

No. 763,307.

PATENTED JUNE 21, 1904.

F. MILLS.

APPARATUS FOR MOVING RAILS, &c., IN RELATION TO THE ROLLS OF  
ROLLING MILLS.

NO MODEL.

APPLICATION FILED JULY 8, 1903.

6 SHEETS—SHEET 1.

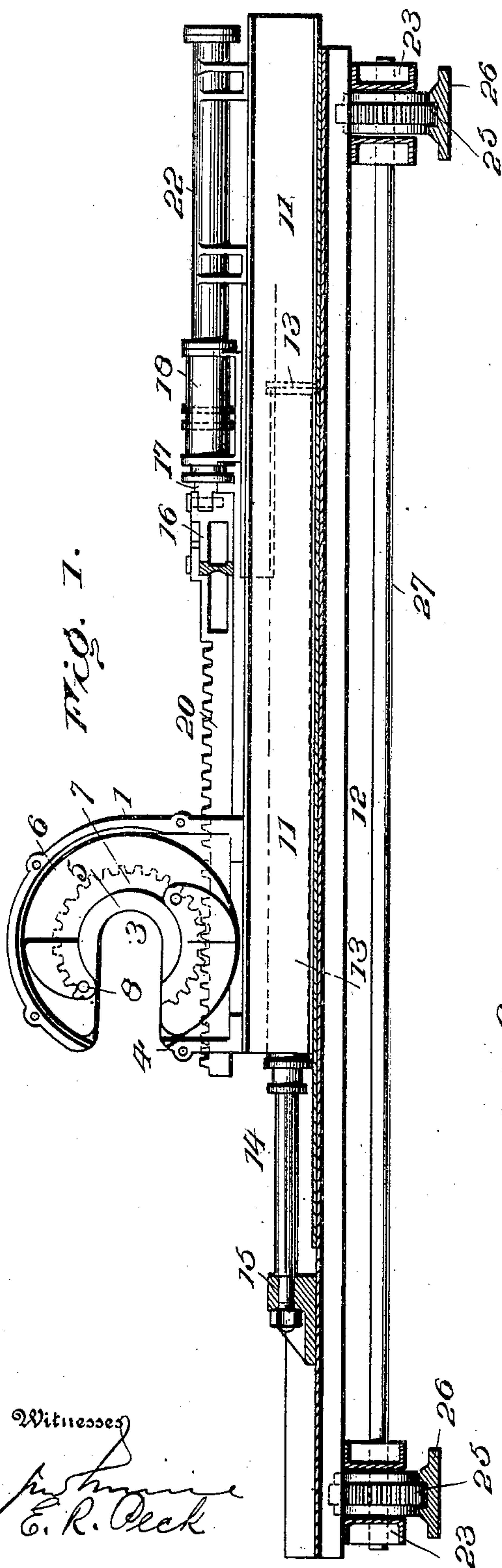


Fig. 7.

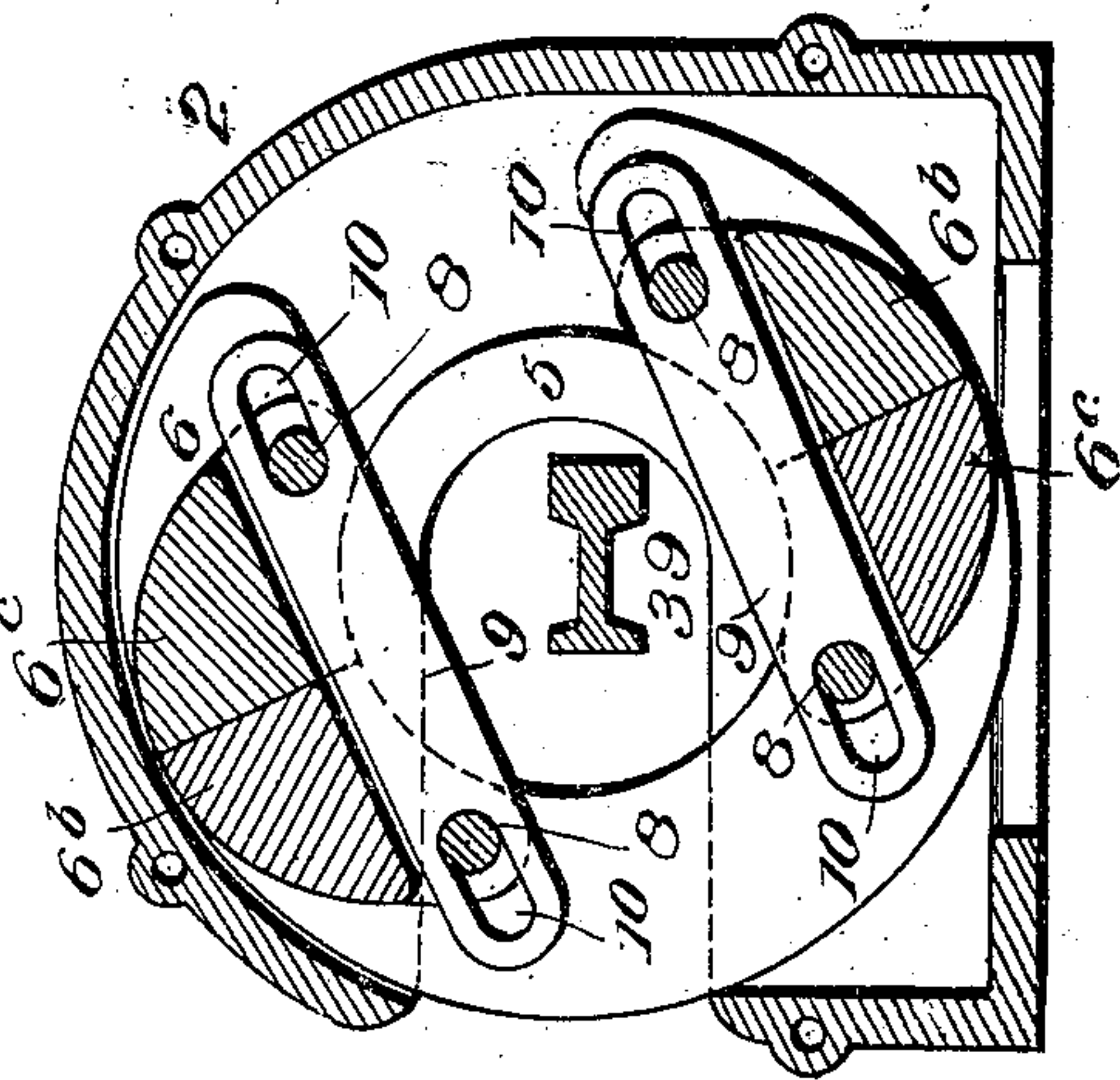
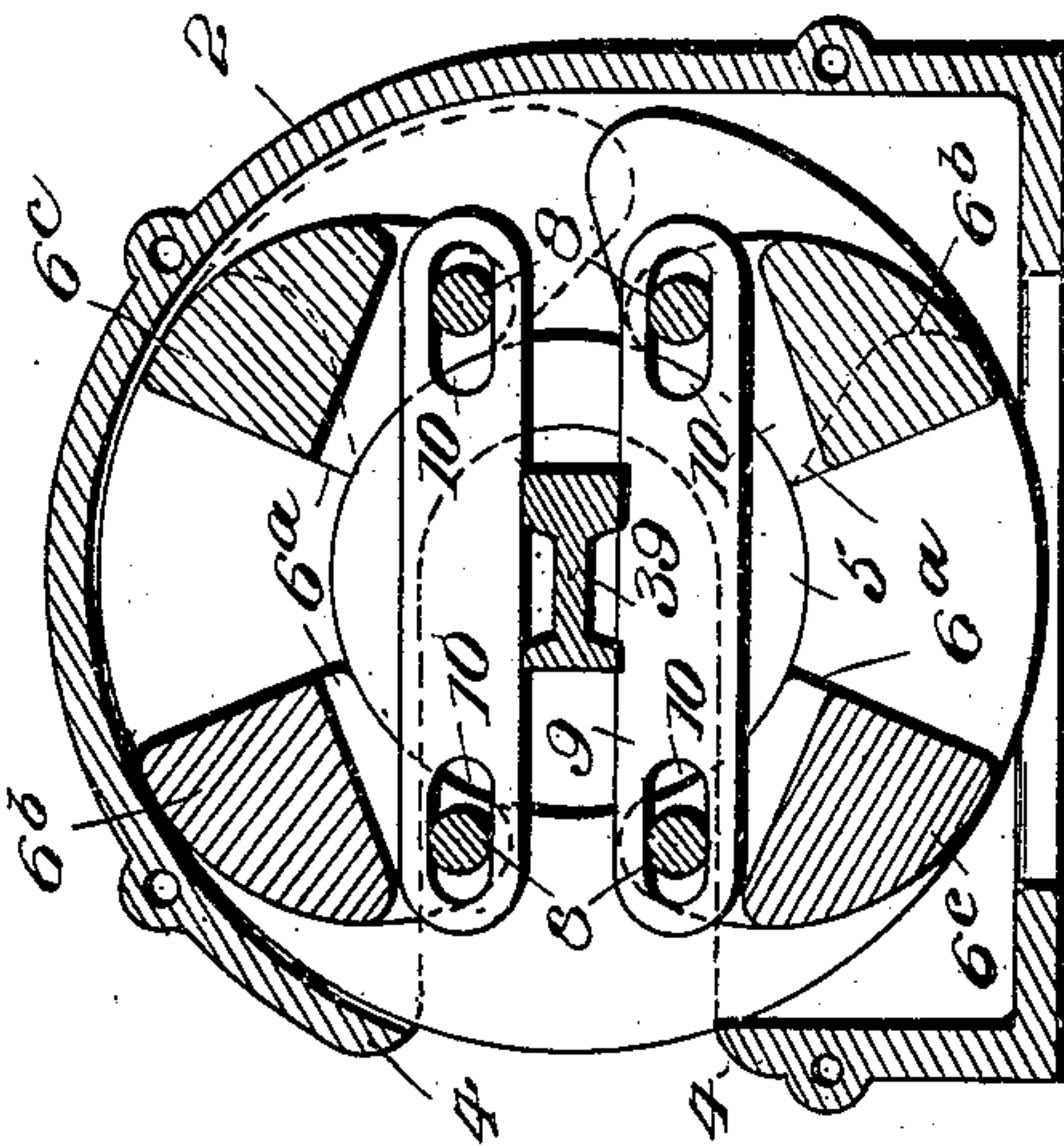


Fig. 6.



Witnesses

Respectfully  
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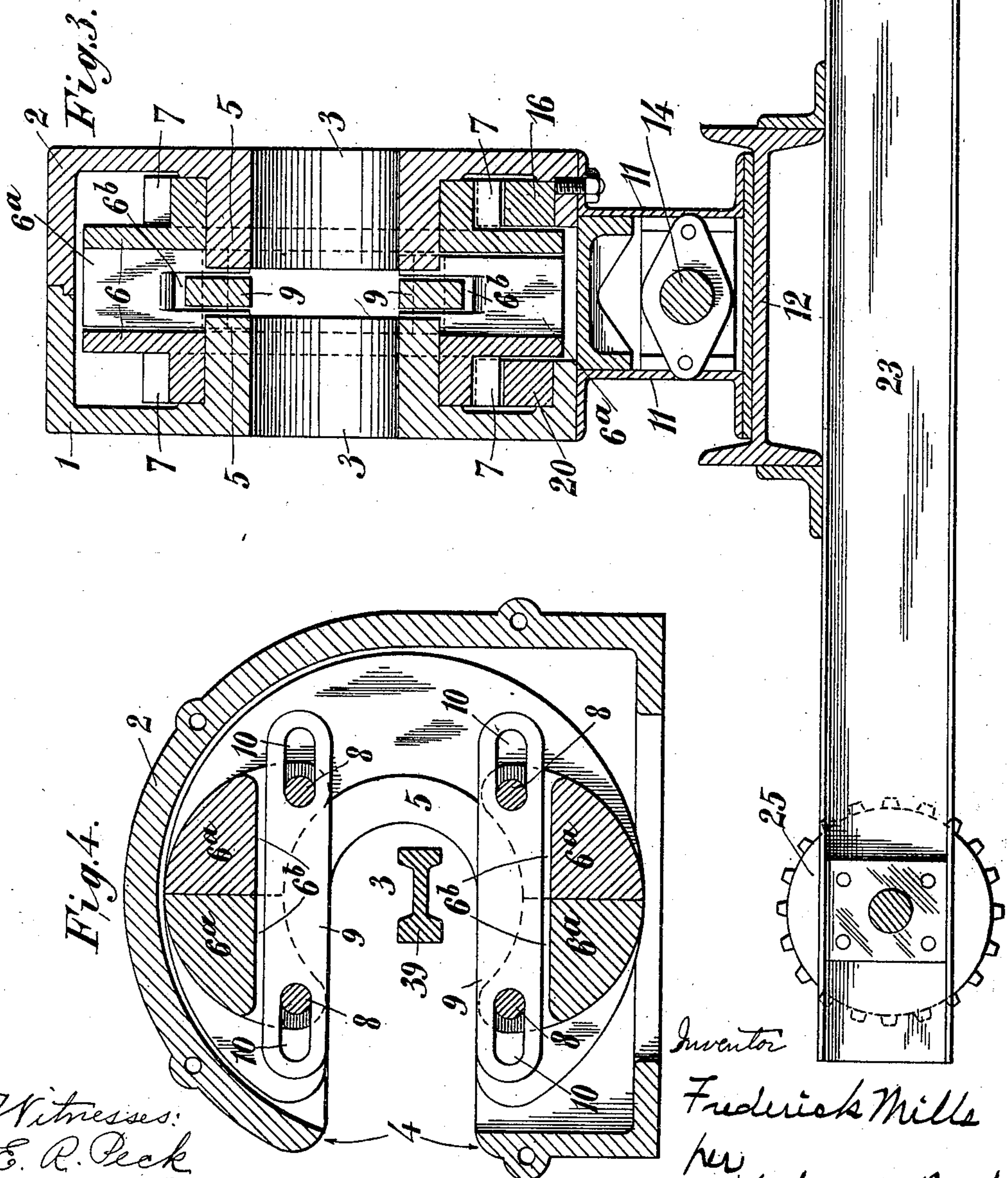
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6 SHEETS—SHEET 3.



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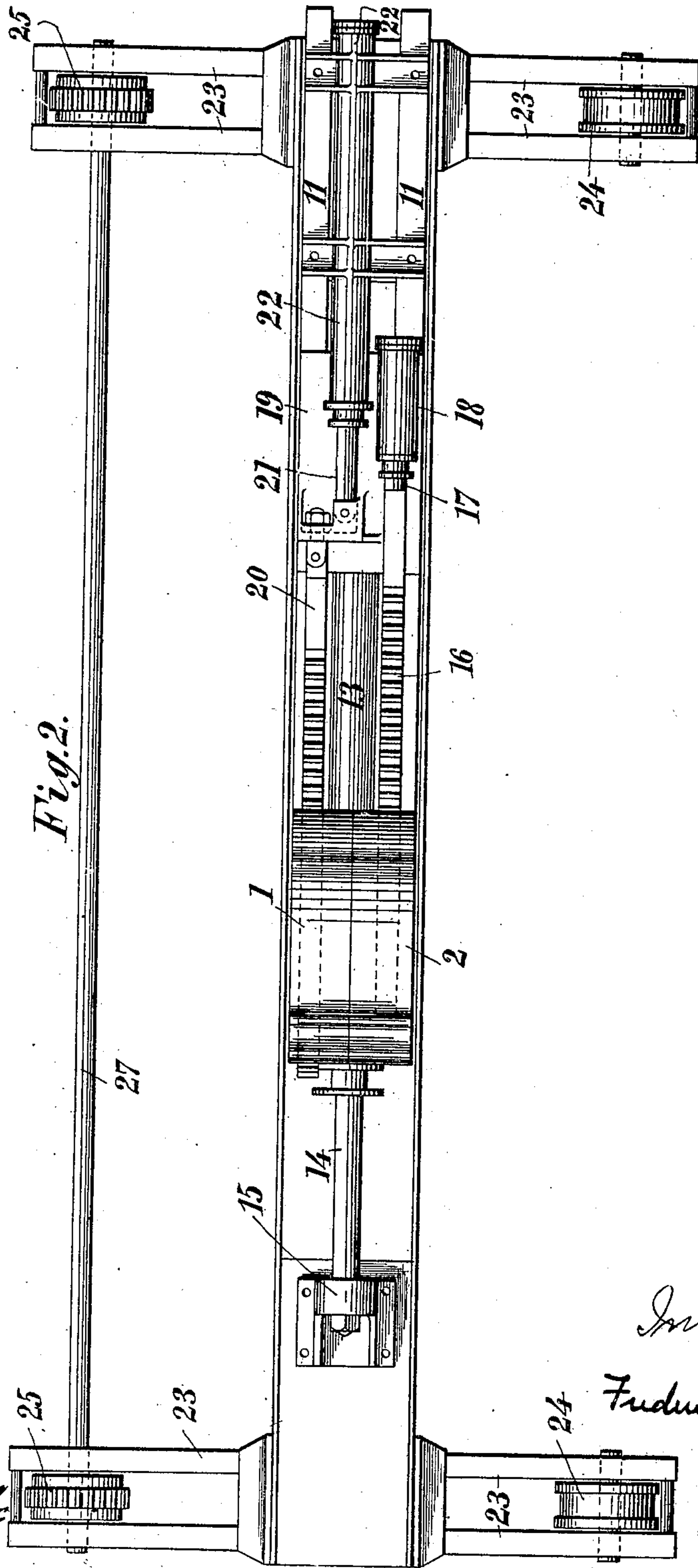


Fig. 2.

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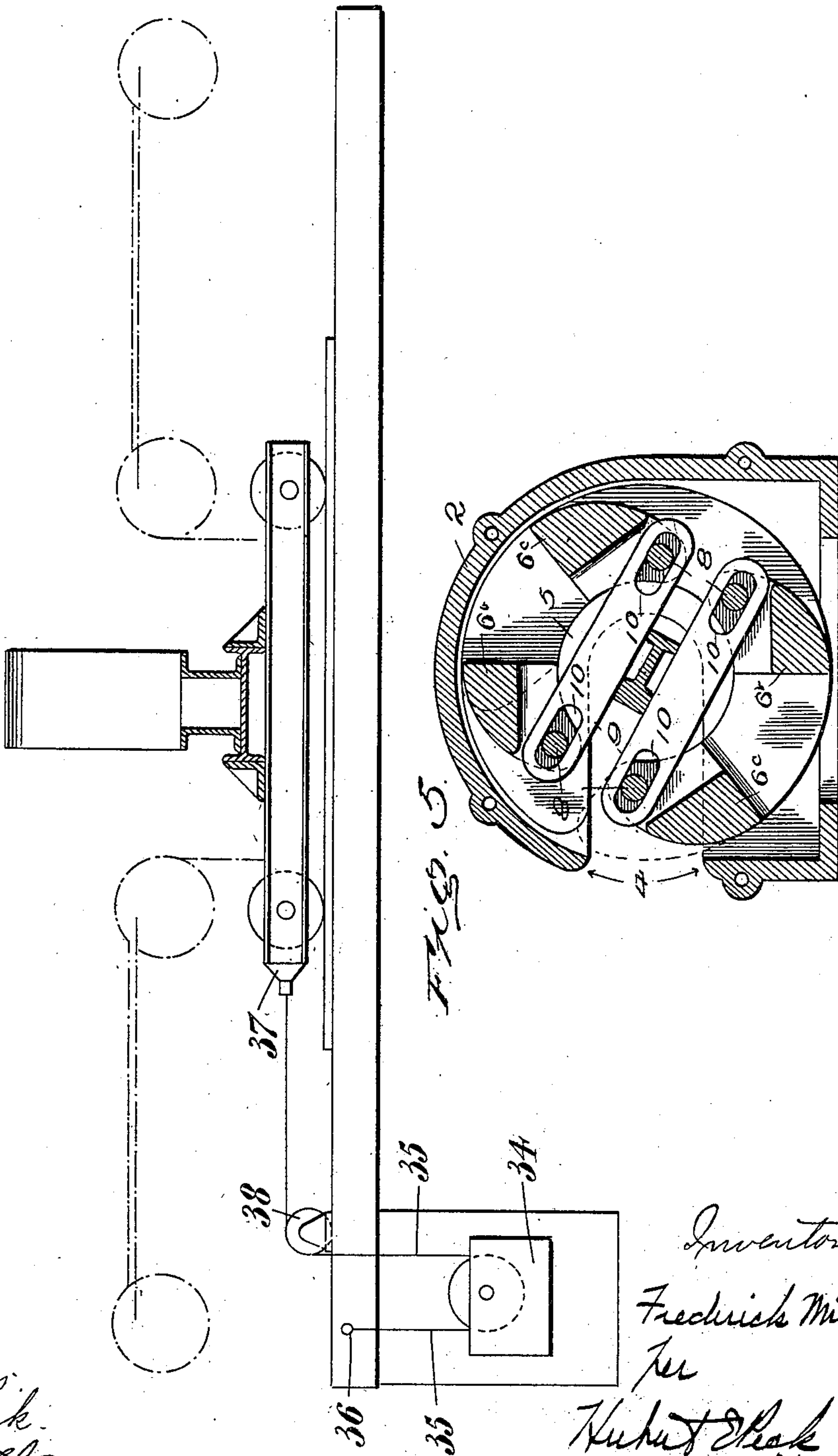
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NO MODEL.

APPLICATION FILED JULY 8, 1903.

6 SHEETS—SHEET 4.

*Fig. 11.*



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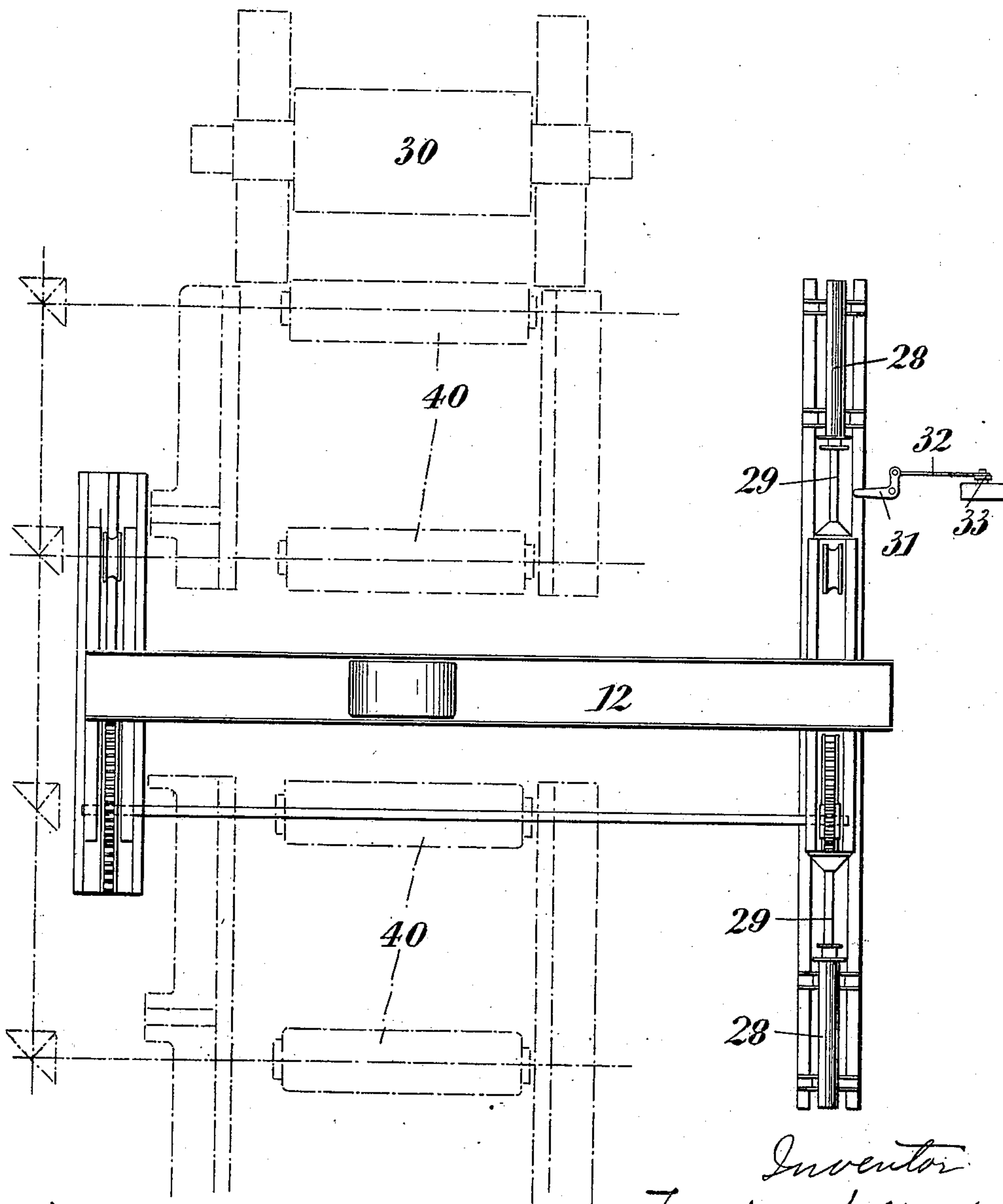
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NO MODEL.

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6 SHEETS—SHEET 6.

*Fig. 8.*



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Atty

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6 SHEETS—SHEET 6.

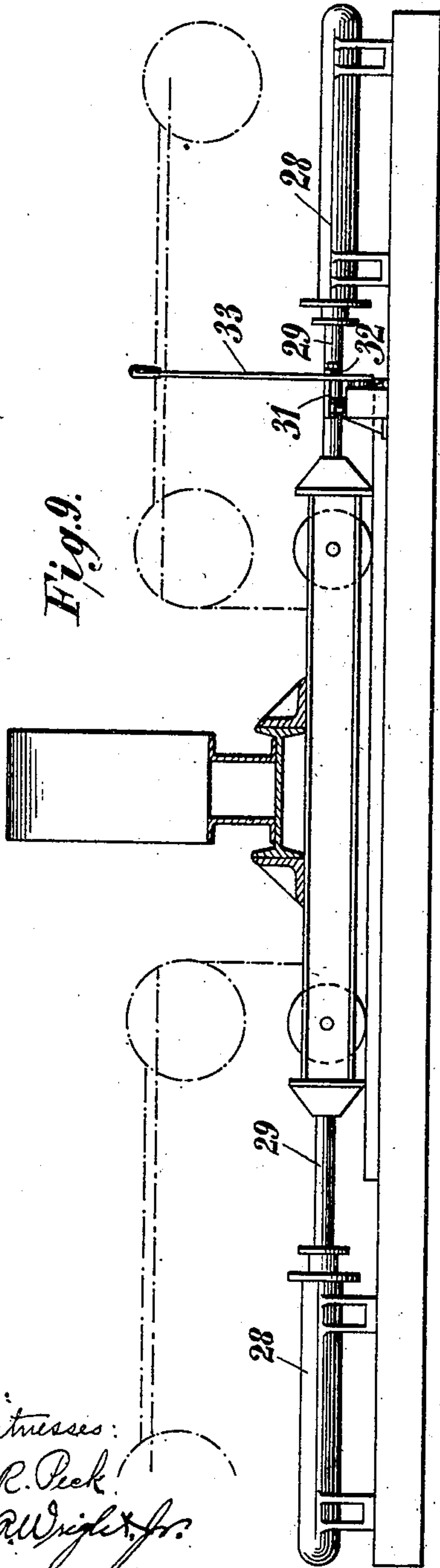


Fig. 9.

Witnesses:  
E. R. Peck  
E. A. Wright, Jr.

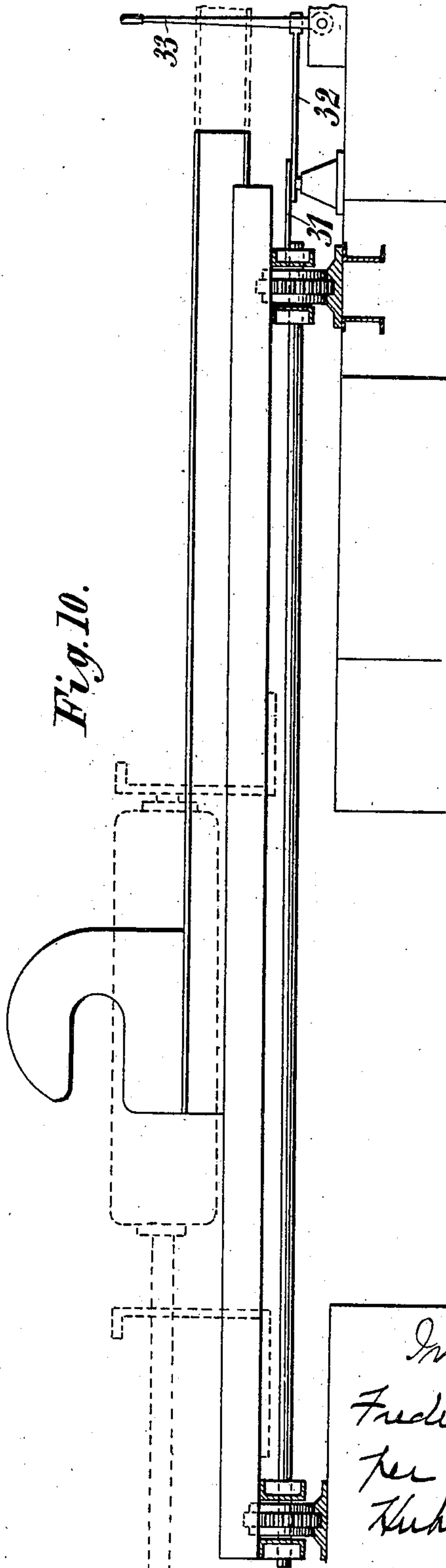


Fig. 10.

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## UNITED STATES PATENT OFFICE.

FREDERICK MILLS, OF EBBW VALE, ENGLAND.

APPARATUS FOR MOVING RAILS, &amp;c., IN RELATION TO THE ROLLS OF ROLLING-MILLS.

SPECIFICATION forming part of Letters Patent No. 763,307, dated June 21, 1904.

Application filed July 8, 1903. Serial No. 164,750. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK MILLS, a subject of the King of Great Britain and Ireland, residing at Ebbw Vale, in the county of Monmouth, England, have invented Improvements in Apparatus for Moving Rails and other Articles in Relation to the Rolls of Rolling-Mills, of which the following is a specification.

This invention has for its object to provide improved apparatus for turning and otherwise moving rails and other articles in relation to the rolls of rolling-mills. Apparatus for this purpose according to this invention comprises a head including a gripping and turning device, a carriage mounted for moving toward and away from the rolls, a slide mounted on the said carriage and having secured to it the said head, means for moving the said slide on the said carriage and parallel to the rolls, means for causing the said device to grip the article, and means for causing the said device to rotate the article so gripped.

Figures 1 to 7, inclusive, of the accompanying illustrative drawings represent an example of apparatus according to this invention. Fig. 1 is a sectional longitudinal elevation, Fig. 2 a plan, and Fig. 3 a sectional transverse view, of the head and its slide and carriage, while Figs. 4, 5, 6, and 7 are sectional views representing parts of the head in four different positions. Figs. 8 and 9 are respectively a diagrammatic plan and a diagrammatic elevation illustrating the position of the apparatus in relation to the rolls and live rollers of a mill and the provision of hydraulic cylinders for operating the carriage, and Fig. 10 is a corresponding end view. Fig. 11 illustrates diagrammatically the employment of a weight for withdrawing the carriage from the rolls.

The head in the example shown in Figs. 1 to 7, inclusive, comprises a casing formed of two parts 1 and 2, placed one in front of the other and each provided with a central aperture 3 and a lateral gap 4, opening into it, the aperture and the gap of one part being opposite to those of the other part, so that the article to be gripped can be inserted laterally into the apertures. Projecting inwardly

from the front or back wall, as the case may be, of each part is a partly-cylindrical portion 5, Fig. 3, on each of which is mounted a plate 6 6<sup>a</sup>, having secured to it a toothed annulus 7 7<sup>a</sup>, the plate and the annulus having a lateral gap corresponding to the gap in the part of the casing on which it is mounted and the two plates being mounted so that in their normal position they will have their gaps opposite to each other. Each of the plates 6 6<sup>a</sup> has projecting from it toward the other plate two diametrically opposite pins 8, and on the four pins 8 there are mounted two links 9, having slots 10, entered by the pins, each link being mounted on one pin of each plate and the two links being parallel and diametrically opposite to each other, so that by turning the two plates 6 6<sup>a</sup> in relation to each other the two links 9 can be moved toward or away from each other, so as to grip or to release the article, as required, and that by rotating the two plates simultaneously the article so gripped can be turned. Each plate 6 6<sup>a</sup> is shown provided with two lugs 6<sup>b</sup> 6<sup>c</sup>, each of which is provided with a slot 6<sup>d</sup>, as shown in Fig. 4, to accommodate the corresponding link 9 and which serve partly to limit the relative rotation of the plates 6 6<sup>a</sup> in one direction and partly to keep them at the desired distance apart. The links 9 may be straight in some cases, as shown in Figs. 4 to 7, inclusive, and in others they may be otherwise shaped to suit the section of the articles to be gripped. Instead of being mounted to rotate or partially rotate on inwardly-projecting portions 5 of a casing, as described, the plates 6 6<sup>a</sup> might be made to fit the internal cylindrical surface of a casing. The casing 1 2 of the head is secured to a slide 11, which is mounted on a carriage 12, on which it can be moved longitudinally by means of a hydraulic cylinder 13, the ram 14 of which is secured at 15 to the carriage 12. For partially rotating the plates 6 6<sup>a</sup>, as required, the toothed annuli 7 7<sup>a</sup> engage two racks, of which one, 16, is connected to the ram 17 of a hydraulic cylinder 18, attached to a slide 19, which is mounted on the slide 11. On the slide 19 is a projection 19<sup>a</sup>, to which is connected, on the one hand, the other rack 20 and,



on the other hand, the plunger 21 of a hydraulic cylinder 22, secured to the slide 11.

The carriage 12 in the example is composed of a longitudinal beam, on which the slide 11 is mounted, and two transverse end members 23, provided with traveling rollers 24 and 25, mounted on rails 26. To keep the machine parallel to the rolls during its movement, one—viz., 25—of the traveling rollers of each end member 23 is provided with teeth for engagement with teeth with which the rails 26 are furnished, and the two traveling rollers 25, provided with teeth, are connected rigidly together by a shaft 27; but other means may be provided for the purpose stated. Hydraulic cylinders 28, Figs. 8 and 9, and rams 29 may be provided for moving the carriage toward and away from the rolls 30 of the mill. In some cases I provide a device for so operating the proper hydraulic ram as to release the article automatically on its being caught by the rolls. The provision of such a device is illustrated in Figs. 8, 9, and 10, 31 being a bell-crank lever arranged to be struck and operated by the carriage 12 on its nearing the rolls 30, and 32 a link connecting the lever 31 with the lever 33 for controlling the valve of the hydraulic cylinder 18. The carriage may be so weighted that it will travel away from the rolls 30 of the mill on its release if the action on the article of the live rollers of the mill be relied on to advance the carriage and its head. Fig. 11 illustrates the carriage so weighted, 34 being a weight supported by a chain 35, of which one end is fixed at 36 and the other end is attached to the carriage at 37, while the chain is supported at an intermediate point by a guide-pulley 38.

Although it has been stated that the pins 8 are secured to plates connected to toothed annuli, toothed annuli may be employed without plates and the pins project directly from the toothed annuli. Other means than those described may be provided for rotating or partially rotating the plates or annuli. Instead of hydraulic means such as described for moving various parts steam, electrical, or pneumatic apparatus may be provided. Again, instead of having lateral gaps to the apertures of the head the apertures of the casing and the plates of the head may be entirely encircled thereby. In this case the article to be moved will enter the head endwise. The operation of the apparatus described is as follows: To move an article 39—for example, a rail—the head is advanced until the aperture of the head surrounds the article, as shown in Fig. 4. The rack 16 is then operated by means of the hydraulic ram 17 to cause the corresponding plate 6" to rotate into the position shown in Fig. 5, so as to cause the two links 9 to approach each other and grip the article 39. To turn the article, the slide 19 is traversed by means of the hydraulic ram

21 in order to operate both of the racks 16 and 20, and thereby to turn both of the plates 6 6" simultaneously into the position shown in Fig. 6. At the same time or subsequently the slide 11 is moved by means of the cylinder 13 so as to bring the article opposite to the groove of the rolls 30 that it is desired to enter. The carriage is then moved toward the rolls by means of the cylinders 28, Figs. 8, 9, and 10, if they are employed, or if they are not employed by the mere action on the article of the live rollers 40 until the article is gripped by the rolls 30. When this is done, the article is released by the operator by means of the lever 33 of the cylinder 18, or if the operator fails to do so the carriage strikes against the lever 31, and so releases the article automatically. The parts are shown in Fig. 7 in the position that they occupy when the ram 17 of the cylinder 18 has been moved fully back so as to move the links 9 apart to their full extent.

Heads such as described for moving rails or other articles may be employed in apparatus otherwise differing from that hereinbefore indicated.

What I claim is—

1. In apparatus for moving an article in relation to the rolls of a rolling-mill, the combination of a gripping and turning device, having a central aperture and a lateral gap which opens into said aperture and through which the article to be moved can be inserted sidewise into said central aperture in which it can be held, and means for rotating said gripping and turning device.

2. In apparatus for moving an article in relation to the rolls of a rolling-mill, the combination of a gripping and turning device through which the article to be turned can extend, and by which it can be held, means for moving said device toward and from said rolls, means for moving said device parallel to said rolls, and means for rotating said device after the same has been engaged with the article to be moved.

3. In apparatus for moving an article in relation to the rolls of a rolling-mill, the combination of a head including a gripping and turning device, a carriage, means for moving said carriage toward and away from said rolls, a carrier mounted on said carriage and having said head secured to it, means for moving said carrier on said carriage and parallel to said rolls, means for causing said device to grip said article, and means for causing said device to rotate said article when gripped thereby.

4. In apparatus for moving an article in relation to the rolls of a rolling-mill, the combination of two bodies rotatable about a common axis of which one is capable of being turned backward and forward in relation to the other, and two links of which each has a pin-and-slot or like connection with each of said bodies so that by rotating one of said bodies in relation to the other said links can



be caused to approach each other and so to grip said article, and that by then rotating both of said bodies simultaneously in the same direction and at the same speed said article so gripped can be rotated.

5. In apparatus for moving an article in relation to the rolls of a rolling-mill, the combination of two bodies rotatable about a common axis, of which one is capable of being turned backward and forward in relation to the other, and two links of which each is connected to each of said bodies so that by rotating one of said bodies in relation to the other said links can be caused to approach each other and so to grip said article.

6. In apparatus for moving an article in relation to the rolls of a rolling-mill, the combination of two bodies rotatable about a common axis, of which one is capable of being turned backward and forward in relation to the other, two links of which each is connected to each of said bodies so that by rotating one of said bodies in relation to the other said links can be caused to approach each other and so to grip said article, and means for rotating said bodies in the manner indicated.

7. In apparatus for moving an article in relation to the rolls of a rolling-mill, the combination of two bodies rotatable about a common axis, of which one is capable of being turned backward and forward in relation to the other, stops for limiting the movement of one of said bodies in relation to the other in one direction, and two links of which each is connected to each of said bodies so that by rotating one of said bodies in relation to the other said links can be caused to approach each other and so to grip said article.

8. In apparatus for moving an article in relation to the rolls of a rolling-mill, the combination of two bodies rotatable about a common axis, of which one is capable of being turned backward and forward in relation to the other and each is provided with teeth arranged around its axis of rotation, two links of which each is connected to each of said bodies so that by rotating one of said bodies in relation to the other said links can be caused to approach each other and so to grip said article, two racks of which each engages the teeth of one of said bodies, means for moving one of said racks longitudinally in relation to the other, and means for moving both of said racks longitudinally together at the same speed and in the same direction.

9. In apparatus for moving an article in relation to the rolls of a rolling-mill, the combination of two bodies rotatable about a common axis, of which one is capable of being turned backward and forward in relation to the other and each is provided with teeth arranged around its axis of rotation, two links of which each is connected to each of said bodies so that by rotating one of said bodies in relation to the other said links can be caused

to approach each other and so to grip said article, two racks of which each engages the teeth of one of said bodies, a carrier to which one of said racks is connected, a motor by means of which said carrier and thereby the last-mentioned rack can be moved so as by means of the latter to rotate the corresponding one of said bodies, and a motor which is carried by said carrier and by means of which the other of said racks can be moved longitudinally.

10. In apparatus for moving an article in relation to the rolls of a rolling-mill, the combination of a head, two rotatable bodies which are mounted on said head so as to be capable of being rotated thereon one in relation to the other, and about a common axis, and of which each has a set of teeth arranged round its axis of rotation, two links of which each is connected to each of said bodies so that by rotating one of said bodies in relation to the other said links can be caused to approach each other and so to grip said article, two racks of which each is in engagement with the teeth of one of said bodies, a carrier to which one of said racks is attached, hydraulic means for connecting the other of said racks with said carrier and for moving the former so as to rotate the corresponding one of said bodies, and hydraulic means for moving said carrier so as to rotate both of said bodies simultaneously by means of said racks.

11. For moving an article in relation to the rolls of a rolling-mill, the combination of a head having a central aperture with a lateral opening thereinto, a device mounted on said head and adapted to grip and to turn said article, means for moving said head and device toward and away from said rolls and means for automatically releasing said article from said device on its approaching said rolls.

12. In apparatus for moving an article in relation to the rolls of a rolling-mill, the combination of two bodies rotatable about a common axis, of which one is capable of being turned backward and forward in relation to the other, two links of which each is connected to each of said bodies so that by rotating one of said bodies in relation to the other said links can be caused to approach each other and so to grip said article, a motor for rotating one of said bodies in relation to the other of said bodies, means for moving said device toward and away from said rolls, and means for automatically controlling said motor so as to release said article on its approaching said rolls.

13. In apparatus for moving an article in relation to the rolls of a rolling-mill, the combination of two bodies rotatable about a common axis and each provided with a central aperture and a lateral gap opening thereinto, two links of which each is connected to each of said bodies so that by rotating one of said bodies in relation to the other said links can



be caused to approach each other and so to grip said article, and bearings on which said bodies are mounted to rotate and which are provided with respective apertures and lateral gaps opening thereinto, the aperture and the gap of one of said bearings being respectively opposite to those of the other thereof and the gaps of said bodies being so arranged that when they are opposite to the gaps of said bearings, said links are comparatively remote from each other, so that said article can be inserted laterally into said apertures.

14. In apparatus for moving an article in relation to the rolls of a rolling-mill, the combination of two bodies rotatable about a common axis, of which one is capable of being turned backward and forward in relation to the other, two links of which each is connected to each of said bodies so that by rotating one of said bodies in relation to the other said links can be caused to approach each other and so to grip said article, two bars of which each is in engagement with one of said bodies so as to be adapted to rotate it, means for moving one of said bars longitudinally in relation to the other, and means for moving both of said bars longitudinally together at the same speed and in the same direction.

15. In apparatus for moving an article in relation to the rolls of a rolling-mill, the combination of two bodies rotatable about a common axis, of which one is capable of being turned backward and forward in relation to the other, two links of which each is connected to each of said bodies so that by rotating one of said bodies in relation to the

other said links can be caused to approach each other and so to grip said article, two bars of which each is connected to one of said bodies so as to be adapted to rotate it in either direction, a carrier to which one of said bars is connected, a motor by means of which said carrier and thereby the last-mentioned bar can be moved so as by means of the latter to rotate the corresponding one of said bodies, and a motor which is carried by said carrier and by means of which the other of said bars can be moved longitudinally.

16. In apparatus for moving an article in relation to the rolls of a rolling-mill, the combination of two bodies rotatable about a common axis of which one is capable of being turned backward and forward in relation to the other, two links of which each is connected to each of said bodies so that by rotating one of said bodies said links can be caused to approach each other and so to grip said article, two bars of which each is in engagement with one of said bodies so as to be adapted to turn it as aforesaid, a carrier to which one of said bars is attached, hydraulic means for connecting the other of said bars with said carrier and for moving the former so as to rotate the corresponding one of said bodies, and hydraulic means for moving said carrier so as to rotate both of said bodies simultaneously by means of said bars.

Signed at United States consulate, Cardiff, this 12th day of June, 1903.

FREDERICK MILLS.

Witnesses:

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