

JOHN H. BURTIS.

Improved Fire Place Heater

Sheet 1.

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PATENTED JUL 4 1871

Fig. 1.

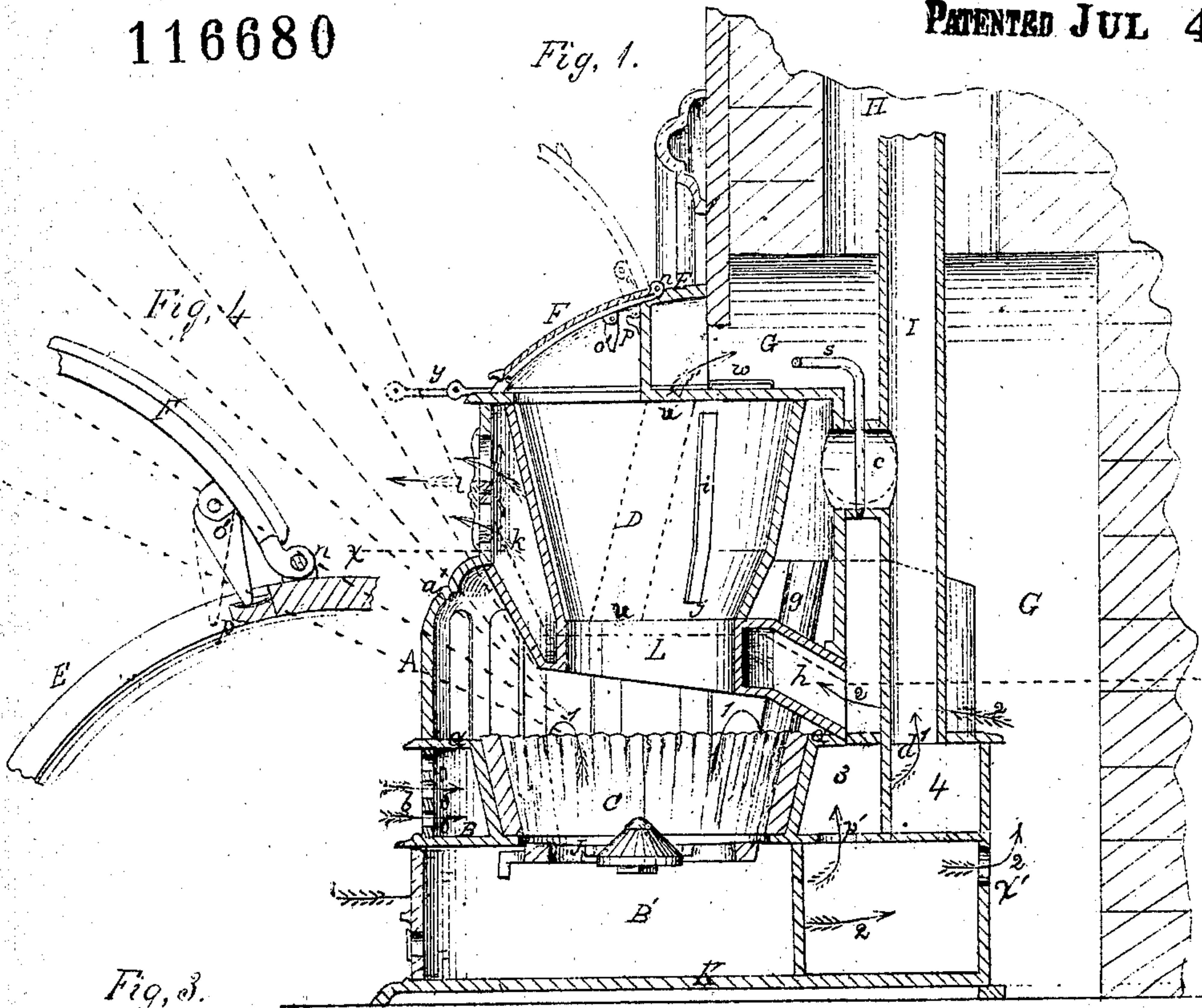


Fig. 3.

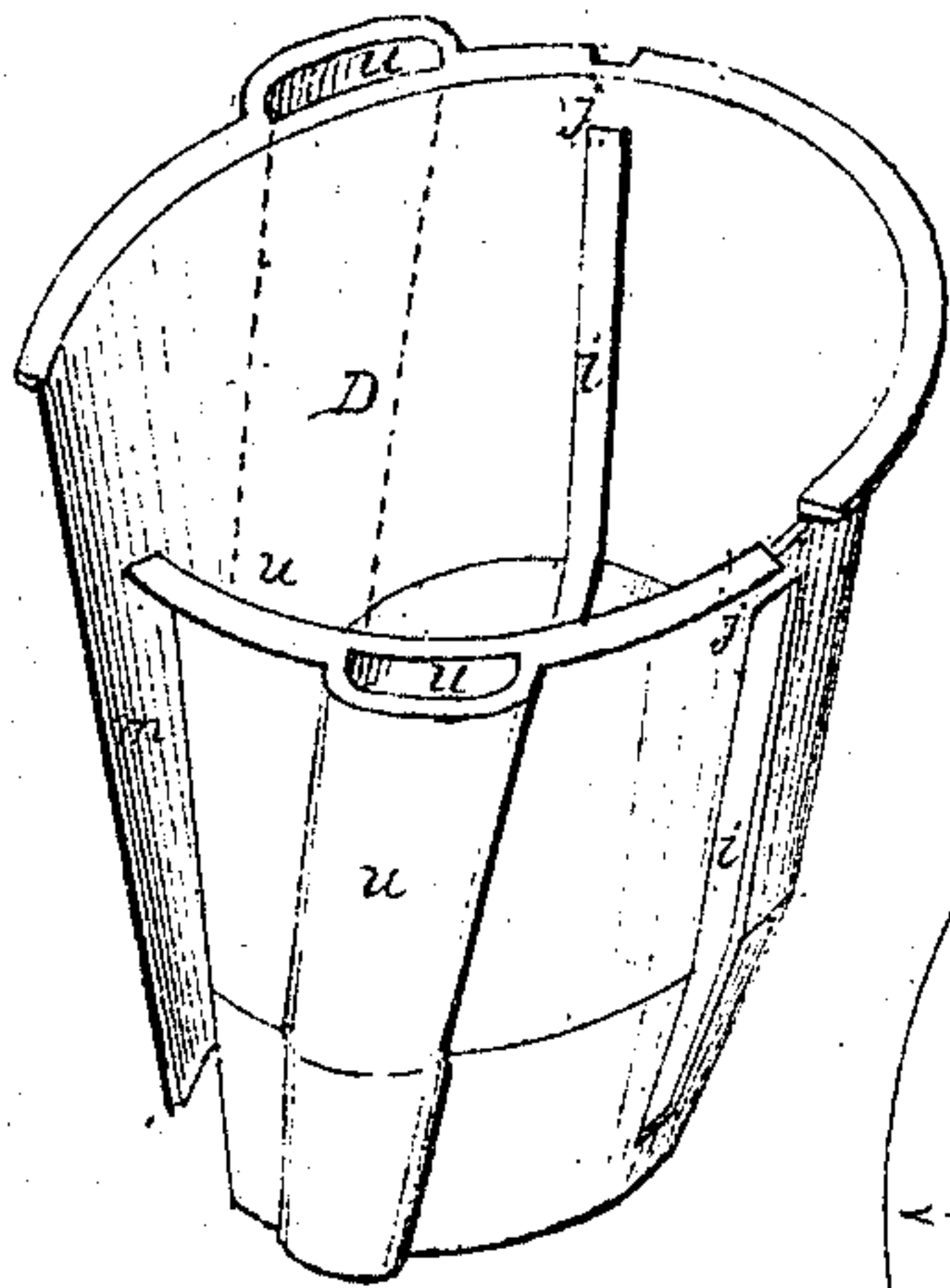


Fig. 2.

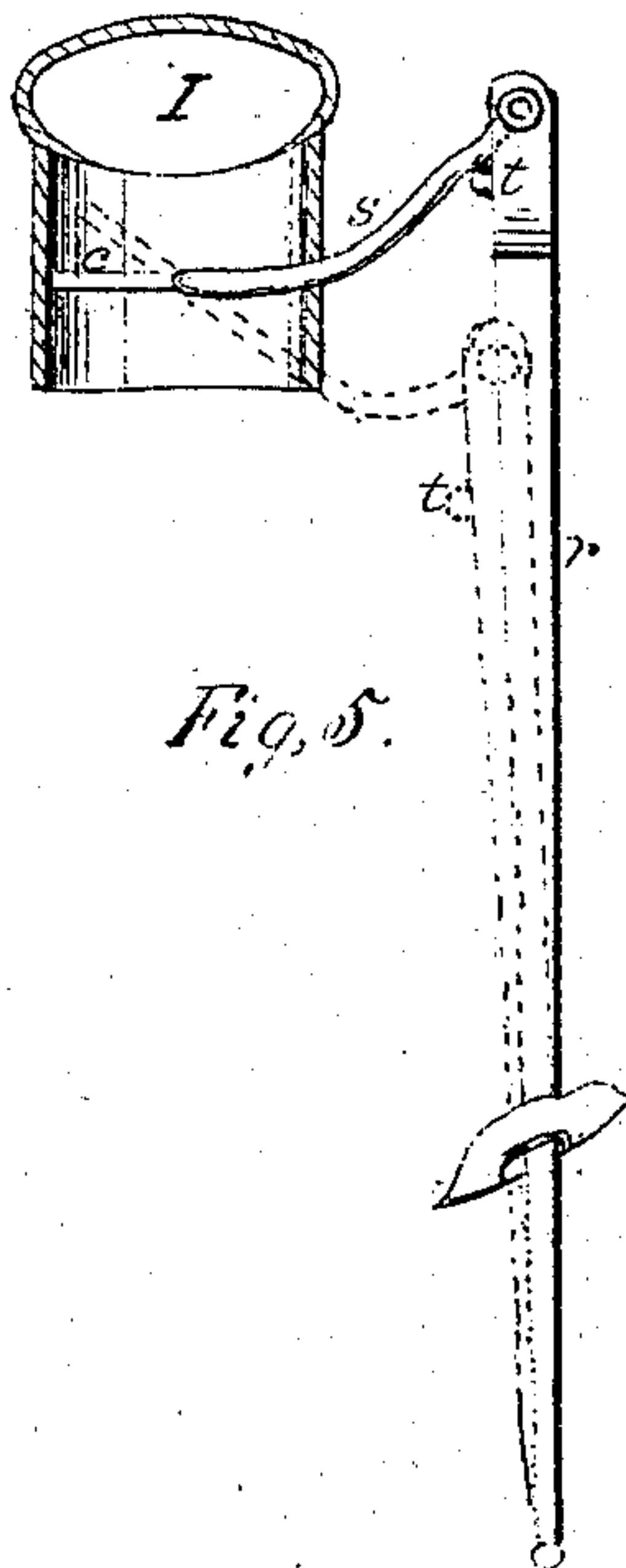
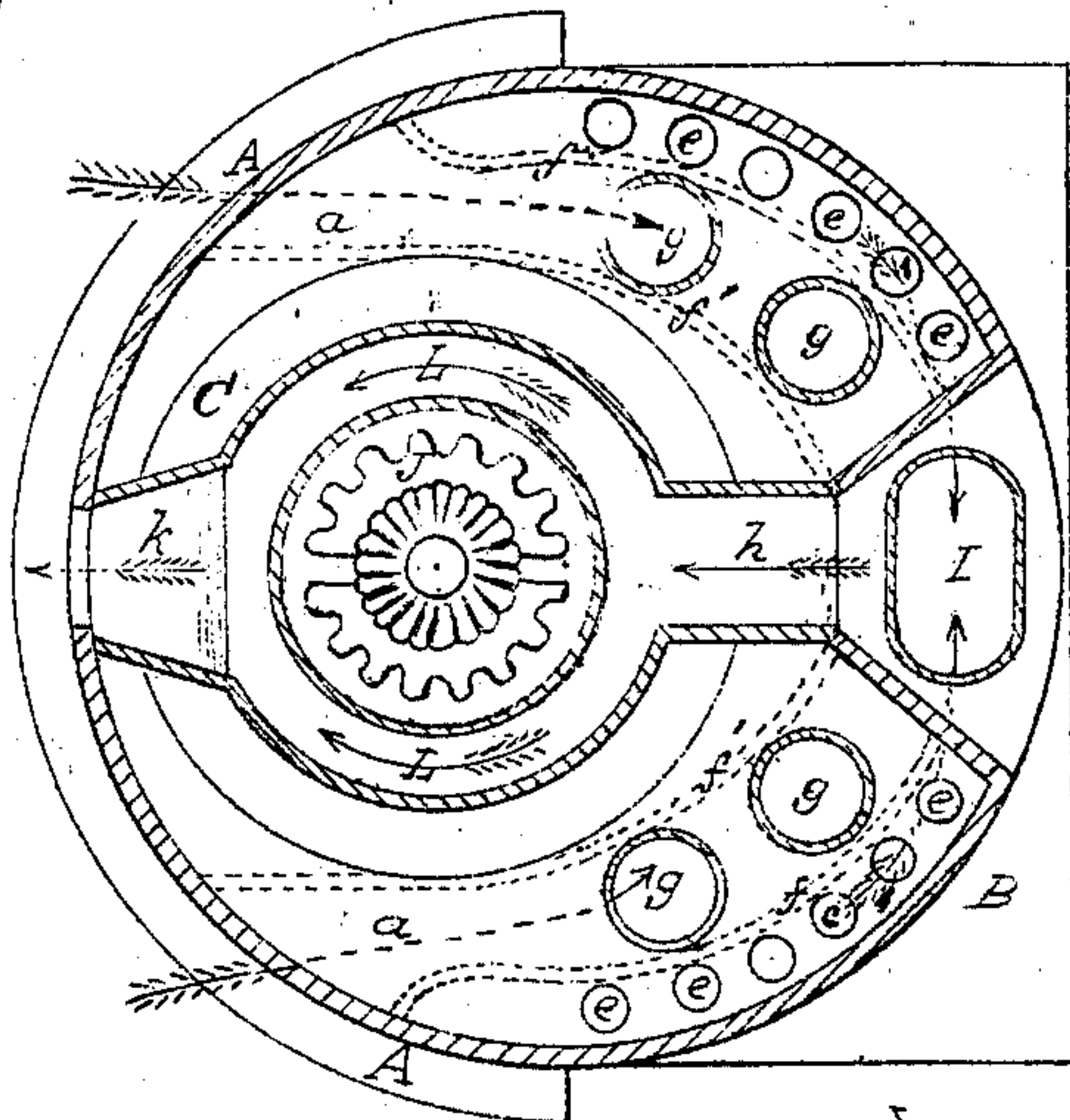


Fig. 5.

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JOHN H. BURTIS.

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Sheet 2.

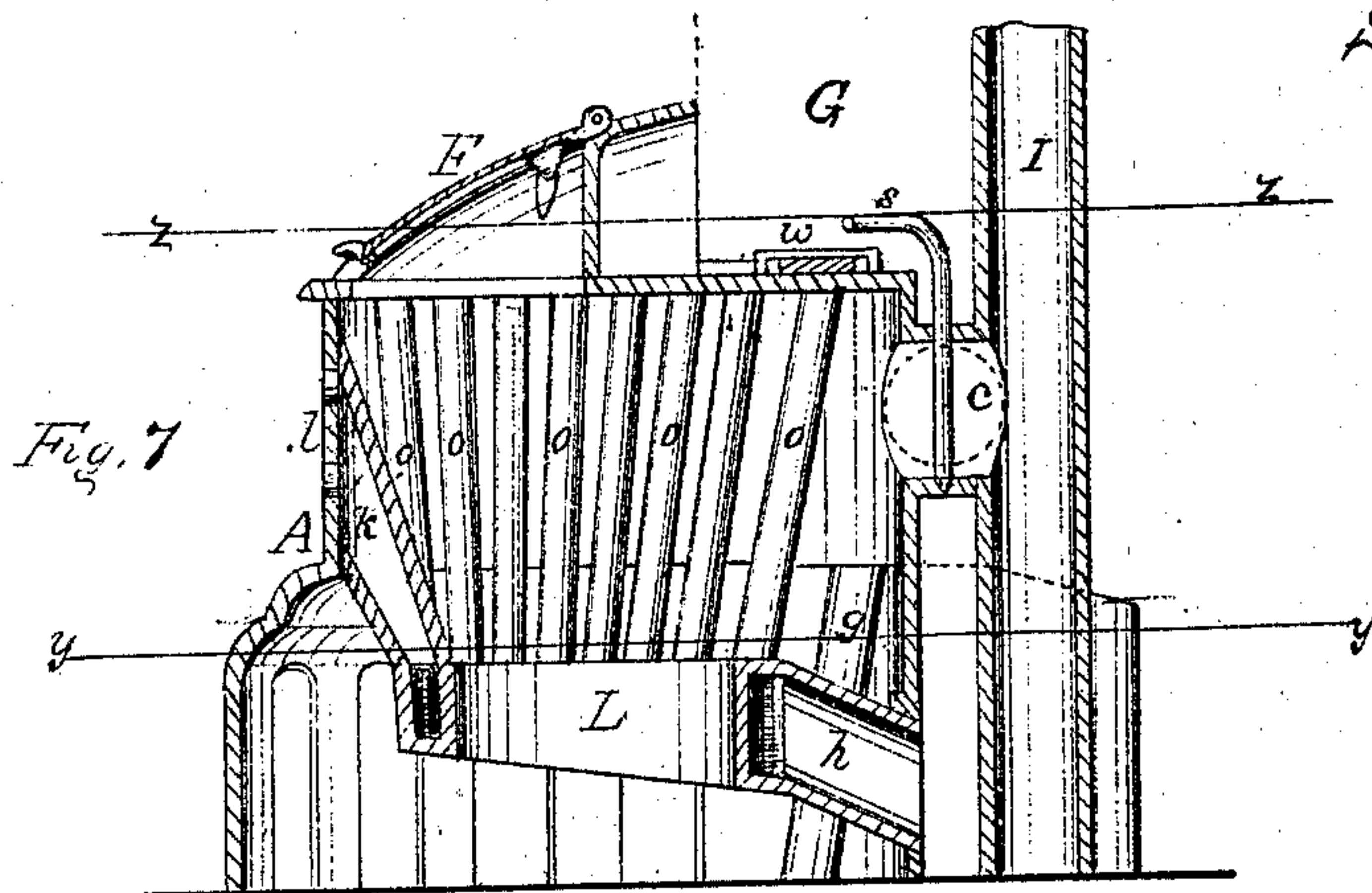


Fig. 6.

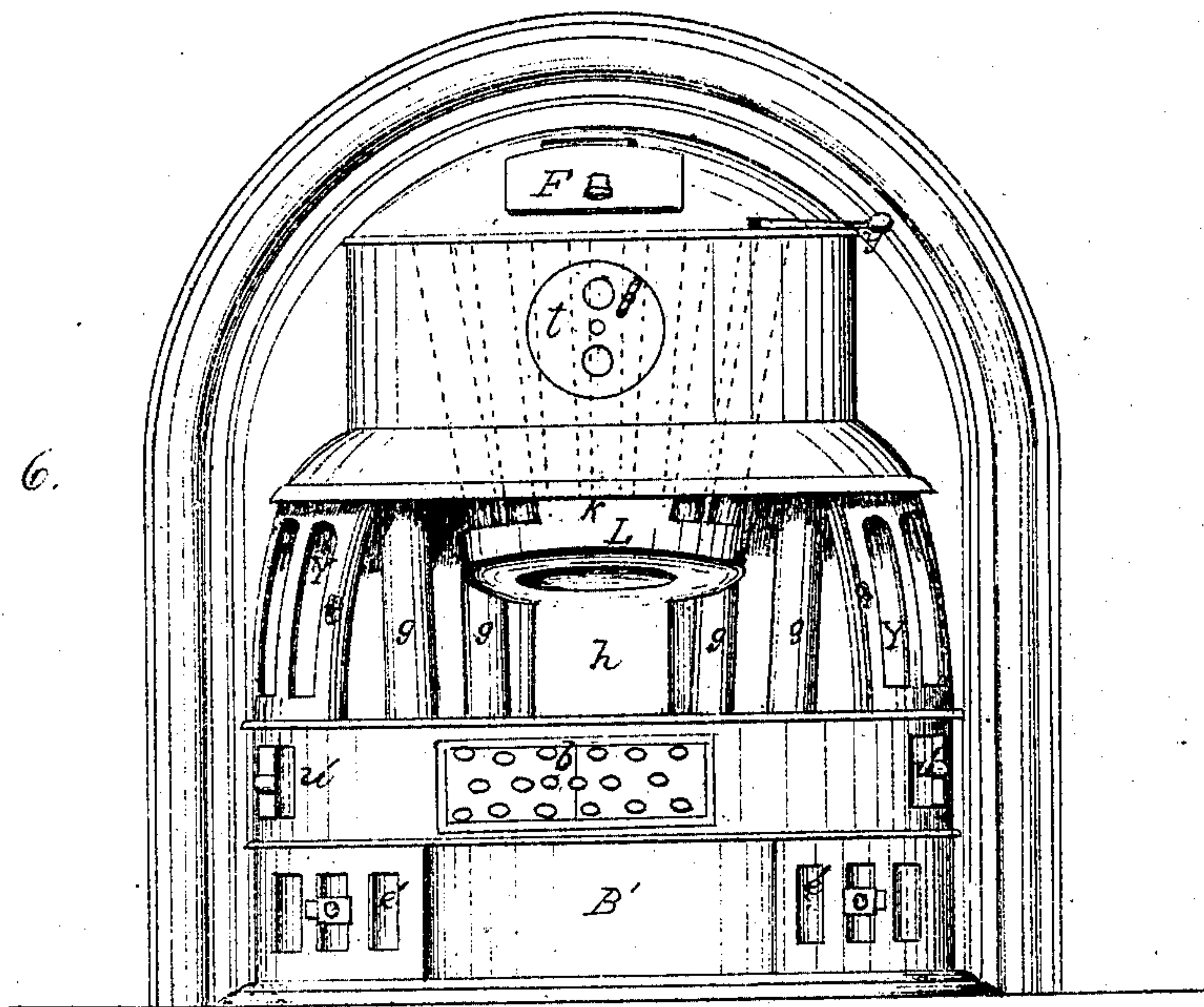


Fig. 9.

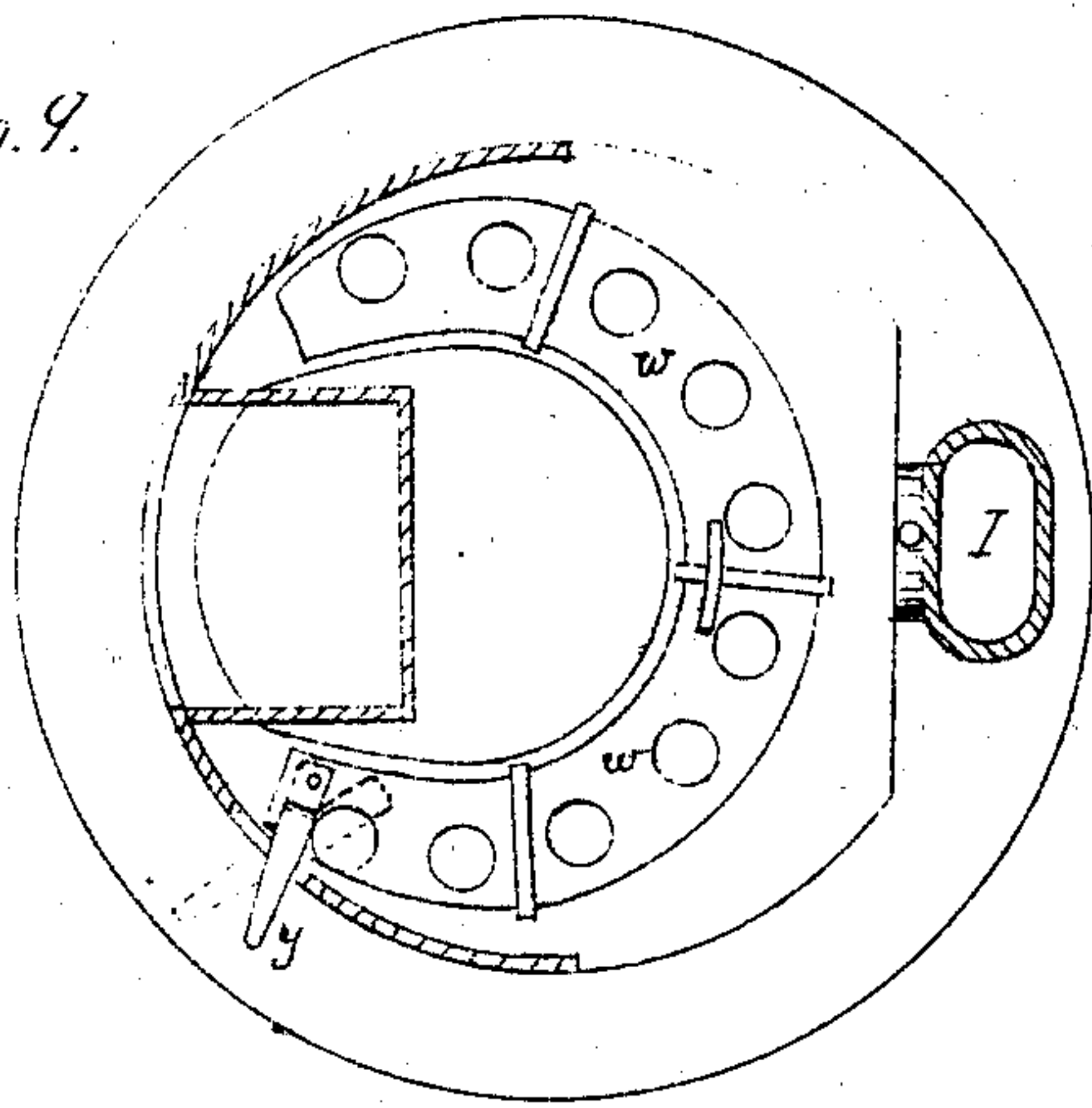
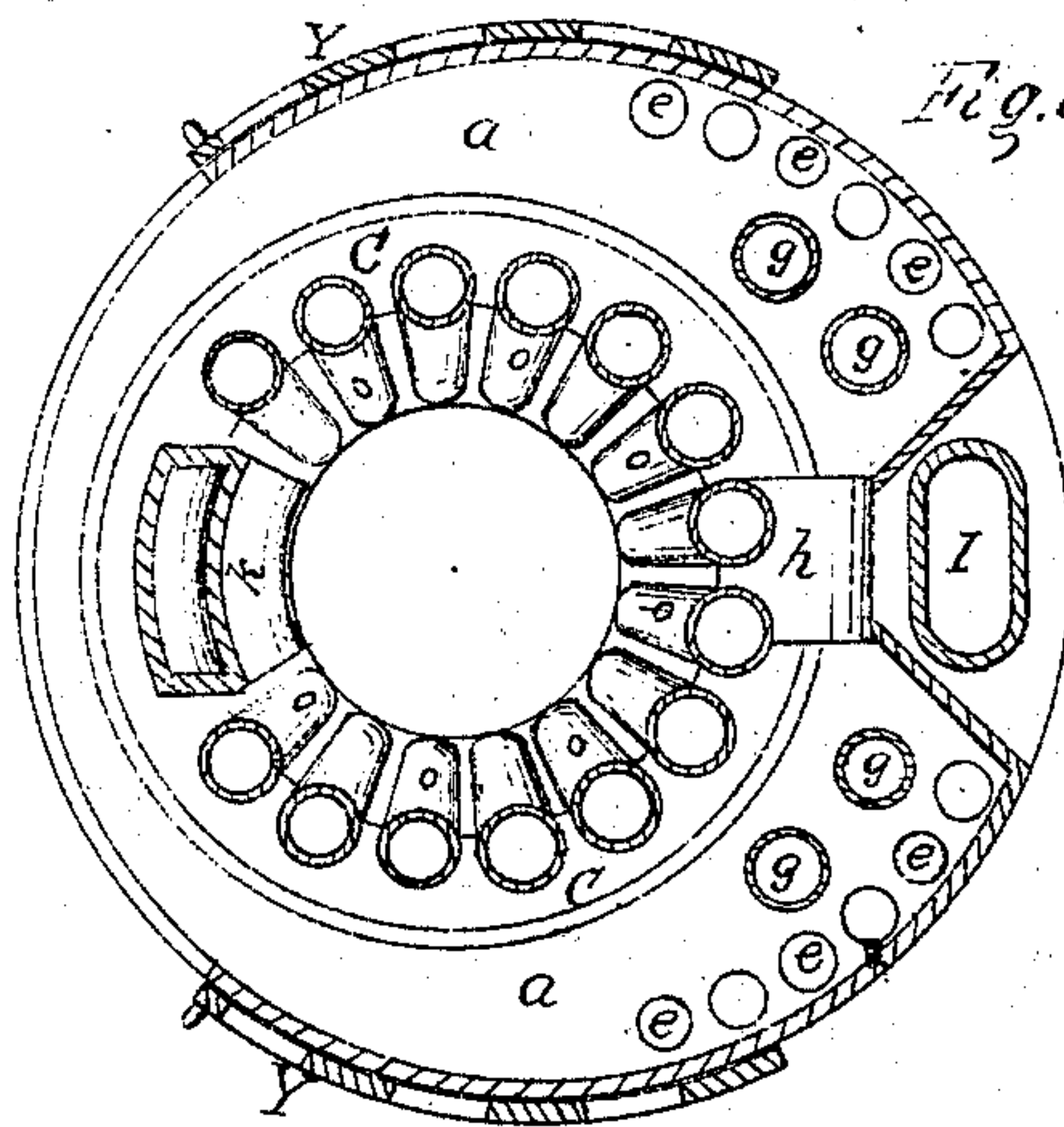


Fig. 8.



UNITED STATES PATENT OFFICE.

JOHN H. BURTIS, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN BASE-BURNING FIRE-PLACE HEATERS.

Specification forming part of Letters Patent No. 116,680, dated July 4, 1871.

To all whom it may concern:

Be it known that I, JOHN H. BURTIS, of the city of Brooklyn, in the county of Kings and State of New York, have invented certain Improvements in Fire-Place Heaters, of which the following is a specification:

The objects of my invention are to improve the heating apparatus named (which is, in kind, of a class intermediate between the portable stove and open fire-place, or grate-fire) by rendering it more efficient in warming the room in which it is located, and increasing its capacity for heating air to be supplied to other rooms; and it consists in arranging the fire-pot eccentrically of the mouth of the reservoir, in combination with an air-heating and conducting-tube extending from the rear of the heater to the front; and, also, in combination with the same, making the mouth of the reservoir oblique, or inclined from the front downward to the rear, employing the space in the base immediately surrounding the ash-pit for the induction of air which is heated by direct radiation from the grate and fire-pot; and, also, by passing through tubes in the combustion-chamber for distribution to upper rooms, in making the illuminating section (being that portion of the case immediately surrounding the combustion-chamber) curved inwardly above the fire, so as to form a vertical front combined with a receding curve for direct radiation upwardly as well as horizontally, in combination with the sliding of the front or projecting portion of the case into the chimney to expose the fire, as in an open grate, when desired; in forming the magazine with its walls composed of tubular spaces for the purpose of receiving air, heated at the base, and discharging it into the warm-air reservoir at the top; in the employment of an annular air-heating chamber surrounding and forming the base of the magazine and receiving air from the rear and discharging it, when heated, either from the front of the heater or through the tubular spaces, as above mentioned; in making the annular air-heating tube and its eduction-branch form a part of the magazine; in providing the hinged feed-cover with a self-acting support for retaining it open while fuel is introduced; and, in combination with the damper, a curved arm for arresting the movement of the damper at the proper time and preventing the arm from striking the smoke-

pipes; and in other improvements, as hereinafter set forth.

In the accompanying drawing, Figure 1 represents the heater as set in a fire-place in a central vertical section. Fig. 2 is a horizontal section on the dotted line *xx* of Fig. 1. Fig. 3 is a perspective view of a fuel-magazine removed, formed with a single wall in sections, joined at the top and bottom of the divisions *i* by bars *j* with side tubes *u*, and adapted for use in connection with the air-heating tube *h L k*, but not otherwise forming a part of my present invention. Fig. 4 is an enlarged fragmentary view of the door with its supporting device. Fig. 5 is a detached view of the damper and actuating-rod, shown in dotted lines in a different position. Fig. 6 is a front elevation with the sliding sections of the case removed to expose the fire. Fig. 7 is a vertical section of the upper part of the heater, showing the fuel-magazine as formed of tubular sections. Fig. 8 is a horizontal section on the line *yy* of Fig. 7, showing the arrangement of the tubular sections composing the magazine, the horizontal division-plate *a*, the sliding sections of the case removed into the chimney-space. Fig. 9 is a view of the top of the stove on the line *zz* of Fig. 7, showing the damper *w* which regulates the passage of heated air through the tubular sides of the magazine, and, when closed, causes its discharge through the register *l* in front of the heater, as shown in Fig. 1.

The inclosing-cylinder or case is indicated by A A. This is divided by a horizontal partition, B, the lower section being occupied by the ash-pit B', with passages for admitting cold air on either side, forming a continuous chamber around the ash-pit in the rear, and occupying the whole of the base except the space required by the ash-pit. The chamber next above contains the fire-pot C, and above is placed the magazine for fuel, D, which extends to and has its mouth or receiving-opening in the inclined top E, being provided with the vertically-opening cover F. A second horizontal partition, *a a*, of annular form, surrounds the fire-pot at its top, leaving below it an annular space around the same for the cold air, which enters both through the openings *e' e'*, Fig. 6, and the grating *b*, as shown in Fig. 1, and, becoming heated by contact with the exterior of the fire-pot, passes into the hot-air chamber G (by passages hereafter de-

scribed) situated within the chimney and surrounding the back part of the heater. From the chamber G the warm air is led to the upper rooms by the conductor H, Fig. 1. I is the smoke-pipe, and *c* a damper, through which, when open, the draught is direct, but, when closed, is carried downward through the flue-holes *e e* in the plate *a a* and into the smoke-pipe at *d*. J is the grate, which may be of any suitable form.

The operation is as follows: The fire being ignited, the gaseous products of combustion pass from the fire-pot in the direction of the arrows 1-1 down the flue-passages *e e* in the horizontal partition *a a* to a passage in the base which communicates with the smoke-pipe I. Cold air is admitted, through apertures *e' e'*, Fig. 6, into passages on either side of and surrounding the ash-pit between the partitions, shown in dotted lines *f f'* in Fig. 2, into the space around the fire-pot. From this space it is conducted by the pipes *g g* through the combustion-chamber, where the pipes are exposed on all sides to the heat of the fire, and discharged thence into the warm-air chamber G in the chimney-recess. A portion of the air to be heated also enters at *b*, as before described. Immediately over the fire-pot, in the hottest portion of the combustion-chamber, is an annular air-heating passage, L L, provided with induction and eduction branches *h* and *k*, by which air is taken from the hot-air chamber G at the rear of the heater, conducted through it, and discharged, when required, in front, through a register, *l*, into the apartment occupied by the heater; or, if not so required, conducted again into the chamber G by passages *o o* or *u u* in the sides of the magazine. This annular passage forms the lower portion of the magazine D, and the inner plate of the eduction branch *k* forms the front side of the magazine, as seen in Fig. 1, filling the opening, shown at *m* in Fig. 3. Although exposed to the most intense heat the annular tube is preserved from melting or warping by the constant current of air, which is given a rapid circulation through it by the ascending inclination of its branches. The air so heated, when allowed to return to the chamber G—if in excess of that required in heating the rooms above—displaces an equal volume from the lower part of said chamber, which also circulates through the described passages of the magazine D, thereby maintaining a continuous circulation and accumulating a reserve of highly-heated air in chamber G as a source of supply for future requirements. I construct the magazine of vertical sections, which rest upon the annular base L, and are hollow or tubular, a convenient method of construction being to use a series of pipes, as at *o o*, Figs. 7 and 8, their lower ends opening into L, and their upper through the top plate in the warm-air reservoir G, by which arrangement the highly-heated air is conveyed thereto through the walls of the magazine. In this case the branch *k* for discharging from the front of the stove may be dispensed with, if desired, and all the air heated employed for distribution in other rooms than that in which the heater is

placed. The air discharged from these tubes is controlled by the damper *w*, which, by moving the lever *y*, is made to close or uncover them at option. The annular air-trunk L forms the base and support of the tubular walls of the magazine. In order to insure greater heating capacity in the room occupied by the heater, and to afford a larger capacity of the hot-air reservoir G, I arrange the fire-pot C and magazine D, in connection with the tube *h L k*, in positions eccentric to each other, by bringing the former near to the front of the case, while the larger part of the latter is back of a vertical line drawn through the center of the grate. This gives room for the free combustion of the fuel in front of the magazine, and gives a cheerful effect of the glowing fire seen through the mica-openings, resembling that of an open grate. I also contribute to this effect, and add largely to the open space for free combustion in the frontal portion of the fire-pot, by making the mouth or lower side of the magazine inclined, being higher in front than at the back, so that it not only leaves more space for the fire but enables the fuel to feed forward of itself and keep the fire-pot well supplied in front. The cold air is mainly admitted into the receiving-chamber surrounding the ash-pit, (except in front,) where it receives the heat radiated from the grate and base of the fire. As it ascends it circulates on all sides of the fire-pot C, in the surrounding chamber 3, and thence rises through the large tubes *g g*, (which may be more or less in number, and which pass through the combustion-chamber and are surrounded by the hot gaseous products of the fire,) when it is discharged into the warm-air reservoir G, which stores it for distribution to the several upper rooms. I form that portion of the case which incloses the combustion-chamber—being the space immediately above the fire-pot and surrounding the lower part of the magazine—with a vertical curve, which contracts the upper part, as is best shown at *a'*, Fig. 1, so that the direction of the lines of radiation determines, as is represented by the diverging dotted lines of Fig. 1. This diffuses the heat more uniformly, especially in an upward direction, and moderates the fierceness occasioned by a small but intensely-heated radiating-surface, while it improves the symmetry of the heater. I form that portion of the case which constitutes the projecting portion, and that above the base or air-heating part, with two movable sections, Y Y, Figs. 6 and 8, which slide back from the frontal center into the fire-place, leaving the fire exposed as in an open grate. These sections, being the vertically-curved or convergent frontal portions before described, constitute the most prominent projecting part above the fire-pot, and, when removed, expose the fire to observation, and the radiation of light and heat in lines nearly approaching the perpendicular, thereby giving more light in the room and closely resembling an open-grate fire, while the inclined under surfaces of *h L k* reflect the heat downward in the room. This does not interfere with the operation of heating the air for the room above, while the objection to such sliding fronts,

as obtains with stoves, does not exist, as the sliding parts, when thrown back, are out of the way and sight in the chimney-recess. The cover F is hinged to the inclined top E at *n*, and is provided with a pendulous piece, *o'*, loosely pivoted a little forward of the hinge. When the cover is shut this hangs vertically by its weight, but when raised it oscillates from the perpendicular, and by quickly releasing the cover while the pendant is vibrating backward its point is caught upon the step *p*, as shown in Fig. 4, by which the cover is held open. When desired to close it, it is only necessary to raise it sufficiently to allow the pendant to gravitate to the perpendicular, when it falls shut. This is of great convenience, as the door can be opened, sustained, and shut by merely touching it with a shovel or other utensil which the attendant may have in hand, entirely obviating the usual troublesome operation of unlatching a door, changing the position of a slide, or removing a griddle to obtain access to the magazine. The damper *c* is operated by the horizontal rod *r* by pulling out, as shown in dotted lines, to open it, and pushing it in to close it. This rod is connected with the vertical axial rod of the damper by a curved horizontal arm, *s*. A stop, *t*, is provided on the rod in such a position that it strikes the arm and prevents further motion when the damper is shut, thereby preventing the arm from striking the smoke-pipe I, which would tend to loosen its joints, and also giving positive assurance that the damper is in its proper position. The register-slide *w* (most clearly shown in Fig. 9) rests on the top of the magazine, and is operated by a lever or handle at *y*, so that, when desired, all the air which passes into the annular chamber L may be thrown into the room through the opening *l*; or, by closing the register at *l* and opening the register-slide at *w*, the air so heated may all be conducted into the chamber G, and so to the rooms above. On either side of the fire-pot are the doors *u' u'* for cleaning the flues of the heater.

The air which is heated in the conductors *h L k* is taken from the lower part of the chamber G, a portion of which enters from the back part of the cold-air chamber through a hole, *x'*, in the back plate, the direction of the currents being shown by the arrows 2 2. It is thus seen that the admitted air is divided into two portions, one of which reaches the annular passage L by the course indicated, and the other ascends through the partition B into the chamber 3 surrounding the fire-pot. This latter chamber is also surrounded by the flue-chamber 4, through which the products of combustion circulate after entering at *e e* to reach the bottom of the smoke-pipe at *d*. Thus the air-passage 3 intervenes between the fire-pot and the flue-chamber 4, and the air-tubes *g g* are likewise surrounded by the products of combustion as they ascend from the fire and descend to enter the flue and reach the smoke-pipe.

The grate J forms no part of my invention, as any one of suitable form may be employed, the

kind represented being especially adapted to the shallow fire-pot employed in this heater.

In a fire-place heater or stove which combines the qualities of a radiator of heat in the apartment in which it is placed and a furnace for supplying warm air to other rooms, and is arranged in combination with the fire-place, I claim as follows:

1. In combination with the air-heating passages *h L k*, the arrangement of the fire-pot eccentrically to the magazine, substantially as and for the purposes set forth.

2. The arrangement of an enlarged cold-air receiving-chamber occupying the entire space immediately surrounding the ash-pit except in front, in combination with the air-heating chamber 3 and the flue-space 4, arranged as set forth.

3. The enlarged cold-air receiving-chamber immediately surrounding the ash-pit except in front, extending back to the outer casing, and the fire-pot with the tubes *g g* which convey the admitted air through the combustion-chamber, in combination with the downward passages *e e* and flue-chamber 4 for the escape of the products of combustion, whereby the air to be heated is conducted, in passages which are surrounded through their whole course by heating-surfaces, until it enters the reservoir G, arranged substantially as set forth.

4. I do not claim, broadly, sliding-doors; but I claim, in combination with a cylindrical front curved inwardly as at *a'*, Fig. 1, and a fire-pot eccentric to the reservoir, making the frontal converging portion in sliding sections to expose the open fire and insure more general radiation and illumination therefrom, substantially as set forth.

5. In combination with the air-heating passages *h L k*, the oblique or inclined mouth of the magazine, and the branches *h k* which form a heat-reflecting surface inclined upwardly from the rear of the combustion-chamber to the front thereof, as and for the purposes set forth.

6. A fuel-magazine, the walls of which are formed of tubes *o o* or equivalent hollow upright sections, substantially as set forth.

7. I do not claim an annular air-heating space at the base of a magazine; but I claim, in a fire-place heater, conveying the air from the chamber G in the rear by the branch *h* and annular passage L around the base of the magazine, and discharging it either through a register in front of the case, or by passing it through the tubular sides of the magazine, return it to the chamber G in a superheated state, substantially as set forth.

8. The combination, with the conductor or passages *h L k*, of tubes or branches *u u* and *o o* forming a part or the whole of the side of the magazine, and conveying and discharging the air heated in its course from the rear to the front of the heater through the top thereof into the hot-air chamber G, substantially as set forth.

9. The combination of said air-heating passage or passages *h L k*, receiving at the rear and discharging both at the front and top of the heater, with the reversible flues *e e*, which so control the

products of combustion that their course is around the exterior surfaces of said conductors in ascending and descending currents, substantially as set forth.

10. Supporting the sides of the magazine on the annular trunks L and its branches *h k*, substantially as and for the purpose set forth.

11. The pendulous support *o*, in combination with the vertically-hinged cover F and step *p*, as and for the purpose set forth.

12. In combination with the damper-arm *s* and rod *r*, the stop *t*, arranged and operating as and for the purpose set forth.

13. The combination of the air-admitting chamber in the base surrounding the ash-pit except in front, and communicating with the chamber G at *x'* with the air-heating passages *h L k*, whereby a portion of the cold air pursuing the

course of the arrows 2 2 is superheated and discharged at *l* or added to the warm-air reservoir G, substantially as set forth.

14. The register *w*, in combination with the tubes *o o* which form the walls of the magazine, as and for the purposes described.

15. Forming a portion of the side of the magazine of the separate air-conducting branch *k* of the annular tube L, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JNO. H. BURTIS.

Witnesses: -

KATE N. JONES,
J. FRASER.