

(No Model.)

3 Sheets—Sheet 1.

C. G. BOSCH.
APPARATUS FOR MALTING.

No. 277,107.

Patented May 8, 1883.

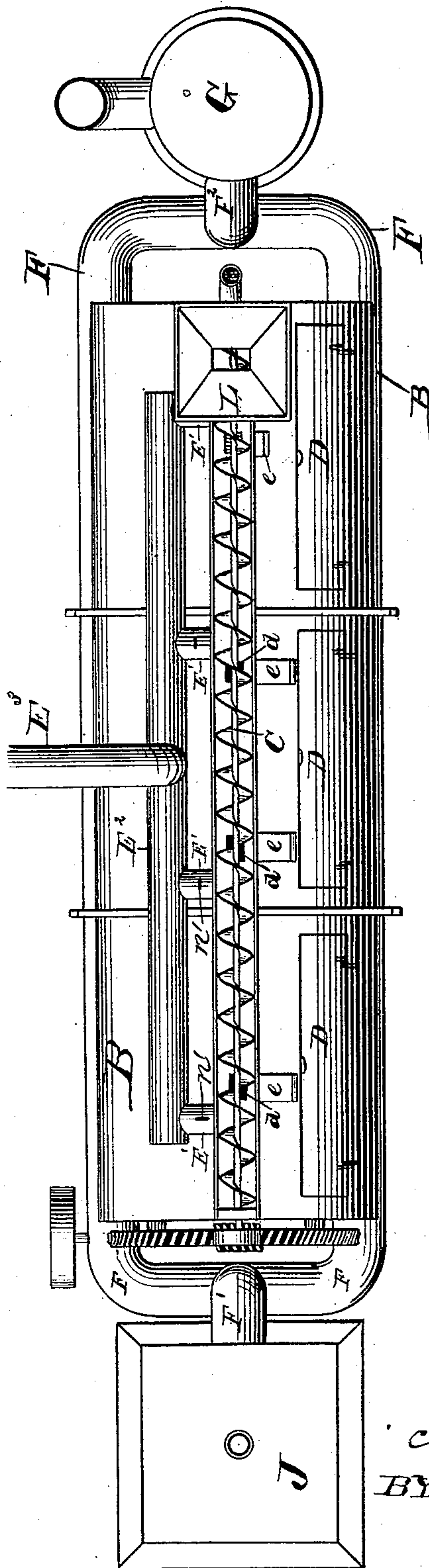


Fig. 1

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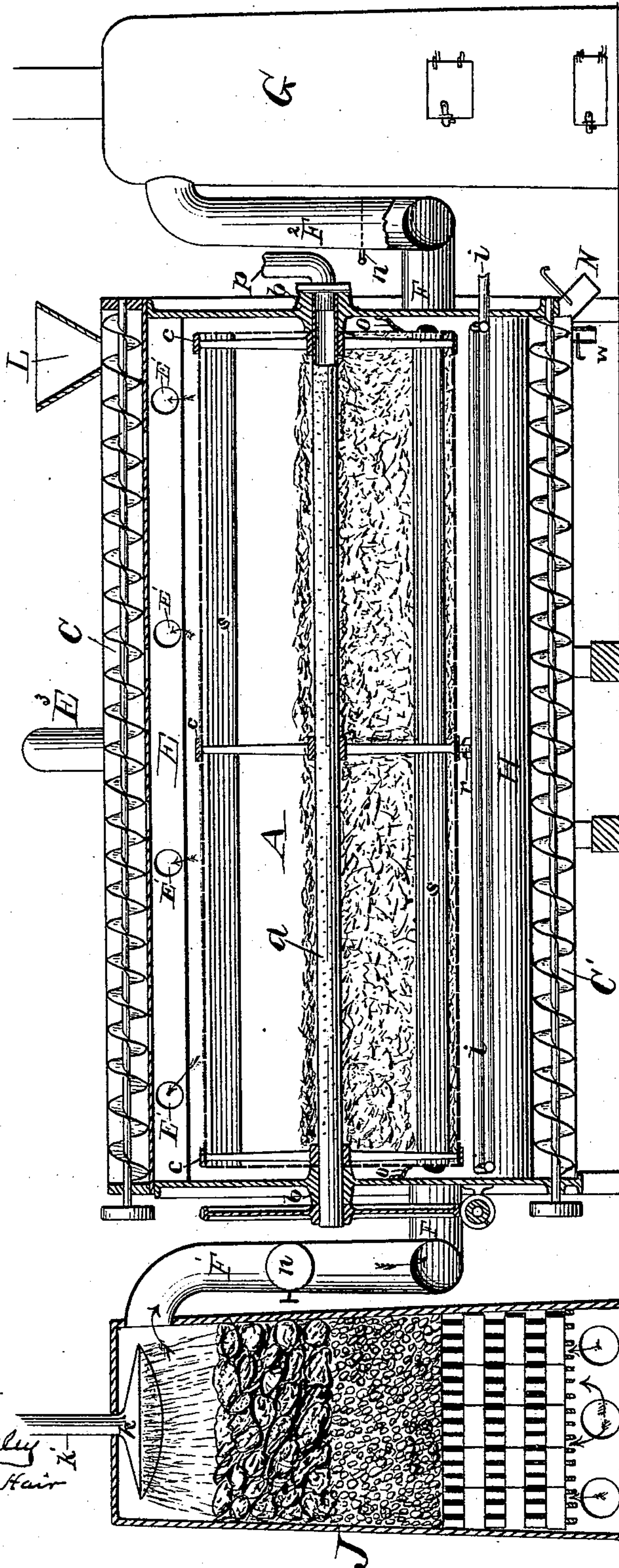


Fig. 2

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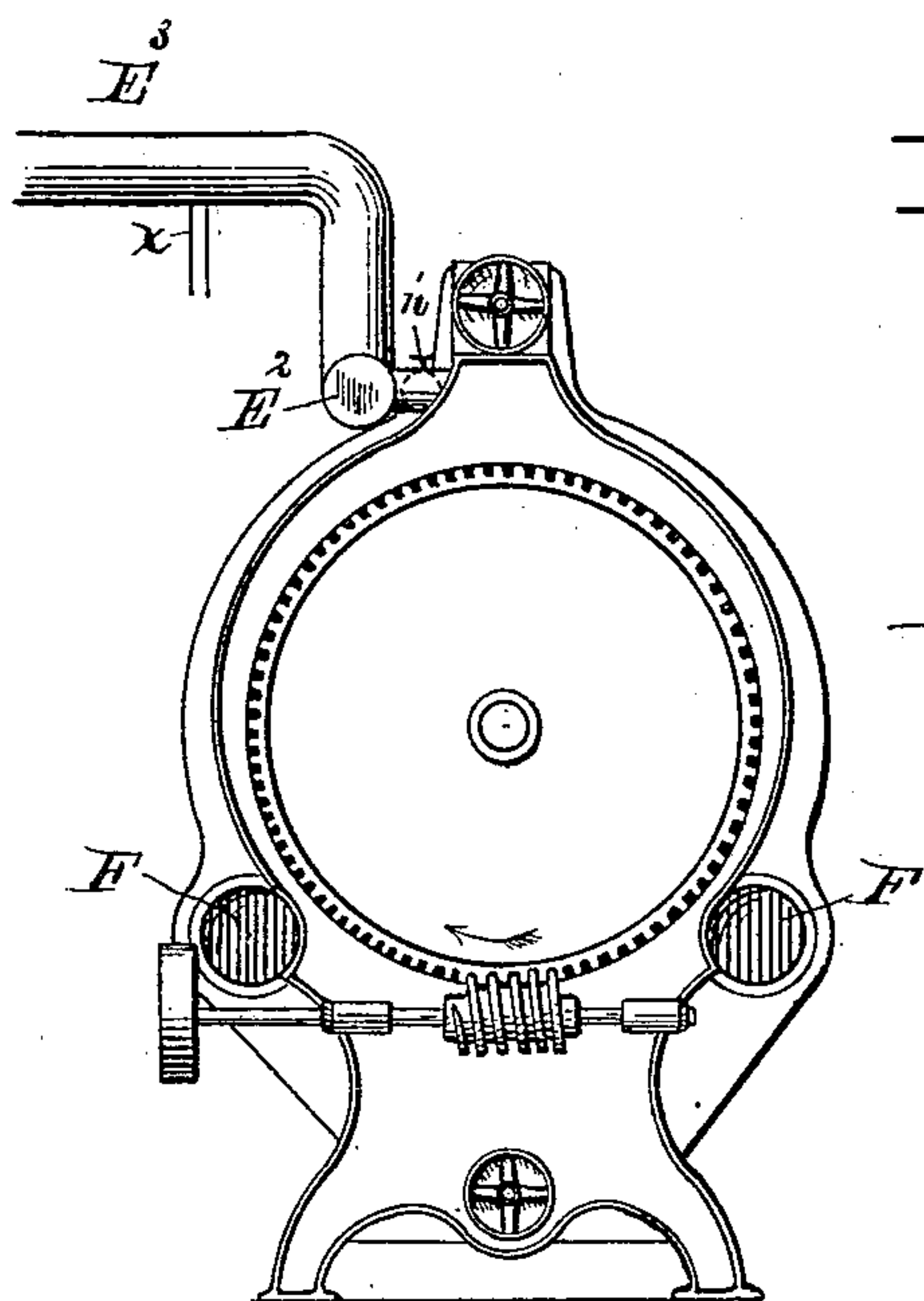


Fig. 3

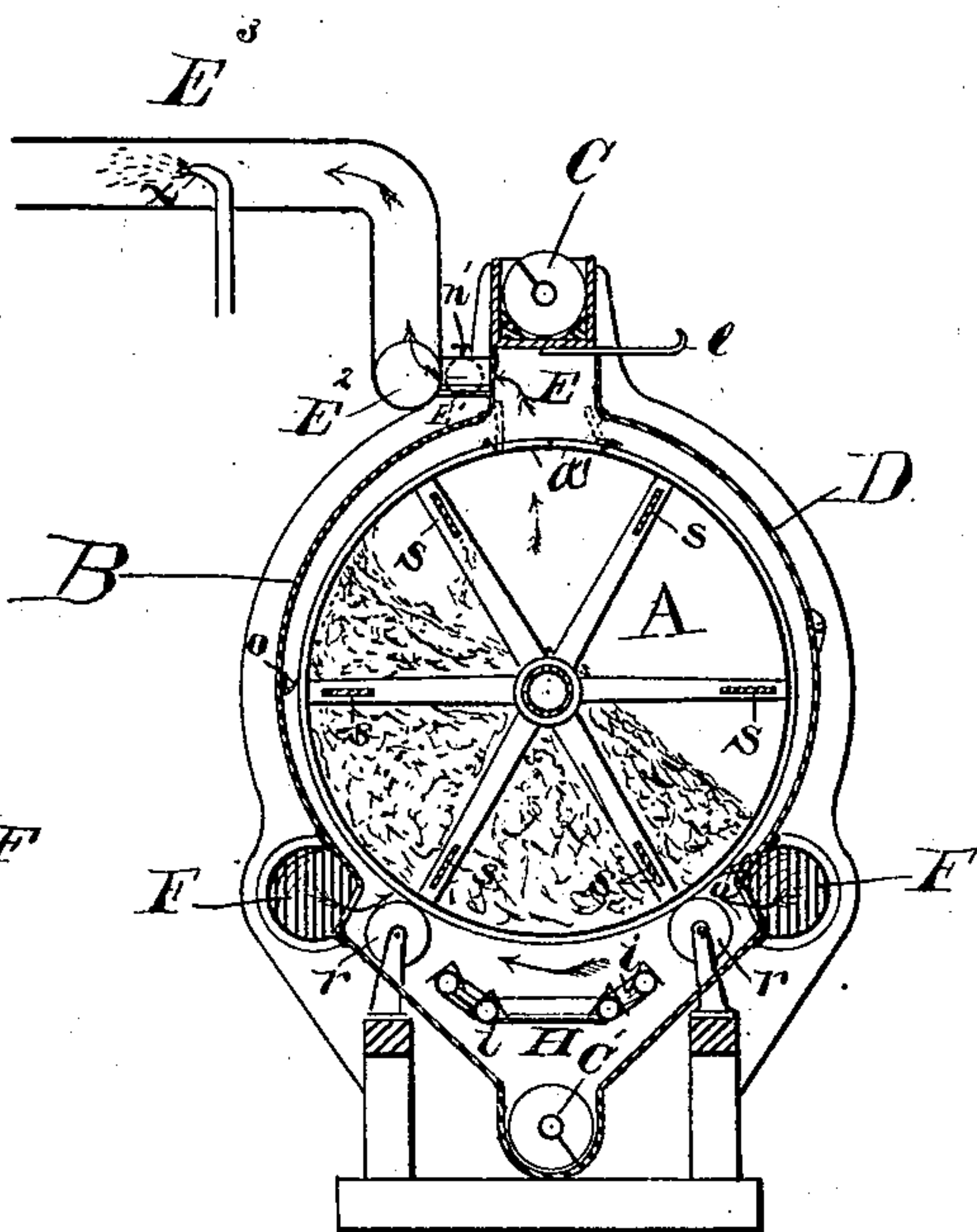


Fig. 4

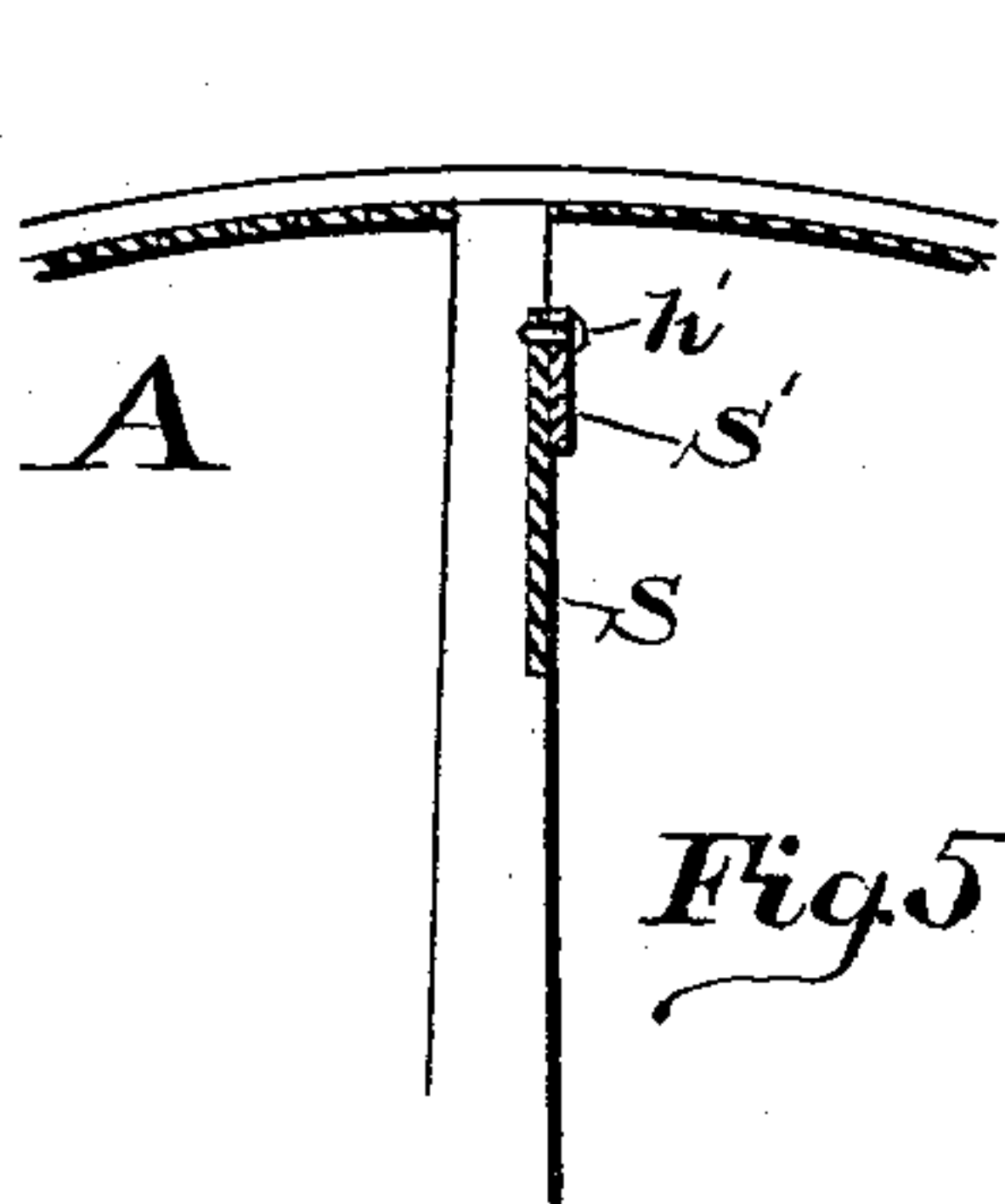


Fig. 5

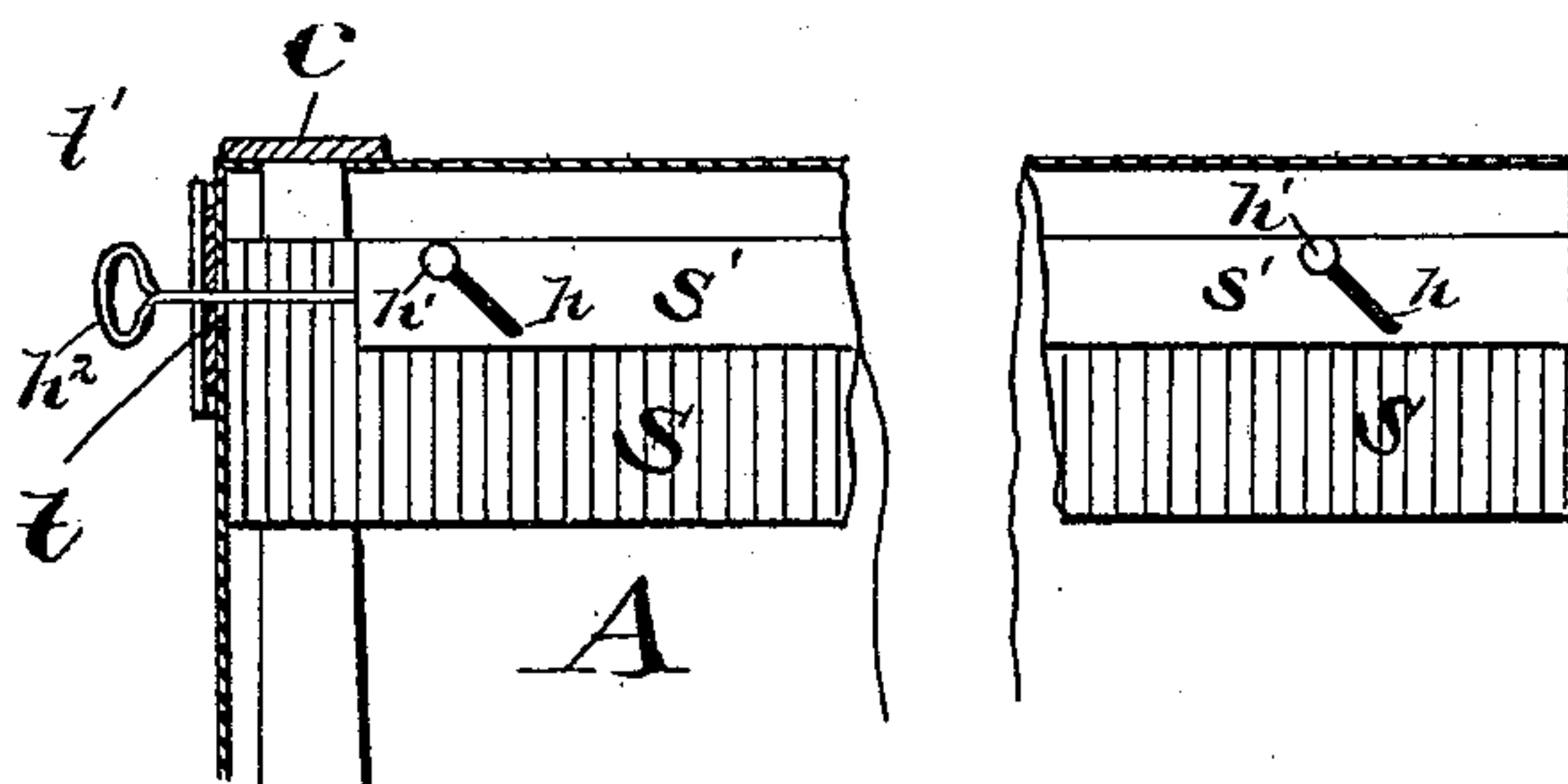


Fig. 6

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UNITED STATES PATENT OFFICE.

CHARLES G. BOSCH, OF DAVENPORT, IOWA.

APPARATUS FOR MALTING.

SPECIFICATION forming part of Letters Patent No. 277,107, dated May 8, 1883.

Application filed December 31, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHARLES G. BOSCH, a citizen of the United States, residing at Davenport, in the county of Scott and State of Iowa, have invented a new and useful Apparatus for Malting, of which the following is a specification.

My invention relates to an apparatus so constructed and arranged that all the operations of malting—viz., steeping, germinating, and drying—may be successively performed therein, after the most approved manner, without removing the grain from the apparatus, and without the aid of manual labor, other than the occasional opening or closing of the different dampers or valves of the apparatus.

In the accompanying drawings, Figure 1 is a plan view of my device; Fig. 2, a longitudinal sectional elevation; Fig. 3, a front elevation, and Fig. 4 a cross-sectional elevation. Figs. 5 and 6 are detailed views referred to hereinafter.

A is a cylinder, made of perforated sheet metal, provided with suitable heads, and mounted on a hollow perforated shaft, *a*, supported at each end in bearings *b*. The cylinder A has at suitable distances along its length rings *c*, connected by arms to a hub on the shaft *a*, thus forming spiders or gratings within the cylinder, under which are placed rollers *r*. Any number of these may be used in the length of the cylinder to secure the proper support and to remove the weight from the bearings *b*.

The cylinder A is completely inclosed by a casing, B, provided at one side, near the top, with doors D, and surmounted by a conveyer, C, which is directly over the cylinder A, and under which, at proper intervals, are openings *d*, closed, when desired, by slides *e*. The lower part or bottom of the casing B is made to incline from each side toward the center, and a second conveyer placed at the bottom thereof, directly under the cylinder A.

At the top of the casing B, immediately under the conveyer C, a flue, E, is formed, from which lead pipes E' into a pipe, E², running along the top of the casing B, and from which leads the exhaust-pipe E³. The pipes E' are supplied with dampers *n'*, by which means communication may be established between the pipe E² and the flue E at the top of the

casing B, at any point along its length, and any number of the pipes E' may be used for the purpose.

At each side of the casing B, at the lower part, is a supply-pipe, F, which opens into the chamber H below the cylinder A. These pipes are connected together at each end of the machine, and are connected at one end with a furnace, G, by a pipe, F², and at the other, by means of a pipe, F', with what I term a "filter," J. The pipes F' and F² are supplied with dampers *n*, by which they may be opened or closed at will. The filter J consists of a suitable receptacle having grates at the bottom, and partially filled with bricks, charcoal, sponges, and the like, and provided at the top with a sprinkler, *k*, to which water is supplied from a suitable reservoir through a pipe, *k'*, provided with a stop-cock or valve, by which the water may be shut off when desired.

To the hollow perforated shaft *a*, at one end, is connected a water-pipe, *p*, in such a manner that the shaft *a* is allowed to rotate, while the pipe *p* remains at rest, without leakage. This water-pipe *p* is connected to a suitable water-reservoir, and is provided with a valve, by which the water may be let on or shut off at will.

To the inside of the casing B, around the cylinder A, are secured strips of rubber or other suitable material, *o*, which press against the cylinder and divide the space between the casing and cylinder into two parts, forcing the air which enters the chamber H under said cylinder to pass through the cylinder in order to escape at the top.

The cylinder A is provided with a door, *a'*, extending the whole or the greater portion of its length, and is also provided on the inside with a series of shelves, S, attached to the arms of the rings or spiders *c*, leaving a space between the inner edge of the shelf and the inner surface of the cylinder, for the purpose hereinafter specified.

Along the casing B, where the supply-pipes F F' connect with the chamber H, an angle or offset is formed in said casing, as shown in Fig. 4 of drawings, so that the grain or other substance that falls on the sloping sides or bottom of the casing will slide down and into the conveyer C' without entering the pipes F F'.

i i are steam-pipes introduced into the chamber H under the cylinder A, for the purpose hereinafter specified.

The operation of malting with this apparatus is as follows: The door *a'* of the cylinder A is opened by means of the doors D in the casing B, and turned to the top directly under the conveyer C, which is set to rotating. The grain to be malted is drawn down from the bins, where it is stored, into the hopper L, above the conveyer C, by which it is conveyed along and dropped at any point desired in the cylinder A through the openings *d*. The cylinder is in this manner filled to the proper fullness of grain, the conveyer stopped, and the openings *d* closed by the slides *e*. The door of the cylinder is then closed and fastened and the cylinder slowly revolved by means of a worm and gear, or in any other suitable manner. A quantity of water is now introduced into the cylinder through the pipe *p* and hollow perforated shaft *a* and the grain thoroughly washed, the surplus water escaping through a waste-pipe, *w*, in the bottom of the conveyer-trough C', near one end, the said trough inclining slightly in this direction for this purpose. The grain is thus thoroughly wetted, and the cylinder is stopped for a period, allowing the grain to swell. Water is added from time to time, and in order that the grain may become thoroughly and evenly soaked, the cylinder is revolved during this operation. Under this treatment the grain becomes thoroughly and evenly steeped, the wetting and rotating being repeated as often as found necessary. The grain may be ventilated at any time during this process by creating a draft in the exhaust-pipe E³ by introducing a jet of steam therein, as shown at *x*, Fig. 4, or by means of a blower connected therewith, drawing the air from the waste-pipe *w* through the grain, the pipes F' and F² being closed by the dampers *n*. When the grain has become sufficiently steeped, the wetting and rotating is stopped and the germination begins, the operation being facilitated and the required temperature and moisture secured by creating a draft through the germinating grain from the filter J, to which water is supplied through the sprinkler *k*, impregnating the air with moisture. This cool moist air is conveyed through the pipes F' and F (the damper *n* in pipe F' being opened for this purpose) into the chamber H under the cylinder A, and, passing through the germinating grain, supplies the required temperatures and moisture and carries off the excess of carbonic-acid gas through the exhaust-pipe E³, the draft being directed through any portion of the grain desired by the dampers *n'* in pipes E', as before described. In this manner the grain is kept at the required temperature and turned, when desired, by simply revolving the cylinder until the germination is sufficiently advanced, when the pipe F', leading from the filter J, is closed, and the one F², leading from the furnace G, opened, introducing heated air into the chamber H under the cylinder A, which is

again set to revolving. This heated air passes through the malt, which is kept constantly stirred by reason of the shelves, and it soon becomes thoroughly dried, the steam and gases escaping through the exhaust-pipe E³. If desired, the heated air may be supplied by introducing steam into the pipes *i* with the same result, and the furnace be dispensed with; or, if convenient, either or both may be used. The malt now being thoroughly dried, the conveyer C' at the bottom of the casing B is started, the waste-pipe *w* opened, and the small particles that have been sifted from the drying malt removed, thus leaving the malt perfectly clean. As soon as the siftings are completely removed the waste-pipe *w* is closed and the discharge-pipe N opened, the cylinder is stopped, the door opened and turned downward, discharging the malt into the conveyer below, by which it is conveyed to and discharged through the opening N. This opening N may be made to empty directly into the foot of an elevator, and the malt be elevated to the proper place for storing without the aid of any manual labor whatever.

It is evident that if the shelves S were placed with their edges against the inner surface of the cylinder A trouble would be experienced in discharging the malt, as a small quantity would continually remain in the angles formed by the junction of the shelves and cylinder. To obviate this I have left a space between the shelves and the cylinder, which allows the grain or malt, in discharging, to follow the inner surface of the cylinder and escape at the discharge-opening, and it would only be necessary to revolve the cylinder once or twice to completely empty it. It may, however, be found advantageous in drying to have this space closed, in order that the grain or malt may be more thoroughly carried over and stirred up. For this reason I have provided an arrangement (shown in Figs. 5 and 6) which consists in fastening a strip, S', along the edge of each shelf next to the surface of the cylinder by means of studs *h'*, which work in slotted holes *h* in the strips S', which extend diagonally across said strips in such a manner that when the strip is moved endwise it is advanced sidewise and closes the space referred to above. These strips are provided at one end with a handle, *h*², which projects through a slotted opening, *t*, in the end of the cylinder A. Over this slotted opening *t*, and around the handle *h*², is a slide, *t'*, which moves up and down with the handle *h*² and keeps the opening *t* constantly closed.

When the above-described arrangement is used just before the drying operation is commenced, each shelf is turned respectively to the top and the slides S' closed against the cylinder, as above described, by means of the handle *h*², a small door being provided in the end of the casing for this purpose. When the grain is to be discharged they are opened again in a similar manner.

If a number of these machines are used, as

will generally be the case, they are placed side by side, and one furnace and one filter made to answer for all, the supply-pipes being properly connected.

5 It will be seen that by the use of this apparatus the process of malting may be completed without the aid of manual labor, other than the proper regulating of the machine from time to time, and a better quality of malt will
10 be produced, as it is constantly under the control of the operator in all the stages of its development.

I am aware that a malting apparatus adapted for the steeping, germinating, and drying of
15 grain without removing the same therefrom is not new, and also that perforated revolving cylinders have heretofore been employed in a malting apparatus. These, however, I do not claim, broadly.

20 Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A perforated revolving cylinder, A, having shelves S, in combination with a perforated
25 hollow shaft, *a*, and water-pipe *p*, whereby grain may be washed and thoroughly and evenly steeped, substantially as shown and described.

2. A perforated cylinder, A, in combination
30 with a casing, B, having strips of rubber or other suitable material, *o*, which press against said cylinder and divide the space around the cylinder in two parts, forcing the air which

enters on one side of the cylinder to pass through the cylinder in order to escape at the
35 opposite side, substantially as described and shown.

3. The combination, with a perforated cylinder, A, of the shelves S, constructed as described, whereby a space is left between the
40 edges of the shelves and the inner surface of the cylinder, substantially as and for the purpose set forth.

4. The combination, with the cylinder A, having shelves S, of the sliding strips S', having slots *h*, pins *h'*, and handles *h''*, substantially as and for the purpose described. 45

5. The combination of the casing B, having openings *d d*, provided with slides *e e*, the perforated cylinder A, inclosed within said casing, and having door *a'*, and the conveyers C C',
50 situated above and below the cylinder, substantially as shown and described.

6. The combination, with the cylinder A and casing B, having a chamber, H, arranged beneath said cylinder, and provided with offsetting angles on each side, of the air-supply pipes
55 F F, communicating with the chamber on the upper side of said angles, whereby air is admitted into the casing without permitting the
60 grain or malt to enter said pipes, substantially as shown and described.

CHARLES G. BOSCH.

Witnesses:

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J. TAYLOR HAIR.