

H. WINTER.  
CRYSTALLIZING APPARATUS.

APPLICATION FILED DEC. 27, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

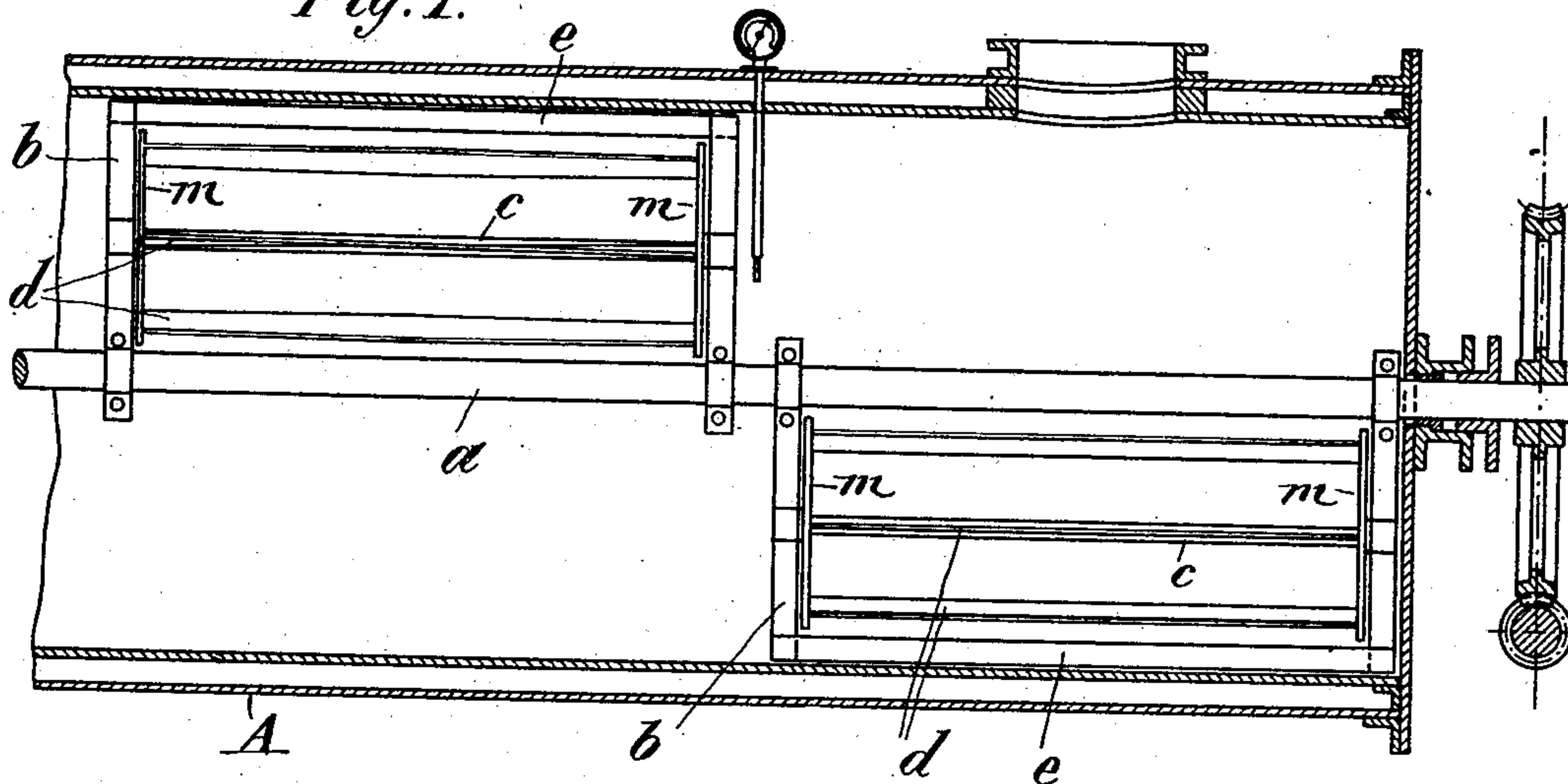
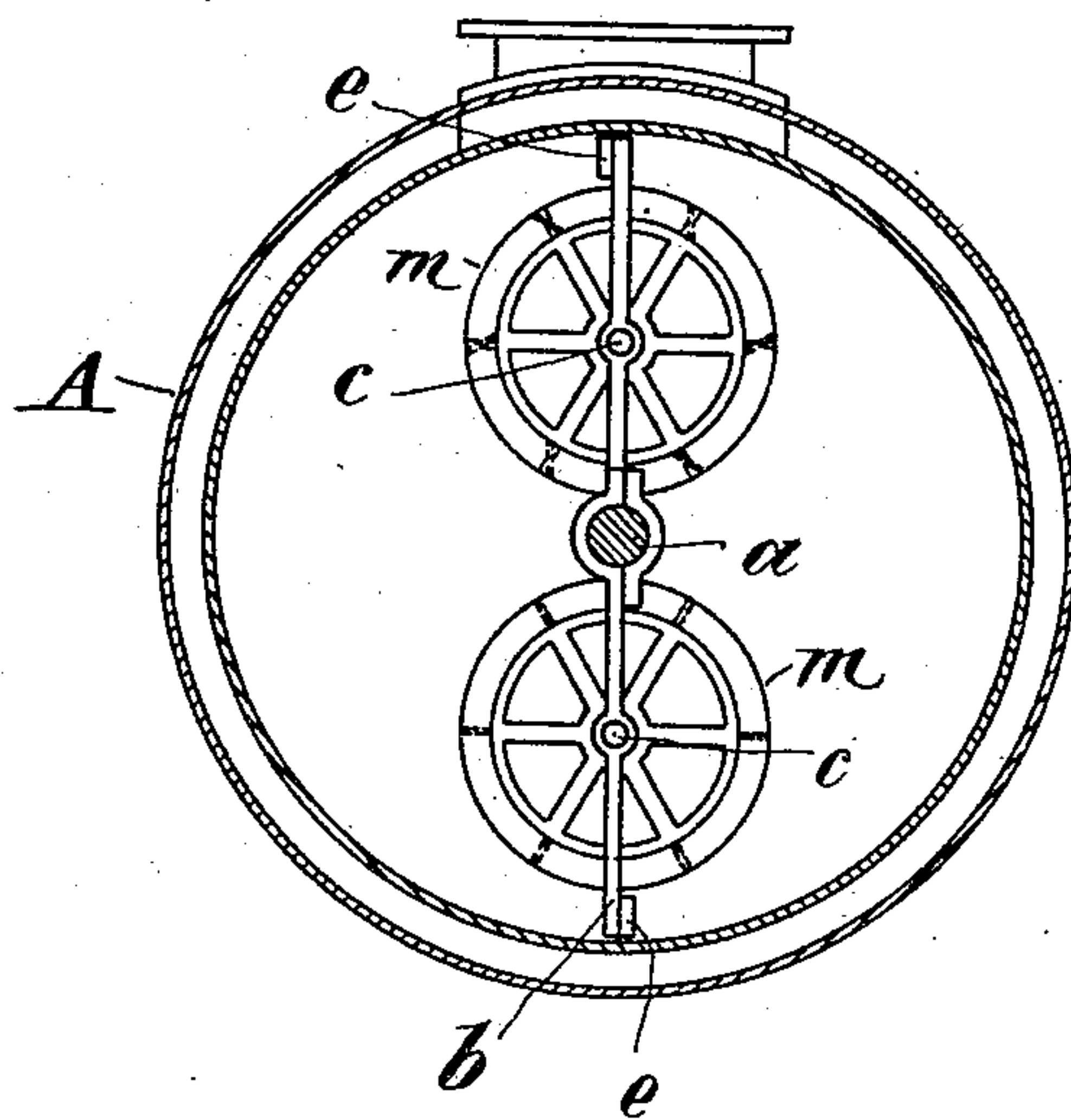


Fig. 2.



WITNESSES:

Henry J. Schreiber  
C. W. Goepel.

INVENTOR

Heinrich Winter  
BY James Viles  
ATTORNEYS.

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2 SHEETS—SHEET 2.

Fig. 3.

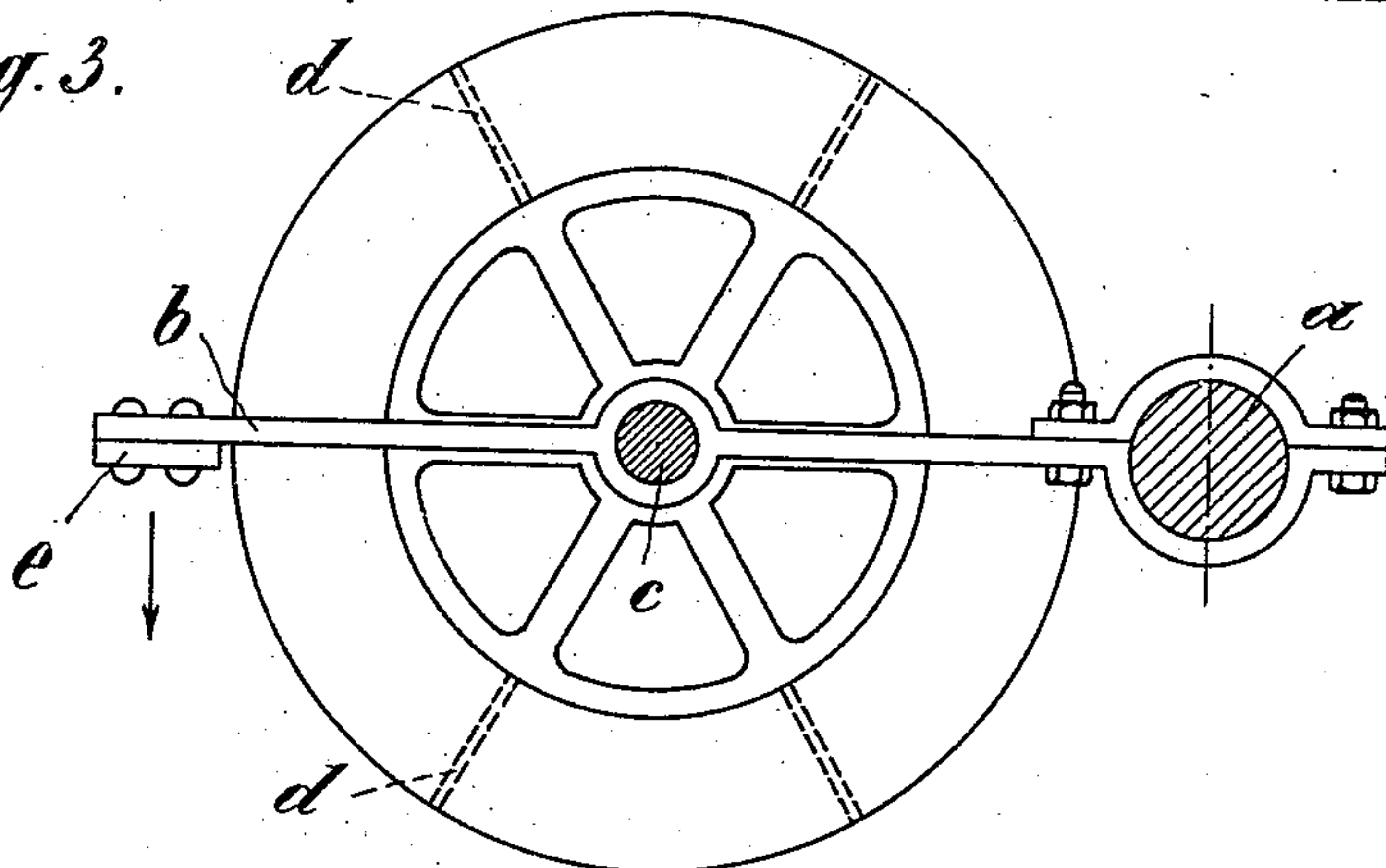


Fig. 4.

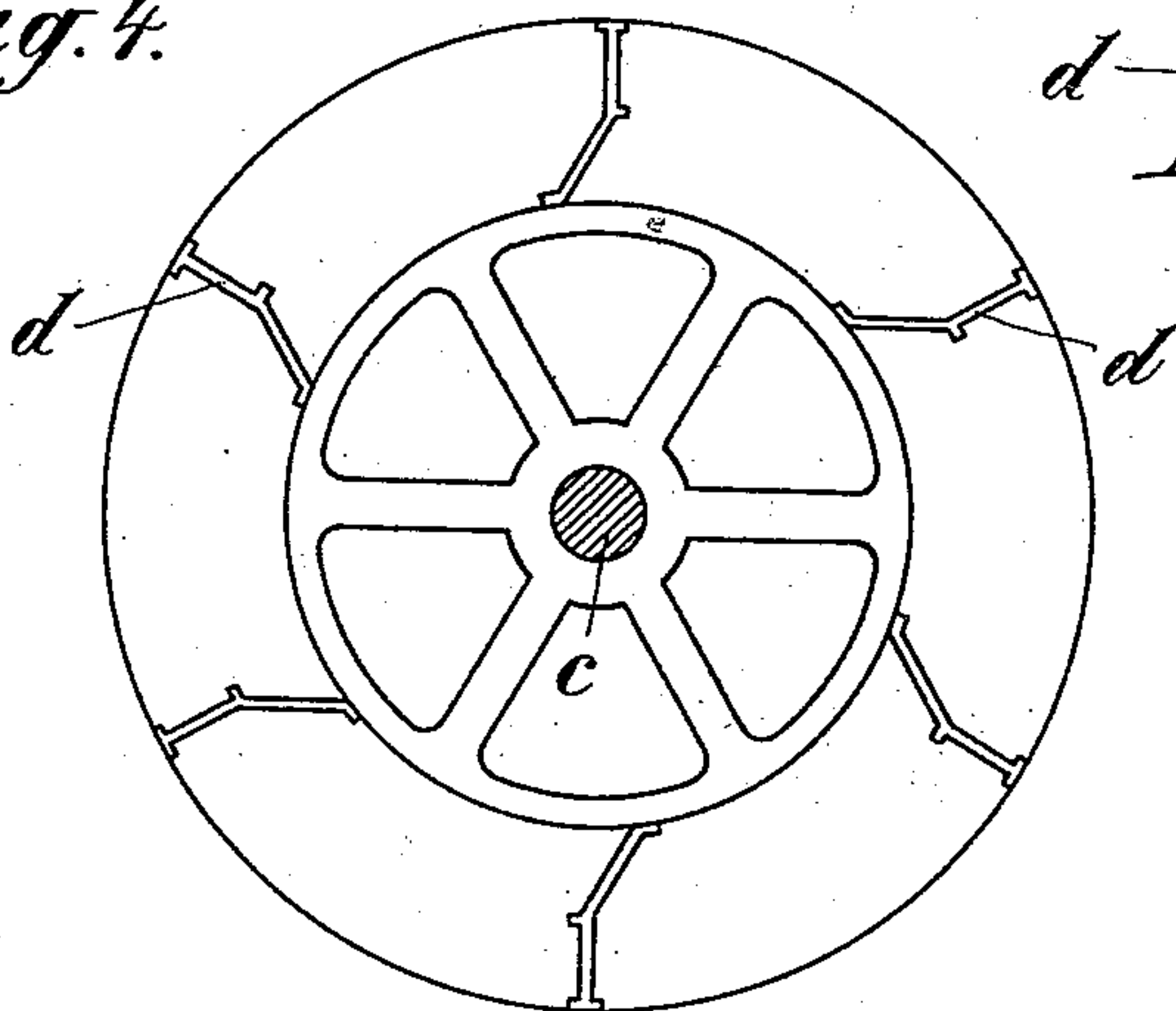


Fig. 5.

Fig. 6.

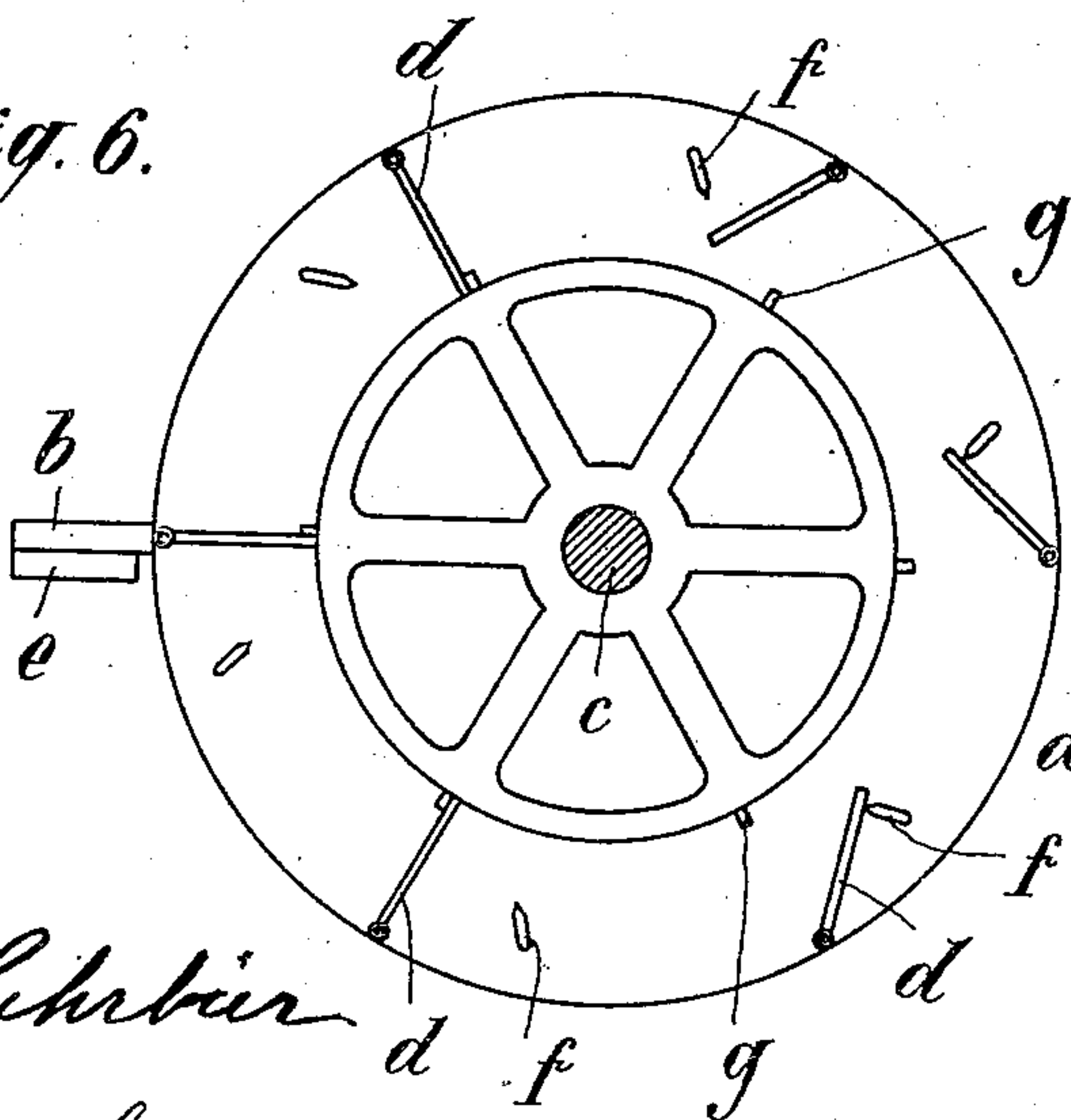
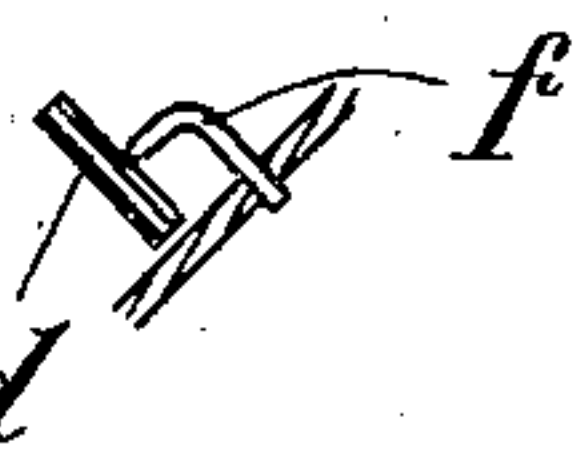


Fig. 7.



WITNESSES:

*Henry J. Schreiber*  
*C. P. Goepel*

INVENTOR

*Heinrich Winter*  
BY *James Hiles*  
ATTORNEYS.



# UNITED STATES PATENT OFFICE.

HEINRICH WINTER, OF CHARLOTTENBURG, GERMANY.

## CRYSTALLIZING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 742,544, dated October 27, 1903.

Application filed December 27, 1902. Serial No. 136,830. (No model.)

*To all whom it may concern:*

Be it known that I, HEINRICH WINTER, a citizen of the German Empire, and a resident of No. 150<sup>a</sup> Kantstrasse, Charlottenburg, Germany, have invented certain new and useful Improvements in Crystallizing Apparatus, of which the following is a specification.

This invention relates to improvements in stirring devices for masse-cuite cooling apparatus and the like, and has for its object to effect a mixing of the mass from the center to the periphery, and vice versa—that is, a thorough mixing of the warmest and coolest layers in the mixer.

In hitherto-known stirring devices as constructed for apparatus of this kind, especially as applied to the process of crystallization in motion, the mass is principally moved around in a concentric path around the central shaft. The mixing of the mass, especially in a radial and in a longitudinal direction to the mixer, as a rule only took place very imperfectly by a screw-like revolution of the stirring-arms and by bent connecting-bands, also spirally curved. In the event of the masse-cuite being hot or of an especially liquid consistency such stirring means may also suffice, but for less hot mash as well as for particularly viscous mash a very imperfect intermixing of those layers nearest to the cooling-mantle, and therefore already somewhat cooled, with those layers nearer to the main shaft results. As a matter of fact, in these cases a considerable difference in temperature can be noted if a thermometer be introduced or inserted first into the peripheral and then into the central layers.

The present invention, as hereinbefore indicated, has the object of effecting an intimate commingling of the mass from the center to the periphery and inversely—that is to say, a thorough and intimate mixing of the warmest and coolest layers. This object is attained by a stirring device constructed substantially as follows:

In the accompanying drawings, Figure 1 is a longitudinal section of the new mixer. Fig. 2 is a cross-section thereof. Fig. 3 is a cross-section of one of the drums mounted on a secondary shaft between the stirring-arms of the main shaft. Fig. 4 is a cross-section of the drum having stirring-blades of another

form. Fig. 5 shows another form of the stirring-blades. Fig. 6 is a cross-section of a drum with movable blades. Fig. 7 is a side elevation of one of the contact-points for the stirring-blades.

Connected with the main shaft *a* of the cylindrical vessel *A* or mash-vat (shown in Figs. 1 and 2) are four or more vertically-arranged stirring-arms *b*, between two of which a stirring device mounted on a secondary shaft *c* is arranged. This device consists of a cylindrical drum provided with end disks *m*, between which are arranged flat stirring-blades *d*, which are, as shown in Fig. 3, radially mounted on the periphery of the drum. The arms *b* may for stiffening purposes be fitted with a cross-bar *e*, which at the same time may serve as a skimmer for the walls of the mash-vat. Two of such drums may be provided, or in the case of especially long mash-vats several may be employed, the said drums being alternately arranged to each other in such a manner that when the first drum is located below the main shaft the second drum is placed above the said main shaft, and so on. A spiral movement being imparted to the flat stirring-blades *d* causes the same to conduct the liquid during the stirring operation in the direction of the longitudinal axis.

The operation of the improved stirring device is as follows: As soon as the main shaft is rotated the arms and the stirring-drum revolve through the liquid, and thereby agitate the same. However, the resistance of the liquid is greater the quicker this movement takes place. The motion, however, is more rapid near or close to the periphery than near the main shaft, in consequence of which the pressure on the stirring-blades *d*, which at a given moment are close to the mantle-wall, is greater than upon such blades which at the same moment are near the main shaft. Consequently the stirring-drum will be rotated and in such a manner that the blades nearest the mantle will move in an opposite direction to the main arms and the skimmer.

In a modification the stirring-arms are provided with ribs, flanges, or projections and are preferably curved, Figs. 4 and 5, so that the resistance hereby occasioned is also greater in the case of the outer arms than of the inner arms. The radially-disposed por-



tion carries on one side, at its center, a small longitudinal rib or flange, whereby about half the width of the blade serves as a carrier. The same result may also be obtained by 5 curved-shaped ribs, wherein the side of the greatest resistance forms, as it were, a concave arch of about two-thirds the total width, while the side offering the least resistance forms an arch of about one-third the total 10 width.

In a further modification the effect in question is produced in the strongest degree by the stirring-blades being arranged pivotally around the outer edge, Fig. 6. Stops *g* at the 15 lower edge limit the movement of the blades in a radial direction in the position of the greatest resistance, while on the opposite side the blades adjust themselves in an acute angle to the radius, in consequence of which less 20 resistance is presented by the blades to the passage of the liquid than in the radial position. This limiting is effected by means of contact-points *f*, which thus offer but a very slight contact-surface to the stirring-blades 25 in order to obviate any breaking of the grain or crystals in consequence of or during both the reversing or stopping action of the blades.

What I claim, and desire to secure by Letters Patent of the United States, is—

30 1. A crystallizing apparatus consisting of a cylindrical vessel, a rotatable shaft central to the same, radial arms on said shaft, secondary shafts supported by said arms, and means on said secondary shaft rotatable when rotating 35 the central shaft, substantially as set forth.

2. A crystallizing apparatus consisting of a cylindrical vessel, a rotatable shaft central to the same, radial arms on said shaft, secondary shafts supported by said arms, cross-bars at 40 the outward ends of the radial arms, and means on said secondary shaft rotatable when rotating the central shaft, substantially as set forth.

3. A crystallizing apparatus consisting of a

cylindrical vessel, a rotatable shaft central to 45 the same, radial arms on said shaft, secondary shafts supported by said arms, drums on said secondary shafts, and blades for said drums for imparting to the drums rotary motion when rotating the central shaft, substantially 50 as set forth.

4. A crystallizing apparatus consisting of a cylindrical vessel, a rotatable shaft central to the same, radial arms on said shaft, secondary 55 shafts supported by said arms, drums on said secondary shafts, disks at the ends of the drums, and blades between the disks for imparting to the drums rotary motion when rotating the central shaft, substantially as set 60 forth.

5. A crystallizing apparatus consisting of a cylindrical vessel, a rotatable shaft central to the same, radial arms on said shaft, secondary shafts supported by said arms, drums on said 65 secondary shafts, disks at the ends of the drums, blades pivoted to said disks, stops on said drums in radial line with the pivots of the blades, and stops for limiting the movement of the blades, substantially as set forth.

6. A crystallizing apparatus consisting of a 70 cylindrical vessel, a rotatable shaft central to the same, radial arms on said shaft, secondary shafts supported by said arms, drums on said secondary shafts, disks at the ends of the drums, blades pivoted to said disks, stops on 75 said drums in radial line with the pivots of the blades, and pointed stops for limiting the movement of the blades formed to contact with the blades at but one point, substantially 80 as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

HEINRICH WINTER.

Witnesses:

HENRY HASPER,  
WOLDEMAR HAUPT.