

No. 868,606.

PATENTED OCT. 15, 1907.

P. W. LANDELL.
AUTOMATIC FLUSH VALVE.
APPLICATION FILED JAN. 11, 1907.

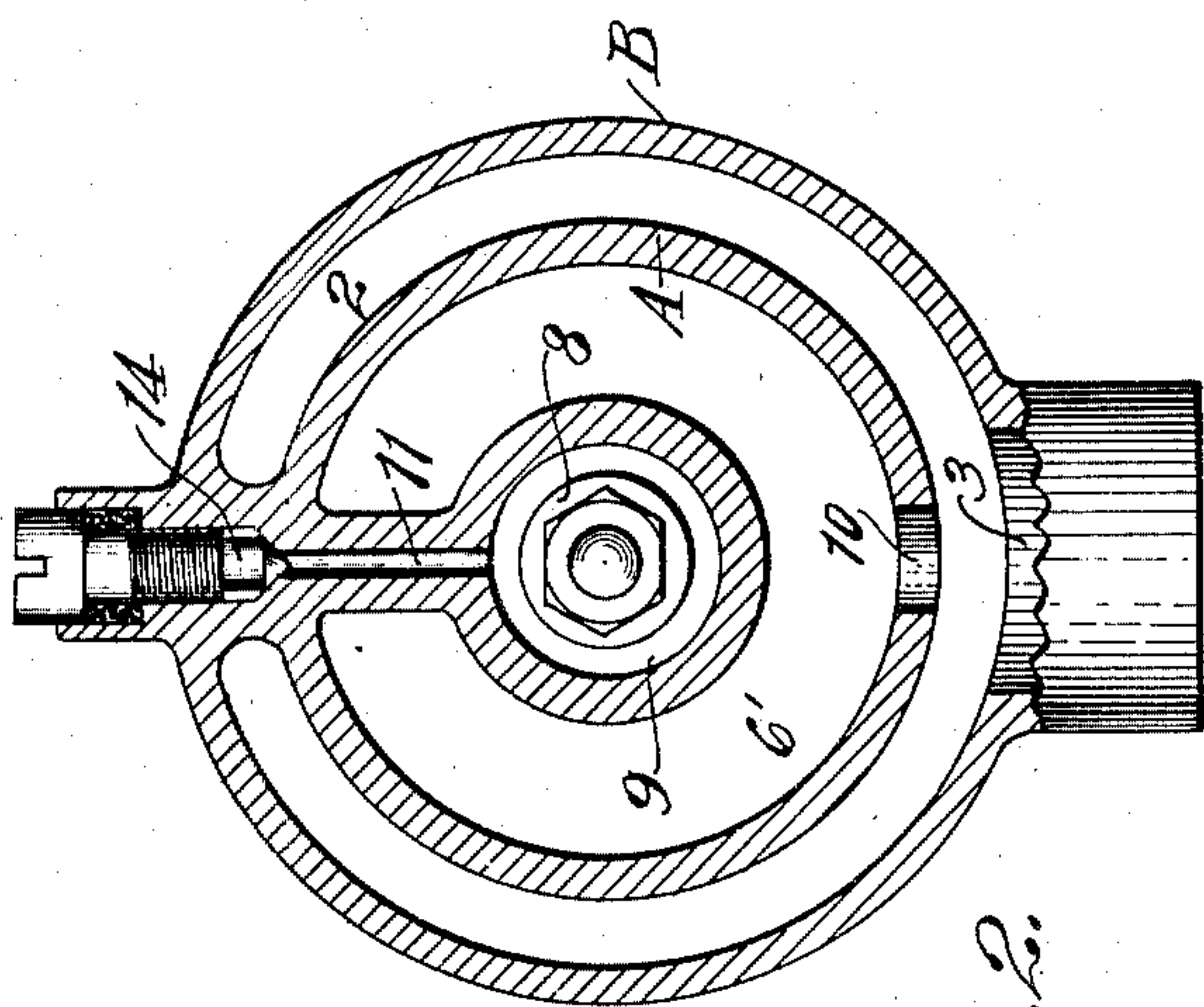


Fig. 2.

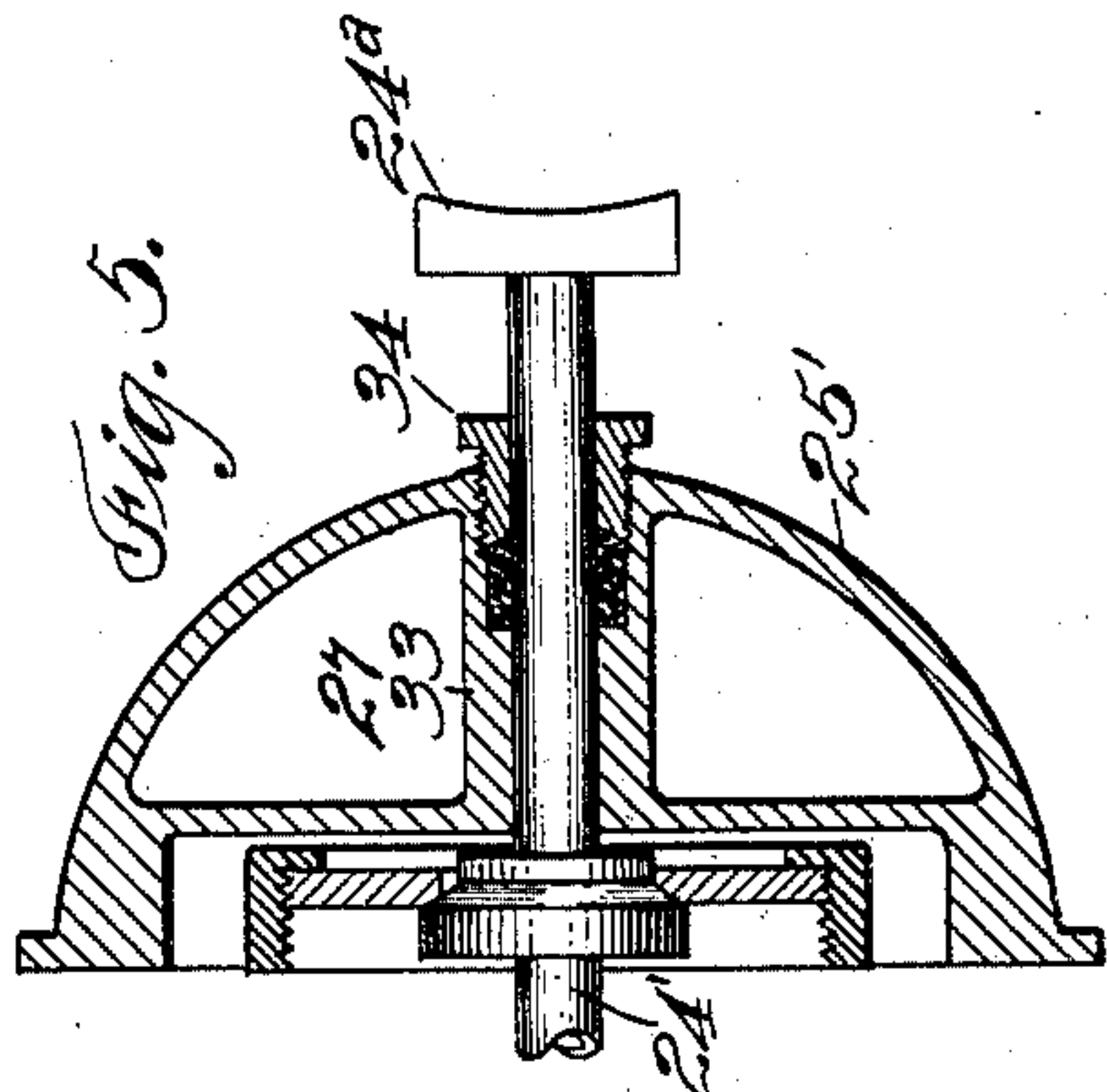


Fig. 5.

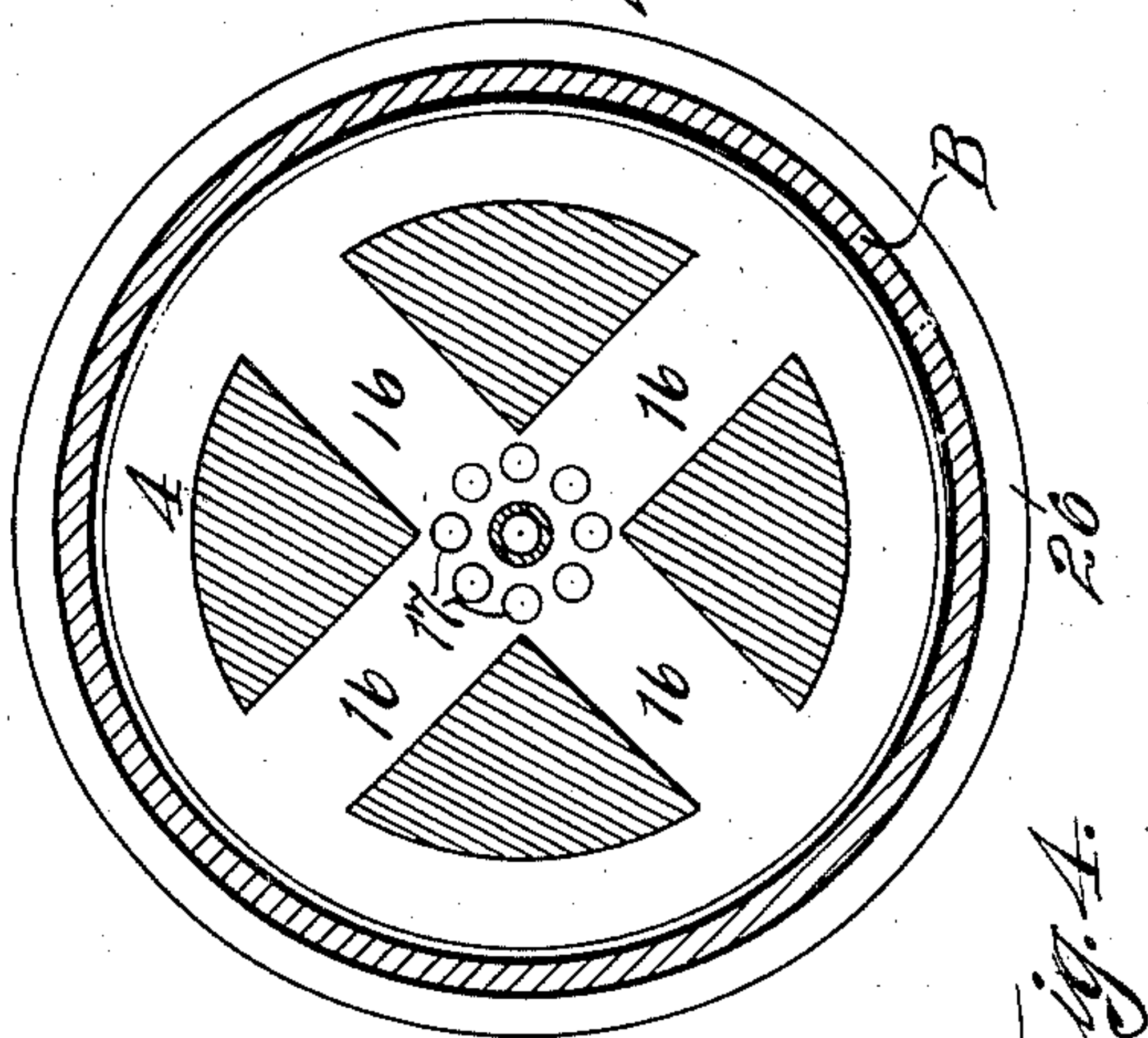


Fig. 4.

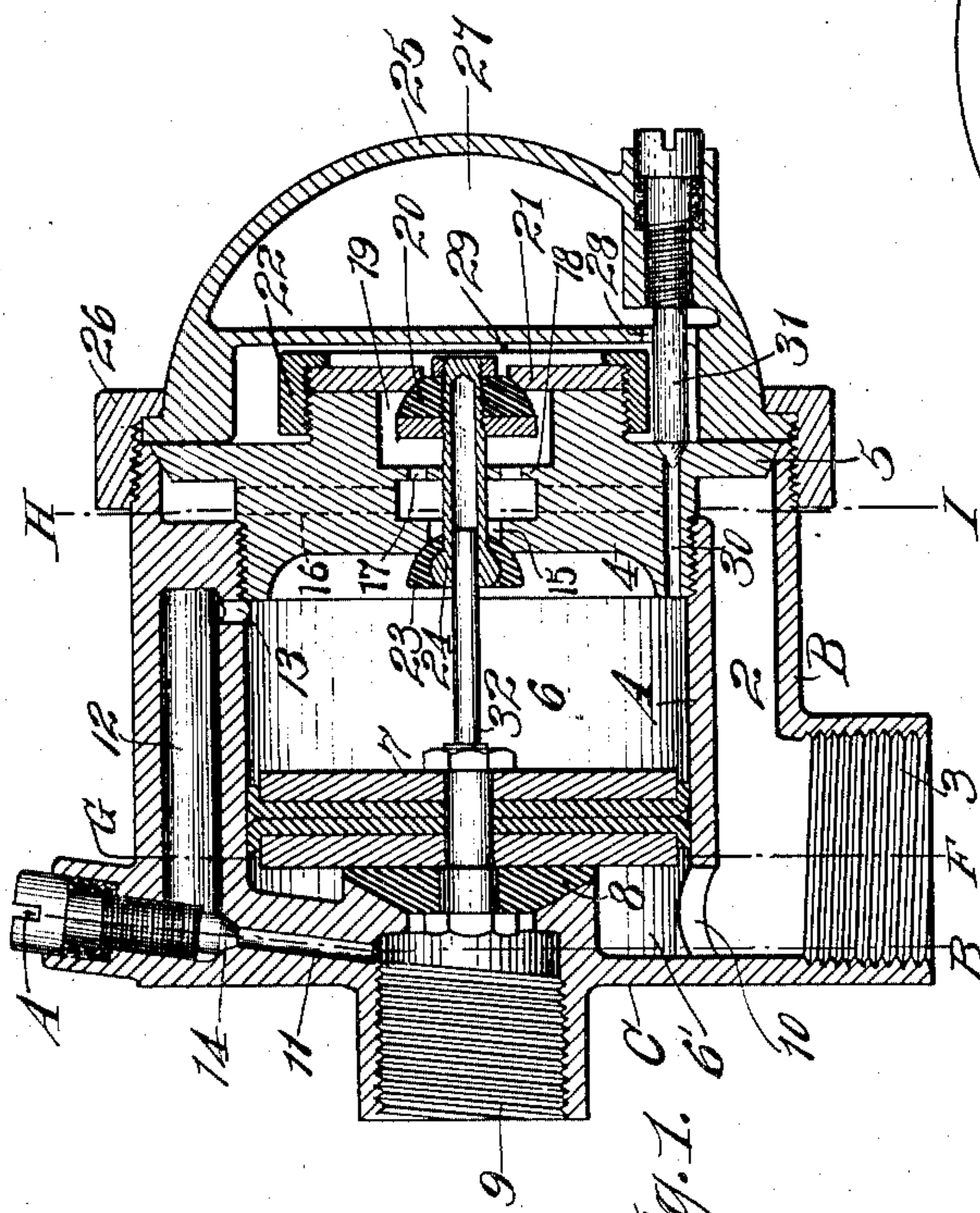


Fig. 1.

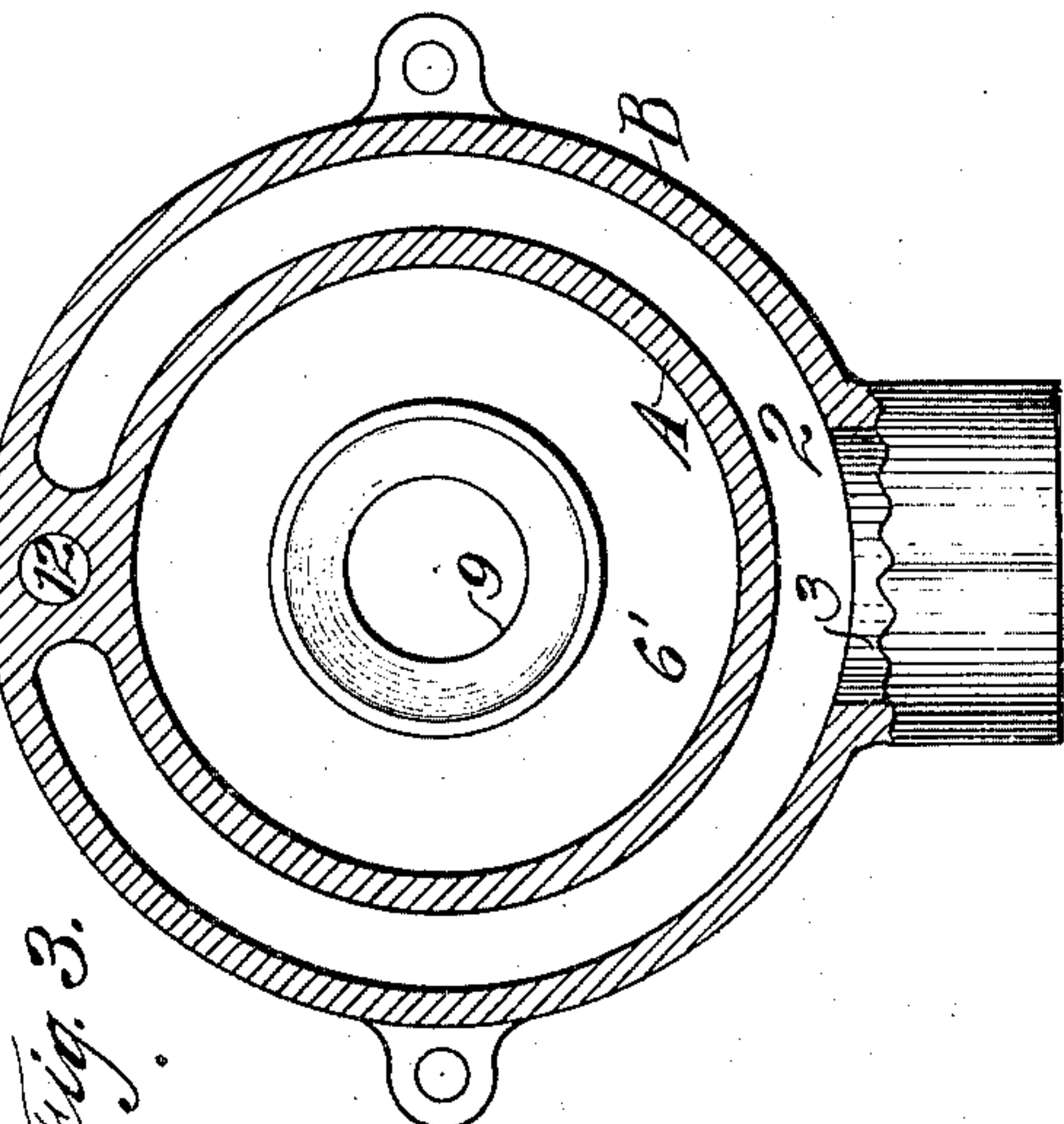


Fig. 3.

WITNESSES:

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UNITED STATES PATENT OFFICE.

PETER W. LANDELL, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF ONE-THIRD TO MONROE N. CALLENDER AND ONE-THIRD TO J. B. WILLIAMS, BOTH OF SAN FRANCISCO, CALIFORNIA.

AUTOMATIC FLUSH-VALVE.

No. 868,606.

Specification of Letters Patent.

Patented Oct. 15, 1907.

Application filed January 11, 1907. Serial No. 351,790.

To all whom it may concern:

Be it known that I, PETER W. LANDELL, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Automatic Flush-Valves, of which the following is a specification.

My invention relates to flush valves. Its object is to provide primarily a flush valve, which shall be automatically operated at regular intervals through the medium of the head of water under control; which valve may be either automatically or manually operated; and which will be simple, neat, compact, durable and practical.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a section of our improved automatic flush valve. Fig. 2 is a section on the irregular line A B, Fig. 1. Fig. 3 is a section on line G F, Fig. 1. Fig. 4 is a section on line H I Fig. 1. Fig. 5 is a section of a modified form of our valve adapted also for manual operation.

The body of the device comprises two concentric cylinders A—B united to a common base C which is adapted to be secured to a vertical wall by any suitable means. The cylinders are spaced to provide an annular passage 2 which is in free communication with the outlet 3.

A plug 4 of special design screws into the interior of the inner cylinder and has a flange 5 over-reaching the end of the outer cylinder and closing that end of the passage 2. When the plug is in position the chamber 6 is formed in the inner cylinder A and a piston 7 is adapted to operate in this chamber and carries a valve 8 movable toward and from its seat to allow water from the inlet 9 to enter periodically the chamber 6' in that end of the cylinder and pass thence out through the port 10 into the outlet 3. The duration of the opening period of this valve 8 determines the flushing period; that is as long as the valve 8 is open water from the inlet 9 flows under full main pressure when the apparatus is connected with the main into the outlet to produce the required flushing.

The operation of the piston 7 to open and close valve 8 at suitable intervals is automatically effected through the medium of differences of pressure produced in the apparatus by the following means:

The end of the chamber 6 opposite to valve 8 is in communication with the inlet 9 through the ports 11—12 and 13. By means of a regulating valve 14 the quantity of flow into the cylinder 6 may be readily controlled. This valve 14 is so placed that it closes against the flow of the liquid to facilitate cleaning out

accumulations of dirt: by opening this valve and allowing the apparatus to operate a couple of times, it will free itself automatically of any foreign substances which may have collected around it.

The plug 4 which closes the ends of the cylinders has a central port 15 leading into the radial ports 16 in the plug. These radial ports being in communication with passage 2. Ports 16 are also in communication through the ports 17 in the web portion 18 of the plug, with a space 19 on top of the plug, in which space a valve 20 is operable to open and close a port in a disk 21 which is held to the top of the plug by a union as 22. The port 15 afore mentioned is closable by a valve 23 which latter is on the same stem with the valve 20. This stem which is represented at 24 is hollow and operates in a guide web 18.

The two valves 20—23 also have their exposed surfaces of different areas; the valve 20 being the larger, so that with the valves normally closed with equal pressures, per square inch, brought to bear on the two valves, the valve 20 will push valve 23 open and simultaneously will open itself.

A crown 25 is adapted to fit over the plug being held in position by a union 26. This crown is provided with an air compartment 27. The bottom of which is in communication through a port 28 with a space 29 into which the valve 20 projects. The bottom of this valve chamber is also in communication with the water chamber 6 through the port 30; the size of which may be regulated by the needle valve 31.

The operation of the valve is as follows: The apparatus being suitably connected and the valves 14—31 adjusted properly and assuming the position of the parts to be as shown, that is, with the valves 8—20—23 closed, the water from the main under full pressure passes through the ports 11—12—13 into chamber 6 and thence through the port 30 into the bottom of the air chamber 27. This flow into the chamber 6 and the air chamber continues until the pressure in the chamber 27 against the body of confined air equals the pressure in the chamber 6; thereupon this pressure being transmitted through the port 28 and space 29 to the larger valve 20, causes the simultaneous opening of both the valves 20—23 due to the difference in pressure on these two valves; instantly there follows a discharge from chamber 6 out through ports 15—16 and 2 to the discharge 3. Pressure on that side of piston 7 being released it immediately flies to the other end of the chamber, opening valve 8 and allowing the full force and volume of water from the inlet 9 to pass through port 10 into the discharge 3 to produce the desired flushing effect.

It should have been stated that the piston 7 has a spindle 32 slidable and guided in the hollow stem 24. This telescoping of the spindle 32 and stem acts as a

guide to preserve the proper alinement and operation of the piston and valves 20—23. At the same time that the valve 8 is open by the movement of the piston, and which movement is quite rapid, the piston contacts
 5 with the valve 23 to close it and also close valve 20, which both can do now that pressure has temporarily been relieved in the air-chamber.

With the valve 23 closed the pressure of the water from the main flowing through ports 11—12—13, gradu-
 10 ally force the piston back until the valve 8 is again seated. When a suitable pressure is once more accumulated in the air chamber 27 the operation is automatically repeated.

During the whole flushing operation described the
 15 liquid is allowed to pass freely into the compartment 6' of the cylinder and through the outlet 10 into the main outlet 3 until the valve 8 engages its seat, when no more liquid will flow until the next operation.

The outlet 10 is so placed over the main outlet 3 that
 20 the liquid discharged into the main outlet 3 in a form of a jet shall have a tendency to siphon out the contents of the receiving chamber 2, preventing back pressure from forming in it. This chamber or passage 2, also, has a capacity sufficient to hold all the liquid discharged
 25 into it from the piston chamber 6 and the air chamber 27.

The regulating valve 14 regulates the time during which it is desired to have the fluid pass through the main valve 8, and this time may be varied to suit the
 30 condition by opening or closing the valve more or less as the case may be.

The adjusting valve 31 governs the frequency with which flushing shall take place. Valve 31 may be set
 35 so as to allow the apparatus to flush at intervals of one minute or one hour, or any other time found desirable or necessary.

This apparatus is especially advantageous for flushing
 40 urinals periodically, either where one urinal is used singly or where several are flushed by one valve; or for any other purpose where an automatic valve is needed to deliver a certain quantity of water at fixed intervals of time.

If the valves are for use with toilets it may be advantageous to render them capable of manual operation
 45 aside from and in addition to their automatic feature. In this case it is only necessary to extend the valve stem 24' as shown in Fig. 5, through the air compartment 27 to a point exterior to the casing, supply this stem with push button as 24" and shut out all possibility of leak from or into the air chamber. As here shown
 50 the stem is surrounded by a cylindrical sleeve 33 inside of and integral with the dome shell 25', which cuts off all communication between the air chamber 27 and the stem. A packing gland 34 is provided to prevent leakage around the stem. This form of apparatus will work
 55 periodically and automatically; besides it may be operated at intermediate intervals and in fact any time by means of the push button.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

60 1. The combination in a flush valve, of a casing having ingress and egress passages in communication through a piston chamber in the casing, a piston operable in said chamber and carrying a valve normally shutting off communication between said ingress and egress passage, a by-
 65 pass leading from said ingress passage around said piston and entering said chamber behind said piston, said cham-

ber having a valved-outlet which latter is in communication with the aforesaid egress passage, a valve in said outlet, and means operable through the medium of a compressible fluid for automatically controlling the action of
 70 said last-named valve.

2. The combination in a flush valve, of a casing having ingress and egress passages in communication through a piston chamber in the casing, a piston operable in said chamber and carrying a valve normally shutting off communication between said ingress and egress passages, means operable through the medium of a compressible fluid for automatically controlling the action of said piston, and means embodied in the same structure for manually controlling the action of said piston.
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3. The combination in a flush valve, of a casing comprising outer and inner cylinders, said inner cylinder inclosing a piston chamber, a piston in said chamber, said chamber on one side of said piston being in communication with the main ingress passage and with a principal discharge passage, a valve on said piston operative to shut off communication between said passages, a passage-way between said cylinders communicating with a main discharge and also communicating through a valved-port with said space in said piston chamber, said casing inclosing an air-pressure-chamber, the latter having communication with the piston chamber behind the piston, and means operable on the equalizing of pressures in said air chamber and said piston chamber to operate the piston.
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4. The combination in a flush valve, of a casing having ingress and egress passages in communication through a piston chamber in the casing, a piston operable in said chamber and carrying a valve normally shutting off communication between said ingress and egress passages, means operable through the medium of a compressible fluid for automatically controlling the action of said piston, means for varying the length of the flushing period, and means for varying the frequency of the flushing operations.
 100 105

5. The combination in a flush valve, of a casing having ingress and egress passages in communication through a piston chamber in the casing, a piston operable in said chamber and carrying a valve and normally shutting off communication between said ingress and egress passages, means for operating said piston automatically, means embodied in the same structure for manually controlling the action of said piston, means for varying the length of the flushing period, and means for varying the frequency of the flushing operations.
 110 115

6. The combination in a flush valve, of a casing having ingress and egress passages in communication through a piston chamber in the casing, a piston operable in said chamber and carrying a valve normally shutting off communication between said ingress and egress passages, the space behind said piston being in communication with the ingress passage, an air-pressure-chamber, said space having two outlets, one outlet communicating with said air-pressure chamber, the other outlet communicating with said egress passage, and means operable on the equalizing of pressure in said air chamber and in said space behind the piston to operate the latter automatically.
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7. The combination in a flush valve, of a casing having ingress and egress passages in communication through a piston chamber in the casing, a piston operable in said chamber and carrying a valve normally shutting off communication between said ingress and egress passages, the space behind said piston being in communication with the ingress passage, an air-pressure-chamber, said space having two outlets, one outlet communicating with said air-pressure-chamber, the other outlet communicating with said egress passage, means operable on the equalizing of pressure in said air chamber and in said space behind the piston to operate the latter automatically, and means whereby the action of the piston may be manually controlled.
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8. The combination in a flush valve, of a casing having ingress and egress passages in communication through a piston chamber in the casing, a piston operable in said chamber and carrying a valve normally shutting off communication between said ingress and egress passages, the space behind said piston being in communication with the ingress-passage, an air-pressure-chamber, said space hav-
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ing two outlets, one outlet communicating with said air-pressure-chamber, the other outlet communicating with said egress-passage, and a valve engageable by the piston and normally closing said outlet which is in communication with said egress passage, said valve having a stem, and a second valve on said stem of greater exposed area, exposed to the pressure in said air chamber.

9. The combination in a flush valve, of a casing having ingress and egress passages in communication through a piston chamber in the casing, a piston operable in said chamber and carrying a valve normally shutting off communication between said ingress and egress passages, the space behind said piston being in communication with the ingress-passage, an air-pressure-chamber, said space having two outlets, one outlet communicating with said air-pressure-chamber, the other outlet communicating with said egress passage, means operable on the equalizing of pressure in said air chamber and in said space behind the piston to operate the latter automatically, and a valve in the passage which connects said air-chamber with the space behind the piston for controlling the frequency of operation.

10. The combination of a flush valve, of a casing having ingress and egress passages in communication through a piston chamber in the casing, a piston operable in said chamber and carrying a valve normally shutting off communication between said ingress and egress passages, the space behind said piston being in communication with the ingress passage, an air-pressure-chamber, said space having two outlets, one outlet communicating with said air-pressure-chamber, the other outlet communicating with

said egress passage, means operable on the equalizing of pressure in said air chamber and in said space behind the piston to operate the latter automatically, said means including two valves of unequal area mounted on the same stem, one of said valves exposed to the pressure in the space behind the piston, and the other to the pressure in the air chamber.

11. The combination of a flush valve, of a casing having ingress and egress passages in communication through a piston chamber in the casing, a piston operable in said chamber and carrying a valve normally shutting off communication between said ingress and egress passages, the space behind said piston being in communication with the ingress passage, an air pressure chamber, said space having two outlets, one outlet communicating with said air pressure chamber, the other outlet communicating with said egress passage, means operable on the equalizing of pressure in said air chamber and in said space behind the piston to operate the latter automatically, said means including two valves of unequal area mounted on the same stem, one of said valves exposed to the pressure in the space behind the piston and the other to the pressure in the air-chamber, and a spindle on said piston telescoping said hollow stem and maintaining the alinement of said movable parts.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

PETER W. LANDELL.

Witnesses:

S. H. NOURSE,
FREDERICK E. MAYNARD.