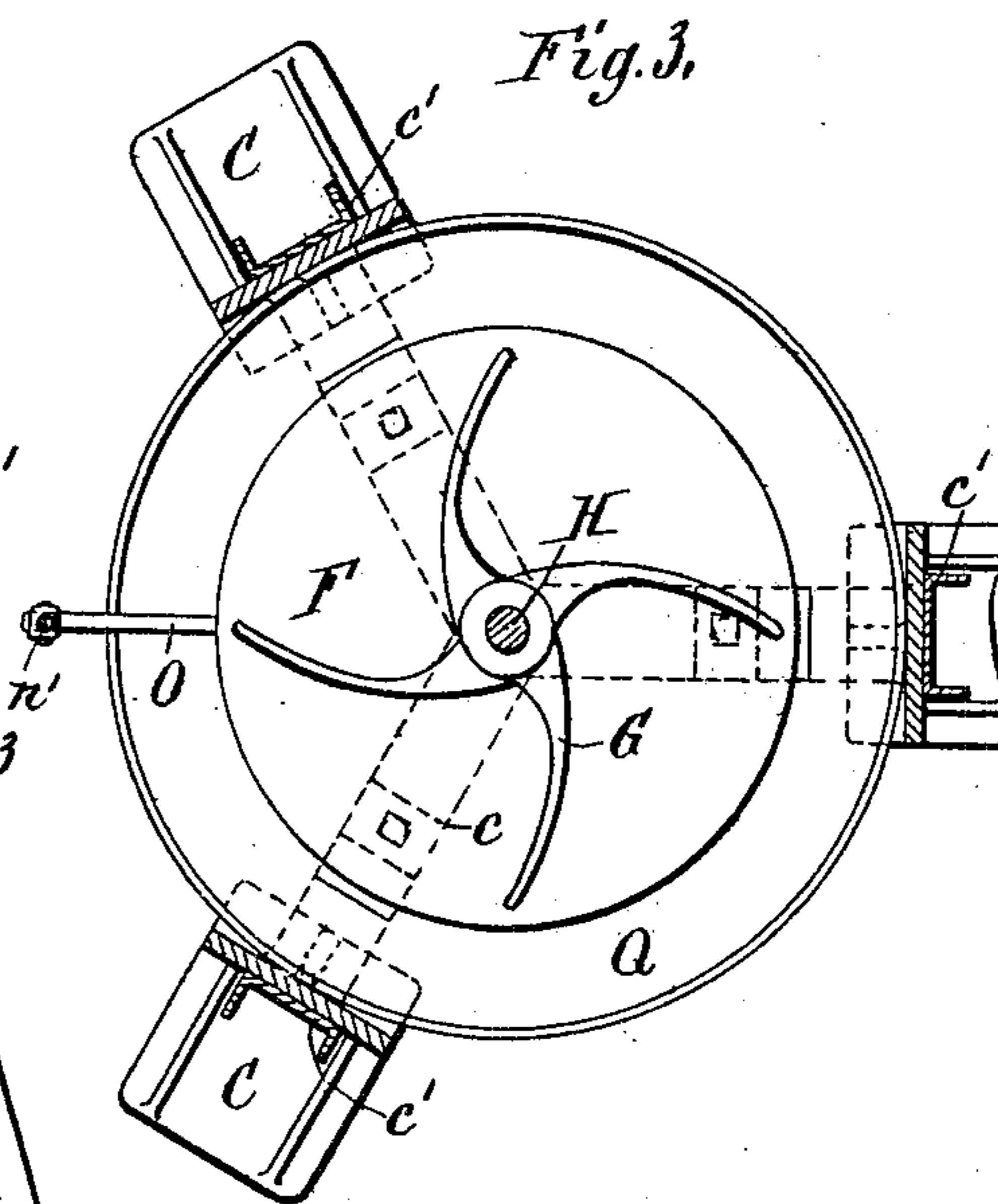
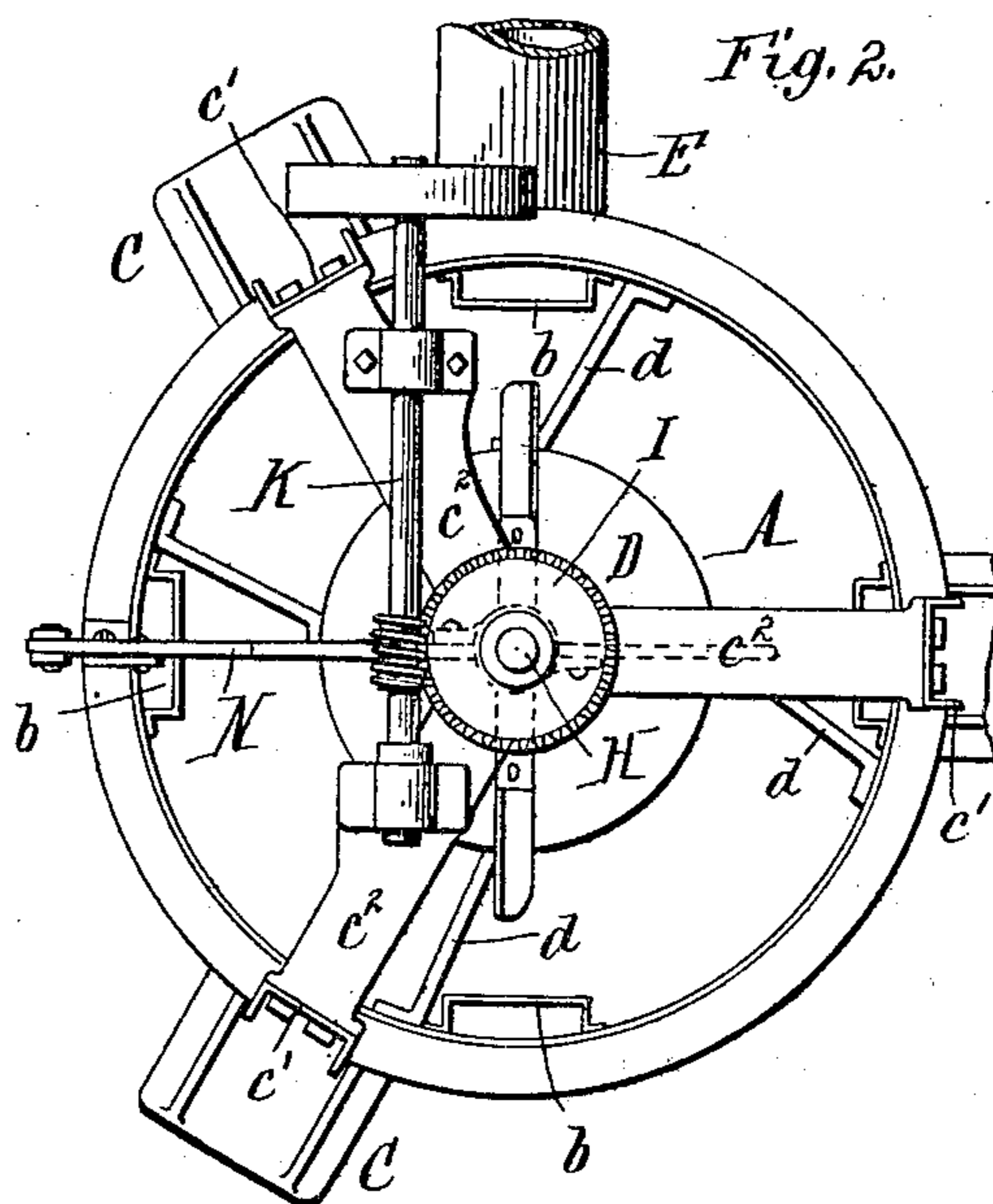
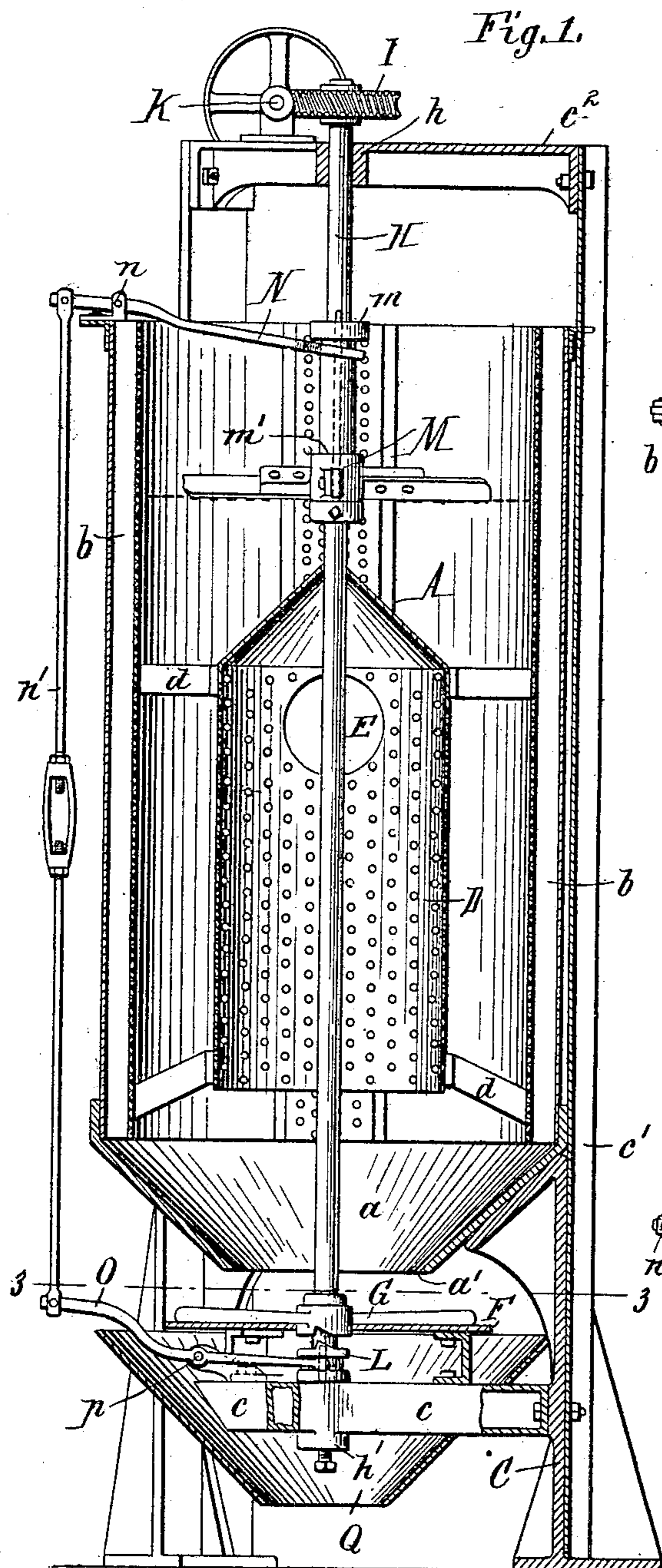


No. 825,595.

PATENTED JULY 10, 1906.

A. W. FRENCH.
COOLER AND DRIER.
APPLICATION FILED MAY 25, 1905.



Witnesses:-
R. W. Ruser.
E. A. Volk.

Inventor.
A. W. French,
by William Parker Hard,
Attorneys.

UNITED STATES PATENT OFFICE.

ALFRED W. FRENCH, OF PIQUA, OHIO.

COOLER AND DRIER.

No. 825,595.

Specification of Letters Patent.

Patented July 10, 1906.

Application filed May 25, 1905. Serial No. 262,284.

To all whom it may concern:

Be it known that I, ALFRED W. FRENCH, a citizen of the United States, residing at Piqua, in the county of Miami and State of Ohio, have invented a new and useful Improvement in Coolers and Driers for Divided Material, of which the following is a specification.

This invention relates more particularly to that type of coolers and driers for divided solid material in which the discharge of the material from the machine is automatically controlled in accordance with the amount of material which is fed into the machine, so that a substantially uniform quantity of the material is maintained at all times in the cooling and drying chamber for treatment, thus facilitating a more uniform treatment of the material.

The machine hereinafter described is intended especially for cooling and drying broken or crushed hot oil-cake preliminarily to the reduction of the same to meal in the attrition-mill; but the invention is not limited to such application, but is also applicable to machines for cooling and drying other divided or granular materials, and also for otherwise treating such materials to alter their physical properties or conditions.

In the accompanying drawings, Figure 1 is a sectional elevation of a cooler and drier embodying the invention. Fig. 2 is a plan view thereof. Fig. 3 is a horizontal sectional plan in line 3 3, Fig. 1, showing the discharge device.

Like letters of reference refer to like parts in the several figures.

A represents an upright drying and cooling chamber or receptacle, into the upper end of which the material to be treated is fed and from the bottom of which the material which has been cooled and dried is discharged at such a rate as to maintain a practically uniform amount of material in the receptacle. The latter preferably consists of a hollow cylinder or shell having an open top and conical bottom *a*, providing a contracted discharge-opening *a'*, and is of any desired construction affording an exit or exits for the air which is circulated through the material to cool and dry the same. As shown, the shell is provided interiorly with upright air-flues *b* open at the top and having perforated inner walls. The receptacle A is supported above the floor or supporting-surface on a base or frame C of any suitable construction. The frame

shown consists of three legs or uprights connected by a horizontal spider or cross-arms *c*, located below the bottom of the cooling-receptacle. The frame C also preferably has upright posts *c'*, which are secured to and rise from the legs of the frame C beside the cooling-receptacle and are connected above the receptacle by a spider or cap-piece *c''*.

D represents an air-distributing tube or cylinder which is supported centrally within the receptacle A—for instance, by arms or bars *d*—so as to form between the distributing-tube and the wall of the receptacle an annular cooling chamber or space for the material. The distributing-tube may, as shown, have a closed top and air-distributing holes in its upright wall of any desirable form and arrangement and is connected, as by a pipe E, with a blower or device for passing air through the distributing-tube and material in the cooling-chamber. The material will be cooled and dried by contact with the cool air and by the evaporation of its moisture which is taken up by the air. The air passing through the material escapes through the perforated air-flues and open upper end of the receptacle.

The described construction of the cooling-receptacle is deemed preferable; but a receptacle of any other suitable construction and any other suitable means for circulating a drying medium through the material can be employed.

Beneath the discharge-opening of the receptacle A is a horizontal discharge-plate F, onto which the material falls from the discharge-opening. The plate is supported on the spider or cross-arms *c* of the frame and is spaced from the edge of the discharge-opening to provide an annular exit for the material.

G represents a discharge device or stirrer provided with arms, which when the stirrer is rotated sweep over the upper face of the discharge-plate F and shove the material off of the latter through the space between the plate and the edge of the discharge-opening. The discharge device is loosely sleeved on an upright shaft H, which is journaled at its upper and lower ends in bearings *h h'* in the upper and lower spiders *c''* and *c* of the frame and is driven by suitable means. As shown, the shaft is connected by worm-gearing I with a drive-shaft K, journaled on the top of the frame. The upright shaft is driven continuously, but the discharge device G only ro-

tates and discharges the material when coupled to the shaft by a clutch. Any suitable form of clutch can be used. That shown consists of a sleeve L splined on the shaft or otherwise connected thereto, so as to rotate with the shaft while being free to slide vertically thereon and having teeth or projections which interlock with the cooperating teeth or projections on the hub of the discharge device when the clutch-sleeve is raised.

The clutch-sleeve L is raised and lowered into and out of operative engagement with the discharge device, so that the action of the latter is controlled by a floating regulating device M in the upper part of the cooling receptacle or chamber. The regulating device illustrated consists of several radial vanes or blades secured to a hub, which is splined or otherwise connected to the shaft K, so as to rotate therewith while being free to slide vertically on the shaft. A portion of the vanes are preferably vertical and act to spread the material and keep the surface thereof level, so that the several blades of the regulating-sweep will bear on the material, and the other vane or vanes is or are inclined to the vertical, thereby causing the regulating-sweep to float on top of the mass of material in the receptacle. It rises with the material as the latter accumulates and descends by gravity as the level of the material lowers. The hub of the regulating-sweep has upper and lower shoulders or projections m m' , between which extends the forked end of a lever N, which is pivoted at n in any suitable manner and is connected by a rod or link n' with a clutch-lever O, fulcrumed on a pivot p , and having a forked end entering an annular groove in the sliding clutch-sleeve L. When the desired quantity of material has accumulated in the receptacle, the floating sweep will rise far enough for its lower shoulder to engage and operate the upper lever N, which, through the described connections, will lift the clutch-sleeve into engagement with the hub of the discharge device and set the latter in action.

The discharge device will continue in operation and discharge the material from the receptacle so long as the feed maintains the desired level of the material in the receptacle. If, however, the discharge exceeds the feed, the level of the material will lower and the upper shoulder m of the regulating-sweep, which descends by gravity, will operate the lever N to lower the clutch-sleeve L and throw the discharge device out of action. Thus the discharge is controlled by the regulating-sweep and a practically constant quantity of material is maintained in the cooling receptacle or chamber under the action of the air.

The improved drier described is especially desirable for use where the feed of the material thereto is very intermittent or irregular— as, for instance, where the feed is more or less

continuous for several minutes, then ceases entirely for awhile, and then commences again. The discharge device is preferably regulated to discharge the material a little faster than it comes in and the size of the receptacle and rate of discharge determine the length of time the material remains in the receptacle under treatment.

Means other than those described for connecting the floating sweep and clutch of the discharge device can be employed. The discharge device being driven by power is efficient and insures a positive discharge of the material, and being connected to the same shaft which operates the regulating-sweep the construction of the machine is simple, strong, and desirable.

A hopper Q of inverted-cone shape is preferably arranged below the discharge-plate to catch the material swept off of the latter by the discharge device and spout the same to any desired point.

I claim as my invention—

1. The combination of a receptacle into which the material to be treated is fed, a discharge device for said receptacle, means for operating said discharge device to positively discharge material from the receptacle, and mechanism for throwing said discharge device into and out of action, including a regulating device which is shifted by the pressure of the material thereon when a predetermined quantity of material accumulates in the receptacle, said mechanism being constructed to throw said discharge device out of action and stop the discharge of material when the amount of material in the receptacle is reduced below said predetermined quantity, whereby a substantially constant amount of material is retained in the receptacle, substantially as set forth.

2. The combination of a receptacle into which the material to be treated is fed, means for subjecting the material in the receptacle to the action of a medium for altering the condition of the material, a discharge device for said receptacle, means for operating said discharge device to positively discharge material from the receptacle, and mechanism for throwing said discharge device into and out of action, including a regulating device which is shifted by the pressure of the material thereon when a predetermined quantity of material accumulates in the receptacle, said mechanism being constructed to throw said discharge device out of action and stop the discharge of material when the amount of material in the receptacle is reduced below said predetermined quantity, whereby a substantially constant amount of material is retained in the receptacle, substantially as set forth.

3. The combination of a receptacle into which the material to be treated is fed, a discharge device for said receptacle, means for

operating said discharge device to positively discharge material from the receptacle, and mechanism for throwing said discharge device into and out of action, including a regulating device which is shifted by the pressure of the material thereon when a predetermined quantity of material accumulates in the receptacle, said mechanism being constructed to operate automatically as soon as the pressure on said regulating device is relieved to throw said discharge device out of action and stop the discharge of material from the receptacle, substantially as set forth.

4. The combination of a receptacle into which the material to be treated is fed, a discharge device for said receptacle, means for operating said discharge device to positively discharge material from the receptacle, a regulating device in said receptacle constructed to be moved from a normal position by the pressure of the material thereon when a predetermined quantity of material has accumulated in the receptacle and to return to its normal position when the pressure of the material thereon is relieved, and means actuated by said regulating device for starting said discharge device when the regulating device is moved out of normal position and for stopping said discharge device when said regulating device returns to normal position, substantially as set forth.

5. The combination of a receptacle having a discharge-opening for the material, a drive-shaft arranged in the receptacle, a rotary discharge device loose on said shaft at or near the discharge-opening of said receptacle, a discharge-regulating device mounted on said shaft to turn therewith and to be moved in the direction of length of said shaft by the pressure of the material accumulating in the receptacle, and means operated by said discharge-regulating device for coupling said discharge device to and uncoupling it from said shaft, substantially as set forth.

6. The combination of a receptacle having a discharge-opening for the material, a plate arranged below said discharge-opening, a rotary discharge device which sweeps over said

plate to positively move the material off of the same, a drive-shaft for said discharge device, a discharge-regulating device which is driven by said shaft and rests on the material in the receptacle and ascends and descends with the changing of the level of the material, and a clutch operated by said regulating device for connecting said discharge device to and disconnecting it from said shaft, substantially as set forth.

7. The combination of a receptacle having a discharge-opening for the material, a plate arranged below said discharge-opening, a drive-shaft arranged in the receptacle, a rotary discharge device which is loose on said shaft and sweeps over said plate to positively move the material off of said plate, a discharge-regulating device mounted on said shaft to turn therewith and to be moved in the direction of length of said shaft by the pressure of the material accumulating in the receptacle, and means operated by said discharge-regulating device for coupling said discharge device to and uncoupling it from said shaft, substantially as set forth.

8. The combination of a receptacle having a discharge-opening for the material, a plate arranged below said discharge-opening, a drive-shaft arranged in the receptacle, a rotary discharge device which is loose on said shaft and sweeps over said plate to positively move the material off of said plate, a discharge-regulating device mounted on said shaft to turn therewith and to be moved in the direction of length of said shaft by the pressure of the material accumulating in the receptacle, and means operated by said discharge-regulating device for coupling said discharge device to and uncoupling it from said shaft, and a hopper arranged below said plate, substantially as set forth.

Witness my hand this 16th day of May, 1905.

ALFRED W. FRENCH.

Witnesses:

PAUL G. WEIDNER,
PAUL WATSON.