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PROVISIONAL SPECIFICATION.

Improvements in Vertical Gas Engines.

I, Dr. WILHELM VON OECHELHAEUSER, of Kavalierstrasse 29/30, Dessau (Anhalt), Germany, Engineer, do hereby declare the nature of this invention to be as follows:—

5 This invention relates to an improved construction of vertical two stroke cycle gas engines with pistons controlling rings of slot ports, wherein during the short time which is available in such engines for the discharge of large quantities of burnt gases and for the scavenging with fresh air, the discharge from the power cylinder and its scavenging and charging is effected in the shortest way and with the least possible resistance and consumption of power.

10 The essential feature of this invention consists in the fact that the supporting frame or the supporting columns of the engine are utilised for supplying and carrying off the gases and air; for this purpose the collecting chambers which surround the rings of slot ports of the working cylinder are connected with hollow chambers in the supporting frame of the column or with pipes
15 located therein, in such an arrangement the exhaust and feed pipes of the motor and of the pumps may also be accommodated in the hollow chambers of the supporting frame so that gas and air can be fed, delivered and removed in the shortest way and with the least resistance.

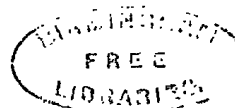
In a constructional form of a vertically arranged double piston gas engine
20 according to this invention, with controlling pistons, the ring of exhaust slot ports are located at the lower part of the working cylinder. In the extreme dead position of the two pistons the exhaust of the products of combustion takes place through the ring of slot ports uncovered by the lower piston. These two pistons move in opposite directions in the well known way.

25 The cylinder is provided at its lower end with a ring of exhaust slot ports. It does not rest directly upon the supporting columns of the engine frame but is carried by a head piece that is formed with an annular chamber and is mounted upon the supporting columns; the lower portion of the cylinder having cast on it three conically turned annular ribs which bear in a fluid tight manner
30 against correspondingly bored out projections or seats on the inner wall of the head piece so that the cylinder is mounted in the head piece like the plug of a plug tap is mounted in its casing.

Between the inner wall of the head and the outer wall of the lower portion
35 of the cylinder is a hollow space which serves as a cooling jacket for that part of the cylinder. The hollow outer wall of the head also forms a cooling jacket which is extended upwardly by a bell shaped cap fixed on the head so that the upper portion of the cylinder wall can also be conveniently cooled. The two hollow spaces or jackets may communicate with each other at a suitable point say by a pipe inserted or cast in the head.

40 The annular chamber of the head communicates with the exhaust slots and is otherwise closed excepting for a crescent shaped aperture placing the chamber in communication with the hollow main supporting column or, with a pipe arranged therein, so that exhaust gases from the cylinder pass through the ring of slots into the inconspicuous chamber of the head and thence freely and
45 unimpeded by the shortest way and with the least possible resistance into the hollow supporting column or the pipe located therein.

[Price 8d.]



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A suitably arranged partition or wall divides a lower portion of the chamber in the head from the main chamber thereof and this subsidiary chamber is itself divided by a partition or wall into two lower chambers which respectively communicate with two hollow supporting columns of the engine frame, in addition to which a pipe places one such chamber in communication with a lower one of a pair of upper rings of slots, and through another pipe another chamber of the head is placed in communication with the second or higher row of the pair of upper rings of slots. The firstly mentioned pipe serves for the conveyance of rinsing or scavenging air supplied through one of the hollow supporting columns and corresponding chamber and the secondly mentioned pipe serves for the conveyance of the gas mixture forced through another of the hollow supporting columns, and its corresponding chamber.

For the purpose of preventing any oil that may be carried along with the exhaust gases or the scavenging air from entering the exhaust pipes or becoming lost, there is arranged, at the junction of the hollow supporting column for exhaust and the corresponding pipe with the head, a filter which also serves as a muffler for sound.

To enable this filter to be conveniently exchanged and cleaned holes are provided in the outer double wall of the head which can be closed in a fluid tight manner by covers.

The exhaust pipe in the column is fixed at its upper end to the opening of the head.

Holes may be formed in the wall of the hollow column for the passage of a cooling air or water. In this way a cooling of the slide bar of the cross head is also effected in an advantageous manner.

In cases where the slot ports for the exhaust do not lie in the lower part of the working cylinder but in the upper or central part thereof, a special exhaust pipe may be joined onto the collecting space which surrounds these rings of ports and be continued downwards outside the supporting frame and through the bed plate frame by means of a bend. In such cases the cooling jacket of the bend and of the exhaust pipe can be screwed to the water jacket of the working cylinder on the one hand and to the bed plate frame on the other hand and thus form a lateral stiffener for the working cylinder. In another construction of engine similar to that hereinbefore described but wherein the rings of exhaust slot ports are arranged in the upper portion of the working cylinder the ring of slot ports for the scavenging air is surrounded by a collecting chamber which communicates directly with a hollow in the frame of the engine.

The ring of slot ports for the mixture of gas and air is surrounded by a collecting chamber which communicates directly with another hollow arranged in the frame of the engine.

A portion of the exhaust collecting chamber is divided off from the remainder by a partition and this portion establishes communication between the collecting chamber for air and the corresponding hollow of the frame. Arranged at different heights in the hollows of the frame are projections which serve for the reception of plates. These plates can be inserted through openings formed above the projections in the frame of the engine and which can be closed by suitable covers. The plates can be secured to the projections as by screwing for example, and may be packed by means of some suitable packing material such for example as cement or the like. This construction and arrangement provides means whereby the size of the hollow chambers and the pressures obtaining therein can be readily varied so that the engine can be adapted in the simplest and cheapest way to the working conditions, kinds of gas *etc.*, employed for the time being.

In the example under notice the pump, for the scavenging air is attached to the pipe junction leading to the collecting air chamber, and the charging pump for the mixture of gas and air is attached to the pipe junction leading to the exhaust collecting chamber.

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The products of combustion which emerge from the ring of exhaust slot ports pass first into the corresponding collecting chamber from which they are led through the pipes in the lower part of the supporting frame to a common exhaust culvert. The exhaust pipes and their cooling jackets are screwed to both the
5 outer walls of the collecting spaces as well as to the lower part of the supporting frame, so that they form a support for the working cylinder and consequently a portion also of the supporting frame.

Instead of two exhaust pipes a single pipe only may be used for carrying off the exhaust gases. Furthermore, in the constructional form of engine first
10 referred to, by using a suitably shaped supporting frame the exhaust gases may be led off at both sides simultaneously instead of at one side as hereinbefore described. The division walls in the hollow chamber of the head piece are then omitted. The supply of the scavenging air and the gas mixture takes place then through exposed pipes instead of through the hollow columns.

15 The supporting frame may be utilised in the same way for the supply to the charging pumps also in case of necessity as it is for the supply of gas and air to the working cylinder, and particularly in cases where the charging pumps are attached directly to the supporting frame.

20 The use of long pipes, numerous bends and consequently injurious resistances in the supply and exhaust of the gas and air, which have heretofore been common in gas engines and which prevent sure regulation of the engine, are avoided by this invention.

Moreover in consequence of the pipes employed comprising only short lengths both material and space will be economised so that engines according to this
25 invention are comparatively cheap to construct and their general outside appearance is simple and elegant.

The arrangements described may be suitably used for all systems of gas motors which employ slot ports for the exhaust, charging *etc.*, and is therefore not limited to the constructional form of the two stroke cycle motor shewn.

30 Dated this 20th day of January 1906.

For the Applicant

F. WISE HOWORTH, F.C.S.,
46 Lincoln's Inn Fields, London, W.C.
Chartered Patent Agent.

35 **COMPLETE SPECIFICATION.**

Improvements in Vertical Gas Engines.

I, Dr. WILHELM VON OECHELHAEUSER, of Kavalierstrasse 29/30, Dessau (Anhalt), Germany, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described
40 and ascertained in and by the following statement:—

This invention relates to an improved construction of vertical two stroke cycle gas engines with pistons controlling rings of slot ports, wherein, during the short time which is available in such engines for the discharge of large quantities of burnt gases and for the scavenging with fresh air, the discharge from
45 the power cylinder and its scavenging and charging is effected in the shortest way and with the least possible resistance and consumption of power.

The essential feature of this invention consists in the fact that the supporting frame or the supporting columns of the engine are utilised for supplying and carrying off the gases and air; for this purpose the collecting chambers
50 which surround the rings of slot ports of the working cylinder are connected

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with hollow chambers in the supporting frame or in the columns or with pipes located therein, in such an arrangement the exhaust and feed pipes of the motor and of the pumps may also be accommodated in the hollow chambers of the supporting frame so that gas and air can be fed, delivered and removed in the shortest way and with the least resistance. 5

Constructional forms of the improved engine are shown by way of example in the accompanying illustrative drawings.

Fig. 1 of such drawings is a central vertical section through a portion of a vertically arranged double piston gas engine with pistons controlling slot ports, the ring of exhaust slot ports being located at the lower part of the working cylinder. The two pistons are shown in their extreme dead position, in which the exhaust of the products of combustion takes place through the ring of slot ports uncovered by the lower piston. 10

Figs. 2 and 3 are horizontal sections respectively corresponding to the lines A—B and C—D of Fig. 1. 15

Fig. 4 is a similar view to Fig. 1 showing an engine in which the ring of exhaust slot ports is arranged in the upper part of the working cylinder. In this figure also the two pistons are shown in their extreme dead position, in which the entrance of the gas mixture takes place through the lowest ring of slot ports uncovered by the lower piston. 20

Fig. 5 is a horizontal section corresponding to the line G—H of Fig. 4 through the ring of slots for the supply of gas mixture.

Fig. 6 is a horizontal section corresponding to the line E—F of Fig. 4 through the ring of slot ports for the scavenging air.

In the constructional form of vertical gas engine illustrated in Figs. 1 to 3, 25 c represents the cylinder of the engine, c^1 and c^2 the pistons thereof which move in opposite directions in the well known way. In Fig. 1 they are shown in their extreme position.

The upper portion of the cylinder is broken away; the lower portion of the cylinder is provided with a ring of exhaust slot ports s . The cylinder does not rest directly upon the supporting columns r , e^1 , e^2 of the engine frame, but is carried by a head piece k formed with an annular chamber f and is mounted upon such supporting columns; the lower portion of the cylinder having cast on it three conically turned annular ribs r^1 , r^2 , r^3 which bear in a fluid tight manner against correspondingly bored out projections or seats a^1 , a^2 , a^3 on the inner wall of the head piece k , so that the cylinder c is mounted in the head piece like the plug of a plug tap is mounted in its casing. 30 35

Between the inner wall of the head k and the outer wall of the lower portion of the cylinder c is a hollow space w^1 which serves as a cooling jacket for that part of the cylinder. The hollow outer wall of the head k also forms a cooling jacket w^2 which is extended upwardly by a bell shaped cap h fixed on the head k so that the upper portion of the cylinder wall can also be conveniently cooled. The two hollow spaces or jackets w^1 and w^2 may communicate with each other at a suitable point say by a pipe inserted or cast in the head k at t . 40 45

The annular chamber f of the head k communicates with the exhaust slots s and is otherwise closed excepting at o which is a crescent shaped aperture (Fig. 2), placing the chamber f in communication with the hollow main supporting column r or, as shown, with a pipe d arranged therein, so that exhaust gases from the cylinder c pass through the ring of slots s into the inconspicuous chamber f and thence freely and unimpeded by the shortest way and with the least possible resistance into the hollow supporting column r or the pipe d located therein. 50

A suitably arranged partition or wall n divides a lower portion of the chamber f from the main chamber and this subsidiary chamber is itself divided by a partition or wall p into two lower chambers g^1 and g^2 which respectively communicate with the hollow supporting columns e^1 and e^2 , in addition to 55

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which a pipe u^1 places the chamber g in communication with the lower one s^1 of a pair of upper rings of slots, and through a pipe u^2 the chamber g^2 is placed in communication with the second or higher row s^2 of the pair of upper rings of slots. The pipe u^1 serves for the conveyance of rinsing or scavenging air supplied through the hollow supporting column e^1 and chamber g^1 and the pipe u^2 serves for the conveyance of the gas mixture forced through the hollow supporting column e^2 and chamber g^2 .

For the purpose of preventing any oil that may be carried along with the exhaust gases or the scavenging air from entering the exhaust pipes or becoming lost, there is arranged, at the junction of the hollow supporting column r and the pipe d with the head k , a filter x which also serves as a muffler for sound.

To enable this filter to be conveniently exchanged and cleaned holes are provided in the outer double wall of the head k which can be closed in a fluid tight manner by covers v^1 and v^2 .

The pipe d in the column r is fixed at its upper end by being expanded into the opening o of the head k .

Holes y y may be formed in the wall of the hollow column r for the passage of a cooling air or water. In this way a cooling of the slide bar of the cross head is also effected in an advantageous manner.

In cases where the slot ports for the exhaust do not lie in the lower part of the working cylinder but in the upper or central part thereof, a special exhaust pipe may be joined onto the collecting space which surrounds these rings of ports and be continued downwards outside the supporting frame and through the bed plate frame by means of a bend. In such cases the cooling jacket of the bend and of the exhaust pipe can be screwed to the water jacket of the working cylinder on the one hand and to the bed plate frame on the other hand and thus form a lateral stiffener for the working cylinder.

A construction of engine similar to that shown in Figs. 1 to 3 but wherein the rings of exhaust slot ports are arranged in the upper portion of the working cylinder is shown in Figs. 4 to 6. The cylinder which is shown broken away is indicated at c and e^1 and e^2 are the pistons of the engine which move in opposite directions and are shown in their extreme positions.

The ring of slot ports s^1 for the scavenging air is surrounded by a collecting chamber f^1 , which communicates directly with a hollow 7 in the frame r of the engine.

The ring of slot ports s^2 for the mixture of gas and air is surrounded by a collecting chamber f^2 which communicates directly with the hollow 6 arranged in the frame of the engine r , Fig. 5.

A portion 9 of the collecting chamber f^2 is divided off from the remainder by a partition 8 and this chamber 9 establishes communication between the collecting chamber f^1 and the hollow 7. Arranged at different heights in the hollows 6 and 7 are projections 10, which serve for the reception of plates 12. These plates can be inserted through openings 11 which are formed above the projections 10 in the frame r of the engine and can be closed by suitable covers. The plates can be secured to the projections as by screwing for example, and may be packed by means of some suitable packing material such for example as cement or the like. This construction and arrangement provides means whereby the size of the hollow chambers and the pressures obtaining therein can be readily varied so that the engine can be adapted in the simplest and cheapest way to the working conditions, kinds of gas *etc.*, employed for the time being.

In the example under notice the pump, not shown, for the scavenging air is attached to the pipe junction 13 leading to the collecting chamber f^1 and the charging pump, also not shown, for the mixture of gas and air is attached to the pipe junction 14 leading to the collecting chamber f^2 .

The products of combustion which emerge from the ring of slot ports s pass first into the collecting chamber f from which they are led through the pipes s^1

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in the lower part 17 of the supporting frame to a common exhaust culvert. The pipes s^1 and their cooling jackets are screwed to both the outer walls of the collecting spaces f^1 and f^2 as well as to the part 17 of the supporting frame, so that they form a support for the working cylinder and consequently a portion also of the supporting frame. 5

Instead of the two pipes s^1 a single pipe only may be used also for carrying off the exhaust gases. Furthermore, in the constructional form of the engine shown in Fig. 1, by using a suitably shaped supporting frame the exhaust gases may be led off at both sides simultaneously instead of at one side as above described. The division walls p and n in the hollow chamber f of the head piece k are then omitted. The supply of the scavenging air and the gas mixture takes place then through exposed pipes instead of through the hollow columns. 10

The supporting frame may be utilised in the same way for the supply to the charging pumps also in case of necessity as it is for the supply of gas and air to the working cylinder, and particularly in cases where the charging pumps are attached directly to the supporting frame. 15

In the constructional form of the engine shown in Figs. 4 to 6 the slide bar of the crosshead might be also cooled in a convenient manner.

The use of long pipes, numerous bends and consequently injurious resistances in the supply and exhaust of the gas and air, which have heretofore been common in gas engines and which prevent sure regulation of the engine, are avoided by this invention. 20

Moreover in consequence of the pipes employed comprising only short lengths both material and space will be economised so that engines according to this invention are comparatively cheap to construct and their general outside appearance is simple and elegant. 25

The arrangements described may be suitably used for all systems of gas motors which employ slot ports for the exhaust, charging *etc.*, and is therefore not limited to the constructional form of the two stroke cycle motor shown.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, I declare that what I claim is:— 30

1. A vertical gas engine of the kind comprising pistons which control rings of slot ports, wherein the working cylinder is supported by a hollow or partly hollow frame through which the gases of combustion are led away from the cylinder and the supply of gas mixture as well as the scavenging air are delivered thereto, substantially as hereinbefore described. 35

2. A gas engine according to the preceding claim, in which hollow spaces of the supporting frame are connected to collecting chambers which surround the rings of slots of the working cylinder, so that gas and air can be supplied and led away by these collecting chambers in an axial direction by the shortest way and with the least resistance in an inconspicuous manner, substantially as hereinbefore described. 40

3. A gas engine according to the preceding claims, having arranged in the lower part of its working cylinder a ring of slot ports which are surrounded by a collecting chamber formed as a head piece arranged upon the engine frame, substantially as hereinbefore described. 45

4. A gas engine according to the preceding claim, wherein the collecting chamber is divided by division walls into distinct compartments, the gases of combustion being led off downwardly through one compartment of the head piece and the supporting frame, and the air and gas, whether separate or mixed, being conveyed up to the engine cylinder through the supporting frame and another compartment of the same head piece, substantially as hereinbefore described. 50

5. A gas engine according to Claims 1 and 2, wherein the working cylinder has formed in its upper part a ring of exhaust slots which are surrounded by a 55

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collecting chamber from which one or more pipes lead into the supporting frame, while the collecting chambers, which surround the rings of slots for the scavenging air and the mixture of air and gas are each directly connected with a hollow space (6, 7) of the supporting frame or the supporting columns, so
5 that air and gas mixture can pass into the cylinder by the shortest way and with the least resistance, substantially as hereinbefore described.

6. A gas engine according to the preceding claim, characterised by the fact that in the hollow spaces (6, 7) of the supporting frame projections are arranged at various heights upon which plates can be placed, secured, and packed for the
10 purpose of enabling the cross sectional area of the hollow spaces to be reduced or enlarged according to requirements, substantially as hereinbefore described.

7. Vertical gas engines constructed substantially as hereinbefore described with reference to and shown in Figs. 1, 2 and 3 and in Figs. 4, 5 and 6 of the accompanying drawings.

15 Dated this 5th day of July 1906.

For the Applicant

F. WISE HOWORTH, F.C.S.
46 Lincoln's Inn Fields, London, W.C.
Chartered Patent Agent.

SHEET 1

SHEET 2

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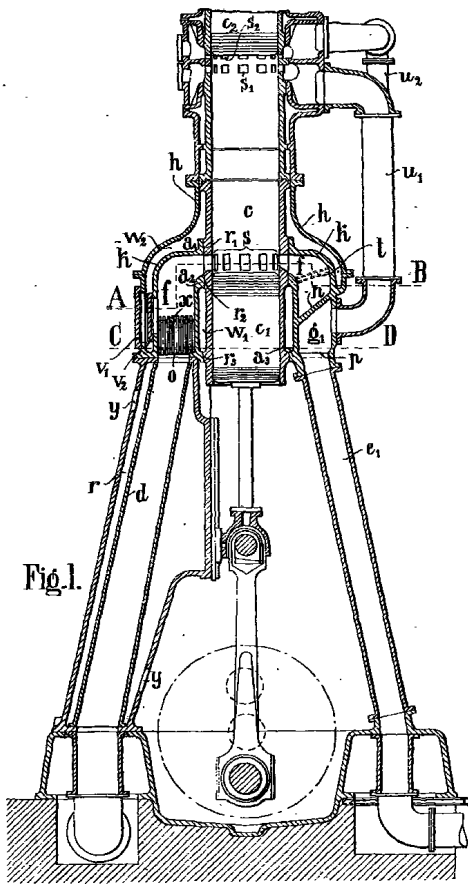


Fig. 1.

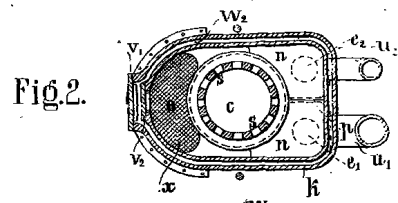


Fig. 2.

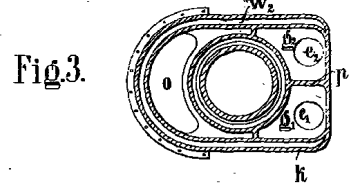


Fig. 3.

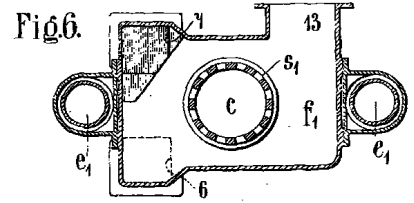


Fig. 6.

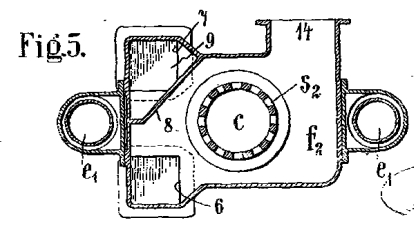


Fig. 5.

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SHEET 1.

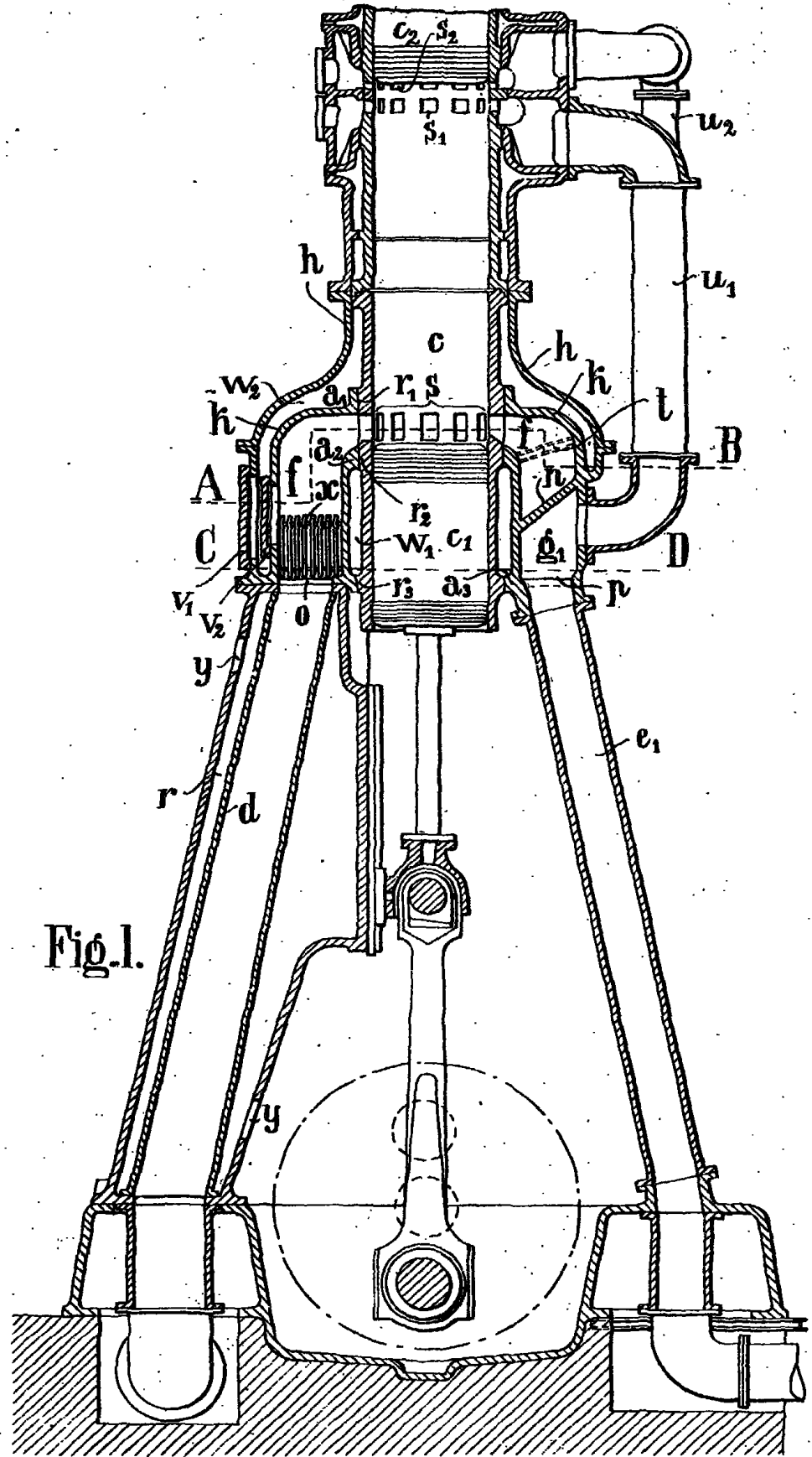


Fig. 1.

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Fig.2.

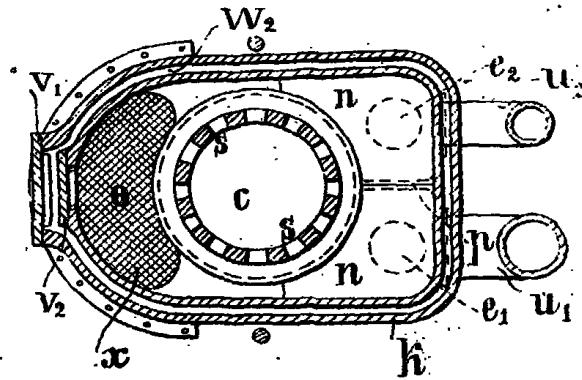


Fig.3.

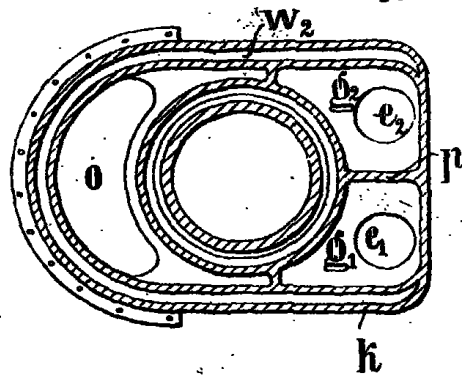


Fig.6.

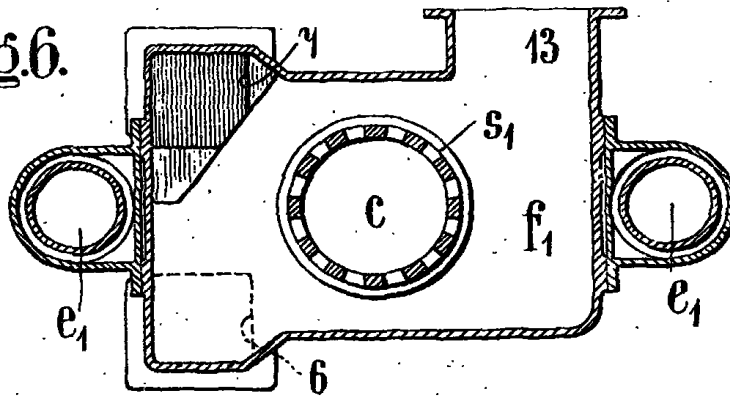
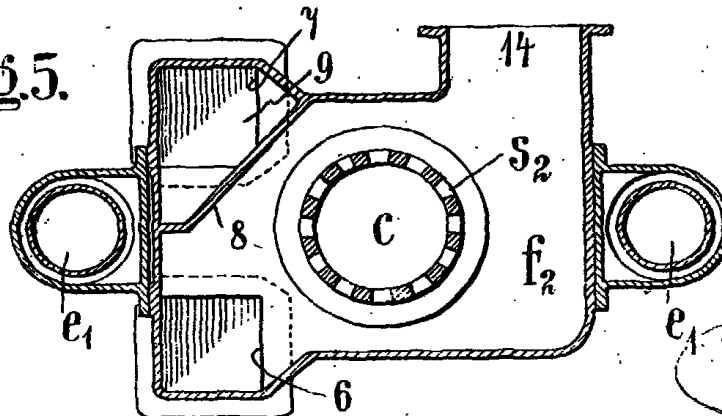


Fig.5.



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Fig. 4.

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