

(No Model.)

2 Sheets—Sheet 1.

J. F. BALDWIN.  
APPARATUS FOR MALTING AND DRYING.

No. 350,472.

Patented Oct. 12, 1886.

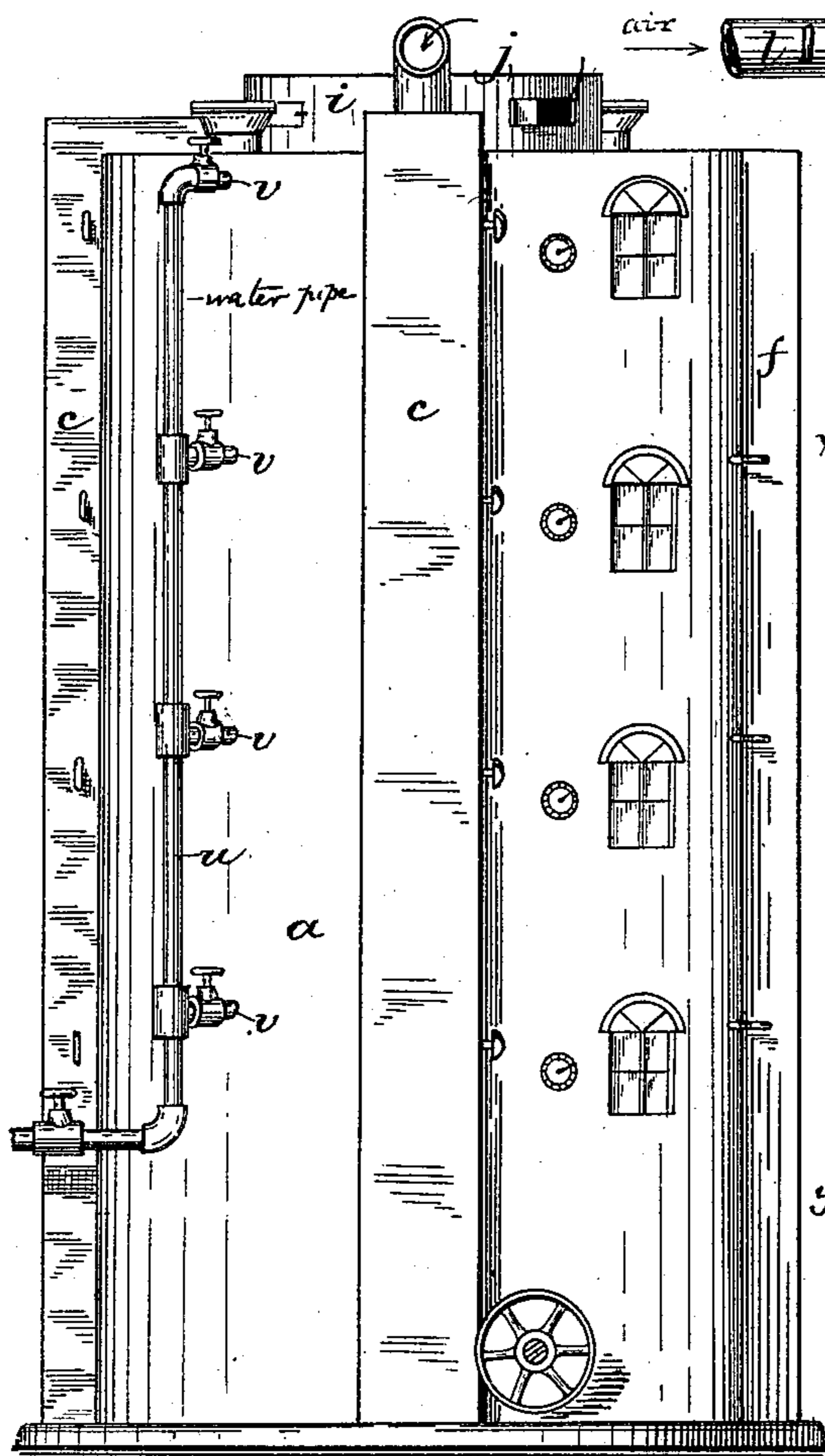


Fig. 1.

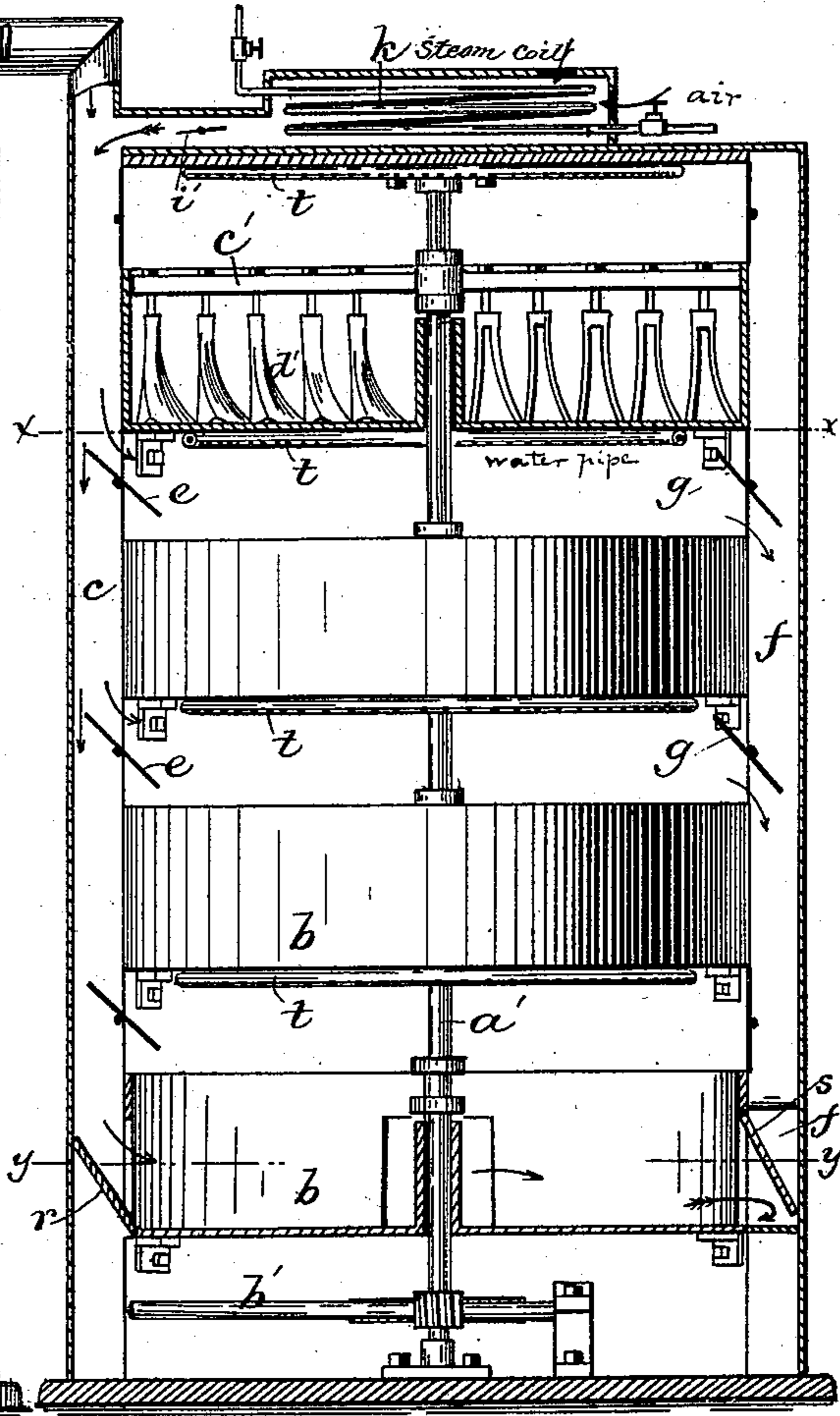


Fig. 2.

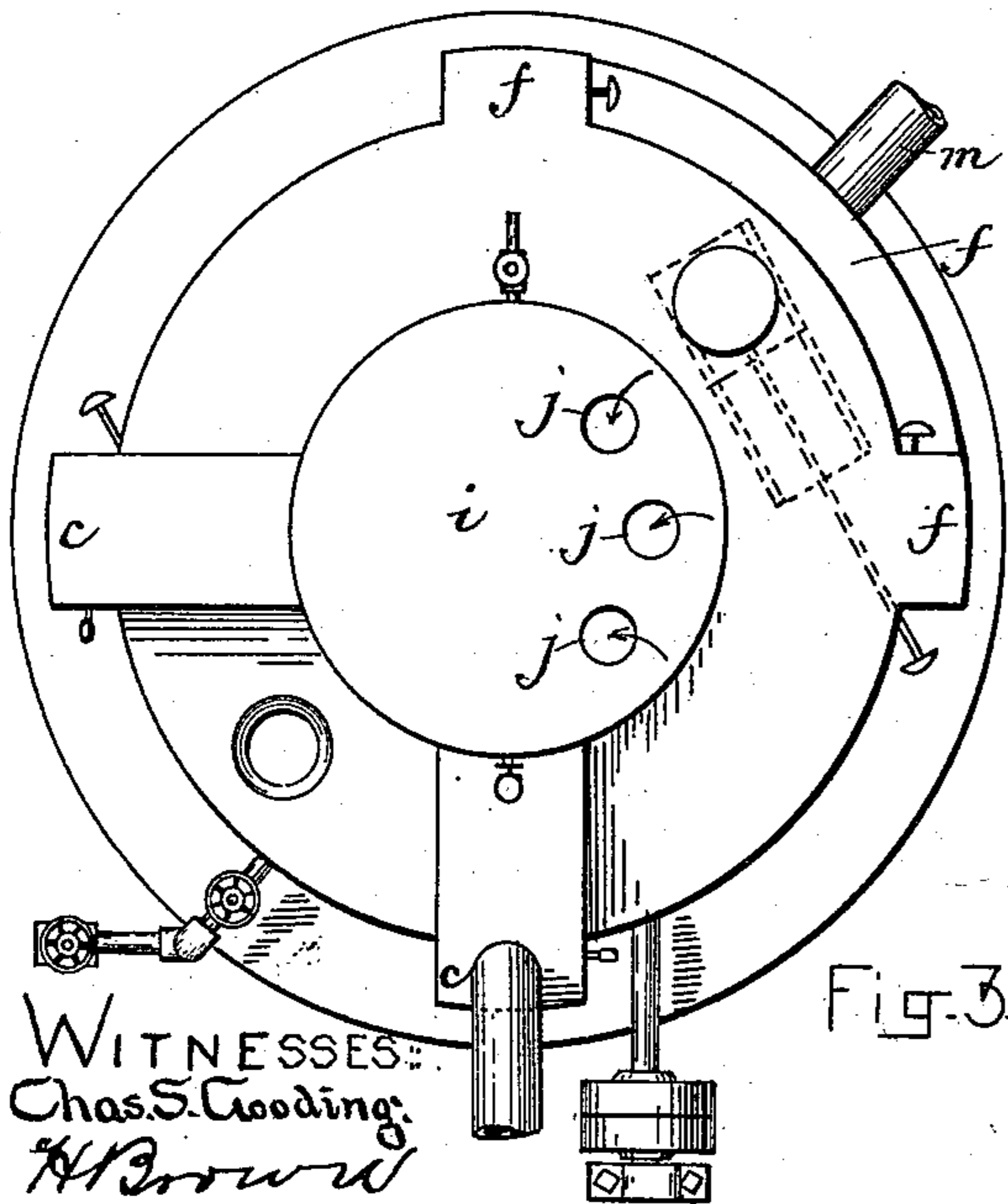


Fig. 3.

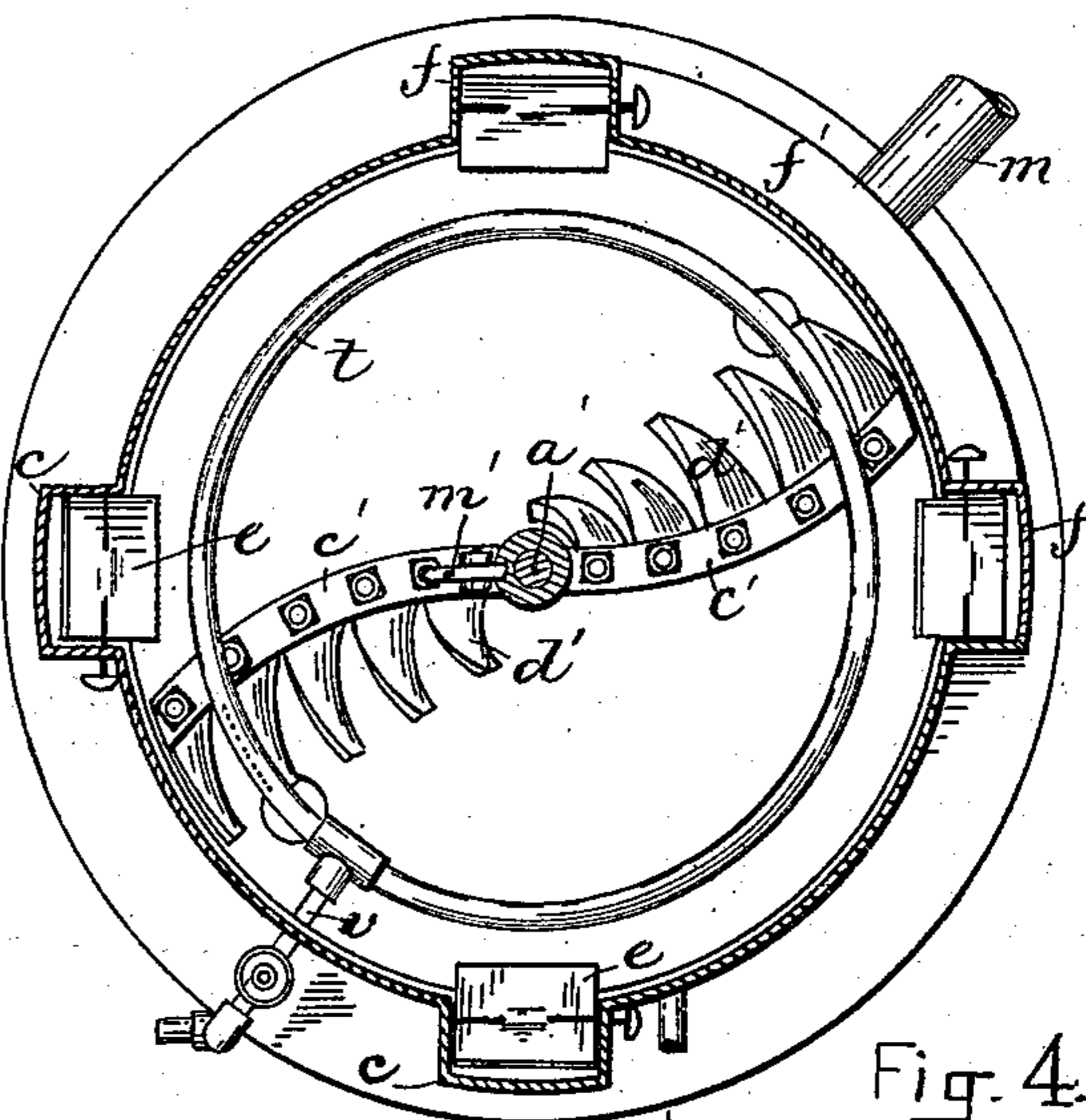


Fig. 4.

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H. Brown

INVENTOR:

J. F. Baldwin  
by Wright & Brown Attys.

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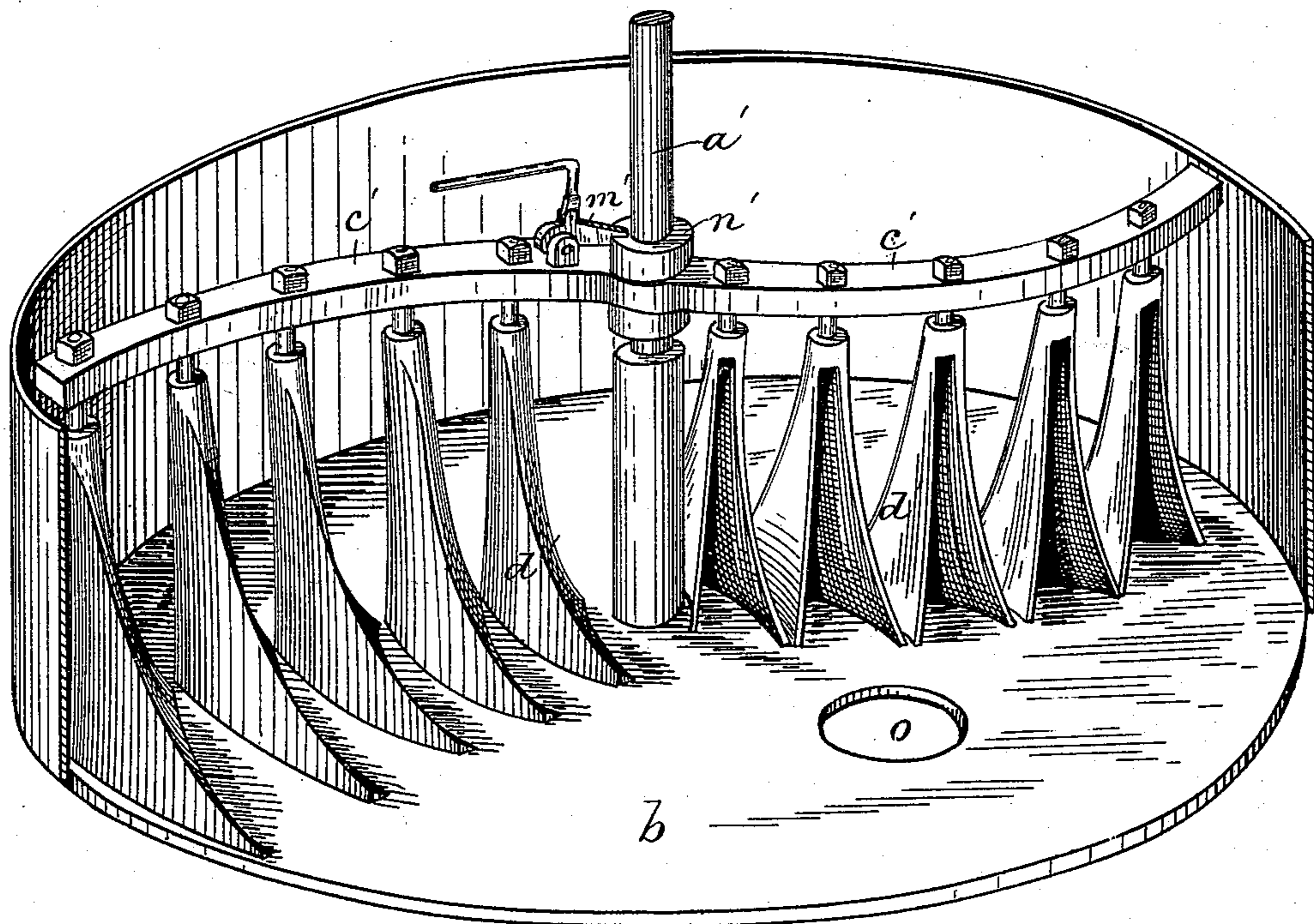


Fig. 6.

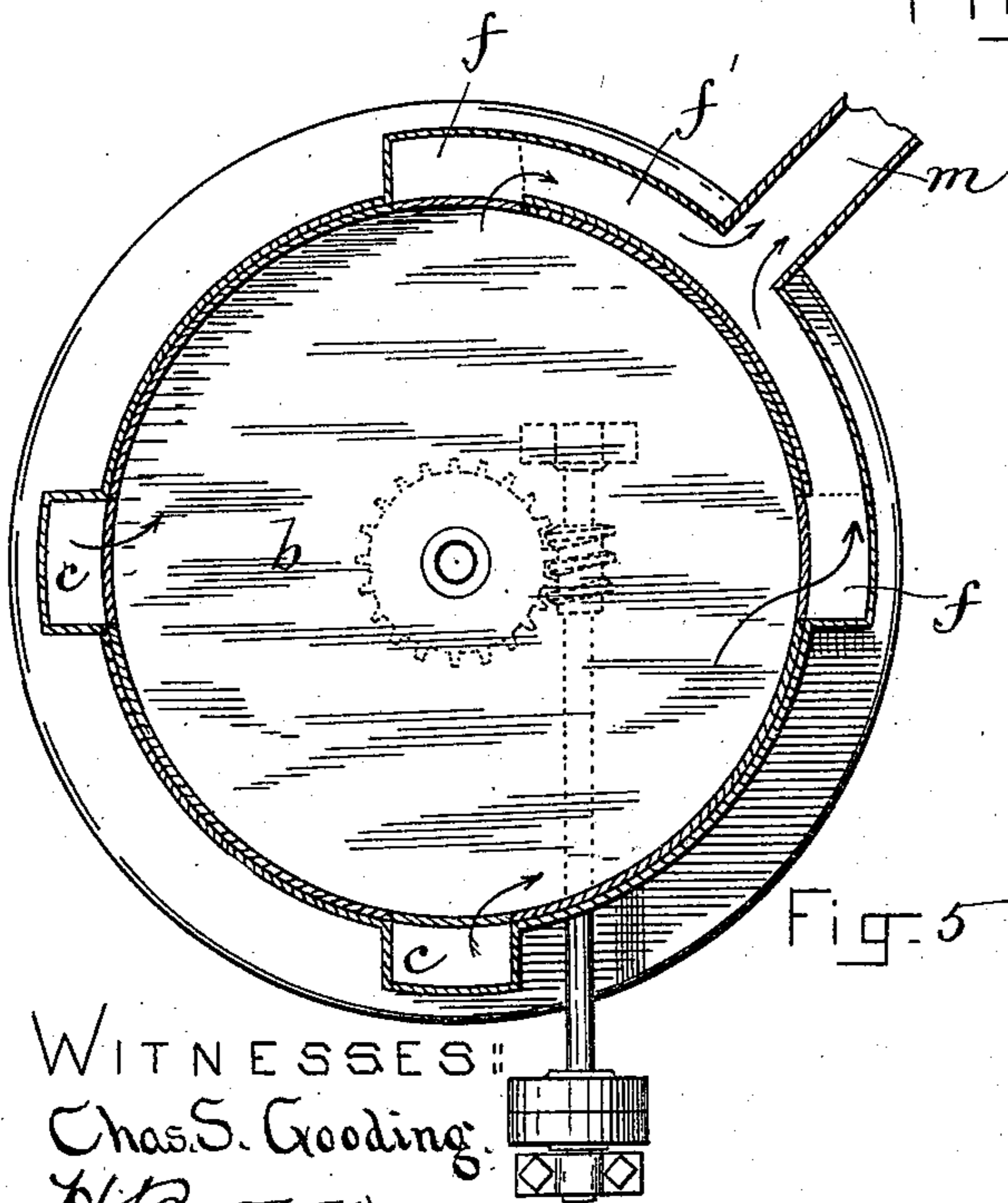


Fig. 5

WITNESSES:  
Chas. S. Gooding.  
H. Brown

INVENTOR:  
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by Hight Brown  
Atty.

# UNITED STATES PATENT OFFICE.

JOSEPH F. BALDWIN, OF CAMBRIDGE, MASSACHUSETTS.

## APPARATUS FOR MALTING AND DRYING.

SPECIFICATION forming part of Letters Patent No. 350,472, dated October 12, 1886.

Application filed April 9, 1885. Serial No. 161,665. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH F. BALDWIN, of Cambridge, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Malting and Drying, of which the following is a specification.

This invention has for its object to provide an improved apparatus adapted to be used for malting grains at any season of the year, and also adapted to be used for drying purposes.

To these ends the invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a side elevation of my improved apparatus. Fig. 2 represents a vertical section of the same. Fig. 3 represents a top view. Fig. 4 represents a section on line *x x*, Fig. 2, looking downward. Fig. 5 represents a section on line *y y*, looking downward. Fig. 6 represents a perspective view of one of the fixed compartments, the side wall thereof being partially broken away.

The same letters of reference indicate the same parts in all the figures.

In the drawings, *a* represents a casing or structure containing a series of floors separating its interior into compartments *b b*, each floor extending entirely across the casing and being rigidly attached thereto, so that there is no space between the walls of the compartments and the casing.

*c c* represent vertical trunks or flues, extending downwardly from the top of the casing and communicating with the spaces over all the compartments *b* through openings, which are provided with valves or dampers *e*, Figs. 2 and 4. *f f* represent similar trunks or flues at the opposite side of the casing from the flues *c c*, and communicating with the spaces over the compartments through openings provided with valves or dampers *g*. The upper ends of the flues *c c* communicate with a chamber, *i*, which may receive air through openings *j j* and conduct it over a steam-coil, *k*, in said chamber, or may receive cold air through a pipe, *l*, communicating with a refrigerating chamber or apparatus, so that either warm or cold air may be supplied to the flues *c c*. The

lower ends of the flues *f f* are connected by a flue, *f'*, Fig. 4, to which is connected a pipe, *m*, leading to an exhaust-fan or other apparatus for drawing air through the flues *f f*, and thus causing it to flow from the flues *c c* laterally through the spaces over the compartments *b*, currents of warm or cold air, as the case may be, being thus caused to pass (always in the same direction) over the contents of the compartments.

When the apparatus is used for drying, warm air being supplied the moisture from the contents of the compartments is carried by said air-currents into the flues *f f*, each compartment being traversed by a current of air which has not passed over any other compartment, and therefore has not received moisture from the drying grain. The action of the air in drying is therefore made rapid and uniform by this arrangement of flues, the moisture from each compartment being carried directly away and not allowed to enter any other compartment.

The bottoms of the compartments are provided with openings *o*, Fig. 6, through which the grain may be discharged from compartment to compartment until it reaches the bottom compartment, which has side openings communicating with the flues *c c* and *f f*, and provided with lids *r s*, adapted to be opened to connect the flues *c f* with the interior of said bottom compartment.

When it is desired to expel the grain from the bottom compartment, the entire air-pressure may be directed thereon by closing the valves *e e e* and *g g g* and opening the lids *r s*. The air-currents thus concentrated will draw the grain outwardly through the pipe *m*.

Over the compartments *b* are circular perforated water-pipes *t*, arranged to discharge water in spray or fine streams or drops upon the grain in the compartments whenever it is desired to dampen it. The perforated pipes are supplied with water by an external pipe, *u*, connected with them by branches *v v*, each having a cock, as shown in Figs. 1, 3, and 4.

*a'* represents a vertical shaft passing through the centers of the compartments and rotated by a driving-shaft, *b'*, having a worm which meshes with a worm-wheel on the shaft. To the shaft *a'* are attached a series of arms, *c' c'*,

each having a series of gangs of plows, *d'*,  
formed to act on the grain in the compart-  
ments, in the same manner that an agricultural  
plow acts on the earth—viz., dislodging and  
5 turning it over, so as to bring previously-cov-  
ered parts to the surface. These plows, re-  
volving in the compartments by continually  
turning the grain, expose all parts of it to the  
action of the air-currents, and thus greatly  
10 facilitate both the action of the warm air in  
drying and of the cold air in malting, and pre-  
vent the grain from souring and fermenting,  
it being impossible for any part of the grain  
to remain covered a sufficient length of time  
15 for fermentation to set in. This continual  
turning of the grain by the plows enables it to  
lie in greater depth on the bottoms of the com-  
partments during the malting process than  
heretofore.

20 It has been the custom to turn the grain by  
shovels when the temperature begins to rise,  
and to enable this to be done it has been nec-  
essary to keep the grain so thinly spread or  
"floored" that the quantity of grain that can  
25 be malted on a given floor-area is necessarily  
much less than can be treated by my improved  
apparatus.

When the machine is used for malting,  
air from the chamber containing the steam-  
30 coil *k* is shut off from the flues *c c* by valves *i'*,  
and cold air admitted from the pipe *l*, said air  
passing over the compartments, as already  
described, each compartment receiving a cur-  
rent of air that has not passed over any other  
35 compartment, so that the air passing over all  
the compartments is at the same temperature.  
The temperature can thus be kept continuously  
at any desired degree, and in practice should  
never be above 60° Fahrenheit during the ger-  
40minating process. The plows are kept in mo-  
tion during the process either continuously or  
for such length of time as may be desired, and,  
by preventing any part of the grain from re-  
maining covered long enough to heat and fer-  
45ment they insure perfectly sweet malted grain.

When the process of germination is to be  
checked, and when the apparatus is to be used  
for drying purposes, the cold air is shut off  
and warm air admitted, an independent fresh  
50 current of said air passing over each compart-  
ment, as already described, the plows being  
kept in motion as before, and subjecting all  
parts of the grain to the drying action of the  
warm air.

I do not limit myself to passing the air 55  
through the machine from top to bottom. If  
desired, the air, either cold or warm, may be  
admitted into the lower part of the casing, and  
caused to ascend either by natural laws (as  
when warm air is used) or by suitable air- 60  
forcing apparatus.

When it is desired to discontinue the opera-  
tion of the plows on any floor, a clutch, *m'*,  
connecting the plow-carrying arms with the  
shaft *a'*, may be disconnected from said shaft. 65  
Said clutch is in the present instance a dog  
pivoted to one of the arms *c'*, and entering a  
slot in a collar, *n'*, affixed to the shaft. When  
the clutch is raised from the collar *n'*, the arms  
*c'* will not rotate with the shaft *a'*. 70

I claim—

1. In a malting or drying machine, the com-  
bination of a casing, a series of fixed floors  
dividing the casing up into a series of inde-  
pendent compartments, a discharge for each 75  
compartment located at each side of the center,  
for delivering the grain to the compartment  
below, an air-induction flue or flues commu-  
nicating with each of said compartments at  
one side of the same, and an air-eduction flue 80  
or flues communicating with the compart-  
ments at the other side of the same, covers  
adapted to close and open said induction and  
eduction openings, and water-spraying pipes  
located in said compartments, substantially as 85  
set forth.

2. The combination, in a malting and dry-  
ing machine, of a casing provided with cham-  
bers separated by intervening floors, having  
apertures to permit the grain in one chamber 90  
to pass to another, air induction and eduction  
flues on opposite sides of the casing, commu-  
nicating with each of the chambers, and means,  
substantially as described, for forcing air into  
the induction-flue, of valves for closing com- 95  
munication between the eduction and induc-  
tion flues and the chambers above the lowest,  
whereby the entire pressure of the air will  
pass through the latter to force the grain out  
of the same, as set forth. 100

In testimony whereof I have signed my name  
to this specification, in the presence of two  
subscribing witnesses, this 6th day of April,  
1885.

JOSEPH F. BALDWIN.

Witnesses:

C. F. BROWN,  
A. L. WHITE.