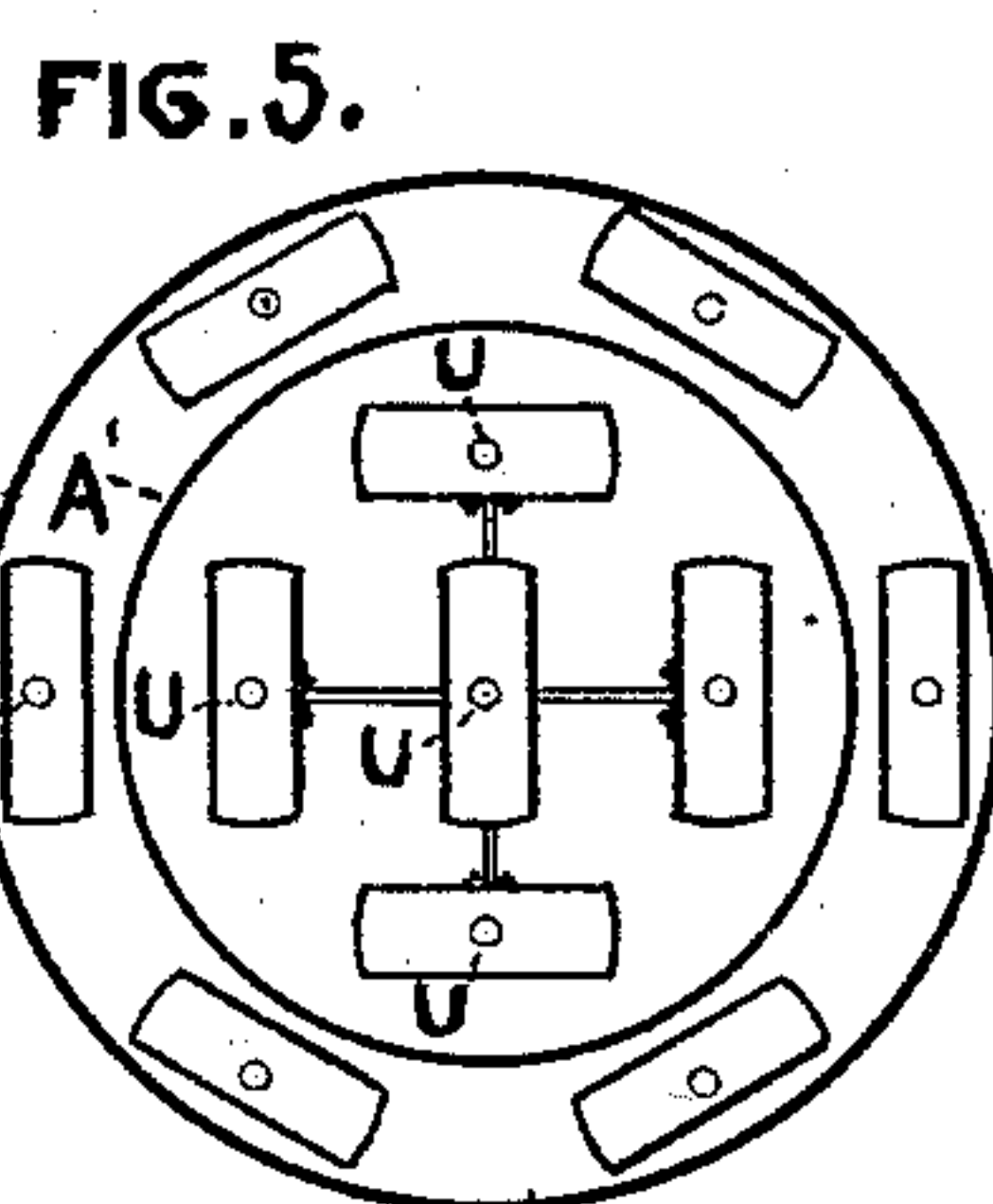
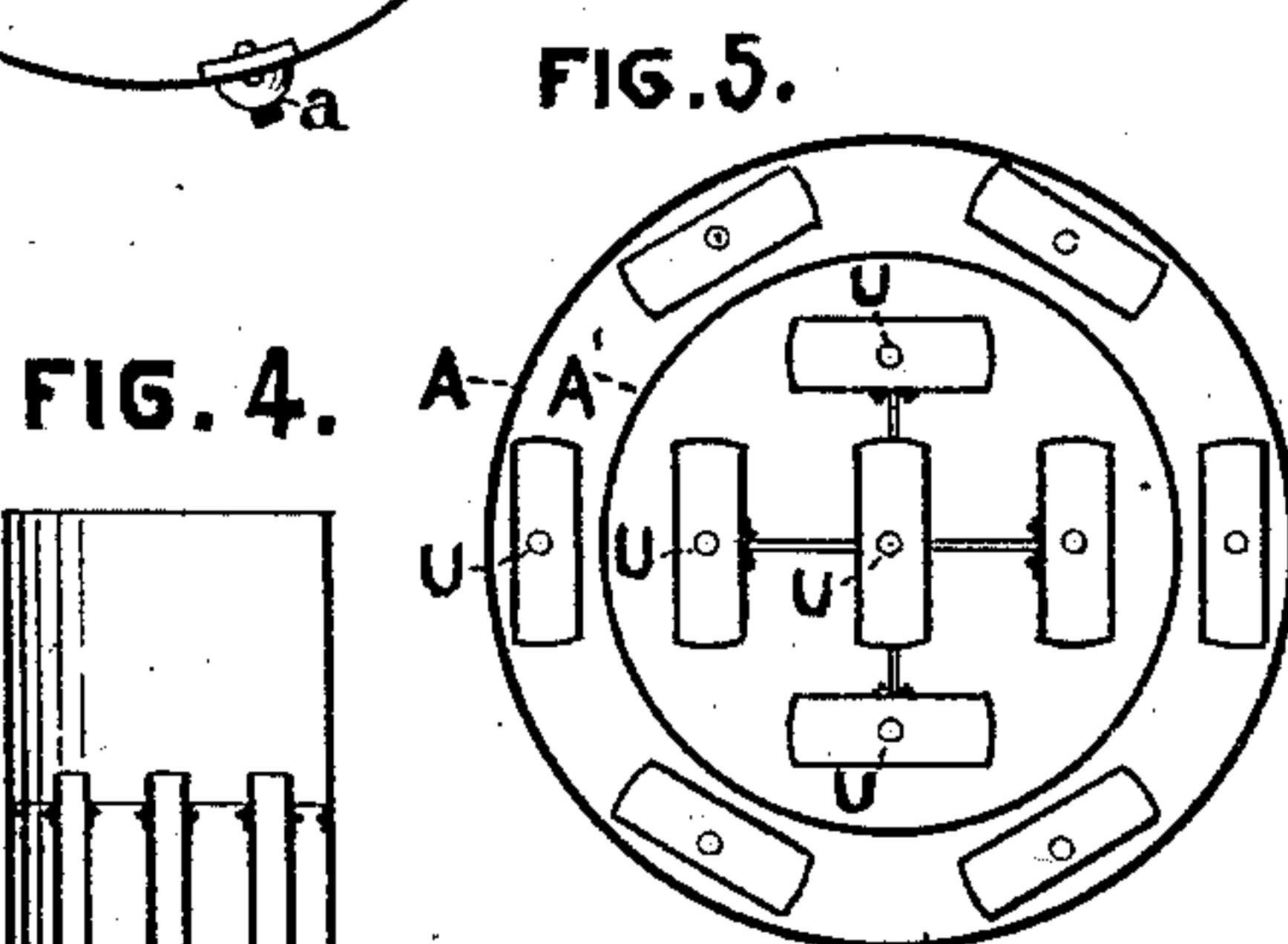
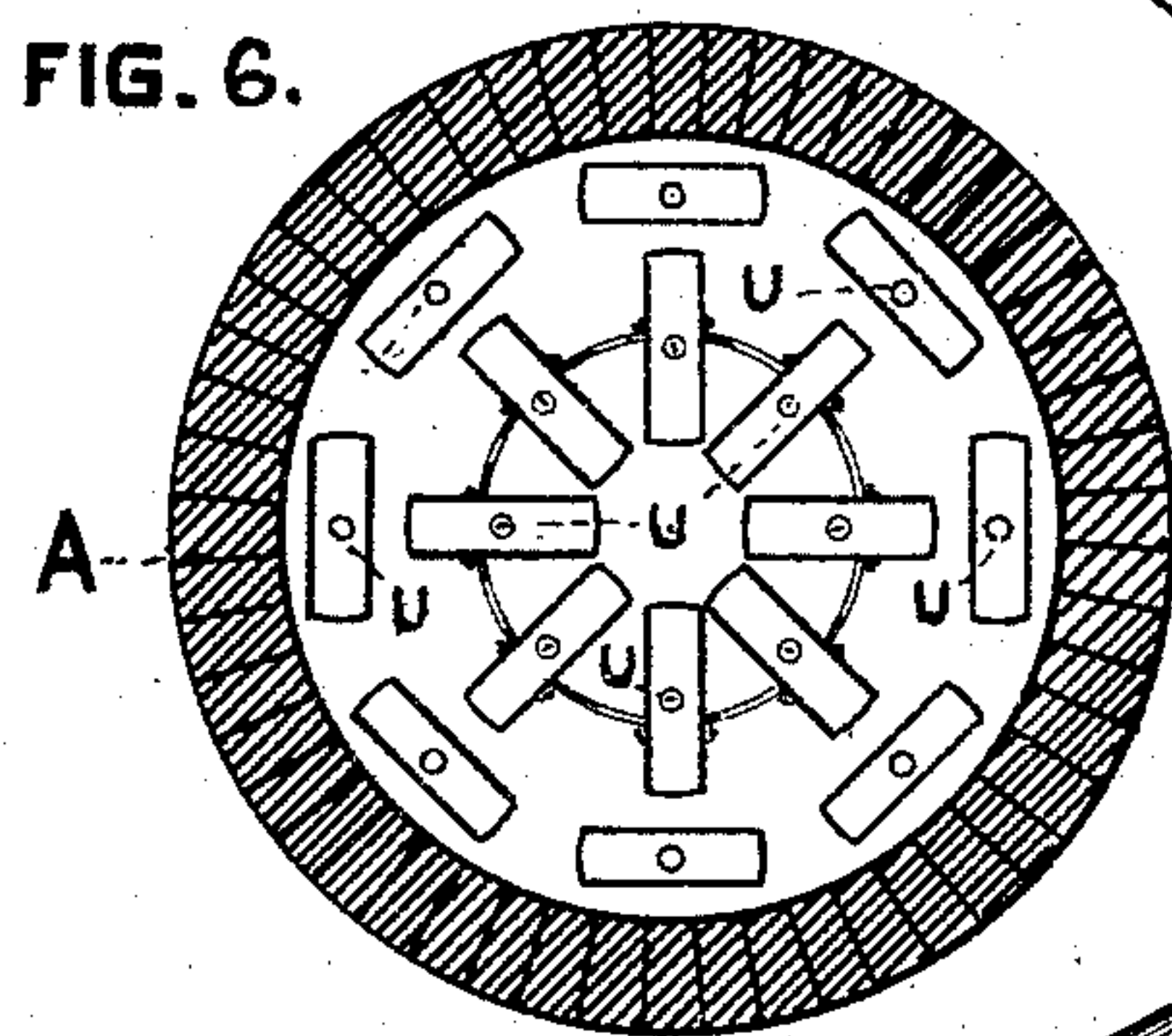
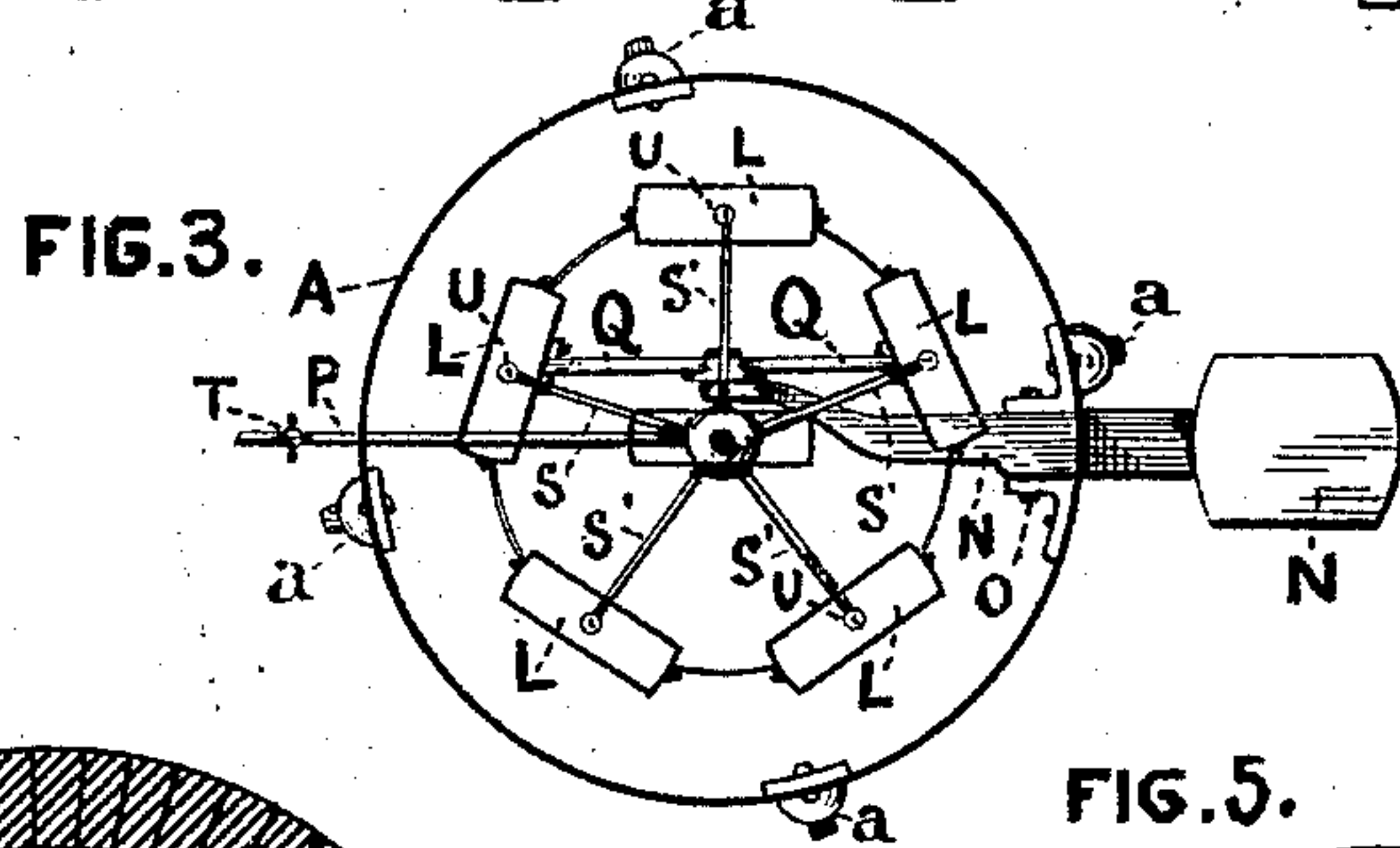
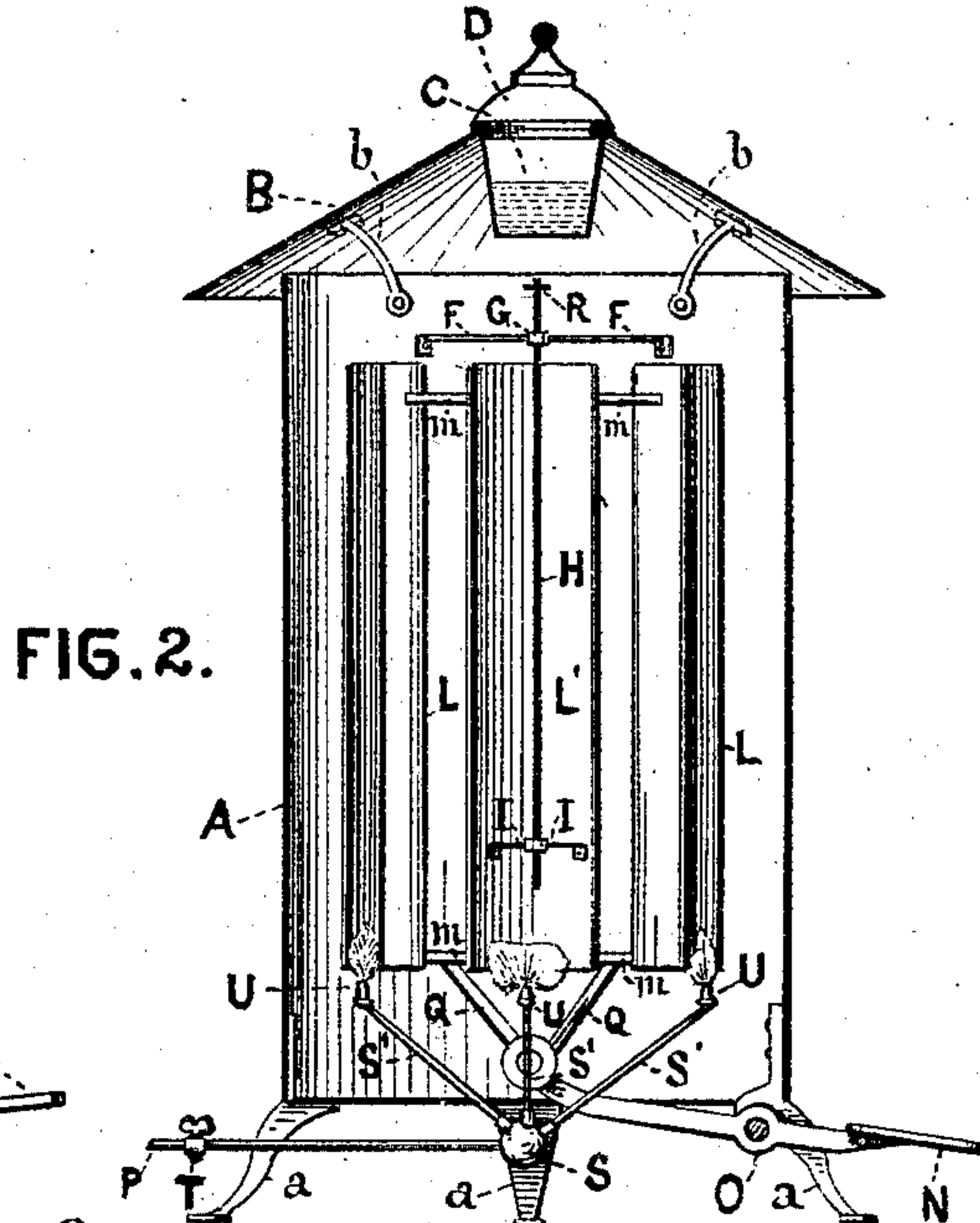
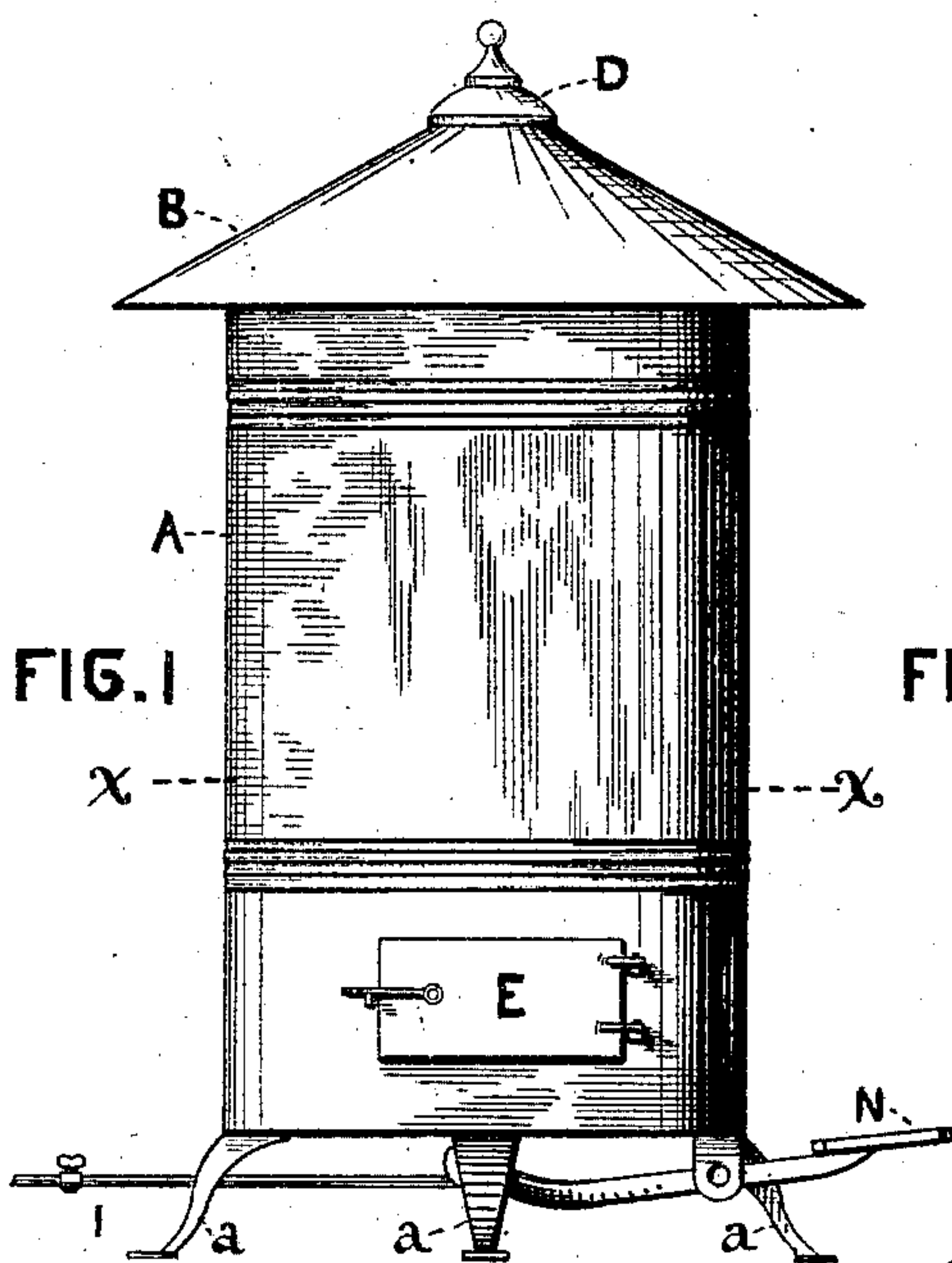


(No Model.)

J. W. BAKER.  
GAS BURNING STOVE.

No. 285,376.

Patented Sept. 25, 1883.



WITNESSES:

*S. H. Pool*  
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INVENTOR

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# UNITED STATES PATENT OFFICE.

JOHN W. BAKER, OF BALTIMORE, MARYLAND.

## GAS-BURNING STOVE.

SPECIFICATION forming part of Letters Patent No. 285,376, dated September 25, 1883.

Application filed December 12, 1882 (No model.)

*To all whom it may concern:*

Be it known that I, JOHN W. BAKER, of the city and county of Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Gas-Burning Stoves, of which improvements the following is a specification.

My improvements relate to that class of heating apparatus in which gas is burned to warm a room or building; and it is the object of my invention to adapt such apparatus to the use of hydrogen gas.

Heretofore gas has been burned in the open fire-place, or in inclosed chambers or stoves, or through wire-gauze, and in some instances reflectors have been arranged so as to better diffuse the directly-radiated heat from the jets; but all such uses are applicable only to the ordinary illuminating coal-gas, and the products of combustion of such gas being highly noxious, it could be burned only a very short time before the atmosphere of a room would become insupportable, or else provision must be made for carrying off the products of combustion, and this of course is attended with a large loss of caloric.

I have discovered that with suitable appliances hydrogen gas, on the contrary, can be burned without giving off any noxious products of combustion that will affect the atmosphere of an ordinary room or dwelling, and that I can, accordingly, utilize the concentrated heat resulting from the thorough combustion of this gas, diffusing it by indirect radiation, and so utilizing all of the heat given off by the flame. The requisites of what I have indicated as suitable appliances are: a series of burners arranged in a corresponding series of open tubes or chimneys inclosed in a surrounding casing or shell, also open at top and bottom, thus providing for the requisite supply and regulation of the heat, the requisite supply of drafts of air, and the requisite large surfaces for diffusing the heat by indirect radiation. In addition to this, I avoid any complication of the apparatus, and further provide a simple method of raising and lowering the tubes or chimneys when the jets are to be lighted, so that the management of the stove or heater requires only the most ordinary attention of even an ignorant domestic.

The gas-burners are of the ordinary kind—for example, fish-tail or bat-wing—provided with keys for reducing or enlarging the jet, as desired. The tubes or chimneys are of sheet metal, and have an oblong cross-section. They are open at top and bottom, and are arranged vertically around a common vertical axis—one tube over each burner—the burner being so adjusted that the width of the flame shall be parallel with the longest section of the tube, so that the draft of air induced through each tube will have free access to the flame on all sides. The casing or shell surrounds and incloses the tubes, and is also of sheet metal. It has a hood or cover above its upper end, but has an opening around the top and beneath the hood, through which opening the products of combustion and the heated air from the tubes and from the spaces between the tubes pour out into the room or rooms to be warmed. The shell or casing is supported upon feet or trivets of the ordinary form or kind, so as not to obstruct the free access of air beneath the shell. The burners are at the end of small pipes radiating from a common center, about which they are supported on suitable trivets, and to this center the gas is led by another pipe from the source of its supply, and thence distributed to the burners. This supply-pipe is to be fitted with a stop cock or valve to regulate the pressure. The tubes are connected together and supported by proper frames or trivets, corresponding to the supports of the burner, so that each tube fits over its corresponding burner, as already mentioned, and the supports of the tubes are further connected with a device hereinafter described, by means of which they can be raised above the burners and again lowered over them. A door or opening in the shell permits the introduction of a taper to light the gas when the tubes are raised for that purpose, the length of the shell or casing being such as to allow for this raising of the tubes to such an extent as will admit of the burners being fixed at some little distance above the bottoms of the tubes when in their operative positions.

In the accompanying drawings, which form part of this specification, I have shown my improved apparatus in such detail as will en-



able any one skilled in the construction of gas-burning stoves to make and use my invention, and also showing my contemplated mode of heating rooms on different floors of a dwelling from one stove.

Figure 1 is an exterior view in elevation of the stove. Fig. 2 is a vertical section through the center of the same. Fig. 3 is a horizontal cross-section through the line  $x x$  of Fig. 1. Fig. 4 is a vertical elevation of a modification of stove for heating separate floors. Fig. 5 is a horizontal cross-section through the plane  $y y$  of Fig. 4, on an enlarged scale, and showing the arrangement of the tubes in such modification; and Fig. 6 is a sectional plan view, showing the arrangement of the tubes in another modification of my invention, being a furnace for heating on a large scale.

An outer casing, A, Fig. 2, or casings A A', Fig. 4, open at top and bottom, is or are supported upon feet  $a a a a$ , and surmounted by a conical hood, B, Figs. 1 and 2, which in turn is supported upon the outer casing by feet  $b b$  in such manner as to leave an annular space between said hood B and outer casing, A. In the upper part of the hood a cup-shaped depression, C, may be formed, so as to allow of placing water therein for evaporation, and the cover D, which may be of any ornamental design, is fitted to close the cup when so desired. The outer casing, A, is also provided with a door, E, for the purpose of affording access to the burners to light them. From the inside face of the outer casing A arms FF, riveted thereto, extend radially toward the center, and are screwed into or otherwise rigidly attached to a small ring, G, serving as a guide for the rod or central stem, H, said rod being rigidly connected, by means of rods II I I, to the central tube, L', of the series L L L L L, placed symmetrically around the central tube, L', to which it is also rigidly attached by means of the stems  $m m m m$ , the stem H and the tubes L' L L L L L thus forming one entire and rigid piece.

A lever, N, pivoted at O and supported by an eye cast with one of the feet of the outer casing, A, or riveted to the outer casing itself, is terminated at its outer end with a pedal or handle, and is connected by means of the rods Q Q with the lower end of the open tubes L L L L L, so that by bearing upon the pedal extremity of the lever the whole series of tubes can be raised, and can be depressed by relieving the pressure on the pedal, being retained in their central position by the stem H, and being prevented from descending beyond a certain point by a stop, R, upon the upper end of the rod H. A tube, P, provided with a stop-cock, T, leading from a main or reservoir, conveys the hydrogen gas to a central chamber, S, from which radiating arms S' S' S' S' lead to burners U U U U, each burner being inside one of the tubes L L L L L, and at such a level that when the tubes are raised by the action of the lever N the tips of the

burners will be exposed and readily accessible from the door E, so that they may be quickly and easily lighted, thus avoiding any danger of accident by explosion arising from the accumulation of gas which might otherwise form in the tubes before the burners could be reached.

When it is desired to heat more than one floor from a single apparatus, an arrangement, as shown in Figs. 4 and 5, is employed in which a double series of tubes is used, the outer series serving to heat the lower apartment and the inner series the upper. A third inner series on the same principle could heat a third floor. Provision for elevating and depressing the tubes similar to that already described must also be made in this case.

Large furnaces for heating entire buildings from the basement may be constructed after the plan of which a horizontal section is shown in Fig. 6.

In order to ignite the gas, the door E of the outer casing is opened, the lever N depressed, thus raising the tubes and exposing the burners, the stop-cock T is opened, the gas ignited, and the lever depressed, thus lowering the tubes L L L L L over the flame, and the door E is closed. The tubes L L L L L become almost instantaneously hot, and throw out a volume of heat, which is absorbed by the air in the tubes and between them inside the outer casing. This heated air rises and escapes into the room through the annular opening at the top, and is constantly renewed from below.

As has been already stated, the heat derived from the combustion of hydrogen gas is the most intense and concentrated, and in order to diffuse it properly it is necessary to surround it with, or to have adjacent to the flame produced by said combustion, some good conducting material—such as sheet-iron, for instance—presenting an extensive radiating-surface, thus enabling the heat, through this indirect radiation, to be diffused economically. This result is attained by the employment of the tubes L' L L L L L L, which also serve to promote the draft, thus supplying the hydrogen with a sufficient quantity of oxygen for its perfect combustion. The tubes soon attain a high degree of heat, which they communicate to the air inclosed in the outer casing, and which, expanded by the heat, rises and escapes, together with the heated products of combustion, from under the hood B. The products of combustion, when hydrogen gas is employed, are chiefly the vapor of water and the heated nitrogen, (and with a very small proportion of carbonic acid left free,) which escapes, with the hot air, from the top of the stove or furnace. These products are innocuous, the nitrogen and carbonic acid being reabsorbed into the atmosphere, while the water derived from the union of the hydrogen and oxygen tends to maintain the air of the room or building at a proper degree of moisture, so that from a hygienic point of view there is no objection to the discharging of the products



above mentioned freely into an apartment to which there is always more or less access of fresh air from doors or windows.

I do not limit myself to the peculiar construction shown in the drawings, as I can construct a stove or heater in which the tubes would be laid horizontally or at angle to the horizon; or the gas might be consumed in a coil or between vertical plates; but the principal point of my invention consists in burning hydrogen gas in such a position relatively to a flat conductive and radiating surface as to afford opportunity for the indirect radiation of the heat produced by said combustion, and the tubular form having proved itself the most advantageous for that purpose, I have shown in the drawings an arrangement with such tubular attachment.

I am aware that it has been proposed to burn coal-gas or hydrocarbon vapor in open-ended tubes, and to make such tubes adjustable relatively to their burners, and do not broadly claim such process or apparatus; but, so far as I am aware, I am the first so to arrange such tubes around a common center that they can all simultaneously be adjusted relatively to their respective burners by one movement of a single instrumentality.

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, substantially as hereinbefore set forth, of a series of tubes or chimneys, means for raising and lowering all the tubes simultaneously by one movement of a single instrumentality, and a series of burners relatively to which the tubes are movable to afford access thereto.

2. The combination, substantially as hereinbefore set forth, of an open-ended outer shell or casing, a series of open-ended tubes or chimneys therein, means for raising and lowering all the tubes simultaneously by one movement of a single instrumentality, a series of burners

relatively to which the tubes are movable to afford access thereto, a gas-supply pipe leading to a central chamber, and pipes connecting said chamber and burners.

3. The combination, substantially as hereinbefore set forth, of an open-ended outer shell or casing, a series of open-ended tubes or chimneys, means for raising all of said tubes simultaneously by one movement of a single instrumentality, guides to control the longitudinal movements of said tubes, and a series of burners relatively to which the tubes are movable to afford access thereto.

4. The combination, substantially as hereinbefore set forth, of a double concentric-walled open-ended casing, a series of open-ended tubes or chimneys in the central chamber of said casing, a second series of such tubes between the inner and outer walls of the casing, a gas-supply pipe leading to a central chamber, and pipes leading from the chamber to each burner—one for each tube or chimney.

5. The combination, substantially as hereinbefore set forth, of a short open-ended outer shell or casing, a corresponding long inner shell or casing; a series of long open-ended central tubes or chimneys inclosed in the inner casing, a corresponding series of short open-ended tubes interposed between the casings, a gas-supply pipe, and a series of burners—one for each tube—whereby different floors may be heated from a single heater.

6. The combination, substantially as hereinbefore set forth, of a casing, open-ended tubes inclosed therein, a frame connecting the tubes, guides on which they slide, a stop to limit their movement, and a pedal-lever pivoted on the casing to raise or lower the tubes relatively to burners radiating from a central gas-chamber.

JOHN W. BAKER.

Witnesses:

J. WALTER DOUGLASS,  
WILLIAM W. FARR, Jr.