

(No Model.)

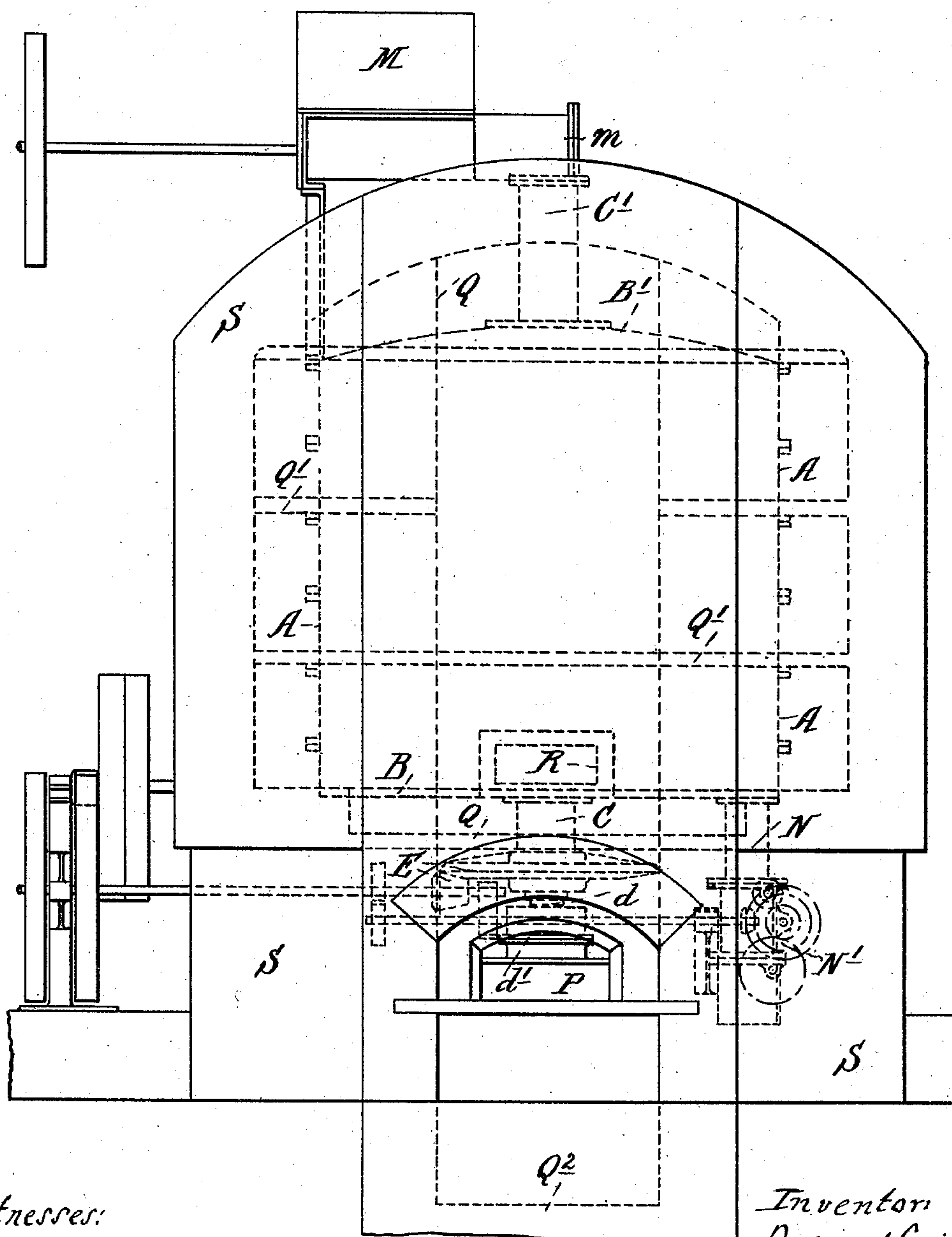
4 Sheets—Sheet 1.

R. HAIG.
MECHANICAL RETORT.

No. 505,356.

Patented Sept. 19, 1893.

Fig. 1.



Witnesses:
Wellbrick
J. B. Keefe

Inventor
Robert Haig
by *Marcellus Bailey*
his attorney

(No Model.)

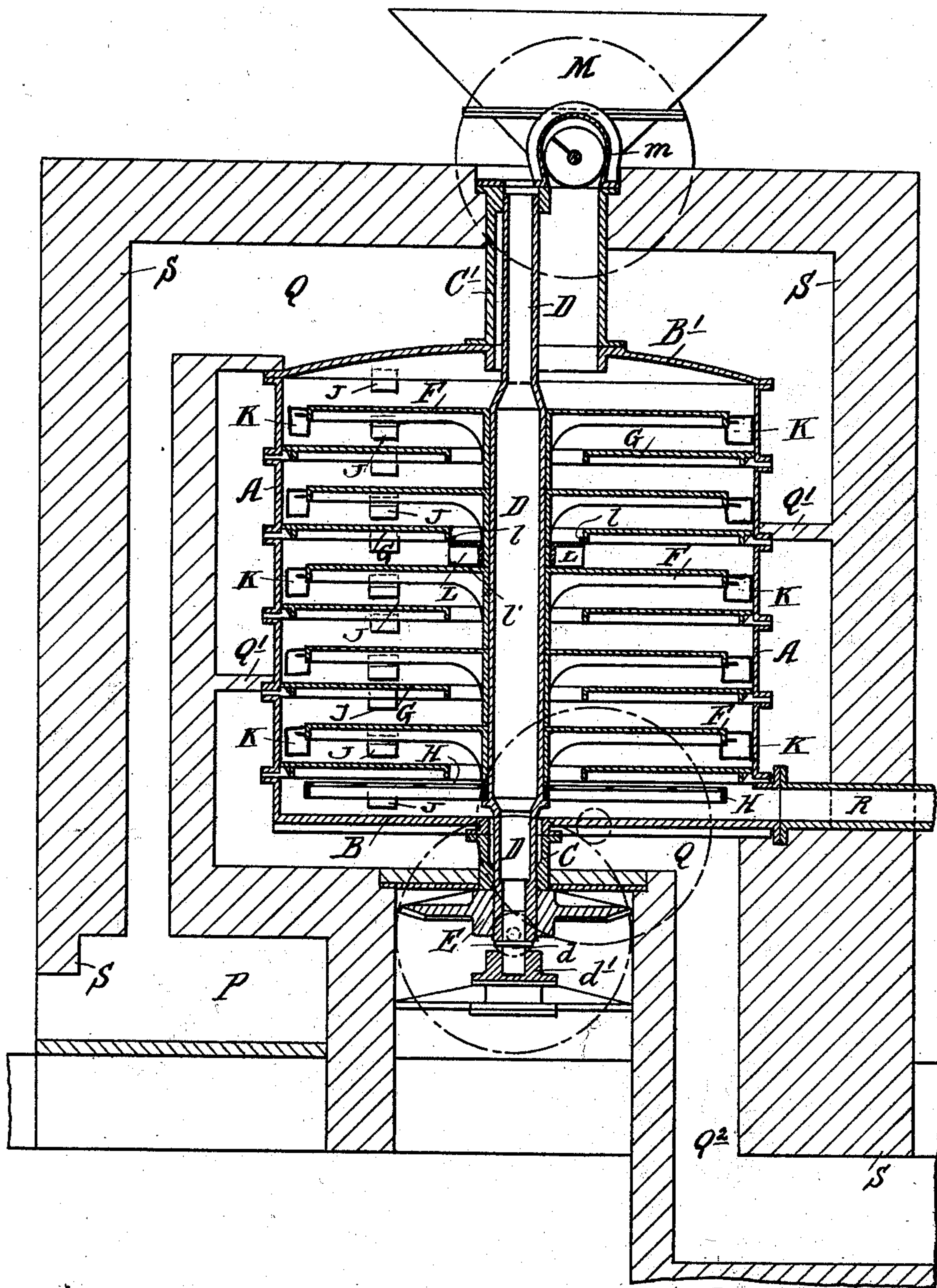
4 Sheets—Sheet 2.

R. HAIG.
MECHANICAL RETORT.

No. 505,356.

Patented Sept. 19, 1893.

Fig. 2.



Witnesses:
Ewell A. Dick
F. B. Keefe

Inventor:
Robert Haig
by Marceline Bailey
his attorney.

(No Model.)

4 Sheets—Sheet 3.

R. HAIG.
MECHANICAL RETORT.

No. 505,356.

Patented Sept. 19, 1893.

Fig. 3.

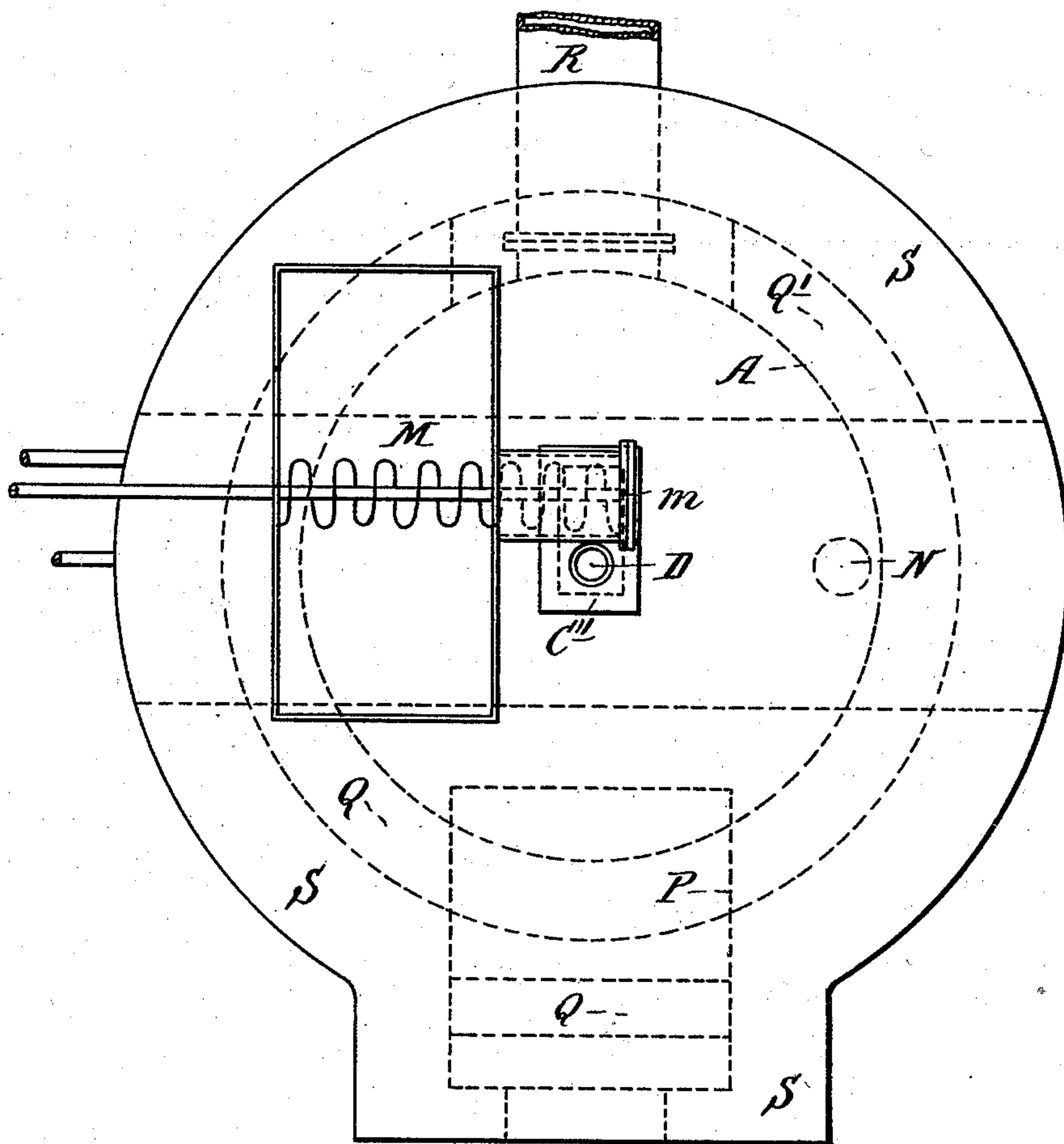


Fig. 7.

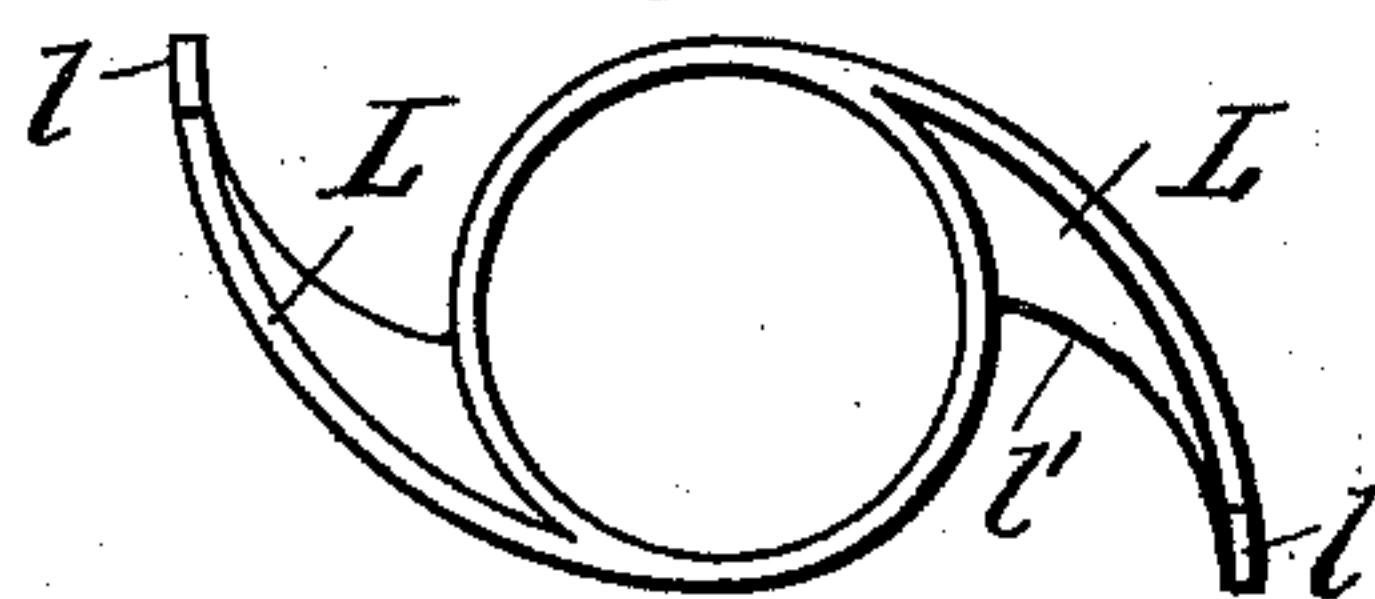
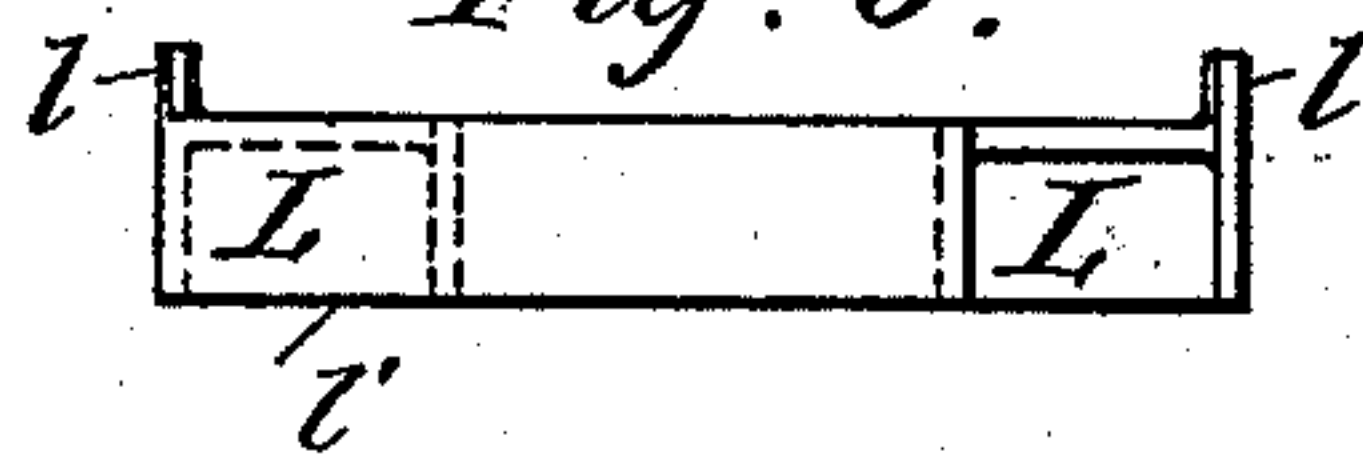


Fig. 8.



Witnesses:

Welland
J. B. Keefe

Inventor:

Robert Haig
by Hercules Daily
his attorney.

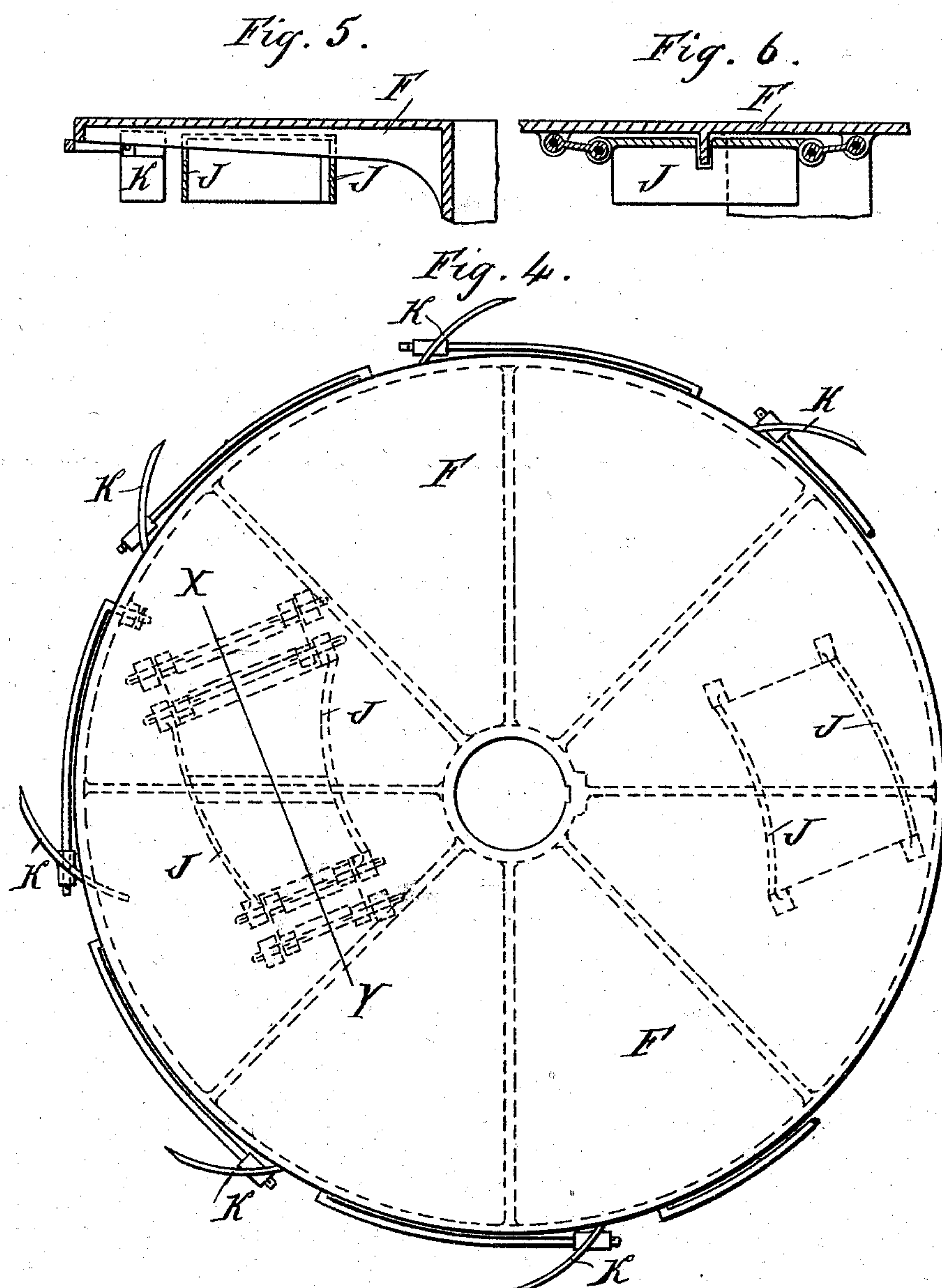
(No Model.)

4 Sheets—Sheet 4.

R. HAIG.
MECHANICAL RETORT.

No. 505,356.

Patented Sept. 19, 1893.



Witnesses:
Ewell A. Dick
F. B. Keifer

Inventor:
Robert Haig
by Marshall Bailey
his attorney

UNITED STATES PATENT OFFICE.

ROBERT HAIG, OF PAISLEY, SCOTLAND.

MECHANICAL RETORT.

SPECIFICATION forming part of Letters Patent No. 505,356, dated September 19, 1893.

Application filed October 20, 1891. Serial No. 409,336. (No model.) Patented in England April 12, 1889, No. 6,242, and in France June 5, 1889, No. 198,736.

To all whom it may concern:

Be it known that I, ROBERT HAIG, chemist, of the Mechanical Retorts Company, Limited, of Murray Street, Paisley, Scotland, have invented Improvements in the Construction and Arrangement of Mechanical Retorts for the Treatment of Animal, Vegetable, and Mineral Matters, (for which I have received Letters Patent in Great Britain, No. 6,242, dated April 12, 1889, and in France, No. 198,736, dated June 5, 1889,) of which the following is a specification.

This invention which relates to improvement in the construction and arrangement of mechanical retorts for the treatment of animal, vegetable and mineral matters, has for its object to provide a mechanical retort which may be used for the distillation, desiccation or regeneration of such matters or substances, as for example among other things, it may be used for distilling shale or wood, drying chemicals, revivifying char for sugar refining, &c., and which owing to its construction and arrangement effects the said processes in a much more efficient and economical manner than hitherto.

My said invention relates to circular upright retorts in which the material under treatment is kept in intermittently continual progression or agitation, from its entrance at the top of the retort until it has traversed the retort and is discharged at the bottom thereof.

In accordance with my improvements upon this class of retorts, I introduce the material through the top cover of the retort as near the center thereof as practicable so that the material falls into the retort upon a top revolving plate, near the center thereof, and is deflected therefrom to and over the outer edge of the said plate, from whence the material falls down upon the outer edge of a fixed plate below, and is deflected therefrom to and over the inner edge of said plate and on to the next lower revolving plate, and so on with regard to every pair of plates in the retort, till it leaves the last fixed plate, when it falls through a skeleton revolving plate on to the bottom of the retort from whence it is deflected outward to the discharge. Also in accordance with my improvements I am enabled, owing to the arrangement of flues, to keep an approximate equality of temperature

throughout the retort by causing the heat to be applied at the top of the retort where the cold material is fed in, and drawing the reduced furnace heat out at the bottom where the hot material leaves, also by the removal of the volatile matters, vapors or gases from the bottom of said retort in lieu of the top, I am enabled not only to maintain equality of heat but to effect an economy of fuel.

In the drawings, Figures 1, 2 and 3 are respectively front view, cross sectional elevation, and plan, and Figs. 4 to 8, inclusive are detail views of my said improved mechanical retort.

Referring to the said drawings I construct, preferably of cast iron rings an upright cylinder or drum A having its ends closed by means of disks or covers B, B', the latter of which is curved or dished. The said disks B, B', are each provided with sleeves C, C', which project through the flues and masonry, in such a manner as to permit of an upright shaft D passing up through the center of the drum A, the said shaft being carried at its lower end *d* in a suitable step bracket *d'*, and driven by means of bevel gearing E either at its lower end as shown or at its top end. Inside the said drum A I arrange a number of pairs of disks or plates, each pair consisting of a revolving disk or plate F and a fixed or stationary disk or plate G, the said revolving plate F being carried by the shaft D and is preferably made less in diameter than the inside diameter of the drum A, so as to leave an annular space around its circumference; underneath the revolving plate F I mount the fixed or stationary plate G which is carried by and suitably connected to the shell of the drum A, and is formed with a central hole or opening so as to leave an annular space around the shaft D.

To the inside of the cover B' also to the under sides of all the plates F and G and to the under side of the revolving skeleton plate H mounted underneath the said plates F and G I attach by any suitable means a number of blades J, which may be mounted singly, or as is shown in part plan and part sectional elevation Figs. 4 and 5, and in sectional elevation Fig. 6 taken on line X, Y, of Figs. 4, in groups so as to form harrows which work upon the upper surface of the plate below

and so plow or stir the material being treated as well as deflect it either toward the shell or away from it according to the plate they are mounted on and to the angle given them; the said deflecting being also assisted by means of single blades or scrapers K, arranged around the circumference of the revolving plates F, as shown in Figs. 2, 4 and 5 so as to keep the annular space clear, and by single blades or scrapers L Figs. 7 and 8 arranged around the inside openings of the stationary plates G the said scrapers L being held stationary by the snugs or projections *l* engaging with the under sides of the stationary plates G so as to scrape the center of the revolving plates F, by the edge *l'*.

In Fig. 2 is illustrated one scraper L in position. The others have been omitted for sake of clearness and a desire not to confuse the drawings.

The top sleeve C' is so made that in addition to carrying or steadying the shaft D it serves as a chute and is connected at its top end to the lower side of the discharge pipe *m*, of the hopper M, into which the material to be treated is charged more or less continuously so as always to have the feeding screw working in a full or nearly full hopper and so prevent air getting into the retort. Also the discharge N is provided with a double door arrangement N' which is so constructed and geared that the two doors are never open at the same time, or a suitable pocketed drum arrangement, and the said discharge N is preferably arranged in or near the bottom of the retort as shown in the drawings though I may also so form the lower sleeve C as to act as a discharge in which case the double door arrangement N' would be mounted underneath, and in lieu of the skeleton plate there would be an ordinary revolving plate F so as to deflect the material toward the center of the retort in lieu of the circumference. In order to keep the said retort at an approximate equality of temperature I so arrange the furnace P and flues Q which are all inclosed in brickwork or other suitable masonry S as well as all the retort and fittings so that the combustion gases which heat the retort are caused to pass up and over the cover B' thence down and around the sides by means of the divisions Q', until they reach the bottom of the retort after passing through below which they are led to the chimney by the flue Q². The said equality of temperature is also assisted by so arranging the volatile matter, vapor or gas outlet R as near the bottom of the retort as possible or through the center of the bottom cover B, so as to enable the said volatile matters, vapors or gases leaving the retort when at their highest temperature as well as when the combustion gases are at their lowest. The said volatile matters may be withdrawn by means of any suitable exhaustor. It will thus be seen that the whole arrangement is such that on the material passing through the hopper M it falls onto

the center of the top revolving plate F, and is formed into rings and deflected outward by means of the harrows and scrapers attached to the cover B' till it drops over the edge of the said revolving plate F and falls on the outer edge of the top stationary plate G and is there formed into rings and deflected inward by means of the top plate's harrows and scrapers till it falls through the annular space, which is kept clear by means of the scrapers L, onto the next revolving plate F, and so on till it reaches the annular space of the lowest stationary plate G whence it falls through the skeleton plate H and is formed into rings and deflected outward by means of the said plate's harrows and scrapers till it reaches the discharge N and passes through the double door arrangement N' to the residue conveyer, &c. To assist the treatment of the material I may introduce superheated or low pressure steam into the interior of the retort preferably along with the material.

I claim—

1. In a drying retort, the combination of a series of revolving plates, a series of stationary plates having central openings, and scrapers the upper ends of which are adapted to extend up into the central openings of the stationary plates, and their lower edges *l'* bearing upon the revolving plates at about their center, substantially as and for the purposes herein before set forth.

2. In a drying apparatus, the combination with a retort, of a series of revolving plates F, a series of stationary plates G, scrapers arranged above the said plates to stir up the material upon them, and blades K arranged around the edges of the revolving plates, substantially as described.

3. In a drying apparatus, the combination with a retort, a series of revolving plates F a series of stationary plates G having central openings, the scrapers arranged above the said plates to stir up the material thereon, the stationary scrapers L arranged to bear upon the revolving plates below the openings in the stationary plates, and the blades K arranged at the edge of the revolving plates substantially as described.

4. In a drying apparatus, the combination of a vertically arranged closed retort, means for feeding material slowly through the same, and an escape passage for the volatile vapors from the retort leading from the lower part thereof, and a heating flue for the retort outside thereof leading first to the top thereof then around the same and then out near the bottom thereof, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT HAIG.

Witnesses:

JAMES YATE JOHNSON,

JOHN GEORGE CLARK,

Both of 115 St. Vincent Street, Glasgow.