No. 849,750. PATENTED APR. 9, 1907.

R. E. ROSEWARNE.

VARIABLE SPEED MECHANISM.

APPLICATION FILED APR. 30, 1906.

3 SHEETS—SHEET 1.

Fig. 1.

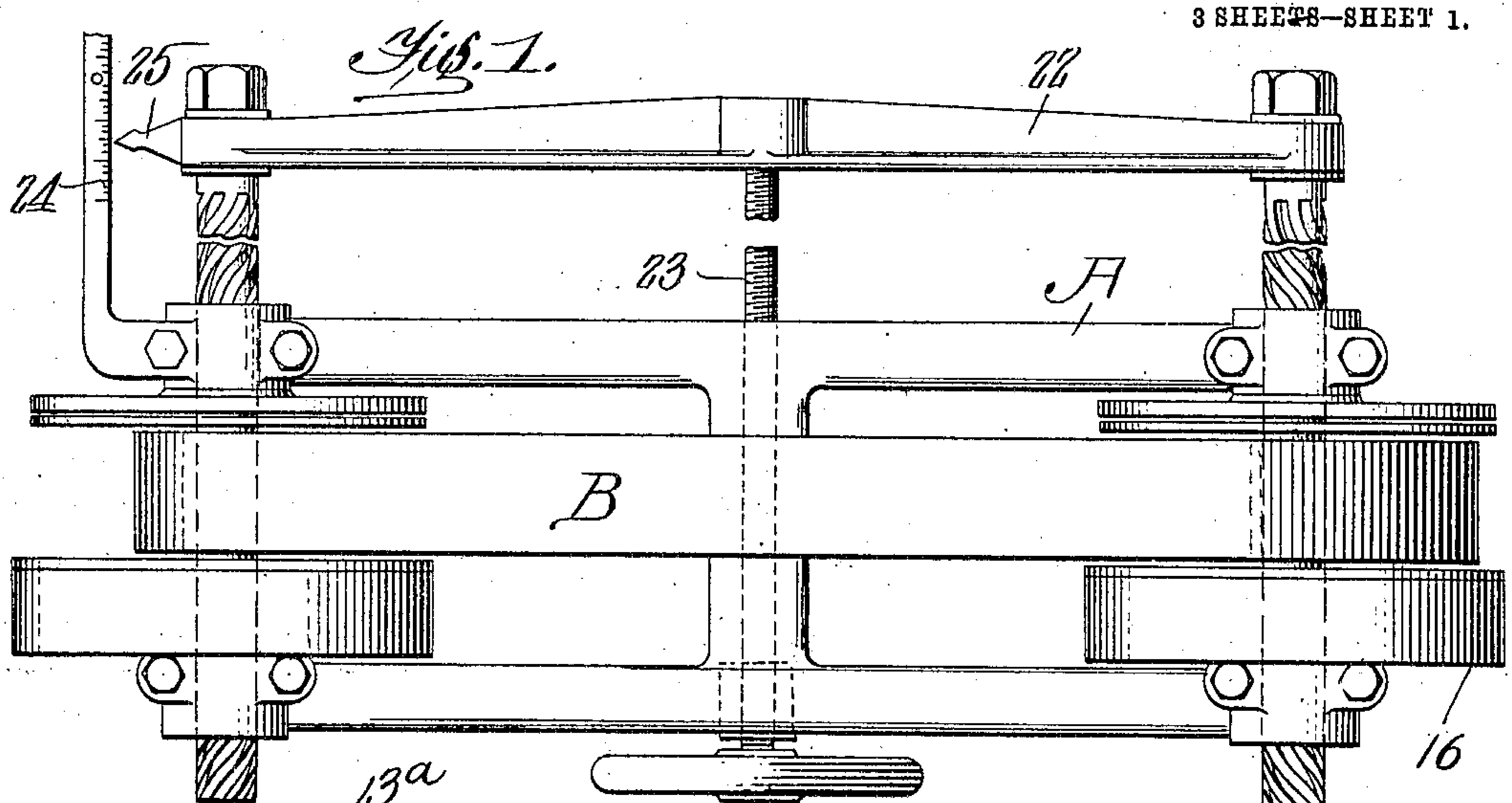
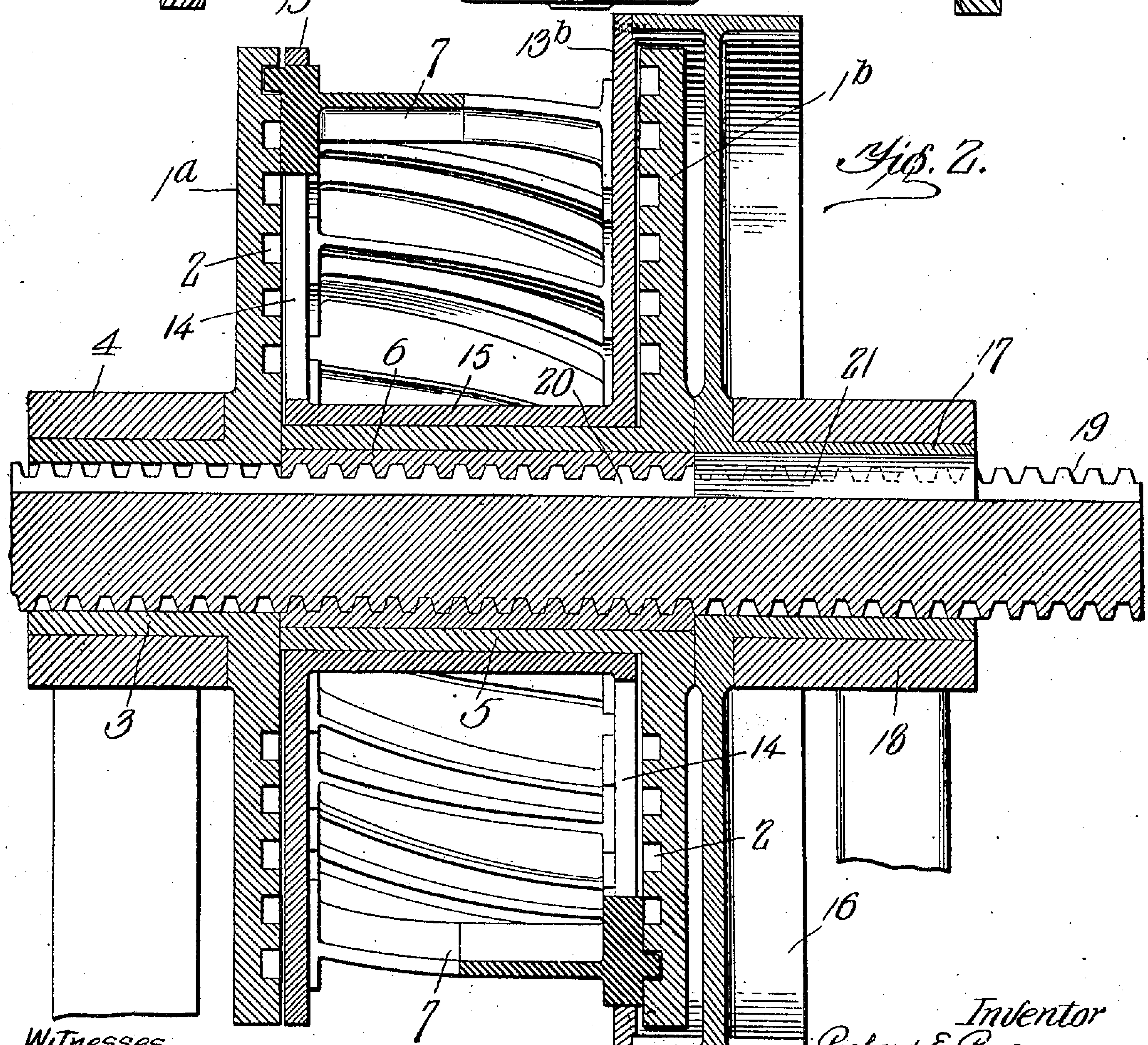


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 3.

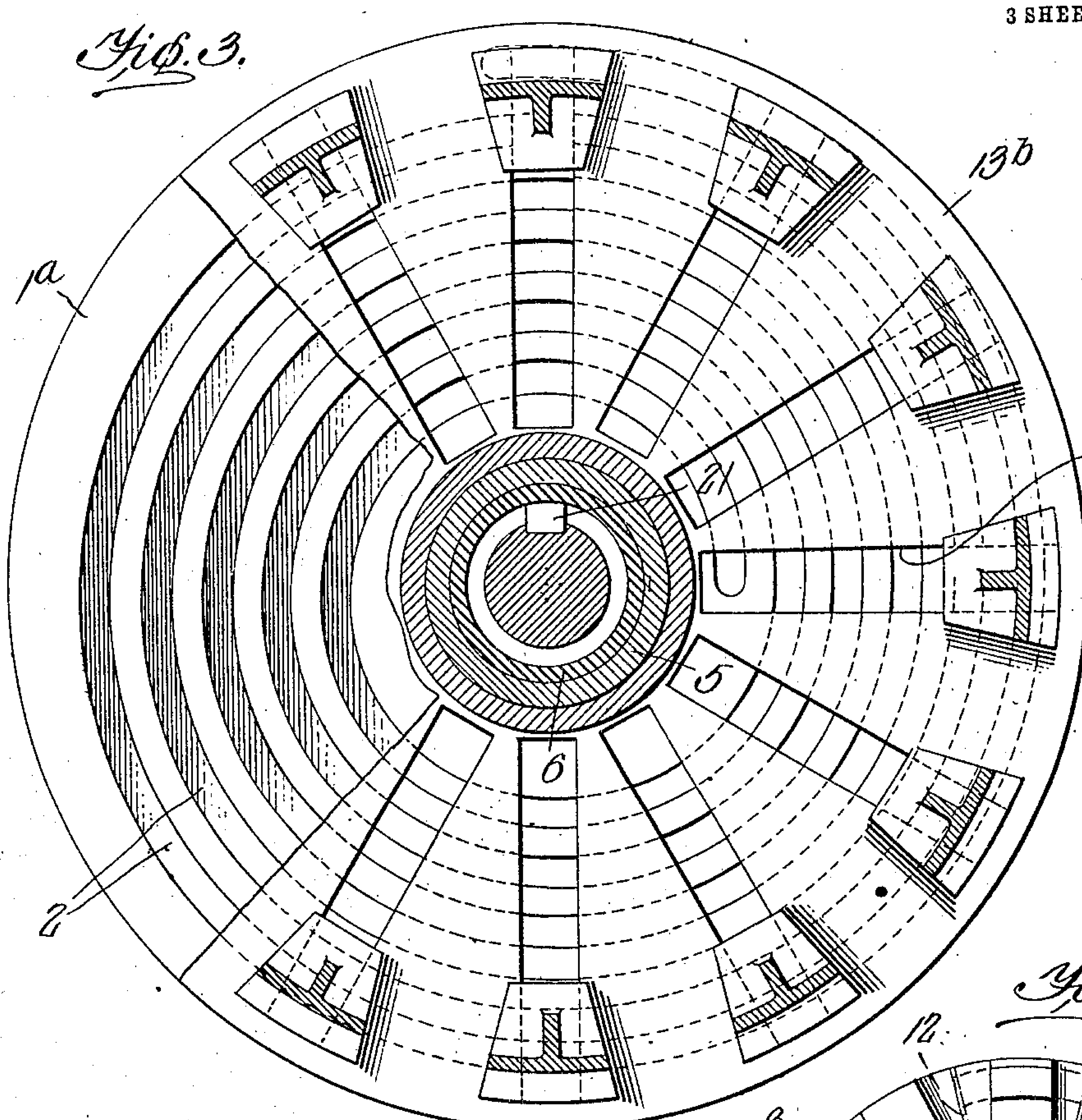


Fig. 4.

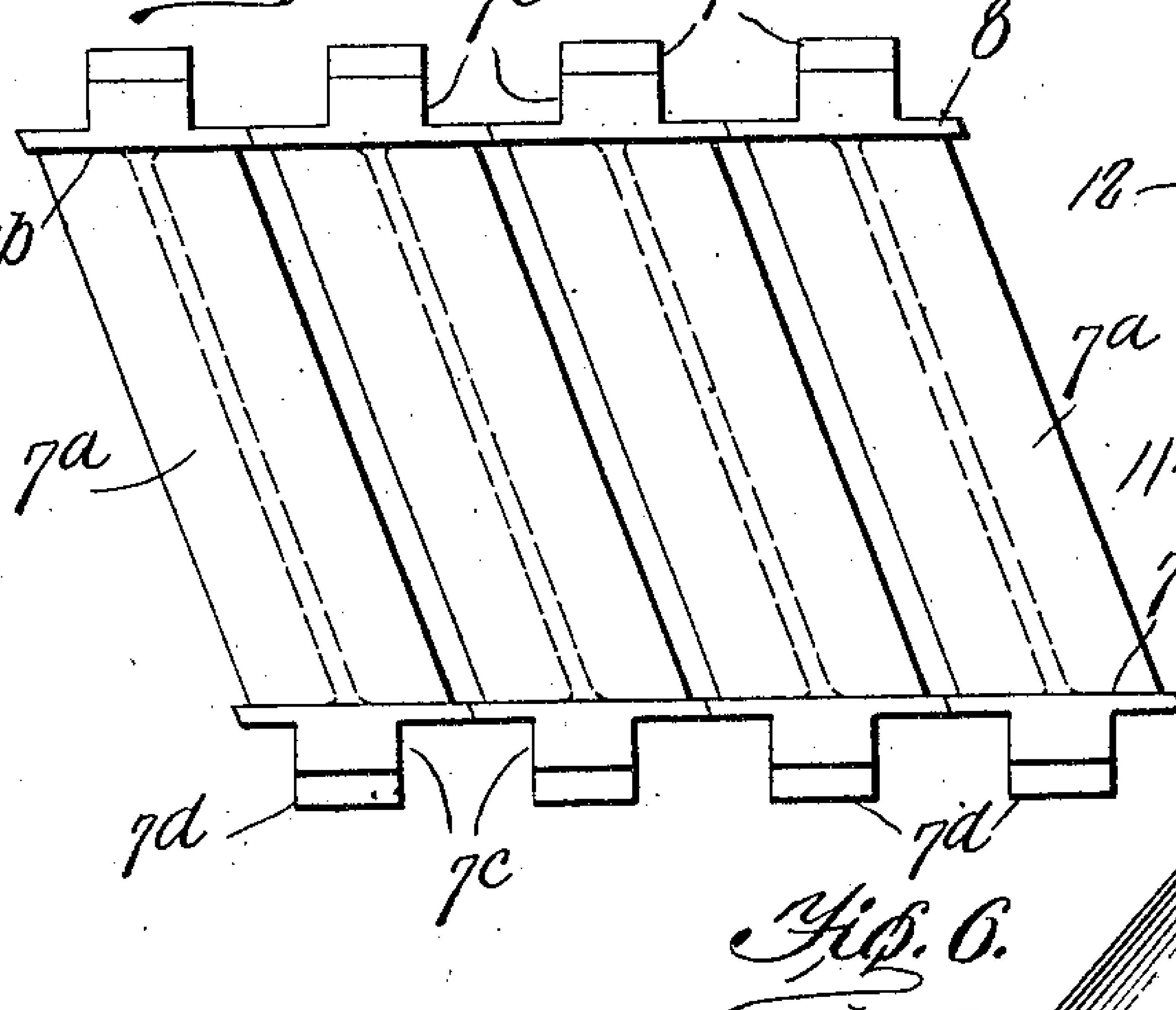


Fig. 5.

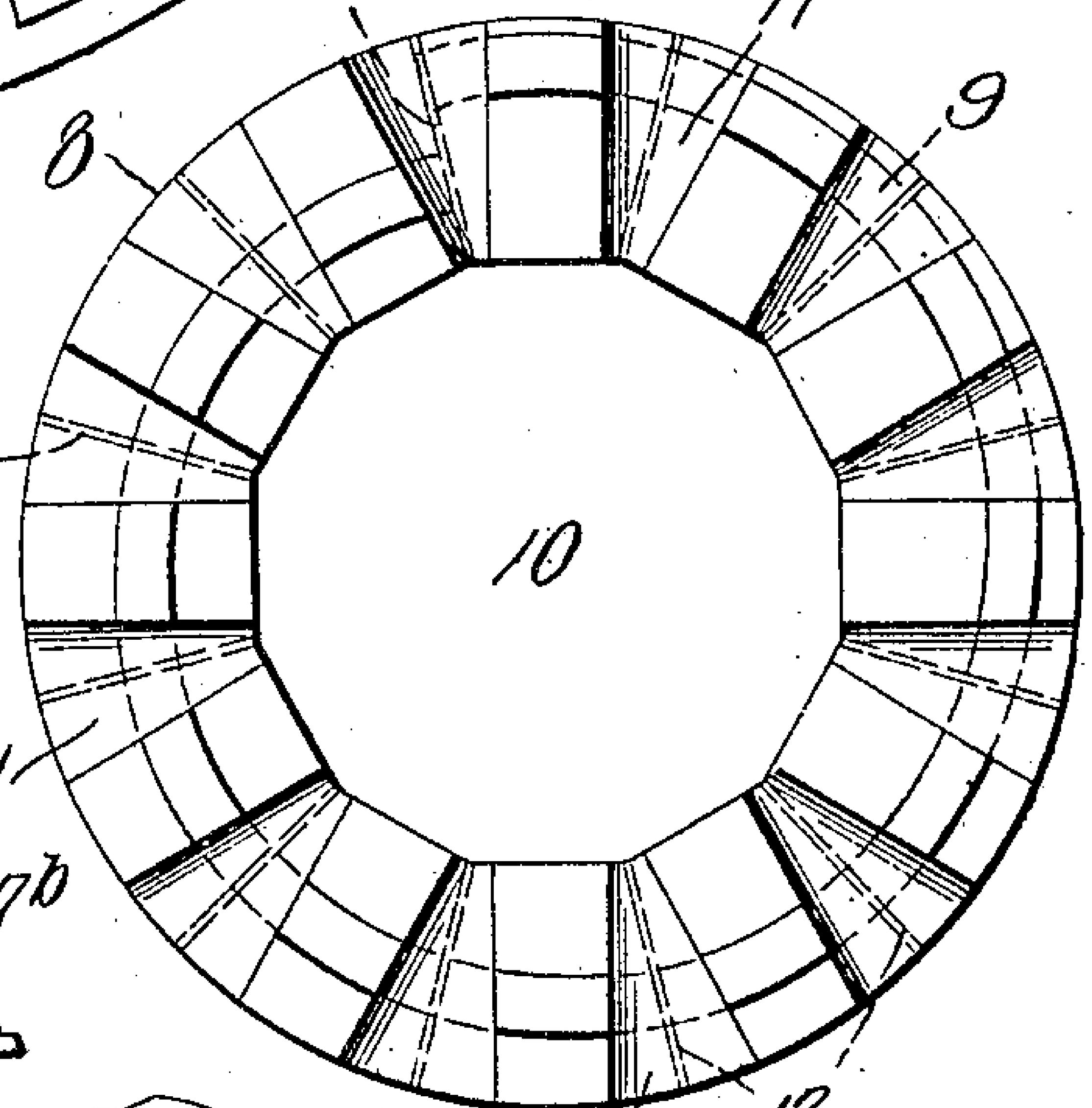
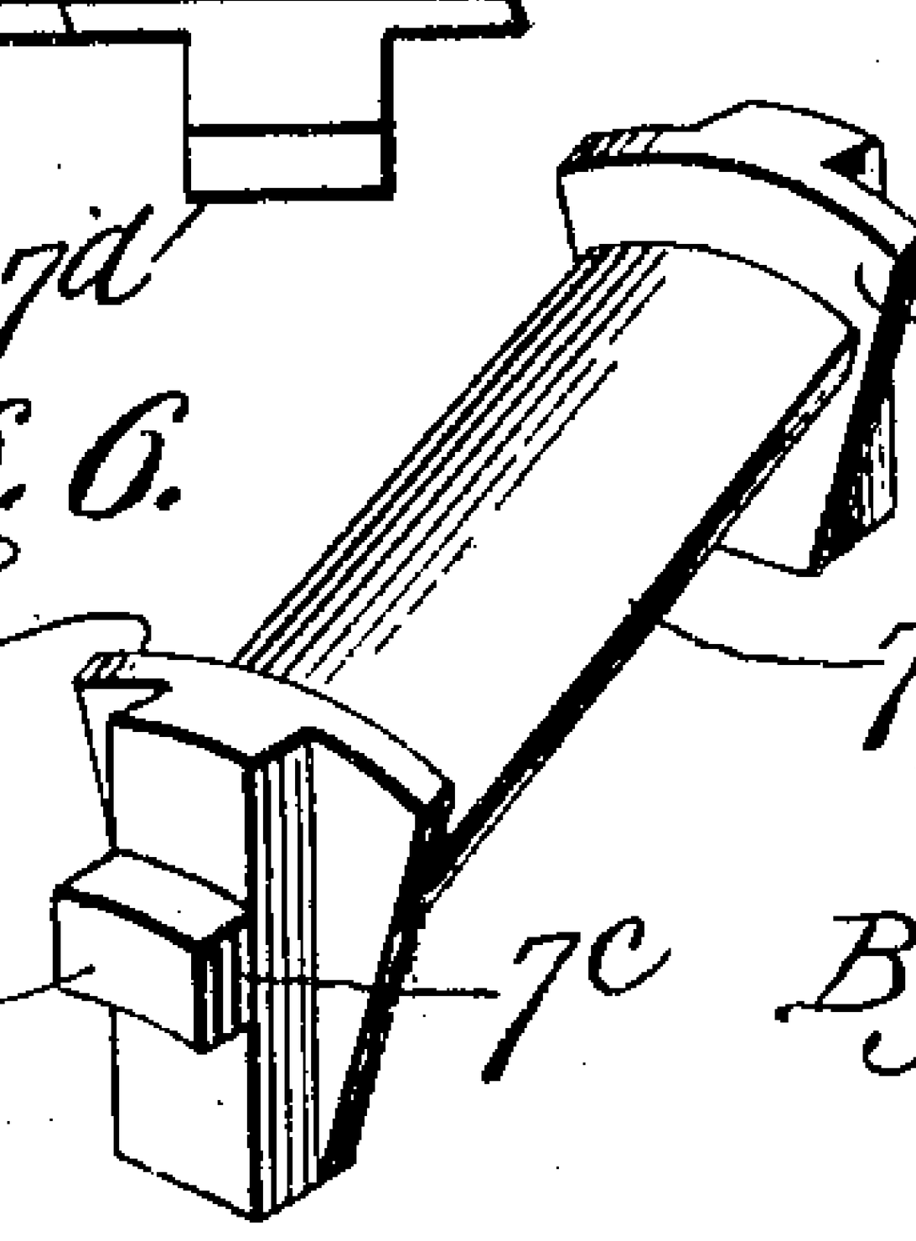


Fig. 6.



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3 SHEETS—SHEET 3.

Fig. 7.

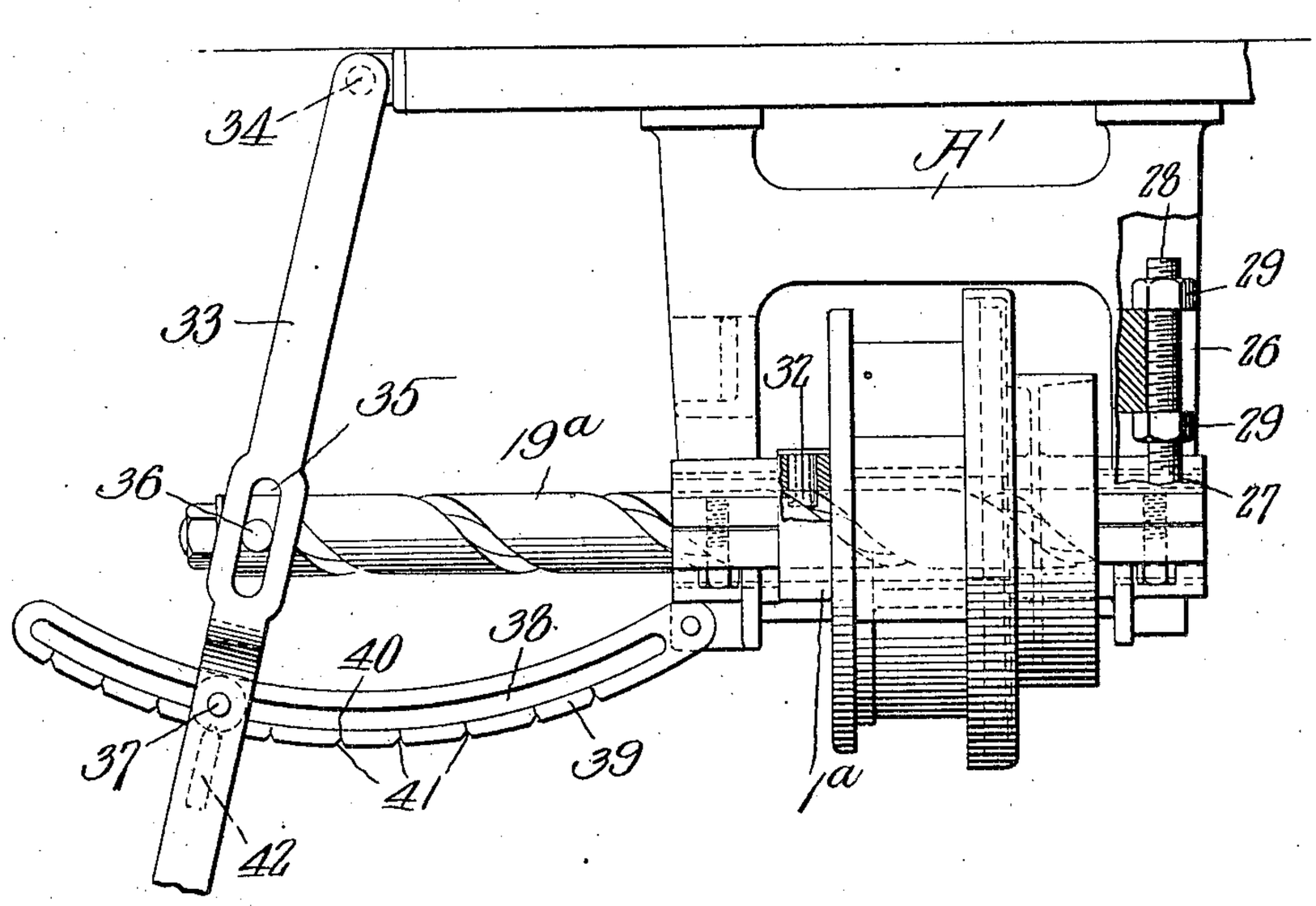
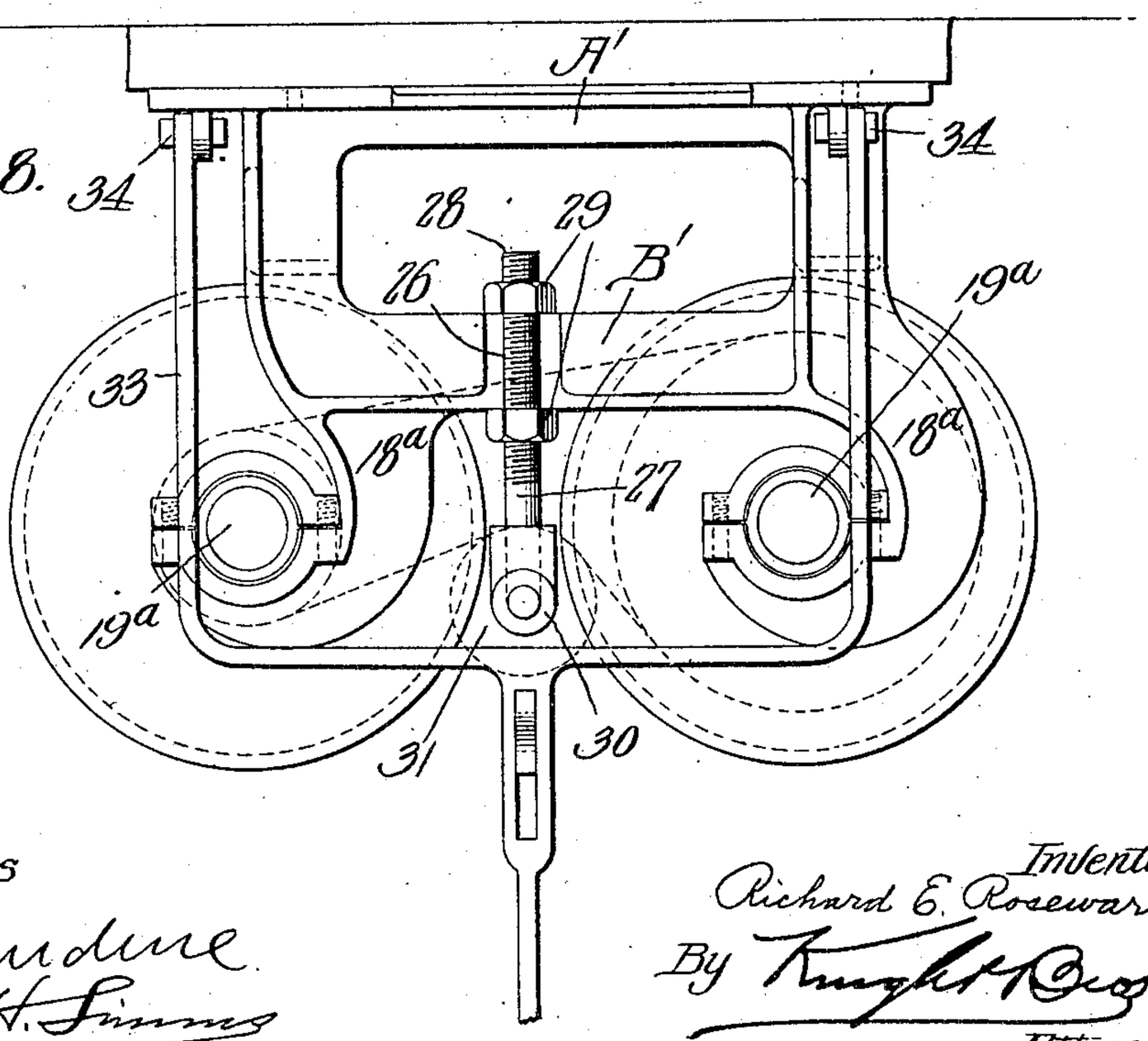


Fig. 8.



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UNITED STATES PATENT OFFICE.

RICHARD E. ROSEWARNE, OF COVINGTON, KENTUCKY, ASSIGNOR TO THE MILLER, DU BRUL AND PETERS MANUFACTURING COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

VARIABLE-SPEED MECHANISM.

No. 849,750. Specification of Letters Patent. Patented April 9, 1907.

Application filed April 30, 1906. Serial No. 314,569.

To all whom it may concern:

Be it known that I, RICHARD E. ROSEWARNE, a citizen of the United States, and a resident of Covington, in the county of Kenton and State of Kentucky, have invented certain new and useful Improvements in Variable-Speed Mechanisms, of which the following is a specification.

This invention relates to variable-speed mechanisms, and particularly to that type in which a pair of expansible pulleys is employed.

It has for an object to relieve the adjusting-screw of all strain in transferring the power of an expansible pulley to the driven pulley or of the driving-pulley to an expansible pulley.

Another object is to form the supports of the expansible pulleys so that they present a smooth-running surface to the belt.

Still another object is to provide an improved frame for supporting the expansible pulleys.

Other and further objects will appear in the following description and will be more particularly pointed out in the appended claims.

In the drawings, Figure 1 is a top plan view of a variable-speed mechanism embodying my invention. Fig. 2 is an axial section through one of the pulleys. Fig. 3 is a transverse section of the pulley, the holding-disk being broken away to show the guide-disk. Fig. 4 is a development of a portion of the periphery of the supports. Fig. 5 is a top plan view of a drum from which the supports are cut. Fig. 6 is a detail perspective view of one of the supports. Fig. 7 is an end elevation of another embodiment of my invention, and Fig. 8 is a side elevation of the embodiment shown in Fig. 7.

Referring more particularly to the drawings and to Figs 1 to 6, A indicates the frame of the mechanism, in each end of which is journaled an expansible pulley, the pulleys being connected by a belt B and one acting to drive the other.

Each pulley is formed of a pair of guide-disks 1^a and 1^b, having their opposed faces provided with spiral guide-grooves 2. The outer face of the disk 1^a is provided with a central hollow spindle-boss 3, which turns in a bearing 4 on the frame A. The disk 1^b has a sleeve 5 cast on its inner face and connected to the inner face of the disk 1^a. A sleeve or member 6, having internal threads, is secured within the sleeve 5, the function of the said sleeve or member 6 appearing hereinafter. Connecting the opposed faces of the spiral guides 1^a and 1^b is a series of supports or bars 7. These supports or bars are formed in the following manner to obtain accuracy. (See Fig. 5.) A drum is first cast with a diameter equal to the diameter of the expansible pulley in its greatest contracted position, with peripheral flanges 8 at each end, with spiral flanges 9 on its ends, and with openings in its ends 10. The ends are then milled or otherwise cut, as at 11, and then the drum is divided on the lines 12 to provide the supports or bars for one pulley. These supports or bars thus formed have a belt portion 7^a, flanges 7^b at the ends of the belt portion, controlling-faces 7^c on opposite sides at each end, and arcuate guiding-flanges 7^d at each end. The arcuate flanges 7^d travel on the spiral guides 2 and support the bars, so that the bars gradually decrease in height from the one having its flanges in those parts of the spirals nearest the axis of the pulley, thus maintaining the concentricity of the pulley. The belt portions of the supports are formed at an angle to the axis of the pulley, so that a portion of each support will project into the plane of an adjacent support—that is, the front portion of one is located in advance of the rear portion of the adjacent one, whereby before any transverse section of the belt leaves one support it will have passed onto the adjacent support, thus reducing the wearing action on the belt.

It is apparent that the arcuate flanges of each support or bar must be out of alinement. To hold the supports against rotation with the spiral guides, there is provided a pair of holding or controlling disks 13^a and 13^b, each provided with radial slots 14, the walls of which engage the controlling-faces 7^c on each side of said supports. Both controlling-disks 13^a and 13^b are adapted to turn on the sleeve 5, connecting the guide-disks, and are connected to each other by a sleeve 15, which is cast integral with disk 13^b and is secured in any suitable manner to disk 13^a. The hold-

ing or controlling disk 13^b has a greater diameter than the adjacent guide-disk 1^b, so that the former projects beyond the latter.

Secured to the protecting portion of the holding-disk 13^b is a driven or driving pulley 16. This pulley 16 is so formed that it houses the disk 1^b and is in axial alinement with the disks forming the expansible pulley. A hollow spindle 17 extends from the outer face of pulley 16 and is journaled in a bearing 18 in the frame A.

Extending through the hollow spindles 3 and 17 and the internally-threaded member 6, connected to the guide-disks 1^a and 1^b, is an adjuster or operating-screw 19. This screw is provided with a longitudinal groove 20, in which works a key 21, carried by the spindle 17. It is apparent that when this screw or adjuster 19 is moved axially through the pulley the guide-disks 1^a and 1^b will be turned relatively to the holding-disks and the supports 7, and as the flanges on supports 7 rest in the spiral grooves 2 the supports will be moved to and from the axis of the pulley. So that one pulley will expand while the other contracts the screws 19 and the internal members 6 have their threads oppositely disposed. It is apparent, however, that the screws may have their threads disposed in the same direction, in which case the spiral grooves in the disks will be right and left. The screws 19 are journaled at one end in the ends of controlling-bar 22, which is moved by means of a screw 23, journaled in the frame and swiveled to the bar.

The exact relation of the two expansible pulleys to each other may be obtained by a scale 24, over which moves a pointer 25, secured to the controlling-bar 22.

In the embodiment shown in Fig. 8 the frame A′ has hanger-bearings 18^a of **J** form, opening upwardly and facing in one direction. These bearings permit the use of an endless belt B′ without the usual lacings. In mounting the expansible pulley one pulley is first surrounded by the belt and placed upon its bearings. The other is then surrounded by the belt and placed in its bearings. This is a very important feature, as there would not be enough length in a belt connecting two pulleys so close together to permit of one pulley being passed over its bearings if the bearings faced in opposite directions unless take-ups are provided, this latter necessarily involving extra mechanism and a longer belt. A further feature in this embodiment is the manner of mounting an idler. The frame is provided with lateral grooves 26 on opposite sides between the pulleys, and in these grooves are fitted by a lateral movement the idler-supports 27, having screw-threads 28, on which are adjustable nuts 29 to engage the frame at each end of the grooves. The idler-supports 27 carry bearings 30 at their free ends to support ends of the shaft of the idler 31. The function of the idler is to create a greater arc of belt-contact on the expansible pulleys and also to take up belt-slack. Instead of the adjuster or screw 19 an adjuster or bar 19^a, having a single spiral groove throughout its entire adjusting length, may be used. A pin or roller 32 extends from the hollow spindle-boss 1^a into the spiral groove of the adjuster. It is clear that the spiral groove may be changed into a single spiral thread on the adjuster to work between two pins or a female projection on the member to be rotated. The adjusters in this embodiment may be operated in unison by a forked lever 33, each arm of which is pivoted at 34 and slotted at 35 intermediate of its ends to engage projections 36 on the adjusters. This lever is also provided with a pin 37 to work in an arcuate slot 38 in a curved guide-bar 39, extending from the frame. The guide bar or indicator is provided with graduations 40 to indicate the relative sizes of the expansible pulleys. This guide-bar is also provided with recesses 41, into which a dog 42 on the lever is adapted to enter.

It is apparent that the spiral grooves form a non-thrust and non-collapsing rest for the pulley supports or segments.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with a pair of guide-disks connected so as to turn together, of an internally-threaded member secured to said disks to cause the disks to turn therewith, a plurality of supports engaging the guide-disks, a pair of holding-disks engaging said supports, a pulley connected to said holding-disks so that the said holding-disks and pulley have no relative turning movement, an axially-movable screw provided with a longitudinal groove and extending axially through the pulley and both pairs of disks, and a key carried by the pulley causing the latter to turn with the screw.

2. The combination with a pair of spirally-grooved disks connected to rotate simultaneously, of an internally-threaded sleeve secured to said disks to cause the disks to turn therewith, a plurality of supports engaging the grooved disks at their ends, a pair of radially-slotted disks turning with one another, and engaging the supports, a pulley connected to the slotted disks so that the said slotted disks and pulley have no relative turning movement, an axially-movable screw provided with a longitudinal groove, and a key on the pulley fitting in the groove of the screw.

3. The combination with a pair of guide-disks connected so as to turn together, of a plurality of supports engaging the guide-disks, a pair of holding-disks engaging said supports, one of said disks projecting beyond the periphery of one of the guide-disks,

a pulley secured to the projecting portion of the holding-disk, and an axially-movable screw extending axially through both pair of disks and the pulley, held against turning with the pulley and holding-disks, and connected to the guide-disks to cause their turning relatively to the holding-disks.

4. The combination with a pair of guide-disks, of an internally-threaded sleeve connecting said disks, a plurality of supports engaging said guides, a pair of holding-disks engaging the supports, surrounding said sleeve and connected together, a pulley secured to one of the holding-disks beyond the periphery of one of the guide-disks, and an axially-movable spiral engaging the threaded sleeve and connected to the pulley and the holding-disks in such a manner that no relative turning is permitted.

5. The combination with a pair of guide-disks connected so as to turn together, of a plurality of supports engaging the guide-disks, a pair of holding-disks engaging the supports and connected together, a pulley connected to the holding-disks to turn therewith, and an axially-movable spiral engaging the guide-disks to turn them relatively to the holding-disks and non-turnable relatively to the holding-disks and the pulleys.

6. In an expansible pulley, the combination with the relatively movable holding and guiding disks, of the supports connected to said disks, each arranged so that a portion thereof projects into the plane of an adjacent support, and movable to and from the axis of the pulley.

7. The combination with the spiral guides, of the supports connecting the spiral guides, and each arranged so that a portion projects into the plane of an adjacent support, and radially-slotted holding-disks engaging the supports.

8. The combination with the spirally-grooved disks, of a plurality of supports connecting said disks and arranged so that a portion of one is in advance of the rear portion of an adjacent one, and radially-slotted holding-disks engaging the supports.

9. In an expansible pulley, a rotating disk carrying a projection, and a spirally-grooved adjuster movable axially through the rotating member and engaging the projection.

10. In an expansible pulley, a rotating member, a rotating disk, and an axially-movable adjuster having a spiral thereon engaged by the disk to cause the rotation of the disk.

11. The combination with a pair of expansible pulleys, of a pair of axially-movable adjusters one for each pulley, and a forked lever each arm of which is connected to an adjuster to move said adjusters simultaneously in the same direction.

12. The combination with a pair of expansible pulleys, of a pair of axially-movable adjusters, each controlling one pulley, a projection on each adjuster, and a forked lever pivoted at its forked end and provided with slots in its arms to receive the projections on the adjusters and to move said adjusters simultaneously in the same direction.

13. The combination with the pair of expansible pulleys, of a belt connecting the pulleys, and an idler bearing on the belt between the pulleys.

14. The combination with the pair of expansible pulleys, of a belt connecting the pulleys, an idler bearing on the belt between the pulleys, and means for adjusting the idler.

The foregoing specification signed at Cincinnati, Ohio, this 26th day of April, 1906.

RICHARD E. ROSEWARNE.

In presence of—
F. BROERMAN,
H. WHYRICH.