March 25, 1941. W. HULSEBOS 2,236,237

PISTON FOR WOBBLER ENGINES

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FIG.1

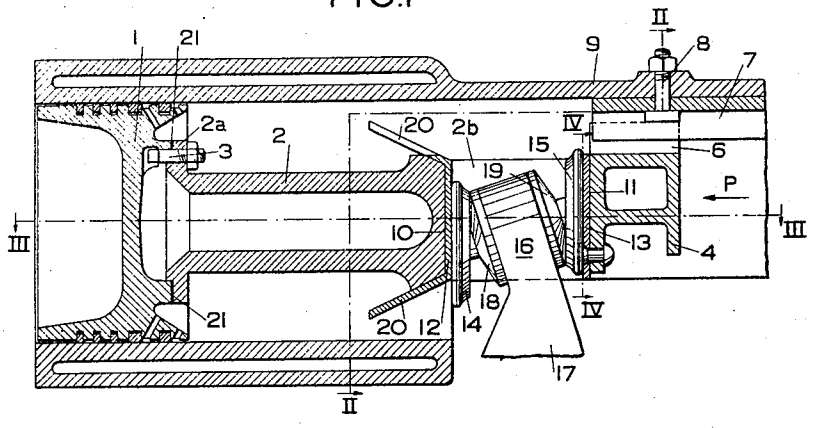



FIG.3

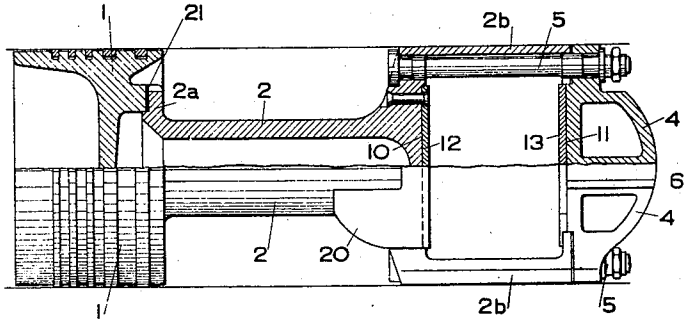



FIG.2

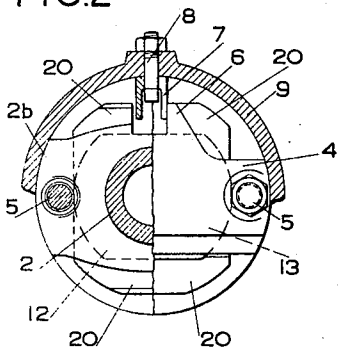
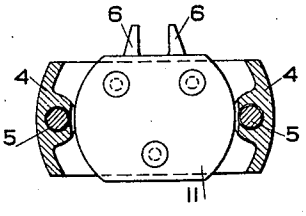



FIG.4




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PISTON FOR WOBBLER ENGINES

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FIG.5

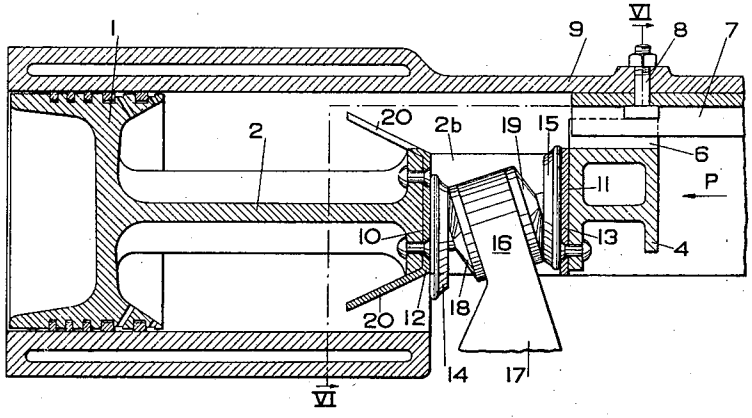



FIG.6

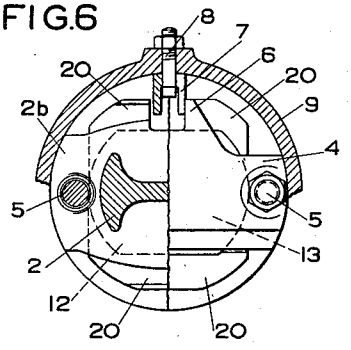
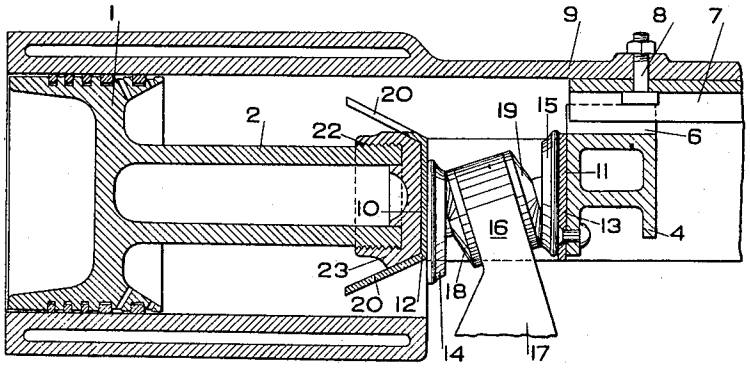



FIG.7




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FIG.8

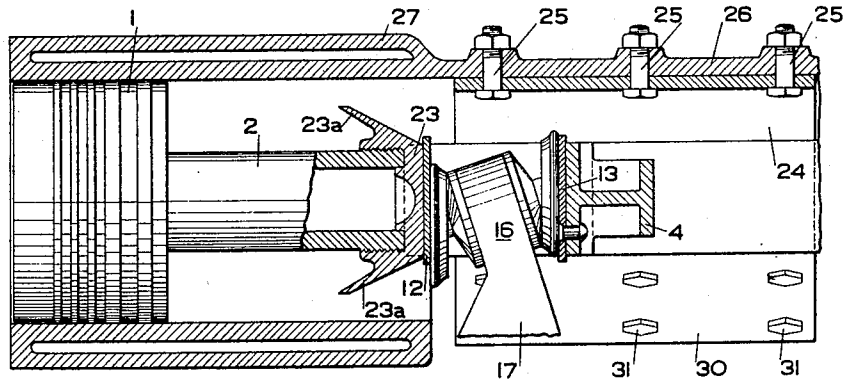
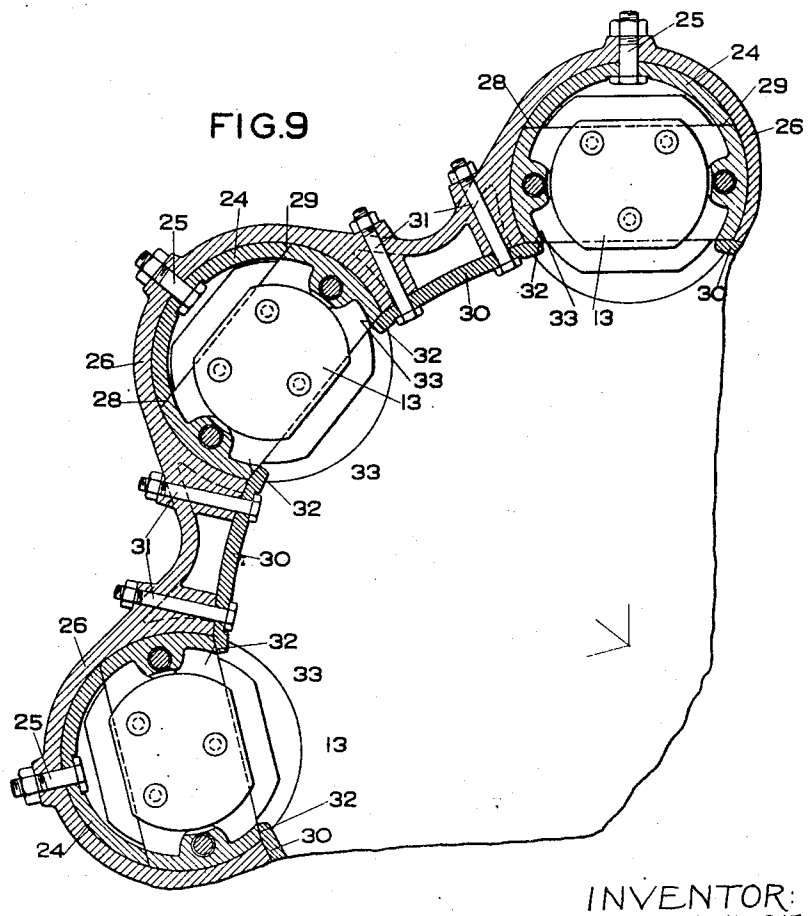



FIG.9




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Patented Mar. 25, 1941 2,236,237

# UNITED STATES PATENT OFFICE

2,236,237

## PISTON FOR WOBBLER ENGINES

Wichert Hulsebos, Laren, Netherlands, assignor to Naamlooze Vennootschap, Hulsemo Utrecht, Netherlands

Application April 18, 1939, Serial No. 268,476
In the Netherlands April 20, 1938

6 Claims. (Cl. 74—60)

This invention relates to improvements in pistons for wobbler engines and to wobbler engines provided with such pistons.

The general objects of the invention are to improve the construction of such pistons and engines.

Another object of the invention is to provide a piston of extremely light construction, such that the inertia forces of the set of pistons in the engine, which result in a couple of forces rotating about the main axis of the engine and consequently the counterweights in the engine, which have to balance said couple of forces, are reduced.

A further object of the invention is to provide a light piston for enabling a reduction of the heat loss from the combustion chamber of an engine through the material of the piston.

A still further object of the invention is to provide a piston, which gives a great safety as to breakage and which if broken does not endanger the entire engine.

With the above and other objects in view the invention consists in a product embodying the novel and improved features, constructions and combination of parts herein after described and particularly pointed out in the claims.

In the drawings:

Fig. 1 is a cross section of a piston according to the invention;

The left hand part of Fig. 2 is a cross section II—II of Fig. 1 and the right hand part a view according to the arrow P in Fig. 1;

The bottom part of Fig. 3 is a plan view and the upper part a cross section along the line III—III in Fig. 1;

Fig. 4 is a cross section according to the line IV—IV in Fig. 1;

Fig. 5 a cross section of another embodiment;

The left hand part of Fig. 6 shows a cross section according to the line VI—VI in Fig. 5 and the right hand part a view according to arrow P in Fig. 5;

Fig. 7 is a cross section of a third embodiment;

Fig. 8 is a cross section of a fourth embodiment;

Fig. 9 shows a partial cross section of a cylinderblock with pistons and means for rectilinearly guiding same.

According to Figs. 1–4 a piston rod **2** is secured to the piston body **1**. Here the rod has a tubular section and a flange **2***a*, which is secured to the piston-body by means of hammer-bolts **3**. Between the flange **2***a* and the piston-bottom a plate **21** of insulating material may be mounted, for preventing the heat to be conducted away from the piston body along the piston rod. Preferably the rod is a forged piece of an aluminium alloy. The piston end is eye-shaped. The eye is formed by the rod **2**, two protruding parts **2***b* thereof and a closing piece **4**, which is secured by means of axial bolts **5** to the rod.

The closing-piece **4** is also a light part forged from light metal, which at the same time serves as a cross head. For this purpose the closing piece **4** presents protruding parts **6**, which slide along U-shaped strips **7**. By means of hammerbolts **8** these strips **7** are drawn against an extension **9** of the cylinder wall.

The height of the eye is as reduced as possible and is internally provided with two flat surfaces **10** and **11** perpendicular to the piston-axis. Those surfaces are covered with plates **12** and **13** on which the sliding pieces **14** and **15** slide during operation. In operation on these sliding pieces cones **18** and **19** affixed at arms **16** of the wobbler **17** revolve. Said cones actually may be of very small size.

The plate **12** is provided with protruding parts **20** which prevent that oil from the connection between piston and wobbler splashes against the piston bottom and cools the latter too much.

According to Fig. 5 the piston body **1** is formed integrally with the rod **2** as one single light metal forged piece. The favourable light and yet strong section of the rod will be clear from the left hand part of Fig. 6. The other parts are equal to those according to Figs. 1–4.

According to Fig. 7 the rod **2** is secured by means of screw-thread **22** to a part **23** of the eye. For the other parts the description of the preceding figures be referred to.

Fig. 8 shows a similar construction as that according to Fig. 7, in which now however the eye-shaped part **23** itself is built as an oil catch **23***a*.

The rectilinear guiding of the eye here takes place at two opposite sides. For guidance of one side there is a guiding piece **24**, which by bolts **25** has been drawn against the extension **26** of the cylinder wall **27** and co-operates with flat surfaces **28** and **29** of the eye (Fig. 9) and for guidance of the other side plates **30** are provided which are secured by means of bolts **31** to the lower side of the extensions **26** of the cylinder wall. Flat surfaces **32** of every plate **30** guide the surfaces **33** of the eye-shaped parts of adjacent pistons.

It is to be understood that the invention is not limited to the particular construction and arrangement of parts of the illustrated embodi-

ments of the invention but that the invention may be embodied in other forms within the scope of the claims.

Having explained the nature and objects of the invention and having specifically described constructions embodying the invention, what I claim is:

1. A wobbler mechanism comprising a wobbler having a plurality of wobbler arms, sliders, pistons and cylinders in which said pistons are reciprocable, the end of each of the piston rods being apertured to present two substantially flat opposed surface portions perpendicular to the piston axis, which surface portions cooperate with some of the sliders which in turn are disposed in rolling contact with portions on one of said wobbler arms, said wobbler mechanism having the height of the apertured piston rod made smaller than the piston diameter and the other dimensions of the piston rod sufficiently reduced to allow said rod together with the piston body to be inserted into the cylinder in the direction of the wobbler so as to cause the apertured free end of the piston during insertion to surround an arm of the wobbler, there being a cap for closing the aperture at the free end of the piston rod in said inserted position, bolts extending lengthwise of the piston for securing the cap to the piston rod, said cap being constructed as a cross head for rectilinearly guiding the piston, and guides for the pistons in alignment with the cylinders for cooperation with the cap.

2. A wobbler mechanism according to claim 1, wherein the bolts are arranged in a diametrically opposed manner with respect to the piston axis.

3. A wobbler mechanism according to claim 1, wherein extensions are disposed on the cylinders and the guides for the piston comprise members disposed on the inside of the extensions upon the cylinder, and having a bore which is concentric with the cylinder bore, each member being provided with means for securing them to a wall of the corresponding cylinder extension, said means passing through said wall and being secured exteriorly of said cylinder extension.

4. A wobbler mechanism according to claim 1, wherein extensions are disposed on each cylinder and a guiding member with a flat side turned towards the piston is arranged in one of the cylinder extensions, and a guiding member is mounted between each cylinder extension and its neighbor which presents two guiding surfaces, one for each of the pistons moving in the two cylinder extensions.

5. A wobbler mechanism according to claim 1, wherein each piston comprises a piston body, a piston rod connected thereto, and connection means between the piston body and the piston rod weaker than the connection between the cap and the piston rod.

6. A wobbler mechanism according to claim 1, wherein each piston comprises a piston body, a piston rod connected thereto, and connection means between the piston body and the piston rod weaker than that between the cap and the piston rod, the connection means between the piston rod and the piston body comprising T-bolts.

WICHERT HULSEBOS.