

C. M. RHODES.

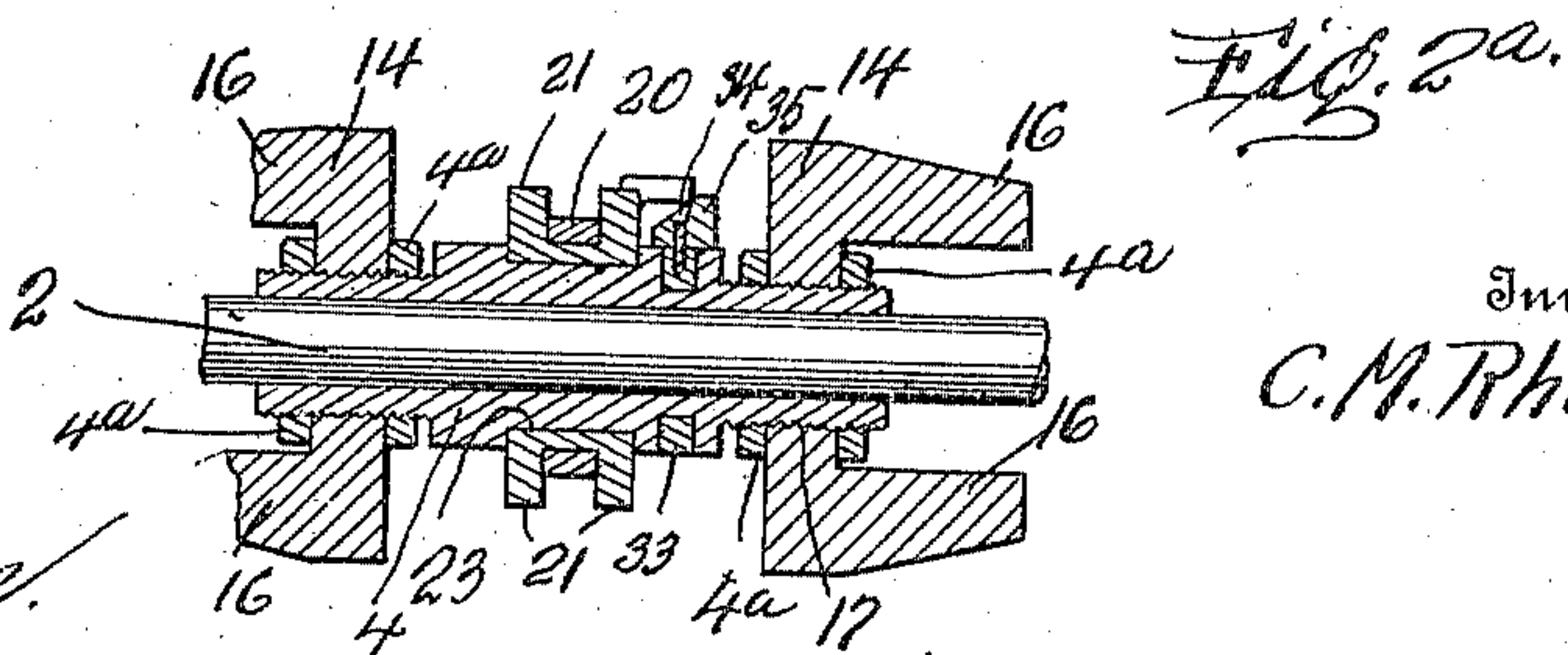
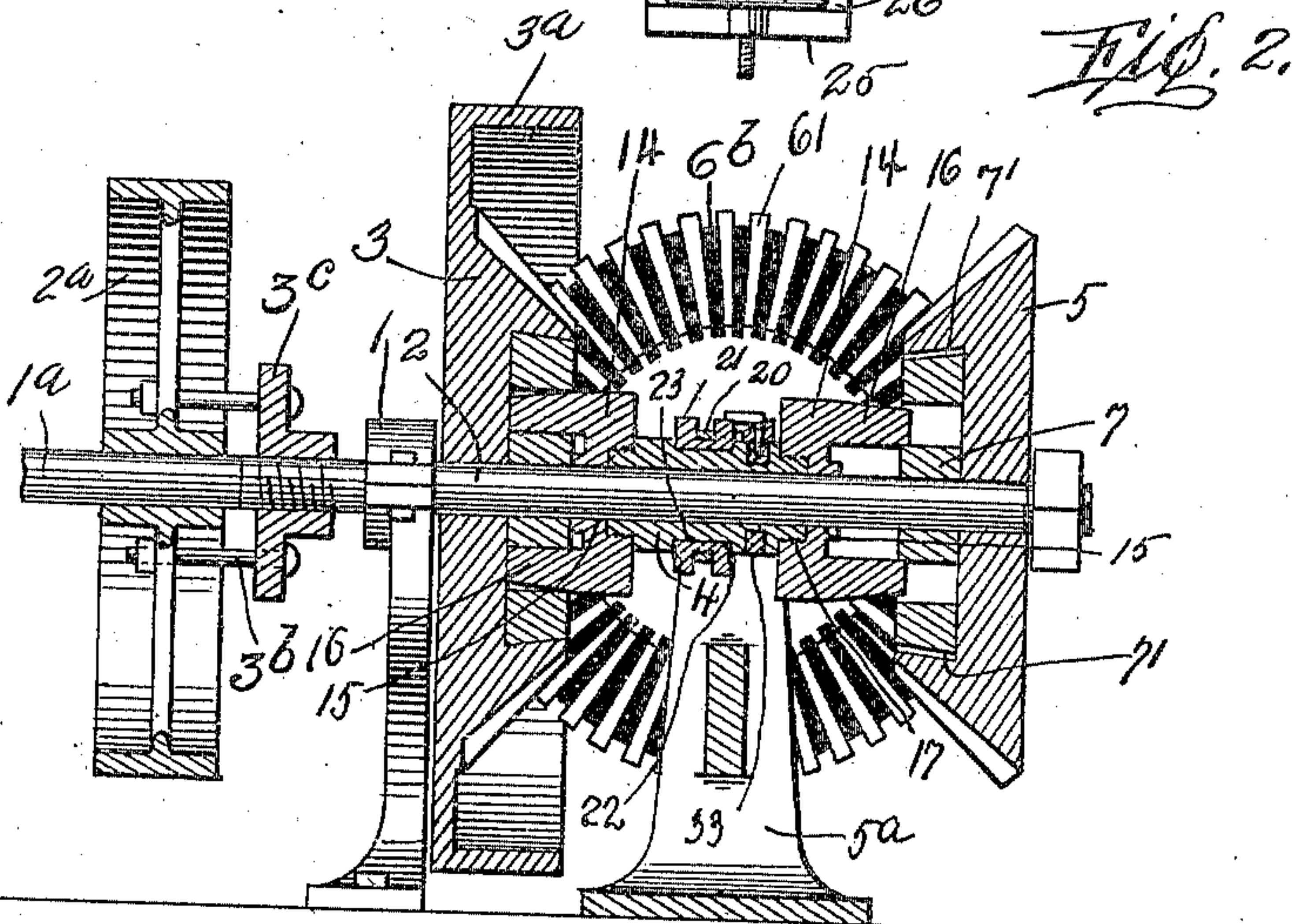
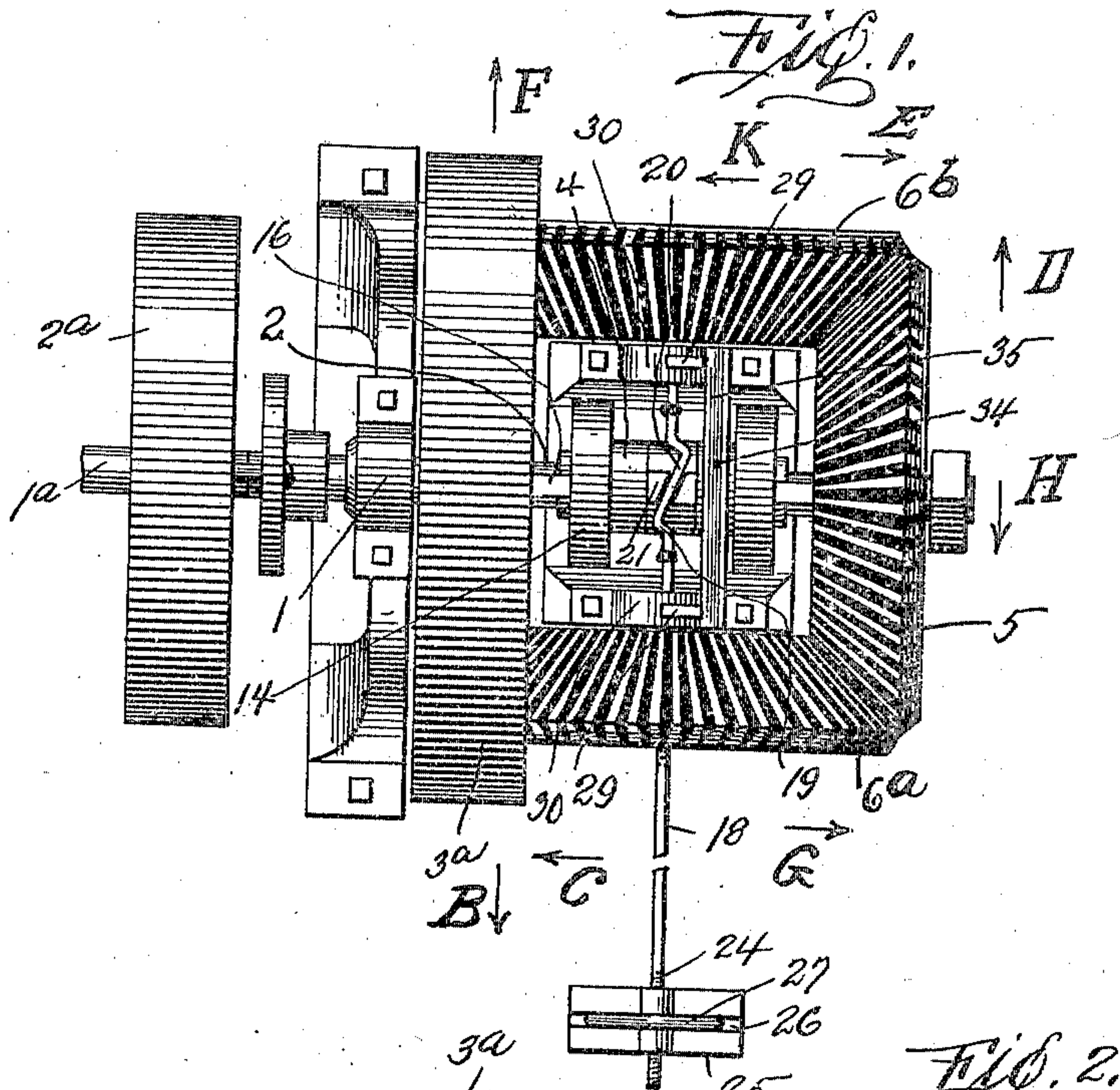
GEARING.

APPLICATION FILED MAR. 31, 1908.

950,958.

Patented Mar. 1, 1910.

3 SHEETS—SHEET 1.



Witnesses

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GEARING.

APPLICATION FILED MAR. 31, 1908.

950,958.

Patented Mar. 1, 1910.
3 SHEETS—SHEET 2.

FIG. 3.

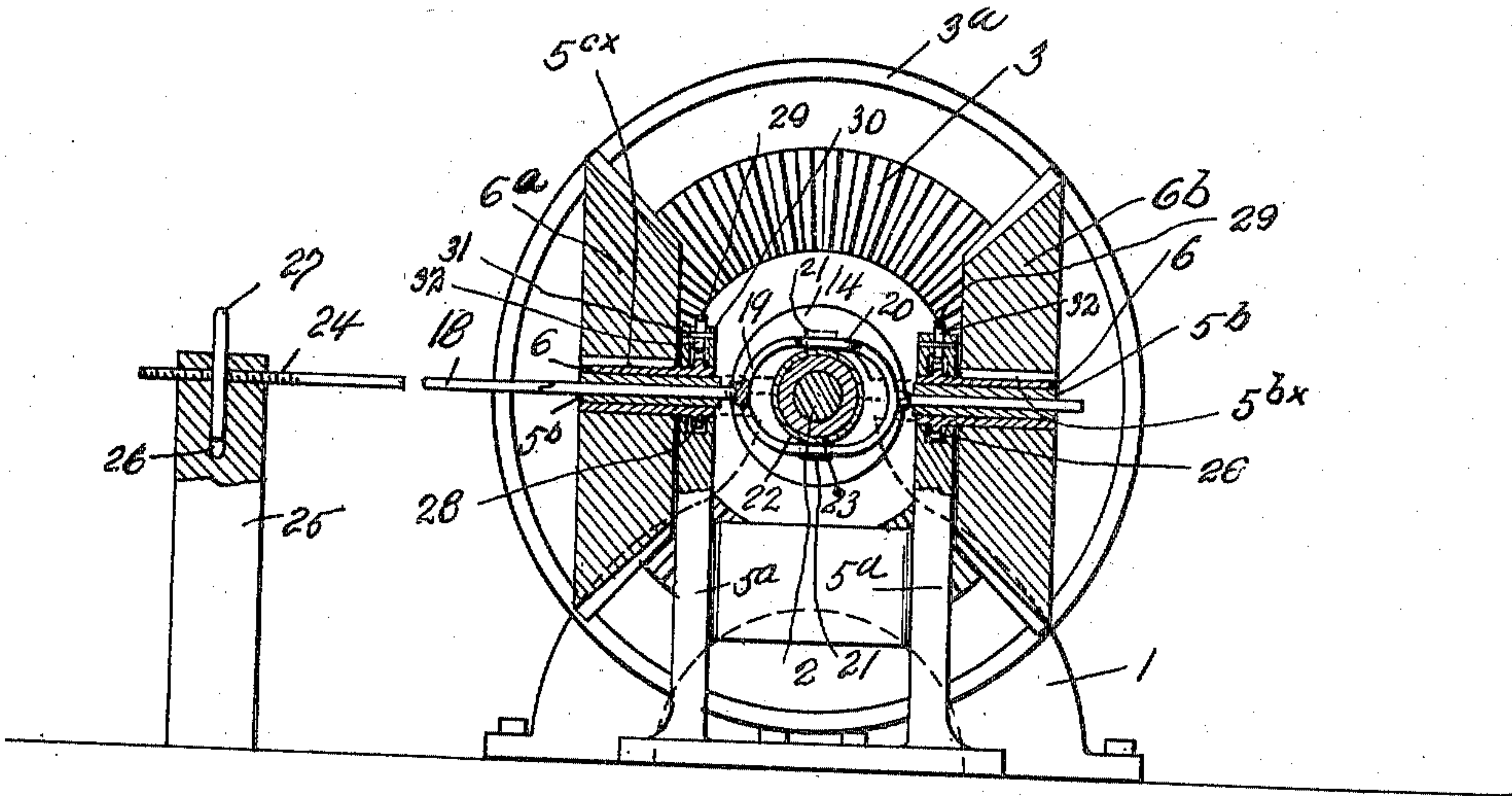


FIG. 4.

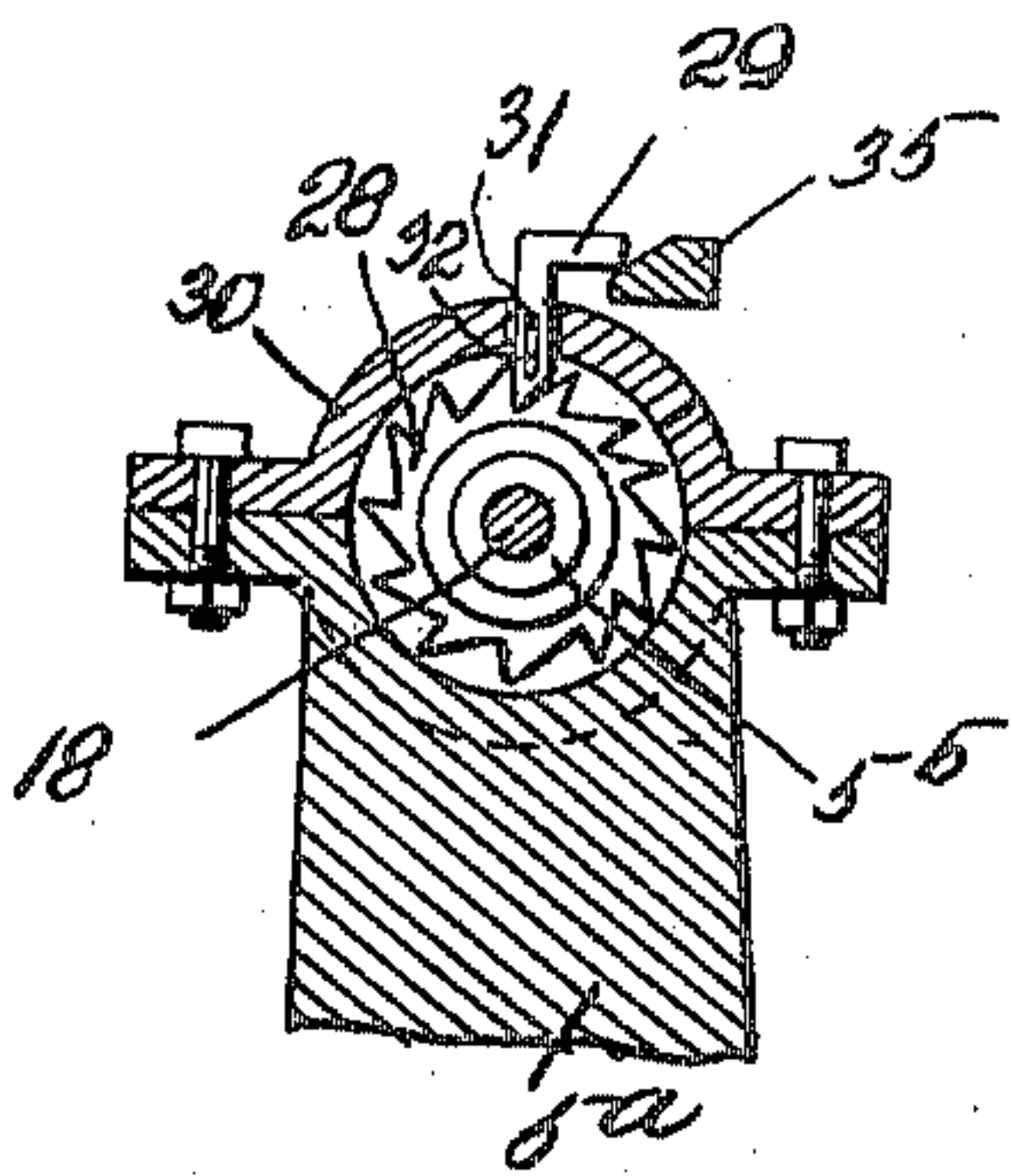


FIG. 5.

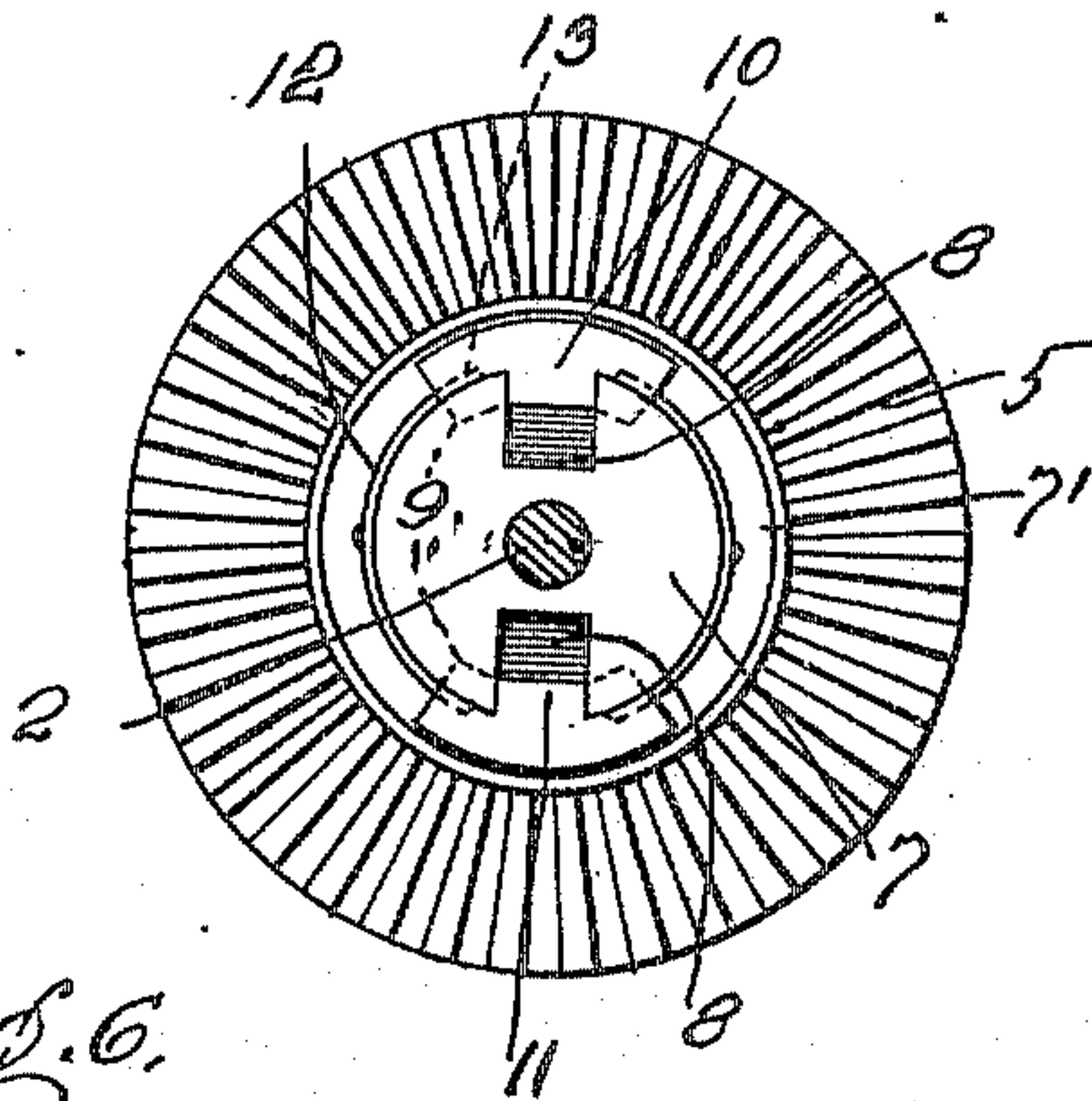
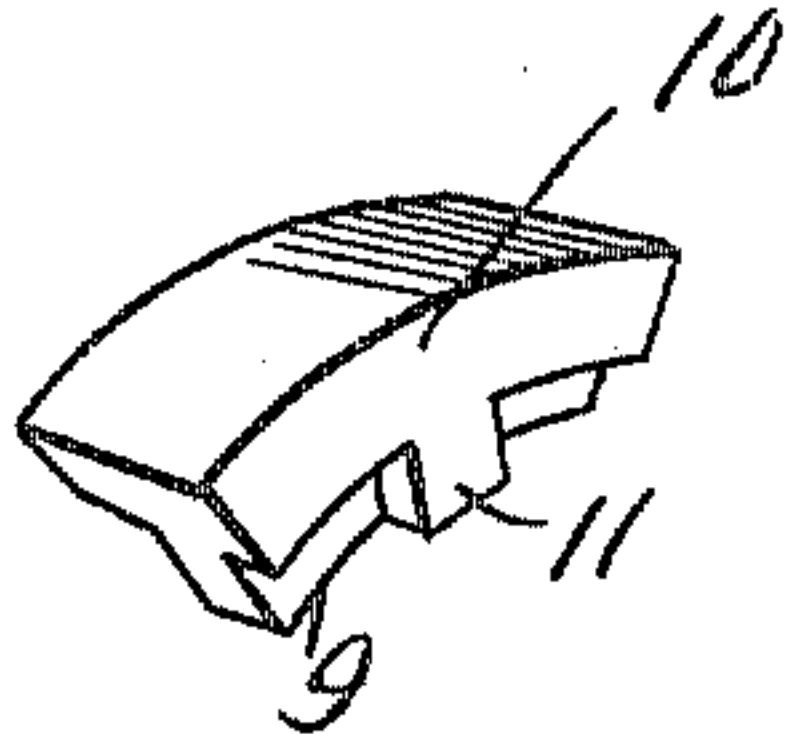


FIG. 6.



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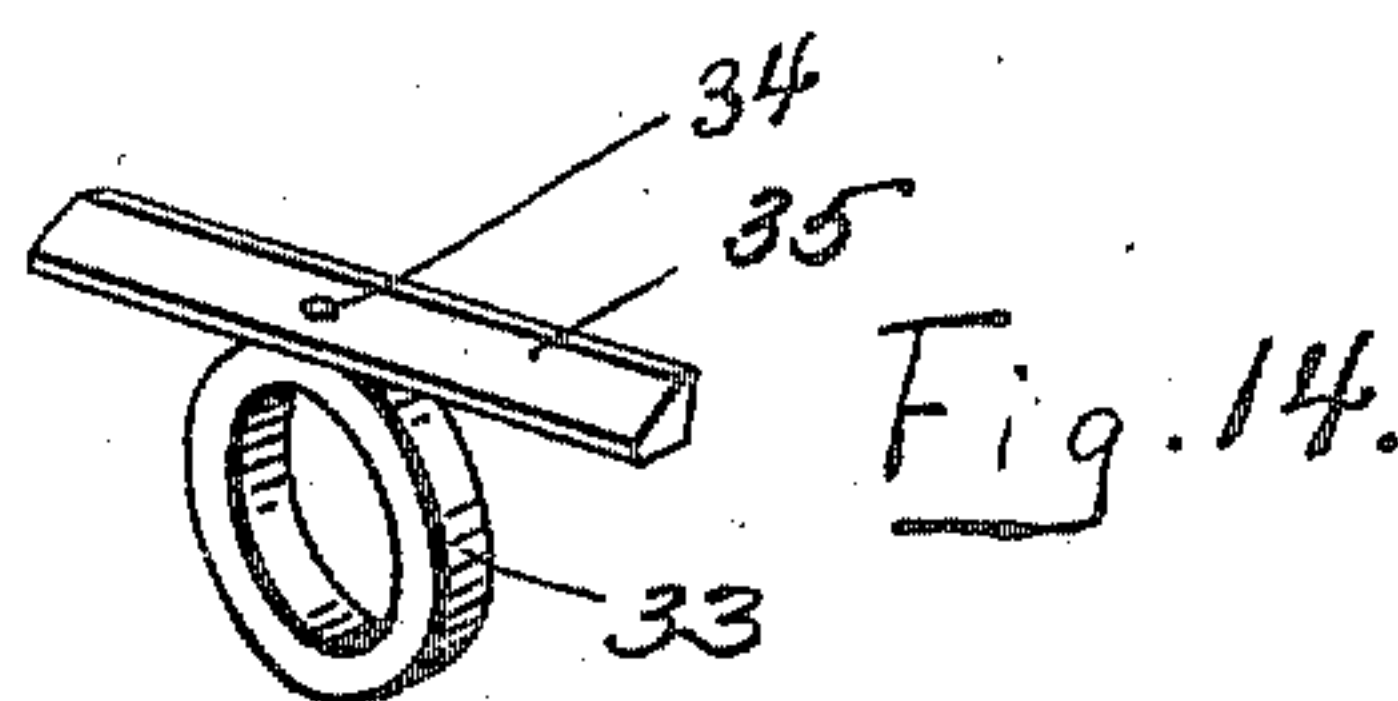
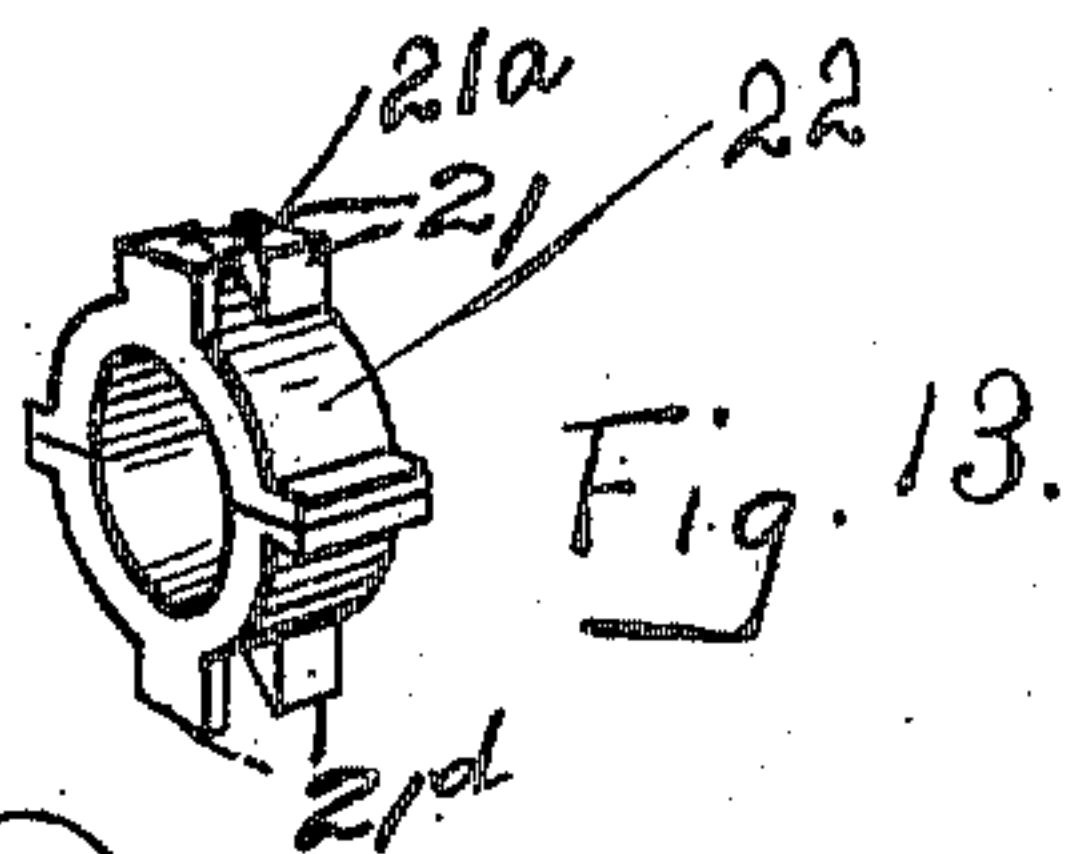
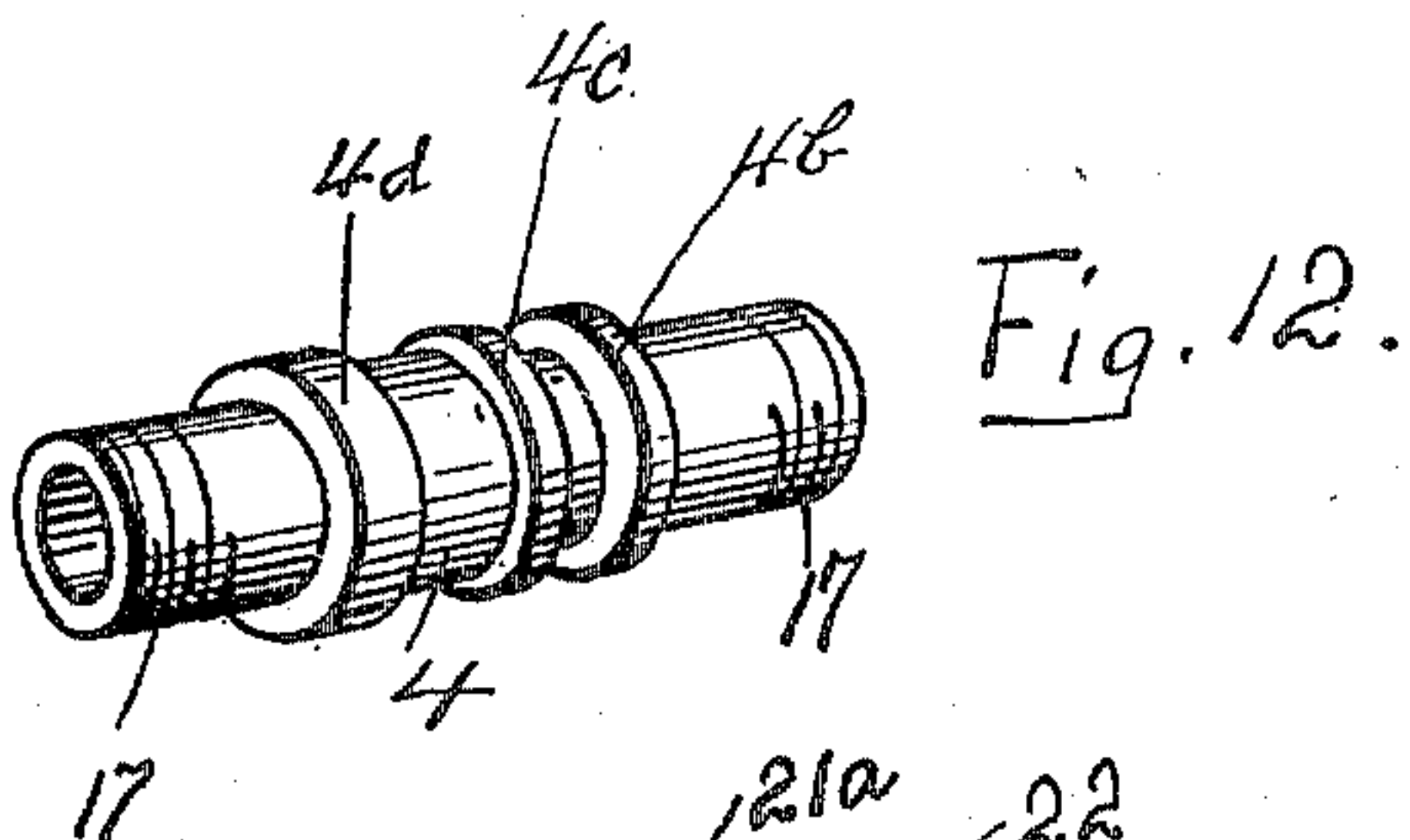
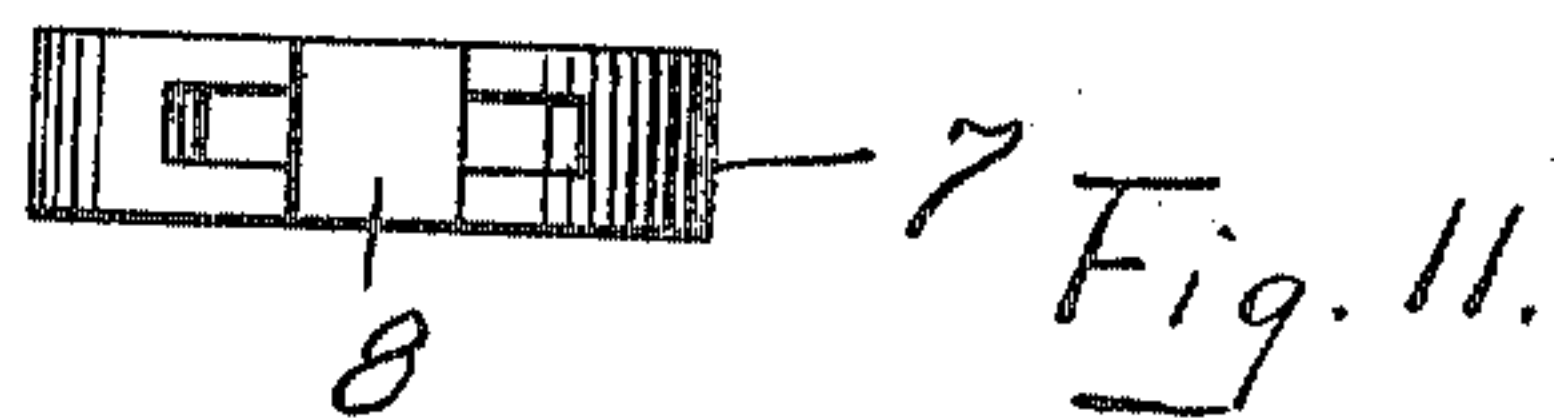
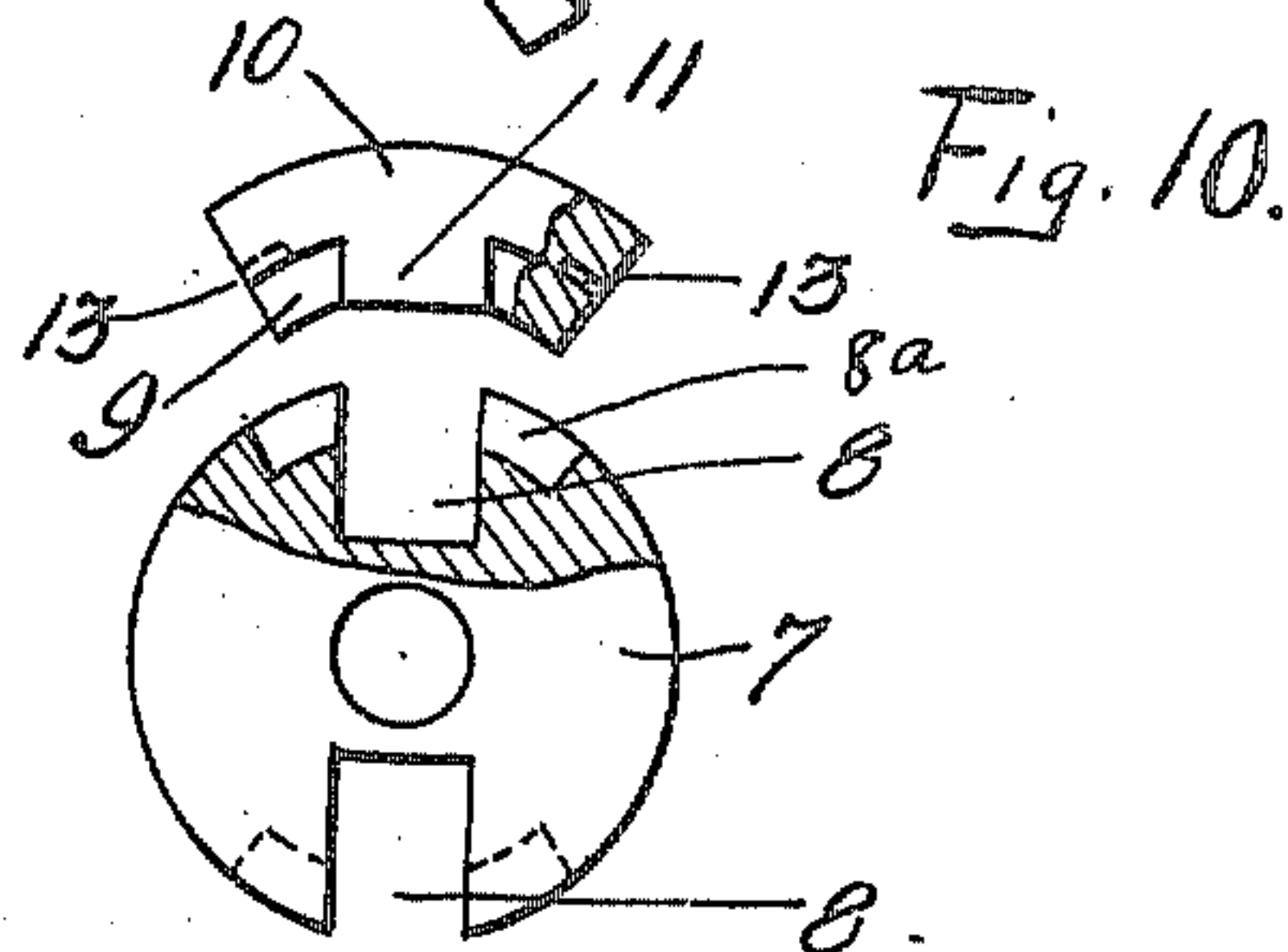
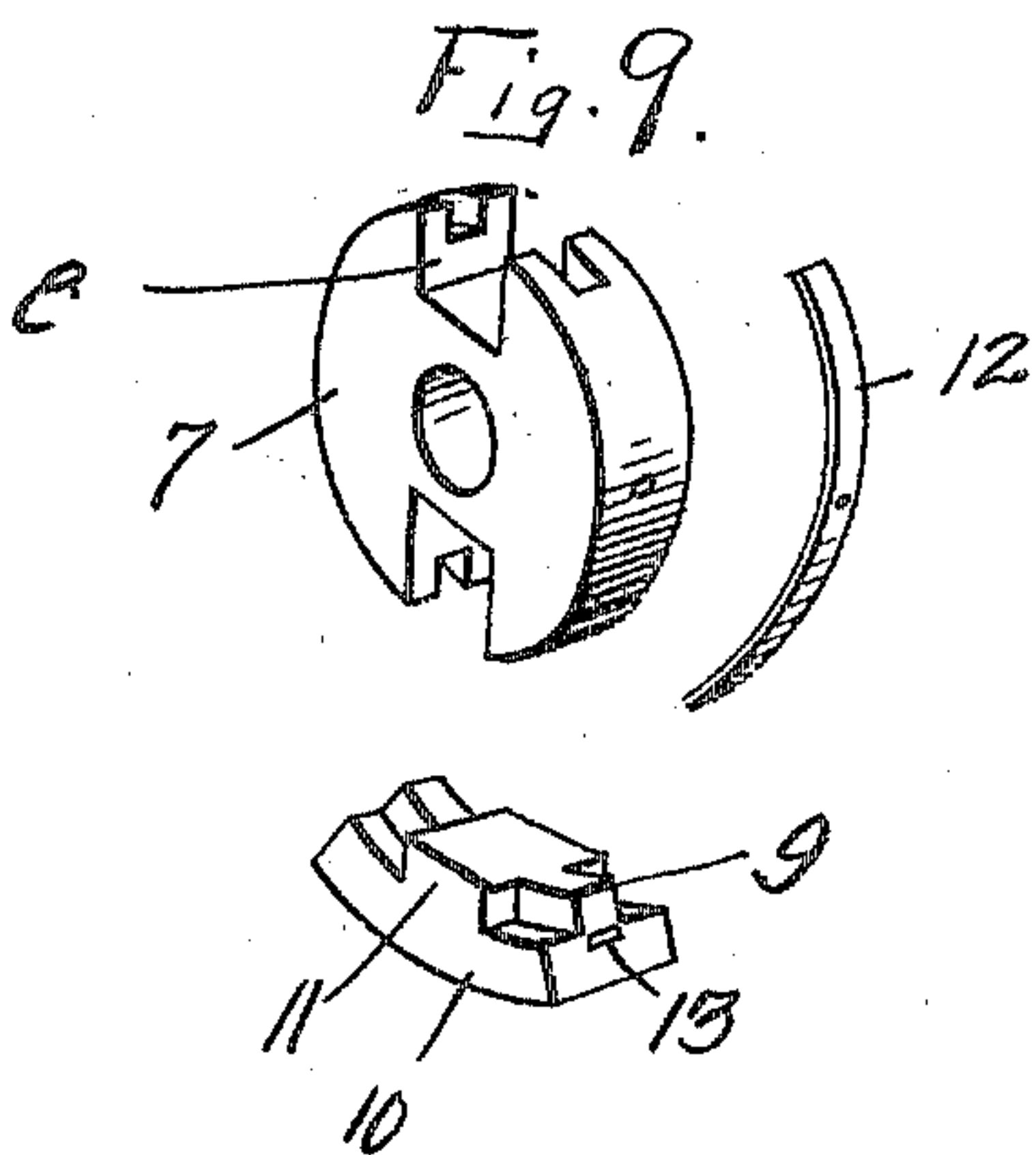
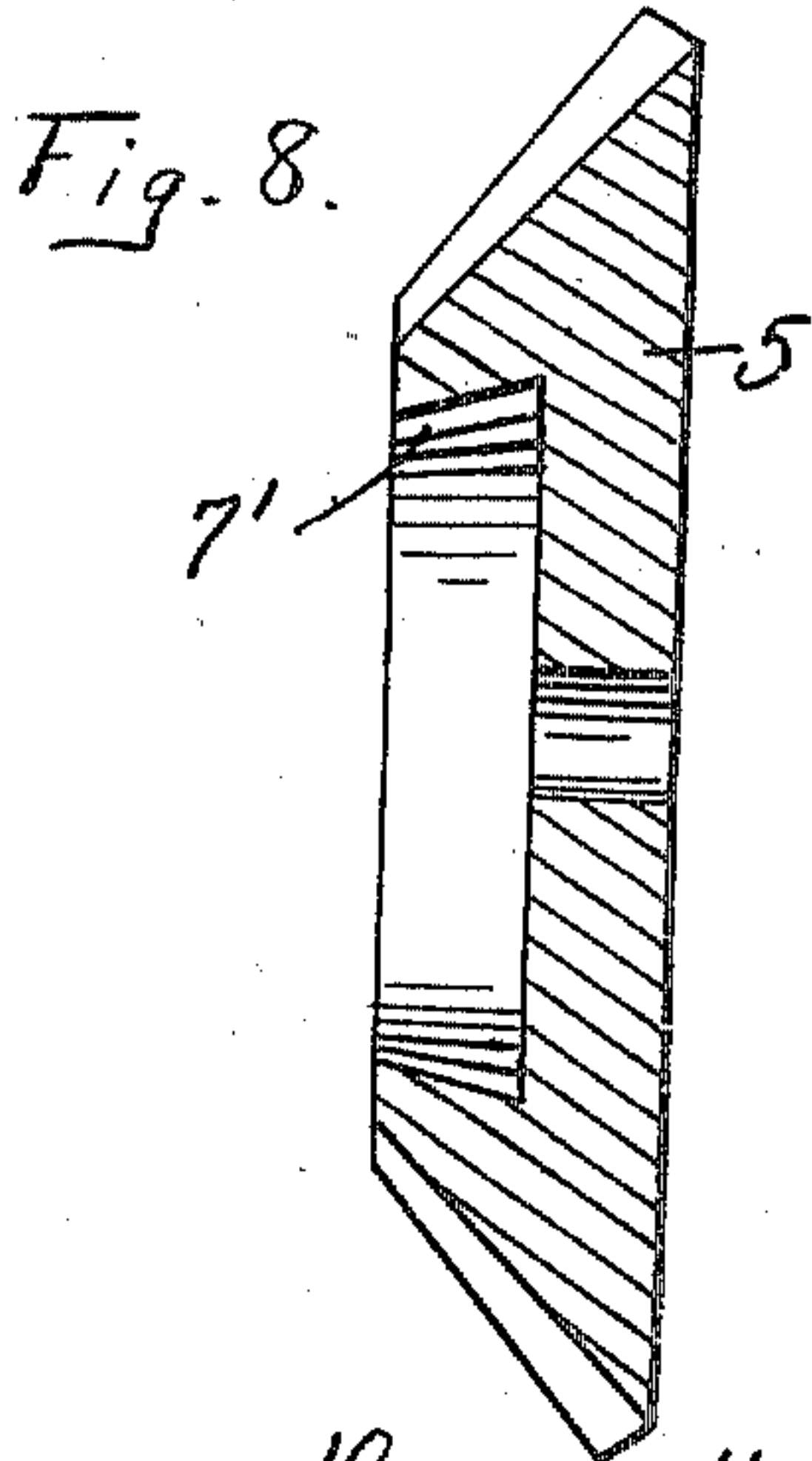
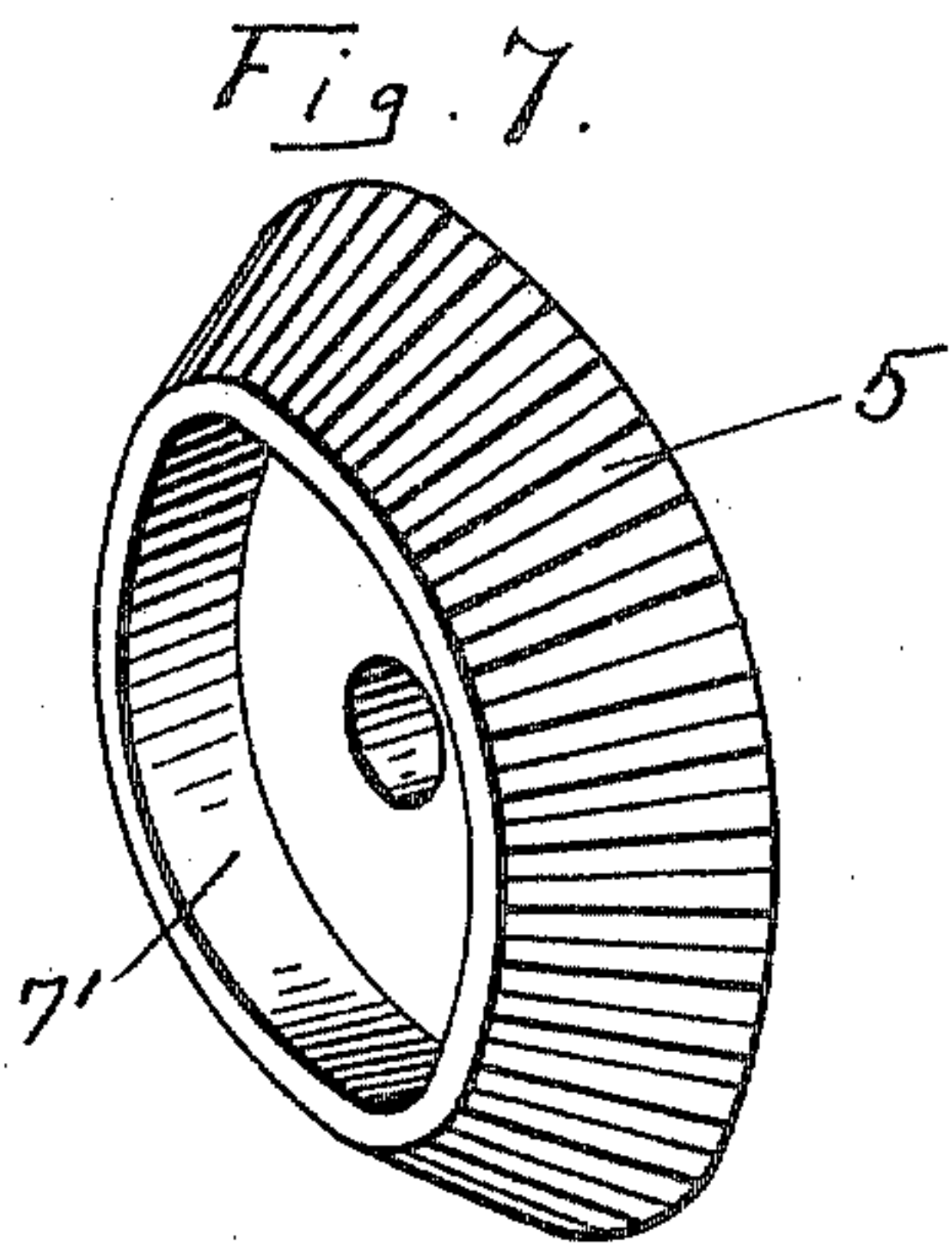
GEARING.

APPLICATION FILED MAR. 31, 1908.

950,958.

Patented Mar. 1, 1910.

3 SHEETS—SHEET 3.



Witnesses

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UNITED STATES PATENT OFFICE.

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GEARING.

950,958.

Specification of Letters Patent.

Patented Mar. 1, 1910.

Application filed March 31, 1908. Serial No. 424,404.

To all whom it may concern:

Be it known that I, CHARLES M. RHODES, a citizen of the United States of America, residing at Steubenville, in the county of Jefferson and State of Ohio, have invented certain new and useful Improvements in Gearing, of which the following is a specification, reference being had therein to the accompanying drawing.

10 This invention relates to gearing and the object thereof is to provide in a manner as hereinafter set forth a simple and effective means for reversing the direction of motion of a revoluble shaft.

15 A further object of the invention is to provide a gearing that can be advantageously employed in the oil fields, where it is often desirable to control and reverse the direction of motion of a revoluble shaft at a considerable distance from the derrick floor.

20 Primarily the invention is designed as an improvement upon the form of gearing as disclosed in application, Serial No. 339,658, filed October 19, 1906, and allowed October 18, 1907.

25 Further objects of the invention are to provide a gearing for the purpose set forth which shall be simple in its construction and arrangement, efficient in its use, conveniently operated, strong, durable, and readily set up in operative relation with respect to a driven shaft.

30 With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts hereinafter more specifically described and illustrated in the accompanying drawings wherein is shown the preferred embodiments of the invention but it is to be understood that changes, variations and modifications can be resorted to which come within the scope of the claims hereunto appended.

35 In the drawings, wherein like reference characters denote corresponding parts throughout the several views, Figure 1 is a plan of a gearing in accordance with this invention, Fig. 2 is a longitudinal sectional view of the same, Fig. 2^a is a longitudinal sectional view of a modified form of shift sleeve forming one of the elements of the gearing, Fig. 3 is a cross sectional view of a gearing in accordance with this invention, Fig. 4 is a vertical sectional view of a detail, one of the ratchet wheels, Fig. 5 is a section taken transversely of the driven shaft illustrating the clutch shoes and supporting

disks in elevation, Fig. 6 is a perspective view of one of the clutch shoes, Fig. 7 is a perspective view of one of the gears, Fig. 8 is a vertical sectional view of one of the gears, Fig. 9 is a perspective view of a supporting disk, a clutch shoe and a retaining spring, disassembled, Fig. 10 is an elevation partly in section of a supporting disk and clutch shoe disassembled, Fig. 11 is a top plan of a supporting disk, Fig. 12 is a perspective view of a shift sleeve, Fig. 13 is a like view of the actuating collar for the shift sleeve, and, Fig. 14 is a perspective view of the pawl shifting device.

Referring to the drawings in detail, 1 denotes a bearing in which is journaled a driven shaft 2. The latter is adapted to be coupled to a drive shaft. As shown, by way of example, the drive shaft is indicated by the reference character 1^a, is connected with a suitable prime mover, (not shown), and carries a fly wheel 2^a which is coupled with a driven shaft 2. The means for coupling the driven shaft 2 with the fly wheel 2^a so that the said shaft 2 will be driven by the shaft 1^a consists of a flanged collar 3^c fixedly connected to the shaft 2 and coupled with the fly wheel 2^a by the hold-fast devices 3^b.

Keyed upon the shaft 2 is a sleeve 4. The latter revolves with the shaft 2 and is capable of being shifted longitudinally upon the shaft 2. The sleeve 4 is provided with the bands 4^b, 4^c and 4^d and at each end screw-threaded as at 17. Mounted upon each screw-threaded end of the sleeve 4 is a clutch shoe shifting member 14, each bored as at 15 for the passage of the shaft 2 and each embodying oppositely disposed arms 16 having the outer faces thereof inclined for a purpose to be hereinafter referred to. The arms 16 of one clutch shoe shifting member extend in an opposite direction with respect to the arms of the other member.

Upon the shaft 2 at one side of the bearing 1 is mounted a beveled gear 3 having formed integral therewith a pulley or belt bearing surface 3^a whereby the gear 3 through a suitable belt connection can be connected with the element which is to be driven from the shaft 2. Upon the free end of the shaft 2 and suitably spaced from the gear 3 is positioned a beveled gear 5. The gears 3 and 5 are oppositely disposed with respect to each other. The inner face of each of the beveled gears 3 and 5 is provided with an annular recess 7' in which is

mounted a clutch shoe supporting disk 7 which is centrally bored for the passage of the shaft 2 and is furthermore provided with diametrically opposed radial slots 8. Each of the disks 7 is furthermore recessed in its periphery on opposite sides of each slot 8 as at 8^a. The reference character 10 denotes segment-shaped clutch shoes, each of which is formed with a central transversely extending lug 11 adapted to be positioned in a slot 8 and is furthermore provided with tongues 9 which project from each side of a lug 11 and which are adapted to extend in the recess 8^a when the shoe is positioned in operative relation with respect to the disk 7. The wall of the recess 7' is beveled and the bearing faces of the shoes 10 are also beveled, so that when pressure is applied to the shoes whereby the outer face of the shoes will engage the walls of the recesses of the gears, a two-fold force is produced, an outward force between the shoes and the gears and a force operating longitudinally of the shaft to materially increase the gripping power of the device and to decrease the tendency of the parts to slip. This is a very important advantage obtained from the construction set forth and adds materially to the efficiency and utility of the device. To the opposite sides of each disk 7 are secured two semi-circular springs 12, the ends of which project into the slots 13 formed in the ends of the shoes. The springs 12 prevent disarrangement or displacement of the shoes by centrifugal force when the disks 7 are revolved.

The disks 7 oppose the arms 16 which project from the members 14 and are carried by the shiftable sleeve 4. The arms 16 are directly opposite to the slots 8, so that when the sleeve 4 is shifted in one direction, that is to say, toward the disk 7, a member 14 will be carried therewith and the arms 16 of said member will extend in the slots 8 of the disks 7 and engage the lugs 11 of the clutch shoes 10 and force the said clutch shoes outwardly so that they will frictionally engage the wall of that recess 7' in which the disk is mounted and under such conditions clutch the gear to the shaft 2 so that motion will be transmitted to the gear through the medium of the sleeve 4, member 14, arms 16 and shoes 10.

Arranged adjacent to the bearing 1 and in a plane which extends between the gears 3 and 5 are a pair of standards 5^a which are suitably spaced apart. Mounted at one end in each of the standards 5^a is a revoluble sleeve 6. The revoluble sleeves 6 project outwardly from and at right angles with respect to the standards 5^a. Mounted within the sleeves 6 and being of substantially the same length therewith is a bushing 5^b adapted to receive the rod 18 hereinafter described. Keyed upon one of the sleeves 6 as

at 5^c is a beveled gear 6^a and keyed upon the other sleeve 6 as at 5^b is a beveled gear 6^b. The beveled gears 6^a and 6^b are disposed at right angles with respect to the gears 3 and 5 and the gears 6^a and 6^b are adapted to transmit motion from the gear 3 to the gear 5 or vice versa according to the position of the clutch mechanism as hereinafter referred to.

Mounted upon the sleeve 4 and interposed between the flanges 4^c and 4^d is a shifting collar 22 for the sleeve 4 and formed integral with said collar at the top thereof is a pair of lugs 21 which are arranged opposite each other with the opposing surfaces thereof beveled as at 21^a, the beveled surfaces being oppositely disposed with respect to each other. Formed integral with the bottom of the collar 22 are the lugs 21^a which are similar in construction and arrangement to the lugs 21. Surrounding the sleeve 4 is an oval-shaped actuating member 19 having a part of its top and bottom angularly disposed as at 20, the said angularly disposed portions 20 of the actuating member 19 extending between the beveled lugs 21 and 21^b. Projecting from one end of the actuating member 19 is a rod 18 which extends through one of the tubes 5^b and has its outer end threaded as at 24, the said outer end being loosely mounted in the slotted post 25. Carried by the threaded end of the rod 18 is a wheel 27 which when revolved, moves the rod 18 back and forth so as to shift the member 19 whereby the angular portions 20 of the said member 19 will engage the lugs 21 and 21^a whereby the sleeve 4 will be shifted through the medium of the collar 22 and bands 4^c and 4^d. Projecting from the other end of the actuating member 19 is a guide rod 18^a which extends through the other tube 5^b.

Each of the sleeves 6 is formed with a ratchet wheel 28 adapted to be engaged by an inverted L-shaped pawl 29 mounted in a cap 30 secured to the standard 5^a. The pawls 29 are slotted as at 32 and are guided in their movement and also retained in the caps 30 by the pins 31. The function of the pawls 29 is to prevent free movement of the gears 6^a and 6^b, when the gears 3 and 5 are released. If the gear 3 was rapidly revolved with the shaft 2 and said gear was released relative to the shaft, the impetus of the wheel would cause it to positively make three or four revolutions before it had stopped if the pawls were not in engagement with the ratchet wheels. The further object of the pawls 29 is to stop the gears 6^a and 6^b, whereby the rotation of the gears can be immediately reversed. The teeth of the ratchet wheel 28 used in connection with the gear 6^a are the reverse of the teeth of the ratchet wheel used in connection with the gear 6^b, and consequently the lower ends

of the pawls 29 are beveled in reverse direction. The pawls 29 are moved out of engagement with the ratchet wheels through the medium of a transversely extending beveled bar 35 which is carried by the collar 33 positioned between the bands 4^b and 4^c. The bar 35 is connected to the collar 33 by the hold-fast device 34. When the sleeve 4 is shifted in one direction, the bar 35 will engage under the outer ends of the pawls 29 and elevate the same. When the sleeve 4 is shifted in the opposite direction, the bar 35 will be moved clear of the pawls so they can lower.

Although the gears 3, 5, 6^a and 6^b are shown as toothed, friction gears could be employed in lieu thereof. The gear 3 as well as the gear 5 is loosely mounted upon the shaft 2, so that unless these gears are coupled with the said shaft, they will not be directly driven thereby. The sleeve 4 rotates with the shaft 2 but as before stated is capable of being shifted longitudinally with respect to the shaft so that when the sleeve is shifted in one direction, the gear 3 will be coupled with the shaft and motion will be transmitted to the other gears of the mechanism and that when the sleeve 4 is shifted in the opposite direction, the gear 5 will be coupled with the shaft and motion will be transmitted to the other gears of the mechanism. In view of the foregoing arrangement of parts, it is obvious that by setting the member 19 through the medium of the rod 18 in a central position relative to the standards 5^a both the members 14 with their arms 16 will be shifted clear of the clutching shoes 10 and the shaft 2 will be uncoupled from the gears 3 and 5 and furthermore will rotate in unison with the shaft 1^a. If the rod 18 be moved inwardly, the member 19 will be carried therewith, causing the sleeve to shift toward the gear 3, the arms 16 of that member 14 which opposes the gear 3 will extend into the slots 8 of the disks carried by the gear 3 and the said arms 16 will engage the lugs 11 and move the shoes 10 to frictionally engage the gear 3 whereby said gear 3 will be coupled to the shaft 2. The wheel 3 will then be revolved in the direction of the arrow F, revolving the gear 6^b in the direction of the arrow G, the gear 5 in the direction of the arrow H, and the gear 6^a in the direction of the arrow K, the direction of the movement of the gear 6^a corresponding to that of the gear 3. This operation is for the wheel 3 revolving in the same direction as the shaft 1^a. To revolve the gear 3 in the direction opposite to that in which the shaft 1^a is revolving, it is necessary that the spring 4 be shifted to the right to couple the gear 5 to the shaft through the medium of the clutching shoes and member 14 with its arm 16. When the gear 5 is coupled to the shaft 2, it rotates in the

direction of the arrow D, causing the wheels 6^a and 6^b to rotate in the direction of the arrows C and E, and the gear 3 in the direction of the arrow B, which is a reverse direction to that in which the shafts 1^a and 2 are revolving.

In Fig. 2^a is illustrated a modification in the manner in which the members 14 with their arms 16 are secured to the sleeve 4. In such connection it will be stated that the members 14 are mounted upon the threaded ends of the sleeve 4 and are maintained in such position by the nuts 4^a. The members 14 are adjustably mounted upon the sleeve 4 so as to take up the wear of the arms 14, the disks 7 and shoes 10.

What I claim is:

1. In a device of the class described, a bearing, a shaft revolvably mounted in said bearing, a pair of reversely disposed beveled gears loosely mounted upon and adapted to be clutched to said shaft, reversely disposed beveled gears supported for rotation adapted to be alternately operated by the first mentioned beveled gears, said first mentioned beveled gears having recesses in their inner faces, disks mounted upon said shaft and arranged within said annular recesses and provided with radial slots, spaced actuating members shiftable upon said shaft between the gears thereon and provided with oppositely disposed arms adapted to alternately enter said slots, shoes arranged within said recesses and adapted to be shifted by the action of said arms, to frictionally engage the walls of the recesses whereby the first mentioned gears are clutched to said shaft, and means extending through said axial bearings for alternately moving said hubs to cause said arms to alternately engage said shoes.

2. In a device of the class described, bearings, oppositely disposed beveled gears mounted for rotation upon said bearings, a rotatable shaft, a support therefor, a pair of oppositely disposed beveled gears loosely mounted for rotation upon said shaft and adapted to be clutched thereto, and each provided with an annular recess in its inner face, disks mounted upon said shaft and arranged within said recesses and provided with radial slots, spaced actuating members shiftable upon said shaft between the gears thereon and provided with oppositely extending arms adapted to alternately enter said slots, shoes arranged within said recesses and provided with lugs adapted to extend in said slots adapted to be operated by the action of said arms, a sleeve revolving with and slidable upon said shaft between said members, means for coupling said sleeve to said shiftable members, and a rod operatively connected to said sleeve for shifting it.

3. In a device of the class described, bear-

ings, oppositely disposed beveled gears mounted for rotation upon said bearings, a rotatable shaft, a support therefor, a pair of oppositely disposed beveled gears loosely
 5 mounted upon and adapted to be clutched to said shaft and provided with annular recesses in their inner faces, disks mounted upon said shaft and arranged within said
 10 recesses and provided with radial slots, spaced actuating members slidable upon said shaft between the gears thereon and provided with oppositely extending arms adapted to alternately enter said radial slots,
 15 shoes arranged within said recesses and provided with lugs extending into said slots, and with their outer faces beveled to correspond with the walls of the recesses and adapted to be operated by the action of said
 20 arms, engaging said lugs when the members are shifted, and means for alternately moving said members to cause said arms to alternately engage said lugs whereby one of the gears upon said shaft is coupled thereto and all the gears are thrown into operation.

25 4. In a device of the class described, bearings, reversely disposed beveled gears mounted for rotation upon said bearings, a rotatable shaft, a support therefor, a pair of reversely disposed gears mounted for rotation
 30 upon said shaft and provided with annular recesses in their inner faces, disks mounted upon said shaft and arranged within said annular recesses and provided with radial slots, spaced actuating members slidable
 35 upon said shaft between the gears thereon and provided with oppositely extending arms adapted to alternately enter said slots, shoes arranged within said recesses provided with lugs extending in said slots and adapted
 40 to be engaged and operated by the action of said arms, and means for alternately moving said members to cause said arms to alternately engage and operate the said shoes, whereby one of said second mentioned gears
 45 will be clutched to the shaft.

50 5. In a device of the class described, a shaft, reversely disposed beveled gears mounted for rotation upon said shaft and provided with recesses in their inner faces, disks mounted upon said shaft and operating
 55 within said annular recesses and provided with radial slots, a pair of reversely disposed beveled gears arranged for operation by the first mentioned beveled gears, actuating members spaced apart and mounted
 60 for rotation upon said shaft between the gears thereon and provided with spaced oppositely extending arms adapted to alternately enter said slots, shoes disposed within said recesses and provided with lugs
 65 extending into said slots and adapted to be actuated by said arms, and means for alternately shifting said members upon said shaft.

6. In a device of the class described,

beveled gears meshing with each other and mounted for rotation, a shaft for imparting a rotary movement to said gears, shoes arranged in certain of said gears and adapted to be alternately operated whereby one of
 70 the gears will be clutched to the shaft, means arranged upon said shaft for operating said shoes, and means extending through another of said gears for actuating the first mentioned means, said last mentioned means in-
 75 cluding an adjustable rod.

7. In a gearing, a pair of beveled gears mounted for rotation, a rotatable shaft, a support therefor, a pair of gears loosely mounted upon said shaft and adapted to
 80 be clutched thereto, said first mentioned gears disposed at right angles with respect to said second mentioned gears and meshing therewith, each of said loosely mounted gears provided on its inner face with a recess
 85 having a beveled wall, a supporting disk arranged in each of said recesses and mounted upon said shaft and provided with radial slots, clutching shoes arranged in the recesses and provided with lugs extending into
 90 said slots, said shoes having beveled outer faces, a shiftable sleeve mounted upon the shaft, actuating members connected to the sleeve and provided with arms adapted to extend into said slots and engage said lugs
 95 for shifting the shoes to frictionally engage with the walls of the recesses for clutching the loosely mounted gears, and means for alternately shifting said sleeve in opposite directions.
 100

8. In a gearing, a pair of beveled gears mounted for rotation, a rotatable shaft, a support therefor, a pair of gears loosely mounted upon said shaft and adapted to be
 105 clutched thereto, said first mentioned gears disposed at right angles with respect to said second mentioned gears and meshing therewith, each of said loosely mounted gears provided on its inner face with a recess having
 110 a beveled wall, a supporting disk arranged in each of said recesses and mounted upon said shaft and provided with radial slots, clutching shoes arranged in the recesses and provided with lugs extending into said slots, said shoes having beveled outer
 115 faces, a shiftable sleeve mounted upon the shaft, actuating members connected to the sleeve and provided with arms adapted to extend into said slots and engage said lugs for shifting the shoes to frictionally engage
 120 with the walls of the recesses for clutching the loosely mounted gears, means for alternately shifting said sleeve in opposite directions, and springs within said recesses and connected to said shoes to prevent the dis-
 125 placement of the latter.

9. In a gearing, a pair of beveled gears mounted for rotation, a rotatable shaft, a support therefor, a pair of gears loosely mounted upon said shaft and adapted to be
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clutched thereto, said first mentioned gears disposed at right angles with respect to said second mentioned gears and meshing therewith, each of said loosely mounted gears provided on its inner face with a recess having a beveled wall, a supporting disk arranged in each of said recesses and mounted upon said shaft and provided with radial slots, clutching shoes arranged in the recesses and provided with lugs extending into said slots, said shoes having beveled outer faces, a shiftable sleeve mounted upon the shaft, actuating members connected to the sleeve and provided with arms adapted to extend into said slots and engage said lugs for shifting the shoes to frictionally engage with the walls of the recesses for clutching the loosely mounted gears, a collar mounted upon the sleeve and provided with beveled lugs, a movable actuating member surrounding said sleeve and having angularly disposed portions engaging the lugs for shifting the sleeve when said member is moved, and means for moving said member.

10. In a gearing, a pair of beveled gears mounted for rotation, a rotatable shaft, a support therefor, a pair of gears loosely mounted upon said shaft and adapted to be clutched thereto, said first mentioned gears disposed at right angles with respect to said second mentioned gears and meshing therewith, each of said loosely mounted gears provided on its inner face with a recess having a beveled wall, a supporting disk arranged in each of said recesses and mounted upon said shaft and provided with radial slots, clutching shoes arranged in the recesses and provided with lugs extending into said slots, said shoes having beveled outer faces, a shiftable sleeve mounted upon the shaft, actuating members connected to the sleeve and provided with arms adapted to extend into said slots and engage said lugs for shifting the shoes to frictionally engage with the walls of the recesses for clutching the loosely mounted gears, a collar mounted upon the sleeve and provided with beveled lugs, a movable actuating member surrounding said sleeve and having angularly disposed portions engaging the lugs for shifting the sleeve when said member is moved, and means extending through the fixed gears for shifting said member.

11. In a gearing, a pair of beveled gears mounted for rotation, a rotatable shaft, a support therefor, a pair of gears loosely mounted upon said shaft and adapted to be clutched thereto, said first mentioned gears disposed at right angles with respect to said second mentioned gears and meshing therewith, each of said loosely mounted gears provided on its inner face with a recess having a beveled wall, a supporting disk arranged in each of said recesses and mount-

ed upon said shaft and provided with radial slots, clutching shoes arranged in the recesses and provided with lugs extending into said slots, said shoes having beveled outer faces, a shiftable sleeve mounted upon the shaft, actuating members connected to the sleeve and provided with arms adapted to extend into said slots and engage said lugs for shifting the shoes to frictionally engage with the walls of the recesses for clutching the loosely mounted gears, a collar mounted upon the sleeve and provided with beveled lugs, a movable actuating member surrounding said sleeve and having angularly disposed portions engaging the lugs for shifting the sleeve when said member is moved, means extending through the bearings of the first mentioned gears for shifting said member, ratchets carried by the bearings of the first mentioned gears, and pawls engaging said ratchets for the purpose set forth.

12. In a gearing, a pair of beveled gears mounted for rotation, a rotatable shaft, a support therefor, a pair of gears loosely mounted upon said shaft and adapted to be clutched thereto, said first mentioned gears disposed at right angles with respect to said second mentioned gears and meshing therewith, each of said loosely mounted gears provided on its inner face with a recess having a beveled wall, a supporting disk arranged in each of said recesses and mounted upon said shaft and provided with radial slots, clutching shoes arranged in the recesses and provided with lugs extending into said slots, said shoes having beveled outer faces, a shiftable sleeve mounted upon the shaft, actuating members connected to the sleeve and provided with arms adapted to extend into said slots and engage said lugs for shifting the shoes to frictionally engage with the walls of the recesses for clutching the loosely mounted gears, means for alternately shifting said sleeve in opposite directions, a collar mounted upon the sleeve and provided with beveled lugs, a movable actuating member surrounding said sleeve and having angularly disposed portions engaging the lugs for shifting the sleeve when said member is moved, means extending through the bearings of the first mentioned gears for shifting said member, ratchets carried by the bearings for the first mentioned gears, pawls engaging said ratchets for the purpose set forth, and springs within said recesses and engaging said shoes to prevent displacement thereof.

In testimony whereof I affix my signature in the presence of two witnesses.

CHARLES M. RHODES.

Witnesses:

MAX H. SROLOVITZ,
K. H. BUTLER.