

N^o 18,053



A.D. 1909

Date of Application, No. 18,053, 5th Aug., 1909

" " " " No. 2767, 4th Feb., 1910

Complete Specification Left, 7th Feb., 1910

(Section 16 of the Patents and Designs Act, 1907)

Complete Specification Accepted, 4th Aug., 1910

PROVISIONAL SPECIFICATION.

No. 18,053, A.D. 1909.

Improvements in the Cylinders and Valves of Compound Engines.

I, GEORGE HUGHES, M.I.Mech.E., M.I.C.E., of Wingfield, Heaton, Bolton, County of Lancaster, Engineer, do hereby declare the nature of this invention to be as follows:—

5 This invention is designed to reduce the excessive or abnormal compression of steam in the high pressure cylinders of compound engines and to maintain an equal ratio of pressure between the H.P. cylinder and the receiver of the L.P. cylinder.

10 In the H.P. cylinders of compound engines an excessive resistance occurs against the piston when steam is cut off earlier than about half stroke owing to the exhaust closing and compression beginning on the steam at receiver pressure the steam being thereby compressed to a higher degree of pressure than the actual working pressure. The effect of this is to seriously reduce the area of the indicator diagram by forming a loop of negative work thus reducing the net work. The same thing occurs with single expansion locomotives running at
15 high speeds with an early cut off.

With compound locomotives it is usual to provide the front and back sides of the high pressure cylinders with spring relief valves loaded to release into the atmosphere when compression reaches the boiler pressure, but such valves are objectionable for various reasons.

20 The invention consists essentially in constructing the cylinder or the valve (either piston or slide valve) with a valve controlled port or passage whereby when the pressure in the L.P. cylinder exceeds that in the steam chest the steam is permitted to escape to the receiver or back to the steam chest.

In carrying out the invention as applied to the main valve or valves which
25 distribute steam to the H.P. cylinder I construct the valve with one or more steam ports or passages with one or more auxiliary valves fitted therein. These valves open or close communication between the high pressure cylinder and the receiver or low pressure steam chest. One side of these valves or valve when closed, is subject to the pressure in the said cylinder, the other side to the
30 pressure in the receiver or low pressure steam chest.

As there is a certain ratio of pressure between the high pressure steam, and the receiver, or low pressure steam, the auxiliary valve is constructed with differential areas, the area of the side exposed to the receiver being larger than the area exposed to the cylinder.

35 The construction of these valves is such that the pressure in the receiver holds them on their seats against the pressure in the cylinder. Should however, the pressure in the cylinder rise beyond the steam chest pressure, then it displaces these valves or valve, and discharges the said steam into the receiver.

[Price 8d.]



Improvements in the Cylinders and Valves of Compound Engines.

In a piston valve these ports extend through the periphery to one side of the valve and a number of radially differential valves are inserted therein which are held to their seats by suitably placed springs.

In a slide valve the steam ports extend from one side to the other and are fitted with similar differential valves which allow the steam to pass from the cylinder to the receiver. 5

A number of such ports and valves may be fitted between the steam passage to the L.P. cylinder and the receiver which will allow steam to pass direct from the cylinder ports to the receiver.

Such valves are automatic and flexible in action. Automatic, because their action is governed by the balance of pressure in the receiver and cylinder. Flexible because should the pressure in the steam chest be reduced, then the pressure in the receiver will correspondingly fall, with the result that whenever compression is pushed up above the steam chest pressure, then it will be released and passed into the receiver. 10 15

Instead of placing one side of the said valve or valves in communication with the receiver, I may prefer to place it in communication with the high pressure steam chest.

These valves serve also the purpose of water release valves also as air valves when the locomotive is coasting. 20

Although I prefer to combine these relief valves with the main valve as aforesaid, I may also fix them on the front and back end of the cylinder if necessary.

The same principle can also be applied to simple expansion engines, with this difference, that one side of the automatic valve or valves will be in communication with the cylinder,—the other side with the steam chest. 25

Dated this 4th day of August, 1909.

J. OWDEN O'BRIEN,
Successor to and late of W. P. Thompson & Co., of Manchester,
Patent Agents. 30

PROVISIONAL SPECIFICATION.

No. 2767, A.D. 1910.

Improvements in Valves for Steam Engines.

I, GEORGE HUGHES, M.I.Mech.E., M.I.C.E., of Wingfield, Heaton, Bolton, County of Lancaster, Engineer, do hereby declare the nature of this invention to be as follows:— 35

This invention relates to certain improvements in the construction of flat slide valves such as described in the Specification of my concurrent Application No. 18,053 of 1909.

I construct the valve either balanced or unbalanced with a central or main portion of hollow rectangular form. 40

In this central portion ports or passages are formed one of which communicates with the steam port of the cylinder and the other with the receiver or steam chest. In the latter passage a differential valve (either ball or other form) is placed by which the passages can be opened or closed. 45

Over the central or base portion of the valve a buckle or strap is fitted to which the valve rods are attached and by which the valve is operated. The buckle is formed with ports or passages corresponding with those in the base portion to form a cap or stop for the release valves.

Improvements in the Cylinders and Valves of Compound Engines.

This construction of valve dispenses with any parts which are liable to become loose in working or cause damage.

Dated this 3rd day of February, 1910.

J. OWDEN O'BRIEN,
Successor to and late of W. P. Thompson & Co., of Manchester,
Patent Agents.

COMPLETE SPECIFICATION.

Improvements in Devices for Preventing Excessive Compression in the Cylinders of Steam Engines.

10 I, GEORGE HUGHES, M.I.Mech.E., M.I.C.E., of Wingfield, Heaton, Bolton, County of Lancaster, Engineer, 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:—

15 This invention relates to distribution valves and cylinders for steam engines constructed with compression relieving devices adapted when a pressure exists in the cylinder in excess of that in the steam chest due for example, to excessive compression or accumulation of water, to relieve such pressure by permitting the steam or liquid to escape to the exhaust receiver, or steam chest, and comprises improved structural arrangements of the parts thereof.

20 The invention will be fully described with reference to the accompanying drawing in which sufficient of a locomotive cylinder and valves are shown to illustrate the invention.

Figure 1. Sectional elevation through the cylinder ports showing the invention applied to a piston valve.

25 Figure 2. Transverse section of the piston valve.

Figure 3. Sectional plan of same.

Figure 4. End elevation.

Figure 5. Sectional elevation through the cylinder ports showing the invention applied to a slide valve.

30 Figure 6. End elevation of same (partly in section).

Figure 7. Half plan and half sectional plan.

Figure 8. Part transverse sectional elevation.

Figure 9. Transverse section.

35 Figure 10. Sectional elevation of cylinder showing the invention applied thereto.

Figure 11. End view, enlarged, of cover of the auxiliary valves in end of cylinder.

Figure 12. Transverse sectional elevation of the same.

Figure 13. Sectional elevation of same.

40 Figure 14. Sectional elevation of the invention applied to the steam ports G of a cylinder.

As applied to the main valve or valves which distribute steam to the H.P. cylinder I construct the valve with one or more steam ports or passages with one or more auxiliary valves. The valve or valves open or close communication between the H.P. cylinder and the receiver or L.P. steam chest. One side of the valve or valves when closed, is subject to the pressure in the said cylinder, the other side to the pressure in the receiver or low pressure steam chest.

50 As there is a certain ratio of pressure between the high pressure steam, and the receiver, or low pressure steam, the auxiliary valve is constructed with

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differential areas, the area of the side exposed to the receiver being larger than the area exposed to the cylinder. The construction of the valves B is such that the pressure in the receiver holds them on their seats against the pressure in the cylinder. Should however, the pressure in the cylinder rise beyond the steam chest pressure, then it displaces the valve or valves and the steam is discharged into the receiver. 5

As applied to a piston valve for the H.P. cylinder of a compound engine (see Figures 1 to 4) the head at both ends is constructed with one or more steam ports A which are controlled by the valve or valves B. The piston rings C are provided with a number of apertures or passages *c* (corresponding in number to the ports A and valves B) which may give communication to the cylinder and receiver when the main valve has closed the exhaust. The valve seat is on the inner side of the piston ring C and the area of the aperture *c* is so proportioned that the pressure in the receiver acting on the back of the valve holds it upon its seat against the pressure in the cylinder. A small spiral spring *b* is applied to the valve B to ensure it being brought back to its seat after the engine has been running without steam. 15

Ball valves such as hereinafter described may be substituted in the piston valves for the valves shown therein.

As applied to a flat slide valve of a single expansion engine (see Figures 5 to 9) the main valve at both ends is constructed with one or more steam ports A controlled by one or more valves B. These valves are preferably ball valves as shown though they may be valves of the construction shown in Figures 1 to 4. The ports A connect with the ports A' forming communication between the cylinder and the steam chest. The area of the valve seating is so proportioned that the pressure in the steam chest acting on the ball valve holds it upon its seat against the pressure in the cylinder. 20 25

The invention may be applied to any form of slide valve whether balanced or unbalanced but I at present prefer to construct the valve as shown.

The valve is constructed with a central or base portion D in which are formed the steam ports or passages A, A' in the form of which the valves B are placed. Over the base portion D a buckle or strap E is fitted to which the valve rods are attached and by which the valve is operated. The buckle or strap E is so designed as to form a cap and stop for the valves B whether of spherical or other form. This construction of valve dispenses with any parts which are liable to become loose in working and cause damage. 30 35

As applied to the cylinder (see Figures 10 to 14) the ports A are formed in the front and back ends of the cylinder or in the ordinary steam passage G and the valves B fitted thereto are held to their seats by the pressure of steam in the steam chest or receiver against the pressure of steam in the cylinder. When the pressure is raised in the cylinder the steam will be allowed to pass direct from the cylinder to the receiver or steam chest. 40

By the application of this invention the amount of compression in the cylinder is controlled and by releasing compression within the cylinder especially with an early cut off the efficiency of the engine will be greatly increased and cylinder cocks with the necessary levers and rods for working them may be dispensed with. 45

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:— 50

1. A piston valve for the cylinder of a steam engine having ports or passages and control valves constructed and arranged substantially as described and shown with reference to Figures 1 to 4 of the accompanying drawings.

2. A flat slide valve for cylinder of steam engines constructed with a central or base portion, having auxiliary ports or passages and control valves (of ball or other form) fitted therein, and with a buckle or strap fitted thereon to form 55

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a cap or stop for the control valves substantially as described with reference to Figures 5 to 9 of the accompanying drawings.

3. A cylinder having relief valves for the purpose specified arranged substantially as described and shown with reference to Figures 10 to 13 or modified as described and shown with reference to Figure 14 of the accompanying drawings.

Dated this 26th day of January, 1910.

J. OWDEN O'BRIEN,
Successor to and late of W. P. Thompson & Co., of Manchester,
Patent Agents.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1910.

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

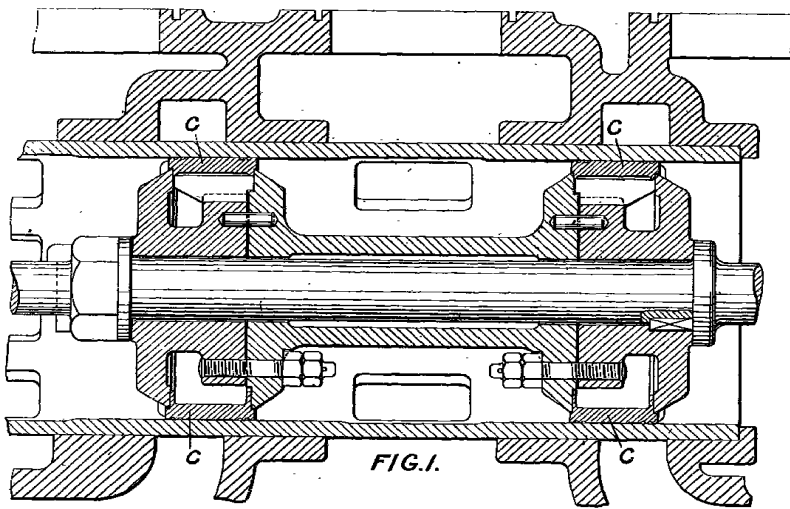


FIG. 1.

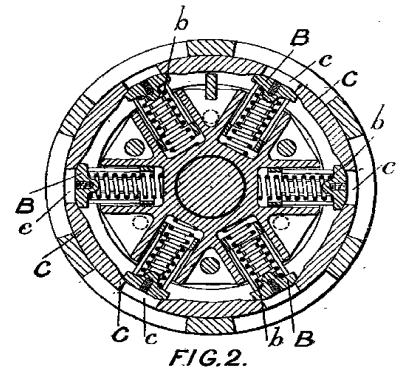


FIG. 2.

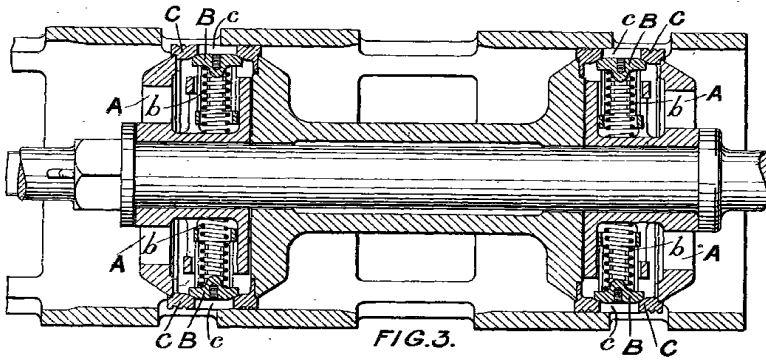


FIG. 3.

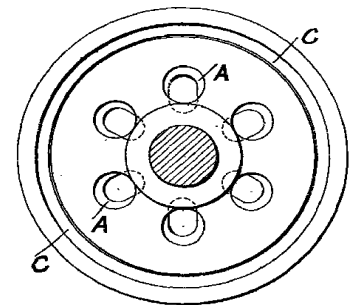


FIG. 4.

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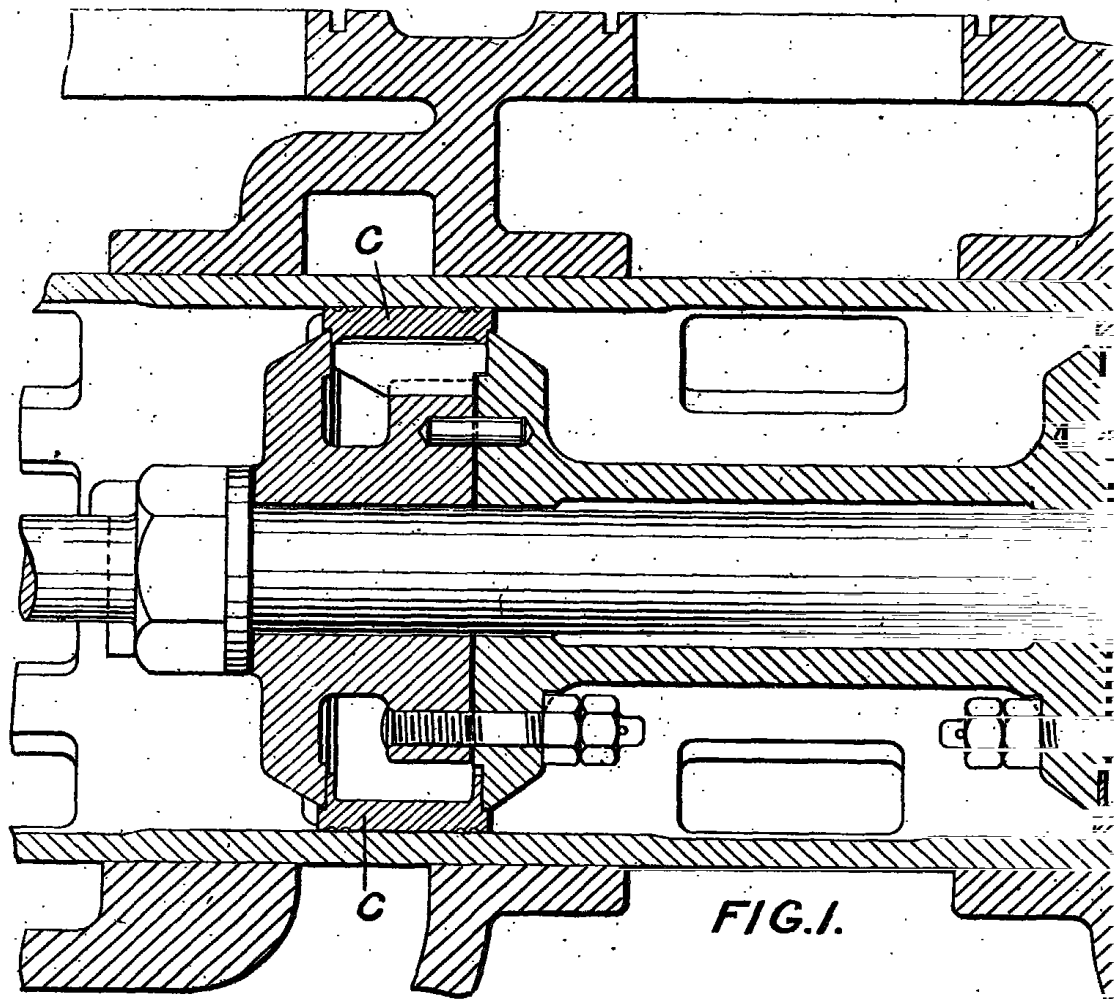


FIG. 1.

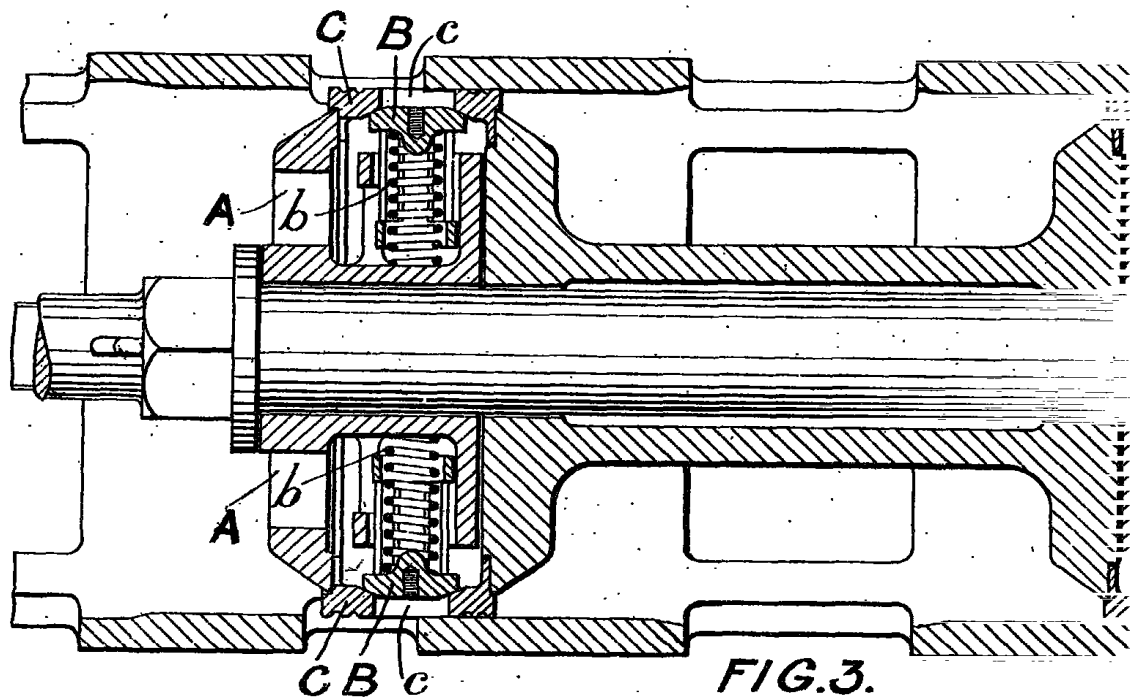


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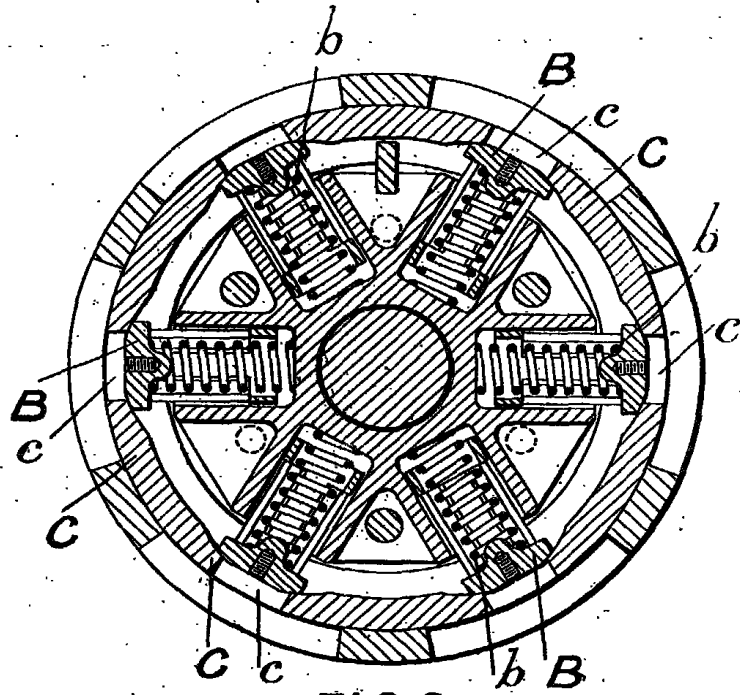
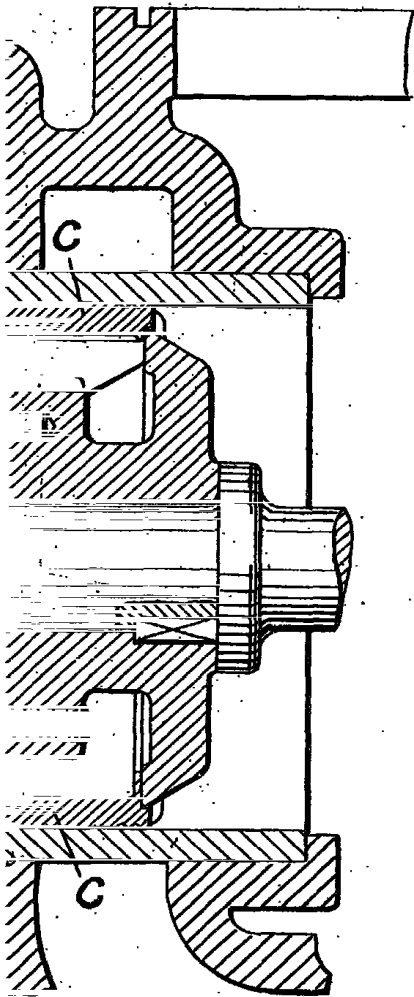


FIG. 2.

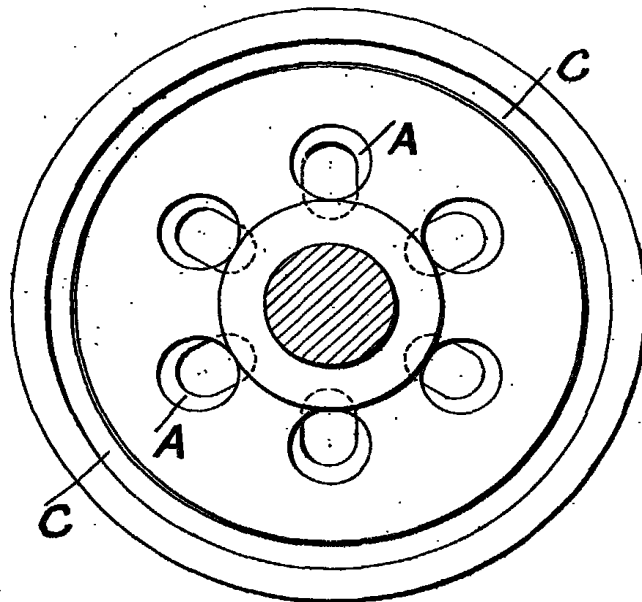
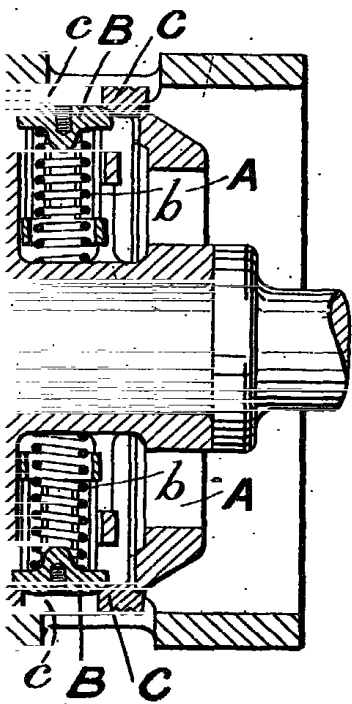
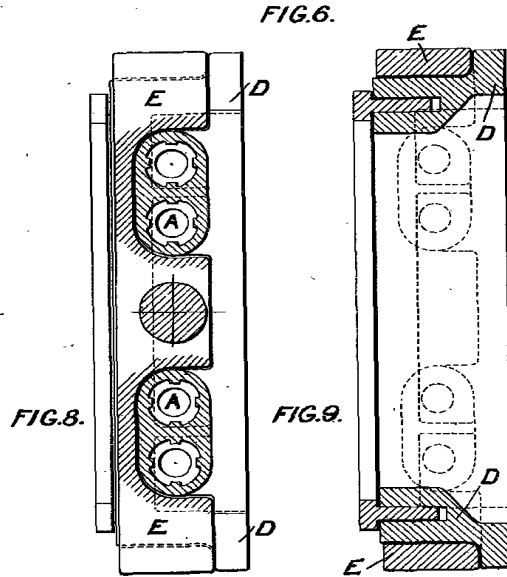
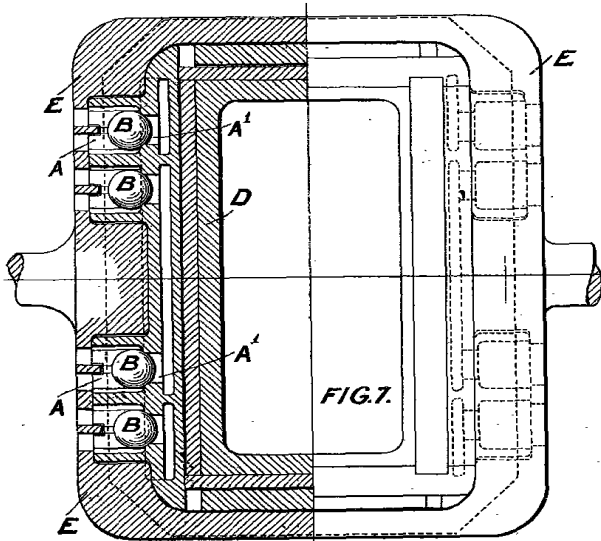
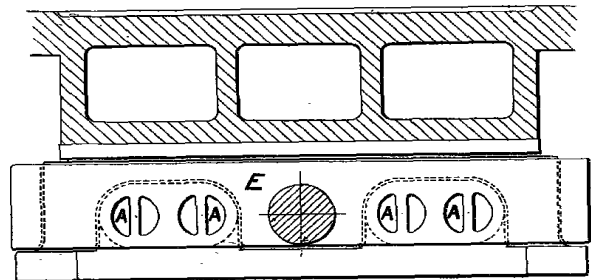
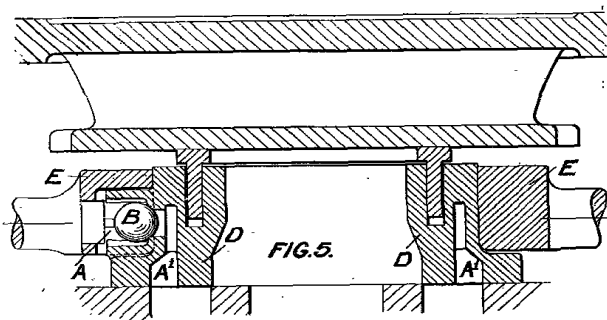


FIG. 4.

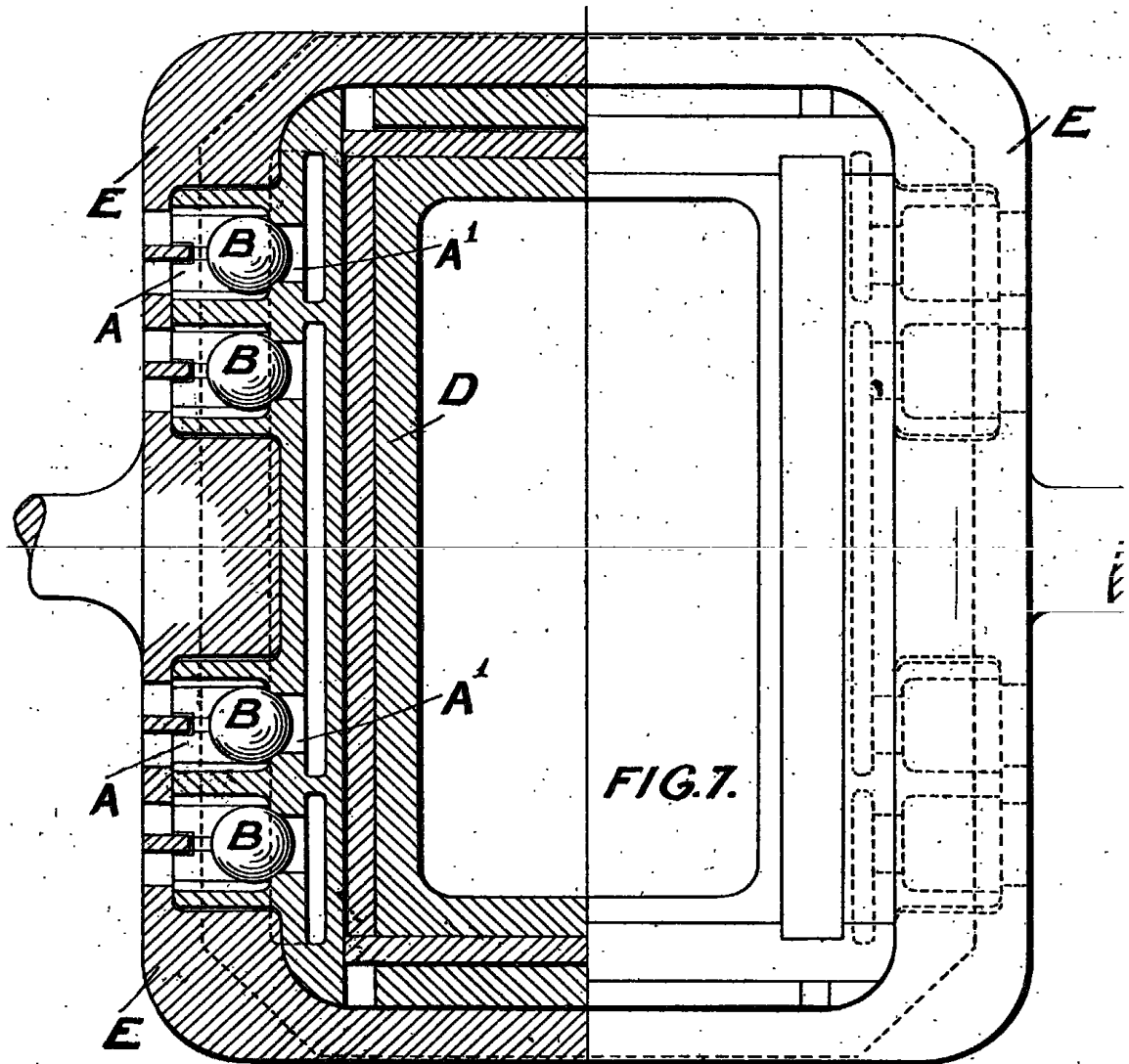
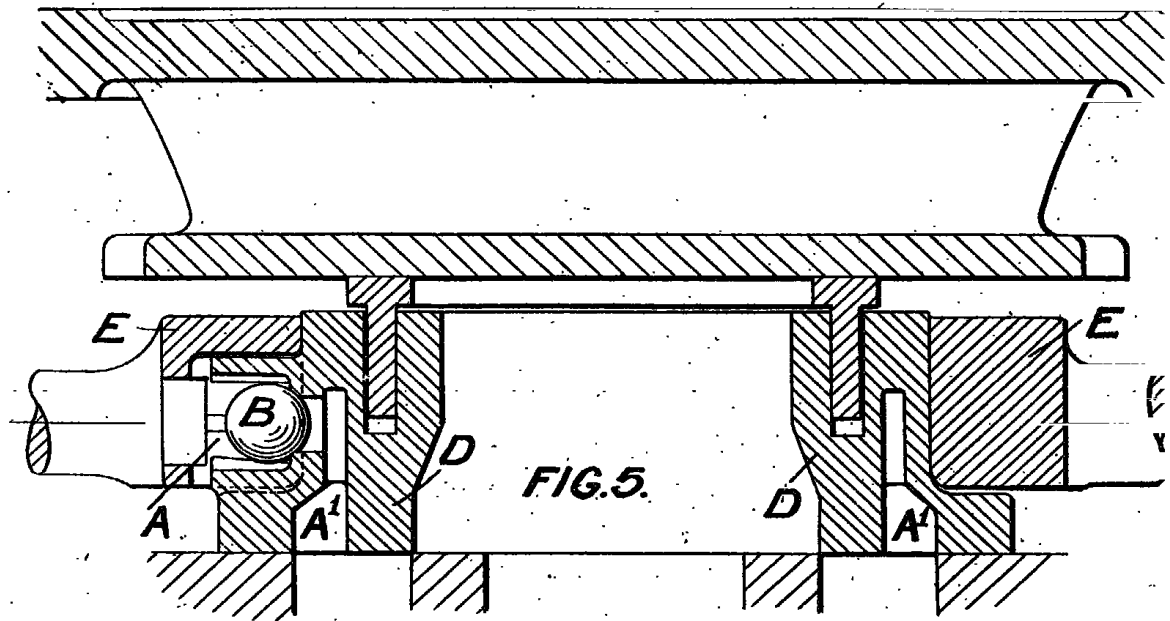
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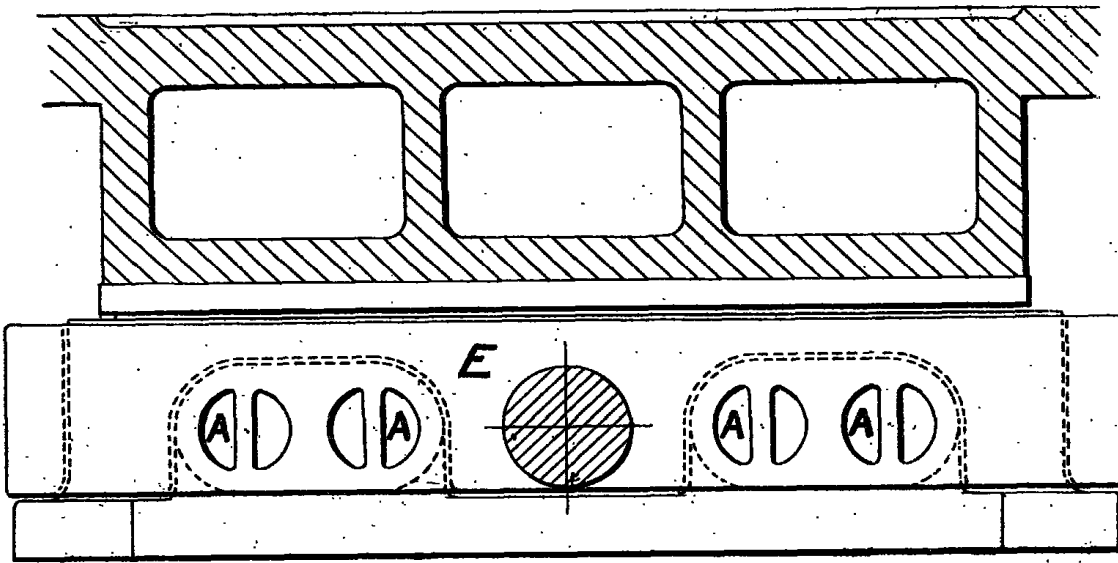


FIG. 6.

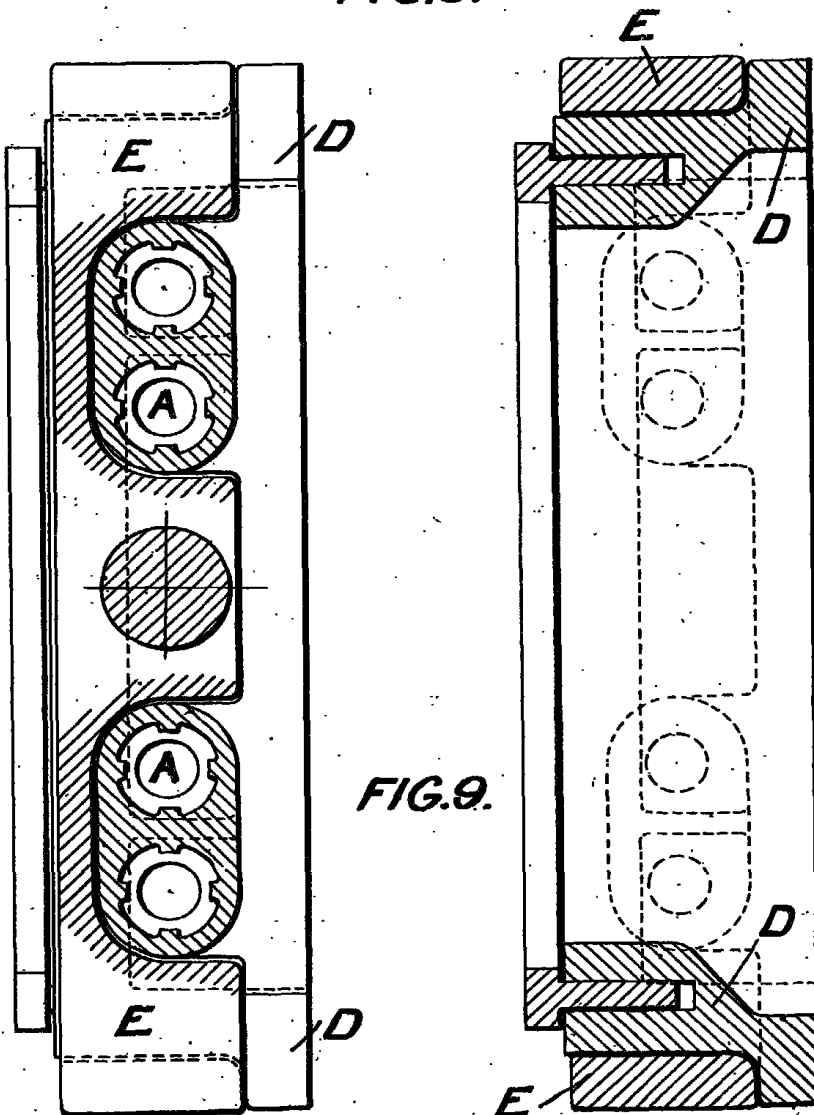


FIG. 8.

FIG. 9.

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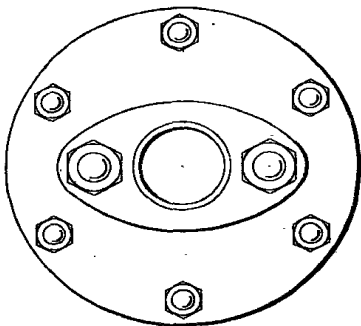


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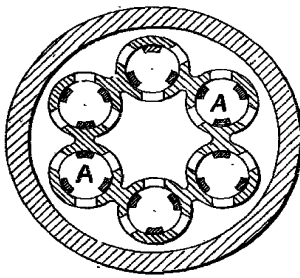


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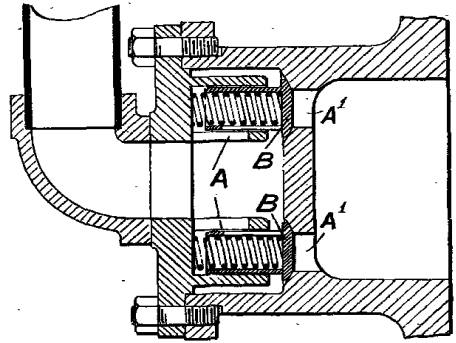


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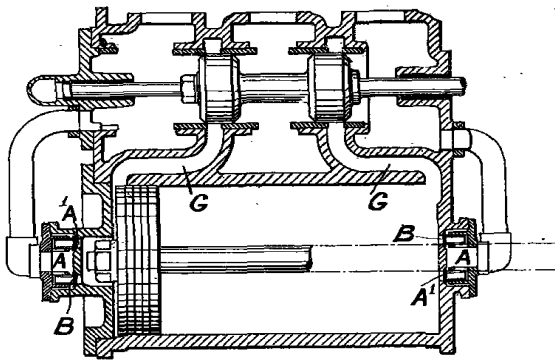


FIG. 10.

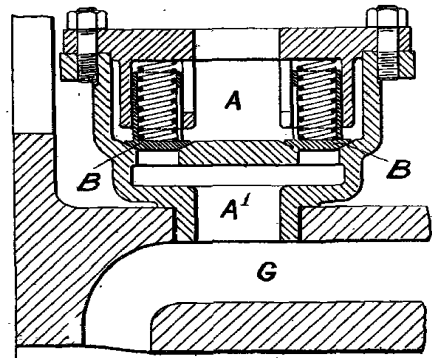


FIG. 14.

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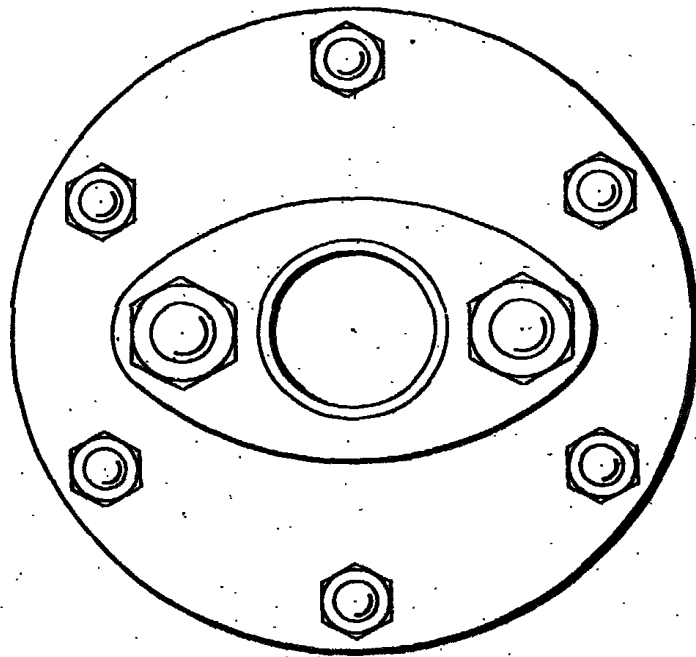


FIG. 11.

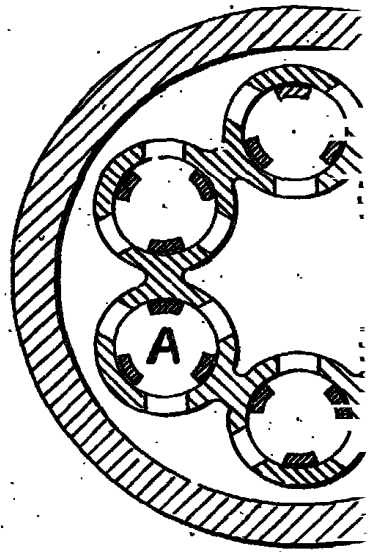


FIG. 12.

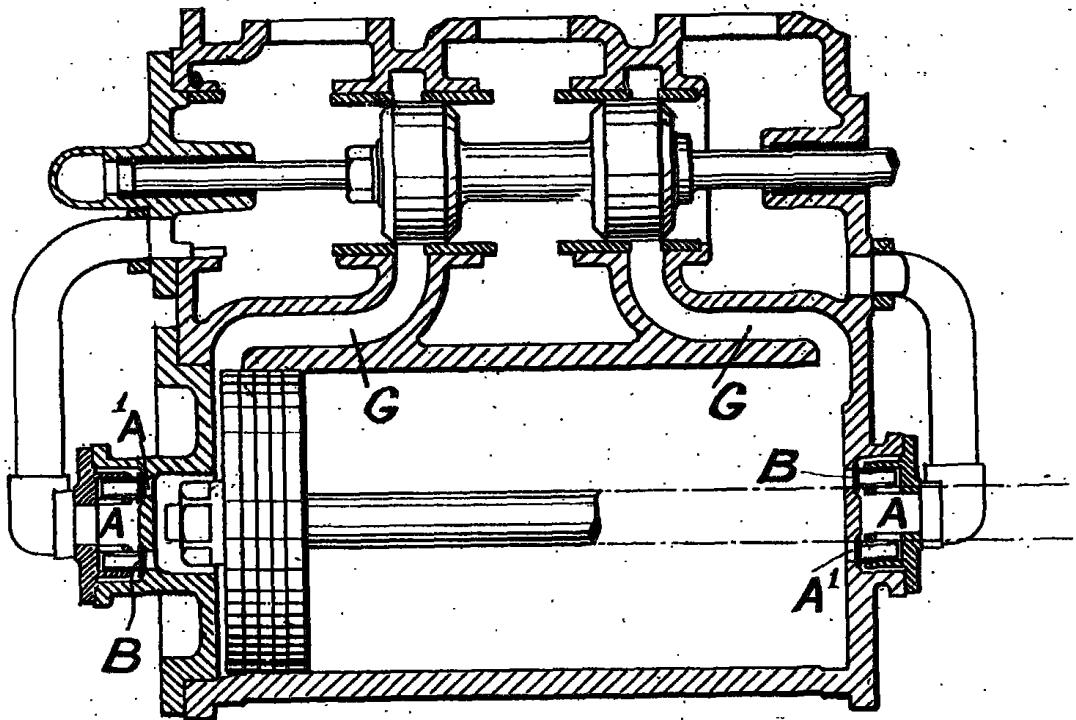


FIG. 10.

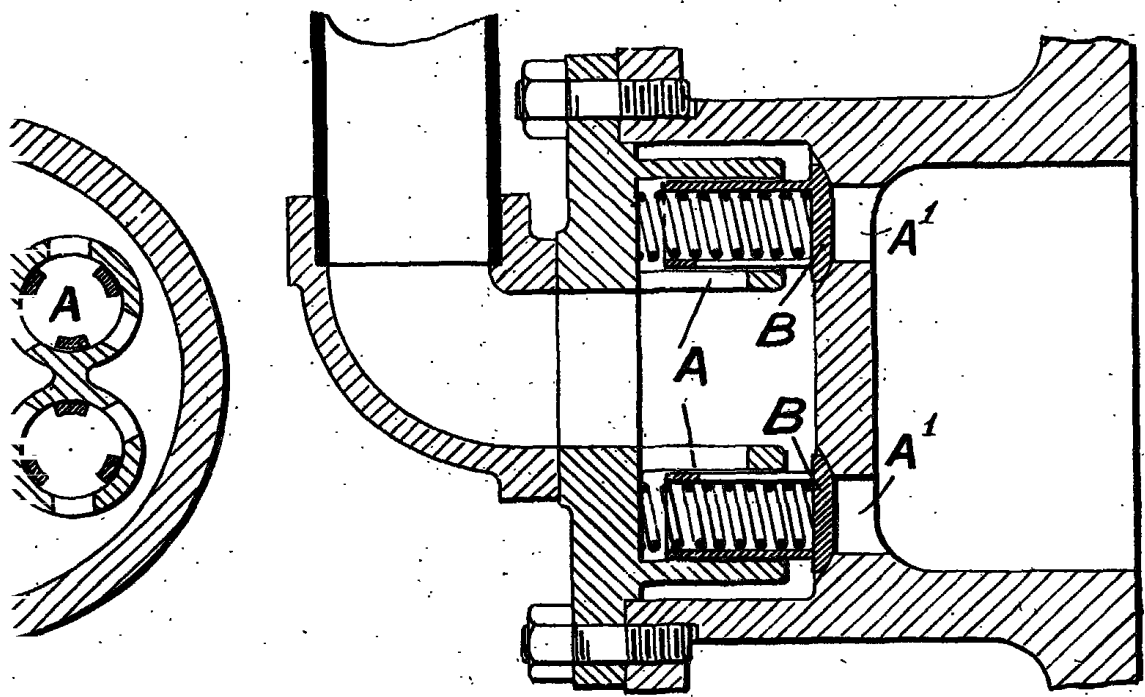


FIG. 13.

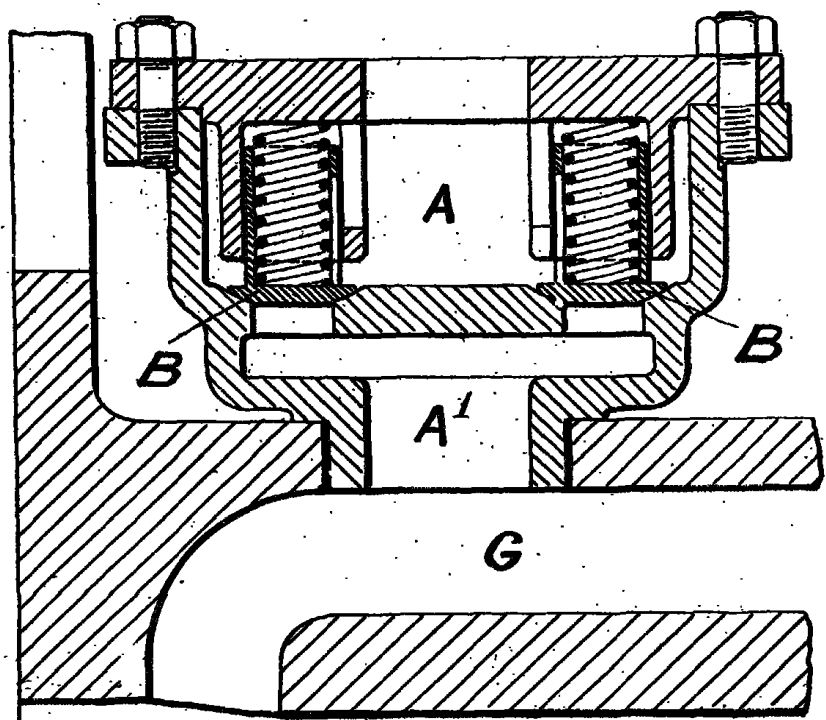


FIG. 14.

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