No. 799,311. PATENTED SEPT. 12, 1905.

W. H. DRAKE.

FURNACE AND HEATER.

APPLICATION FILED JULY 18, 1902.

4 SHEETS—SHEET 1.

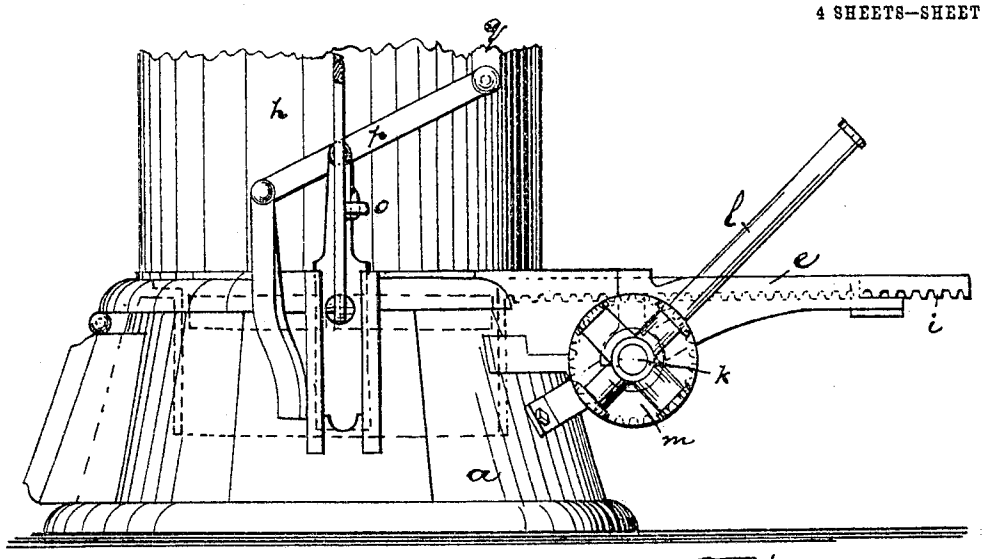


Fig. 1.

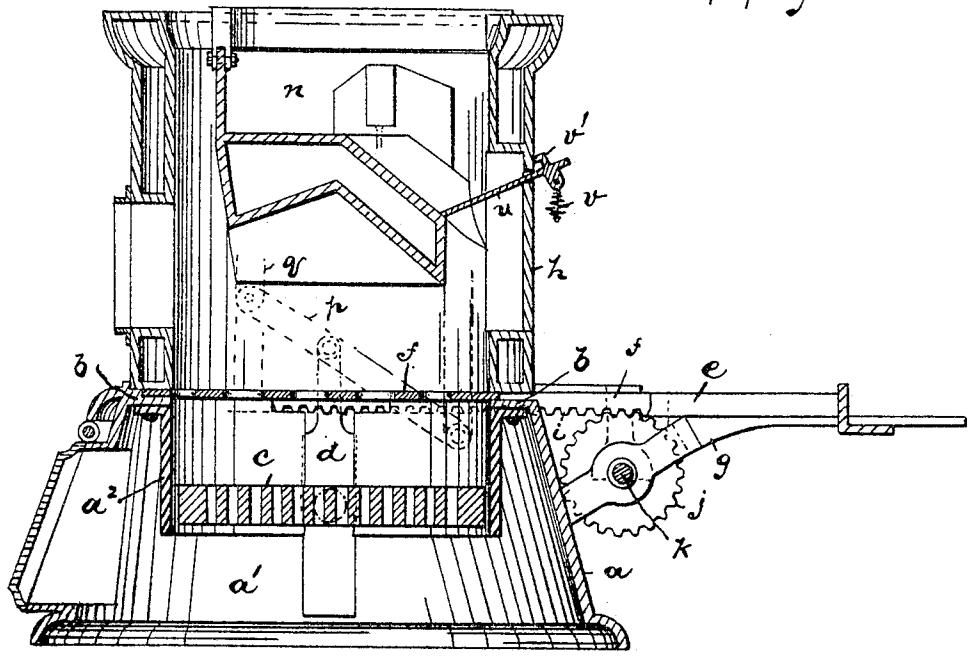


Fig. 2.

WITNESSES:

Henry D'Arcy

Russell M. Everett

INVENTOR

William H. Drake;

BY

Drake & Co.

ATTORNEYS

No. 799,311. PATENTED SEPT. 12, 1905.

W. H. DRAKE.

FURNACE AND HEATER.

APPLICATION FILED JULY 18, 1902.

4 SHEETS—SHEET 2.

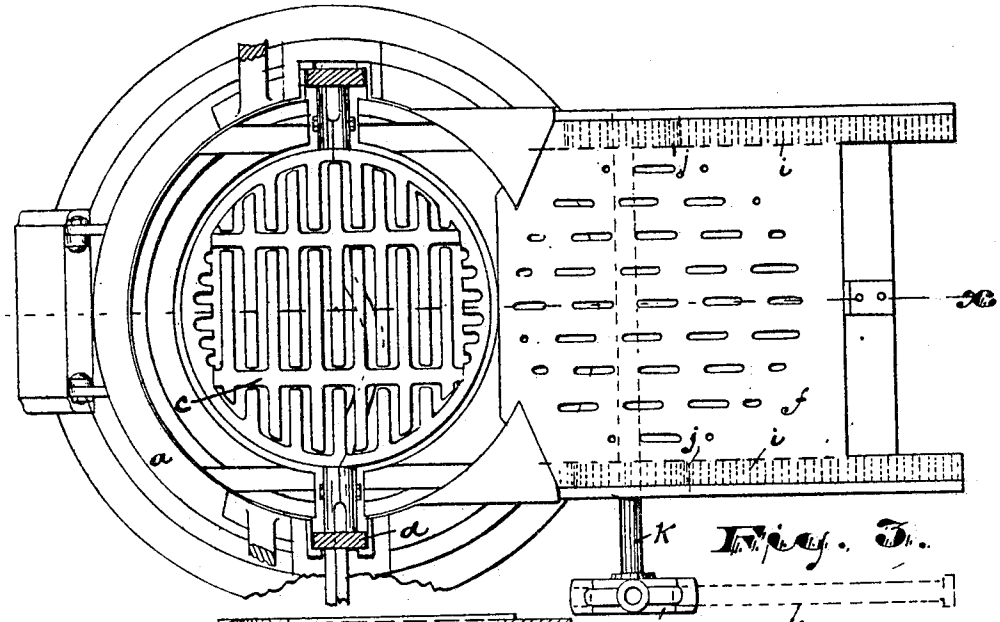


Fig. 3.

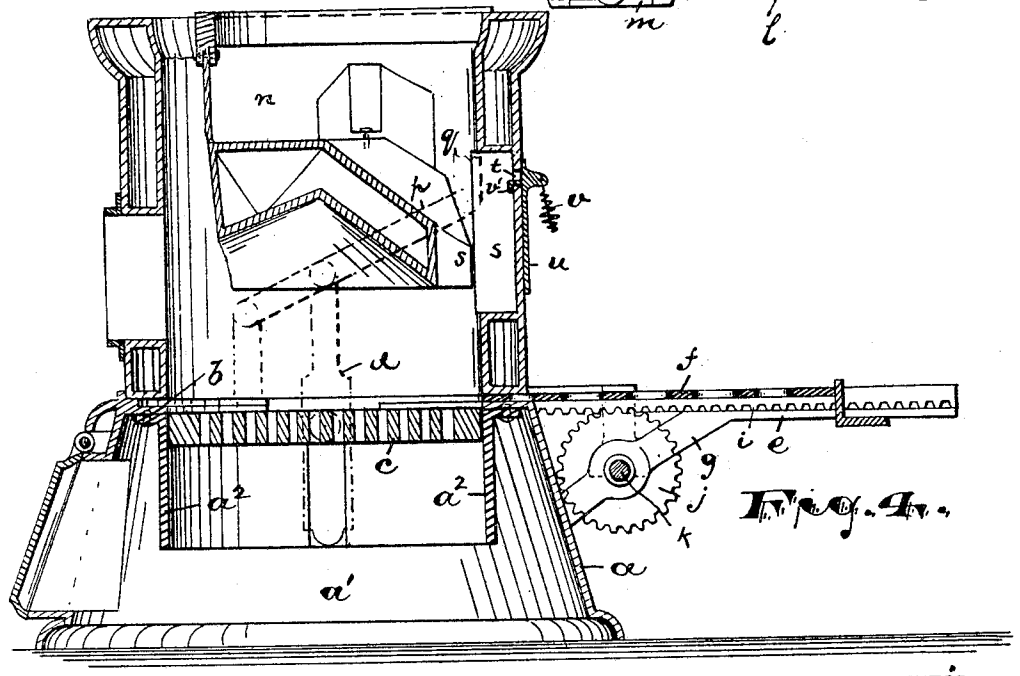


Fig. 4.

WITNESSES:

Henry Krug

Russell M. Everett

INVENTOR:

William H. Drake,

BY

Drake & Co.

ATTORNEYS.

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

No. 799,311. PATENTED SEPT. 12, 1905.

W. H. DRAKE.

FURNACE AND HEATER.

APPLICATION FILED JULY 18, 1902.

4 SHEETS—SHEET 3.

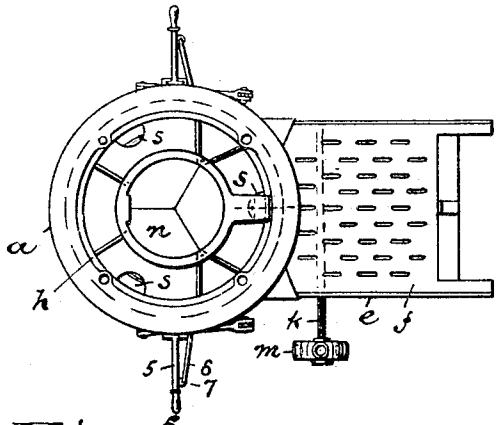


Fig. 5.

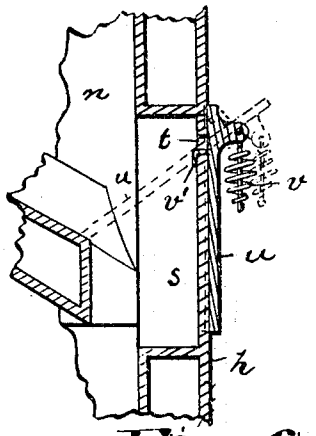


Fig. 6.

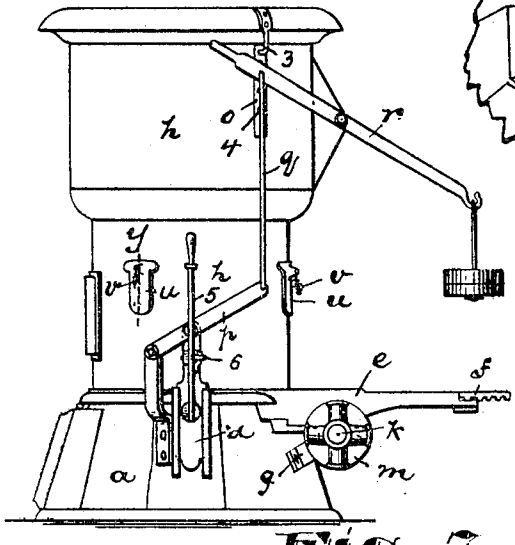


Fig. 7.

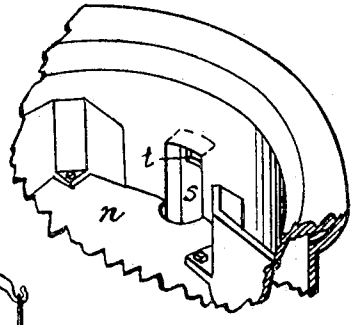


Fig. 8.

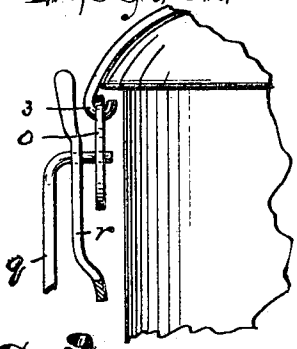


Fig. 9.

WITNESSES:

Henry Krug

Russell M. Everett.

INVENTOR:

William H. Drake,

BY

Drake & Co.

ATTORNEYS

No. 799,311. PATENTED SEPT. 12, 1905.

W. H. DRAKE.

FURNACE AND HEATER.

APPLICATION FILED JULY 18, 1902.

4 SHEETS—SHEET 4

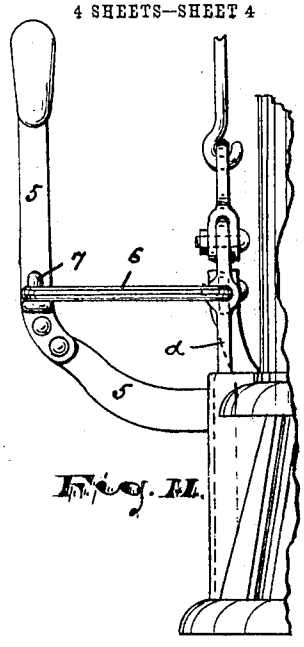


Fig. 11.

Fig. 10.

WITNESSES:

Henry Krug

Russell M. Everett.

INVENTOR:

William H. Drake,

BY Drake & Co.

ATTORNEYS.

ANDREW B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM H. DRAKE, OF HACKETTSTOWN, NEW JERSEY.

FURNACE AND HEATER.

No. 799,311. Specification of Letters Patent. Patented Sept. 12, 1905.

Application filed July 18, 1902. Serial No. 116,046.

To all whom it may concern:

Be it known that I, WILLIAM H. DRAKE, a citizen of the United States, residing at Hackettstown, in the county of Warren and State of New Jersey, have invented certain new and useful Improvements in Furnaces and Heaters; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

This invention relates to certain improvements in that class of furnaces for heating purposes represented by the one shown in my Patent No. 712,271, dated October 28, 1902, the objects of the present improvements being to secure a more perfect combustion of the fuel and to more perfectly control the feeding of said fuel to the bed of ignited coal beneath; to provide more perfect and controllable means for removing the ashes and controlling the bed of live and unburned coals during such removal of the ashes; to provide means for positively separating the live coals from the ashes preliminary to the removal of the latter, and to secure other advantages and results, some of which will be referred to hereinafter in connection with the description of the working parts.

The invention consists in the improved furnace or heater and in the arrangements and combinations of parts thereof, all substantially as will be hereinafter set forth, and finally embraced in the clauses of the claim.

In referring to the accompanying drawings, in which like characters of reference indicate corresponding parts in each of the several figures, Figure 1 is a side elevation of the lower part of a furnace of my improved construction. Fig. 2 is a central vertical section of the same, showing the grate in its lower position and the cut-off or separator plate in operative position, where it will support the live coals while the ashes beneath are being removed. Fig. 3 is a plan showing the sliding cut-off plate in its outlying position; and Fig. 4 is a section of the same, taken as shown at x. Fig. 5 is a plan of the furnace on a reduced scale. Fig. 6 is a section taken at line y of Fig. 7 on a larger scale. Fig. 7 is a side elevation on the scale of Fig. 5, and Fig. 8 is a detail view showing a certain coal-feed passage more clearly. Fig. 9 is a detail rear view of a certain latch and connections for holding the grate-supporting connections. Fig. 10 is a sectional view of the furnace, showing the construction of a certain coal-reservoir more clearly and showing in side elevation the means for feeding the coal from said reservoir to the fire-chamber. Fig. 11 is a detail view showing a certain grate-supporting slide and its connections from the rear.

In said drawings, a indicates the base of the furnace, which may be of any ordinary construction and serves to form the ash-pit a'. At the top of said base the same is provided with an inwardly-extending flange b, to the under side of which is bolted a cylindrical guard a^2, which is bolted to or cast solid or integral with the said flange and within which is arranged the vertically-movable grate c. The said grate c is supported by the vertically-movable slides d and is adapted to lower automatically as the coal or fuel burns away, the movement being controlled by the plate n', lying within the reservoir n for the coal at the top of the furnace. Said plate rests on or engages the coal, and as the latter burns away said plate turns on pivotal connection with the arm or arms r, so that said arm and the rods or connections q p thereof, with the said vertically-movable slides and the grate, all move downward together as the coal is consumed. At the top of said base a, preferably upon or in line with this flange b, above referred to, is formed a slideway e, which is horizontally disposed and is adapted to receive the sliding cut-off plate f. This last consists, preferably, of a comparatively thin but rigid metal plate or sheet (preferably a casting) provided with a collection of small perforations, which perforations, however, may be dispensed with in view of the fact that I do not allow nor propose to allow the said cut-off to remain any material period of time beneath the burning coals. The plate serves to prevent the small granular coals, preferably "pea" or "buckwheat" size, from falling through while the parts are being manipulated, and thus conduces to economy. This cut-off plate f is arranged so that when the grate is in its lower position the said cut-off will lie in a plane or nearly at the plane which divides the live coals in the furnace or the coals which are partially consumed from the ashes, and thus when the said cut-off plate is moved inward by the means hereinafter described it will enter beneath the said live coals and above the

ashes, and thus sustain the said live coals in position while the ashes are being removed, the said cut-off plate separating the live coals without materially disturbing the same or permitting material interference with the combustion or normal condition of the bed of live coals.

To hold the cut-off plate in horizontal plane when the same is lying in operative position, I have preferably formed and arranged the slideway *e*, either integral with the base *a* or partly integral and partly on a bracket *g*, fastened rigidly upon the said base.

The base and upper part *h* of the furnace forming the slideway are shaped to form a slot which is but a little larger in width than the thickness of the cut-off plate, and thus the said slide or cut-off plate is prevented from carrying out with it any material amount of ashes, and thus accumulating droppings on the floor at the rear or side of the furnace.

To force the solid plate through the body of ashes requires considerable power—more than by merely forcing a series of spikes therethrough, as will be evident—and thus I do not employ a mere lever to effect a driving under the power of the hand, but means by which greater motive force can be secured from the hand within a limited space.

To operate the cut-off plate *f*, I have formed thereon or fixed thereto a rack or racks *i*. I prefer to employ two of such racks and arrange them at opposite sides of the said cut-off plate in order to get an easier movement and prevent interference of said rack with the center of the bed of ashes, which ashes would tend to somewhat obstruct the movement of the said cut-off plate. A central arrangement of the rack would to some extent interfere with the up movement of the grate to its highest point, compelling the coals to drop a greater distance when the plate is withdrawn. Cooperating with said racks are pinions *j*, arranged upon a shaft *k*, having bearings in the brackets above referred to, the said pinions *j* intermeshing with the teeth of the racks *i*, and thus when the said pinions are turned, by means of a hand-lever *l*, adapted to enter the sockets of a socket-wheel *m* on the shaft *k* or other suitable means, the said cut-off plate will be moved horizontally either toward or from the bed of coals. The hand-lever *l* is preferably detachable from the socket-wheel *m* or shaft carrying the pinions. Said wheel *m* has a series of sockets each adapted to receive the removable hand-lever *l*, so that the operator or attendant may simply turn the shaft a limited distance and then change his lever to the next socket in turn in said wheel and continue the operation until the cut-off plate has arrived to its inner or outer position. I may make suitable modifications in the manner and means for operating the cut-off plate. The grate having automatically gravitated to its lower position because of the consumption of the coal underneath the plate *n'* and the ashes having accumulated on the said grate to a depth of six inches, more or less, the result of, say, a day's burning and it being desired to remove the said ashes, I force the said cut-off plate *f* from its outlying position of Fig. 4 inward, employing the hand-lever *l*, as above described.

Having separated the ashes from the live coals, the said ashes are dumped into the ash-pit and removed, after which the empty grate is raised up to a point close beneath the cut-off plate. Then the said cut-off plate *f* is again withdrawn, and the said grate may then be again raised to its uppermost position, if deemed desirable, although the very small vertical space previously occupied by the cut-off plate renders such subsequent raising of the grate unnecessary.

To hold the grate *c* in its elevated position preliminary to refilling of the empty coal-reservoir *n* at the top of the furnace, I have employed a latch or holder *o*, by means of which the levers and rods *p q r* or connections controlling the downward movement of the grate are stayed in position to hold the said grate in its said elevated position. When the reservoir is filled with coal, the latch or holder *o* is released from said levers or connections with the plate *n'*, adapted to lie on the coal in the reservoir *n*, and as the coal burns away in the fire-chamber and gravitates from the reservoir said plate *n'* and the grate gradually lower and the grate accumulates ashes thereon, as heretofore described. The latch *o* is preferably a flat strip of metal loosely suspended from an eye 3, Figs. 7 and 9, and having a series of perforations 4, into which the end of the rod *q* may catch where it projects through the lever *r*, as shown more clearly in Figs. 7 and 9.

Where the unburned coal passes out from the reservoir *n* to the fire-chamber below, I have provided contracted passages *s s* at the sides of the furnace, as indicated more clearly in Figs. 5 and 8. I have provided slots *t* through the outsides of the furnace, through which I can insert coal-stays *u u*. These are preferably provided with handles *v* on the outside and hooks *v'*, Fig. 6, on the inside, the latter enabling the stays to be arranged over the openings or slots *t* to close the same, and thus prevent interference with the draft during ordinary operations of combustion.

When it is found desirable to lower the grate while the coal-reservoir is full of coal, I unhook the stays *u* and thrust the small ends of the same through the slots *t*, Figs. 6 and 8, and close the passages *s*, and thus prevent the down passage of the coal therethrough.

When dumping the ashes from the grate after thrusting the cut-off plate *f* between the live coals and said ashes, I prefer to employ a shaking and dumping handle 5, such as has

been heretofore in use in connection with a furnace-grate and slide *d*, and when such handle is used I prefer to hold said handle 5 in its uppermost position and positively prevent any interference thereof with the automatic down movement of the said slides and their connections by means of a stay 6, pivoted on and movable with the slide *d* and adapted to catch on a hook 7 at or near the free end of the handle 5, as will be understood upon reference to Fig. 11.

Having thus described the invention, what I claim as new is—

1. The combination, in a furnace, with the base having an ash-pit, a grate and a guard in which the grate may work, and a horizontal slideway immediately above said grate and guard, of a perforated cut-off plate arranged in said slideway and adapted to be thrust between the ashes and the live coals above to hold the latter in position to receive the grate while removing the ashes from within said guard, substantially as set forth.

2. The combination with the furnace and vertically-movable grate and means controlling the vertical movements of said grate, of a sliding sheet having small perforations therein and adapted to be thrust between the ashes and live coals above said grate, substantially as set forth.

3. A furnace having downwardly-movable slides and a grate pivoted in said slides and means controlling the downward movements of the slides and grate, and handle 5, for operating the grate and a stay movable with one of said slides and adapted to engage the said handle to hold it away from a position of interference as the grate and slide descend, said parts being in combination, substantially as described.

4. The combination with the furnace having a vertically-movable grate and means for supporting the same and permitting an automatic lowering of the said grate as the coals thereover burn away, of a sliding perforated sheet adapted to be thrust under the live coals to support the same temporarily while removing the accumulated ashes on the grate, substantially as set forth.

5. The improved furnace having a downwardly-movable grate and means controlling the downward movements thereof, a fuel-reservoir communicating through contracted passages with the fire-chamber above said grate and stays adapted to be thrust through said contracted passages to prevent temporarily the down passage of the said fuel, said parts being combined, substantially as set forth.

6. The improved furnace herein described, having therein a downwardly-movable grate and means controlling the downward movements thereof, a fuel-reservoir communicating through contracted passages with the fire-chamber above the said grate, the sides of said furnace being provided with openings at said contracted passages, and stays adapted to be thrust through said openings across said passages to stop the passage of coal to the fire-chamber, substantially as set forth.

7. The improved furnace herein described having therein a downwardly-movable grate and means controlling the downward movements thereof, a fuel-reservoir communicating through contracted passages with the fire-chamber above said grate, the sides of said furnace being provided with openings at said contracted passages, and stays having suspensory-hooks whereby said stays may be arranged to close said openings and said stays being adapted to be thrust through said openings across the said passages to stop the passage of coal to the fire-chamber substantially as set forth.

8. The improved furnace herein described, having therein a downwardly-movable grate and means controlling the downward movements thereof, a fuel-resorvoir communicating through contracted passages with the fire-chamber above said grate the sides of said furnace being provided with openings at said contracted passages, and stays adapted to normally close said openings and adapted to be thrust through said openings across the said passages to stop the passage of coal to the fire-chamber, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 9th day of July, 1902.

WILLIAM H. DRAKE.

Witnesses:
CHARLES H. PELL,
LILLIAN K. MANN.