said body engaging one end of said ring, and a spring clip mounted on said cylinder between cooling fins retainingly engaging the other end of said ring.

References Cited in the file of this patent

UNITED STATES PATENTS

2,401,932	Heintz	June 11, 1946
2,806,458	Mettetal	Sept. 17, 1957
2,810,373	Lang	Oct. 22, 1957

FOREIGN PATENTS

558,610	France	Oct. 23, 1922
572,883	Great Britain	Oct. 26, 1945