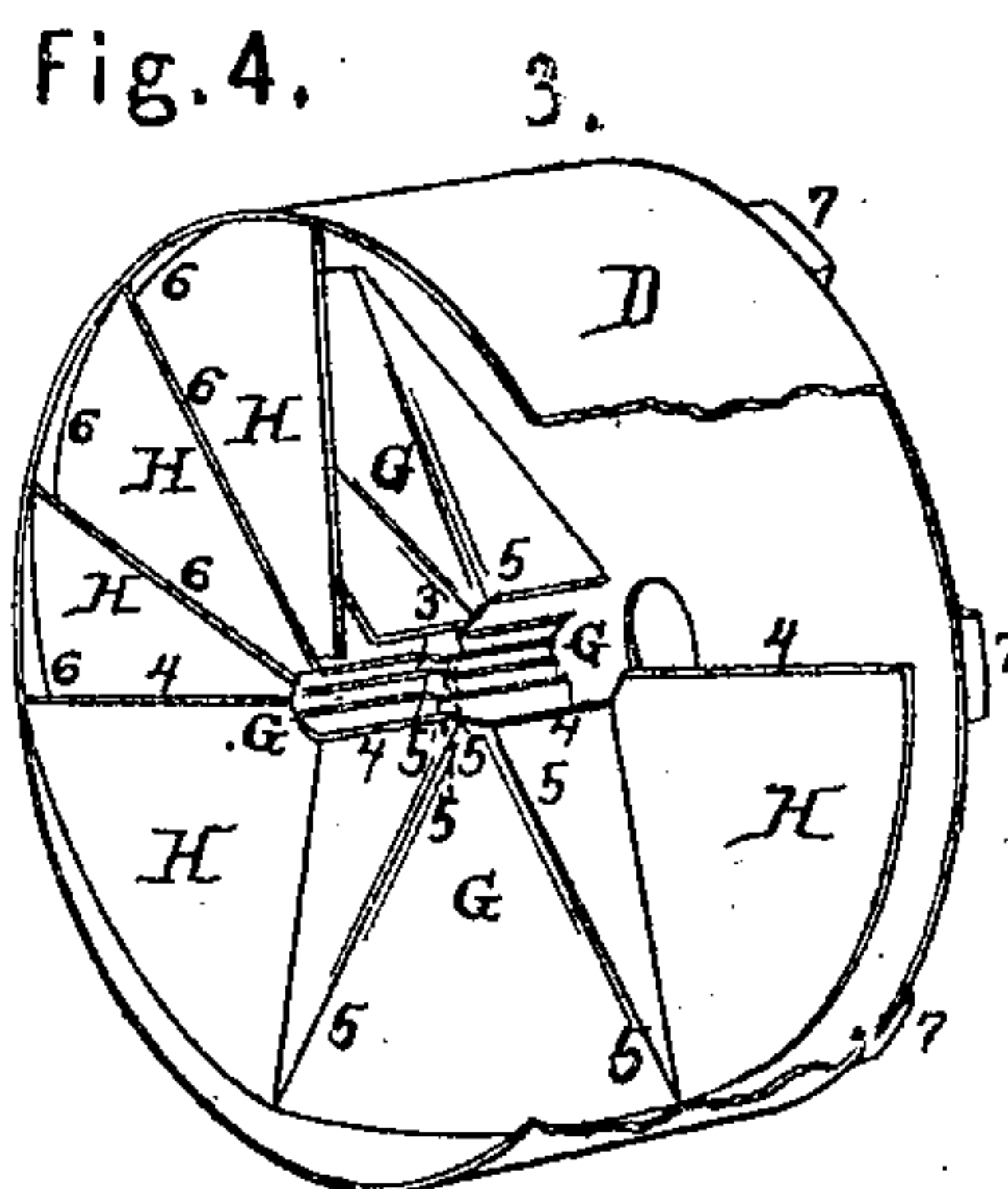
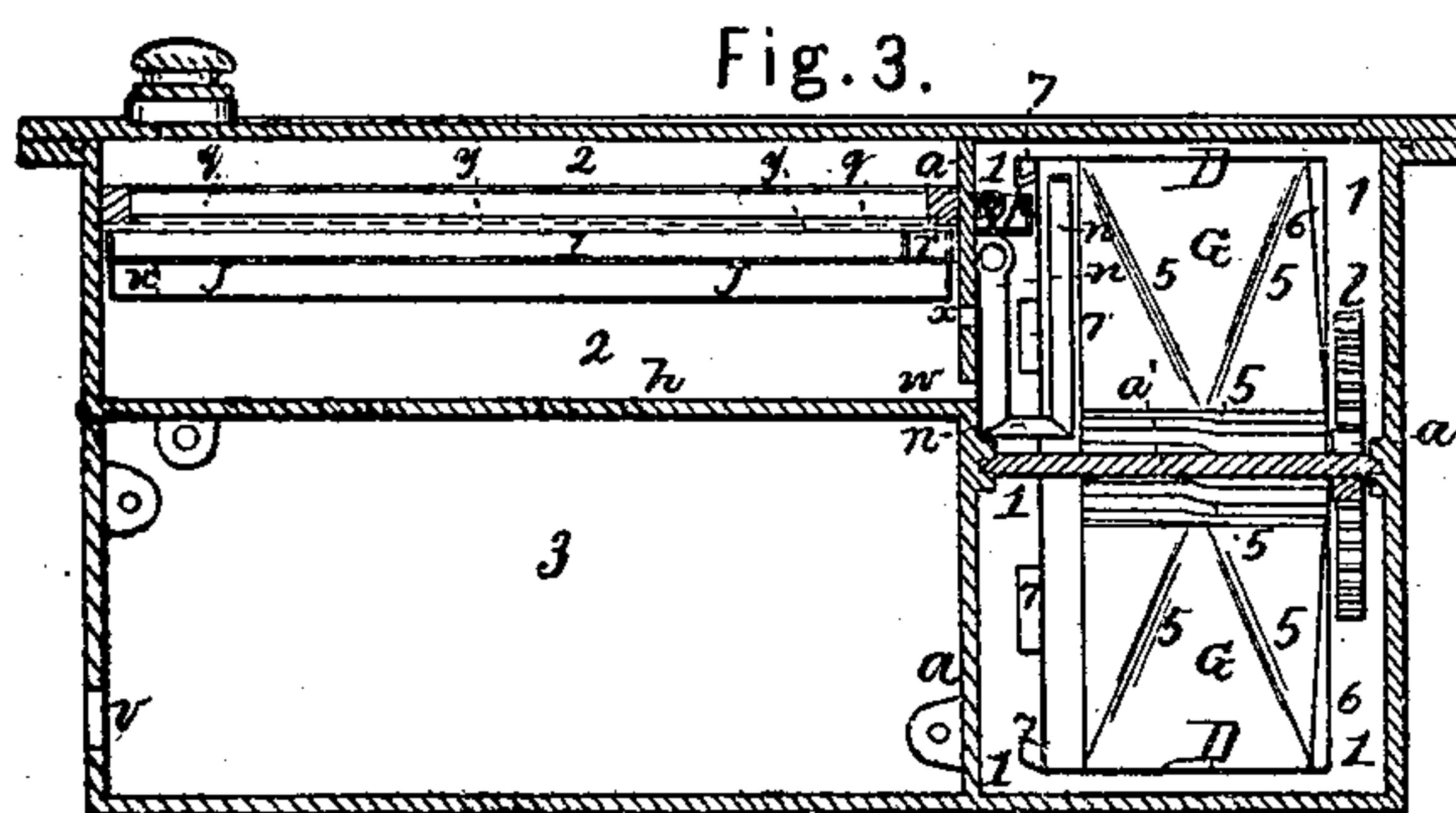
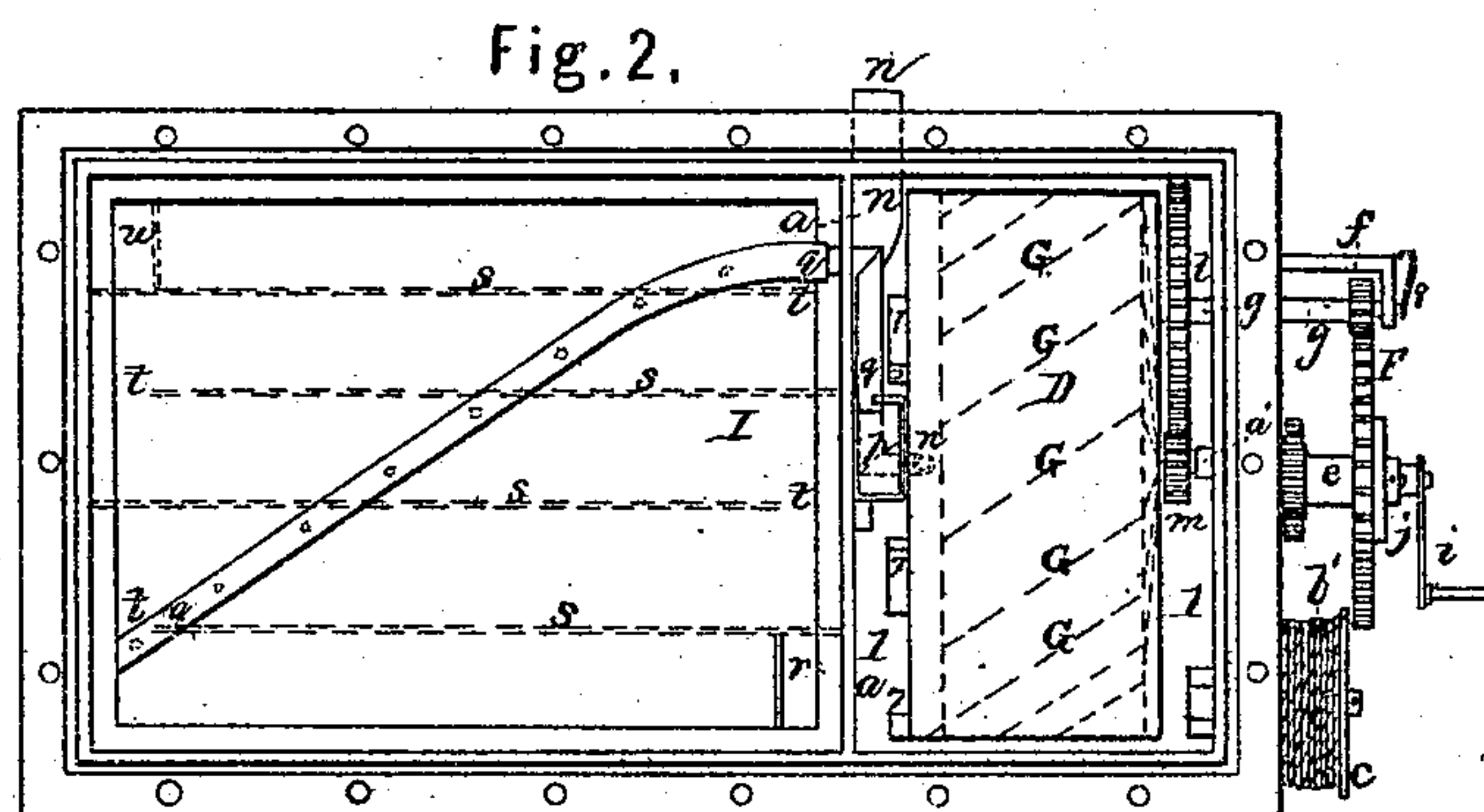
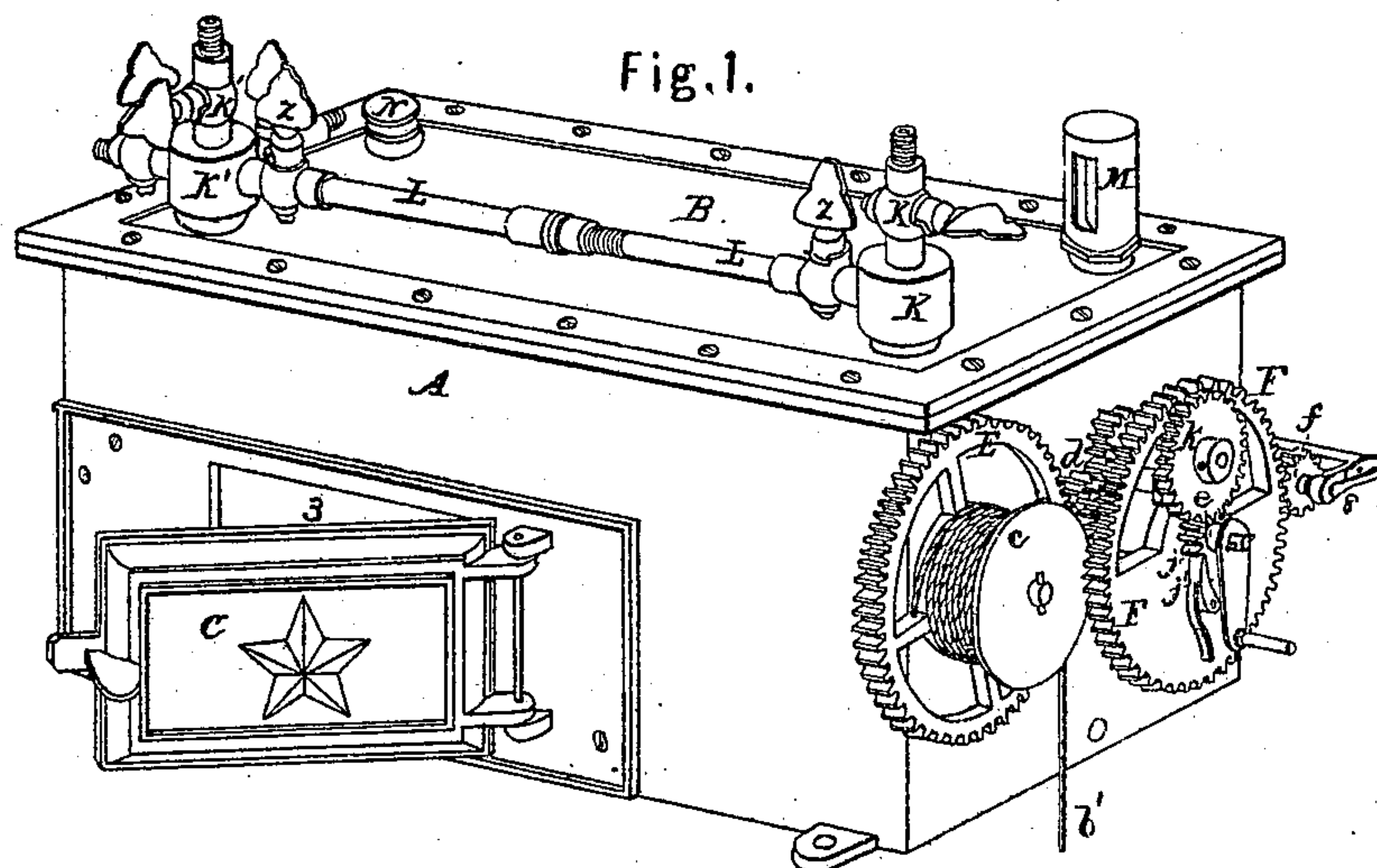


M. A. ROOT & J. D. CUSTER.
PORTABLE GAS APPARATUS AND CARBURETER.

No. 97,122.

Patented Nov. 23, 1869.



Witnesses:

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United States Patent Office.

MARCUS A. ROOT, OF PHILADELPHIA, AND JACOB D. CUSTER, OF NORRISTOWN, PENNSYLVANIA.

Letters Patent No. 97,122, dated November 23, 1869.

IMPROVED PORTABLE GAS-APPARATUS AND CARBURETTER.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that we, MARCUS A. ROOT, of Philadelphia, and JACOB D. CUSTER, of Norristown, Montgomery county, both in the State of Pennsylvania, have invented certain new and useful Improvements in Portable Illuminating-Gas Machines; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 represents, in perspective, an exterior view of the apparatus;

Figure 2 represents a top plan of the interior arrangement, as it appears when the top or cover is removed;

Figure 3 represents a longitudinal vertical section, through the machine; and

Figure 4 represents, in perspective, the blowing-wheel, with portions broken away to show the form of the buckets and chambers with it.

Similar letters of reference, where they occur in the several separate figures, denote like parts of the apparatus in all of the drawings.

For the purposes of portability and economy of space, our invention consists in a cast-iron case, divided into three chambers, and in or upon which case are all the chamber's appliances, and gearing for putting and maintaining the machine in operation.

And for the rapid and uniform transmission and saturation of the air with the hydrocarbon-vapor, our invention consists in a peculiarly-constructed blowing-wheel, revolving in and through the liquid hydrocarbon, in connection with suitable inlet and exit-avenues for taking in atmospheric air and carburetting it, and driving it through vaporizing-chambers for a secondary surcharging of it, and thence to a receiver, main, or to the burners.

To enable others skilled in the art to make and use our invention, we will proceed to describe the same, with reference to the drawings.

A represents a rectangular cast-metal box, divided, in its interior by the vertical partition *a*, and a horizontal partition, *b*, into three separate chambers, marked, respectively 1, 2, 3, of which chambers those, 1 and 2, when the cover B is screwed down, are inaccessible from the exterior, except through or by means of valved or controllable passages, whilst that, 3, may have a door, C, through which access is had to it, and air-holes for supplying air to a burner or heater arranged therein.

The chamber 1 we term "a well," or "wheel-house," as it contains a hydrocarbon of any of the

known or used kinds for carburetting atmospheric air, by passing the air over or through it, or in contact with its vapor, or all three.

In this chamber is hung, by its shaft *a'*, so that it can be revolved therein, a "blowing-wheel," D, of peculiar construction, as will be hereinafter more particularly described.

On the exterior of the case A, and at one end thereof, is arranged a retaining and driving-mechanism, which is driven by a falling weight attached to the cord or chain *b'*, wound around the drum *c*, or by a coiled spring in said drum, or by any other well-known first moving-power.

On this drum *c*, or fastened to its shaft, is a cogged gear, E, which works into a pinion, *d*, on the shaft *e*, giving motion to said shaft, and through it to the gear F, which drives the pinion *f* and its shaft *g*.

Connected with the wheel F, and its shaft, there are a crank, *i*, ratchet and spring-pawl *j*, and pinion *k*, for winding up the weight or spring when necessary to do so.

The shaft *g*, fig. 2, extends into the chamber 1, and has upon it a cogged gear, *l*, that works into a pinion, *m*, on the shaft of the blowing-wheel, and thus the blowing-wheel is driven.

An air-pipe, *n*, that projects through the case, and its exterior end controlled by a valve that closes outward, and further protected by wire gauze, to prevent insects or crude matter from entering, as well as to protect the gas or vapor from igniting, is arranged in the chamber 1, which, extending downward to near the centre of the wheel D, extends horizontally into the head of the wheel, and thence projects upward to near the interior perimeter of said wheel, as clearly seen in fig. 3, so that the exterior air drawn through said air-pipe *n*, by the rotation of the blowing-wheel and the burning of the carburetted air, or its escape from the carburetting-chamber, to be hereafter described, shall enter near the top of the interior of the wheel, and, by the peculiar shape and form of the buckets therein, be carried in contact with the hydrocarbon in the well, and become partially saturated thereby, or carburetted to an extent.

The buckets in the blowing-wheel D, of which there may be any suitable number, are what may be termed "winged buckets;" that is to say, the bucket proper, G, is that portion of it which extends from head to head of the blowing-wheel or cylinder, and in oblique lines, as shown in fig. 2; and the "winged" portions of each bucket are seen more particularly at H H', fig. 4. The wing H, as seen in said figure, projecting rearward, and the wing H' projecting forward, so that the bucket G, and its

two wings H H', shall extend jointly about half way around the wheel, as shown by the characters 4 4 4 4 in said fig. 4.

In addition to the wings to each of the buckets, there are angular planes at 5 5, in each bucket, the object and purpose of which angles or deflections are to cause the air that is carried through them, or in or by them, to be brought with more certainty, and for a greater period, in contact with the hydrocarbon in which the wheel turns.

The buckets, from their extreme length and shape, not only prevent the air from going straight through the wheel, but the point of one wing being so far in advance of the other, and dipping into the liquid, far in advance of its rear portion, the air, by the filling of the buckets, by the liquid being driven out of each bucket into the wheel-house above the fluid, and the gasoline being driven from bucket to bucket, with some agitation, in its transmission through the blowing-wheel, when and where it (the air) comes in contact with the liquid, and becomes charged with its vapor, so much so that its transmission through the carburetting-chamber may be quite rapid, and still it will be abundantly charged to burn with a bright light.

The wings of the buckets, where they come to and form the heads or ends of the blowing-wheel, overlap each other, and are open, as at 6 6 6, after the manner of blowing-wheels in general, so that the atmospheric air, as well as the liquid, may have forced transmission through said wheel, the air going in at one side or end, and coming out at the other, and in so doing is forced into intimate contact with the liquid vaporizing-material in which the wheel turns.

On the blowing-wheel D, and on that side or end of it, for convenience, next to the carburetting-chamber, and near its perimeter, is arranged a series of lifting-cups, 7 7 7, which dip into and fill with the hydrocarbon as they pass through it, and as they come around to the top of the chamber, or nearly so, they pour out their contents into a receiver, p, whence it flows through a pipe, q, that has a series of holes in it, or through a series of such pipes that overlie the pan I, so as to distribute the hydrocarbon uniformly throughout said pan.

From the pan I, the hydrocarbon passes through an opening, r, into a second pan, J, below it; this second pan being furnished with a series of partitions, s, that are open at alternate ends, as at t, so that the hydrocarbon must flow through all of the passages between said partitions, before it reaches the exit-opening u, through which it finally passes on to the partition-plate b, which forms the bottom of the carburetting-chamber, and is corrugated, for several purposes: first, to prevent it from cracking by shrinkage or contraction of the metal in cooling, as it is cast with and a part of the enclosing box or case; second, it affords more surface for the conduction of heat through it, from the heater in the chamber 3, which heater may be a very small jet of burning-gas taken through the hole v from the gas-pipes on top of the apparatus; and third, it forms drains or drips, through which the hydrocarbon may flow to a common opening, w, whence it passes again into the well or chamber 1.

The object of the heating-chamber is to prevent the hydrocarbon from becoming chilled, and to incite its volatility.

The pan J may have in it any suitable absorbing-material, as cloth, felt, moss, shavings, wool, cotton, sponge, or any other animal or vegetable substance, so as to take up the hydrocarbon and increase its vaporizing-property, and allow the air to pass into and through it.

The air from the chamber 1, charged to an extent by having already passed in contact with or through

the hydrocarbon, or its vapor, is driven through an opening, x, in the wall a, into the space underneath the first pan J; thence upward and over said pan, and between it and the pan I; thence over the pan I, and through the meshes of the gauze-wire screen y, and to the burners K K', or to the receiver or main, as may best suit the use or purposes of the apparatus.

The primarily-charged air, whilst passing through the carburetting-chamber, is in immediate contact with the vapor therein, and every atom of it is charged to its greatest capacity, which it carries with it to the burners.

The burner K is placed over and communicates with the chamber 1, in which the air is less charged with the vapor, and would ordinarily burn with a less bright light, though at times would be sufficiently bright.

The burner K' is placed over and communicates with the carburetting-chamber 2, where the air is sometimes so highly charged with the carbon-vapor as to cause smoke in burning, not being able to take in the quantity of oxygen necessary to consume it.

But to avoid, or, rather, to compensate for either contingency, we connect the two burners, K and K', or any other number used with the apparatus, with a communicating-pipe L, controlled by stop-cocks z, so that the differently-charged vapors may be commingled in such regulated proportions as will cause the flame to throw off a bright or subdued light, as may be desired, or as their charged condition may require, and at either burner, as the burners are, like all others, controlled by cocks or cut-offs.

The machine may be supplied with its vaporizing-material through a capped opening at N, and an indicator is arranged at M, having a float extending up into it, from the surface of the liquid in the well, and a glass, or other transparent head, so that from its exterior, the height of the liquid in the well, which must always be below the air-opening x, can always be seen when necessary to examine the condition of the supply.

The supply-opening, the indicator, and the heating-chamber, should all be secured by locking or otherwise, so that no one but the proprietor or the attendant can have access to or meddle with the interior working of the apparatus.

This precaution, together with the covering of such openings or passages as communicate with the charged air in the interior, with wire gauze, or its equivalent flame-resisting medium, will put the apparatus beyond the possibility of any casualty due to the flammability of the vaporized air.

A click may be arranged to act in connection with one of the pinions of the driving-gear, by which the machine may be stopped from working, should any leak in the gas-pipe or fixtures occur.

To keep the shoulder of the shaft g close up against the box or packing through which it passes into the interior of the wheel-house, and preserve said joint tight, a pressure-spring, 8, may bear against the end of said shaft, to move it or hold it in such working position.

And this shaft g, instead of being on the same horizontal plane with the shaft of the blowing-wheel, which it is intended, through its gearing, to drive, and which latter shaft would, as a general thing, be below the surface of the gasoline, may enter or pass through the case above that line, or above the liquid, and still drive, through its gear, the pinion on the blowing-wheel shaft.

Having thus fully described our invention, and shown its operation, we would state that we are aware that carburetting-apparatus has been encased in various ways; that a blowing-wheel has been operated in a hydrocarbon-liquid, and that buckets

have been used therewith, and that coal-gas and atmospheric air have been mixed or mingled with the carburetted air. These things we do not claim, but hereby specially disclaim; but

What we do claim herein as new, and desire to secure by Letters Patent, is—

1. The box or case A, cast in one piece with its partitions *a b*, so as to comprise within it the two chambers 1 2, made and arranged for the purpose and in the manner described.

2. In combination with a carburetting-apparatus, the blowing-wheel D, composed of winged buckets, with deflecting-surfaces, as and for the purpose herein described and represented.

3. In combination with the blowing-wheel D, constructed and operating as herein described, and revolving in a well partially filled with a hydrocarbon,

the lifting-cups 7, on said wheel, for carrying up from the well the hydrocarbon that is to supply the carburetting-chamber, and flowing it therein or thereto, substantially as described.

4. In combination with a carburetting-apparatus, in which the air is subjected to two distinct charging-operations, a burner and cock, connecting with each interior chamber, and an exterior communicating-pipe, with a cock for each burner, so that the air differently charged in the interior may be separately burned or mixed before coming to the flame, as and for the purpose described.

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