

No. 765,281.

PATENTED JULY 19, 1904.

E. HERMANN.
GAGED GRANULATOR.

APPLICATION FILED FEB. 5, 1904.

NO MODEL.

3 SHEETS—SHEET 1.

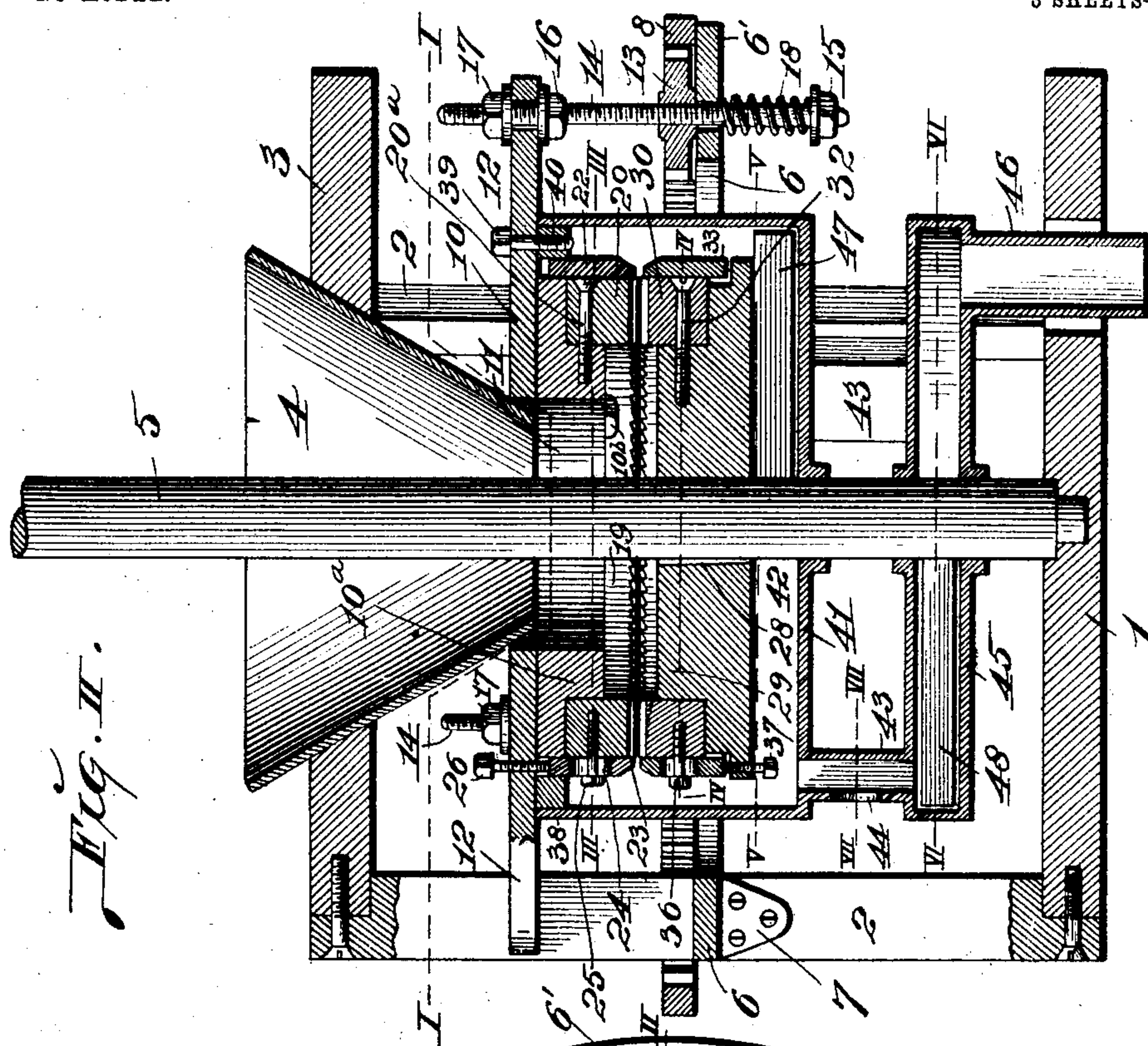


Fig. II.

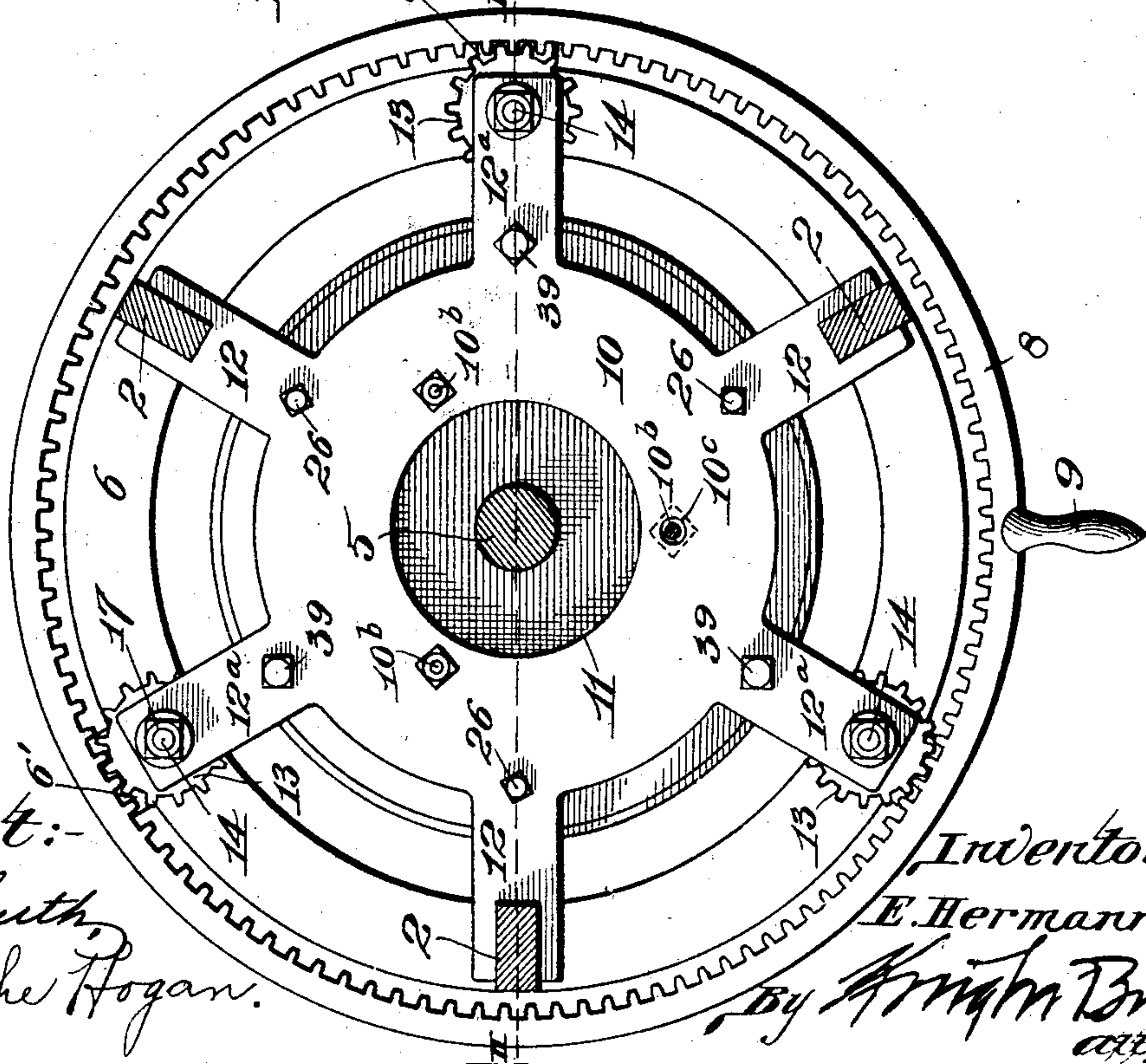


Fig. I.

Attest:-
M. Smith,
Blanche Hogan.

Inventor:
E. Hermann.

By *Arthur B. Brown*
attys.

No. 765,281.

PATENTED JULY 19, 1904.

E. HERMANN.
GAGED GRANULATOR.

APPLICATION FILED FEB. 5, 1904.

NO MODEL.

3 SHEETS—SHEET 2.

Fig. III.

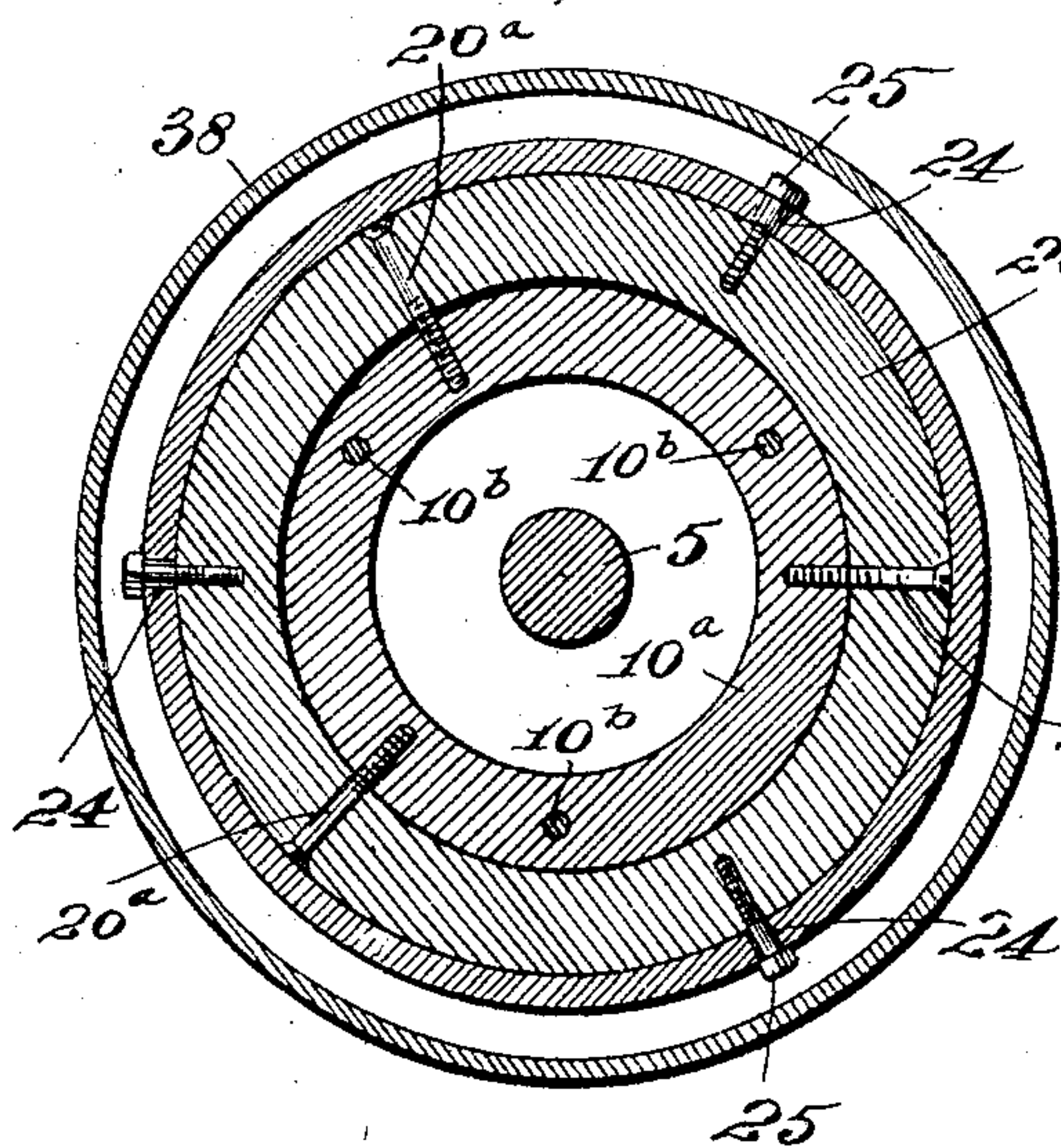


Fig. IV.

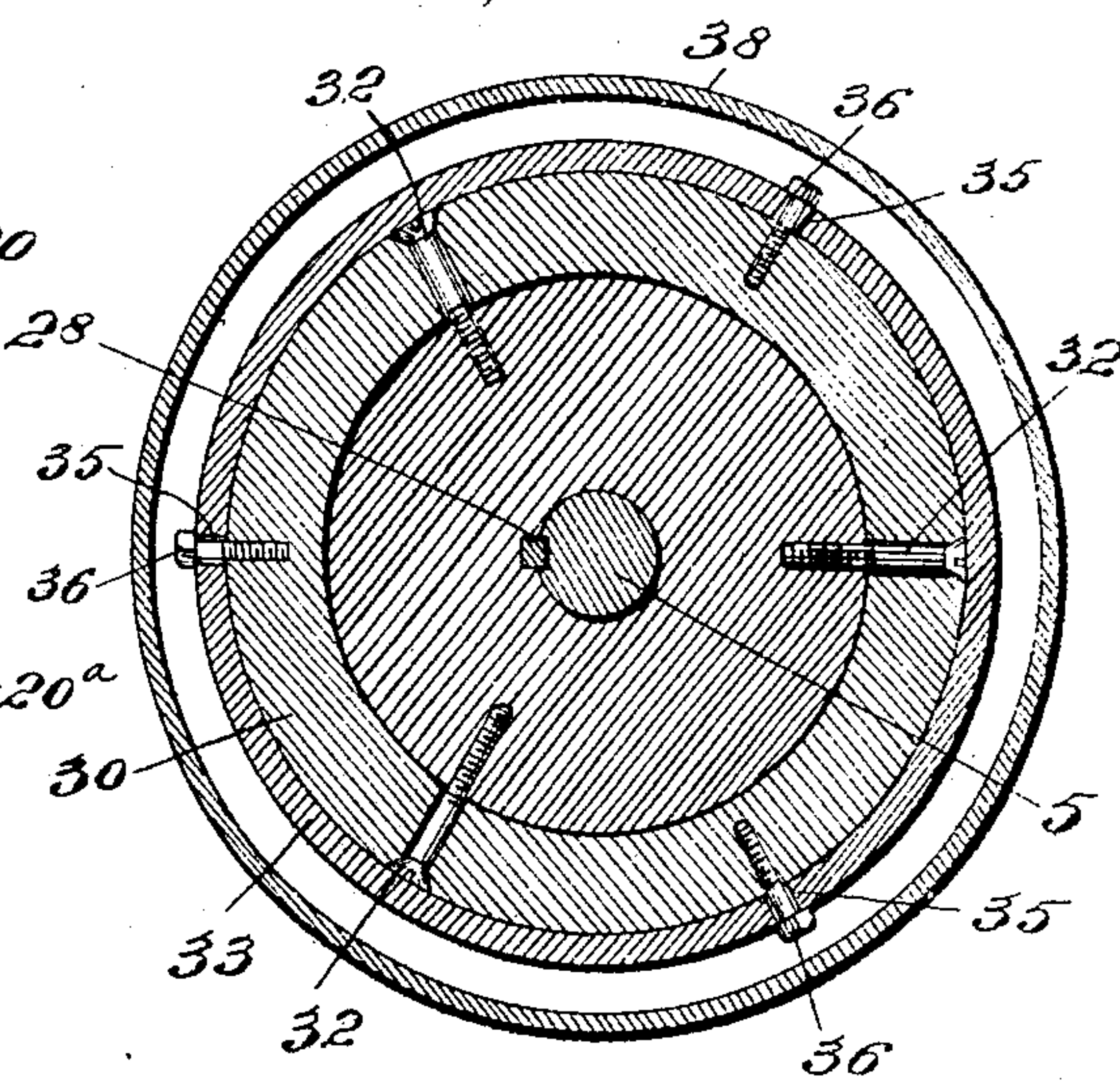


Fig. V.

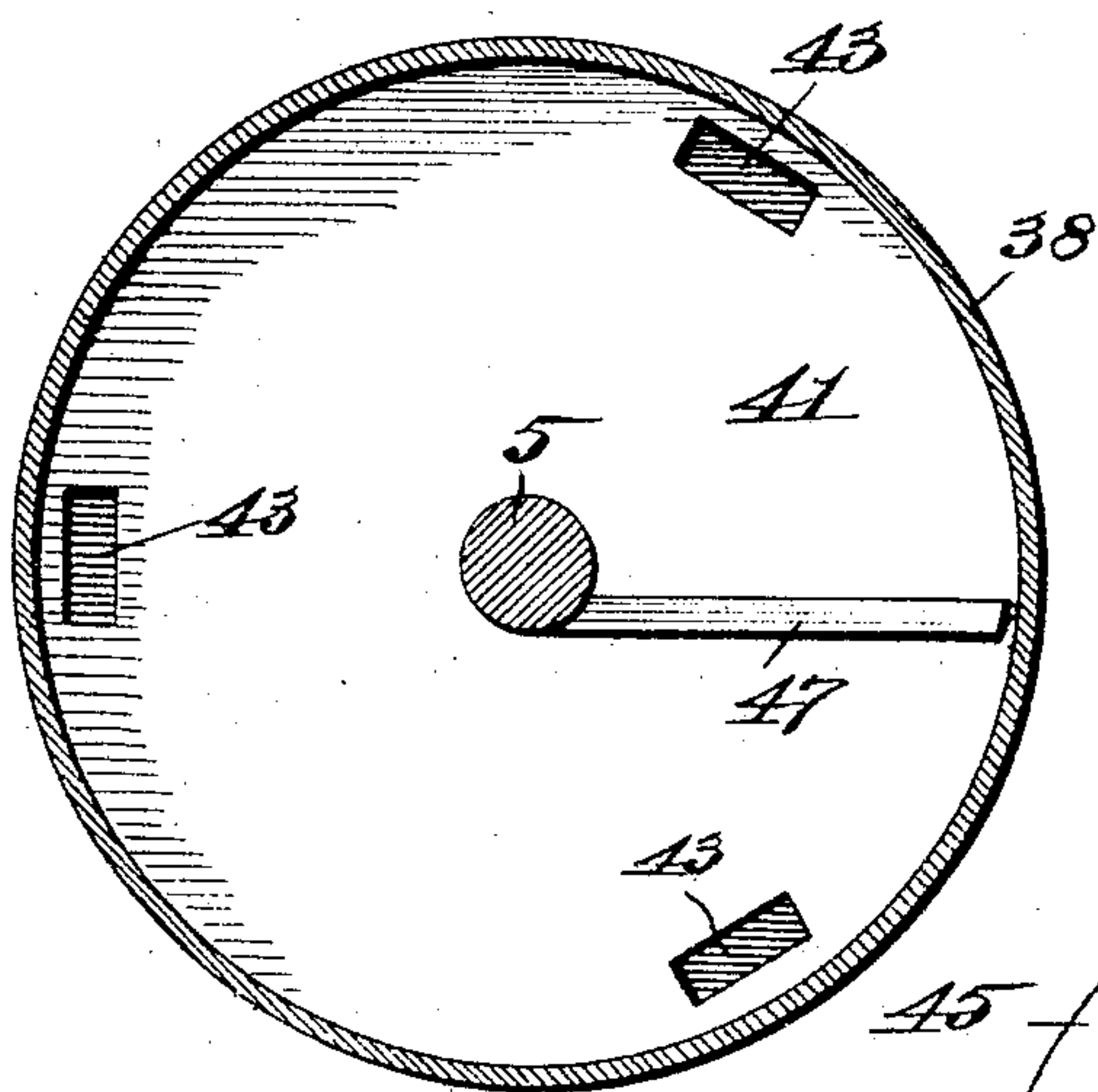


Fig. VI.

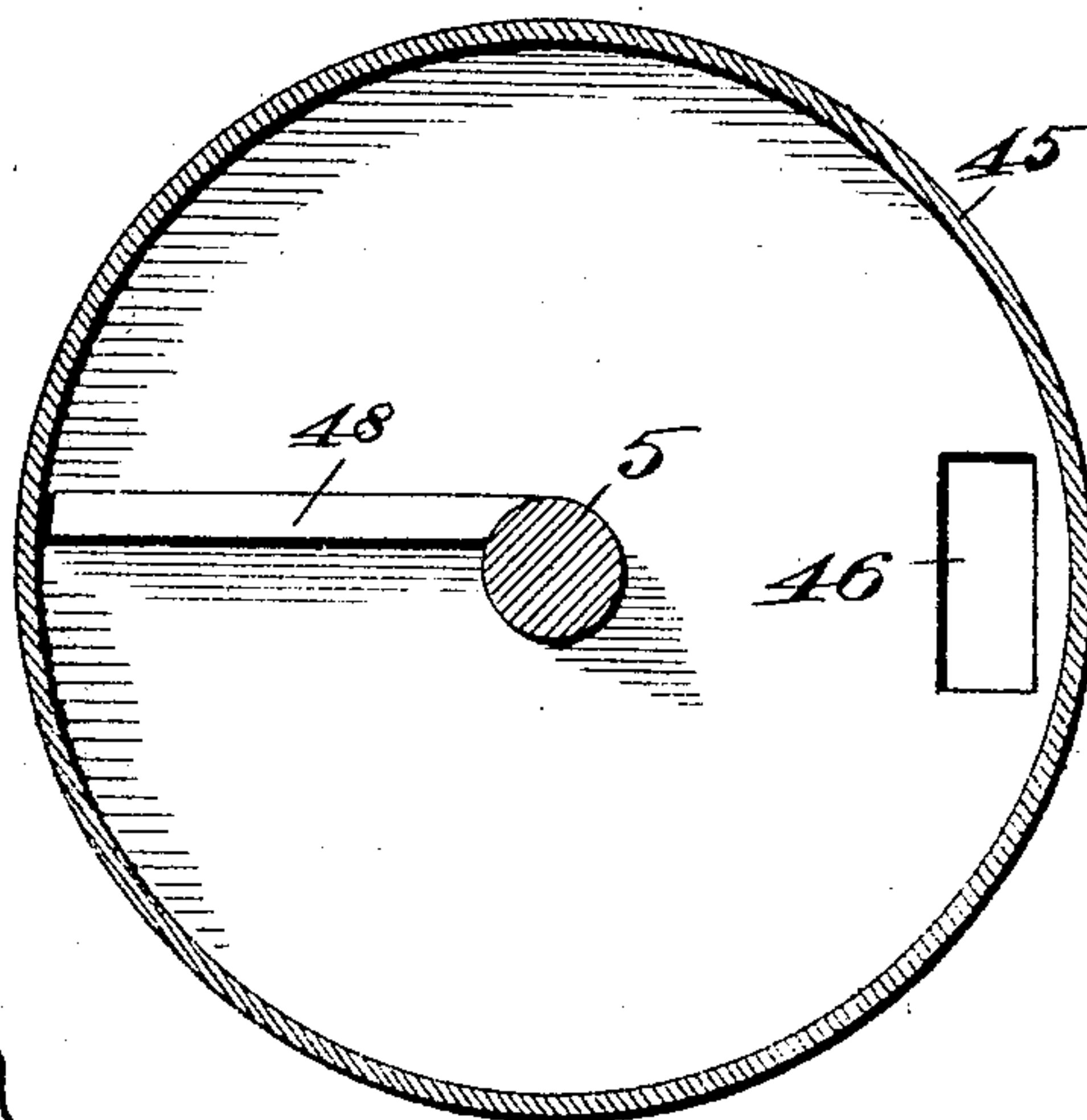
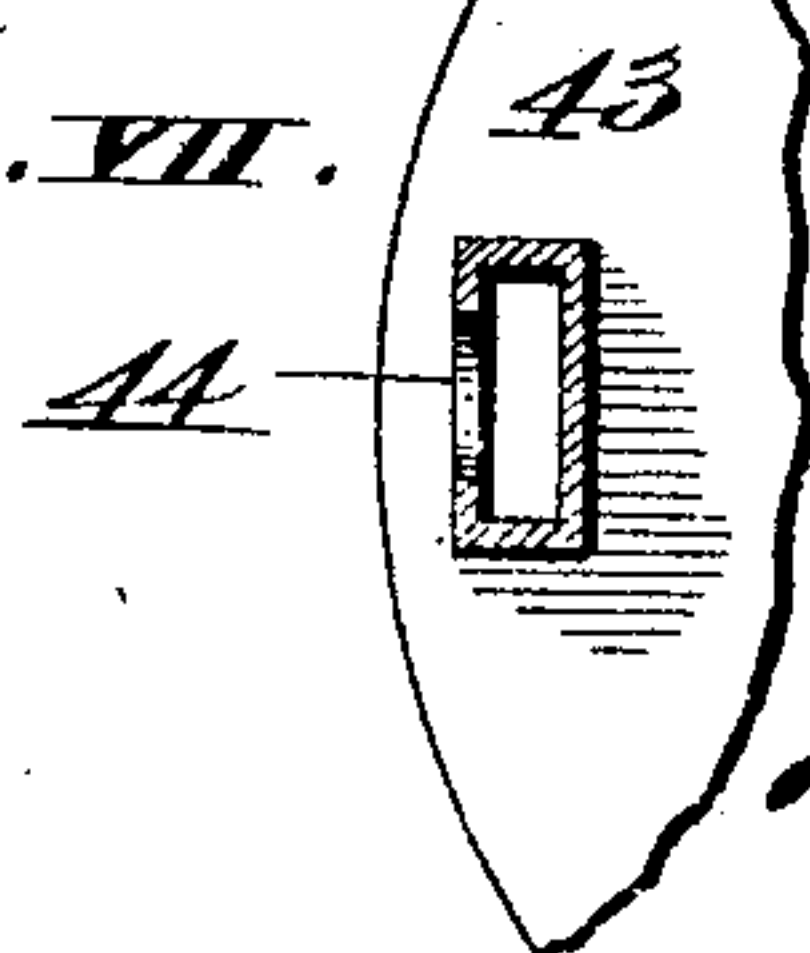


Fig. VII.



attest:

M. Smith,
Blanche Hogan.

Inventor:
Emil Hermann.

By *Arthur T. Bros*
attys.

No. 765,281.

PATENTED JULY 19, 1904.

E. HERMANN.
GAGED GRANULATOR.

APPLICATION FILED FEB. 5, 1904.

NO MODEL.

3 SHEETS—SHEET 3.

Fig. VIII.

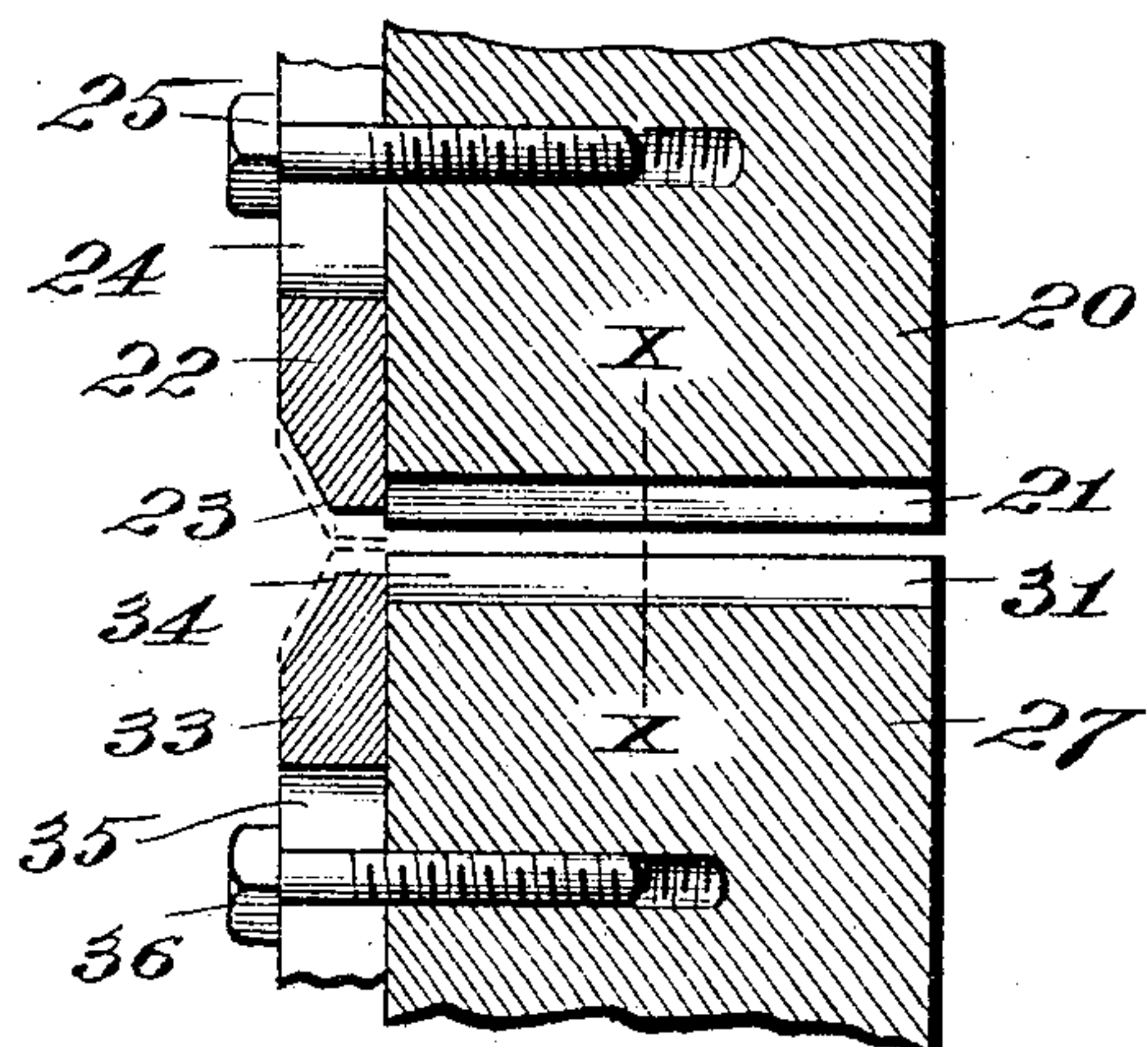


Fig. IX.

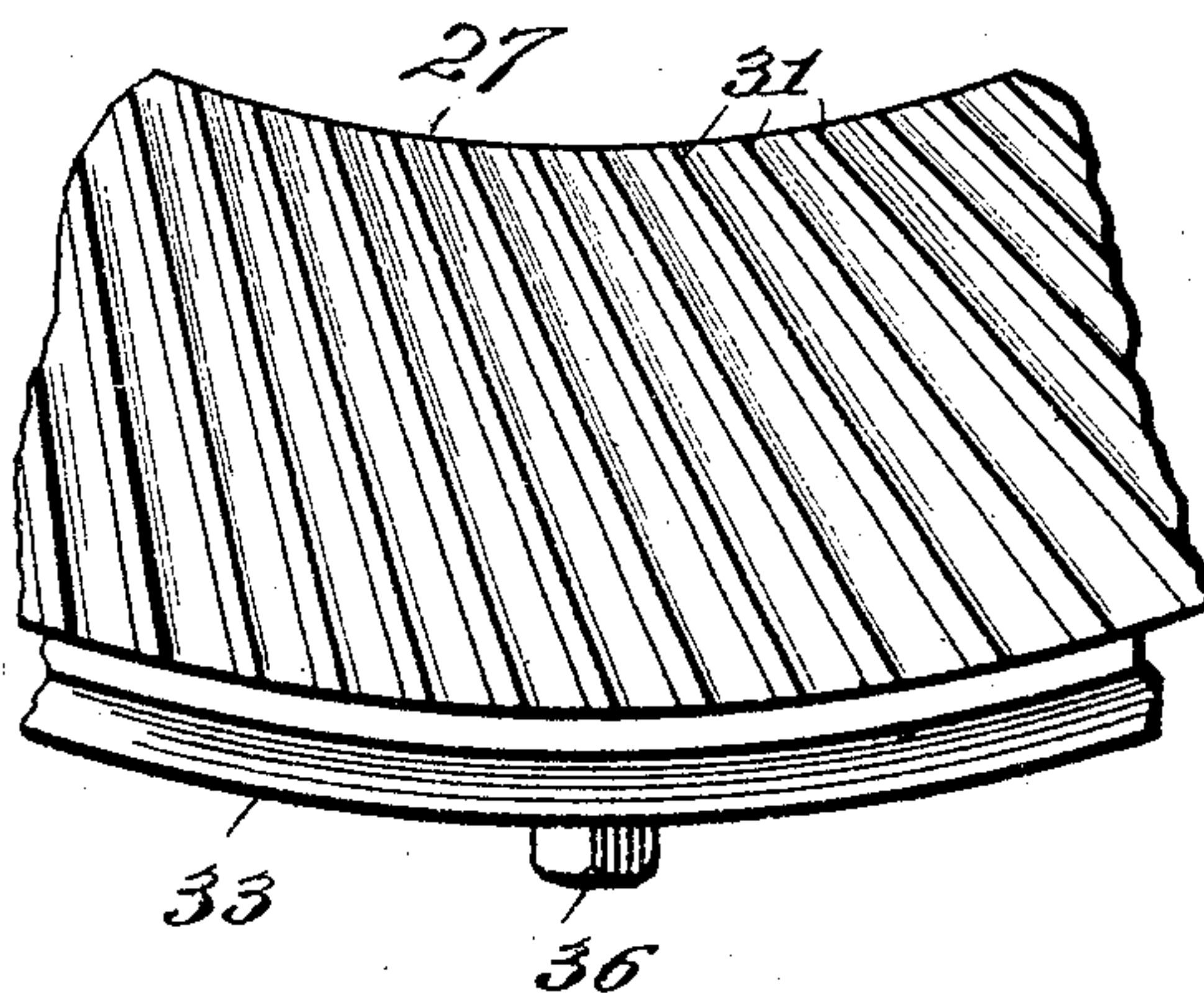
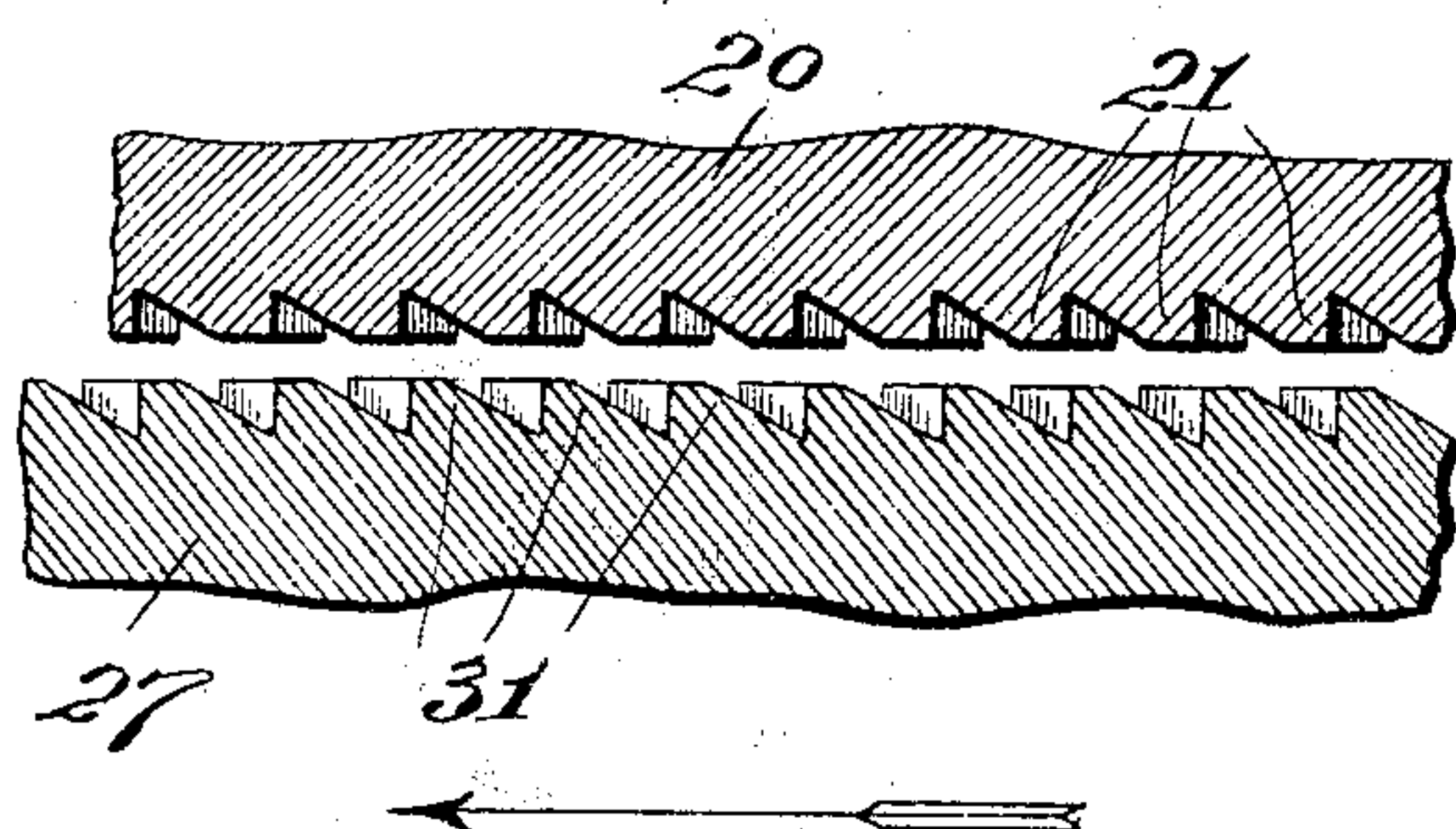


Fig. X.



Attest:—

M. P. Smith
Blanche Hogan

Inventor:—

Emil Hermann.

By Knight Bros.
Attys.

UNITED STATES PATENT OFFICE.

EMIL HERMANN, OF HIGHLAND, ILLINOIS.

GAGED GRANULATOR.

SPECIFICATION forming part of Letters Patent No. 765,281, dated July 19, 1904.

Application filed February 5, 1904. Serial No. 192,114. (No model.)

To all whom it may concern:

Be it known that I, EMIL HERMANN, a citizen of the United States, residing in Highland, in the county of Madison and State of Illinois, have invented certain new and useful Improvements in Gaged Granulators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to an apparatus for granulating various products, such as grain, including wheat, corn, rye, &c.; and it has for its object to provide a construction in which the product being operated upon may be ground of absolutely even granulation; also, a construction whereby the grinding members may be adjusted or trammed, and also the provision of an arrangement whereby the ground product may be constantly observed to furnish knowledge of the character of grinding throughout the apparatus to thereby provide for any necessary alteration in the adjustment of the grinding members to overcome uneven grinding operation at any point. The invention consists in features of novelty hereinafter fully described, and pointed out in the claims.

Figure I is a view, partially in plan, of parts of my granulator and partially in horizontal section taken on irregular line I I, Fig. II. Fig. II is a vertical section taken on line II II, Fig. I. Fig. III is a horizontal section taken on line III III, Fig. II. Fig. IV is a horizontal section taken on line IV IV, Fig. II. Fig. V is a horizontal section taken on line V V, Fig. II. Fig. VI is a horizontal section taken on line VI VI, Fig. II. Fig. VII is a horizontal section taken on line VII VII, Fig. II. Fig. VIII is an enlarged vertical section taken through portions of the lower and upper grinding-rings and the adjustable gage-rings associated therewith. Fig. IX is a top view of a fragment of the corrugated upper face of the lower grinding-ring and gage-ring associated therewith. Fig. X is a section taken on line X X, Fig. VIII, illustrating the corrugations of the two grinding-rings.

The frame of my granulator consists of a base 1, a series of uprights 2, and a top 3, all united, as seen in Fig. II.

4 is a feed-hopper seated in the top 3 of the granulator-frame.

5 is a rotatable shaft that is centrally disposed in the granulator and has its lower end stepped into the frame-base 1.

6 designates a supporting-ring mounted intermediate of the ends of the frame-uprights 2 on brackets 7, secured to said uprights.

8 is an internal gear-ring supported by a series of arms 6' extending from the supporting-ring 6. (See Figs. I and II.) This gear-ring is preferably furnished with a handle 9, by which it may be rotated for a purpose to be hereinafter stated.

10 designates an upper grinder member, that is provided with a central orifice 11, which receives the lower end of the feed-hopper 4 and which is free of connection to the shaft 5. The grinder member 10 is furnished with guide-arms 12, corresponding in number to the series of frame-uprights 2 and ring-arms 6', each of said grinder-member arms being bifurcated, as seen in Fig I, so as to straddle the uprights and ride in engagement therewith when said grinder member is raised and lowered. The grinder member 10 is raised and lowered to tram it by the following means: 13 designates pinions seated on the supporting-rings 6 at the location of its arm 6' and arranged in mesh with the teeth of the internal gear-ring 8. 14 represents adjustment-screws that pass vertically and freely through the supporting-ring 6 and the arms 12 of the upper grinding member and which have threaded engagement with the pinions 13, through which they pass. The pinions 13 and adjustment-screws 14 are of a number corresponding to that of the upper grinding-member arms 12^a. Each of said screws is provided with a nut 15, which may be rotated to adjust it vertically on the screw, and applied to each screw, respectively beneath and above each of the grinding-member arms 12^a, are nuts 16 and 17.

18 designates tension-springs surrounding the adjustment-screws 14 between the supporting-ring 6 and the screw-nuts 15, these springs being designed to permit upward movement of the screws through the supporting-ring with the members to which they are

connected under a condition to be hereinafter specified. The tension-springs are tightened by the nuts 15.

Beneath the central portion of the upper grinding member 10 is a chamber 19, with which the feed-hopper 4 has communication through the orifice 11 in said member. 10^a is a shiftable ring secured to the grinder member 10 by adjustment-bolts 10^b, that pass through openings 10^c in the member 10, that are of greater diameter than said bolts. (See Fig. I.)

20 is a grinding-ring carried by the shiftable ring 10^a and having a lower corrugated face 21 extending to the periphery of the ring. The grinding-ring 20 is connected to the ring 10^a by screws 20^a.

22 is an upper gage-ring encircling the grinding-ring 20 and adjustably fitted to said grinding-ring for vertical movement, so that its lower straight edge 23 may be moved downwardly to more or less close the outer ends of the corrugation-grooves in the lower face of said grinding-ring 20. To provide for the adjustment of the gage-ring and the maintenance thereof in a fixed position into which it has been adjusted, I form vertical slots 24 in the ring at intervals and introduce therethrough set-screws 25, that seat in the grinding-ring 20, (see Figs. II and III,) the heads of said screws being arranged to bear against the outer face of the gage-ring when the screws are screwed home. Downward movement is imparted to the gage-ring for its adjustment by set-screws 26, that pass through the arms 12 of the upper grinder member 10 and bear against the upper edge of the gage-ring.

27 designates a lower grinder member fixed to the rotatable shaft 5 by any suitable means, such as a key 28, so that said member will rotate with said shaft. This grinder member is provided with a raised central portion 29, to which it is secured by screws 32.

30 is a lower grinding-ring on the grinder member 27 and encircling its raised central portion. This grinding-ring has a corrugated upper face 31, made with an outward pitch and that opposes the corrugated face of the upper grinding-ring 20. During the rotation of the lower grinder member it is conveyed in alinement with the corrugated face of the upper grinder-ring.

To secure lateral adjustment of the upper grinding-ring 20 beneath the upper grinder member 10, so that it may be shifted at any time into precise vertical position with the axis of the lower grinding-ring 30, I loosen the nuts of the bolts 10^b and move the shiftable ring 10^a sufficiently to aline the grinding-rings.

33 designates a lower gage-ring that is positioned immediately beneath the upper gage-ring 22 and is adjustably fitted to the lower grinding-ring 30 for vertical movement with

respect thereto. This lower gage-ring is provided with an upper straight edge 34, that opposes the lower straight edge 23 of the upper gage-ring.

In the lower gage-ring is a series of vertical slots 35, that receive set-screws 36, which pass therethrough and enter into the lower grinding-ring 27. Vertical adjustment of the lower gage-ring toward the upper gage-ring to partially close the corrugation-grooves in the lower grinding-ring is accomplished through the medium of vertical set-screws 37, that pass upwardly through the lower grinder member 27 at its edge and bear against the lower edge of the lower gage-ring.

38 designates an upper ground-product-receiving hopper that receives the product discharged from between the grinding-rings 20 and 30, this hopper being concentric with the grinding-rings and having its wall sufficiently remote from said rings and the gage-rings associated therewith to furnish a space between the grinding members and the hopper. The hopper 38 is supported by any suitable means, such as screws 39, that pass downwardly through the upper grinder-member arms 12^a and enter into a ring 40, that is located in the interior of the hopper 38, as seen in Fig. II. The hopper 38 has a centrally-apertured bottom 41, through which the shaft 5 operates loosely, the said bottom being disposed sufficiently beneath the lower grinder member 27 to furnish an annular space 42 above the hopper-bottom and with which the upright space within the hopper communicates.

43 is a series of spouts leading downwardly from the ground-product-receiving hopper 38, these spouts corresponding in number to that of the adjustment-screws 14 and each spout being provided with an orifice 44, (see Figs. II and VII,) through which the operator of the granulator may observe the descending product to determine the character of the work being accomplished by the grinding mechanism at different points.

45 is a lower ground-product-receiving hopper encircling the shaft 5, free of connection thereto, and to which the spouts 43 lead. This lower hopper is furnished with a single discharge-spout 46.

47 designates a sweep carried by the shaft 5 and arranged to operate in the upper ground-product-receiving hopper 38 immediately above its bottom and by which the ground product is conveyed to the series of spouts 43 to enter therein and descend into the lower hopper 45.

48 is a sweep carried by the shaft 5 and arranged to operate in the lower hopper 45 to convey the product received thereby to the discharge-spout 46.

Having now described the mechanical construction of my granulator, I will furnish a description of its operation. The product to be ground is delivered into the feed-hopper 4

and descends therefrom into the space between the upper and lower grinder members 11 and 27, the first named of which remains stationary, while the last named rotates with the shaft 5, driven through the medium of power suitably applied thereto. As the lower grinder member rotates it carries therewith the lower grinding-ring 30, and the product entering into the space between the grinder members is thrown outwardly by centrifugal action to enter between the opposing corrugated faces of the grinding-rings. The product is ground between these rings and passes outwardly into the upper receiving-hopper 38, from which it is discharged by the sweep 47 to descend through the spouts 43 and be in turn discharged by the sweep 48 from the lower receiving-hopper 45 into the discharge-spout 46.

The regulation of the discharge of the ground product from between the grinding-rings is provided for by the gage-rings 23, which partially close the outer ends of the grooves in the corrugations of the grinding-rings, and thereby more or less clog the outflow of the product, so that it will be maintained between the grinding-rings a length of time to produce a requisite amount of grinding to reduce it to the desired degree of fineness. Should there be any point throughout the extent of the grinding-rings at which the rings are unevenly separated or out of tram, the unevenness is overcome by operating the adjustment-screws 14 after loosening the proper nut 16 or 17 thereon, and by such actuation of the adjustment-screw the upper grinding member is raised or lowered with respect to the lower grinder member to overcome the unevenness referred to.

The internal gear-ring 8, arranged in mesh with the pinions 13 on the adjustment-screws 14, furnishes a medium through means of which the upper grinding member, with its grinding-ring, may be quickly and accurately raised and lowered at any time to alter the space existing between the upper and lower grinding-rings without affecting the alignment or tram of said rings or changing the uniformity of space between the grinding-rings.

The grinding members of my granulator are by their described construction and arrangement such that any product ground by passage between them is rendered of uniform fineness and even granulation. Due to the corrugations in the grinding-rings being formed with a pitch extending to the peripheries of the rings, the product is caused to move outwardly as it comes in contact with the sharp inside edges of the gage-rings 22 and 33, encircling the grinding-rings, in a manner to cause the gage-rings to assist in the grinding operation or help to break the product at the same time that they gage the exit

of the product from between the grinding-rings.

The construction and adjustable arrangement of the grinder members renders it possible to grind materials of various sizes and qualities. For illustration, in using the granulator in a flour-mill I am enabled by keeping the gage-rings widely separated to break the berry of wheat or other grain into clean middlings with the least possible amount of bran or germ adhering thereto, or the middlings may be ground to any desired degree of fineness by setting the gage-rings closer together, thereby forcing the corrugations to reduce the product being ground to flour of any desired degree of fineness before the ground product may escape between the gage-rings.

Due to the ground-product-receiving hoppers being constructed and arranged as described and having the discharge means leading therefrom, the operator is constantly advised of the character of work the granulator is accomplishing at all points, and should the condition of the product discharged show at any time that the apparatus is working unevenly at any point the upper grinder member may be adjusted vertically with respect to the lower grinder member, so as to secure accurate operation. It is not absolutely essential that the two ground-product-receiving hoppers be employed, as the ground product may be discharged directly from the upper receiving-hopper through the inspection-spouts into an elevator; but by providing the second receiving-hopper below the upper it is more convenient, as it is desirable to use but a single spout for delivering the ground product into the elevator. By providing the springs 18 on the adjustment-screws 14 I permit vertical movement of said screws and the upper grinder member 10 at any time should a hard object, such as a nail, enter with the product being ground and become positioned between the grinding-rings of the apparatus. In such event the springs yield and allow the upper grinding member to rise, so that the grinding-surfaces will not be injured by the hard object.

I claim as my invention—

1. In a granulator, the combination of a rotatable grinder member, a grinding-ring carried by said rotatable member, a non-rotatable grinder member, a grinding-ring carried by said non-rotatable member, and a pair of gage-rings both of the same diameter fitted to said grinding-rings and having flat opposing edges, substantially as set forth.

2. In a granulator, the combination of a rotatable grinder member, a grinding-ring carried by said rotatable member, a non-rotatable grinder member, a grinding-ring carried by said non-rotatable member, and a pair of gage-rings both of the same diameter adjustably carried by said grinding-rings and hav-

ing flat opposing edges, substantially as set forth.

3. In a granulator, the combination of a rotatable grinder member, a grinding-ring carried by said rotatable member, a non-rotatable grinder member, a grinding-ring carried by said non-rotatable member, a pair of gage-rings both of the same diameter adjustably carried by said grinding-rings, and means for
10 adjusting both of said gage-rings, independently of each other, substantially as set forth.

4. In a granulator, the combination of a rotatable grinder member, a grinding-ring carried by said rotatable member, a non-rotatable grinder member, a grinding-ring carried
15 by said non-rotatable member, a pair of gage-rings both of the same diameter adjustably

carried by said grinding-rings, set-screws for adjusting both of said gage-rings independently of each other, and set-screws for holding the gage-rings when adjusted, substantially as set forth. 20

5. In a granulator, the combination of grinding members, an upper ground-product-receiving hopper inclosing said grinding members, inspection-spouts leading from said upper hopper, and a lower ground-product-receiving hopper having communication with said inspection-spouts and provided with a discharge-spout, substantially as set forth. 25 30

EMIL HERMANN.

In presence of—

ADOLPH RUEGGER,
ROBERT M. VAUPEL.