

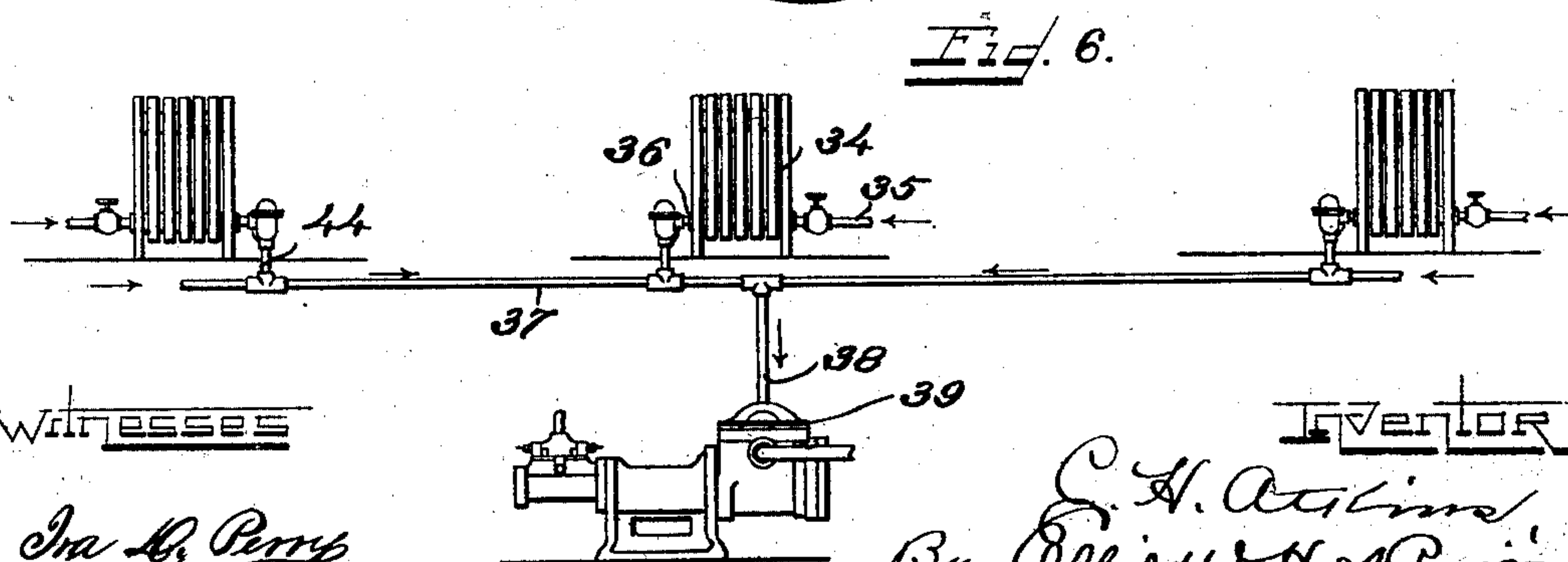
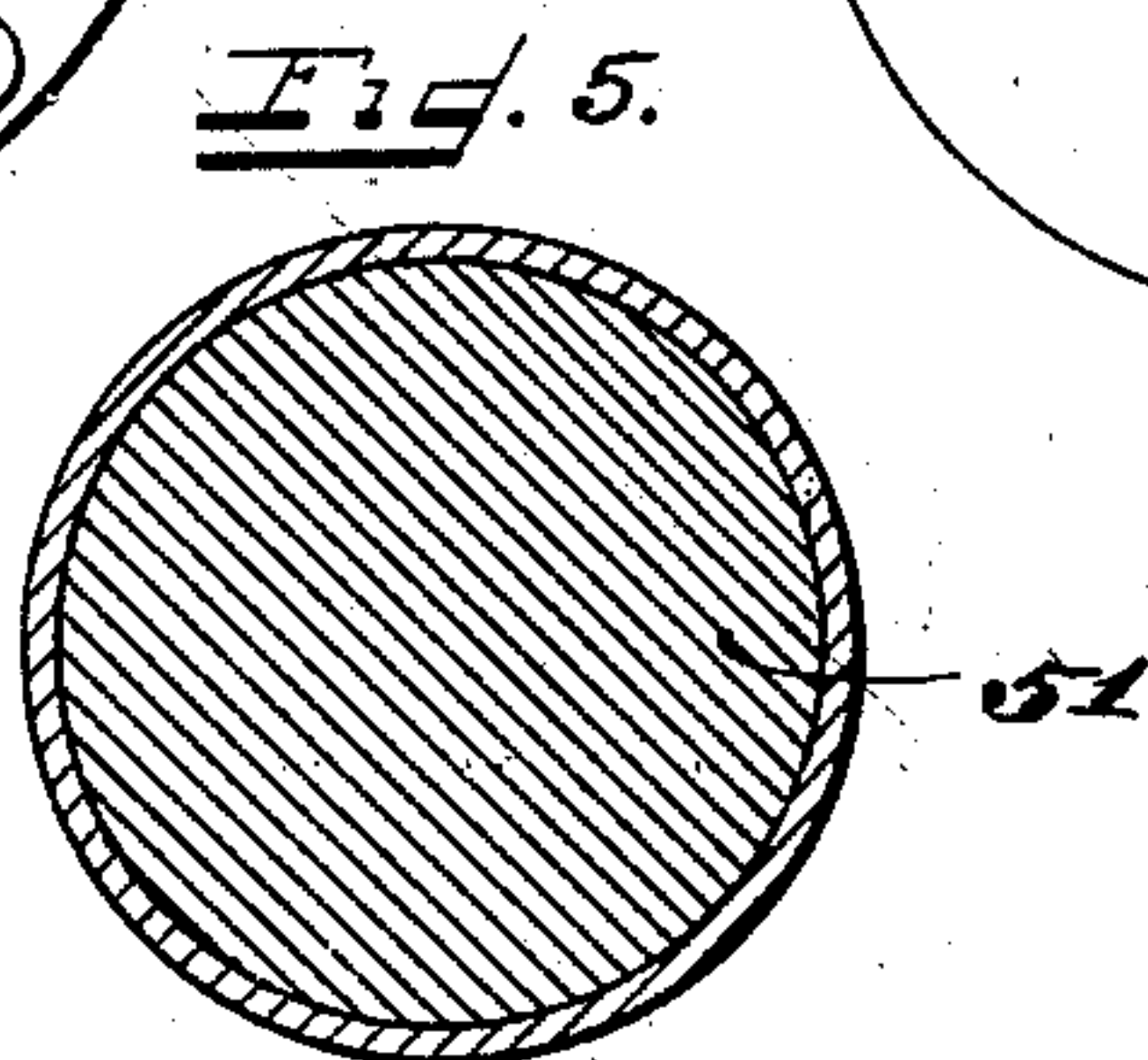
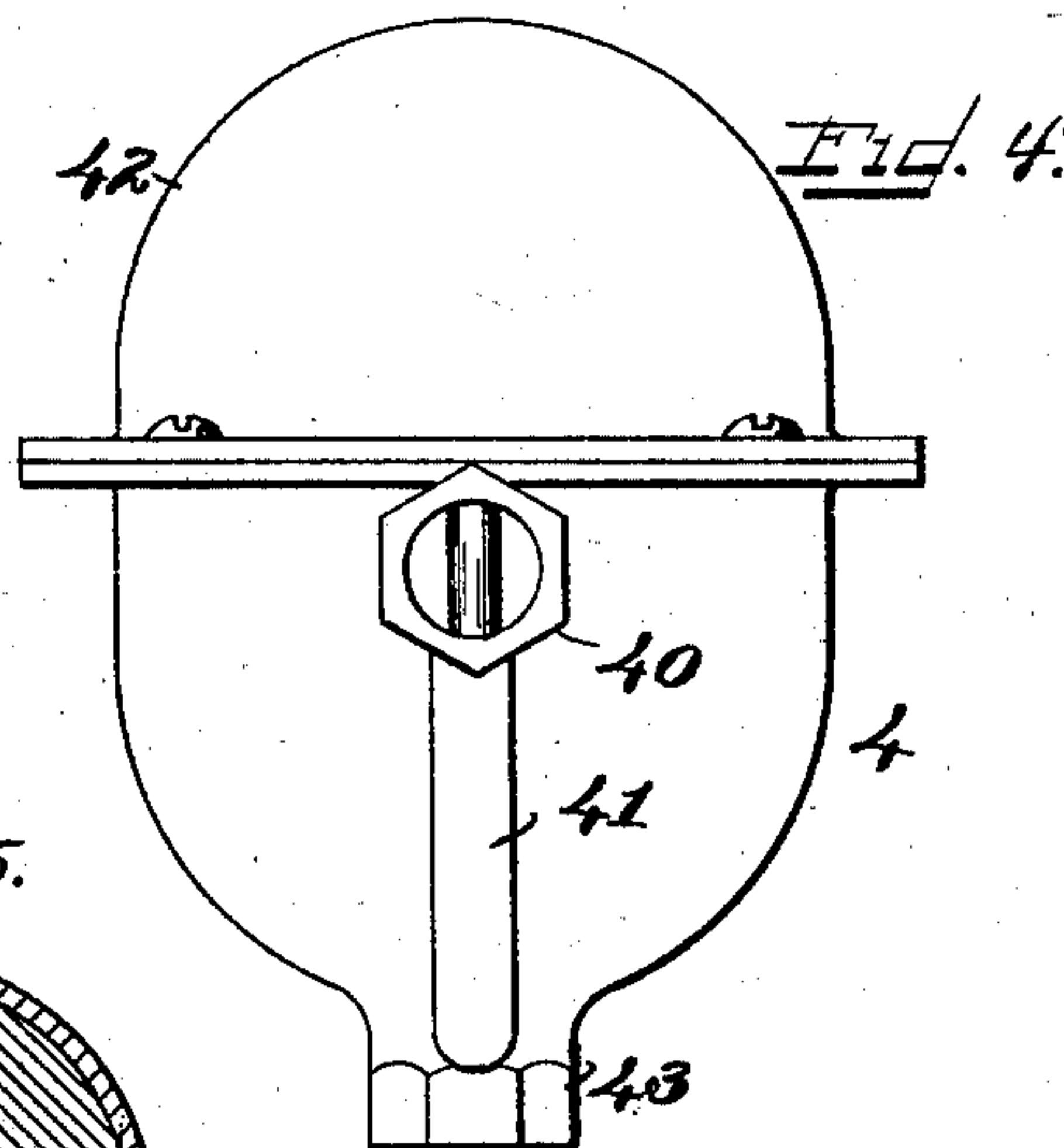
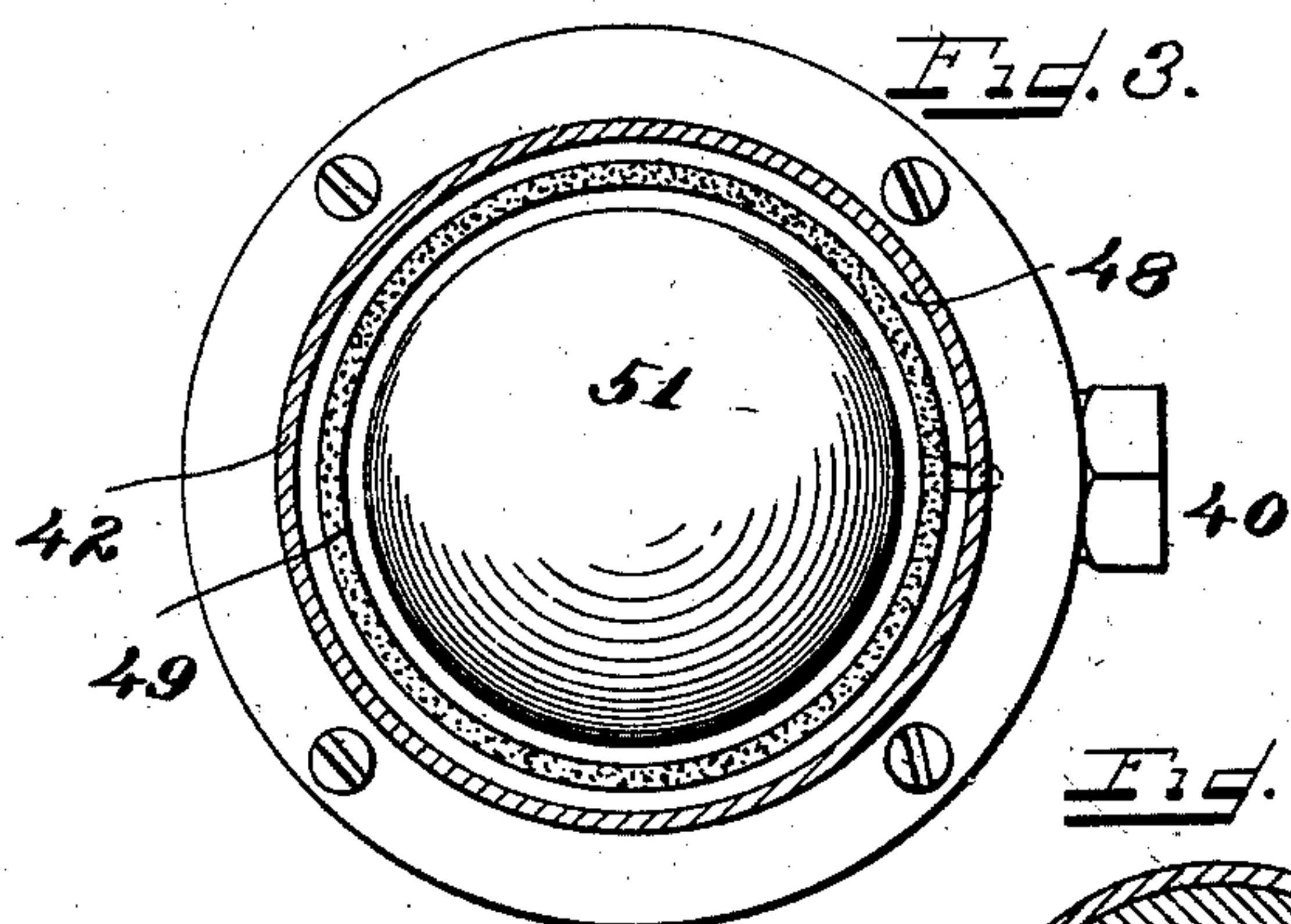
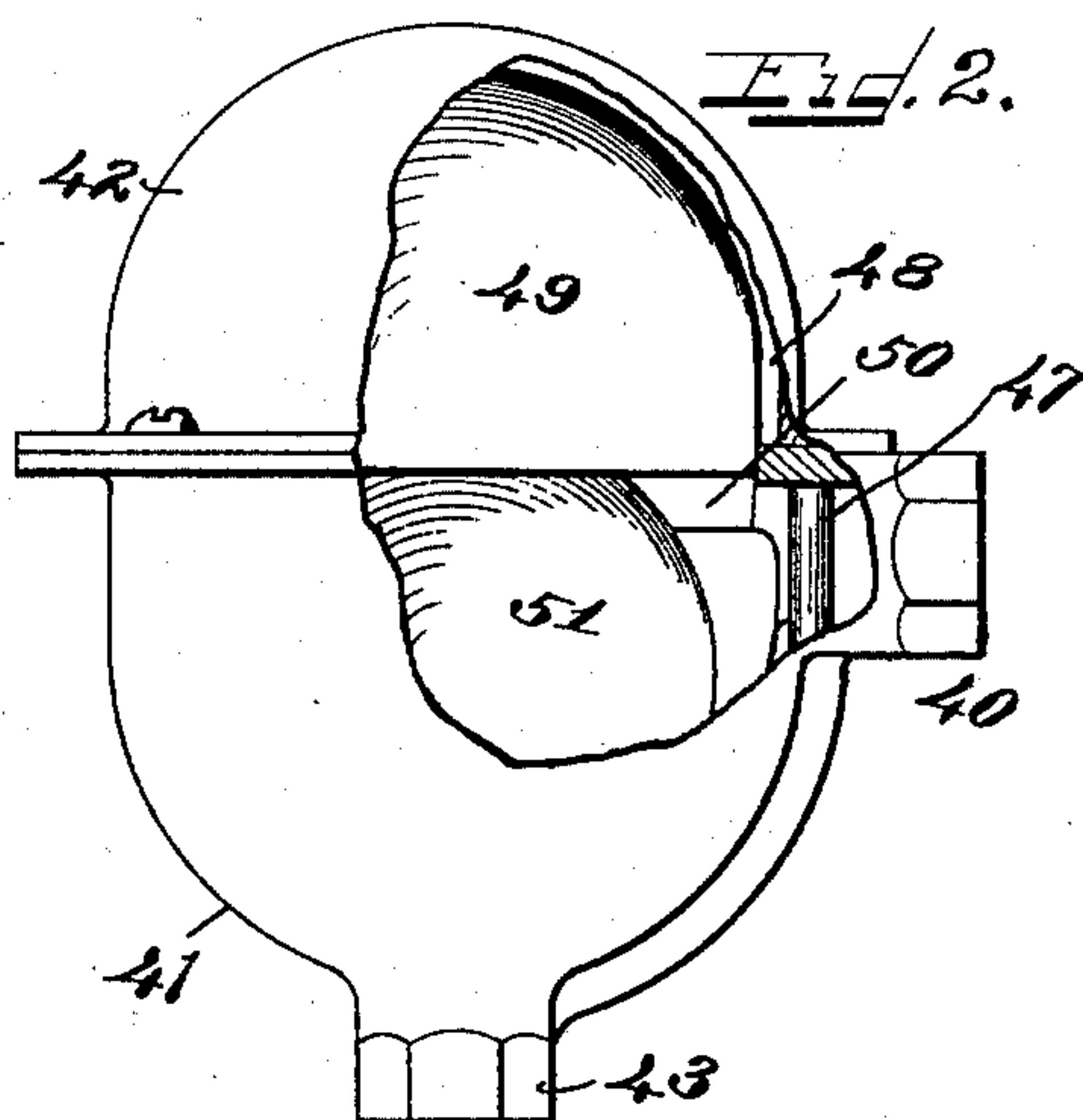
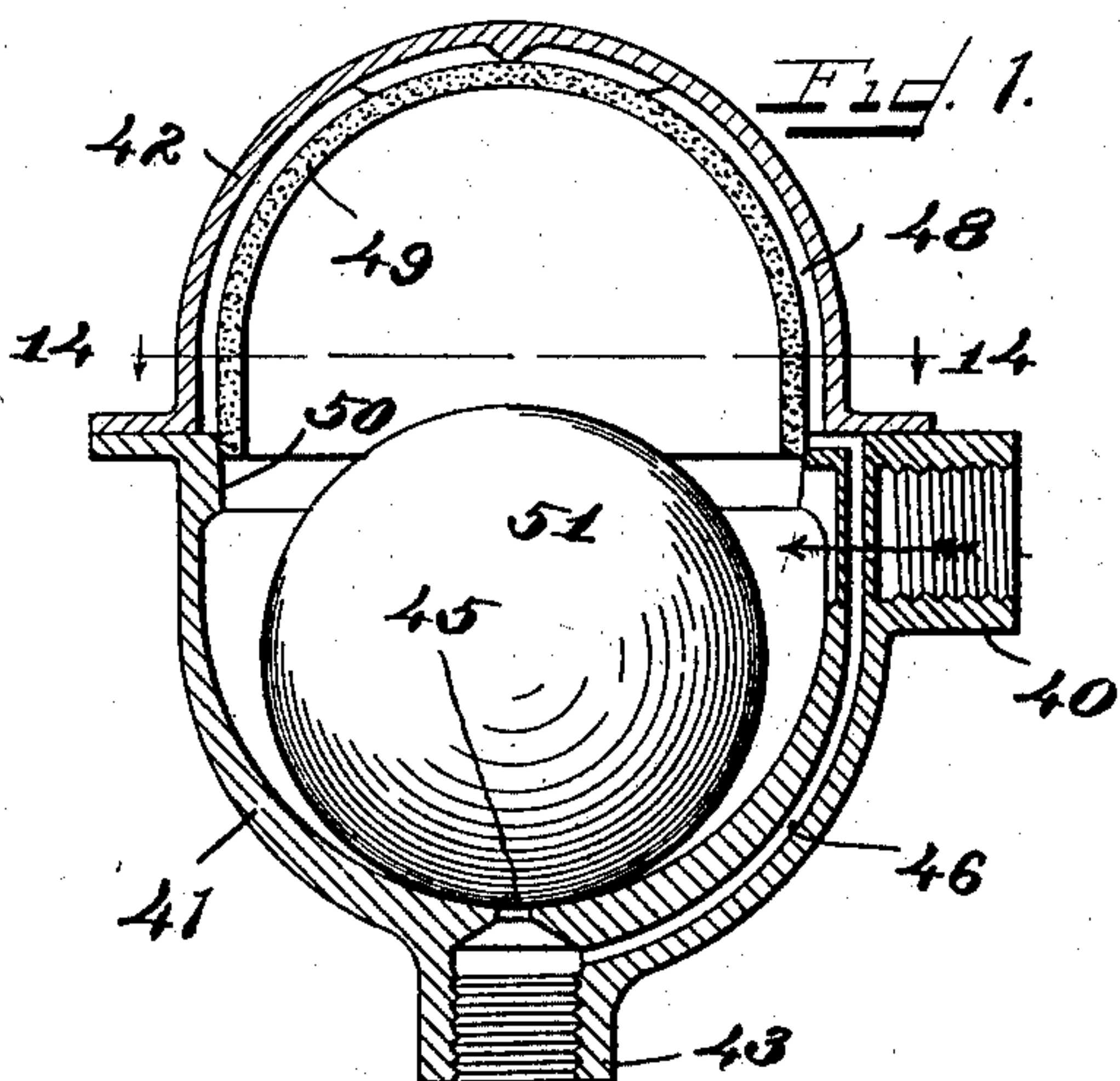
No. 702,352.

Patented June 10, 1902.

C. H. ATKINS.  
STEAM HEATING APPARATUS.

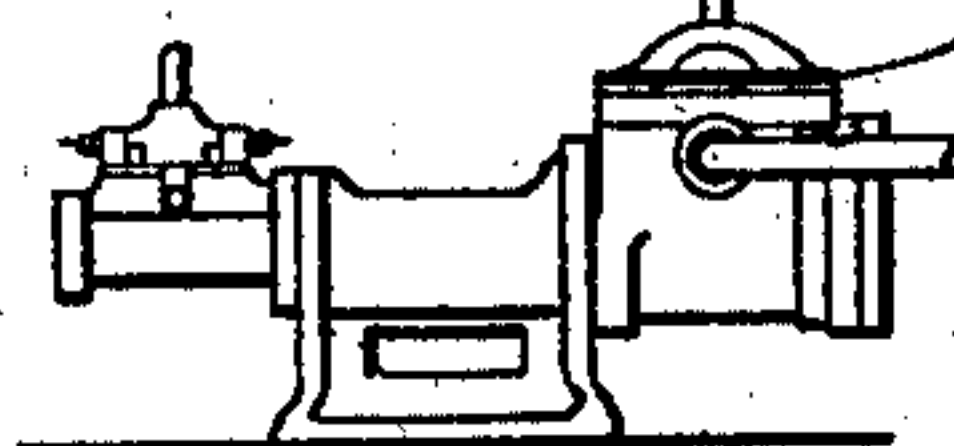
(Application filed Mar. 23, 1900.)

(No Model.)



WITNESSES

*Wm. L. Perry*  
*J. B. Kerr*



INVENTOR  
*C. H. Atkins*  
By *Ellis H. Perkins*  
ATTY



# UNITED STATES PATENT OFFICE.

CHARLES H. ATKINS, OF CHICAGO, ILLINOIS, ASSIGNOR TO WARREN WEBSTER, OF MERCHANTVILLE, NEW JERSEY.

## STEAM-HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 702,352, dated June 10, 1902.

Application filed March 23, 1900. Serial No. 9,860. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES HENRY ATKINS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Steam-Heating Apparatus, of which the following is a full, clear, and exact specification.

My invention relates particularly to steam-heating apparatus employing automatic valve devices to control the outflow of the air and water of condensation from a radiating device or through any pipe or passage. In such apparatus it has been proposed to employ in addition to the main outlet or thoroughfare controlled by the automatic valve a small auxiliary outlet or passage for the air, so that the air may escape or be drawn out if a vacuum or lower pressure is created on the discharge side when the main thoroughfare is closed. With such devices it is desirable that the escape of steam in any material volumes through the air passage-way should be prevented, and to this end it has been proposed to make the auxiliary air passage-way or outlet of restricted area; but such small passage-ways or outlets are liable to become clogged by small particles of foreign matter carried by the steam, and thus to be permanently closed and rendered useless.

It is the object of my invention to so construct the air outlet or passage-way that it will remain operative at all times for the discharge of air without liability of becoming clogged up and will effectively prevent the escape of uncondensed steam. This object I accomplish by interposing in the air passage-way or outlet a steam-barrier of porous material pervious to air, but impervious to uncondensed steam. Any material having the desired properties may be used for the steam-barrier; but I have found carbon, either in its solid integral condition or in comminuted form, to possess excellent qualities for the purpose. The barrier acts not only to prevent the escape or passage of uncondensed steam, but also as a filtrant.

In the drawings, Figure 1 is a vertical sectional view of an automatic valve device embodying my invention. Fig. 2 is a side elevation of the same with part of the casing

broken away. Fig. 3 is a horizontal section on the line 14 14 of Fig. 1. Fig. 4 is an elevation looking to the right of Fig. 1. Fig. 5 is a transverse section of the ball float-valve, and Fig. 6 is a diagram of a steam-heating apparatus embodying the invention.

While I have shown my invention applied to a "vacuum system," or one in which a partial vacuum or lower pressure is created in the return by a vacuum-pump or other exhausting device, my invention may also be employed in ordinary pressure systems, in which such means to assist circulation are not used.

My improved valve consists of a suitable valve casing or body having an inlet and an outlet for the passage of water of condensation, the thoroughfare through which is controlled by any suitable automatic valve, and an auxiliary air passage-way for the discharge of air independently of the operation of the automatic valve in which the steam-barrier is interposed. In the particular construction shown the valve-casing is composed of two parts 41 42, the lower part 41 of which is provided with an inlet 40 and an outlet 43, adapted to be connected, respectively, with the radiator-outlet 36 and the return-pipe 37. The outlet 43 communicates with the interior of the valve-chamber through a valve-seat 45, which is controlled by a ball float 51.

46 is a duct or passage-way leading through the side of the lower portion 41 of the casing and across the inlet 40 in the form of a small tube 47.

49 is a dome of carbon or other porous material fitting within the upper part 42 of the casing, seated at its lower edge upon a conical seat 50 on the part 51 and forming an air-space 48 between its outer surface and the inner walls of the casing-cap 42, with which space the tube 47 of the air-duct 46 communicates. It will thus be seen that the interior of the valve-chamber which communicates with the inlet 40 is formed by the lower part of the casing and the carbon dome 49, while the duct 46 has no direct communication with the interior of the valve-chamber, but leads to the space 48 between the dome and cap. The air and water of condensation



enter the interior of the valve-chamber through the inlet 40, and if sufficient water is not present to raise the ball-float 51 and open the thoroughfare 45 the air will pass or  
 5 be drawn out through the carbon dome or barrier 49 into the space 48 and thence through the tube 47 and duct 46 to the discharge-outlet 43. When water of condensation enters in sufficient quantities, it will lift  
 10 the float and be discharged. If at any time uncondensed steam passes into the valve-chamber, under which conditions the float will be closed, it cannot pass through the steam-barrier 49, but will be condensed in  
 15 the valve-chamber and pass out of the outlet 45 in the form of water of condensation when the ball-float 51 is lifted.

In Fig. 6 I have shown the valve device applied to a vacuum system in which it is connected with the outlets 36 of the radiators 34,  
 20 which are supplied with steam by the supply-pipes 35, and the outlets of the valve devices are connected with the suction-line 37 38, which leads to the pump or exhausting device 39. In such a system the ball-float  
 25 will remain closed until the buoyancy of the ball resting in water is sufficient to overcome the action of the vacuum-pump on the bottom of the valve and lift it from its seat.  
 30 This will not take place until the water has risen considerable distance around the float, and, as a consequence, the valve will open periodically and very suddenly, and this sudden movement will be effectual in carrying  
 35 off any scale or foreign substance which may have accumulated in the valve-chamber. This enables me to use a very small opening in the valve-seat 45 without danger of its becoming clogged, and consequently I am enabled to use a comparatively small valve.  
 40 As the buoyancy of the valve must be sufficient to overcome the suction of the pump 39 against its under side, it is desirable that the opening 45 should be comparatively small.

45 The valve 51 may be formed of a wooden or cork core or other suitable buoyant material, or even hollow, if desired, and coated with rubber or other suitable material, as shown in Fig. 5.

50 While I have illustrated and described this particular form of automatic valve and arrangement of the auxiliary air-duct, I do not mean to limit my invention thereto, as, broadly considered, it includes any form of automatic  
 55 valve controlled by the condition within the valve-body combined with an auxiliary air passage-way acting as a by-pass about the automatic valve in which is interposed a steam-barrier pervious to air, but impervious  
 60 to steam in the state of vapor.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. A relief-valve device for steam-heating apparatus, consisting of a valve-body provided with an inlet and an outlet, an automatic valve controlled by the conditions on

the inlet side of said valve-body to control said outlet, said valve device being provided with an air passage-way between the inlet and the outlet beyond the automatic valve, and a  
 70 steam-barrier interposed in said air passage-way and composed of porous material pervious to air and impervious to steam in a state of vapor, whereby the air may escape through  
 75 said steam-barrier and air passage-way independently of the operation of said automatic valve.

2. A relief-valve device for steam-heating apparatus, consisting of a valve-body provided with an inlet and an outlet, an automatic valve controlled by the conditions on  
 80 the inlet side of said valve-body to control said outlet, said valve device being provided with an air passage-way between the inlet and the outlet beyond the automatic valve, and  
 85 a steam-barrier interposed in said air passage-way and composed of porous material pervious to air and impervious to steam in a state of vapor, in combination with means to create  
 90 a partial vacuum or lower pressure in the outlet of the valve device, whereby the air may be drawn out through said steam-barrier and air passage-way independently of the operation of said automatic valve.

3. A relief-valve device for steam-heating apparatus, consisting of a valve-body provided with an inlet and an outlet, an automatic float-valve controlled by the water of  
 95 condensation on the inlet side of said valve-body to control said outlet, said valve device being provided with an air passage-way between the inlet and the outlet beyond the float-valve, and a steam-barrier interposed in  
 100 said air passage-way and composed of porous material pervious to air but impervious to steam in a state of vapor, whereby the air may escape through said steam-barrier and air passage-way independently of the operation of said automatic valve.

4. In a steam-heating apparatus, the combination of a steam-radiating device provided with an outlet, a return-pipe communicating with said outlet, means to create a partial vacuum or lower pressure in said return, an automatic valve to control the communication  
 110 between said radiator-outlet and the return, an air by-pass forming a communication between the radiator-outlet and the return beyond the said automatic valve, and a steam-barrier interposed in said by-pass between  
 115 the outlet of the radiating device and the return consisting of porous material pervious to air and impervious to steam in a state of vapor, whereby the air is drawn out of said radiating device through said steam-barrier  
 120 into the return without loss of uncondensed steam and the water of condensation may be discharged through said automatic valve.

C. H. ATKINS.

Witnesses:

EDNA B. JOHNSON,  
 F. A. HOPKINS.