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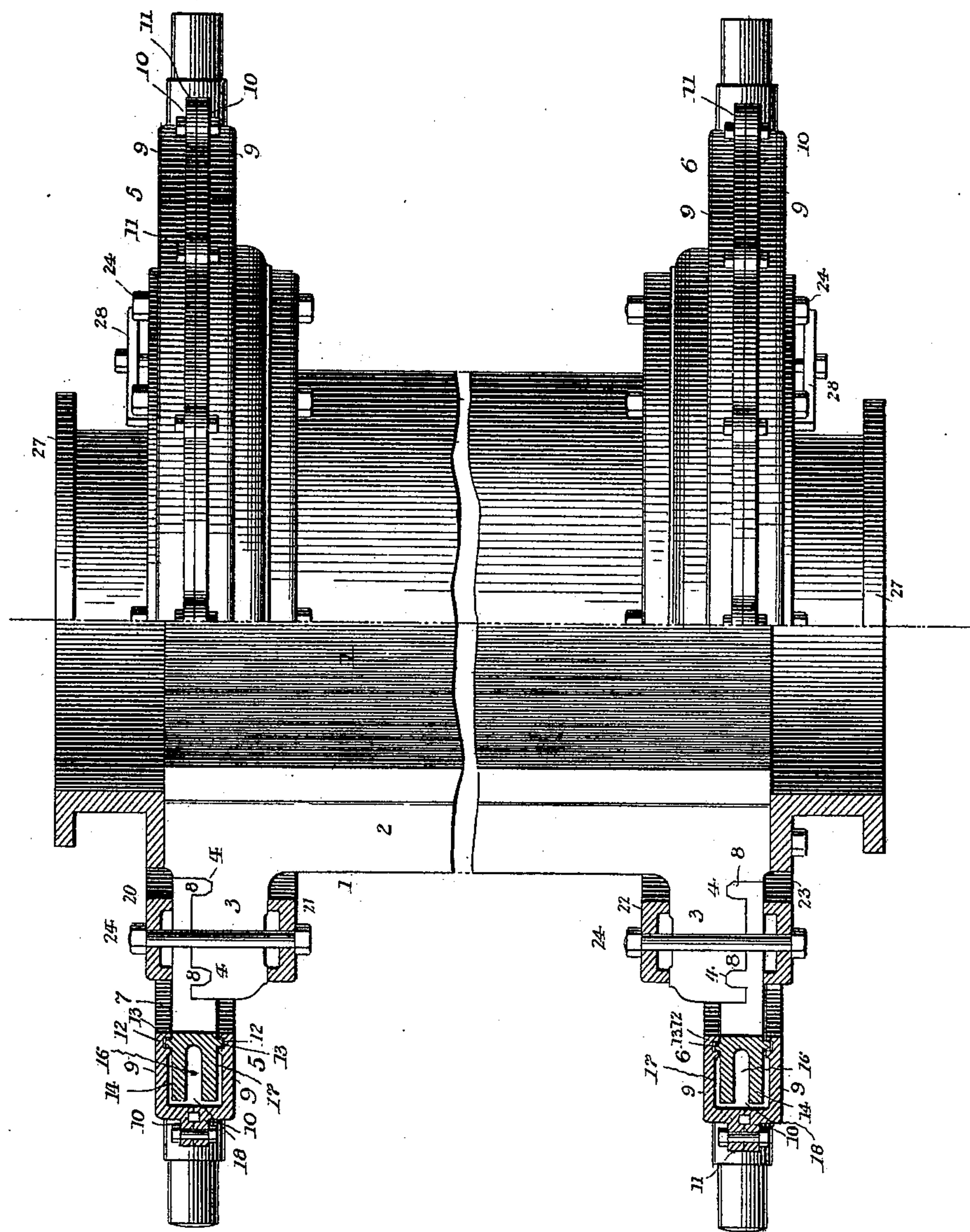
Patented Feb. 21, 1899.

J. N. BARR.
CONTRACTILE CHILL.
(Application filed Dec. 22, 1894.)

(No Model.)

6 Sheets—Sheet 1.

Fig. 1.



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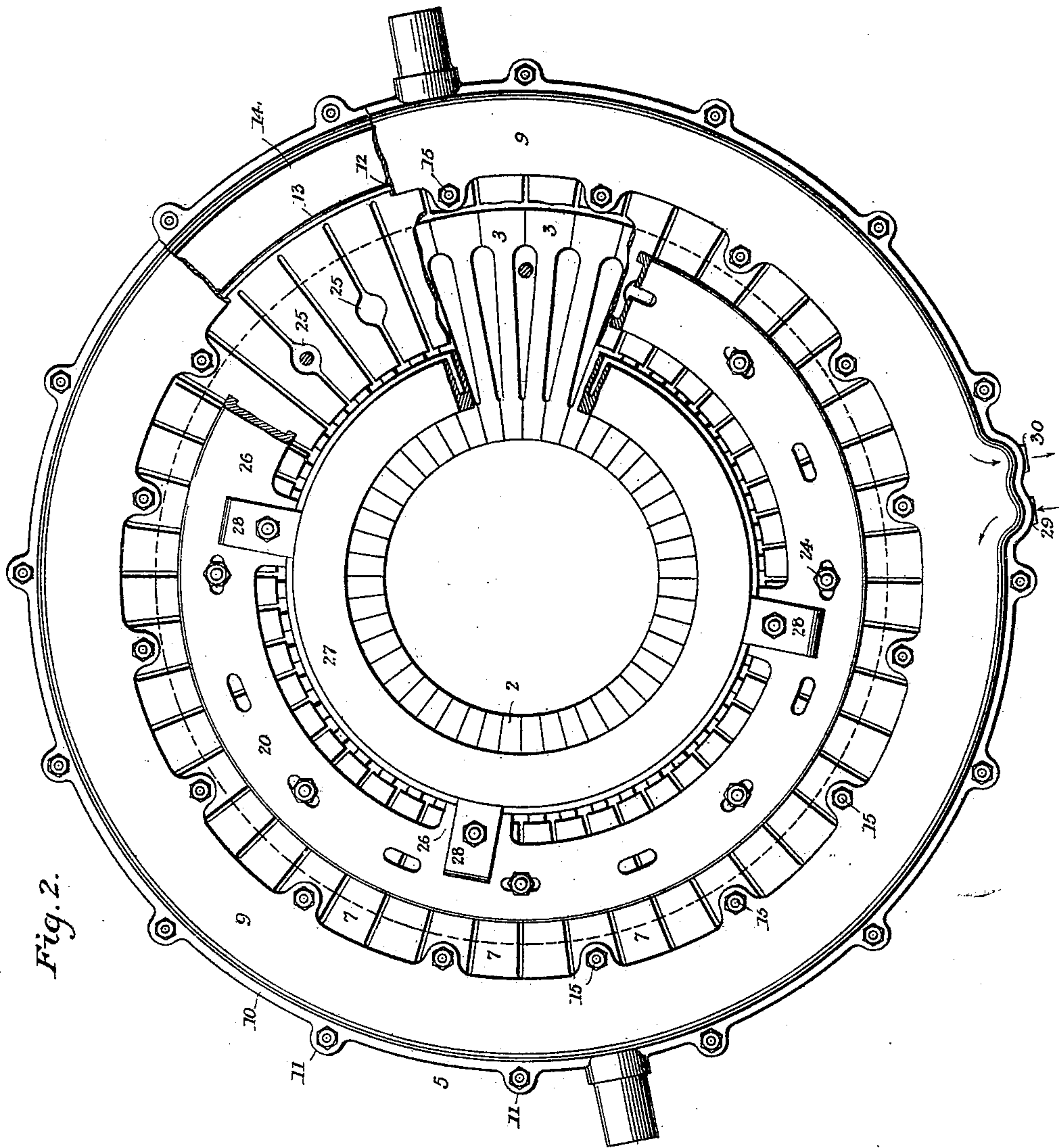


Fig. 2.

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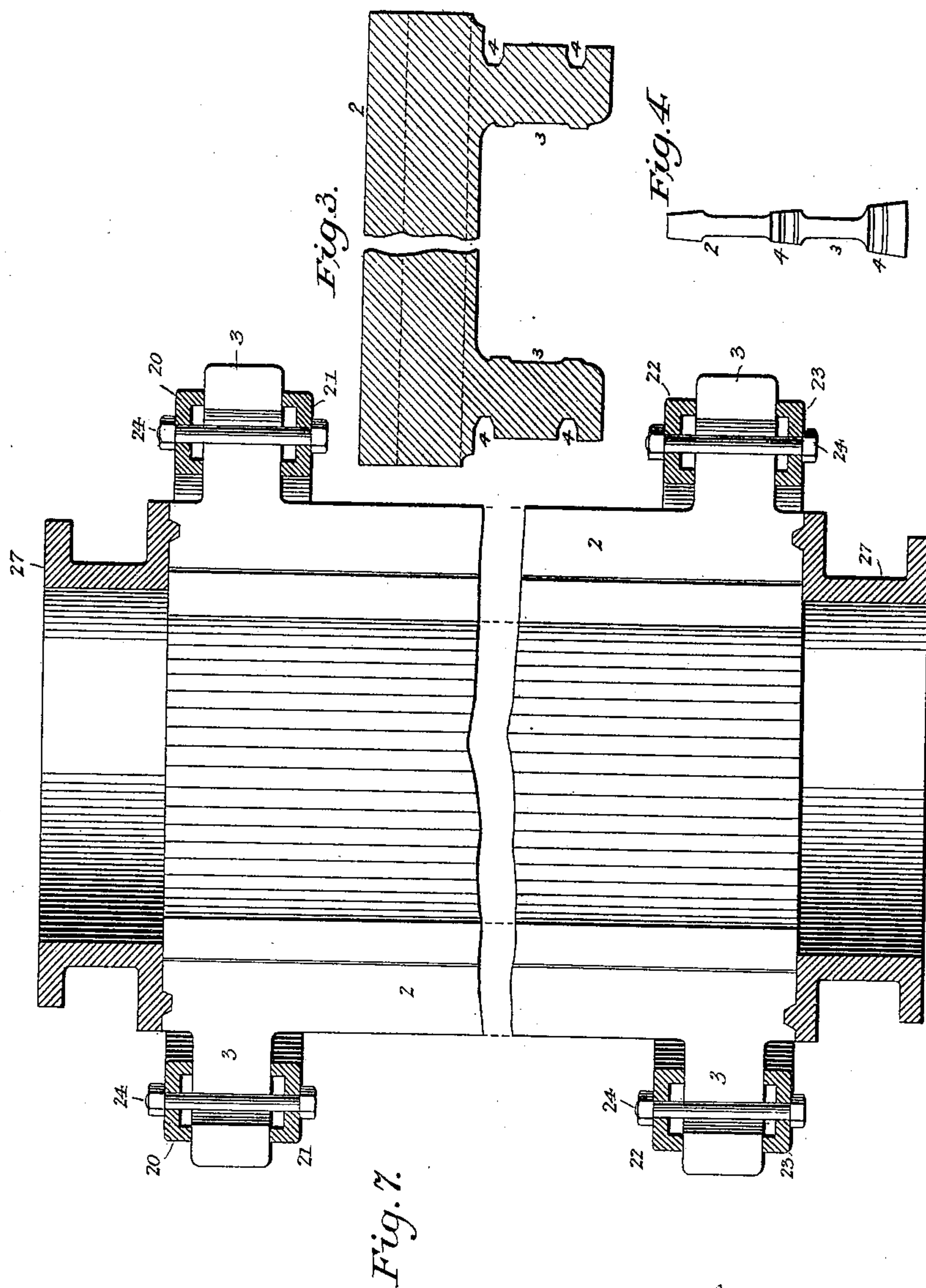
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Fig. 5.

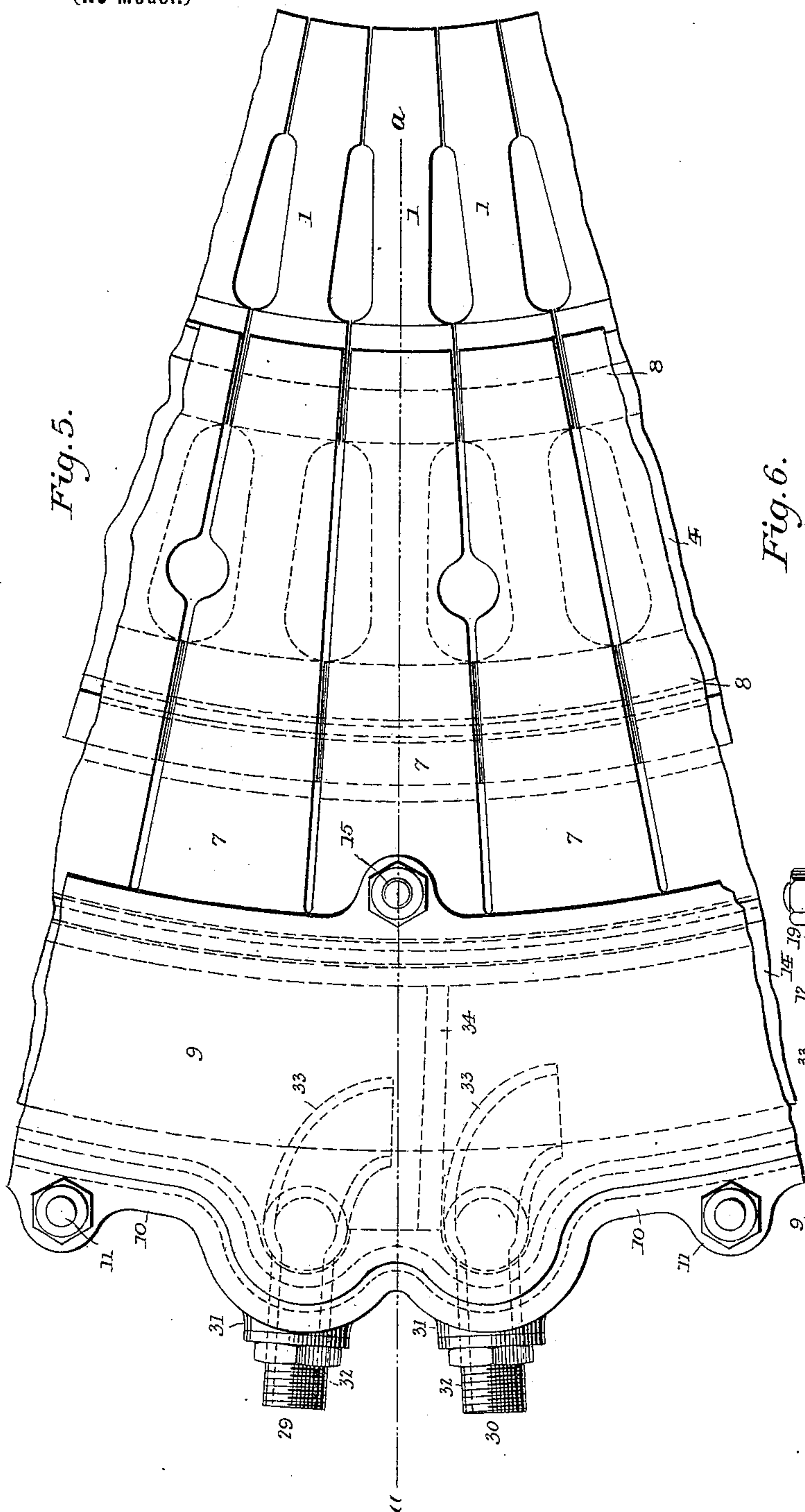
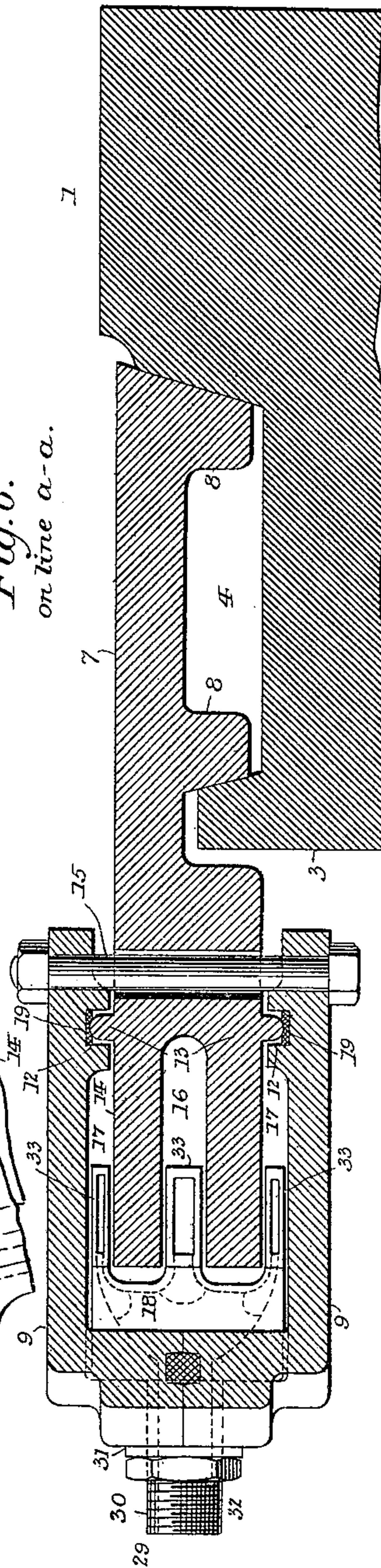


Fig. 6.
on line a-a.



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(Application filed Dec. 22, 1894.)

(No Model.)

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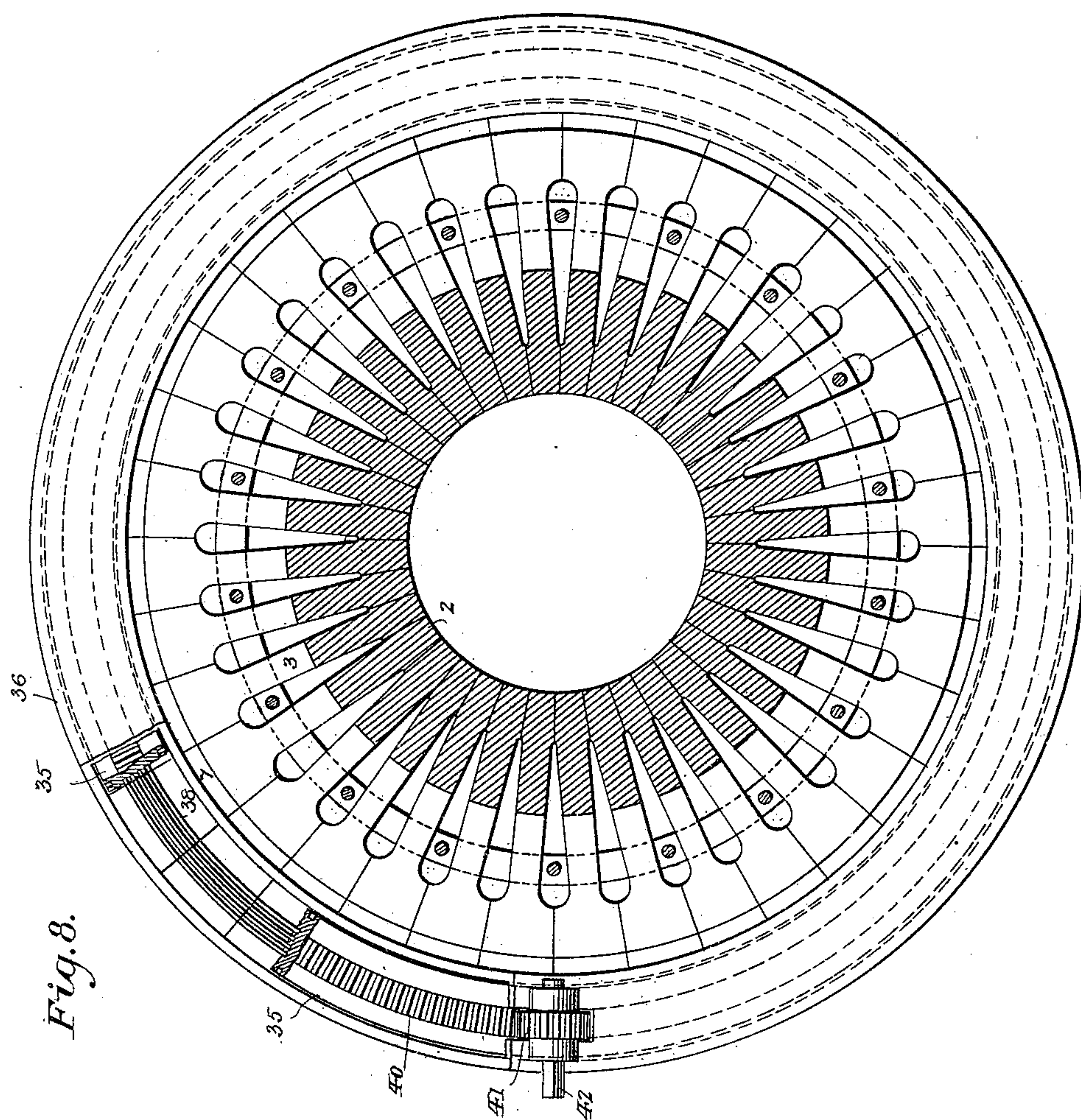


Fig. 8.

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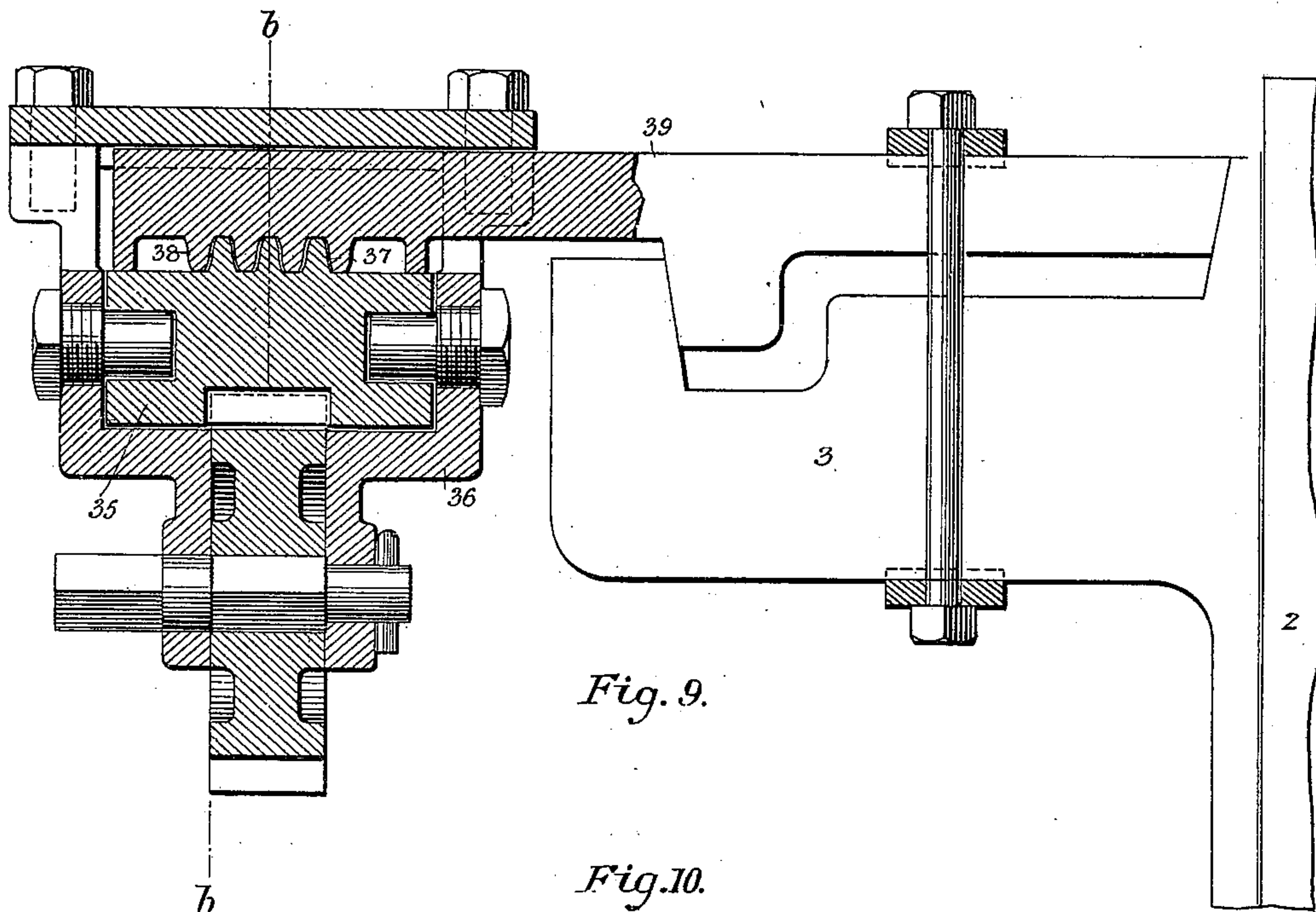
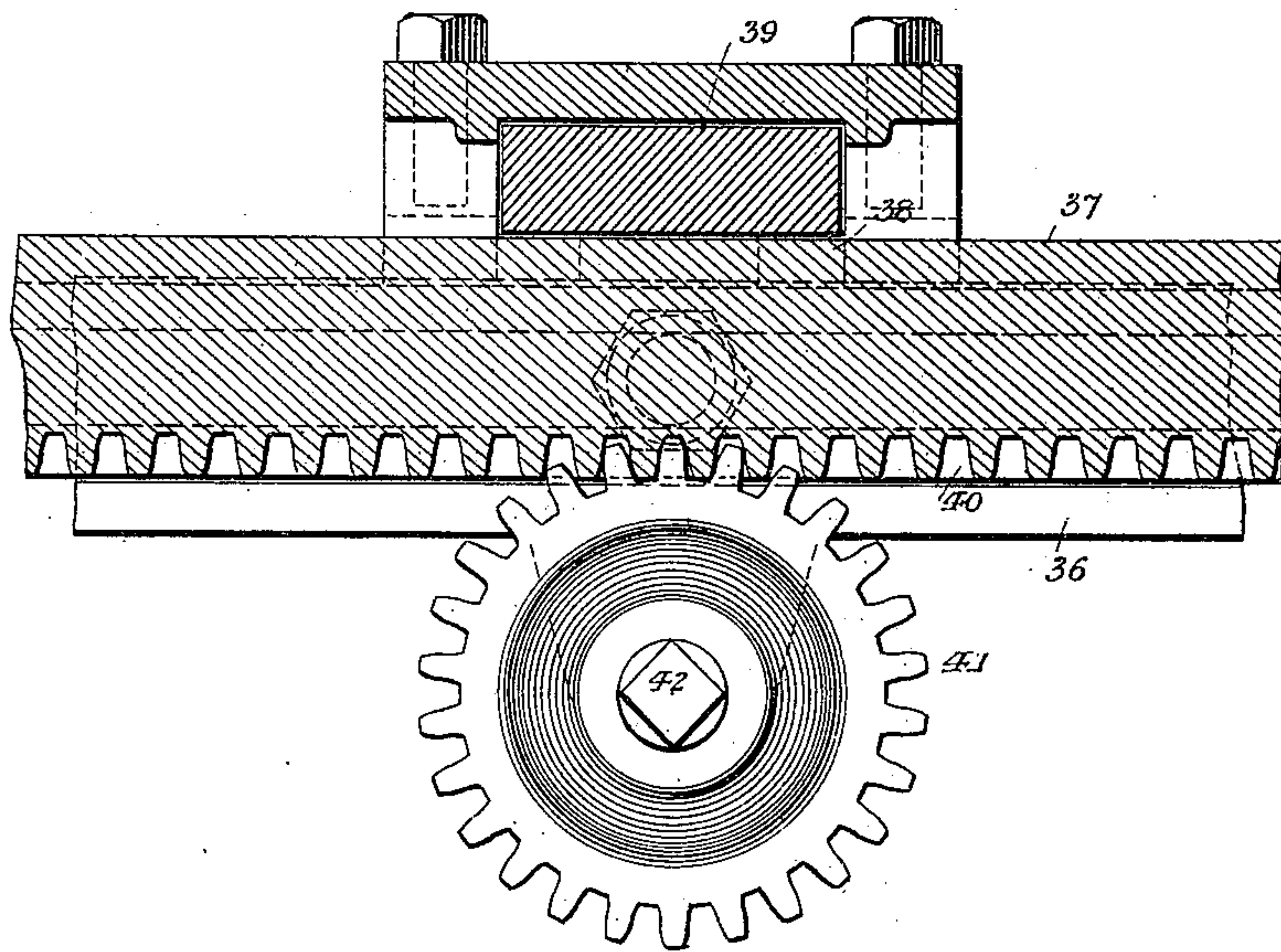


Fig. 9.

Fig. 10.
on line b-b.



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UNITED STATES PATENT OFFICE.

JACOB N. BARR, OF MILWAUKEE, WISCONSIN.

CONTRACTILE CHILL.

SPECIFICATION forming part of Letters Patent No. 619,926, dated February 21, 1899.

Application filed December 22, 1894. Serial No. 532,704. (No model.)

To all whom it may concern:

Be it known that I, JACOB N. BARR, of Milwaukee, county of Milwaukee, and State of Wisconsin, have invented a new and useful Improvement in Contractile Chills, of which the following is a specification.

My invention has reference to chills, and relates more particularly to chills for casting metal rolls, though, as more fully described, it may be used for casting car-wheels or other objects which are to be given a hard wearing-surface.

My invention consists principally of a series of single chills adapted to form the mold and adapted to be moved inward to follow the contraction of the casting.

The invention further consists in a series of single chills forming the mold and held within an annular frame of greater internal diameter than the external diameter of the mold formed by the chills, whereby the entire series of chills may be moved radially outward in their frame away from the casting to permit the removal of the casting without taking the apparatus apart.

The invention also consists in the construction and combination of parts hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side elevation, partly in section, of a chill constructed in accordance with my invention, the parts being in the form I prefer to adopt. Fig. 2 is a top plan view of the same, portions being broken away to expose other parts to view. Fig. 3 is a longitudinal section, on an enlarged scale, through one of the chill-blocks. Fig. 4 is an end view of the same. Fig. 5 is an enlarged elevation viewed from above of a portion of one side of the chill, showing series of chill-blocks and their contractile ring. Fig. 6 is a vertical section through the same on the line *a a*. Fig. 7 is a sectional elevation of a chill provided with a confining-ring of modified form. Fig. 8 is a plan view showing still another modification of the confining-ring. Fig. 9 is a vertical sectional elevation of the same. Fig. 10 is a section on the line *b b* of Fig. 9.

In carrying my invention into practice I provide a number of chill-blocks 1 of the general form represented in Figs. 1 and 3, consisting of a body portion 2, having projecting

from its opposite ends two lateral extensions 3. These blocks are placed side by side, their shape being such that when assembled in this manner they will form a cylinder, their inner faces constituting a continuous interior surface of the cylinder. The blocks are securely held by any suitable means in this position in order that they may be subjected to a finishing operation. Their inner faces are formed smooth by a lathe or boring-machine, and a groove or grooves 4 are cut in the upper edge of the upper extension and in the lower edge of the lower extension. In fact, while in this position the blocks may be simultaneously and uniformly finished in the required manner to adapt them to be finally assembled to form the chill, as more fully described hereinafter. By subjecting the chill-blocks in this manner to the finishing operation their inner faces will conjointly form a true and perfect cylinder when they are finally assembled.

In order that when assembled for use the usual spaces will be left between the blocks to admit of their contraction, I prefer to secure together for the finishing operation a number of blocks, one or more in excess of those required for the chill, so that by omitting the block or blocks in excess of the required number when they are finally assembled the necessary spaces will be left between them. The same result may be accomplished, however, by providing a filling between the blocks when they are primarily assembled for the finishing operation and omitting this filling when the blocks are finally assembled in the chill.

I prefer to finish the chill-blocks in the manner described above, for the reason that they may be conveniently handled and given a uniform shape and size; but it is to be understood that they may be formed or finished in other ways, the essential requirement being that they will be of such form as to adapt them to be assembled in the chill and secured together in a manner to be more fully described hereinafter.

Referring to Figs. 1 to 6, inclusive, it will be seen that the blocks are held in position by means of an upper contractile ring 5 and a lower contractile ring 6, which rings are each provided with a series of inwardly-ex-

tending radial fingers 7, formed with ribs 8, arranged to enter the grooves in the edges of the lateral extensions on the chill-blocks.

The portion of the chill-block and the finger 7 shown in Figs. 5 and 6 are slightly different in form from those shown in Fig. 1. In the former case the lateral extension 3 of the chill-block is not provided with two grooves; but a single groove is formed with inclined ends, in which project two inclined lugs formed on the finger. The functions of the parts, however, are substantially the same in both cases.

Each of the contractile rings is formed by two rings 9, having each at their outer edges a lateral annular flange 10, which at intervals is provided with perforated ears 11, the said flanges being placed face to face and secured firmly together by bolts extending through the ears, as shown in Fig. 1. The hollow contractile ring thus formed is provided on its interior sides with opposite grooves 12 a short distance from its inner edge, which receive correspondingly-formed ribs 13, projecting from opposite sides of an interior annular frame 14, from the inner edge of which the fingers 7, before alluded to, project inwardly. The annular frame is secured within the ring by means of transverse bolts 15, which extend through ears projecting at intervals from the inner edge of the two sides of the ring and through the frame. The opening in the frame is larger than the bolt in order that the former may have a slight movement independent of the contractile ring, while the grooves in the inner faces of the contractile ring are constructed slightly larger than the ribs on the frame for the same purpose. The outer edge of the annular frame, within the ring, is formed with an annular chamber or groove 16, while annular chambers 17 extend between the sides of the frame and the inner sides of the ring. The purpose of these annular chambers is to afford an extended surface for the heating and cooling medium, which is circulated through the ring, as more fully described hereinafter. These annular chambers communicate with a lateral passage 18 at their outer ends. A packing 19, of rubber or other appropriate material, is interposed between the ring and frame within the grooves in the former in order that a tight joint between the parts may be insured. The rings thus formed are applied to the chill-blocks, as shown more particularly in Fig. 1, the ribs on the fingers of the two rings being seated, as before stated, in the grooves in the lateral extensions of the chill-blocks. The two rings are held to the chill-blocks by four annular clamping-frames 20, 21, 22, and 23 of greater internal diameter than the exterior of the mold formed by the chill-blocks, the two frames 20 and 23 being seated upon the fingers of the contractile rings, while the two adjacent frames 21 and 22 are seated against the edges of the lateral extensions of the chill-blocks. The clamping-frames are secured together by means

of a series of through-bolts 24, extending at intervals through the two opposite clamping-frames and between the fingers and chill-blocks. The frames thus serve to clamp together between them the fingers projecting from the contractile rings and the lateral extensions on the chill-blocks. Where the bolts pass between the fingers, they are cut away, as shown at 25, so that they may expand and contract in the proper manner. The annular frames are formed with elongated slots where the bolts pass through them in order that the parts may move relatively when the chill contracts or expands.

The two clamping-frames 20 and 23, which are seated against the fingers of the contractile rings, are each provided at intervals with inwardly-extending lugs 26, within which are seated the flanged ends of two cylinders or barrels 27, which rest upon the opposite ends of the chill-blocks. These cylinders are securely held in position by means of clamping-fingers 28, secured on the lugs 26 and extending inwardly and overlying the flanges on the cylinders. It will be seen, therefore, that owing to the larger diameter of the annular clamping or retaining frame the series of chills may be moved out and in to follow the expansion and contraction of the casting, and it will also be apparent that by removing the expanding and contracting rings from connection with the extensions on the chills the chills may all be moved outwardly in their clamping-frame to permit the removal of the casting. This is of advantage in that it is possible to cast rolls having corrugated or irregular surfaces. The feature is also of advantage in that the size of the casting may be varied by simply varying the length of the chill-blocks and this without altering the form, size, or construction of the remaining portions of the chill. By referring to Fig. 1, for instance, it will be seen that the internal diameter of the mold formed by the chills is less than that of the cylinders or barrels 27, so that the ends of the casting would be larger than the intermediate portion. To remove the casting, the individual chills may be moved outwardly in their annular clamping-frames, as before described, till the inner faces of the chills coincide with the interior of the said cylinders or molds, when the casting may be removed.

Each of the contractile rings is provided with inlet and outlet openings 29 and 30, respectively, for the entrance and exit of the heating or cooling medium. These openings extend through two bosses 31 on the outer edges of the rings, the openings being threaded as shown in Figs. 5 and 6. In each of the threaded openings is screwed from the inside an exteriorly-threaded pipe 32, the inner end of which is provided with three short curved branch tubes 33, which are so formed that when secured in place these tubes will extend within the three chambers in the contractile ring. A partition 34, of rubber or

other suitable material, extends within the contractile ring between the ends of the inlet and outlet tubes, so that when the steam, hot air, or other heating medium is introduced through the inlet-opening it will be directed by the partition outward through the outlet-opening.

In the use of my improved chill steam, hot air, or other heating medium is introduced into the contractile rings, which will cause the rings to expand and to correspondingly expand the chill as a whole. The molten metal to form the casting is then introduced into the chill and at the proper time the cooling medium is introduced into the rings, which will then begin to contract, causing the inner faces of the chill-blocks to follow closely the contracting surface of the casting as the latter cools.

While the construction above described is that which I prefer to adopt and while such a construction has been found to answer in a practical manner the ends in view, it is to be understood that my invention is not to be confined to the various details set forth, as they may be modified in many particulars by the skilled mechanic without departing from the limits of my invention. For instance, it is not necessary that the confining-ring or clamping-frame be so constructed as to be capable *per se* of expansion and contraction, the essence of the invention in this regard residing in the combination, with a series of chill-blocks, of a confining-ring or clamping-frame detachably secured to the blocks in such manner as to be removed without disturbing them, said frame being of appreciably greater internal diameter than the latter are expanded or contracted, and means for moving the blocks inward to follow the casting.

In Fig. 7 I have shown the chill blocks or sections secured by confining-rings in the form of removable frames applied to the opposite sides of the lateral extension 3 on the chill-blocks and held by through-bolts, as in the first instance described. In this case the contractile rings, with their radial fingers, are omitted, also the grooves in the lateral extension of the chill-blocks, the clamping-frames being applied directly to said extensions and serving through the medium of the connecting-bolts to hold the parts together. To remove the casting, the nuts on the bolts 24 are merely loosened to permit the chills to be moved outwardly in their clamping-frames away from the casting. Of course it is not necessary that the chill-blocks be held by two rings applied to the opposite ends, as but one may be employed applied to an extension at the center of the block. I prefer, however, to employ, especially in the case of of long castings, two.

In Figs. 8, 9, and 10 I have shown still another form of confining-ring which while capable of contraction and expansion, as in the

first case described, is not operated by changes in temperature, but mechanically. This ring is in the form of a chuck comprising a ring 35, mounted to oscillate within a casing 36, the upper side of the ring being provided with spiral ribs 37, engaging corresponding ribs 38, formed on the sides of radial fingers 39, the inner ends of which engage lateral extensions on the chill-blocks. The lateral extensions on the chill-blocks and the radial fingers in this instance are not identical with the corresponding parts shown in Fig. 1, but are substantially similar to those shown in Figs. 5 and 6, hereinbefore described. The functions of these parts, however, are the same and in no manner affect or modify the action of the chuck in expanding and contracting the chill. By the movement of the ring it is obvious that the radial fingers will be moved together inward or outward to contract or expand the mold according as to the direction of movement of the ring. To effect the movement of the ring as desired and in a convenient manner, I form on the side of the same opposite to the spiral ribs a rack 40, which is engaged by a spur-pinion 41, mounted in the casing and formed with a stud 42, having its end constructed to receive a crank or other appropriate operating device. By turning the pinion it will engage the rack on the ring, move the latter, and cause the radial movement of the fingers and the consequent radial movement of the chill-blocks. In the use of the chill constructed in this manner the pinion is first turned to expand the chill, and the molten metal being introduced the pinion is at the proper time turned in opposite direction to cause the contraction of the chill. In this construction the casting will be removed substantially as described in regard to Fig. 1. In all the forms the bolts 24 form vertical bars which extend between the adjacent faces of the outer portions or extensions of the chills.

In cases where long castings are to be produced it is preferable to employ two or more confining-rings; but where short castings are to be made a single ring will suffice.

Having thus described my invention, what I claim is—

1. A mold for the purpose described, comprising a series of chills whose inner edges or ends are set close together so as to form a continuous surface while the chills are spaced apart therebeyond, a ring surrounding the chills and engaging the outer edges or ends thereof, and a frame provided with bolts or bars arranged between the chills, substantially as set forth.

2. A mold comprising a series of chill-blocks provided each with a lateral extension or arm, an annular clamping-frame applied to said extensions, means for securing the clamping-frame detachably to the extensions in such manner that the frame may be removed from the extensions without disturbing the chill-blocks, said frame being of appreciably

greater internal diameter than the exterior of the chill-blocks, both when the latter are expanded or contracted, whereby the clamping-frame may be detached and the chill-blocks moved free of the casting to permit the latter to be removed, and means for moving said blocks inward to follow the casting.

3. In a contractile chill the combination with a series of chill-blocks arranged side by side and provided with lateral horizontal extensions, of a contractile ring provided with horizontal fingers engaging the extensions, and means for securing said fingers to the lateral extensions.

4. In a contractile chill the combination with a series of chill-blocks arranged side by side and provided with lateral extensions, of a contractile ring provided with fingers engaging the extensions, annular clamping-frames seated against the fingers and the opposite edges of the extensions on the chill-blocks, and means for securing said parts together.

5. In a contractile chill the combination with a series of chill-blocks provided at their outer edges with two lateral extensions, of two contractile rings provided with fingers seated against the extensions on the chill-blocks, annular clamping-frames seated against the fingers and the opposite edges of the lateral extensions, and the through-bolts connecting said parts.

6. In a contractile chill the combination with a series of chill-blocks having lateral extensions provided with a groove, of a removable contractile ring having fingers formed with ribs to enter the groove, and means for securing said parts together.

7. In a contractile chill the combination with a series of chill-blocks having lateral extensions provided in their edges with grooves, of contractile rings having inwardly-extending fingers formed with ribs to enter the grooves, clamping-frames applied to the fingers and opposite edges of the extensions, and fastening devices for securing said parts together.

8. In a contractile chill, a contractile ring comprising a hollow outer ring and an annular frame connected to and extending within

the outer ring and leaving spaces between the sides of the outer ring and the frame, said frame formed with inwardly-extending fingers, in combination with a series of chill-blocks applied to the fingers, and means for securing the fingers to the blocks.

9. In a chill the combination with a series of chill-blocks formed with lateral extensions at opposite ends, of two rings secured to said extensions, annular clamping-frames, means for securing said parts together, cylinders provided with lateral flanges seated on the ends of the chill-blocks and fingers extending inwardly from the clamping-frames and engaging the flanges of the cylinders.

10. In a contractile chill the combination of a series of chill-blocks provided at opposite ends with lateral extensions formed with grooves, two contractile rings, annular frames having their outer edges secured in said rings and provided at their inner edges with inwardly-extending fingers having ribs to enter the grooves in the extensions on the chill-blocks, the bolts for securing said circular frames within the rings, annular clamping-frames applied to the fingers and opposite sides of the lateral extensions, and transverse bolts extending through said clamping-frames and between the intermediate fingers and chill-blocks.

11. A mold comprising a series of chills having lateral extensions or arms projecting from their outer edges, an annular clamping-frame formed of parallel horizontal rings receiving the said extensions between them beyond their outer edges and of appreciably greater internal diameter than the exterior of the mold formed by the chills both when the chill is expanded and contracted and through-bolts connecting said rings in such manner as to permit of the removal of the rings without disturbing the chill-blocks, substantially as set forth.

In testimony whereof I hereunto set my hand, this 12th day of September, 1894, in the presence of two attesting witnesses.

JACOB N. BARR.

Witnesses:

JOS. CHAS. GRIEB,
FRANK P. BROCK.