

No. 746,088.

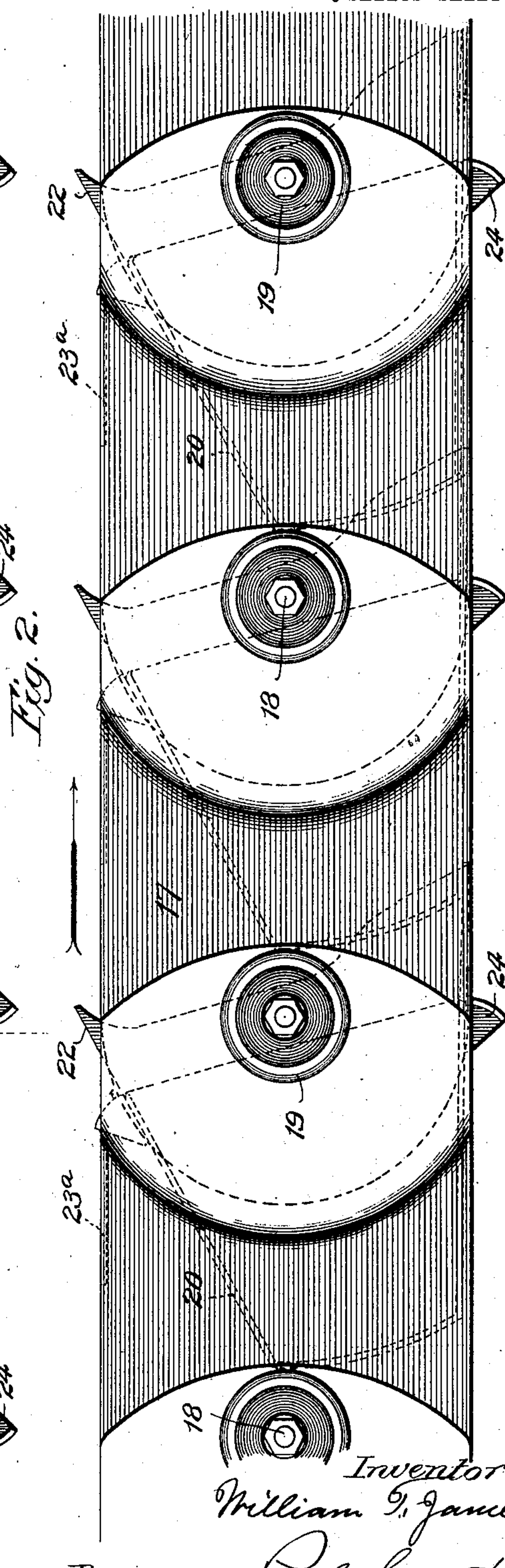
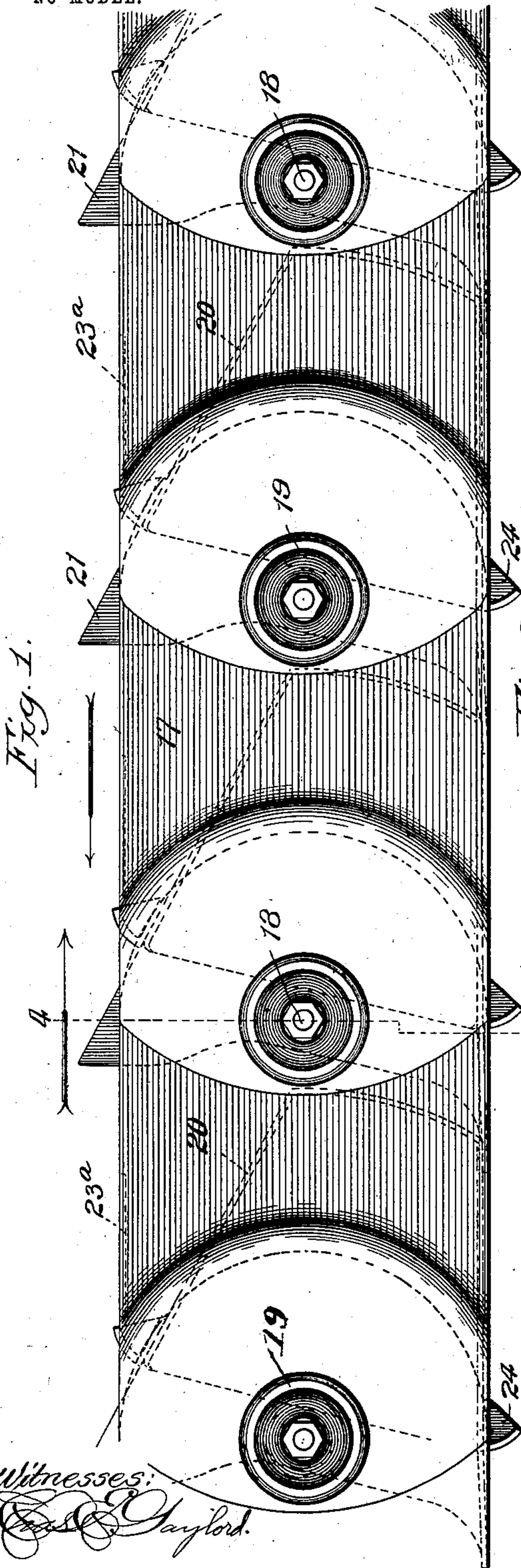
PATENTED DEC. 8, 1903.

W. T. JAMES.  
CONVEYER.

APPLICATION FILED APR. 13, 1903.

NO MODEL.

5 SHEETS—SHEET 1.



Witnesses:  
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Inventor:  
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5 SHEETS—SHEET 2.

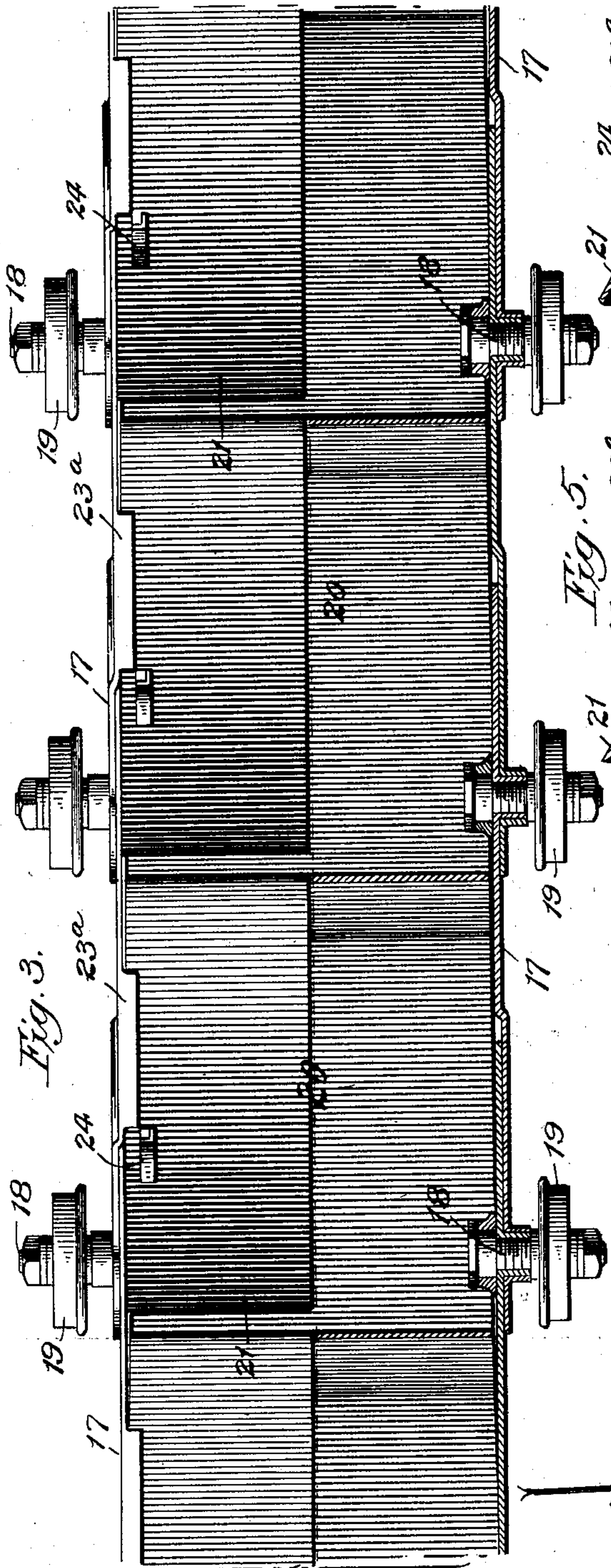


Fig. 3.

Fig. 5.

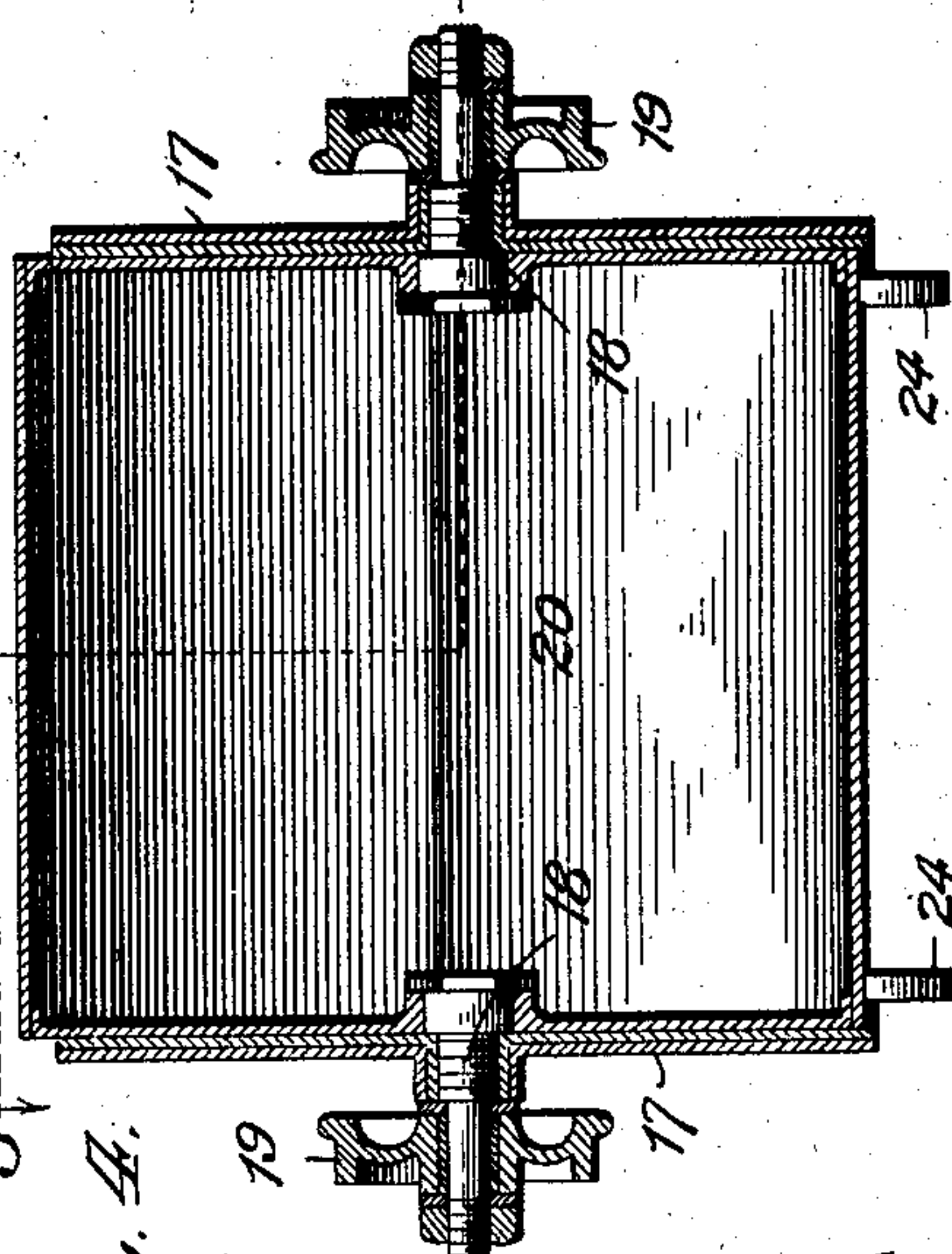
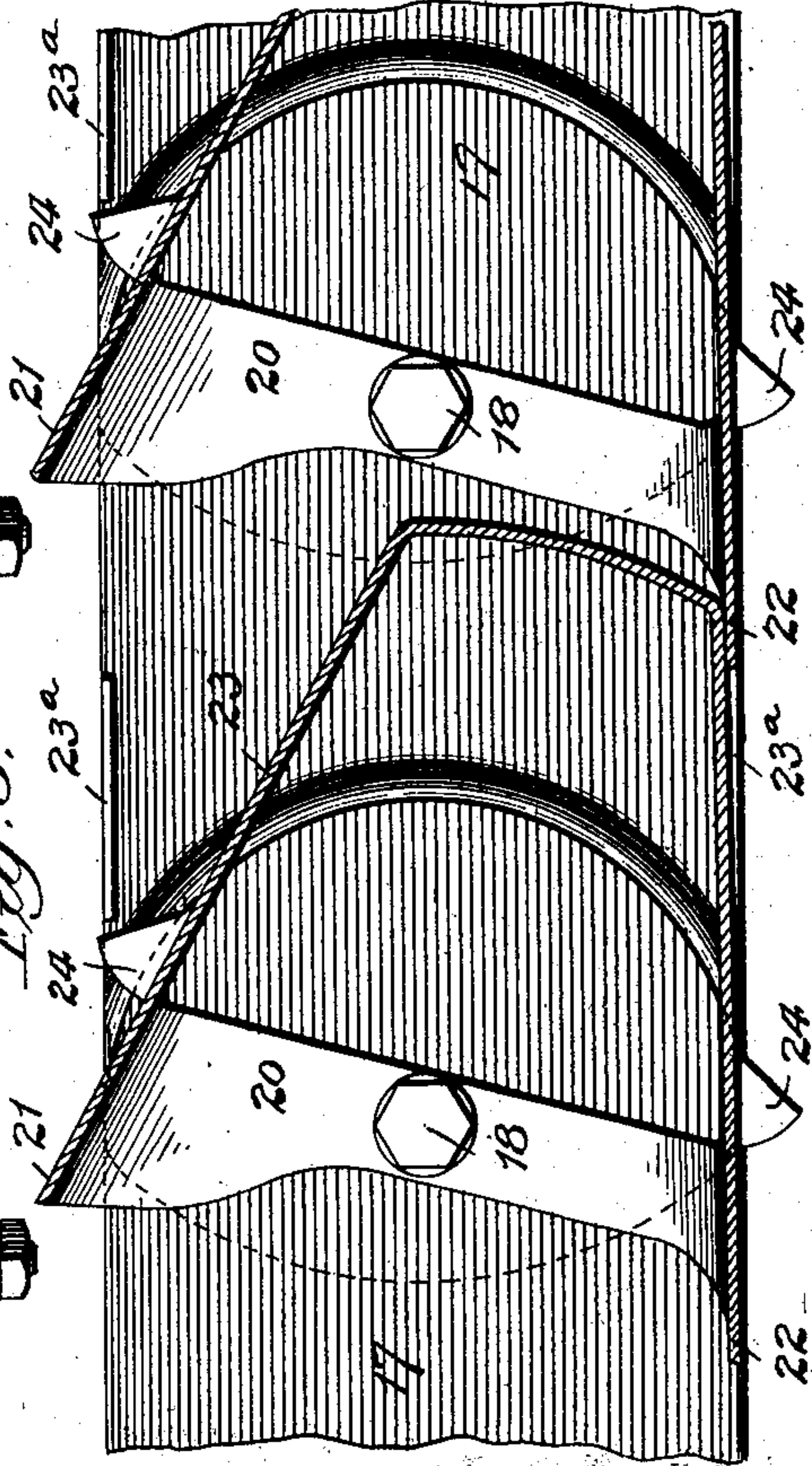


Fig. 4.

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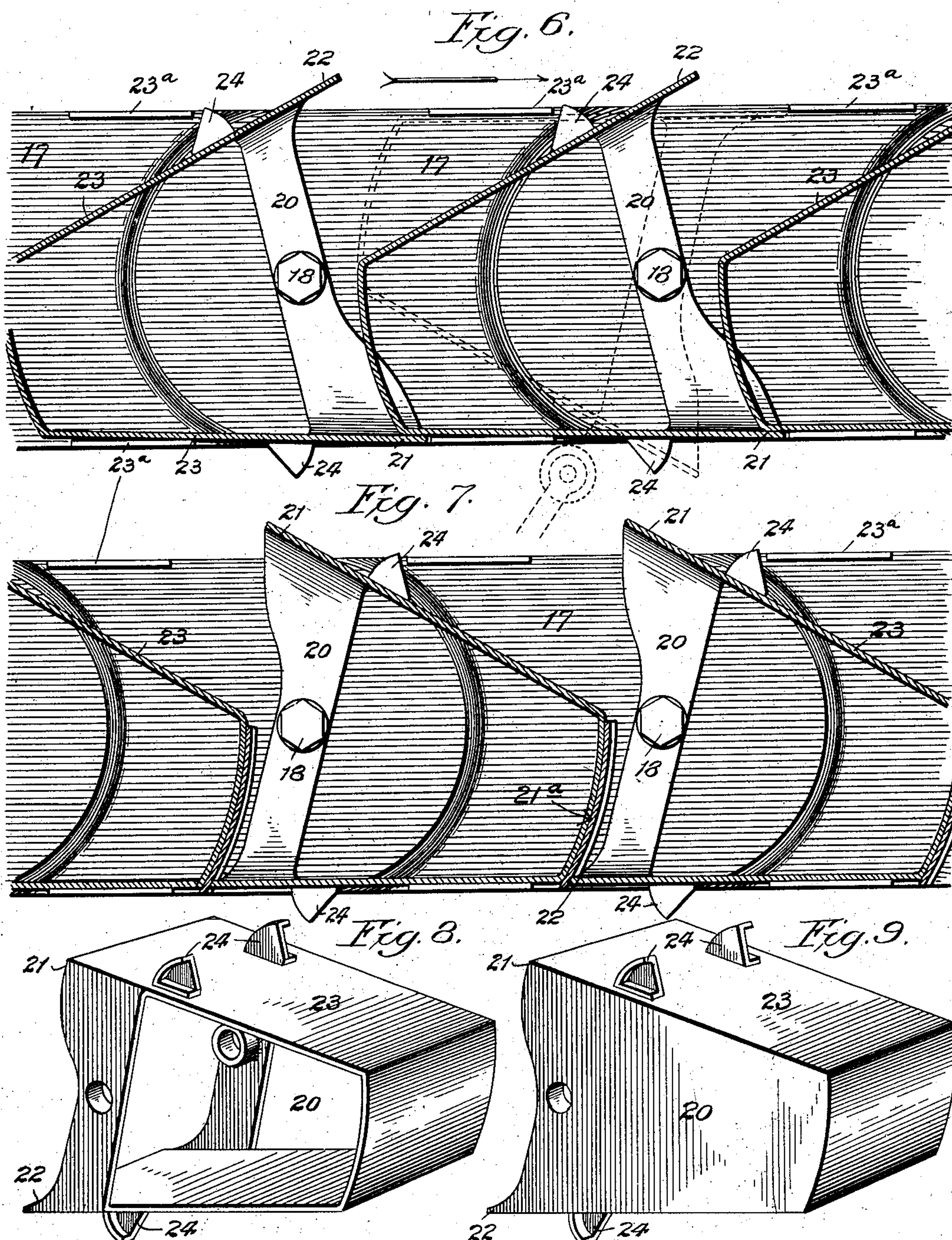
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5 SHEETS—SHEET 3.



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5 SHEETS—SHEET 4.

Fig. 10.

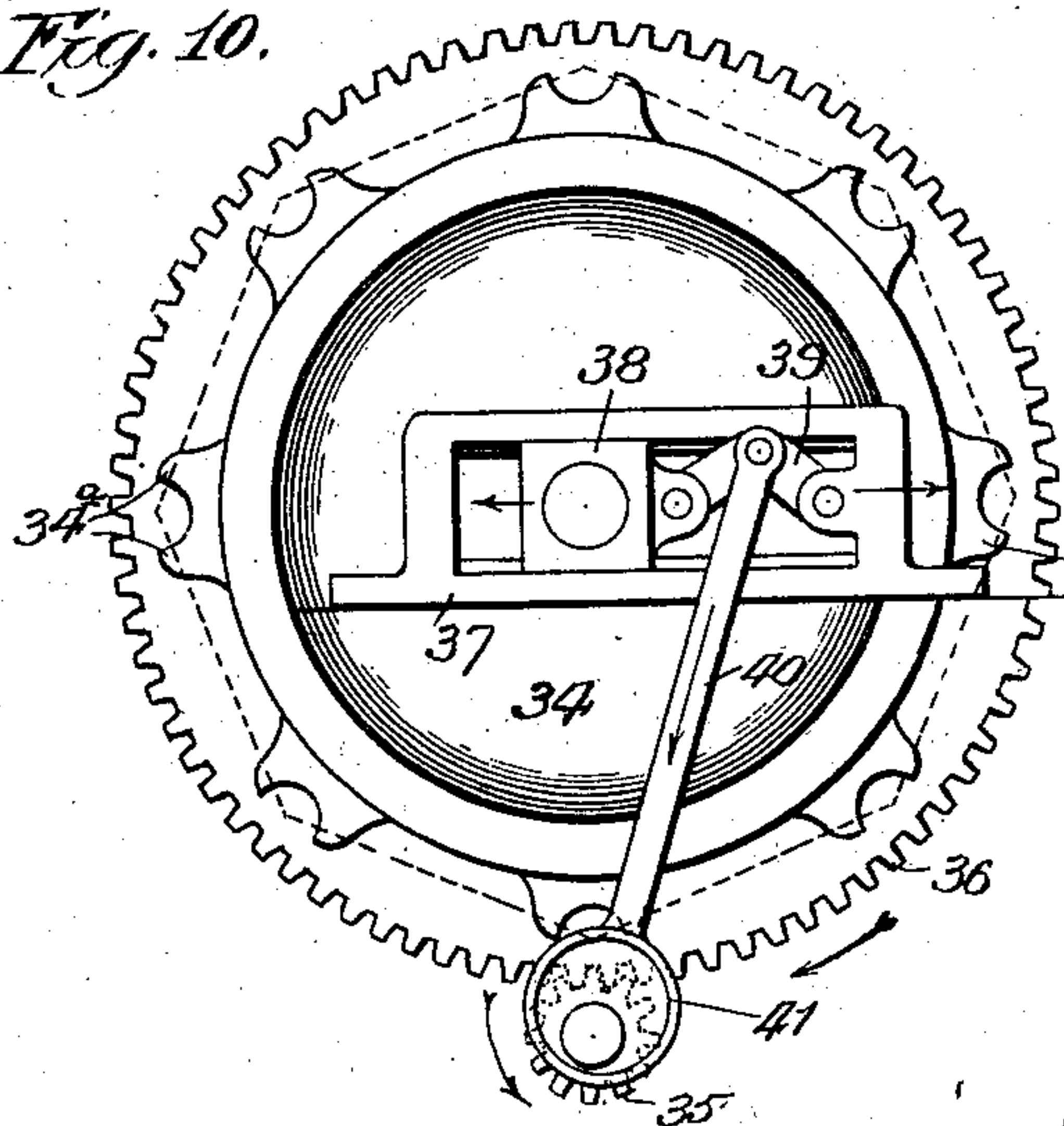


Fig. 11.

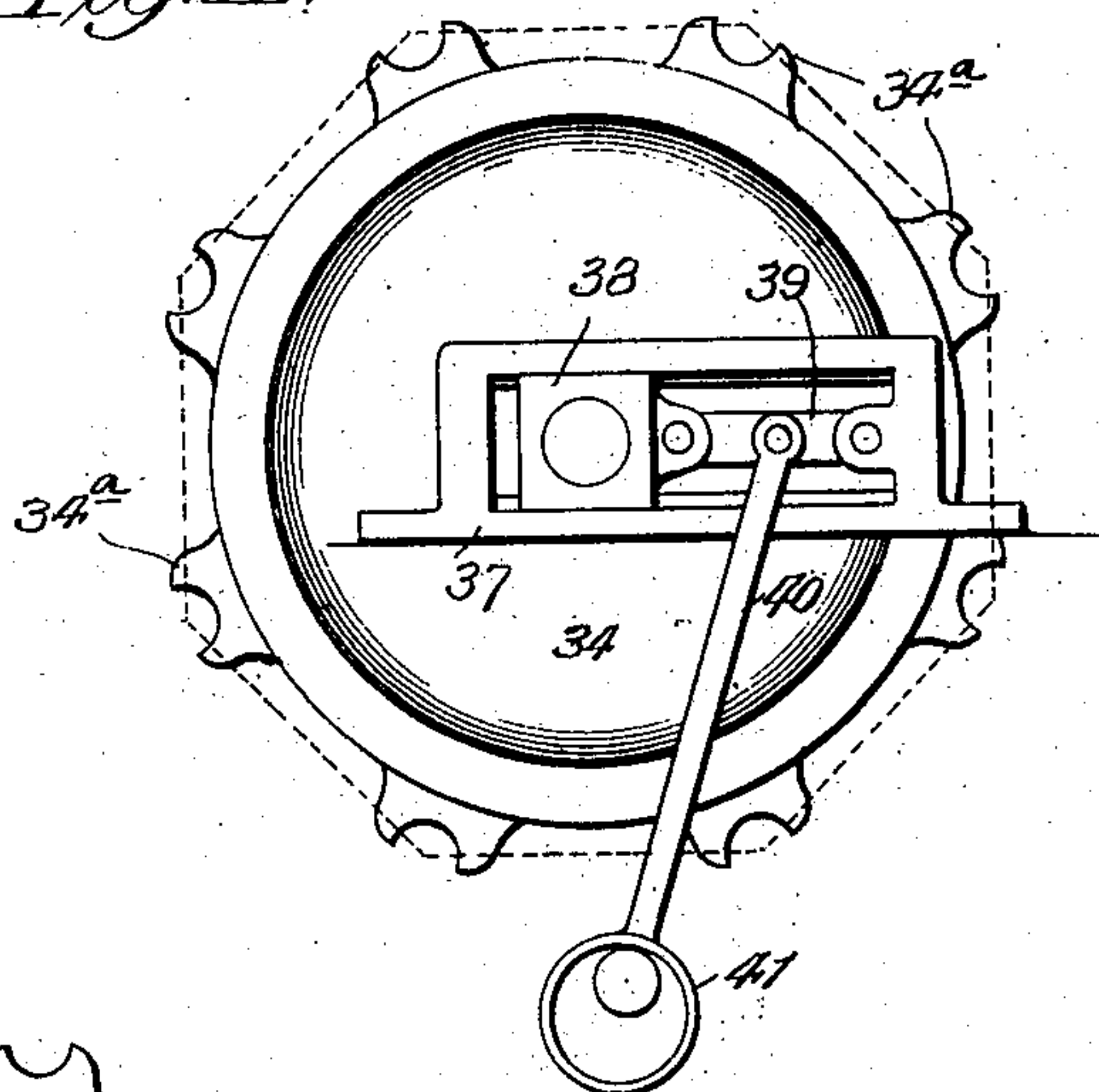


Fig. 12.

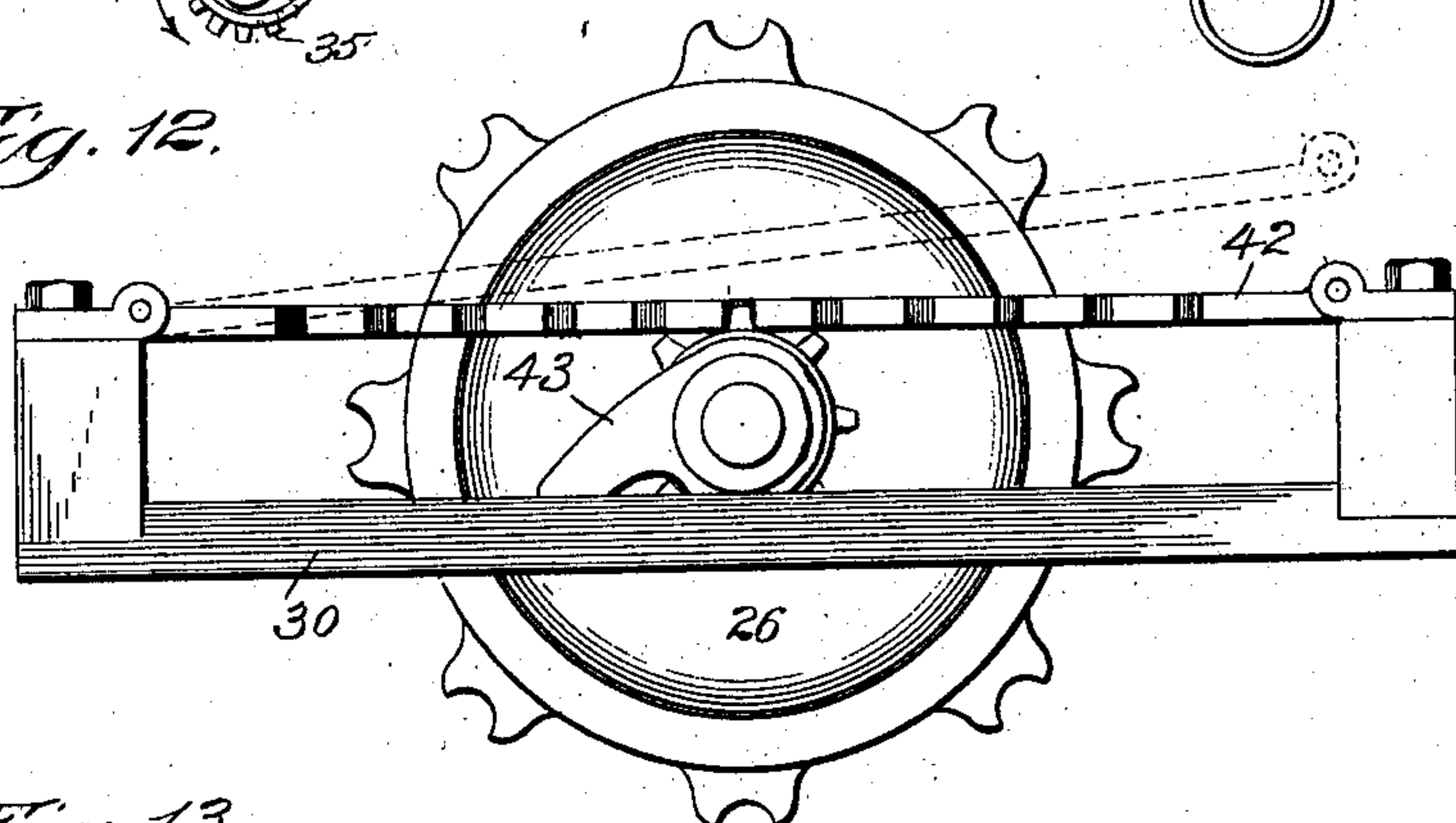


Fig. 13.

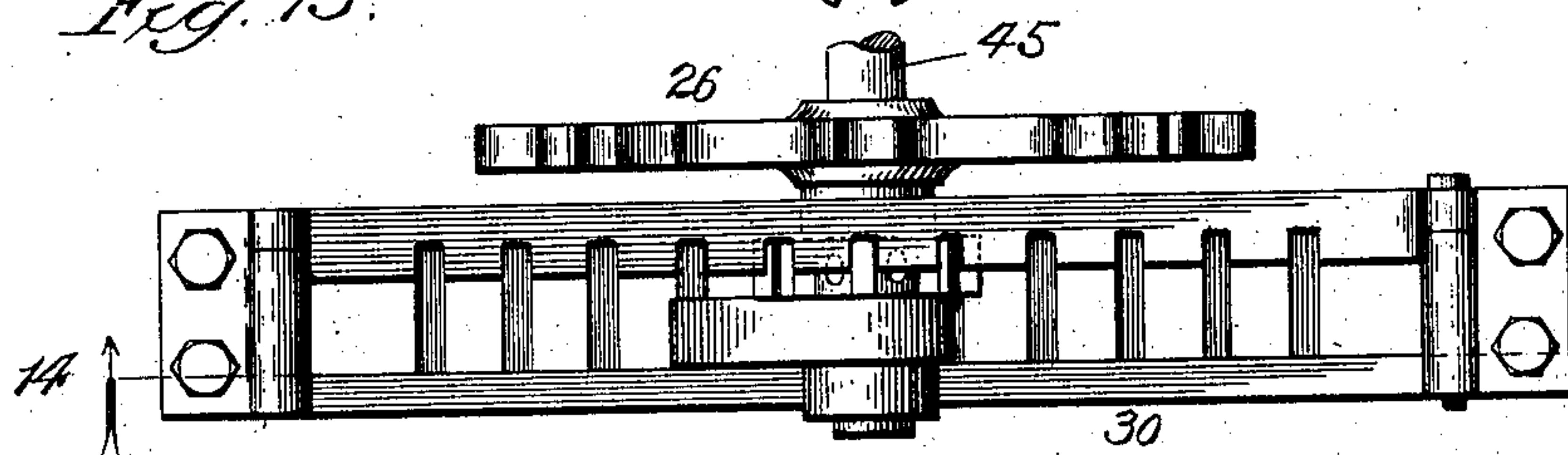
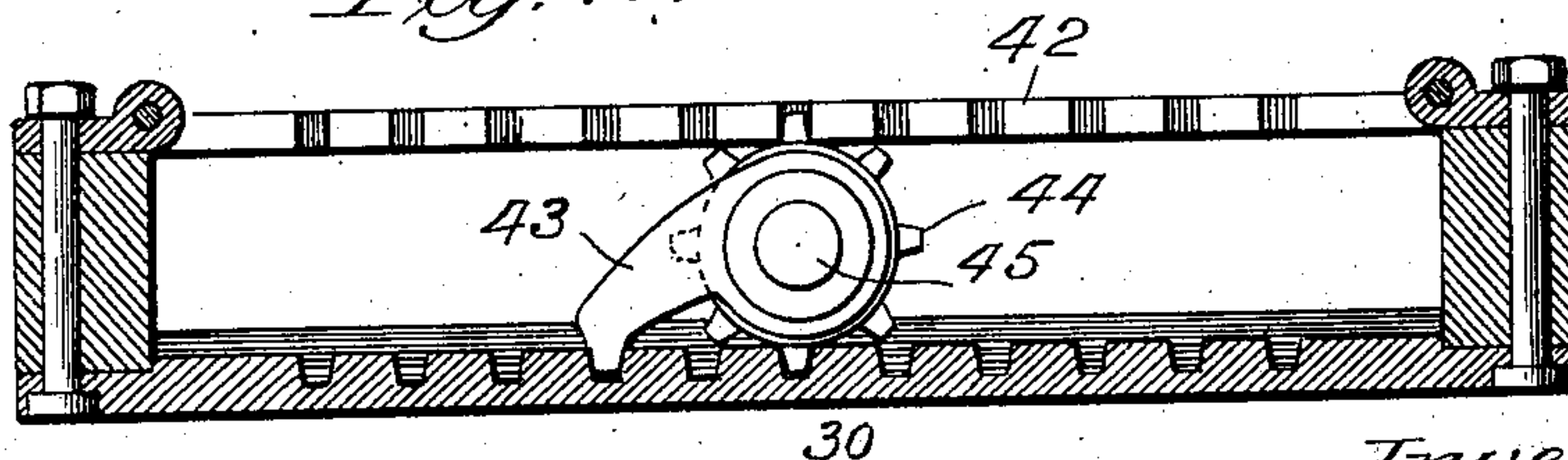


Fig. 14.



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No. 746,088.

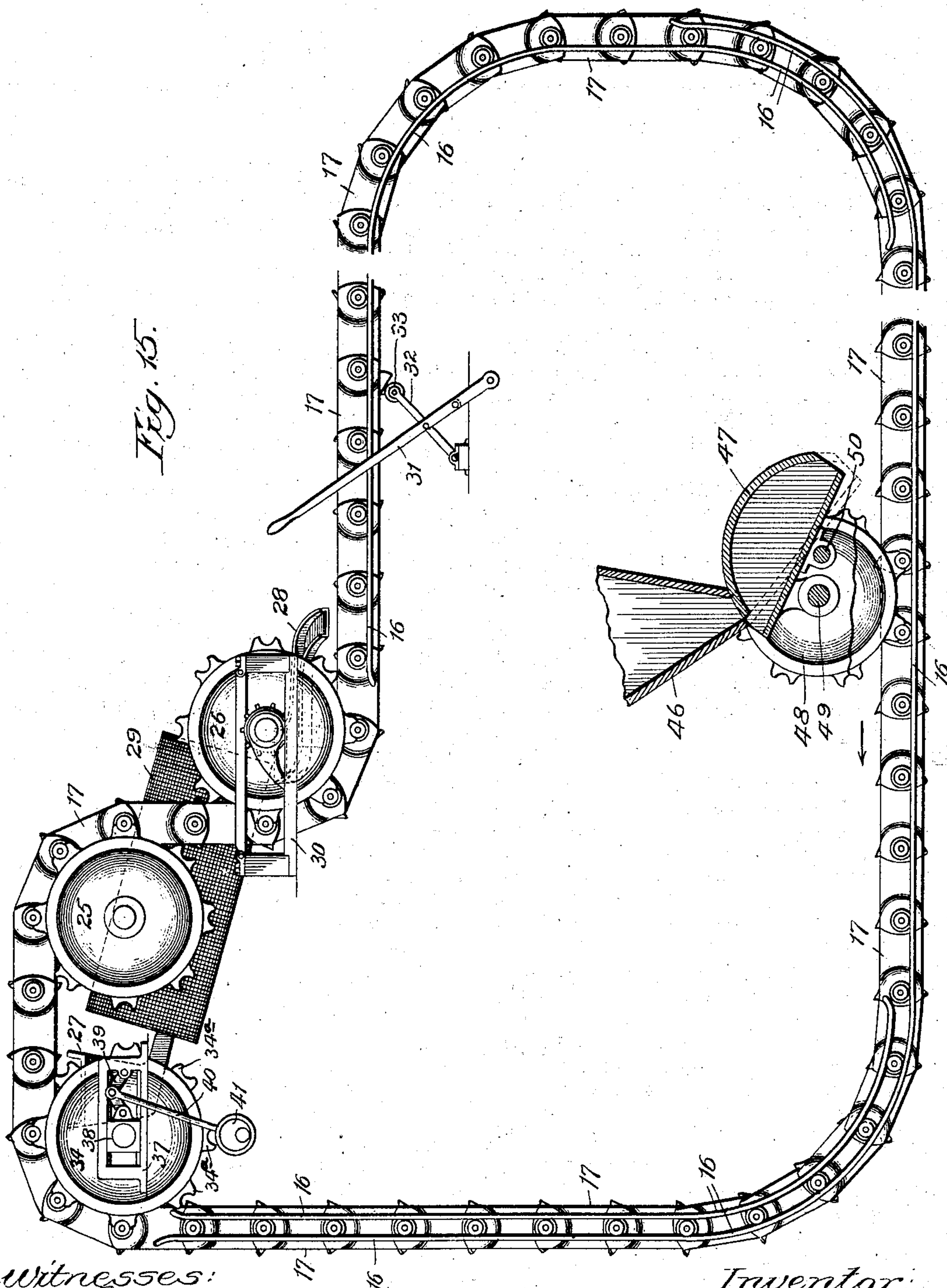
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W. T. JAMES.  
CONVEYER.

APPLICATION FILED APR. 13, 1903.

NO MODEL.

5 SHEETS—SHEET 5.



Witnesses:

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*Att'y in*

By



## UNITED STATES PATENT OFFICE.

WILLIAM T. JAMES, OF CHICAGO, ILLINOIS.

## CONVEYER.

SPECIFICATION forming part of Letters Patent No. 746,088, dated December 8, 1903.

Application filed April 13, 1903, Serial No. 152,457. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM T. JAMES, a citizen of the United States, residing at Chicago, in the State of Illinois, have invented certain new and useful Improvements in Conveyers, of which the following is a specification.

My invention relates to apparatus for moving and elevating loose material by means of a series of conveyers linked together and traveling continuously, and particularly to that kind of conveyer which is composed of a series of buckets articulated together and carried upon tracks in a continuous circuit.

The objects of my invention are, to provide a series of reversible elevator buckets, and to so design them that they will fit together to close the space between them when turned in either position; to provide such a bucket as will be capable of easy loading and unloading by gravity; to provide a series of such buckets with overlapping mouths so as to present a continuous conveyer floor in either position of the buckets. Another object of the invention is to provide an elevator bucket with interchangeable sides and to provide means by which each bucket in a series forms a closure for the mouth of the bucket next succeeding it. Other objects are to provide improved means for dumping the buckets and righting them up in order to receive a new load; to provide improved mechanism by which the chain of buckets is drawn at an even and regular speed over the actuating devices, and to provide an improved mechanical motion for this purpose, whereby the supporting point of the wheel that drives the chain of buckets will draw the said chain at uniform speed around it. Still another object is to provide a superior take-up mechanism for regulating the length of the conveyer chain, and to generally improve the structure and operation of the same.

The above objects, and other advantages which will hereinafter appear, I attain by means of the construction and assemblage of parts as illustrated in preferred form in the accompanying drawings, wherein,—

Figure 1 is a side elevation of a portion of the chain of conveyer buckets.

Figure 2 is a side elevation of a portion of

the chain of buckets with the same in position reversed from that of Figure 1.

Figure 3 is a half plan and half horizontal section of a series of buckets.

Figure 4 is a cross section of one of the buckets and the side links, taken along the line of the supporting trunnions.

Figure 5 is a central vertical longitudinal section through a pair of the buckets showing their form and mounting.

Figure 6 is a similar section through a series of the buckets turned in the reversed position.

Figure 7 is a vertical longitudinal section indicating a modification.

Figures 8 and 9 are perspective views showing respectively an open form and a closed form of conveyer bucket.

Figures 10 and 11 are side elevations showing the device I use for causing the driving sprocket wheel for the chain to move the chain at a uniform speed, the first showing one position and the second view another position of the shifting device for moving the journal of the wheel.

Figures 12 and 13 are respectively a side elevation and a plan of the take-up device for tightening the chain by moving one of the sprocket wheels supporting the same.

Figure 14 is a partial vertical section of the rack shown in Figure 12.

Figure 15 is a view showing the general arrangement of the conveyer and means for loading and for dumping.

Several very desirable features in an apparatus of this kind are the following:

First, the buckets should be invertible and when in either position they should form at the bottom a continuous floor for retaining the material poured therein; second, the shape of the bucket should be such that it may be both loaded and dumped by gravity,—that is to say when the material is simply dropped upon the top of a chain of buckets the side of the bucket should provide for the material sliding into its proper place, and conversely when the bucket is dumped on the upper way the material should easily slide out of the same; thirdly, the bucket should have interchangeable parts; fourthly, the chain of buckets should be capable of being



tightened to the proper tension and held in tension as circumstances require; fifthly, the motion of the buckets around the circuit should be continuous and not intermittent as is generally the case in passing them over a sprocket wheel which drives the entire chain.

In order to attain these advantages I make use of the form of bucket shown. A chain is formed by a series of links 17 which are joined together by means of trunnions 18 which carry thereon the wheels 19 to roll upon the guide way or tracks 16 shown in Figure 15. Inside these plates forming the chain, (which may also form the sides of the buckets themselves in some instances,) I place the buckets 20 which are also pivoted on the trunnions 18 and are made of such a form and length that the rear end of each bucket rests upon the lip of the mouth of the bucket next behind it, in either the upright or the inverted position, as will be clear from the figures. Two forms of the bucket are shown, respectively, in Figures 8 and 9; I generally prefer the form of Figure 9 for small loose material.

In some cases I find it convenient to provide the side links with a cross partition 21<sup>a</sup> as shown in Figure 7, which forms a fixed front to the compartment inclosed in the bucket, not depending on the bottom of the next preceding bucket for this purpose, as in the case of the buckets in Figure 6.

The buckets are preferably made with sloping sides 23, by which means when the series of buckets are put together as illustrated in Figure 7 it will be evident that by merely dropping the material on top of the series of buckets it will by reason of the slant sides be fed by gravity into the buckets themselves. It will also be observed that the lips 21, 22 of the bucket are projecting so that in either position of the bucket they overlap the bucket preceding them so as to form a continuous floor for the material. The links 17 will be provided with inwardly projecting flanges 23<sup>a</sup> in order to retain the buckets in the same and prevent their dumping too far. These buckets may either be made of the closed form shown in Figure 9 or the form shown in Figure 8 which has its sides open and depends upon the links of the chain for forming the sides of the compartment. In Figure 15 I have shown an arrangement of conveyers designed to load the material, elevate it, dump it into a revolving screen, receive it again after it has been sifted, and again dump it out of the buckets, whereupon the buckets return to their normal position. There are guide-ways or tracks 16 provided in proper position as shown and the entire chain of buckets is driven by means of the gear wheel 35 and the gear wheel 36 attached to the sprocket wheel 34. It will be understood that the sprocket wheel 34 has recessed studs 34<sup>a</sup> adapted to receive the wheel 19 of the bucket chain and carry the same around it and from here it proceeds over to the sprocket wheel 25 after first dumping

into the chute 27. The material may then be conveniently carried through the revolving screen 29 and dumped by the chute 28 into the buckets again after the latter have passed under the sprocket wheel 26.

In loading the material into the conveyer it is sometimes convenient to dump it intermittently in the buckets as they come past, and for this purpose I have indicated a device in the lower part of Figure 15. 46 represents the mouth of a fixed hopper which I may place at any desired point in the conveyer; a fixed pivot 50 carries a valve or movable supplemental hopper 47 which is designed with a circular upper surface and two openings as shown so that when tipped in one position it is opened to communicate with the hopper 46 and in another position closes the mouth of the hopper 46. The axle 50 being fixed a bracket extends from the supplemental hopper 47 and carries an axle 49 which is provided with a sprocket wheel 48 to engage the wheels on the conveyer buckets as shown. It will be seen that motion of the conveyer chain in the direction indicated by the arrow will cause one of the sprockets to pass under the center of the axle 49 and by reason of the difference of radius will raise the point 49 and tip the supplemental hopper 47 about its pivot 50 thereby communicating with the hopper 46 and dumping into the next succeeding bucket. The supplemental hopper 47 is thus alternately filled and closed and dumps into each bucket as it comes under; and when the chain of conveyers stop the supplemental hopper will take the position shown in the figure.

At some point in the course of the conveyer chain where it is convenient to dump the material I provide a tripping device shown in Figure 15, which may be composed of a pivoted arm 32 carrying a roller 33 and operated by means of the lever 31 so that at the particular point desired the roller 33 will engage with the lug 24 on each conveyer bucket and tip it about its center as indicated in dotted lines in Figure 6, thus dumping the material and immediately allowing the bucket to right itself up again.

Referring to Figures 10 and 11 particularly, it will be seen that if the shaft of the wheel 34 were to remain stationary and the wheel turned at a constant rotation the chain would be drawn over with somewhat intermittent motion. That is to say, while the recessed stud 34<sup>a</sup> passes from a horizontal position to the top of the wheel the chain would not be lifted at the same rate as would be the case with a belt but there will be a loss of motion due to the fact that the chain stands across a chord of the circle of the wheel rather than lying constantly on the circumference thereof. In other words the motion of the stud 34<sup>a</sup> from the time it first takes upon the wheel of the bucket until it gets in the horizontal position shown, and also between the horizontal position and the vertical position, the motion would not be entirely a lifting mo-



tion but also a sidewise shifting motion. In order to correct this disadvantage I provide upon the shaft support a bracket 37, and the shaft of the gear wheel 36 and a sprocket attached thereto, 34, is mounted in a movable block 38 which moves in the guide-ways of the frame 37. Upon the axle of the driving pinion 35 is placed an eccentric cam 41 which has a circumference equal to twice the distance between the successive recessed sprocket studs and said cam is provided with a link 40 which by means of the toggle links 39 is attached respectively to the frame 37 and to the movable block 38, whereby as the large gear wheel 36 and the sprocket wheel 34 are revolved the wheel is shifted laterally a slight distance with the passage of each sprocket arm 34<sup>a</sup> past the horizontal as will be evident from Figures 10 and 11, the latter of which shows the wheel and sprocket pushed over to the right while the former shows it in its extreme position toward the left. The result of this action will be a variable motion of the sprocket wheel such as to cause the conveyer chain to move over the sprocket wheel at a constant speed.

At some point in the course of the conveyer chain as conveniently placed in Figure 15 I provide an adjustable tension wheel 26 which is shown in detail, together with its mounting, in Figures 12, 13 and 14. The axle 45 of the sprocket wheel 26 is carried in a pinion 44 which is provided with a dog 43 which engages the rack on the bottom of the frame 30 and also engages the pillow bar 42 at the top so that the position of the axle of the wheel 26 may be shifted laterally and held in place securely, all as will be evident from inspection of said figures.

The operation of the apparatus will be apparent from inspection of Figure 15. The continuously moving chain of buckets 17 passing under the hopper 47 is loaded by pouring the material on the top and falling down the slanting sides of the bucket, 23, and filling the chambers therein. The buckets then travel around and up through the tracks 16, over the sprocket wheel 34 by the peculiar motion heretofore described and dump into the chute 27 at that point if desired. The material may then be carried through the revolving screen 29 and again dumped by means of the chute 28 into the buckets again and carried to the point desired to be dumped as shown by the position of the wheel 33 in said figure.

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

1. In a conveyer a series of buckets having narrower bottoms than their mouths and so connected together that the bottom of each bucket has play within the mouth of the next succeeding bucket, whereby the chamber is opened on either side to dump the material or to load, substantially as described.

2. A series of conveyer buckets mounted

upon a chain in such manner that each bucket hangs within the next succeeding bucket, whereby in either of its positions it has a continuous floor formed by a series of buckets and each bucket is opened upon its other side.

3. In a conveyer a reversible bucket provided with inclined sides and projecting lips mounted to overlap the next preceding bucket, substantially as described.

4. In a conveyer a reversible bucket provided with inclined sides and projecting upper and lower lips and having on each of its sides a tripping device.

5. In a conveyer the combination with a series of side bars forming links pivoted together upon journals and provided with supporting wheels, of a series of buckets mounted within said links and upon said journals so that each bucket dips into the bucket behind it and all are reversible upon their support, substantially as described.

6. The combination in a conveyer of a series of jointed link plates, a series of buckets with open sides provided with oblique tops and bottoms and having projecting lips each bucket being provided upon both sides with tripping lugs.

7. In a conveyer the combination of a series of articulated buckets, a driving sprocket wheel therefor provided with mechanism for shifting the journal of said wheel sidewise as each of said buckets passes over a sprocket of the wheel, whereby the chain is drawn at a constant motion around the wheel.

8. In a conveyer a driving sprocket wheel for the conveyer chain mounted upon a shifting axle and means whereby the said axle is shifted sidewise at the passage of each of the sprockets upon the said wheel.

9. In a conveyer the combination of a driving sprocket wheel, a driving pinion therefor, a link and toggle mechanism for causing a reciprocal motion of the said sprocket wheel shifting it sidewise once for the passage of each sprocket upon the wheel past any given point, substantially as described.

10. In a conveyer a driving sprocket wheel therefor mounted upon an axle journaled in a shifting block, a guide-way for said block, a pair of toggle links, a link connecting the toggle links and operating upon an eccentric cam from the driving pinion of the sprocket wheel, operating to extend and pull said toggle links once for each of the sprocket arms upon the said wheel.

11. In a conveyer a driving sprocket wheel therefor having intermittent motion, whereby the chain is drawn over the same at a constant speed.

12. In a conveyer a tightening device therefor comprising a sprocket wheel mounted upon a movable block, said block being provided with teeth and rolling upon a rack in a fixed frame, substantially as described.

13. In a conveyer the tightening device comprising a sprocket wheel mounted upon an axle, a carrying pinion for said axle, a



rack for supporting said pinion, a slotted bar for engaging the side of said pinion opposite to the rack, and a dog for holding said pinion at any desired point upon the rack, substantially as described.

14. In a conveyer a series of links articulated together and provided with a cross partition, a series of conveyer buckets mounted to revolve within said links and having bottoms narrower than their mouths, the said bottoms extending into the mouths of the respective bucket next succeeding them, and said partition forming a front to the compartment of each bucket when in position to be loaded.

15. The combination of a stationary hopper and a pivoted chute to deliver from said hopper mounted upon a fixed pivot, and provided with a depending arm having a sprocket wheel to engage the conveyer chain and tilt the said spout at the passage of each compartment of the conveyer chain, substantially as described.

16. The combination with a fixed hopper having an outlet of a pivoted hopper provided with an opening adapted to register with the opening of the hopper, a depending arm upon said pivoted chute provided with a sprocket wheel to engage the conveyer chain and vibrate the said chute.

17. The combination with a series of conveyer buckets pivoted to rotate within a set

of links, each bucket being provided with a tripping lug, of a dumping device comprising a roller and a lever mechanism by which said roller is brought into engagement with the said lugs successively.

18. In a conveyer a hopper and an intermittently operating chute registering therewith, and means by which the travel of the conveyer chain operates the hopper chute for discharge from the hopper into the conveyer, substantially as described.

19. In a conveyer a bucket comprising vertical sides and slanting top and bottom, means for pivoting the bucket about the larger end thereof, said bucket being provided with projecting lips at top and bottom and with tripping lugs upon each side thereof.

20. In a conveyer the combination with side links provided with inwardly projecting stop lugs, of a series of pivoted buckets within said links having wider mouths than their bottoms whereby the bottoms may vibrate between the said retaining lugs on opposite sides of the links.

In testimony whereof I have hereunder signed my name in the presence of the two subscribed witnesses.

WILLIAM T. JAMES.

Witnesses:

PAUL CARPENTER,  
EDWARD C. BURNS.