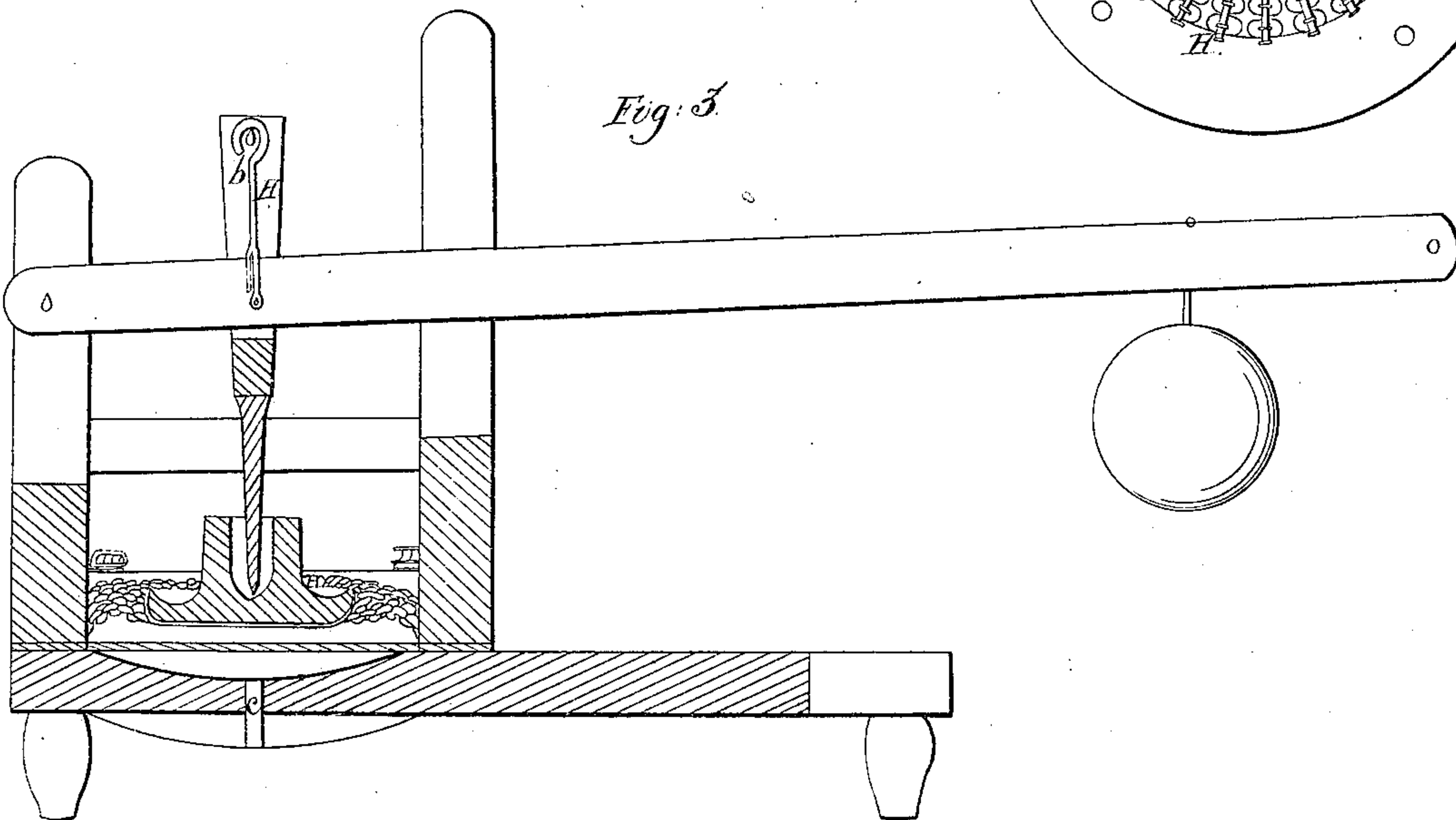
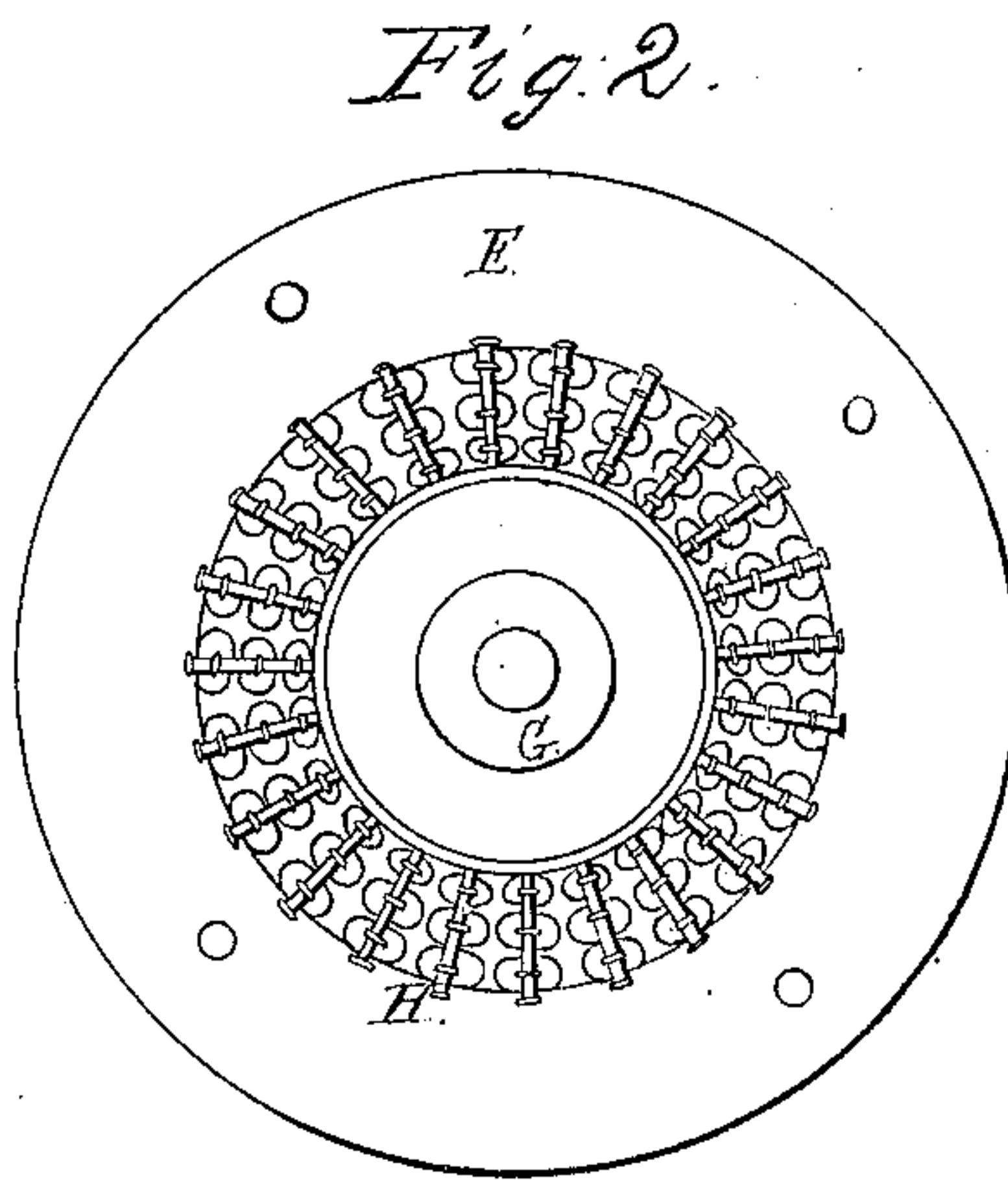
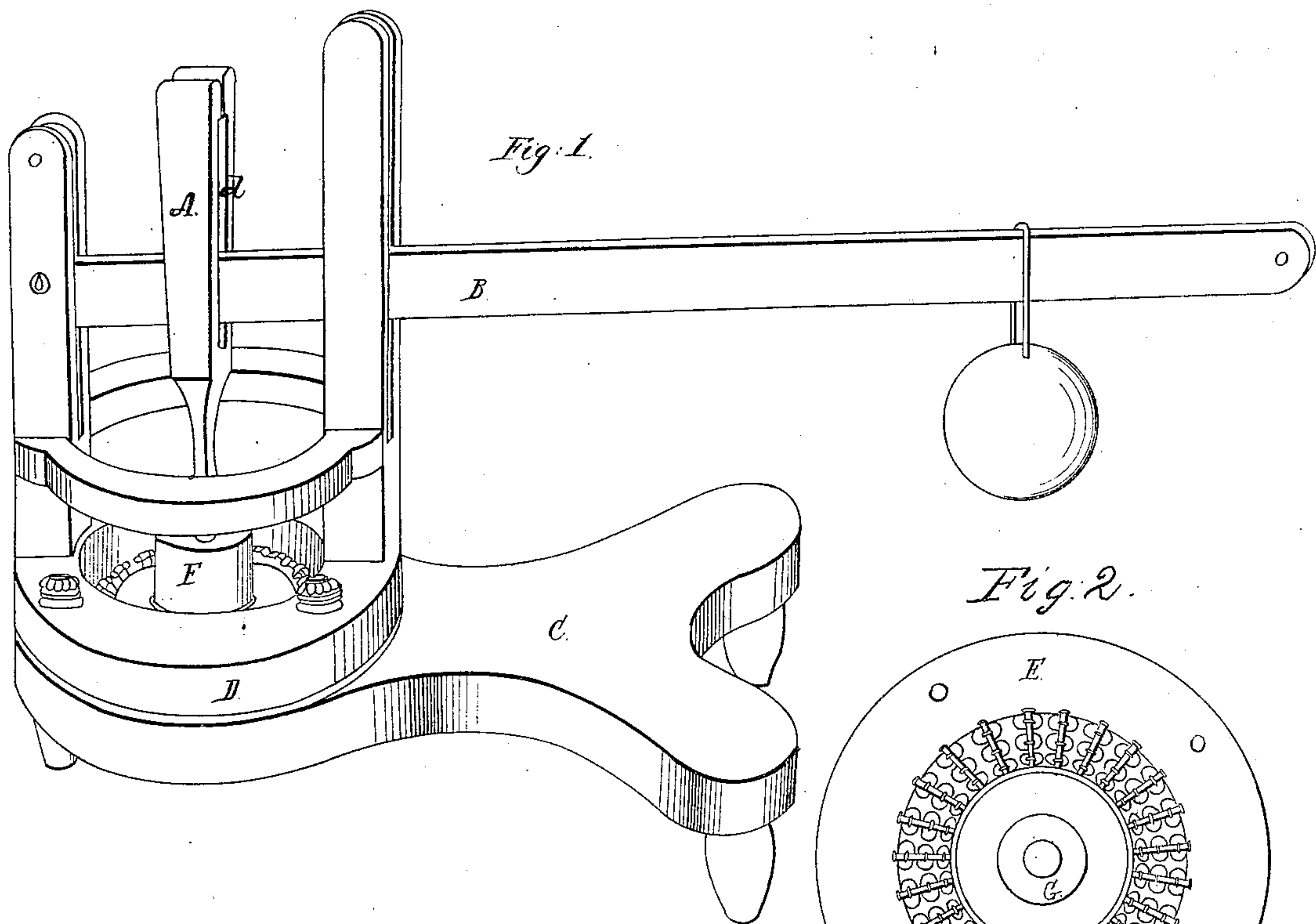


J. Woodruff.

Boiler-Furnace Draft-Regulator.

N^o 13711.

Patented Oct. 23, 1855.



UNITED STATES PATENT OFFICE.

JOSEPH WOODRUFF, OF RAHWAY, NEW JERSEY.

IMPROVEMENT IN ELASTIC-DIAPHRAGM STEAM-PRESSURE REGULATORS.

Specification forming part of Letters Patent No. 13,711, dated October 23, 1855.

To all whom it may concern:

Be it known that I, JOSEPH WOODRUFF, of the town of Rahway, county of Essex, and State of New Jersey, have invented a new and Improved Mode of Preventing the Diaphragms of Steam and Fire Regulators from Bursting; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of my invention consists in providing a metallic flexible support to a diaphragm of steam and fire regulators to prevent them from bursting, and at the same time being a guiding-support to the plunger and piston of said regulator.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

I use any of the known forms or construction of apparatus as constructed for the purpose of regulating the fire in steam-boilers by steam; but for the purpose of showing the practical operation of my invention I prefer the plan of the construction of that represented by Figure 1, having all the necessary appliances of guiding and regulating the piston and plunger, as shown by L A.

I construct the piston-rod A with slot *a*, extending up to bar *b*, as seen in Fig. 3, on which I hang yoke I by a proper balance beam and weight, as shown by letter B, with a bed-plate forming in part a platform or stand, as shown by C, through which is aperture *c*, Fig. 3, to admit the pressure of the steam, and a suitable curb for the application of a diaphragm, as shown by D.

Thus arranged, I will proceed to specify more particularly the nature of my invention by stating that I use any suitable material of which a diaphragm may be constructed. The cavity within the curb is formed by the bed-plate being made concave upon the upper side, corresponding in circumference with the inner side of the circumference of the curb. Between the curb and bed-plate I place a metal plate (or its equivalent) corresponding in form to the lower part of the curb, as shown by Fig. 2, letter E, beneath which I secure the outer edge of the diaphragm by compressing the curb and bed-plate by means of screw-bolts or their equivalents. The dia-

phragm is so arranged that when thus secured it is at the same time loose or sagging in its center, thereby producing the required space or cavity. The plunger, as represented by Fig. 1, letter F, as will be seen, is less in circumference than the diameter of the space between the curb and by this arrangement may be of any required size, so as to admit of more or less space between the curb and plunger, as may be desired. At the bottom part of the plunger is also secured another metallic plate corresponding in size to that of the plunger, as represented by Fig. 2, G. By this arrangement it will also be seen that a much larger space may be admitted between the inner edge of the curb and the outer surface of the plunger, thereby producing less liability of friction in its operation, and also imparting a greater degree of flexibility to the diaphragm. Thus by this arrangement a greater proportion of the surface of the diaphragm is exposed to its power of tension, and at the same time the plunger has no guiding-support.

For the purpose of securing the advantage of operating the plunger with the least amount of friction, and at the same time for the protection of the diaphragm from bursting, and by the same means also producing a guiding-support to the piston-rod and plunger, the lower end of said plunger or piston-head is made convex for the purpose of letting the piston-rod at its bearing-point in the piston-head be below the pressure of the steam on the diaphragm, thereby keeping it in a central position and allowing it to descend as far below the bottom of the curb as it rises above it. I construct chains made of suitable metallic plates or any other similar device answering the same purpose. I take a series of these chains and secure their one ends to the outer edge of plate G and their other ends to the inner edge of plate E, and thus forming a metallic net-work support to the diaphragm, which by its flexibility supports and sustains the diaphragm, and thereby prevents it from bursting, and also becomes a guiding-support to the plunger and piston. Thus when in operation these chains, while they form a net-work support to the diaphragm by their flexibility, vertically considered, and at the same time by their rigidity, laterally considered, become a guiding

and bracing support to the plunger and piston, as is more particularly shown by Fig. 2.

Fig. 3 represents a side view of the apparatus.

Having thus described the nature of my invention, I do not claim as new the convex or cup-edged piston, as it may have been used before; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

The chains II, as arranged in relation to

the cupped edge or convex surface of the piston for controlling and guiding the piston and keeping it in its central position without coming in contact with any substance to cause friction when operated upon by the diaphragm, as herein set forth.

JOSEPH WOODRUFF.

Witnesses:

MATTHIAS P. COONS,
GERRET ERKSON.