R. C. SEYMOUR.

PRINTING PRESS.

APPLICATION FILED DEC. 30, 1905.

907,415.

Patented Dec. 22, 1908.

8 SHEETS—SHEET 1.

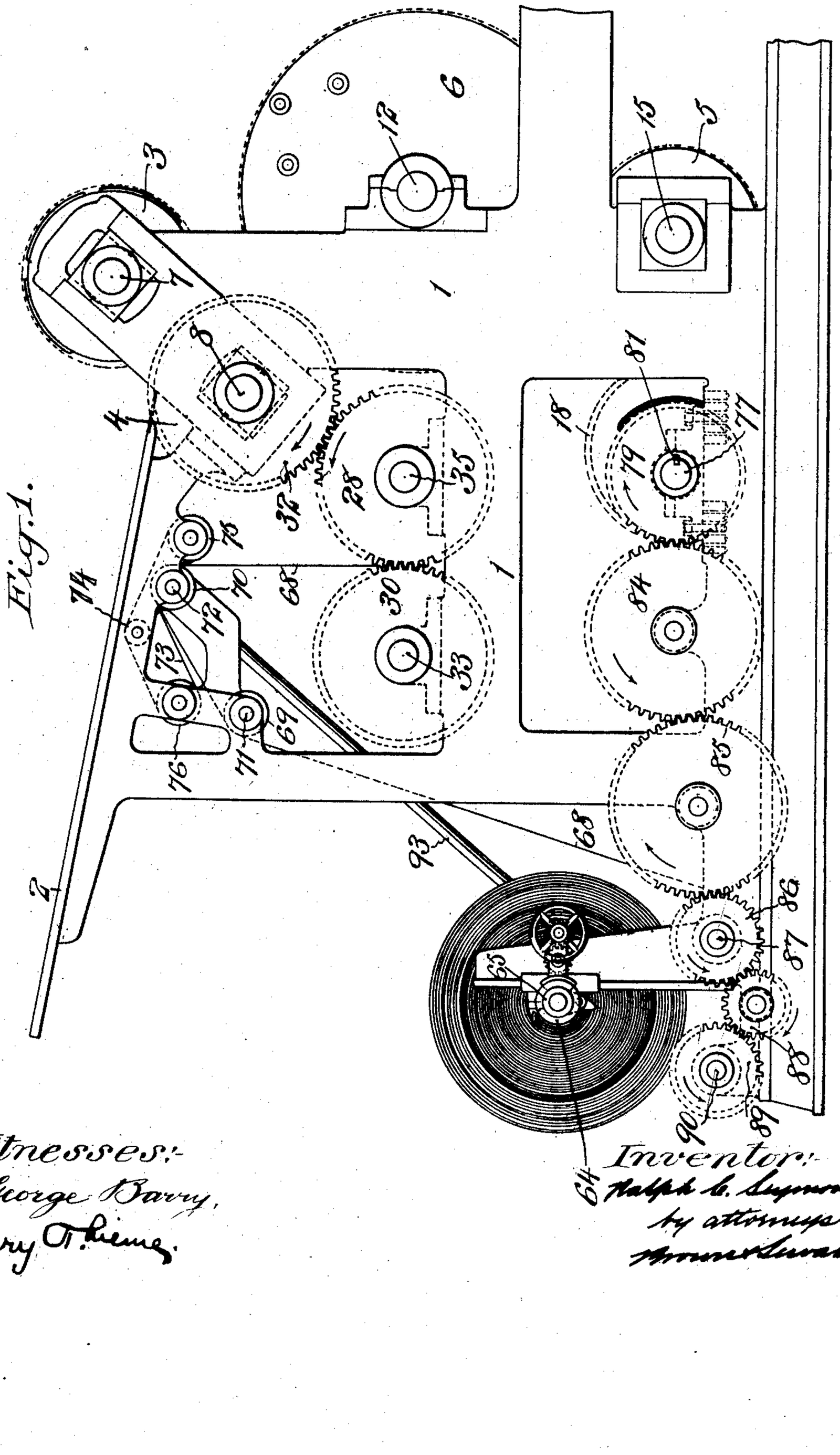

Fig. 1.

Witnesses:-
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Henry T. Hiemz.

Inventor:-
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by attorneys
Brownell and

907,415.

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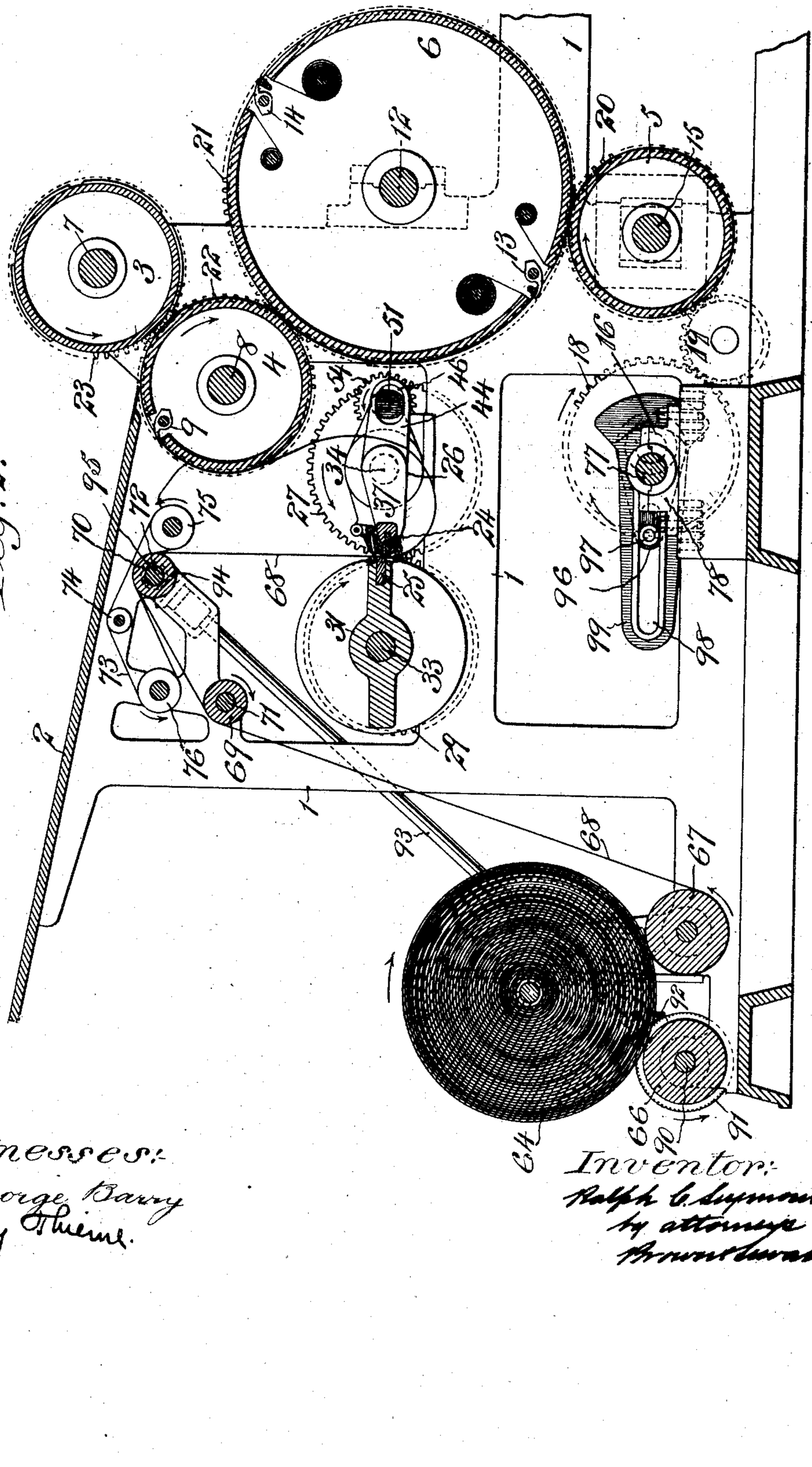
8 SHEETS—SHEET 2.

Fig. 2.



Witnesses:-
F. George Barry
Henry Theime.

Inventor:-
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8 SHEETS—SHEET 3.

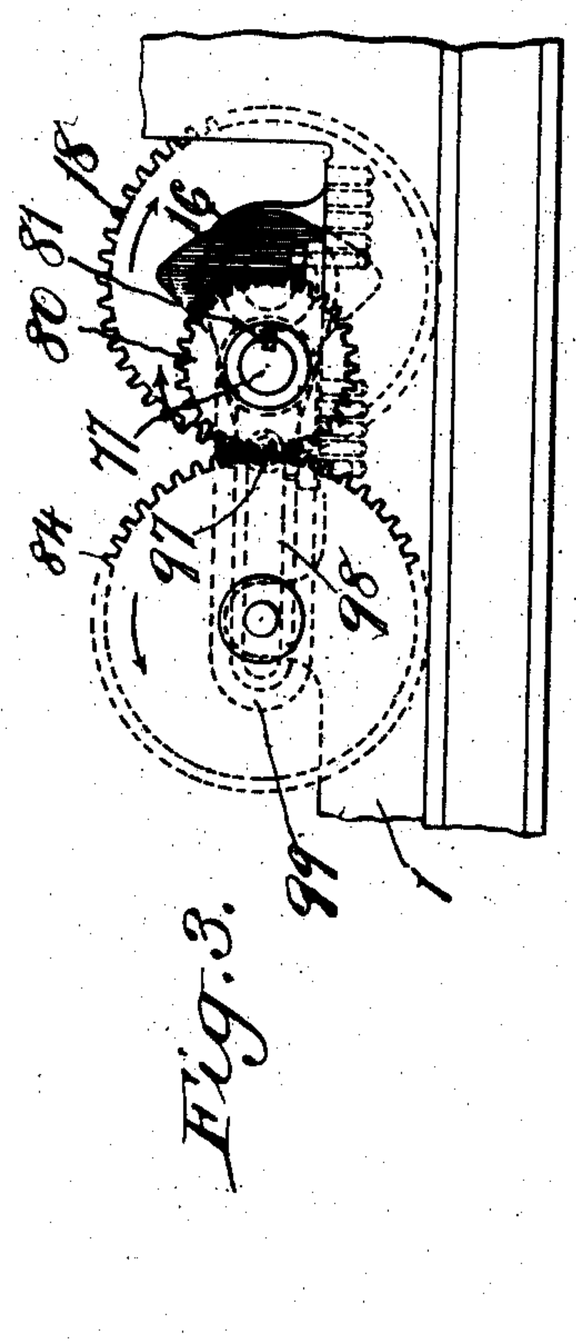

Fig. 3.

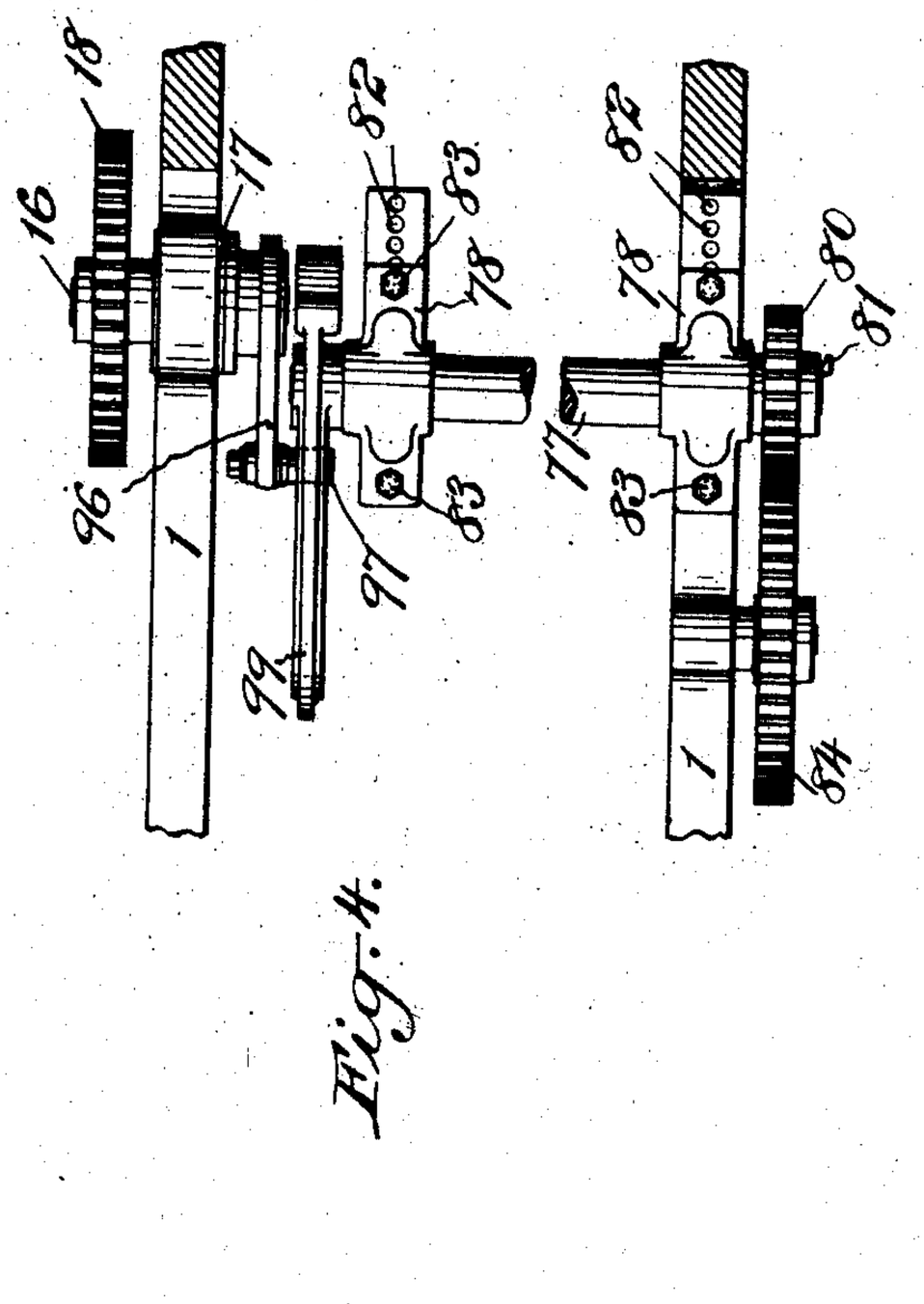

Fig. 4.

Witnesses:-
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8 SHEETS—SHEET 4.

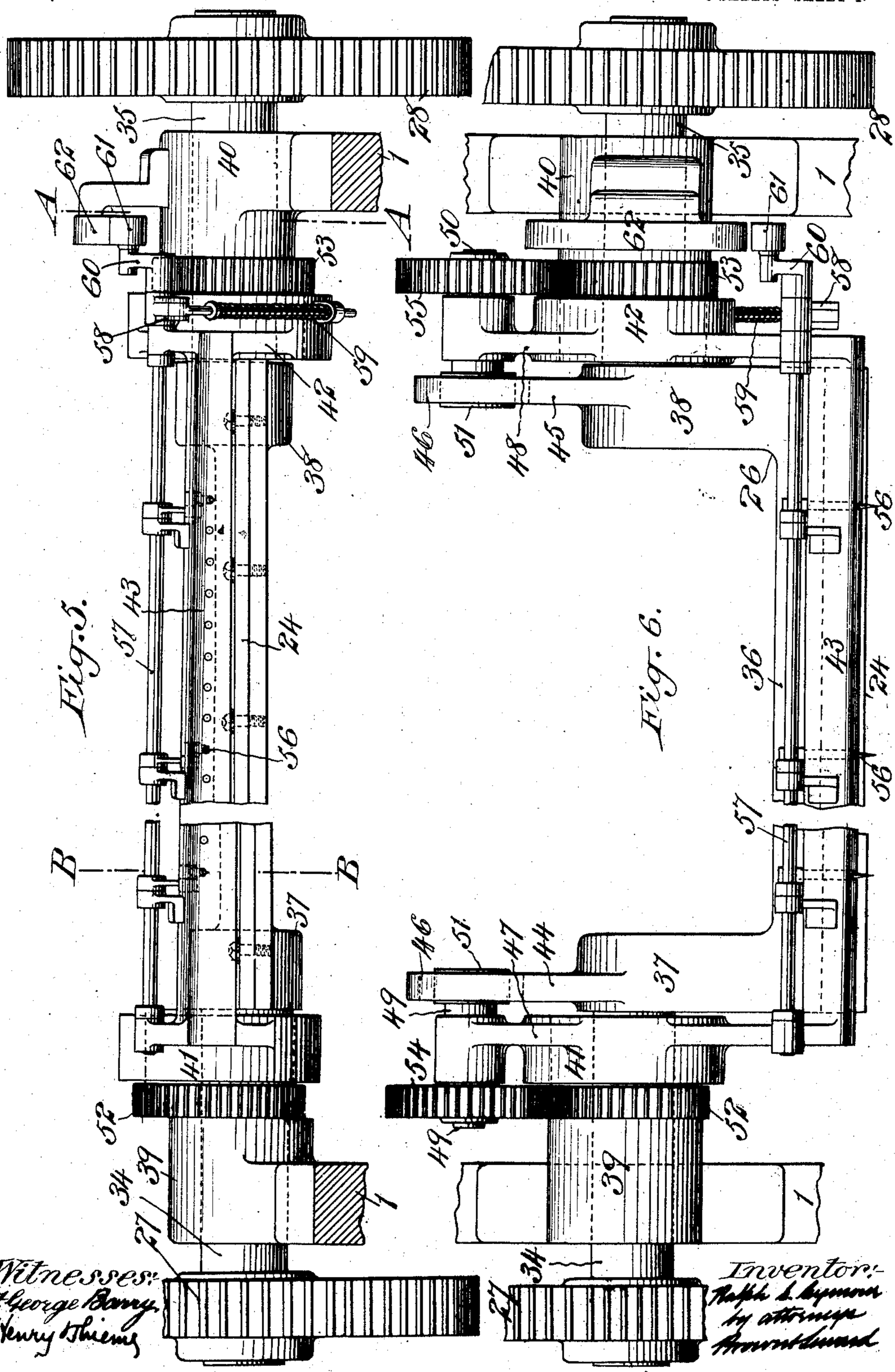

Fig. 5.

Fig. 6.

Witnesses:
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8 SHEETS—SHEET 5.

Fig. 8.

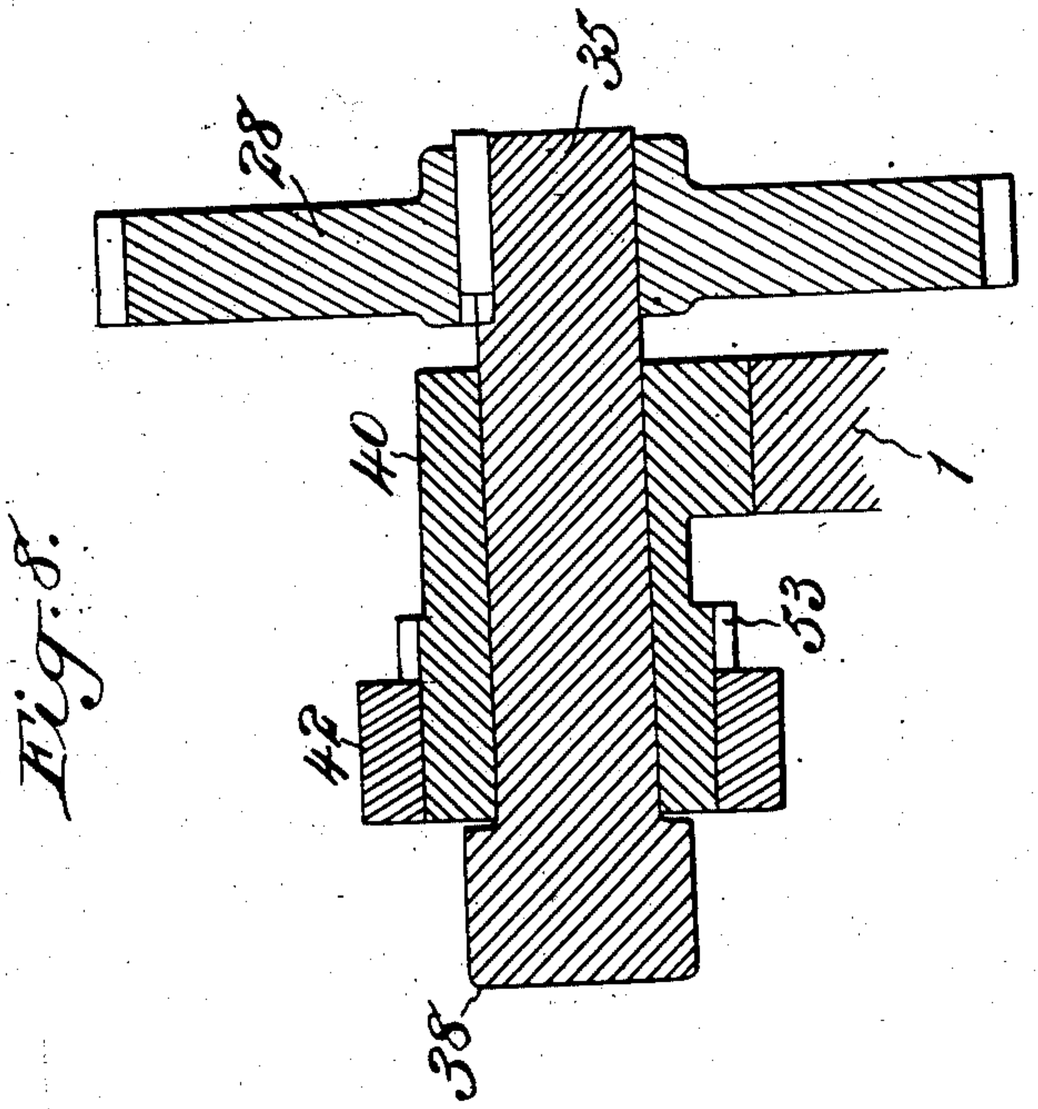
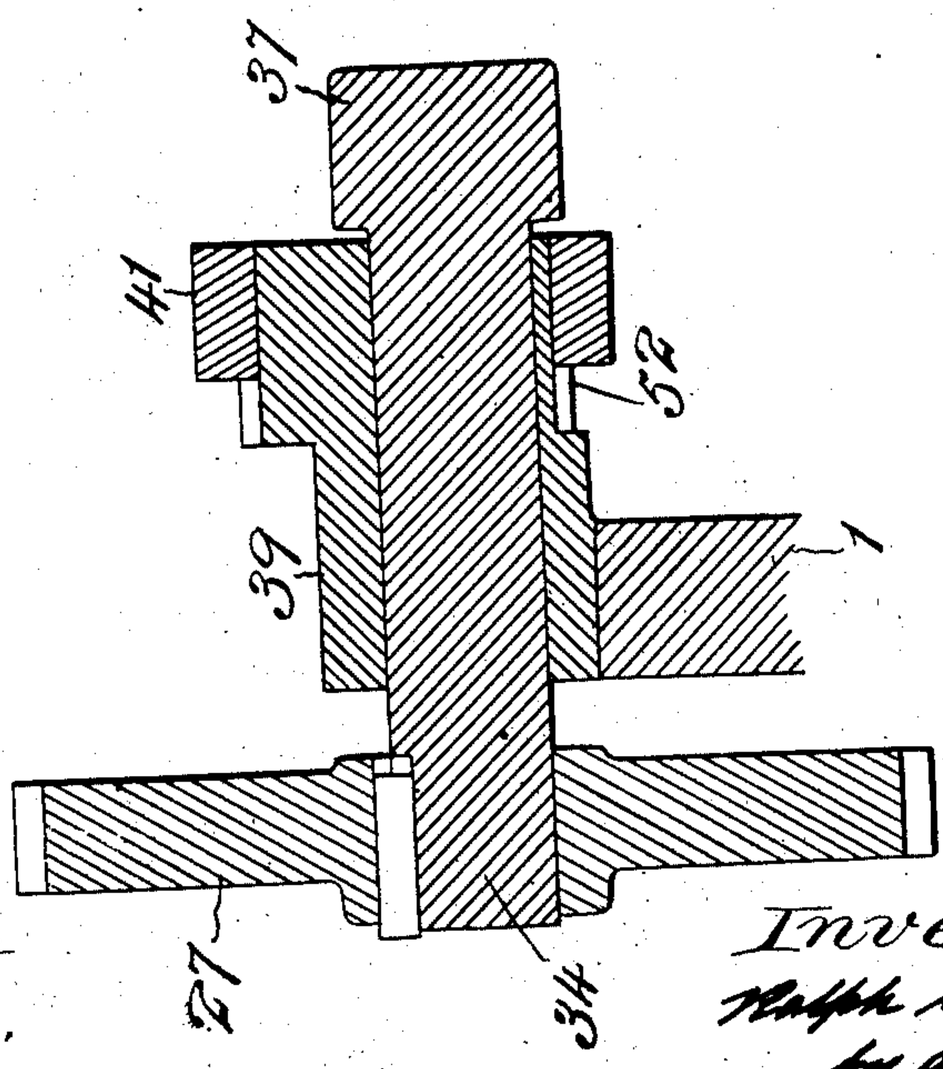


Fig. 7.



Witnesses:-
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APPLICATION FILED DEC. 30, 1905.

907,415.

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8 SHEETS—SHEET 6.

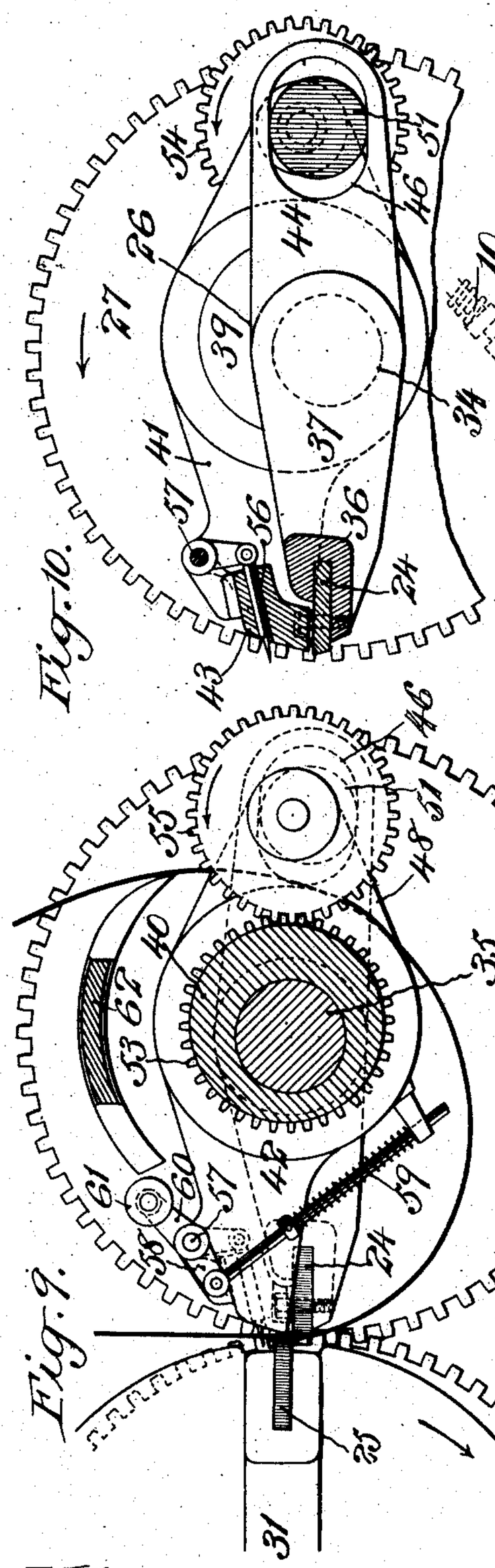

Fig. 10.

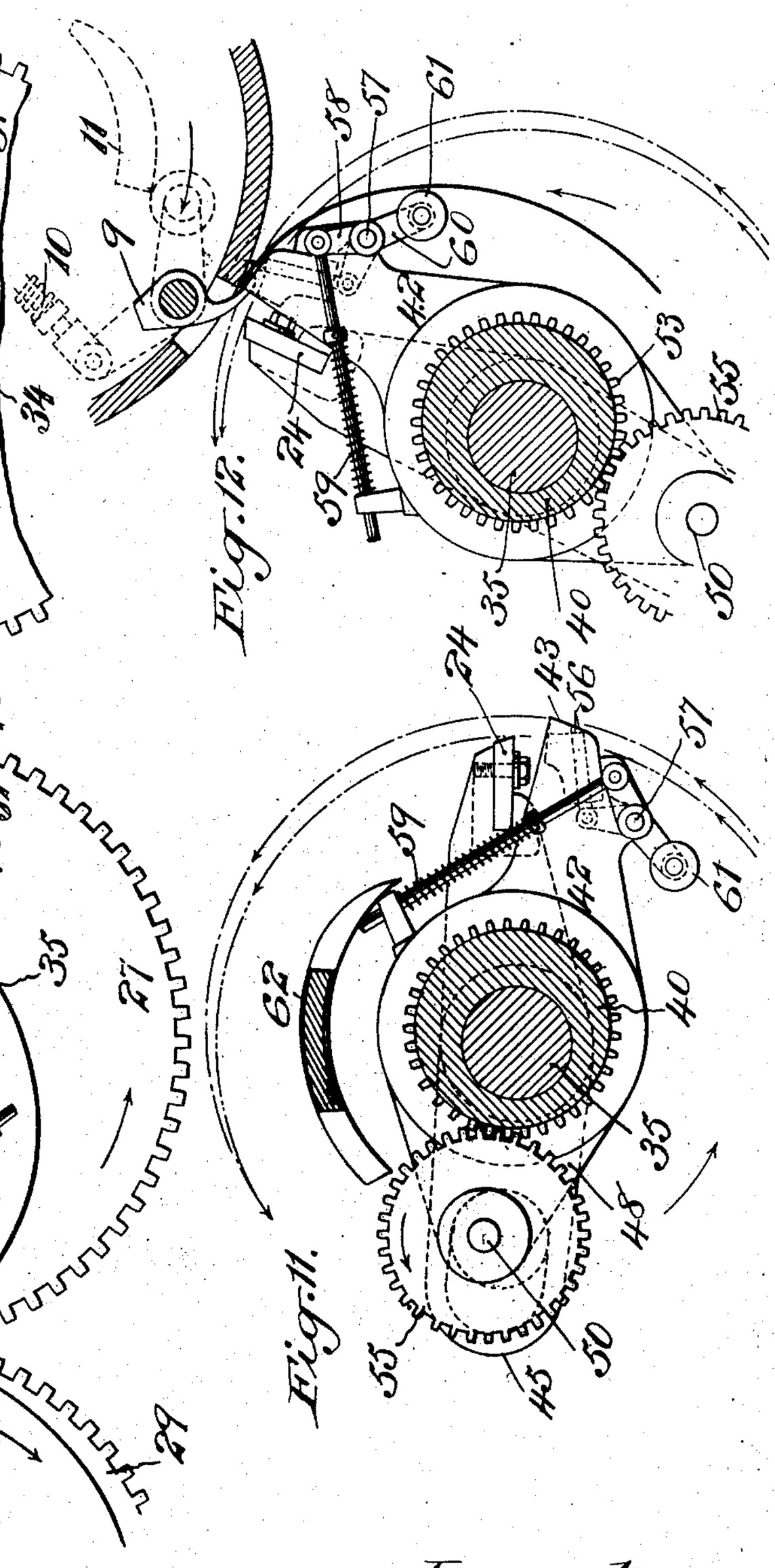

Fig. 12.

Fig. 9.

Fig. 11.

Witnesses:-

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APPLICATION FILED DEC. 30, 1905.

907,415.

Patented Dec. 22, 1908.

8 SHEETS—SHEET 7.

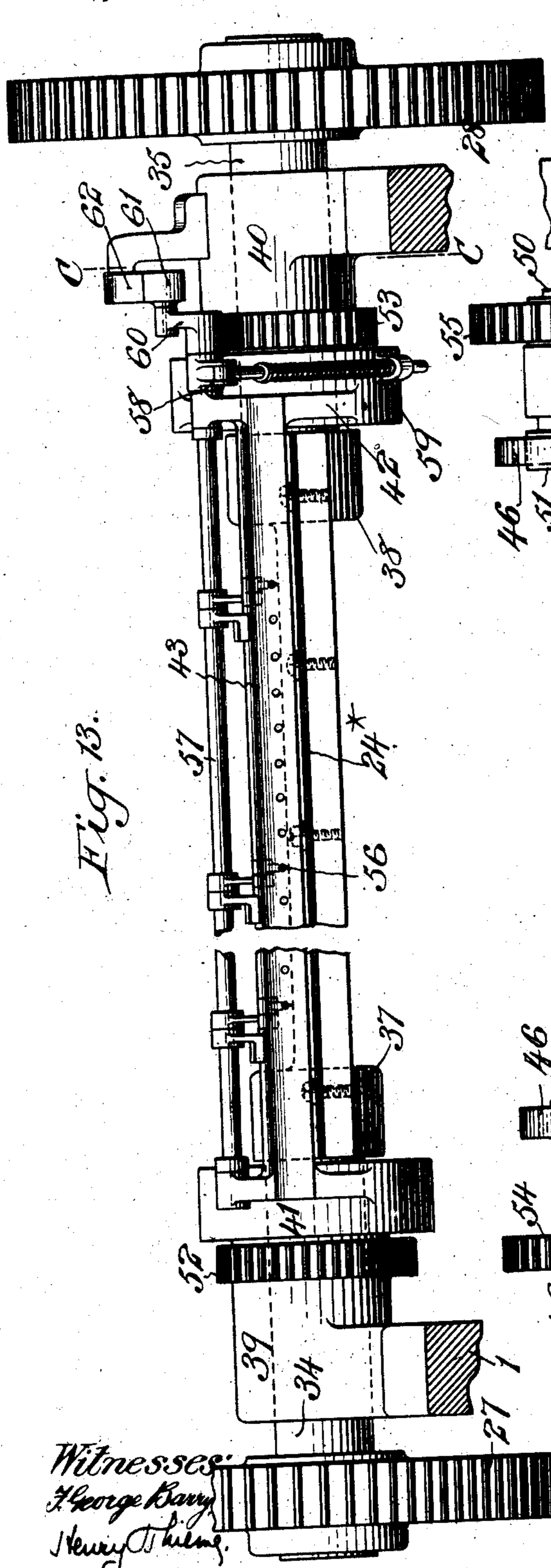

Fig. 13.

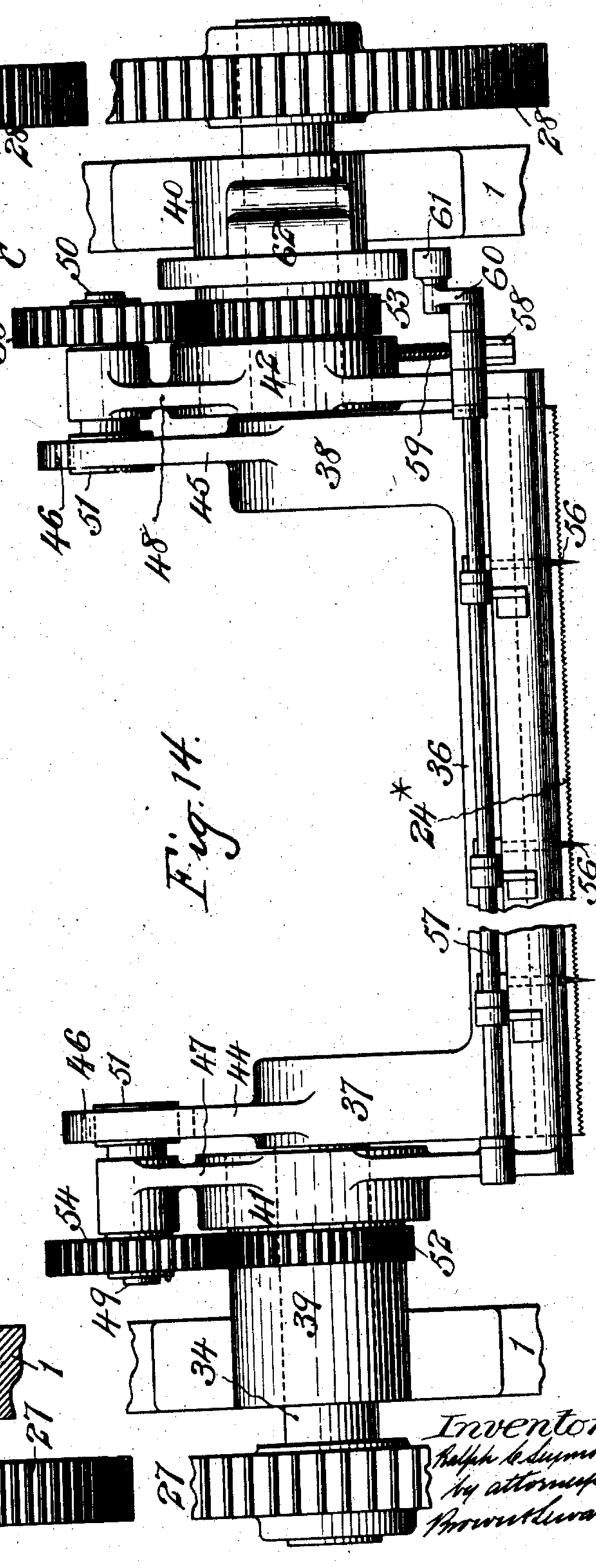

Fig. 14.

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APPLICATION FILED DEC. 30, 1905.

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8 SHEETS—SHEET 8.

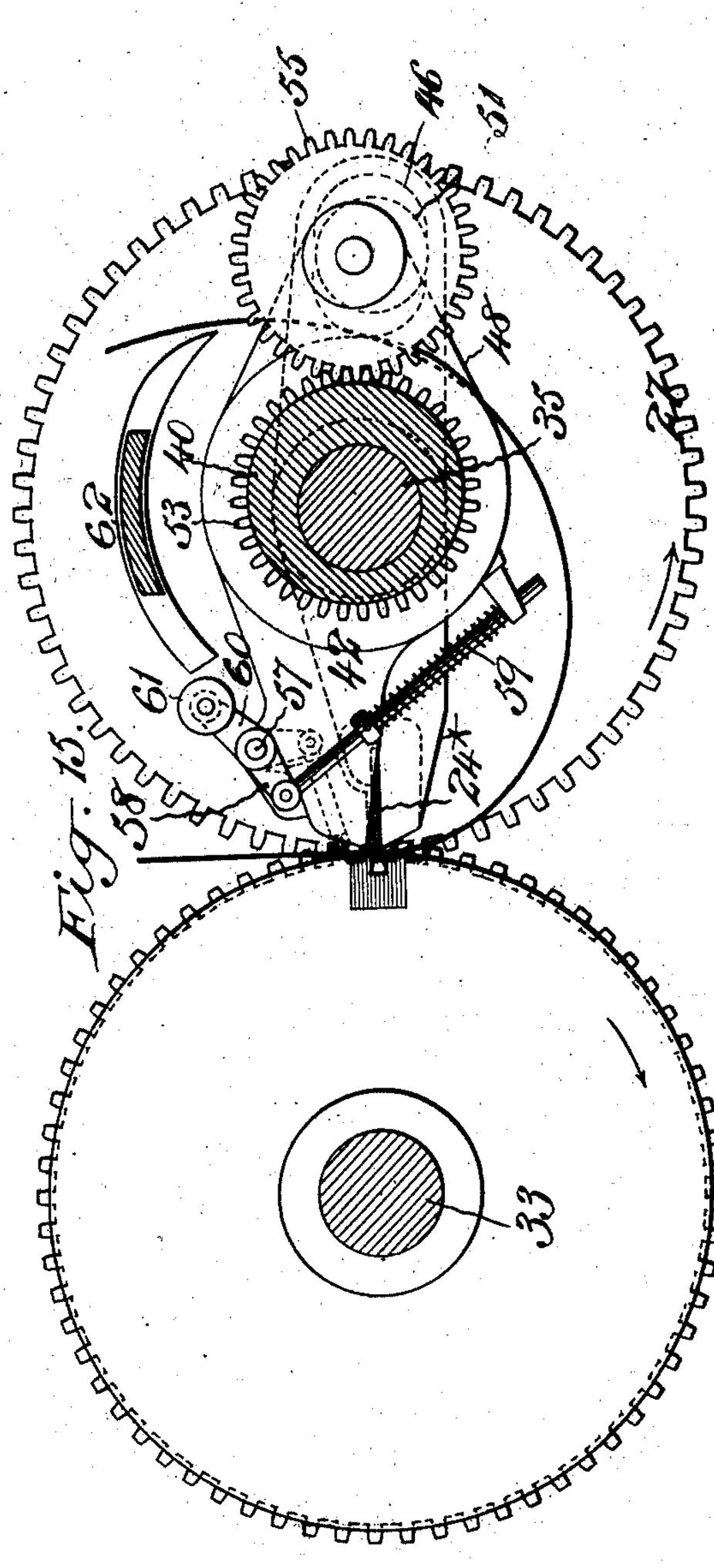

Fig. 15.

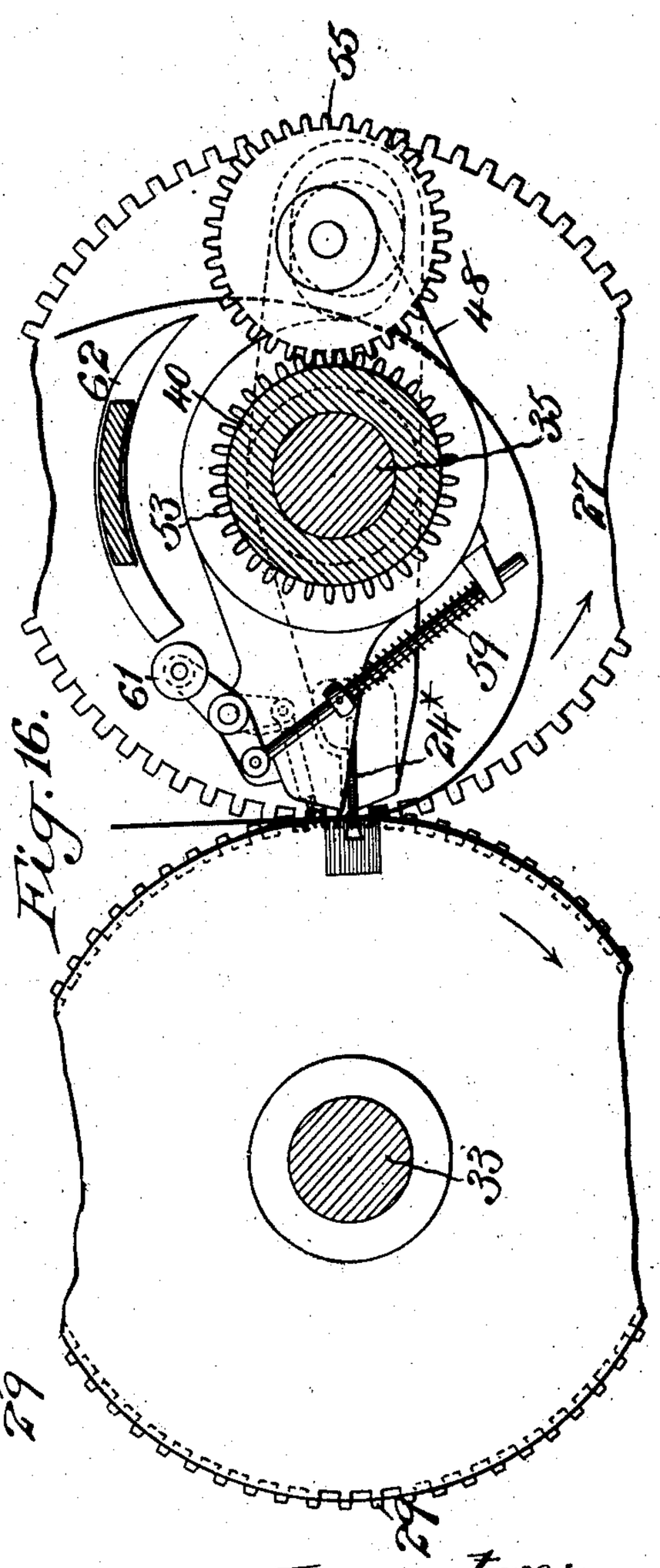

Fig. 16.

Witnesses:-
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Henry Thiemann.

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UNITED STATES PATENT OFFICE.

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PRINTING-PRESS.

No. 907,415. Specification of Letters Patent. Patented Dec. 22, 1908.

Application filed December 30, 1905. Serial No. 293,923.

To all whom it may concern:

Be it known that I, RALPH C. SEYMOUR, a citizen of the United States, and resident of the borough of Manhattan, in the city and State of New York, have invented a new and useful Improvement in Printing-Presses, of which the following is a specification.

The objects of my invention are to provide certain improvements in the construction, form and arrangement of the several parts of a printing press in which (1) means are provided for feeding greater or lesser lengths of web to rotary cutters driven at a constant speed during one revolution thereof to permit sheets of different lengths to be cut from the web; (2) means are provided for accomplishing the above result while the rotary cutters are being driven at the same surface speed as the rotary printing cylinders; (3) means are provided for accelerating and retarding the speed of the web during one revolution of the rotary cutters so that the web may be caused to travel at the same speed as the cutters at the time that the sheet is being severed from the web; (4) I provide one of the cutter carriers of crank form that a shorter sheet than has heretofore been possible may be cut from the web and fed to the printing mechanism without changing the speed of the cutters; (5) I provide a rotary web carrier arranged to engage the advance edge of the web as a preceding sheet is cut therefrom and feed the advance edge of the web to the printing mechanism; (6) I provide means for retarding and accelerating the web carrier mounted to rotate with and driven by one of the cutter carriers whereby all tendency of the web carrier to tear the web is obviated and whereby the advance edge of the web may be positively delivered to the grippers of the printing mechanism at a greater speed than the surface speed of the said grippers, thus insuring the positive engagement of the advance edge of the web by the grippers; (7) I mount the web carrier eccentric to its cutter whereby the path of the web carrier will be beyond the path of the cutter at the part of the revolution of the same when the advance edge of the web is being fed to the grippers of the printing mechanism, and (8) I so arrange the several parts of the press that sheets may be fed to the printing mechanism from an independent source of sheet supply as a substitute for the supply from the web roll when so desired, without changing the printing mechanism.

In the accompanying drawings, Figure 1 represents in side elevation so much of my improved rotary printing press as will give a clear understanding of the several parts of the present invention, an arrangement of gearing being shown capable of feeding the web to the cutters at the required speed to permit sheets of a certain length to be cut from the web; Fig. 2 is a vertical section taken from front to rear through the press, Fig. 3 is a detail view in side elevation of the web driving mechanism showing a second arrangement of gearing capable of feeding the web to the cutters at the required speed to permit sheets of a shorter length to be cut from the web; Fig. 4 is a top plan view of the same, Fig. 5 is a partial front view on an enlarged scale, of one of a pair of cutters which is arranged out of parallelism with the advancing web, the web carrier shown in connection therewith being arranged in parallelism with the advancing web and eccentric to the axis of the said cutter, Fig. 6 is a top plan view of the same, Fig. 7 is a detail longitudinal central section through the stationary support and its adjacent parts at one end of the cutter and web carriers; Fig. 8 is a similar view through the stationary support at the other end of the cutter and web carriers, Fig. 9 is a transverse section taken in the plane of the line A—A of Fig. 5, this view also illustrating a portion of the other cutter of the pair of cutters, the parts being in the position which they assume as the sheet is being cut from the web; Fig. 10, is a partial transverse section taken in the plane of the line B—B of Fig. 5, Fig. 11 is a section taken in the plane of the line A—A of Fig. 5, showing the parts in the position which they assume when the cutter has been rotated a half revolution, Fig. 12 is a similar section showing a portion of the first impression cylinder of the printing mechanism in connection therewith, the parts being in the position which they assume when the web carrier is feeding the advance edge of the web to the grippers on the first impression cylinder, Fig. 13 is a partial front view of a rotary cutter which is arranged in parallelism with the advancing web, the web carrier shown in con-

nection therewith being also arranged in parallelism with the advancing web and mounted eccentric to the axis of said cutter; Fig. 14 is a top plan view of the same, Fig. 15 is a transverse section taken in the plane of the line C—C of Fig. 13, this view also illustrating the cylinder which carries the cutting block which coacts with the rotary cutter blade, the parts being in the position which they assume as the sheet is being cut from the web, and Fig. 16 is a similar section in which the cutter is arranged in parallelism with the advancing web and the web carrier is also arranged in parallelism with the advancing web and mounted concentric with the axis of the cutter.

The parts of the rotary printing press which have been illustrated herein to give a clear understanding of the several parts of my invention comprise a framing 1 on which is supported a feeding table 2. The printing mechanism comprises a first form printing cylinder 3, its impression cylinder 4, a second form printing cylinder 5 and its impression cylinder 6. The shafts 7 and 8 of the printing and impression cylinders 3 and 4 are mounted in suitable bearings in the framing 1, in position to receive sheets directly from the feeding table. The first impression cylinder 4 of the printing mechanism is provided with a set of grippers 9 arranged to receive the sheets from the cutting mechanism as will hereinafter appear. These grippers 9 are opened and closed at the required moments in the revolution of the cylinder, a spring 10 being shown in dotted lines in Fig. 11 for normally holding the grippers closed and a stationary cam 11 being shown in the same figure for opening the grippers at the required time to receive the sheets from the cutting mechanism.

The shaft 12 of the second impression cylinder 6 is mounted in the framing 1 of the press in position to bring the periphery of the said cylinder into engagement with the periphery of the first impression cylinder 4 and the said second impression cylinder 6 may be provided with sets of grippers 13, 14, arranged to receive the sheets from the first impression cylinder and convey them into position to be printed from the second form printing cylinder 5. The shaft 15 of the printing cylinder 5 is suitably mounted in the framing 1 of the press.

The printing mechanism is driven from a drive shaft 16 mounted at 17 in suitable bearings in the framing 1, as follows. A spur gear 18 on the drive shaft 16 meshes with an intermediate gear 19 which in turn meshes with a gear 20 on the shaft 15 of the second form printing cylinder 5. This gear 20 in turn meshes with a spur gear 21 on the shaft 12 of the second impression cylinder 6. This gear 21 meshes with a gear 22 on the shaft 8 of the first impression cylinder 4, which gear 22 in turn meshes with a gear 23 on the shaft 7 of the first form printing cylinder 3.

In the form shown in Figs. 1 to 12 inclusive, the blades 24, 25, of the pair of rotary cutters are arranged to coact with each other every complete revolution and are driven at the same speed as the surface speed of the printing cylinders, the carrier 26 for the blade 24 having gears 27, 28, which mesh with gears 29, 30 fixed to the carrier 31 of the cutter blade 25. The gear 28 of the carrier 26 is driven from a gear 32 fixed to the shaft 8 of the first impression cylinder. The axes of the cutter carriers 26, 31 shown herein are arranged out of parallelism with the plane of travel of the web and the cutter blades 24, 25, are arranged out of parallelism with the axes of rotation of the cutter carriers 26, 31 and in lines which are spiral or oblique relatively to a line parallel with such axes so-as to produce the required shearing cut on the web as it passes through the cutting mechanism. This arrangement is the well known Cottrell type of cutter such as that shown, described and claimed in United States Letters Patent No. 391,949 dated October 30, 1888 entitled paper cutting machine and granted to Calvert B. Cottrell.

The shaft 33 of the cutter carrier 31 is suitably mounted in the framing 1. To permit shorter lengths of sheets to be passed through the cutting mechanism than has heretofore been possible, I make the cutter carrier 26 of crank form, its shaft sections 34, 35, being in alinement and its offset portion 36 at the ends of the crank arms 37, 38, forming a support for the cutter blade. The shaft sections 34, 35, are mounted to rotate in stationary supports 39, 40, carried by the framing 1 of the press. The gear 27 is shown as fixed to the shaft section 34 and the gear 28 is shown as fixed to the shaft section 35 of the cutter carrier exterior to the framing 1.

The web carrier is shown herein as a pin carrier and has its axis arranged in parallelism with the plane of travel of the web, the said carrier comprising two arms 41, 42, mounted on the stationary supports 39, 40 eccentric to the axis of the cutter carrier, the said arms being connected by an offset portion 43 located adjacent to and back of the cutter blade 24.

The web carrier is driven from the cutter carrier, in the present instance by providing the crank arms 37, 38, of the cutter carrier with rearwardly extended branches 44, 45, having elongated slots 46 and providing the arms 41, 42 of the web carrier with rearwardly extended branches 47, 48, in which stud shafts 49, 50 are mounted to rotate, the said stud shafts being provided with eccentric cams 51 located in the elongated slots 46 of the branches 44, 45, of the cutter carrier. The stationary supports 39, 40 have fixed

thereto gears 52, 53, concentric with the axis of the web carrier and eccentric to the axis of the cutter carrier, around which gears are fitted to travel in mesh therewith gears 54, 55 fixed to the stud shafts 49, 50, carried by the web carrier. These parts are so related that as the cutters are rotated at the same speed as the surface speed of the printing cylinders, the movement of the web carrier will be retarded during the first half of the revolution of the cutters after the preceding sheet has been severed from the web and will be accelerated during the second half of the revolution. This carrier, because of its being mounted eccentrically to the axis of rotation of the cutter carrier, will describe a circular path which will be beyond the path of the cutter when passing a set of grippers on the impression cylinder. It is also desirable that the path of the web carrier shall be at or within the path of the cutter at the point where the two cutters co-act to sever the sheet from the web.

The type of web carrier shown herein is a pin carrier and the pins are denoted by 56 and they are mounted to slide in the offset portion 43 of the pin carrier. The movements of these pins are controlled by a rock-shaft 57 which is provided with an arm 58 connected to spring-actuated means 59 tending to slide the pins outwardly into engagement with the advance edge of the web at the time the preceding sheet is cut therefrom, and an arm 60 carrying a roll 61 arranged to be engaged by a stationary cam 62 fixed in the present instance to the stationary support 40 of the framing 1. This cam 62 is so arranged that the pins 56 will be held in their withdrawn position until the sheet is about to be severed from the web when the pins will be released and permitted to engage the advance edge of the web.

The web roll is denoted by 64 and it is mounted in vertically sliding bearings 65, which roll 64 is supported upon two friction drive rolls 66, 67, the web 68 being led from the roll 64 around the roll 67 and from thence upwardly over an idler roll 69 and a drive roll 70, the shafts 71, 72 of which are mounted in the framing 1 adjacent to the under side of the feeding table 2. From the drive roll 70, the web 68 is led downwardly to the cutting mechanism. The web 68 is held pressed against the roll 70 by an endless tape carrier 73 which passes over the roll 70 and an idler roll 74 and around rolls 75, 76 to the front and rear of the roll 70, thus preventing any tendency of the web to slip while being fed to the cutting mechanism.

The means which I have shown for driving the web is as follows. A cross shaft 77 is mounted in suitable bearings in longitudinally adjustable supports 78, which shaft may have gears of different sizes interchangeably fixed thereto according to the speed with which it is required to drive the web 68. In the accompanying drawings a gear 79 of one size is shown in Fig. 1 and a gear 80 of another size is shown in Figs. 4 and 5. These gears are shown as fixed to the shaft 77 by a removable key 81. The supports 78 for the shaft 77 are shown longitudinally adjustable, in the present instance by providing the framing with a longitudinal series of holes 82 and the supports 78 with bolts 83 arranged to enter the desired holes. However, it is to be understood that various other devices for adjusting the shaft 77 longitudinally of the press might be employed. The shaft 77 is adjusted to the required position to permit the gear which is fixed thereto, as for instance the gear 79, to mesh with a gear 84 mounted in the framing 1, which gear 84 in turn meshes with a gear 85 mounted in the framing. This gear 85 meshes with a gear 86 fixed to the shaft 87 of the friction drive roll 67. This gear 86 meshes with an intermediate gear 88 mounted in the framing 1. The said intermediate gear 88 meshes with a gear 89 fixed to the shaft 90 of the friction drive roll 66. This shaft 90 has fixed thereto a bevel gear 91 which meshes with a bevel gear 92 carried by a power transmitting shaft 93, which shaft has a bevel gear 94 meshing with a bevel gear 95 carried by the shaft 72 of the drive roll 70. The gear connection between the roll 66 and the roll 70 is such that the roll 70 is driven at the same surface speed as the rolls 66 and 67.

The speed of the web 68 is increased and decreased during one revolution of the cutters whereby the web, when the sheet is cut therefrom, may be driven at the same speed as the cutters. This is accomplished by providing a variable drive between the shafts 16 and 77 as follows. The shaft 16 is provided with a crank arm 96 having a pin 97 located in a radially elongated slot 98 in a counterbalanced arm 99 fixed to the shaft 77. As the pin 97 travels around the shaft 77 in sliding engagement with its arm 99, the movement of the shaft will be accelerated and retarded. The arrangement of the two shafts is such that the greatest speed is imparted to the web at the time that the sheet is being cut therefrom in the cutting mechanism. It will be seen that this variable drive does not interfere in any particular with the interchangeable drive for feeding a greater or lesser length of web through the cutting mechanism according to the lengths of sheets which it is desired to cut from the web.

In operation it is to be understood that the rotary cutters are being driven from the drive shaft 16 at the same surface speed as the printing cylinders. The shaft 77 is rotated one complete revolution for every revolution of the shaft 16 but because of the variable drive connection between the two shafts, the shaft 77 will be driven from its

point of highest speed at a gradually lessening speed during one half of its revolution and then at a gradually accelerated speed during the other half revolution.

A gear of the required size to feed a predetermined length of sheet through the cutters during one revolution thereof is fixed to the shaft 77 and the longitudinally adjustable supports 78 are adjusted to bring the gear which is fixed to the shaft 77 into mesh with the train of gearing leading to the web roll driving mechanism. It will be seen that if the adjustable supports 78 are adjusted into position to bring the shafts 77 and 16 into alinement, a full length sheet will be fed through the cutters for every revolution of the cutters and will travel at the same speed as the cutters.

In the construction shown in Fig. 1, when a gear 79 is used on the shaft 77, a three-quarter length sheet is fed through the cutters, which sheet is caused to travel at the same surface speed as the cutters at the time of cut. Because of the variable drive connection between the shafts 77 and 16, the speed of the web from which the succeeding sheet is to be cut is gradually decreased during one half of a revolution of the cutters. This will allow the web carrier to be retarded in its movement during the first half revolution of the cutters. During the next half revolution of the cutters, the speed of the web is increased and also the speed of the web carrier is accelerated, thus permitting the web carrier to feed the advance edge of the web into the grippers on the impression cylinder at a greater speed than the surface speed of travel of the impression cylinder, thereby insuring the positive insertion of the advance edge of the web into the grippers carried by the first impression cylinder. It is also to be seen that because of the eccentricity of the axes of the cutter and web carriers, the path of the web carrier will be exterior to the path of the cutter carrier during the time that the advance edge of the web is being fed into the grippers on the first impression cylinder.

The advancing web and the web carrier are both being driven at the same speed as the cutters at the time of cut but immediately after the cut, the driving mechanism of the web is so timed with respect to the connection between the web carrier and cutter carrier that both the web and the web carrier will be retarded for a part of the revolution of the cutter so as to permit both the speed of the web and the web carrier to be accelerated at the time that the advancing edge of the web is fed to the printing mechanism. Furthermore, by mounting the axis of the cutter out of parallelism with the plane of travel of the advancing web and mounting the axis of the web carrier in parallelism with the plane of travel of the advancing web, the sheet may be severed along a line at right angles to the travel of the web and the web carrier may be caused to engage the advance edge of the web at points along a line parallel with the line of cut.

By making the cutter carrier of crank shaft form a three-quarter or less length of sheet can be readily fed to the first impression cylinder while permitting the cutters to rotate at the same surface speed as the impression cylinders.

In Figs. 3 and 4, I have shown a gear 80 fixed on the shaft 77, which gear is of the required size to permit the web to be fed to the cutters at a sufficient speed to allow half length sheets to be cut therefrom. This result also can be readily secured because of the crank shaft form of the cutter carrier.

In Figs. 13 to 16 inclusive, another form of rotary cutter is shown in which the cutter is arranged in parallelism with the advancing web and the offset portion of the cutter is provided with a serrated cutting blade 24* which is parallel with the axis of the cutter.

In Figs. 13 to 15 inclusive, the web carrier is shown as being mounted eccentric to the axis of the cutter, while in Fig. 16 the web carrier is shown as being mounted concentric with the axis of the cutter. In both of these forms the driving connection between the cutter carrier and the web carrier is such that the speed of the web carrier is retarded and accelerated during the constant rotary speed of the cutter so as to correspond with the retardation and acceleration of the advancing web.

What I claim is:

1. In a web sheet fed printing press, rotary printing cylinders, rotary cutters, a web roll and means for feeding greater or lesser lengths of web to the cutters during one revolution thereof to permit sheets of different lengths to be cut from the web, said web feeding means including friction driving rolls forming a support for the web roll and a variable driving mechanism for the friction driving rolls.

2. In a web sheet fed printing press, rotary printing cylinders, rotary cutters driven at the same surface speed as the printing cylinders, a web roll and means for feeding greater or lesser lengths of web to the cutters during one revolution thereof to permit sheets of different lengths to be cut from the web, said web feeding means including friction driving rolls forming a support for the web roll and a variable driving mechanism for the friction driving rolls.

3. In a web sheet fed printing press, its printing and impression cylinders, rotary cutters driven at the same surface speed as the printing and impression cylinders, means for feeding greater or lesser lengths of web to the cutters during one revolution thereof to permit sheets of different lengths to be cut

from the web and a rotary web carrier for feeding the advance edge of the web to the impression cylinder.

4. In a web sheet fed printing press, its printing and impression cylinders, rotary cutters driven at the same surface speed as the printing cylinders, means for feeding greater or lesser lengths of web to the cutters during one revolution thereof to permit sheets of different lengths to be cut from the web and a rotary web carrier mounted eccentrically to one of the cutters for feeding the advance edge of the web to the impression cylinder.

5. In a web sheet fed printing press, its printing and impression cylinders, rotary cutters driven at the same surface speed as the printing and impression cylinders, means for feeding a predetermined length of web to the cutters during one revolution thereof, a rotary web carrier and means for retarding and accelerating the speed of the web carrier to permit it to feed the advance edge of the web to the impression cylinder at a greater surface speed than the impression cylinder.

6. In a web sheet fed printing press, its printing and impression cylinders, rotary cutters driven at the same surface speed as the printing and impression cylinders, means for feeding a predetermined length of web to the cutters during one revolution thereof, a rotary web carrier and means for retarding and accelerating the speed of the web and the web carrier whereby the advance edge of the web may be fed to the impression cylinder at a greater surface speed than the impression cylinder.

7. In a web sheet fed printing press, its printing and impression cylinders, rotary cutters driven at the same surface speed as the printing and impression cylinders, a set of grippers on the impression cylinder, means for feeding a predetermined length of web to the cutters during one revolution thereof and for varying the speed of the web during one revolution of the cutters, a rotary web carrier and means for varying the speed of the web and web carrier during one revolution of the web carrier arranged to permit the advance edge of the web to be fed to the grippers on the impression cylinder at a greater speed than the surface speed of the impression cylinder.

8. In a web sheet fed printing press, its printing and impression cylinders, rotary cutters driven at the same surface speed as the printing and impression cylinders, grippers carried by the impression cylinder, means for feeding a predetermined length of web to the cutters during one revolution thereof and for varying the speed of the web during said one revolution of the cutters, a rotary web carrier mounted eccentrically to one of the cutters and an eccentric connection between the cutter carrier and web carrier for varying the speed of the web carrier to permit it to feed the advance edge of the web to the grippers on the impression cylinder at a greater speed than the surface speed of the said impression cylinder.

9. In a web sheet fed printing press, printing mechanism, rotary cutters, and a web carrier having a rotary movement around the axis of the rotary cutters independent of the speed of the cutters, said web carrier being arranged to engage the advance edge of the web as the preceding sheet is cut therefrom and feed the advance edge of the web to the printing mechanism before the succeeding sheet is cut from the web.

10. In a web sheet fed printing press, a rotary impression cylinder, rotary cutters and a web carrier having a rotary movement around the axis of the rotary cutters independent of the speed of the cutters, said web carrier being arranged to engage the advance edge of the web as the preceding sheet is cut therefrom and feed the advance edge of the web to the impression cylinder before the succeeding sheet is cut from the web.

11. In a web sheet fed printing press, a rotary impression cylinder, grippers carried thereby, rotary cutters and a web carrier having a rotary movement around the axis of the rotary cutters independent of the speed of the cutters, said web carrier being arranged to engage the advance edge of the web as the preceding sheet is cut therefrom and to feed the advance edge of the web into engagement with the impression cylinder grippers before the succeeding sheet is cut from the web.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this 28th day of December 1905.

RALPH C. SEYMOUR.

Witnesses:

F. GEORGE BARRY,

FREDK. HAYNES.