PATENT SPECIFICATION

486,594

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Complete Specification Accepted : June 8, 1938.

COMPLETE SPECIFICATION

Improvements in or relating to Rotary Valves for Internal Combustion Engines

We, JOHN BROWN and EDWARD BROWN, British Subjects, both of 2, Nowell Street, Wednesbury, Staffordshire, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention comprises certain improvements in or relating to rotary valves for internal combustion engines of the type in which an oil supply is fed to the wall of the valve.

According to the present invention, a valve mechanism for internal combustion is provided in which a continuous circulating stream of oil is fed to the bearing surface of the valve wall and returned from the wall of the valve to the source of supply, by means of an oiling pad pressed against the wall of the valve and having an oil duct or ducts through which passes a continuous circulating stream of oil, which oil duct or ducts open directly on the walls of the valve, and by means provided to direct the oil from the feed duct or ducts over the surface of the rotary valve to an outlet duct or ducts leading the oil back to the source of supply. A fresh supply of oil is thus fed to the wall of the valve, and burning of oil is prevented. The oiling pad is adjustably spring pressed against the wall of the valve, in order to adjust the oil feed. The oiling pad may have a scraper which diverts the oil centrally of the valve. A sealing pad seating on the rotary valve may form a means of conducting oil from the wall of the valve and delivering the oil to a duct or ducts returning the oil to the source of supply. Oil channels may be provided in the surface of the cylindrical bore in which the rotary valve is mounted, such oil channels directing the oil towards the sealing pad. The feed duct to the oiling pad passes from a valve body or inlet, which valve body or inlet feeds oil to the interior of the valve for cooling the valves. The means for cooling the rotary valve may comprise a bearing ring or member on one side of the valve and fitted in an annular recess in the cylinder head, an annular oil duct surrounding the periphery of the bearing member, two annular ducts around the internal periphery of the bearing member, and ducts in the wall of the valve for registering with ducts leading to the respective annular ducts on the interior of the bearing member for the feed and return flow of oil to an interior chamber in the valve for cooling the valve the oil flowing from the outer annual duct to an inner annual duct and passing to the return from the other duct. In order that the invention may be clearly understood and readily carried into effect, reference may be had to the accompanying drawings on which:—

Figure 1 is a cross sectional elevation of a cylinder head of an internal combustion engine having a rotary valve mechanism constructed according to this invention,

Figure 2 is a section of the cylinder head on line II—II of Figure 1, the rotary valve being shown in full lines.

Figure 3 is a section on line III—III of Figure 2.

Figure 4 is a perspective view of the sealing pad.

Figure 5 is a perspective view of the spring ring for bearing on the sealing pad.

Figure 6 is a perspective view of the sealing ring.

Figures 7 and 8 are respectively end views of the split ends of the sealing ring.

Figure 9 is a perspective view of the oiling pad, and

Figure 10 is a section through the cylinder head with the rotary valve removed, the section being taken on line X—X of Fig. 3.

According to a convenient embodiment, the invention is applied to a single cylinder air cooled motor cycle engine. The detachable head 1 has a cylindrical bore for receiving a cylindrical rotary valve 2 which is fixed in position by the lock nut 3 which bears against the bearing ring 4 slidably but non-rotatably mounted in the cylinder head 1. An oil seal is formed by a metal ring 5 which is clamped between the bearing ring 4 and the cylinder head 1 at its outer periphery

[*Price* 1/-]

and spring pressed at its inner periphery against the shoulder 6 on the rotary valve. The rotary valve is driven by a bevel gearing 7 and 8.

The detachable head 1 has a port having a conical seating 9 for receiving a sealing ring 10. The sealing ring 10 is formed of cast steel or other metal and has a conical outer circumference for bedding against the conical seating 9 around the port. The ring is split and stepped so that the split ends overlap. Preferably for this purpose an inclined face 13 is cut on one side of the ring from a point below the middle of the conical outer wall to the flat seating 12, whilst the other part has a similar inclined face 14, the inclined faces sliding on one another as the split ring expands or contracts. A sealing pad 15 is interposed between the sealing ring 10 and the cylindrical surface of the rotary valve 2, the sealing pad being let into a recess in the detachable head. The sealing pad has a port 16 therein which registers with the inlet and exhaust ports in the rotary valve as such valve rotates and a surrounding surface 17 which forms a sealing surface around the port. The sealing pad is pressed against the valve 2 by means of a spring 18 (Figure 5). The sealing ring 10 not only expands radially under spring tension but also tends to slide up the conical seating 9 to press against the flat outer surface of the pad 15.

The exhaust port 19 in the valve is formed by a pipe 20 which is heat insulated from the body of the valve by means of asbestos lining 21. The pipe 20 has a spout 22 to prevent formation of carbon. The exhaust port passes from one end of the rotary valve whilst the inlet port 11 passes from the other end.

During the firing stroke one side of the valve is subjected to considerable heat and this side has an oil cooling chamber 23 through which oil constantly circulates. A groove 24 is formed in the cylinder head around the periphery of the bearing ring 4 and this groove is in communication with a non-return spring controlled ball valve or oil inlet 25. The groove 24 is placed in communication with an annular groove 26 in the internal surface of the bearing ring 4 by means of passages 27 and the groove 26 is placed in communication with the chamber 23 by means of the passages 28. The chamber 23 is divided by a central partition 29 and the passages 28 lead to one side of this partition. Outlet passages 30 lead from the chamber 23 on the other side of the partition 29 and such passages 30 lead to an annular groove 31 in the bearing ring 4. This groove 31 communicates by way of passages 32 with a passage 34 returning the oil to the source of supply. The oil is thus continuously circulated through the cooling compartment 23 whilst the bearing ring 4 is also efficiently lubricated.

In order to lubricate the cylindrical wall of the rotary valve by means of a constantly circulating flow of oil, a lubricating pad 35 is pressed against the wall of the valve. This pad has two end limbs 36 having oil ducts 37 which immerge from the raised portions 38 bearing in the annular grooves 39 in the cylindrical valve. The lubricating pad 35 has a **U**-shaped passage 39*a* which communicates with the flow and return pipes 40 and 41 which communicate with ducts 42, 42*a* in a bridge piece 43 fixed to the cylinder head. The pipes 40 and 41 spring support the lubricating pad 35 and such pad 35 is pressed on the valve 2 by means of a member 44 pressed towards the valve by means of a spring 45, the pressure of which may be adjustable to govern the film of oil supplied through the ducts 38. The duct 42 is in communication by means of the passage 46 with the oil supply entering the valve body or inlet 25, whilst the duct 42*a* returns the oil to the source of supply. The lubricating pads have inclined projections 47 which scrape the oil passed through the ducts 38 inwardly of the rotary valve, the rotary valve rotating in the direction from the scrapers 47 to the ducts 38. The bearing surface of the cylinder head is provided with inclined oil channels 48 which collect the oil from the surface of the rotary valve and direct the same towards the centre of the valve. These grooves 48 are shaped to scrape the oil into the grooves. The oil therefore is caused to flow towards the centre of the rotary valve and the sealing pad 15 forms a scraper and causes the oil to flow away through the ducts 49 into the annular groove 50 which is in communication with the duct 51 for returning the oil to the source of supply. The continuous flow of oil therefore lubricates the bearing surface of the rotary valve, whereby oil is prevented from burning and carbonizing. Annular grooves 55 are formed in the cylinder head on each side of the valve and these annular grooves are in communication with the groove 50 so that any oil which flows outwardly on the rotary valve will also be returned to the source of supply.

The outer end of the rotary valve on the inlet side is sealed by means of a rubber ring 52 which is pressed between the washer and a casing 53 by means of a spring ring 54.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. A valve mechanism for internal combustion engines in which a continuous circulating stream of oil is fed to the bearing surface of the valve wall and returned from the valve wall to the source of supply, by means of an oiling pad pressed against the wall of the valve and having an oil duct or ducts through which passes a continuous circulating stream of oil which oil duct or ducts open directly on the wall of the valve, and by means provided to direct the oil from the feed duct over the surface of the rotary valve to an outlet duct or ducts leading the oil back to the source of supply.

2. A rotary valve mechanism as set forth in claim 1, in which the oiling pad is adjustably spring pressed against the wall of the valve.

3. A rotary valve mechanism as set forth in claim 1 or 2, in which the pad has a scraper which diverts the oil centrally of the valve.

4. A rotary valve mechanism as set forth in claim 1, 2 or 3, in which a sealing pad seating on the rotary valve forms a means of conducting oil from the wall of the valve and delivering the oil to a duct returning the oil to the source of supply.

5. A rotary valve mechanism as set forth in claim 4, in which oil channels are provided in the surface of the cylindrical bore in which the rotary valve is mounted, such oil channels directing the oil towards the sealing pad.

6. A rotary valve mechanism as set forth in claim 1, in which the feed duct to the oiling pad passes from an inlet in the valve body, which feeds oil to the interior of the valve for cooling the valve.

7. A rotary valve mechanism for internal combustion engines as set forth in claim 6, comprising a rotary valve, a bearing ring or member on one side of the valve and fitted in an annular recess in the cylinder head, an outer annular oil duct surrounding the periphery of the bearing member, two inner annular ducts around the internal periphery of the bearing member, and ducts in the wall of the valve for registering with ducts leading to the respective annular ducts on the interior of the bearing member for the feed and return flow of oil to an interior chamber in the valve for cooling the valve, the oil flowing from the outer annular duct to an inner annular duct and passing to the return from the other annular inner duct.

8. A valve mechanism as set forth in claim 7, in which the cooling chamber in the valve is behind that portion of the valve which closes the combustion chamber during the firing stroke.

9. A rotary valve mechanism as set forth in claims 1, 2, or 3 in which the outlet of the oil duct leading from the oiling pad and the scraper thereon are on a projection on the oiling pad which enters an annular groove in the rotary valve.

10. A rotary valve mechanism for internal combustion engines substantially as herein set forth or shown.

Dated this 3rd day of November, 1937.

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Agent for the Applicants,
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31, Queen Street, Wolverhampton.

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[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1.

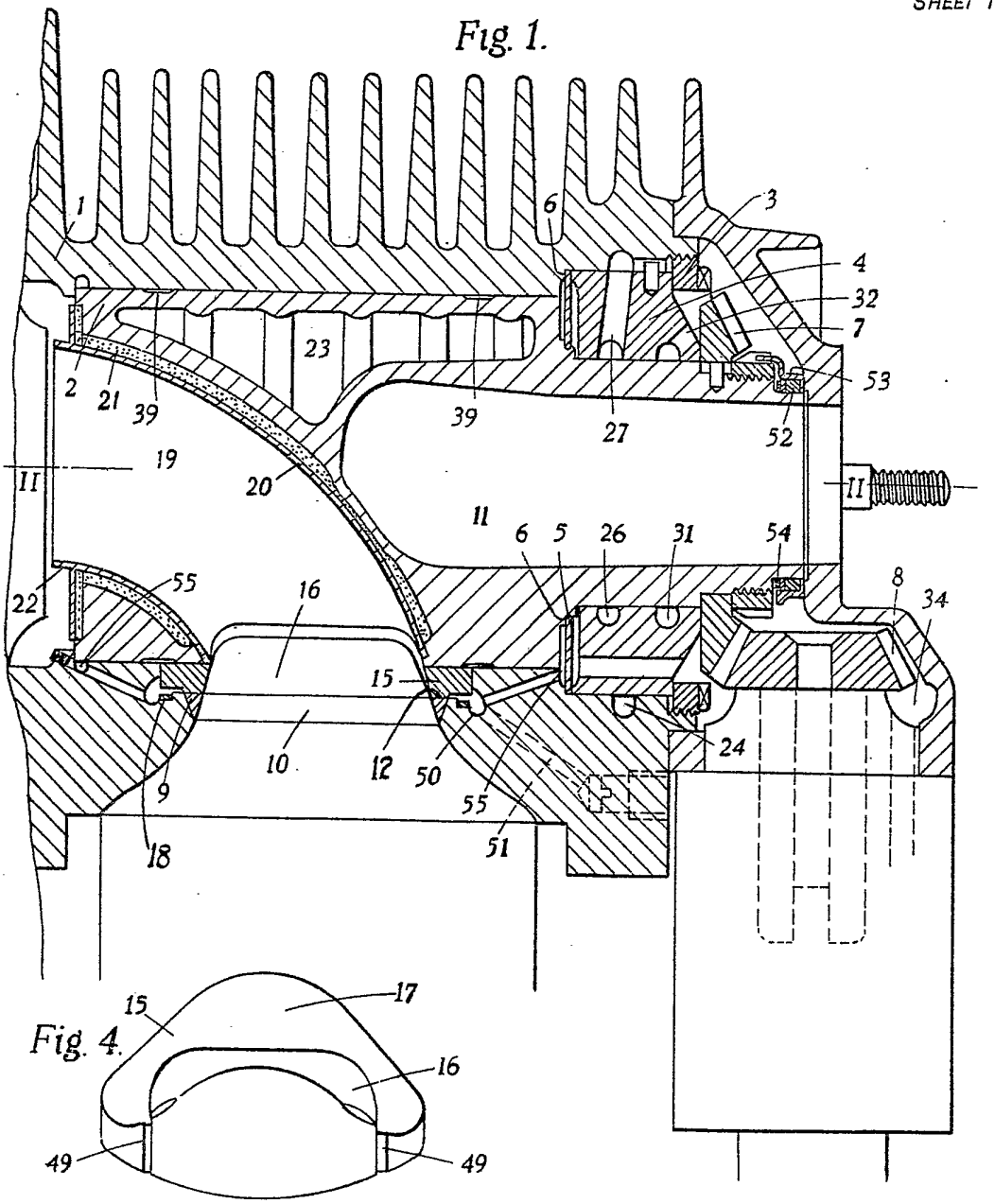


Fig. 4.

Fig. 5.

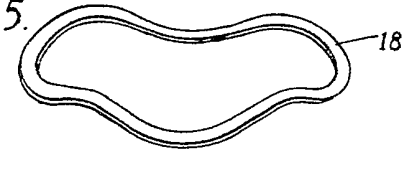


Fig. 6.

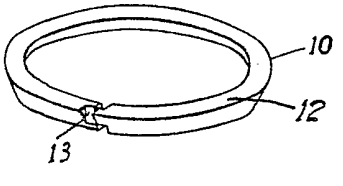


Fig. 7

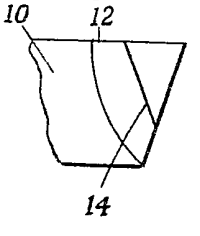


Fig. 8.

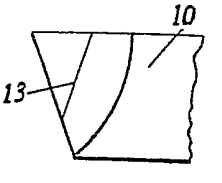
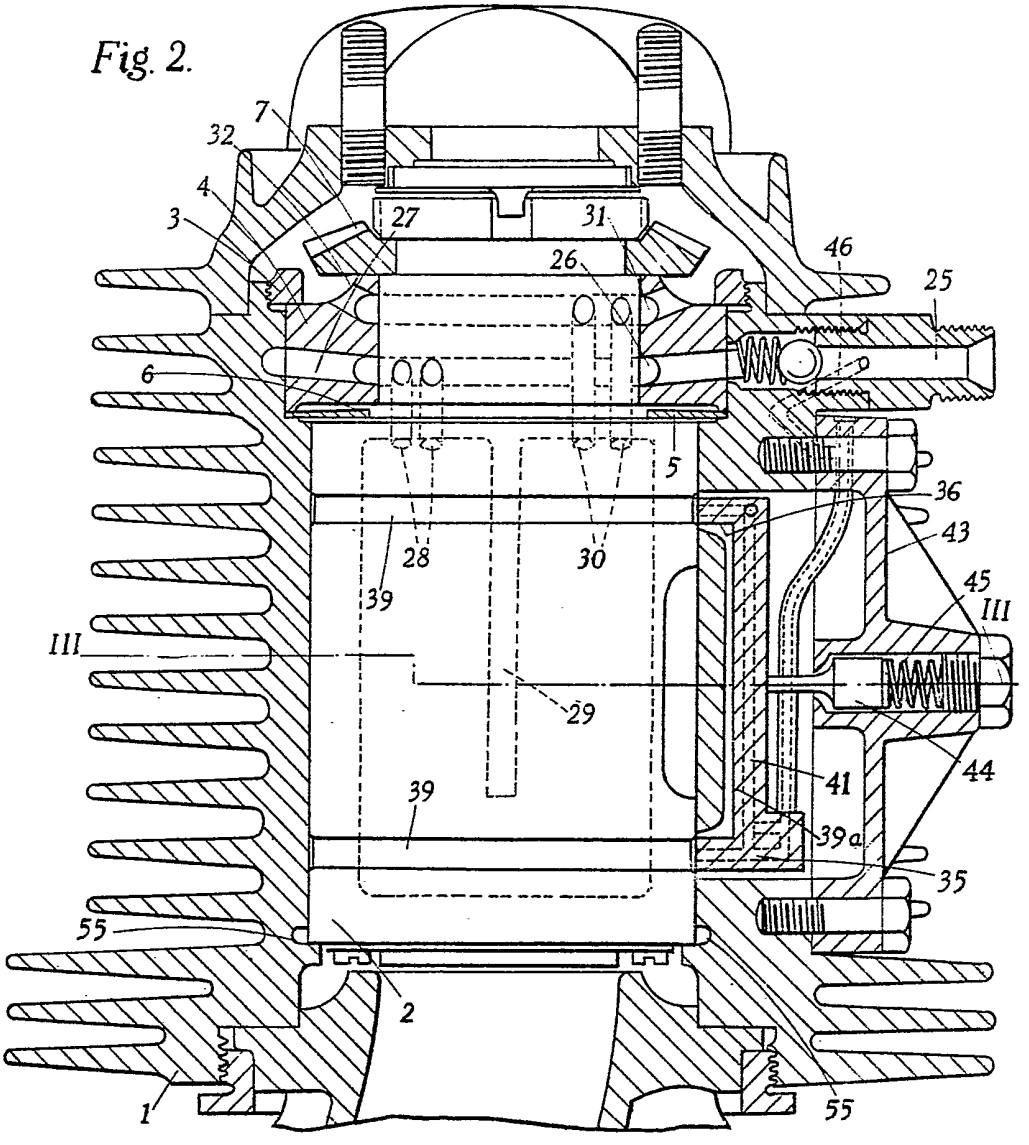


Fig. 2.



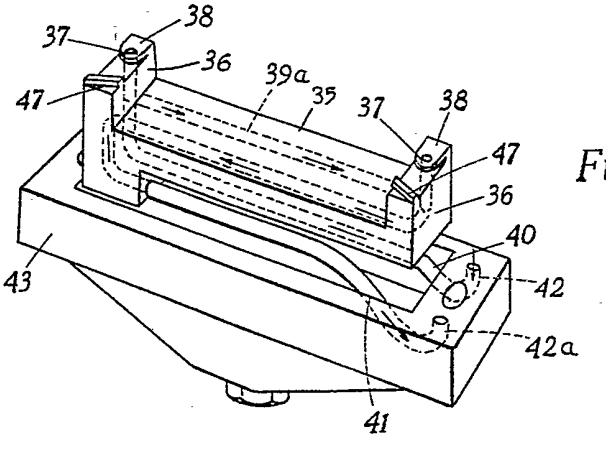


Fig. 9.

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Fig. 1.

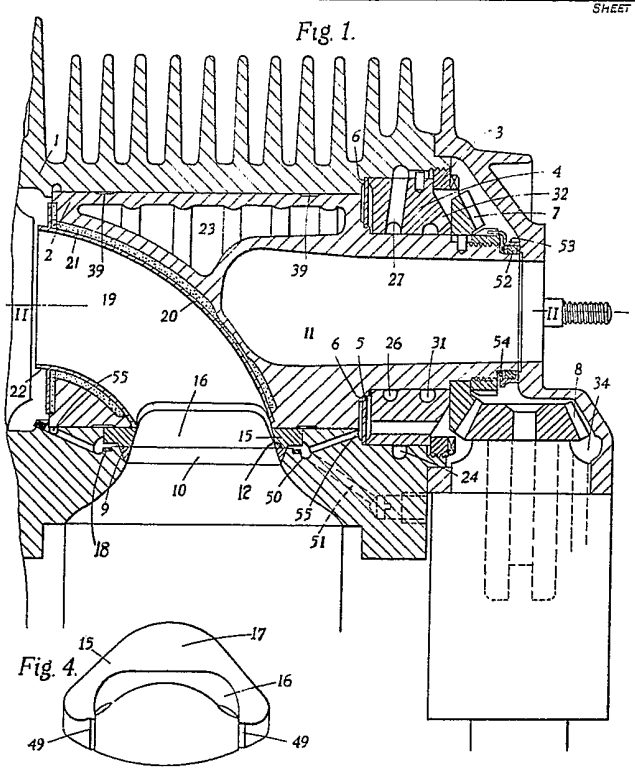

Fig. 2.

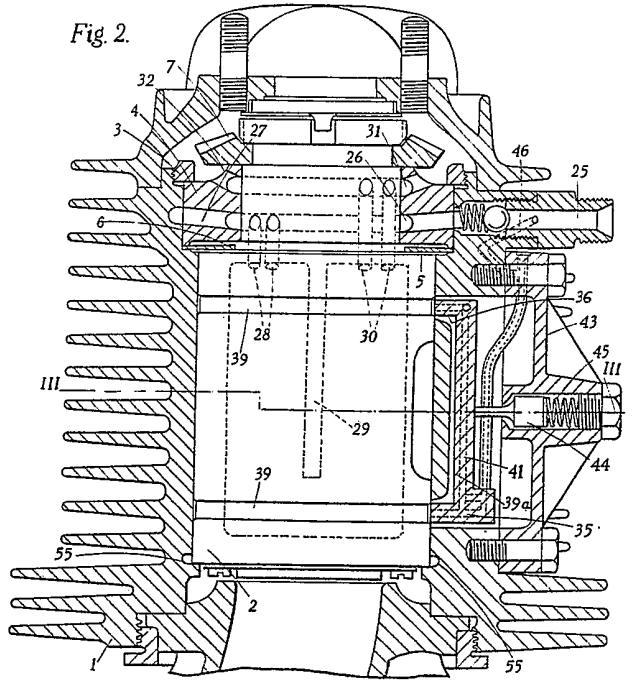

Fig. 4.

Fig. 5.

Fig. 6.

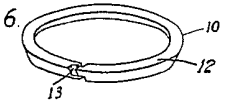

Fig. 7

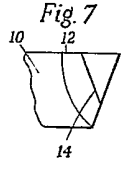

Fig. 8.

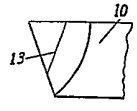

Fig. 9.

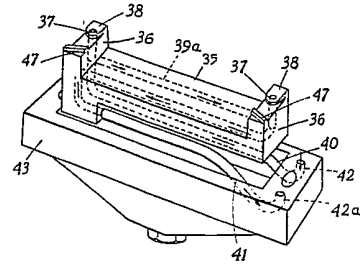

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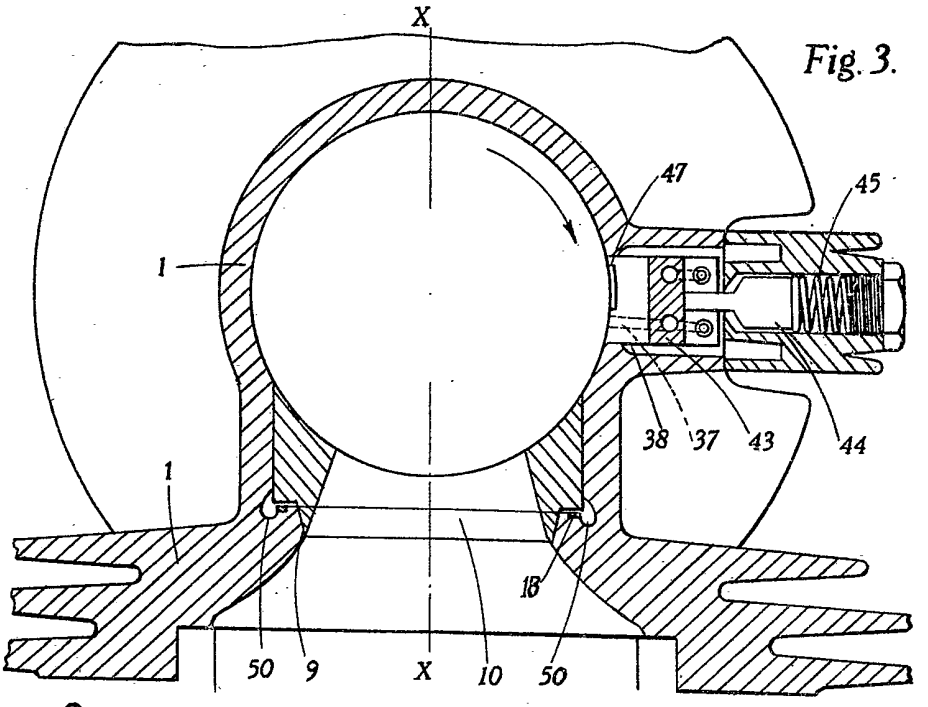
Fig. 3.



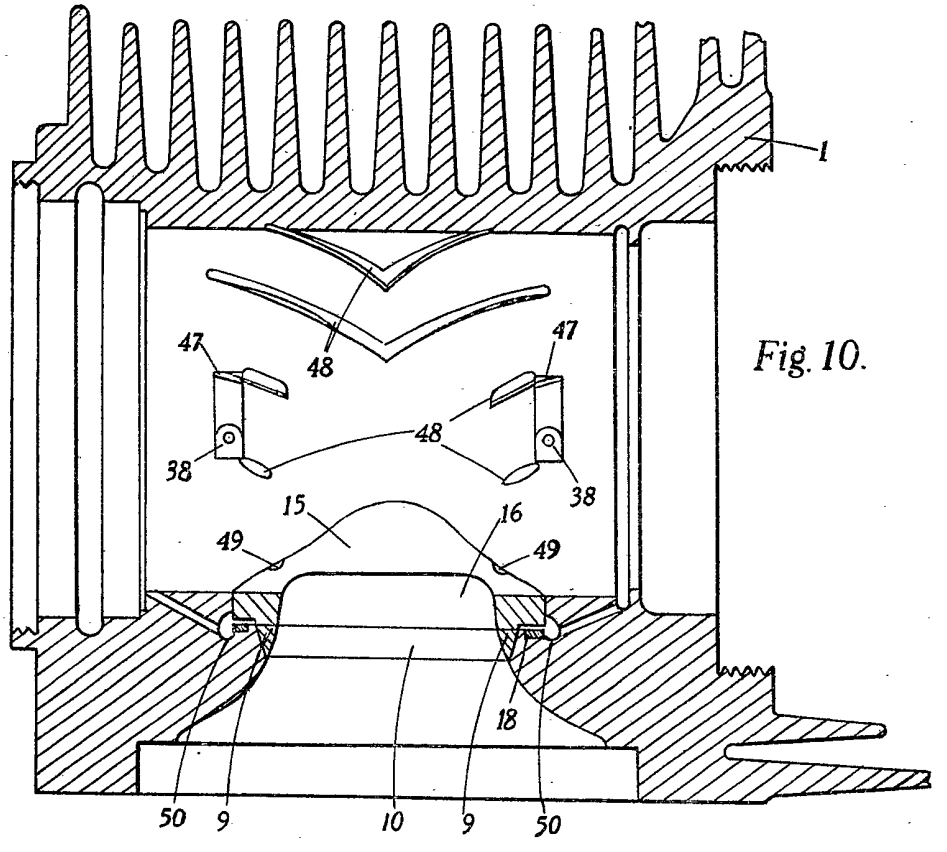


Fig. 10.

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