

J. A. MATHIEU.

FURNACE FOR DISTILLING AND CARBONIZING WOOD, &c.

No. 282,342.

Patented July 31, 1883.

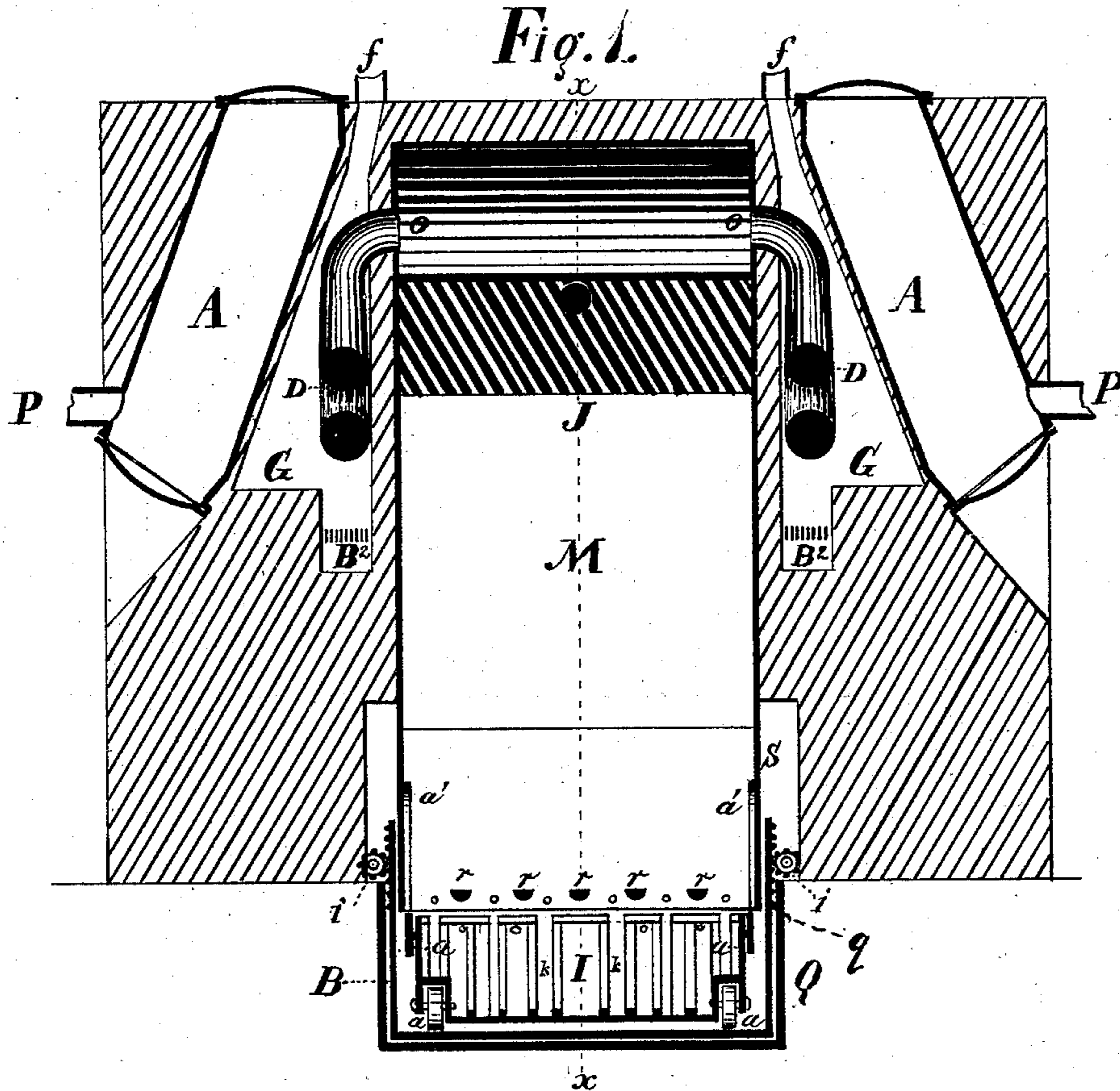
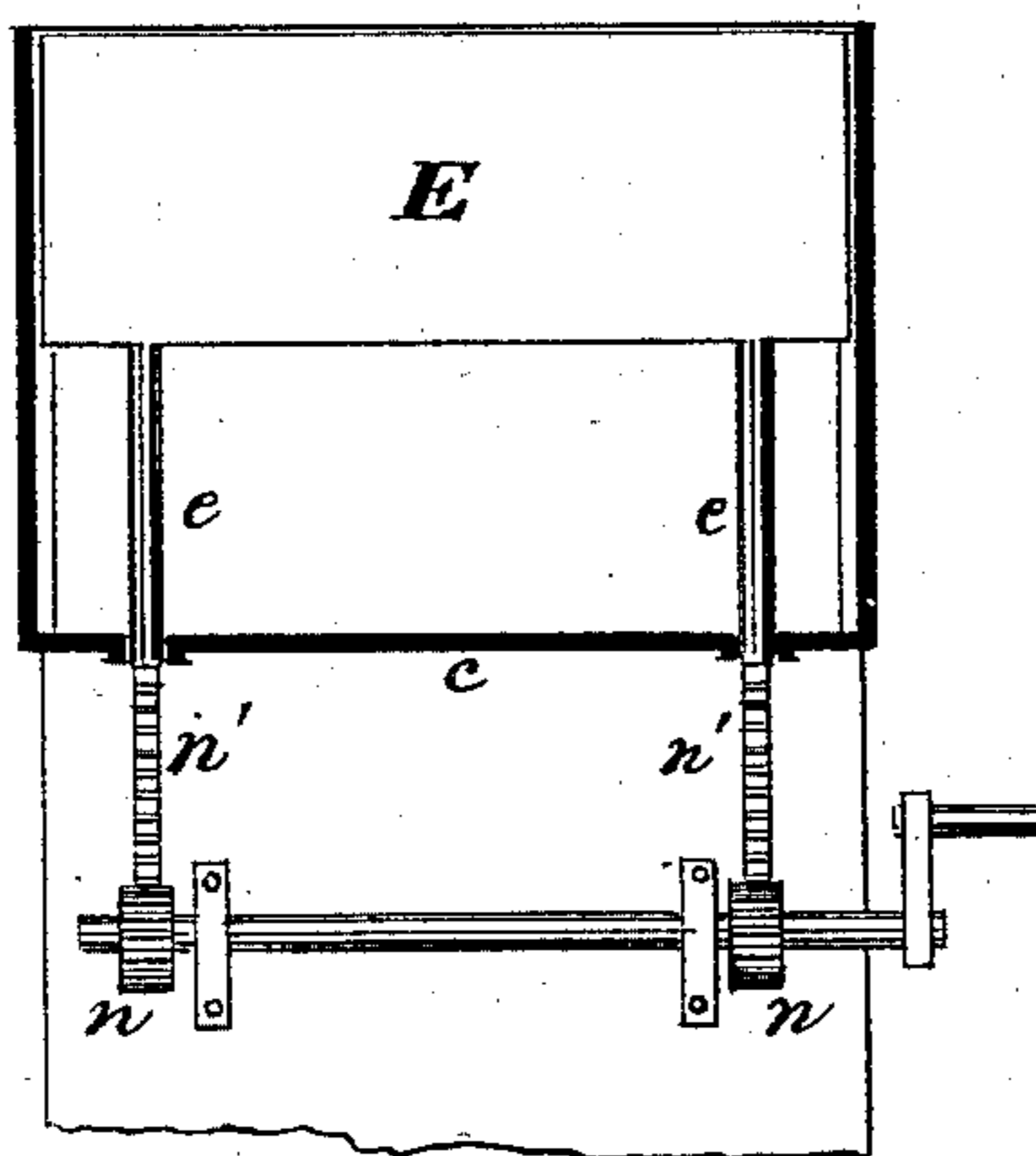


Fig. 4.



WITNESSES

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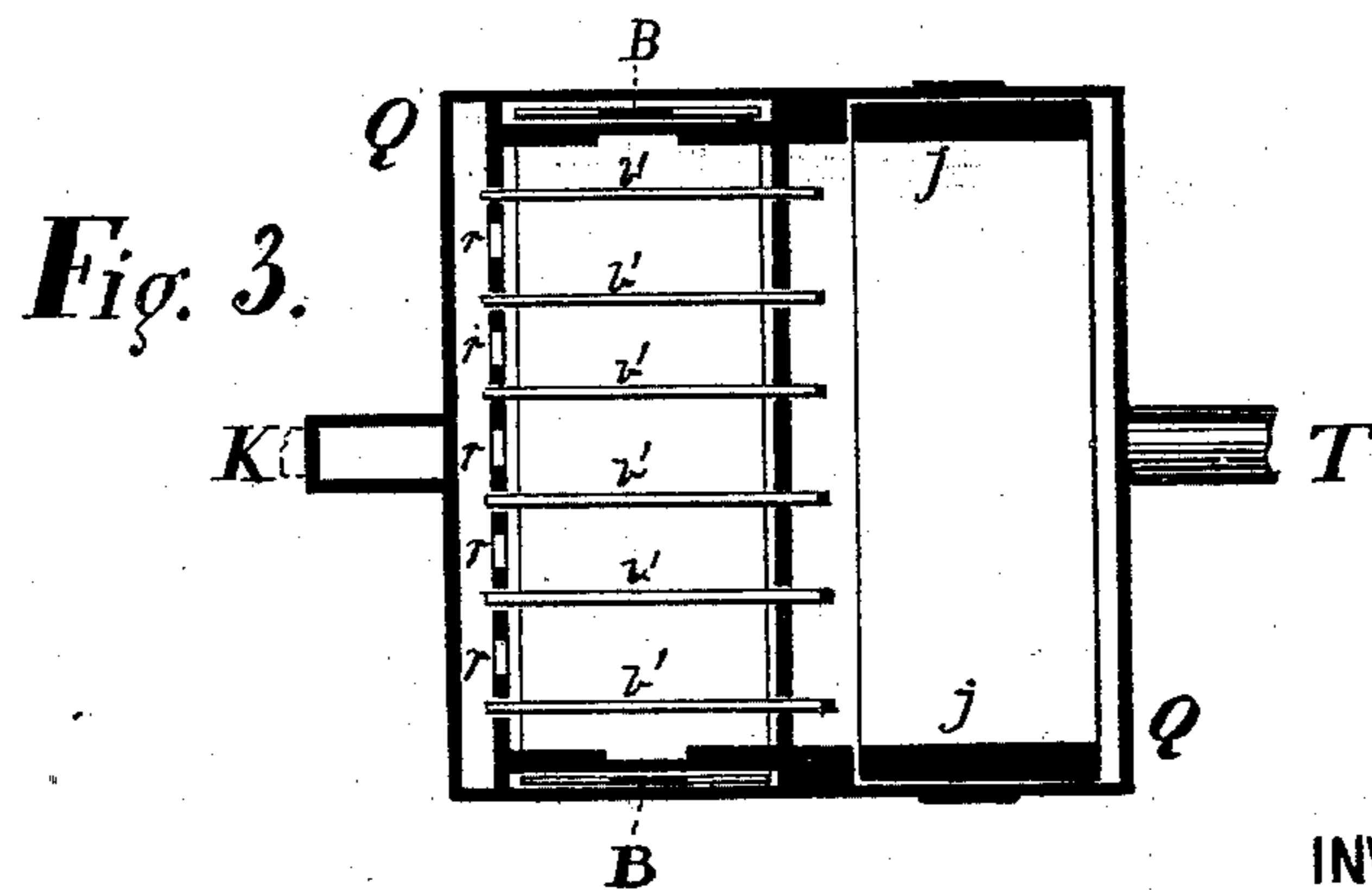
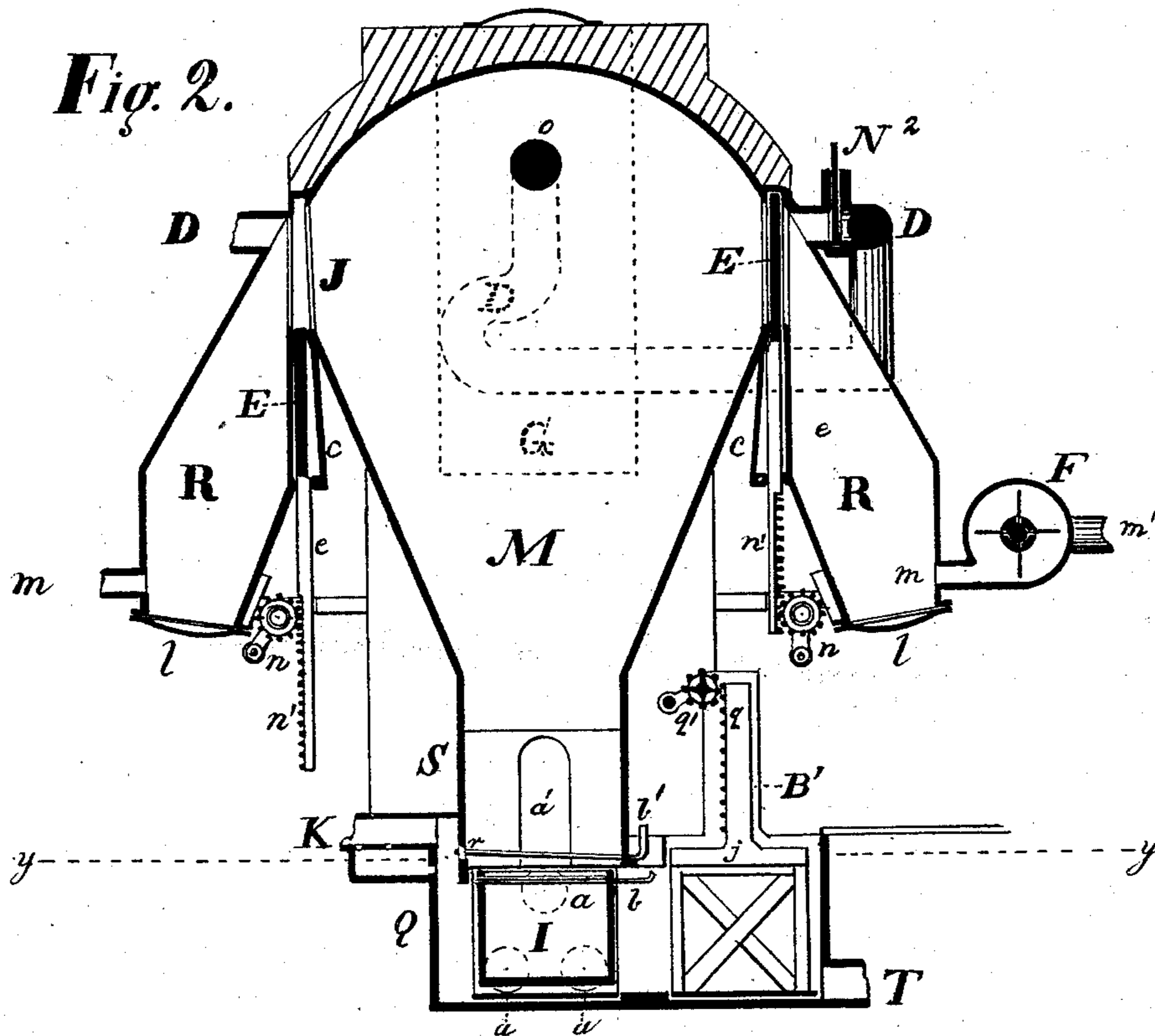
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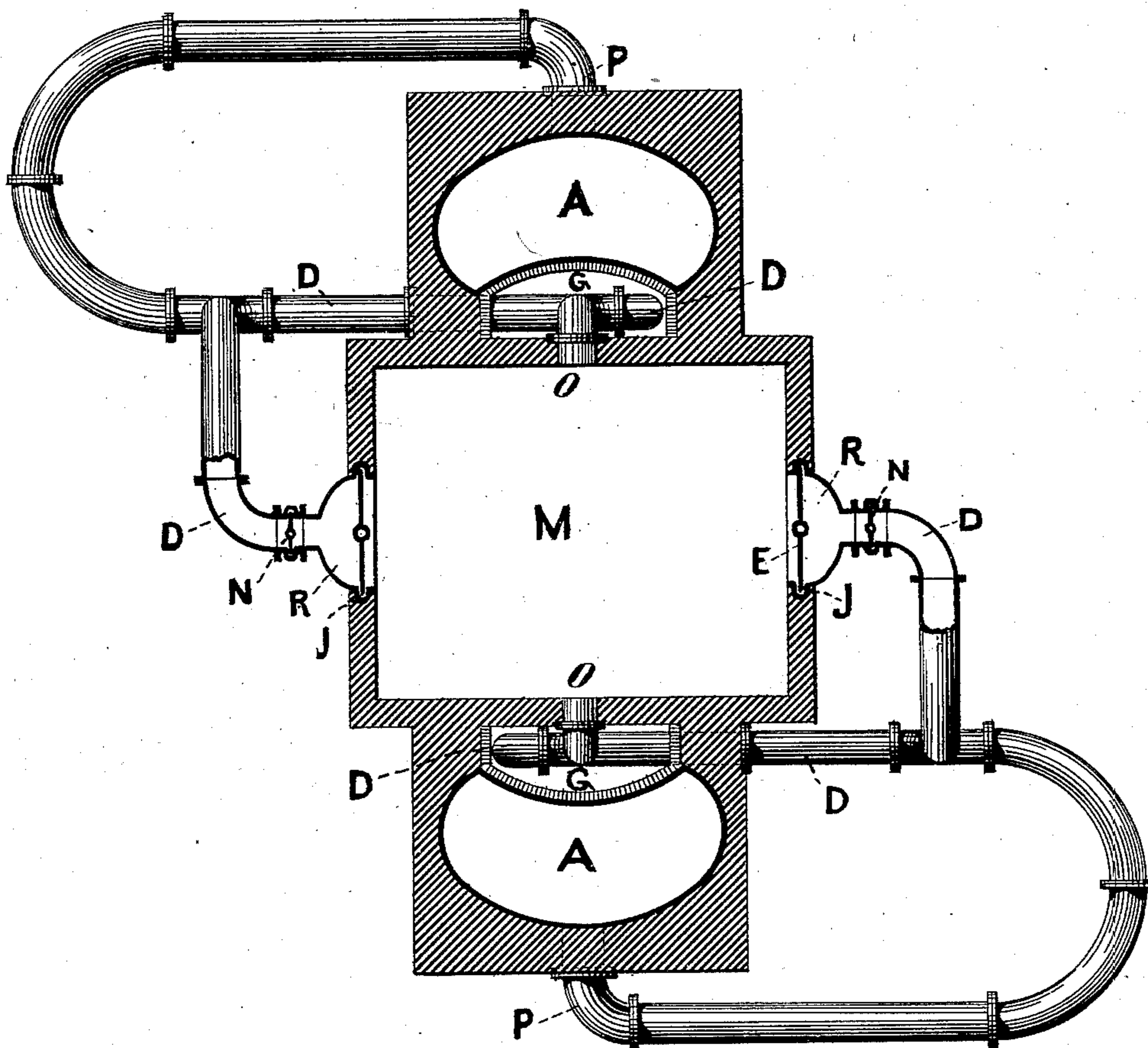
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FIG. 5.



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JEAN A. MATHIEU, OF PHILADELPHIA, PENNSYLVANIA.

FURNACE FOR DISTILLING AND CARBONIZING WOOD, &c.

SPECIFICATION forming part of Letters Patent No. 282,342, dated July 31, 1883.

Application filed December 5, 1878.

To all whom it may concern:

Be it known that I, JEAN A. MATHIEU, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain Improvements in Furnaces for Distilling and Carbonizing Wood and other Similar Substances, of which the following is a specification, reference being had to the accompanying drawings.

My invention consists, mainly, in certain improvements upon the furnace described in Letters Patent No. 208,835, granted to me under date of October 8, 1878, and is specially adapted to be used in connection with a system similar to that there described, wherein one or more lesser retorts are combined with a large retort, and distillation is conducted by re-entry of the non-condensable or uncondensed vapors and the products of combustion into the retorts. Certain features, however, can be advantageously used in any apparatus for distilling wood or similar substances.

The object of my invention is to economize heat and to facilitate the introduction of the wood and the removal of the charcoal, while affording opportunity for the treatment of the former prior to, and of the latter after, carbonization.

In the accompanying drawings, Figure 1 represents a vertical section through the center of the main retort and two of the lesser retorts which flank it, and also through the car for introducing wood. Fig. 2 is a vertical section at right angles to that of Fig. 1, and through the line *xx* of the latter. Fig. 3 is a horizontal section through the line *yy* of Fig. 2, showing the neck of the main retort and the tank which contains the car. Fig. 4 is an elevation of the sliding door of the charcoal-receptacle and its actuating device. Fig. 5 is a horizontal section through the retorts and charcoal-receptacles, on a line coinciding with the center of pipe D, showing also portions of said pipe D and its connections in perspective.

The details of the lesser retorts, condensers, and safety apparatus are not shown, since they are fully described in my Patent No. 208,835.

The main retort M is preferably constructed of brick or iron, and has at its bottom the neck S, which descends into the tank Q, and which is provided on one side with openings *r r r*

for exit of the distilled vapors. Sliding rods *b'* extend across the mouth of the neck S and form a grating for the support of the wood to be distilled. A pipe, K, maintains the liquid in the tank Q at a proper height to seal the neck of the retort, while also serving to conduct the vapors to the condenser. The latter is not shown in the drawings, but is preferably of the form described in my Patent No. 208,835, and communicates through a safety apparatus (also there described) with the fan F, the blast-pipe of which in turn leads into the receptacles R. The exit-pipes P of the lesser retorts A also communicate with their condensers, and through similar safety apparatus with the fan F, or a corresponding fan on the opposite side, which, to avoid repetition, is not shown. Pipe P is connected with retort A, near the bottom thereof, instead of near the top, as shown in my Patent No. 208,835. When retort A is heated the wood therein gives off gas, which rises to the top of the retort, and finding no outlet there is compelled to descend through the mass of carbonizing material and pass out near the bottom of the retort. The effect is to heat the wood in the bottom and outer part of retort A, where the retort is always coolest, nearly as rapidly as the wood in other parts of the retort is heated, and thus complete the carbonization of the whole mass in a shorter time and with less heat than would otherwise be necessary.

The receptacles or charcoal-reservoirs R R are adjusted on either side of the main retort M, which has two openings, J J, near its top, communicating with the reservoirs R R and controlled by doors E. These doors slide vertically, and when raised by the rack and pinion *n n* into the position shown on the right-hand side of Fig. 2 tightly close the openings J J. The supporting-rods *e e* pass through stuffing-boxes *c* to insure a tight joint.

Near the top of the reservoirs R R are pipes D, controlled by dampers N², which lead through the flues G of the lesser retorts A, and thence into the main retort M. That part of the pipes D which is within the flue G is preferably serpentine in form, as shown, to insure a large heating-surface. The reservoirs R R have also openings at the bottom fitted with lids L.

The tank Q communicates, by the pipe T, with a larger tank, (not shown,) into which its contents can be charged when desired. Within that portion of the tank Q which is beneath the neck S is the elevator B, which consists of a stout rectangular frame-work, conforming in size and shape to the mouth of the neck S, and provided at its ends with racks *g*, which project vertically upward just outside of the neck S, and engage with pinions *i*. These pinions *i* are rotated by cranks or other suitable mechanism, so as to raise the frame-work B until its bottom is flush with the mouth of neck S.

In a lateral extension of the tank Q, and adjacent to the side of neck S, is placed a second elevator, B', constructed similarly to the elevator B, except that it is provided at each end with an inwardly-projecting flange or rim, *j*, formed along the upper side of the frame-work. The length of the frame B' and the height of these flanges *j* are such that when the frame is sunk to the bottom of the tank, as indicated in Figs. 2 and 3, the flanges *j* are in line with the edges or ends of the mouth of neck S. A car, I, having at each end wheels *a a a*, fits snugly within the elevator B', the third or upper wheels engaging beneath the flanges *j*, and as the car is rolled from the elevator B' to the elevator B, at the bottom of the tank, these wheels engage beneath the edges or ends of the mouth of neck S. Vertical recesses *a'* are formed on the inside of the neck S to receive the upper wheels when the car is properly in position to be raised by the elevator B within the retort. Sliding rods *b* extend across the car I, near its top, and between these rods the sides of the car are slotted vertically from top to bottom, as shown at *k*. These slots *k* are so distanced as to correspond with the bars *b'*, which extend across the neck S.

All the parts of the apparatus, except the main retort and flues, are preferably constructed of cast-iron.

The operation is as follows: When wood is to be distilled, the lesser retorts A A are charged and the tank Q is filled with liquid—preferably pyroligneous acid—to the level of the pipe K. The car I being filled with fagots laid longitudinally therein, the slide-bars *b b* are inserted above them, and the loaded car is sunk into the tank upon the frame-work B' by means of its racks and pinions. The bars *b b* prevent the wood from floating, and the shoulders *j* hold the car down firmly. The car is then rolled into position beneath the neck S, and the bars *b b* and *b' b'* being withdrawn, it is raised by the elevator B into the retort M, the upper wheels working loosely in the guiding-recesses *a' a'*. The slide-bars *b' b'* are then inserted at the bottom of the slots *k*, beneath the fagots, and the car being lowered the wood remains in the retort M. The car is then run onto the elevator B', where it is raised and recharged. The fires being lighted on the grates B², distillation commences in the lesser

retorts A, the vapors from which, after passing through condensers, are drawn down by the fans F and forced into the reservoirs R, whose doors E E are closed. They thence pass, by the pipes D, through the flues G G, where they are reheated, and into the main retort at *o o*. Descending upon the wood therein, they commence distillation thereof, and pass out with the products of distillation through the openings *r r r* and pipe K to the condenser. The liquid in the tank Q serves as a seal to prevent their escape in the other direction. As distillation continues in the main retort M repeated charges of wood are introduced by the car I and the charcoal on top rises and fills the retort. One of the doors E is then lowered and the charcoal falls into the reservoir R adjoining. The door is then raised and the operation continues. The blast of gases from the fans F is now driven through the mass of hot charcoal in the reservoir R before entering the pipes D, and the double effect is thus accomplished of cooling the charcoal and reheating the gases before their entry into the pipes D and main retort M. The reservoirs R R are preferably used alternately, and during the brief time that their respective doors E E are open, and also when the lid *l* is removed to discharge the charcoal, the damper N² is closed, and the fan upon that side is stopped.

I claim—

1. The combination of the charcoal-reservoir with the exit-pipe of the condenser, whereby the non-condensed or uncondensable gases are passed through the hot charcoal, substantially as described.

2. The combination of the charcoal-reservoir, exit-pipe of the condenser, and pipe D, leading to the main retort, whereby the gases, after passing through the hot charcoal, are driven into the retort, substantially as described.

3. The retort M, having lateral openings near its top, and vertically-sliding doors E, substantially as described.

4. The combination of the neck S and tank Q with the car and its elevators, substantially as described.

5. The combination of the car I, having slots *k*, with the neck S and bars *b'*, substantially as described.

6. The combination of the elevator B and car I, having upper guide-wheels, with the neck S and guides *a' a'*, substantially as described.

7. A closed retort for carbonization of wood, having a pipe adapted to lead off from said retort the gaseous products of distillation, connected with said retort at or near the lower end thereof.

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Witnesses:

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