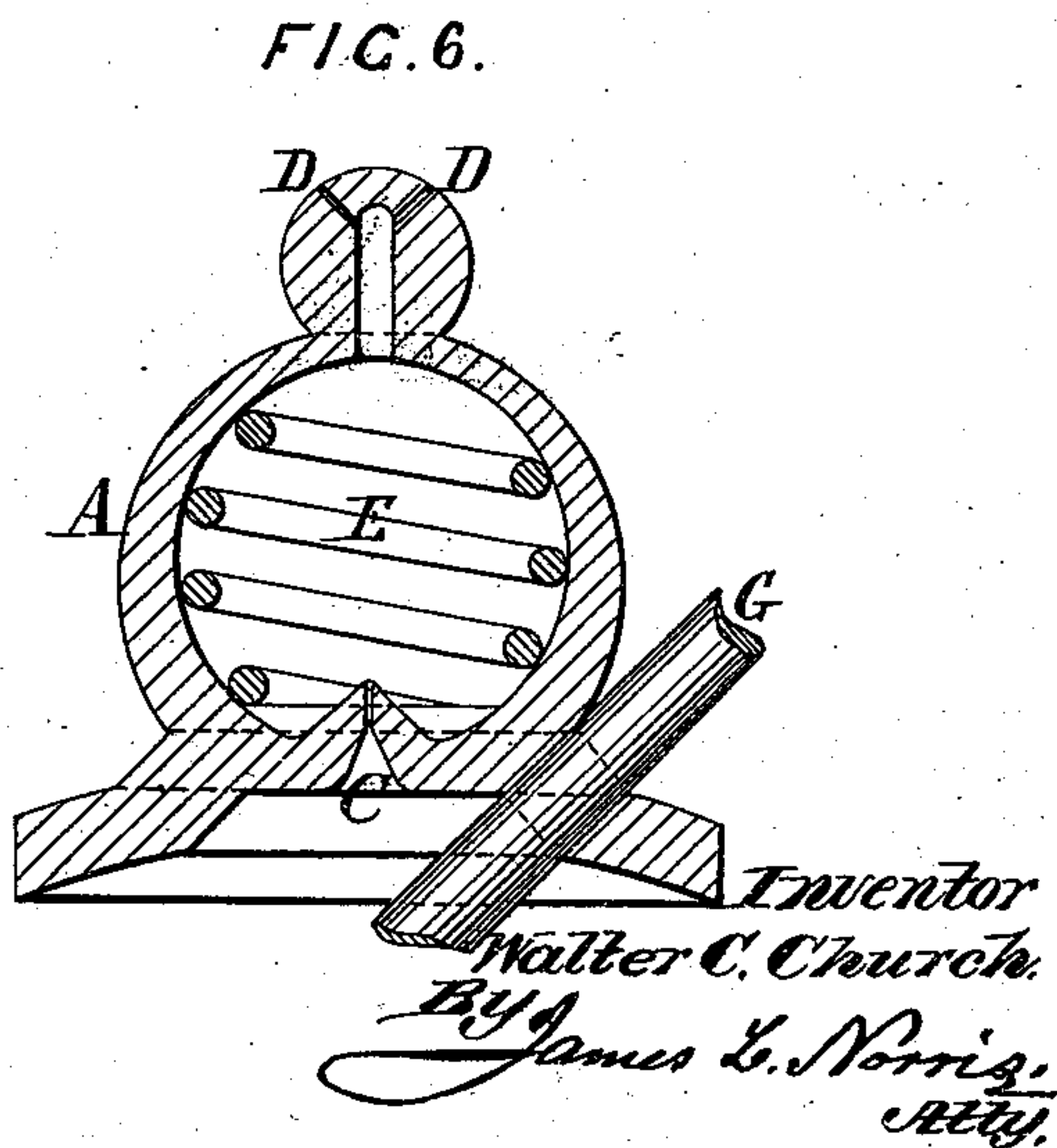
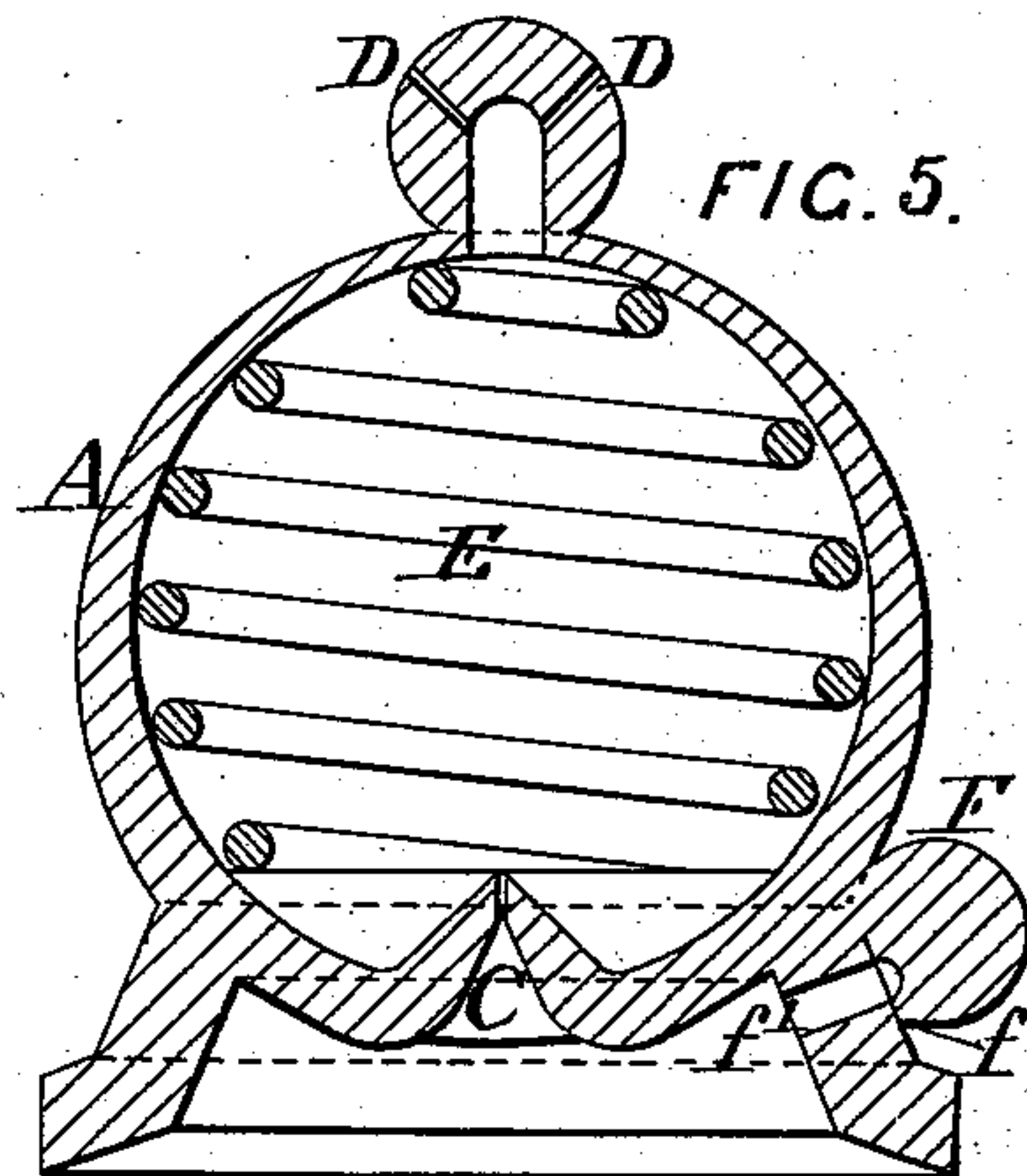
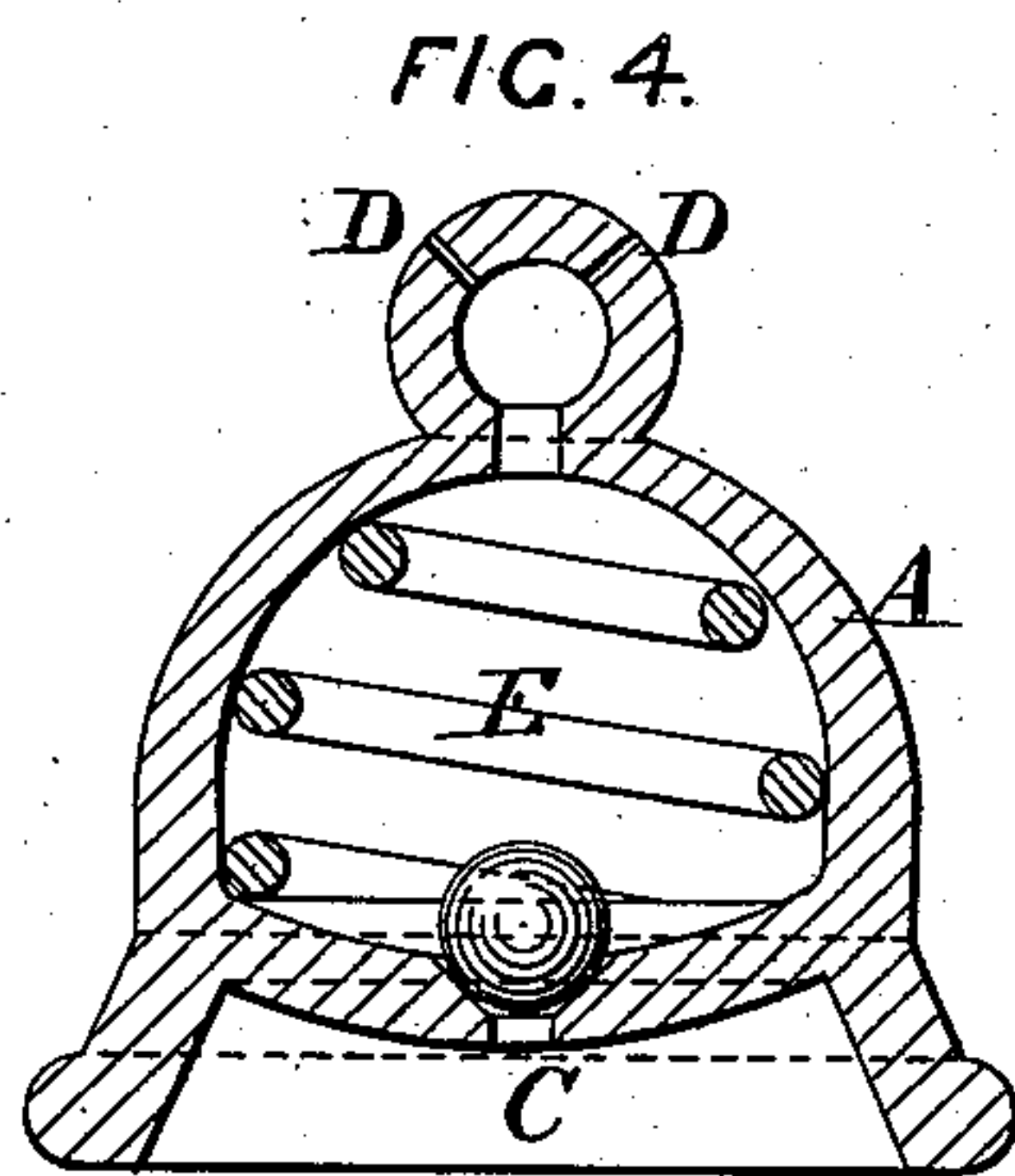
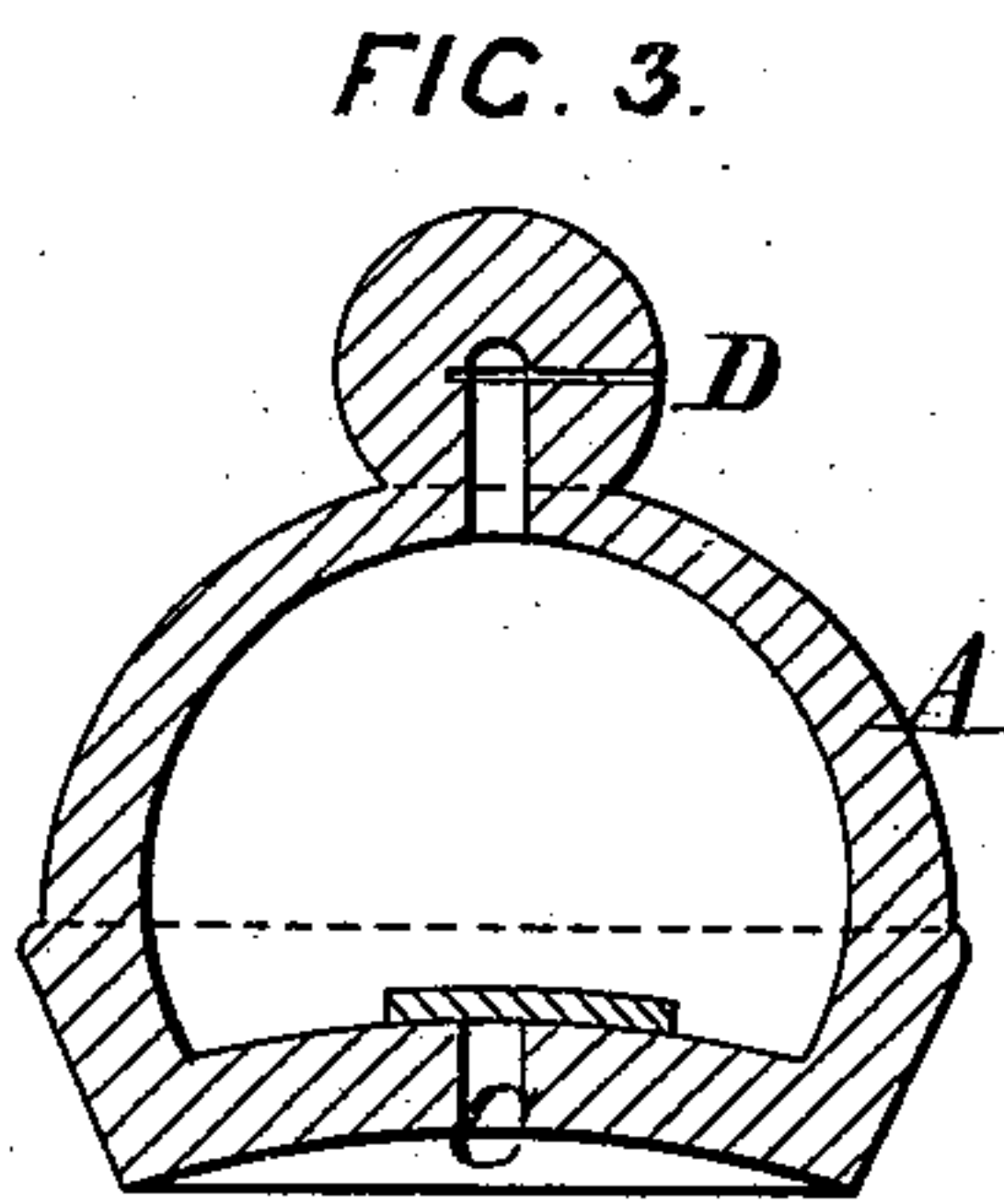
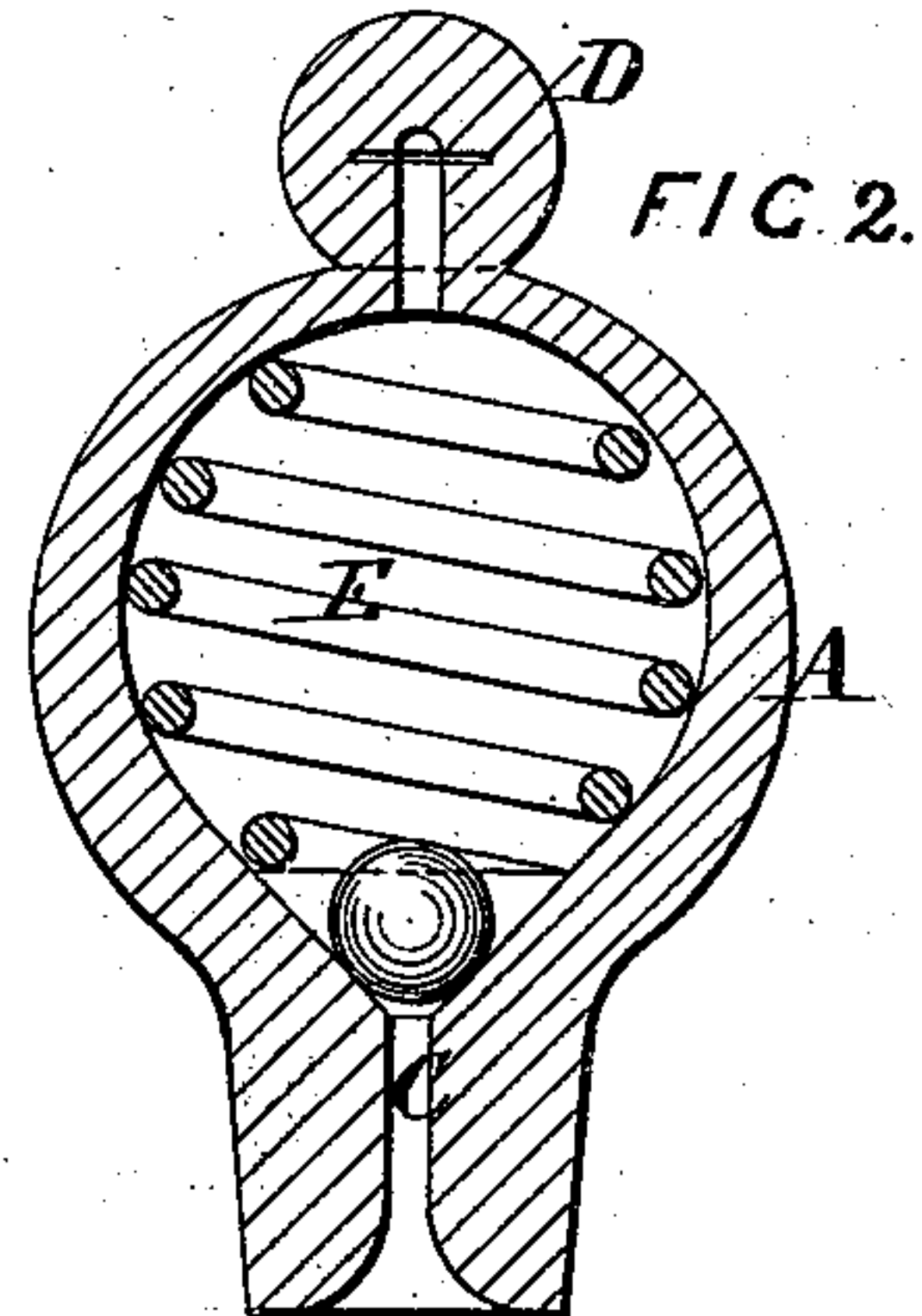
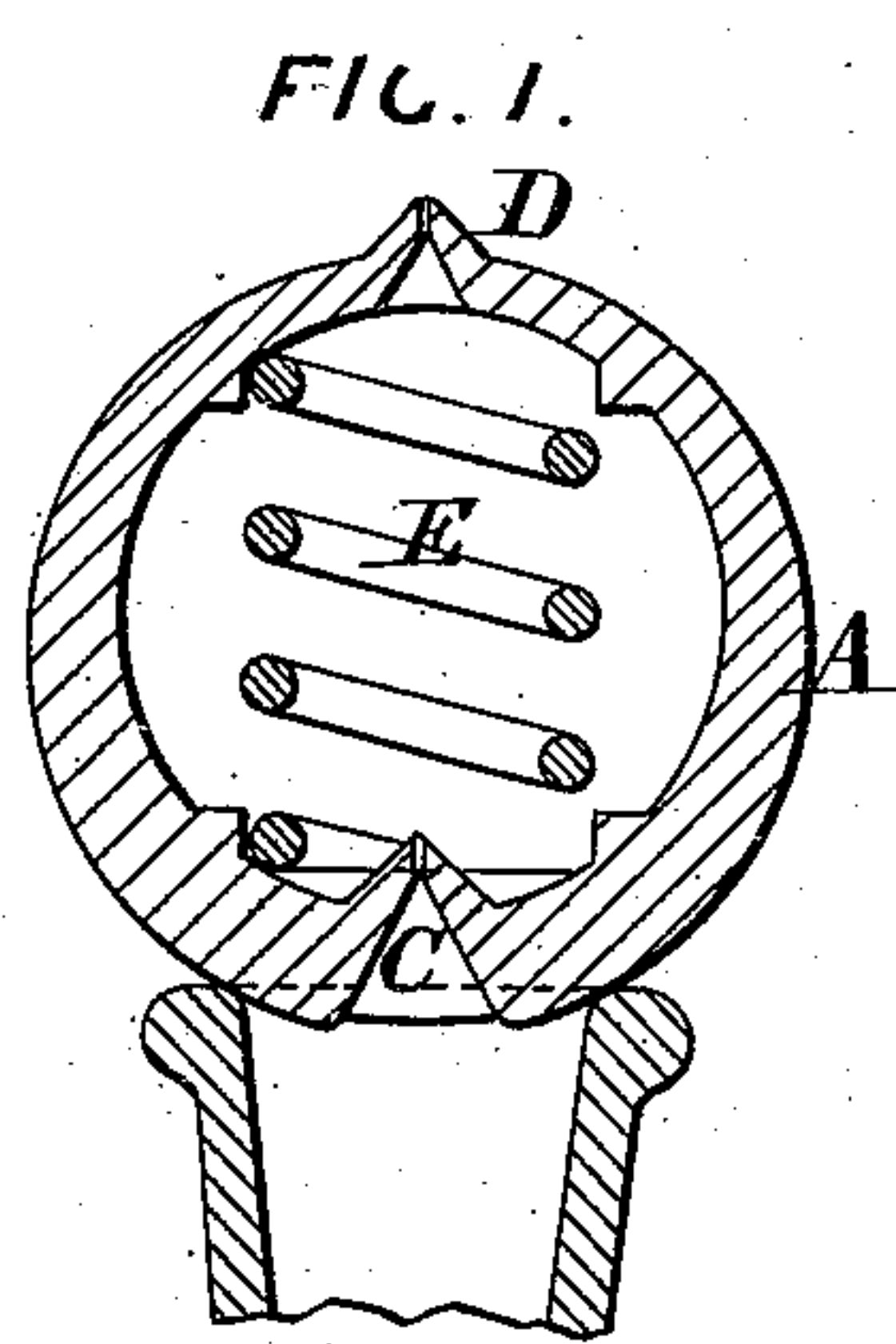


(No Model.)

W. C. CHURCH.
BOTTLE STOPPER.

No. 376,977.

Patented Jan. 24, 1888.



Witnesses
J. A. Rutherford.
Robert Everett.

Inventor
Walter C. Church.
By *James L. Norris,*
Atty.

UNITED STATES PATENT OFFICE.

WALTER C. CHURCH, OF BRIXTON, COUNTY OF SURREY, ENGLAND,
ASSIGNOR OF ONE-HALF TO HENRY SMITH, OF SAME PLACE.

BOTTLE-STOPPER.

SPECIFICATION forming part of Letters Patent No. 376,977, dated January 24, 1888.

Application filed October 25, 1887. Serial No. 253,352. (No model.) Patented in England January 12, 1887, No. 522.

To all whom it may concern:

Be it known that I, WALTER CHARLES CHURCH, a citizen of England, residing at 6 Trinity Square, Brixton, in the county of Surrey, England, have invented a certain new and useful Improvement in Stoppers for Bottles, Jars, and other Vessels, (for which I have obtained a patent in Great Britain, dated January 12, 1887, No. 522,) of which the following is a specification.

My invention relates to means of stoppering bottles, jars, and other vessels within which the pressure may be less than that of the external atmosphere without injury to the contents. For this purpose I make the plug or stopper wholly or partly of caoutchouc or equivalent elastic material, with a head in the form of a hollow ball or bulb, and with either a plug part to enter the mouth of the vessel or a hood to cover the mouth. In putting in or on the stopper I compress the bulbous head and thus force out the air through a hole at the top. Then on relieving the pressure on the bulb it dilates, causing a reduction of pressure within the vessel such that the superior external pressure, by forcing down the stopper, makes the closure tight. I make the elastic bulb with two apertures provided with valves, or made so as to act as valves, opening the one inward and the other outward. The bulb then, being compressed and allowed to dilate several times, acts as an air-pump, exhausting to a certain extent the vessel to which it is applied. When a considerable degree of exhaustion is desired, I place within the bulb a spring, which causes it to dilate even when the pressure within it is considerably below that of the atmosphere. When a stopper is used in this way, it is of advantage to provide it with a valve or aperture that can be opened, so as to admit air and relieve the pressure which holds it closed.

The stoppers, according to my invention, may be of various forms and proportions. I will describe several convenient forms as examples, referring to the accompanying drawings.

Figure 1 is a section of a stopper having a spring within its bulb and inlet and outlet valves. Fig. 2 is a section of a similar stop-

per with valves of a different kind. Fig. 3 is a section of a stopper with valves, but without spring. Fig. 4 is a section of a stopper with spring and valves and with a mouth to cover externally the vessel to which it is applied. Fig. 5 is a section of a similar stopper with additional valve to relieve pressure. Fig. 6 is a section of a stopper through which a stem passes—such, for instance, as a mucilage-brush.

The bulb A, Fig. 1, has slits cut at C and D through ridges of the elastic material, these operating as valves—C for suction and D for discharge. A spring, E, within the bulb causes it to expand after being compressed vertically. After placing the bulb on the mouth of a bottle or vessel, it may be compressed and released repeatedly, acting as a pump to exhaust the air in the vessel.

In the modified form, Fig. 2, the spring E is made nearly to fit the interior of the bulb, so as to dilate it in all directions. The suction-valve at C is a ball, and the discharge-valve consists of a slit at D, formed by passing a sharp blade transversely through the elastic head.

In the stopper, Fig. 3, the bulb is made with a base, which may be flat or somewhat hollowed out, as shown, to seat on the top of the vessel that is closed by it. The suction-valve at C is in this case a flap-valve, and the discharge-valve is a slit at D.

In the modified form, Fig. 4, the bulb has a base made as a mouth-piece, with lips to close over the mouth of a vessel. There is an internal spring, E, a ball suction-valve at C, and several slits at D to operate as discharge-valves.

The stopper shown in Fig. 5, besides having an internal spring, E, and suction and discharge valves C and D, has at the side of its mouth-piece a projection, F, which is partly severed by a cut at *f* across a small passage, *f'*. When by repeated compressions and dilatations of the bulb the air in the vessel is so far exhausted that it would require considerable force to remove the stopper, the projection F can be raised by the finger to admit air by the slit *f* and passage *f'* under the base of the bulb, whereupon the stopper can be readily

removed. Obviously a valve of any suitable form, or a plug, might be used for this purpose.

In Fig. 6 I have shown a stopper made in accordance with my invention, as above described, and provided with a brush—such, for instance, as a mucilage-brush—the stem or handle G of said brush passing through any suitable part of the stopper.

Although I have shown the springs E as placed within the bulbs A, they may be embedded in the material of the bulbs, and they may be introduced compressed to any desired extent, so as to cause forcible dilation of the bulbs.

Having thus described the nature of my invention and the best means I know of carrying it out in practice, I claim—

1. A stopper for a bottle, jar, or other vessel, consisting of an elastic hollow bulb having an inlet-opening in the portion to be applied to the vessel provided with a suction-valve,

and an outer opening from the bulb provided with a discharge-valve, substantially as described.

2. In combination with a hollow elastic stopper provided with suction and discharge valves, an opening at the base of the stopper having a movable closure for relieving pressure, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 10th day of October, A. D. 1887.

W. C. CHURCH.

Witnesses:

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