

(No Model.)

6 Sheets—Sheet 1.

L. C. CROWELL.

SHEET DELIVERY APPARATUS.

No. 316,123.

Patented Apr. 21, 1885.

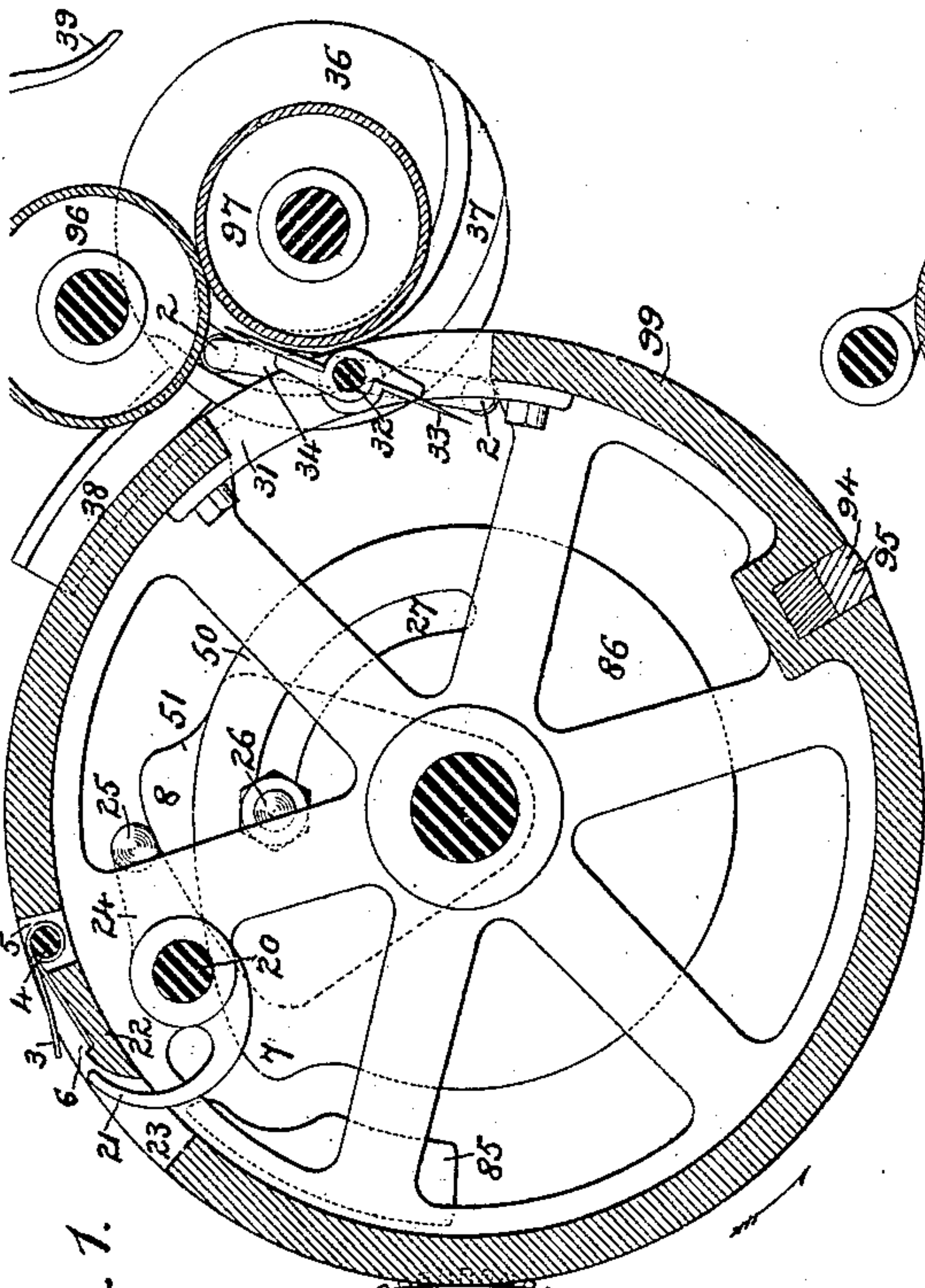


Fig. 1.

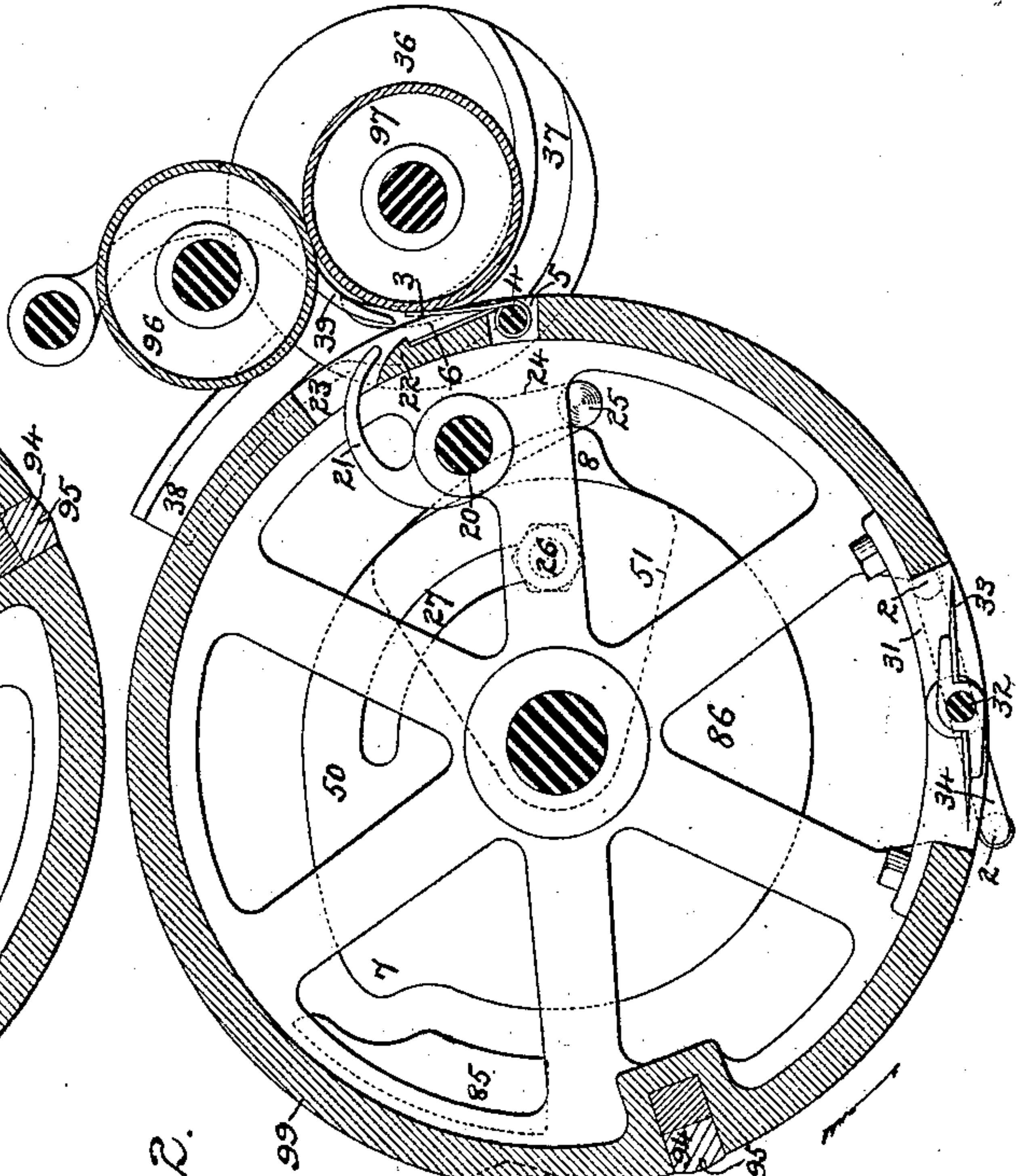
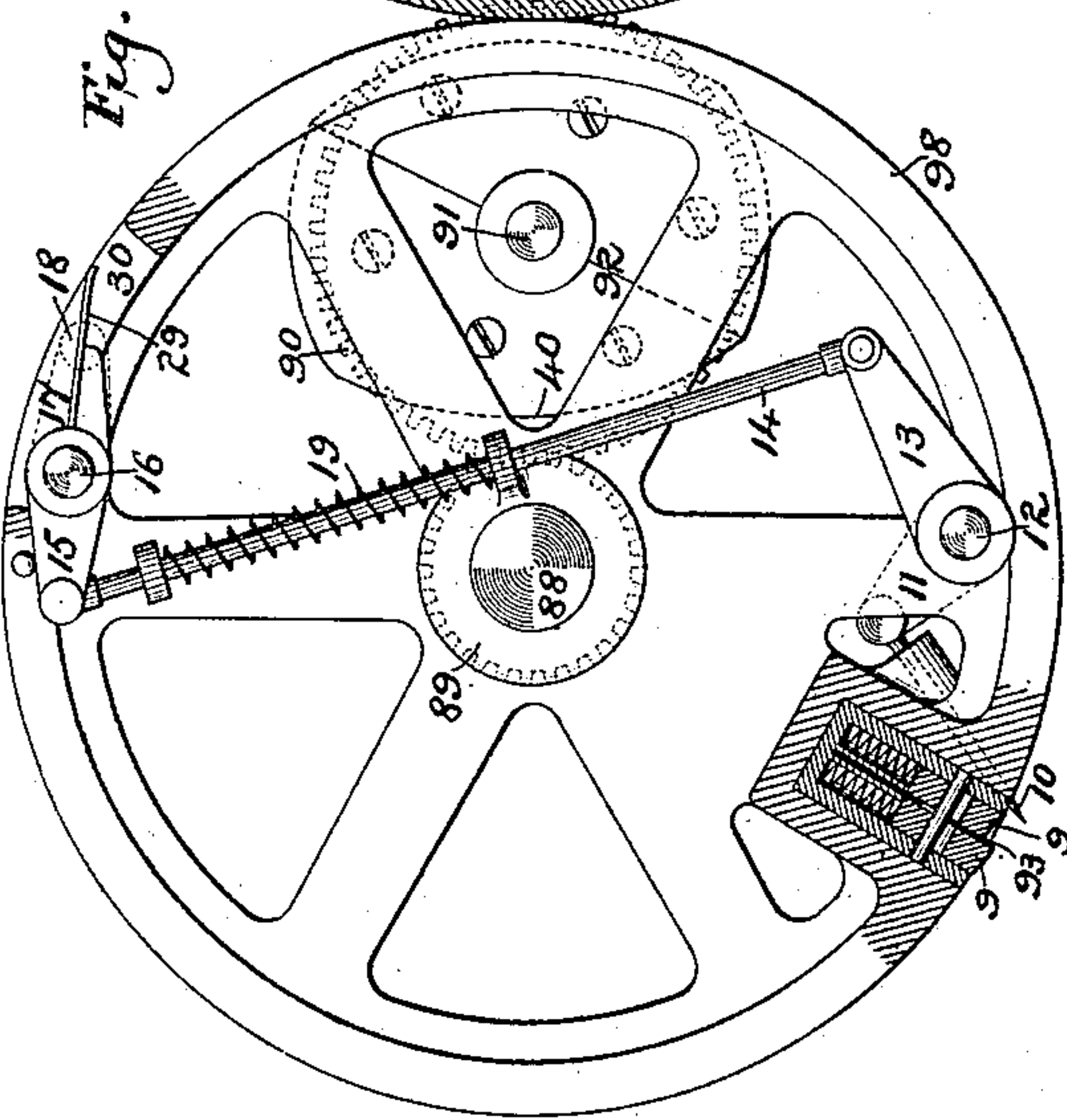
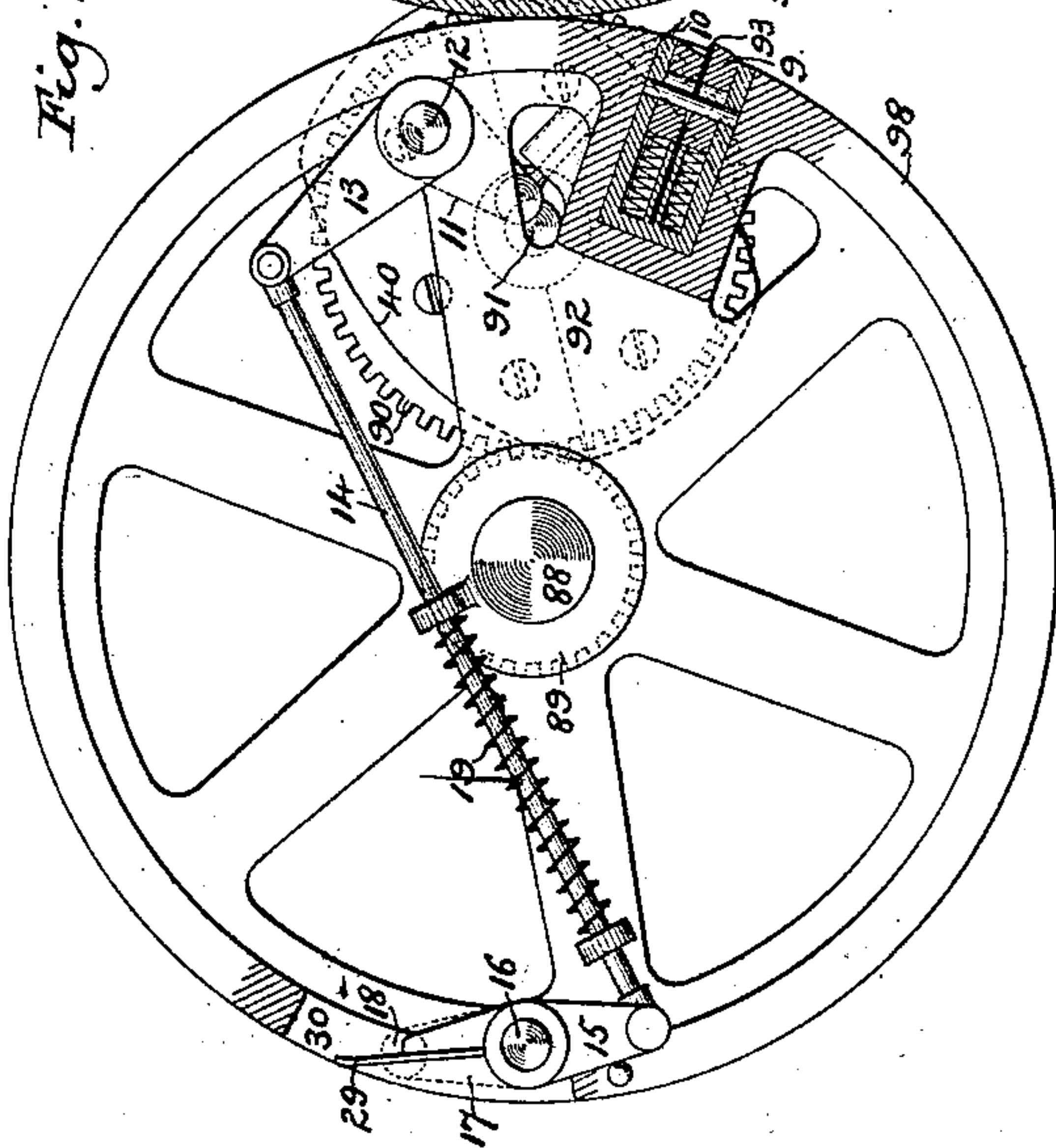


Fig. 2.



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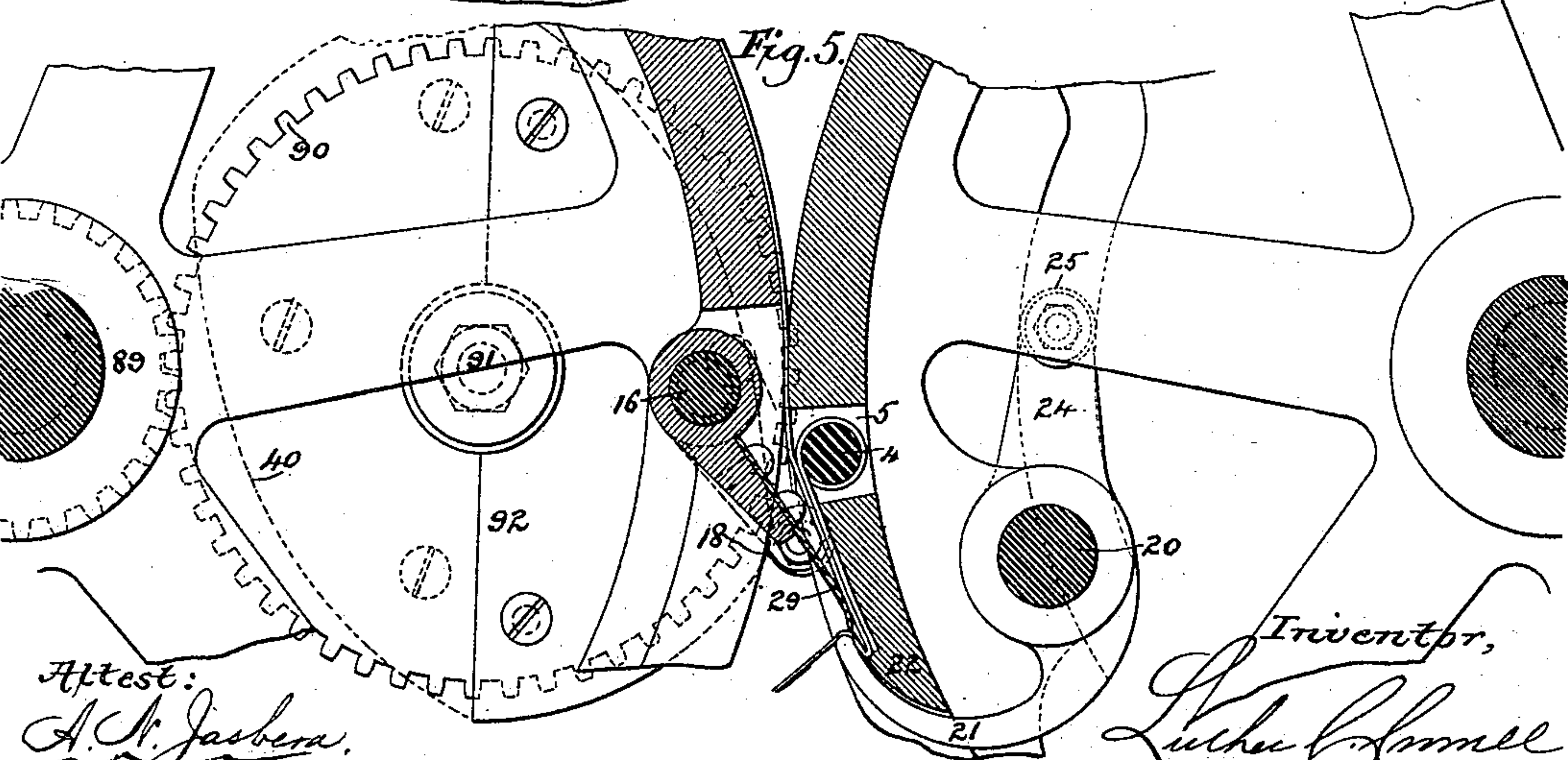
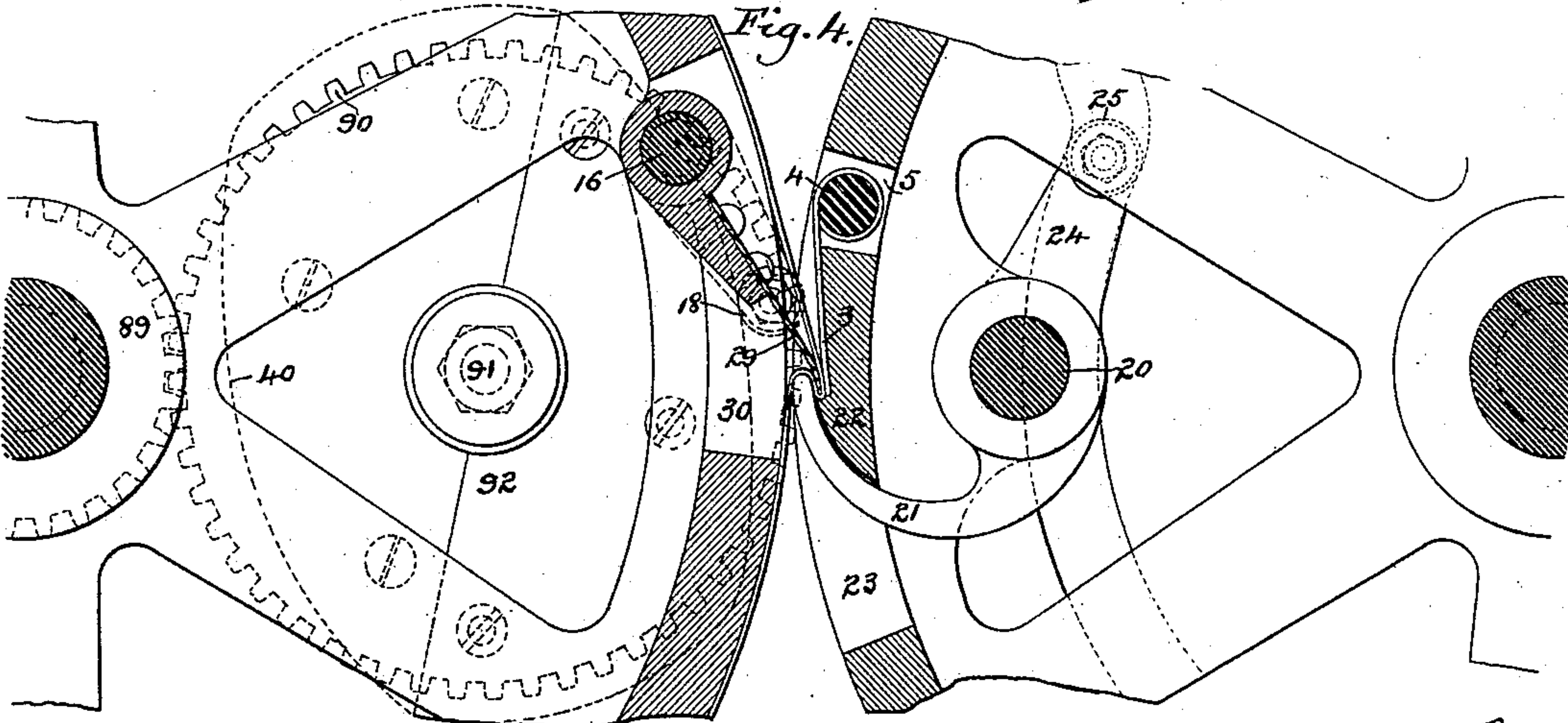
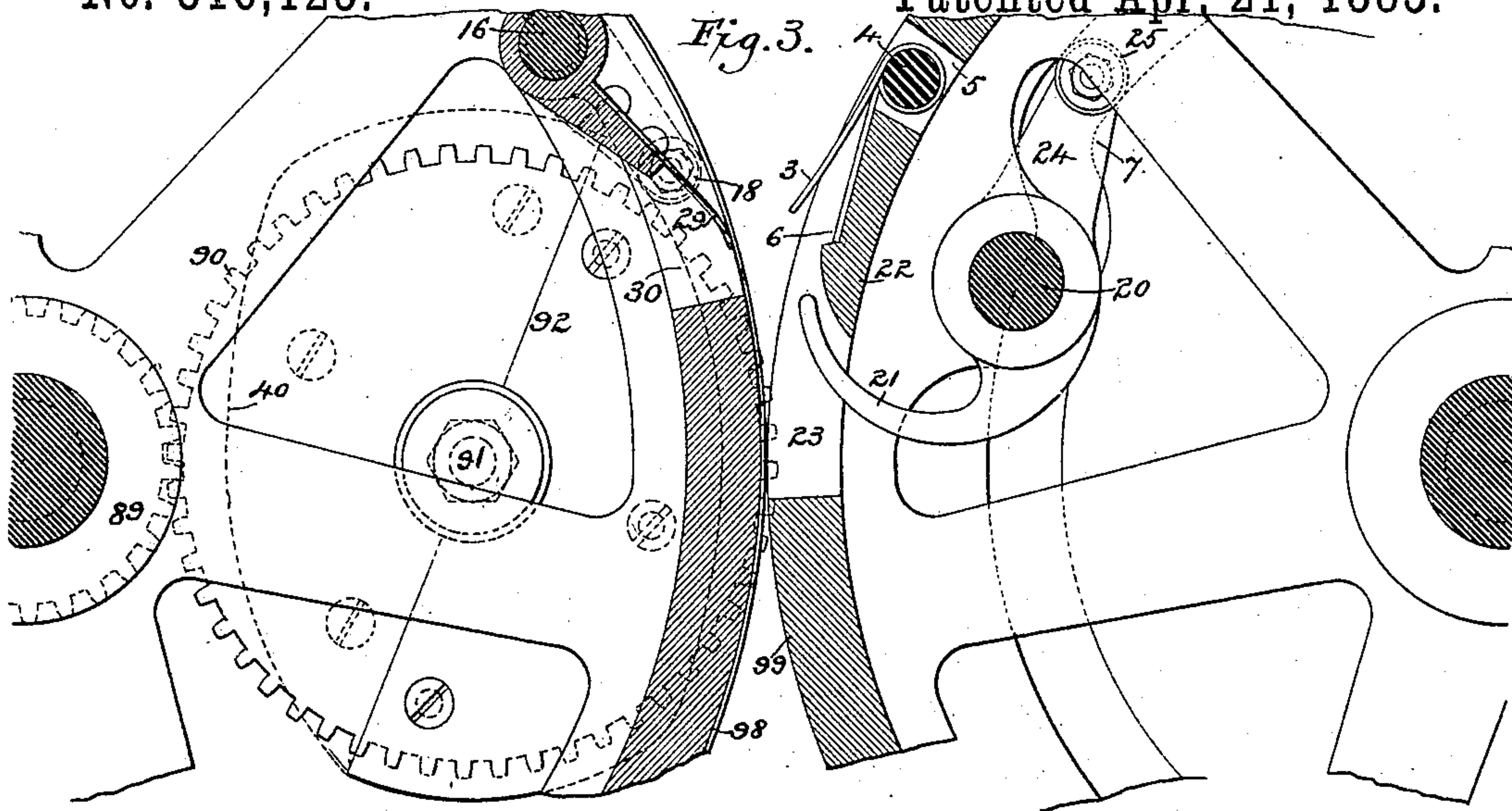
Atty's.



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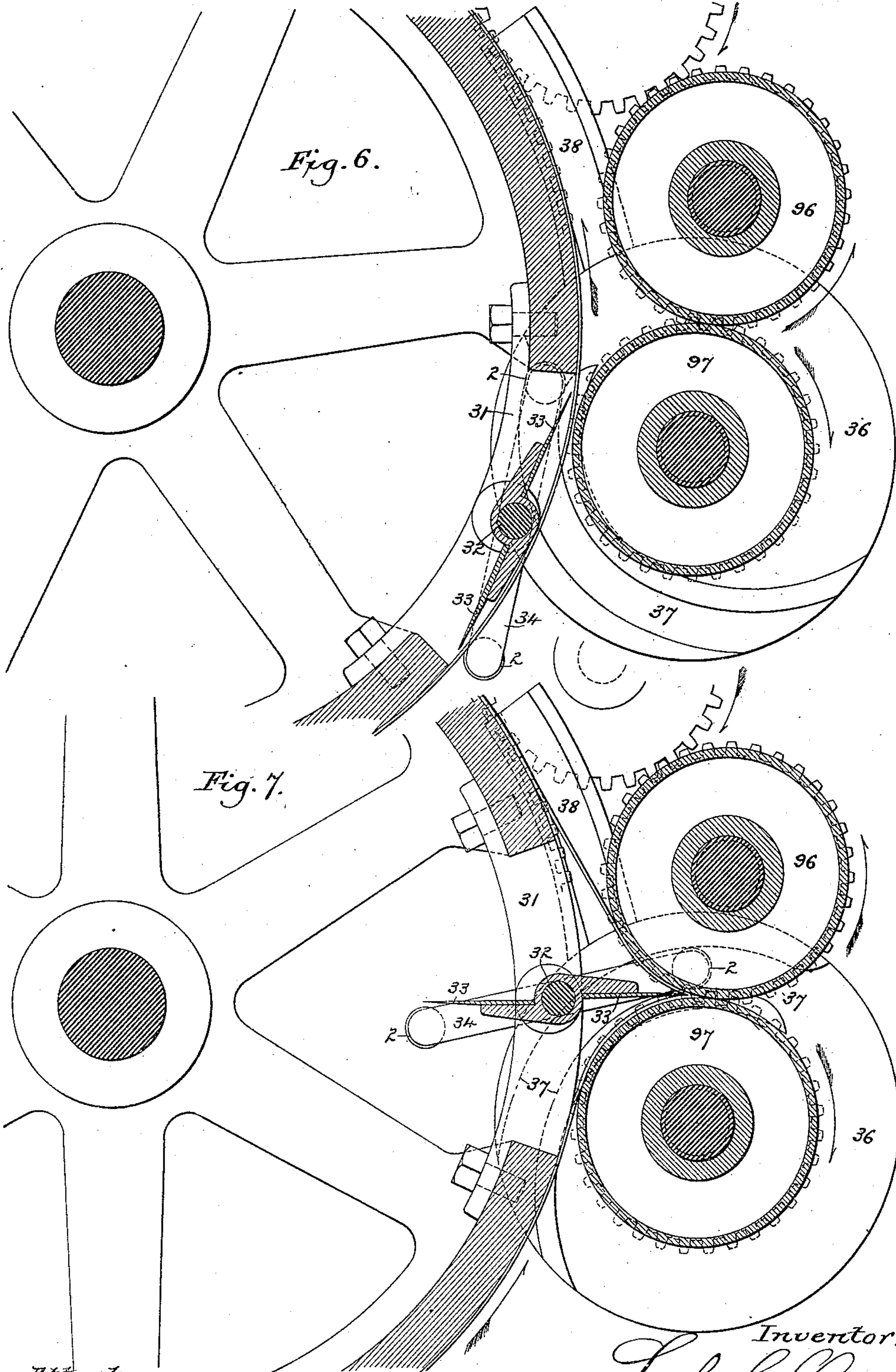
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6 Sheets—Sheet 3.

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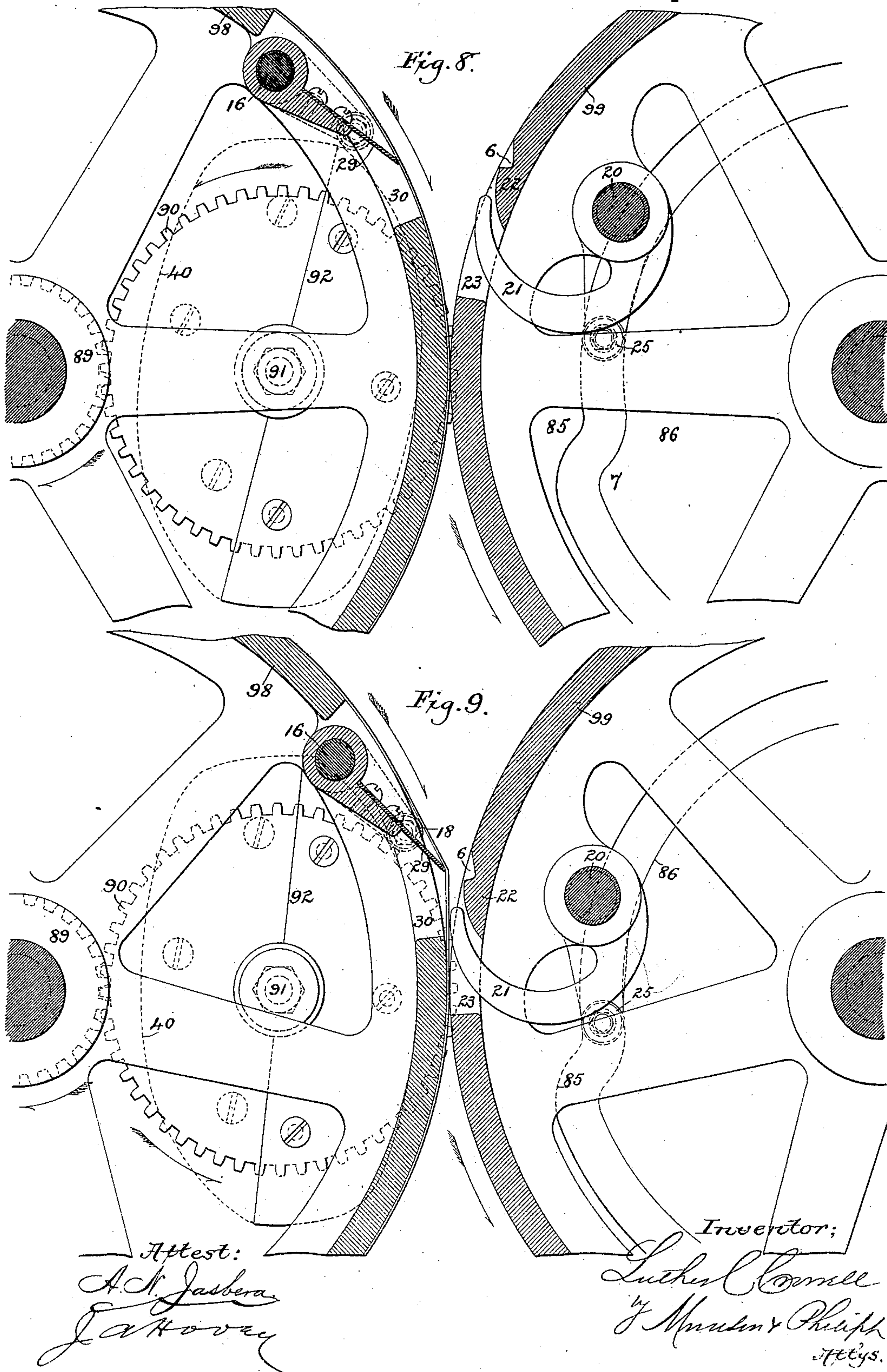
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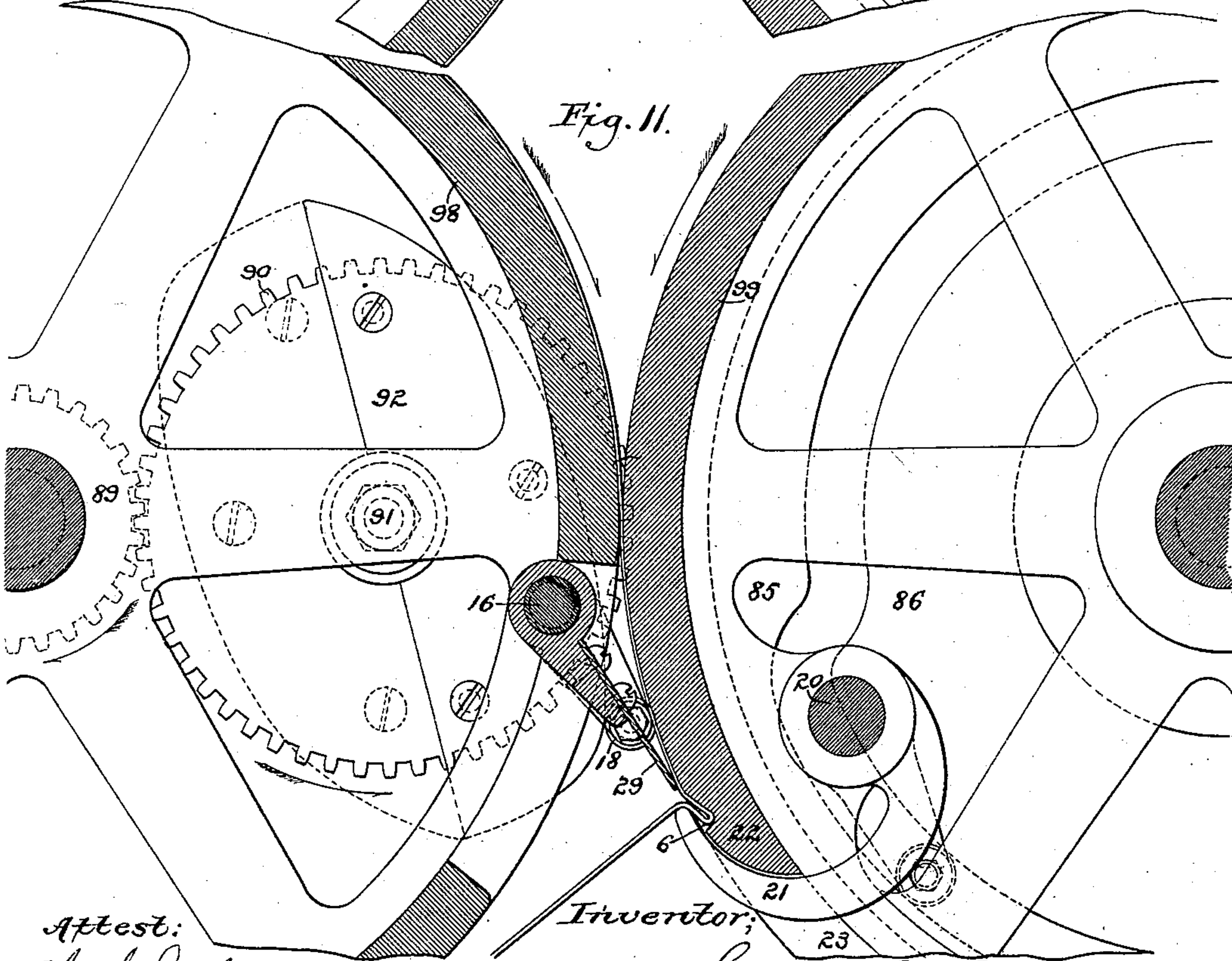
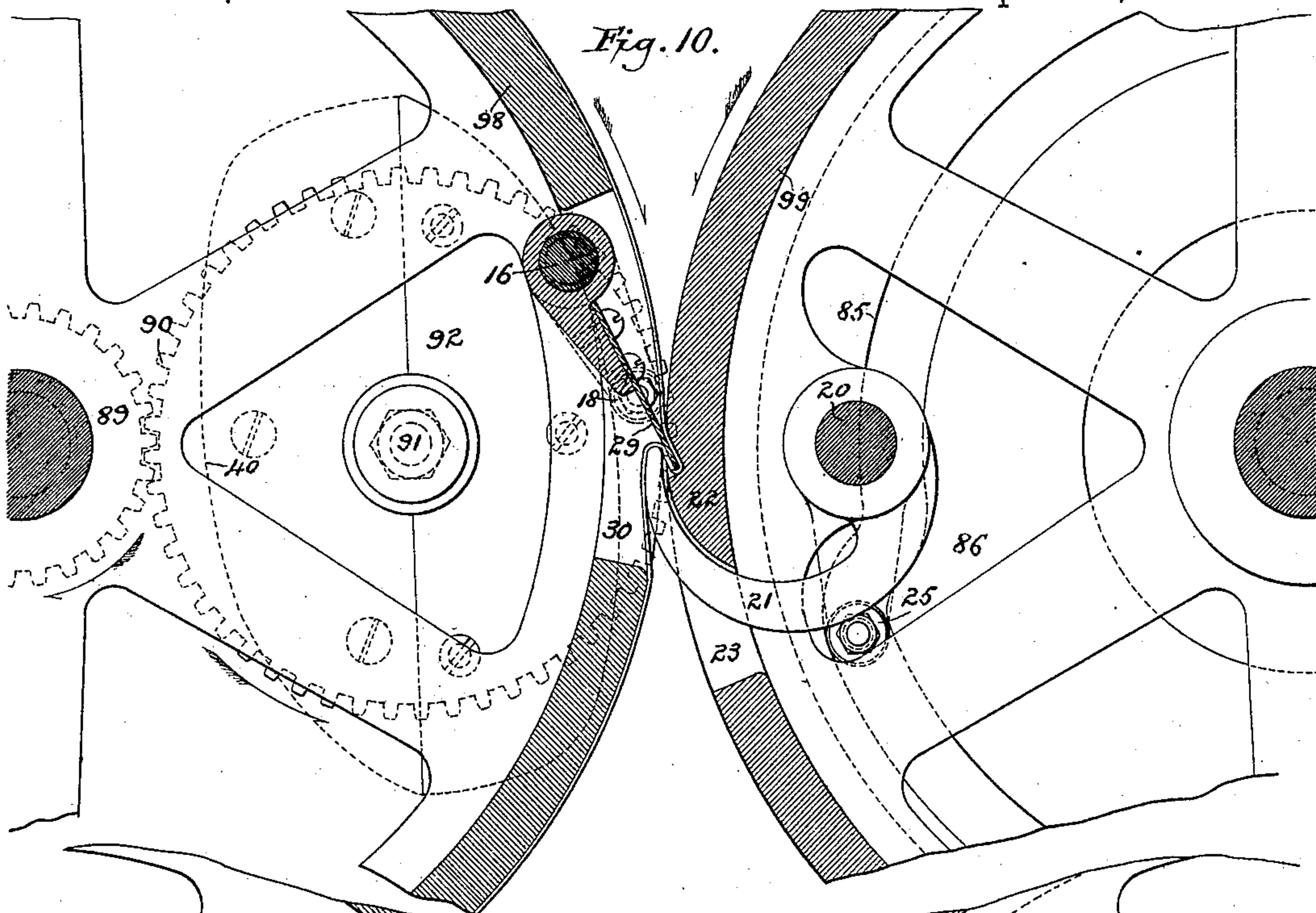




L. C. CROWELL.  
SHEET DELIVERY APPARATUS.

No. 316,123.

Patented Apr. 21, 1885.



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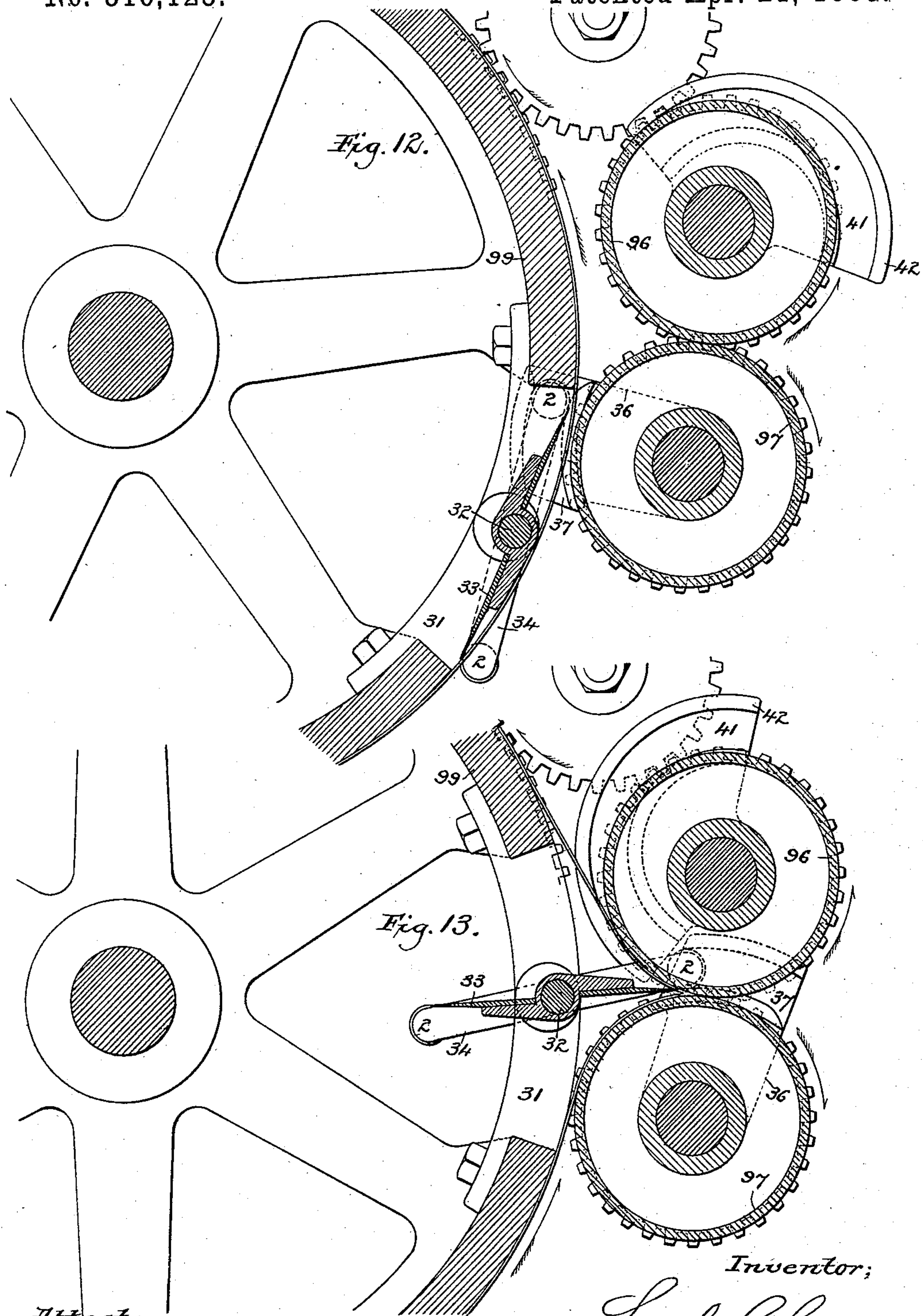
(No Model.)

6 Sheets—Sheet 6.

L. C. CROWELL.  
SHEET DELIVERY APPARATUS.

No. 316,123.

Patented Apr. 21, 1885.



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# UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BROOKLYN, ASSIGNOR TO R. HOE & CO., OF  
NEW YORK, N. Y.

## SHEET-DELIVERY APPARATUS.

SPECIFICATION forming part of Letters Patent No. 316,123, dated April 21, 1885.

Application filed February 25, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, LUTHER C. CROWELL, a citizen of the United States, residing in the city of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Sheet-Delivery Apparatus, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 This invention relates to a mechanism which is designed to operate in connection with a web-printing mechanism to sever the printed web into sheets and deliver the same, either singly or associated into lots of two or more, 15 with either one or two transverse folds, it being the object of the invention to provide a simple and reliable delivery mechanism for use in those printing establishments which desire to issue papers which vary in volume and to deliver them folded to different dimensions.

To these ends the invention consists, broadly, of two co-operating rotating cylinders or carriers provided with cutting, collecting, and folding mechanisms, which are arranged to operate in such manner that the sheets severed from the web may be collected into lots of two or more, and then folded once or twice transversely, or that said sheets may be operated upon singly and folded in either of said ways. 25 The invention also embraces various details of construction in the mechanisms just specified, all of which will be hereinafter fully explained, and particularly pointed out.

In the accompanying drawings, Figure 1 is a sectional elevation of the main cylinders and their co-operating folding-rolls, the framework for supporting the parts being omitted, as the same can be readily supplied by any ordinarily skillful mechanic. Fig. 2 is a similar view showing the parts in a different position. Figs. 3, 4, and 5 are enlarged sectional details illustrating the construction and operation of the mechanisms for making the first fold, said mechanisms being shown in different positions in the several figures. Figs. 6 and 7 are like views illustrating the construction and operation of the mechanisms for making the second fold, said mechanisms being shown in different positions in the two figures. Figs. 8, 9, 10, and 11 are like views illustrating the construction and

operation of a modified form of the mechanisms for making the first fold, said mechanisms being shown in different positions in the several figures; and Figs. 12 and 13 55 are like views illustrating the construction and operation of a modified form of the mechanisms for making the second fold, said mechanisms being shown in different positions in the two figures. 60

Referring particularly to Figs. 1 and 2, it is to be understood that the mechanism embodying the present invention consists, essentially, of two revolving cylinders or carriers, 98 99, which are of a circumference at least equal to 65 the length of the sheet which is to be operated upon, and are geared together or otherwise connected so as to be driven at the same surface-speed, and a pair of folding-rolls, 96 97, which are geared to each other and to the cylinders in the usual manner. These cylinders and rolls are provided with cutting, collecting, and folding mechanisms, which are constructed and arranged as follows: The cylinder 99 is provided with a cutting-groove, 95, 75 formed in a wooden bar, 94, which is seated in a longitudinal recess in the cylinder in the usual manner, and the cylinder 98 is provided at a corresponding point with a blade, 93, which co-operates with the groove 95 in 80 the usual manner to sever the sheets from the web.

The blade 93 is provided with the usual spring-seated cheek-pieces, 9, which project slightly beyond the periphery of the cylinder 85 upon each side of the blade, so as to press the paper against the cylinder 99 and hold it stretched across the groove 95 at the time the cutting takes place.

The bar 94, in which the cutting-groove 95 90 is formed, is made to project slightly beyond the periphery of the cylinder 99, so that as the blade and groove come into co-operation the walls of the groove will press the paper slightly within the periphery of the cylinder 98. By 95 this means the blade is caused to pass through the paper a sufficient distance to insure a clean and perfect severance without the necessity of making the blade project but a slight distance beyond the periphery of its cylinder. 100

Just in the rear of the blade 93 the cylinder 98 is provided with a set of impaling-pins, 10,



which are pivotally secured to the ends of a series of arms, 11, extending from a rock-shaft, 12, journaled in the heads of the cylinder in the usual manner. These pins are protruded and retracted to impale and release the leading ends of the sheets in the following manner: The shaft 12 is provided with a rock-arm, 13, to which is connected one end of a rod, 14, the opposite end of which is connected to a rock-arm, 15, extending from a second rock-shaft, 16, also journaled in the heads of the cylinder, and provided with a second rock-arm, 17, having a stud, 18, which, as the cylinder revolves, is engaged by a rotary cam, 92, which is secured to the face of a gear, 90, mounted upon a short shaft or stud, 91, and engaging with a gear, 89, of one-half its size mounted upon the shaft 88 of the cylinder. The movement of the pins in the opposite direction is effected by means of a spring, 19, which is confined between a collar upon the rod 14 and a projection upon the cylinder-head.

The cylinder 99 is provided at a point opposite the cutting-groove 95 with a rock-shaft, 20, upon which is mounted a nipping-jaw, 21, which extends the length of the cylinder, and is curved so as to be of about the shape of an ordinary sheet-gripper, so that when operated to grasp the sheet its nipping-edge passes through a longitudinal opening, 23, in the cylinder, and closes down upon the slightly-depressed portion 22 of the cylinder in the rear of the opening 23 in substantially the same manner as an ordinary sheet-gripper. The jaw 21 is closed to grasp and hold the sheets by means of a spring arranged upon the shaft 20, in the usual manner, and a stationary cam, 85, which engages with a stud, 25, projecting from a rock-arm, 24, extending from the shaft 20, and is opened to receive and release the sheets at the proper times by means of a stationary cam, 86, which also engages with the stud 25. The cam 86 is made in two parts, 50 51, as indicated by the dotted lines in Figs. 1 and 2, the part 50, which is provided with the projection 7 for opening the jaw to receive the sheets, being fixed, while the part 51, which is provided with the projection 8 for opening the jaw to release the sheets, is adjustably secured to the part 50 by means of the bolt 26, passing through the slot 27, so that the projection 8 can be shifted in position, and thus cause the jaw to be opened to release the sheets at different points in the revolution of the cylinder, as will be more fully described when the operation of the mechanism is explained.

A short distance in the rear of the opening 23 the cylinder 99 is provided with a second longitudinal opening, 5, in which is journaled a small rock-shaft, 4, to which is secured a number of fingers or a thin plate, 3, which extend forward so as to lie just above a recess, 6, formed in the depressed portion 22, upon which the jaw 21 closes. The shaft 4 is provided with a suitable spring or springs, which

serve to hold it normally in such position that the plate or fingers 3 will project somewhat beyond the periphery of the cylinder, as shown in Figs. 1 and 2.

The rock-shaft 16, which has already been mentioned in connection with the cylinder 98, is provided with a forwardly-extending tucking-blade, 29, which lies in a longitudinal opening, 30, in the cylinder, in such position that as the cylinders 98 99 revolve and the stud 18 is brought into engagement with the cam 92, so as to rock the shaft 16, the forward edge of the blade will be thrown outward beyond the periphery of the cylinder 98 and come into engagement with the plate 3, so as to depress said plate into the recess 6 and be caught beneath the end of the jaw 21 as it is closed by the cam 85.

The cylinder 99, in addition to the features already described, is provided at a suitable distance in the rear of the jaw 21 with a longitudinal opening, 31, in which is journaled a shaft, 32, carrying an ordinary rotating folding-blade, 33, which acts in the usual manner to fold the sheets from the cylinder into the bite of the rolls 96 97.

The blade 33 is operated in the following manner: The shaft 32 upon which the blade is mounted is provided at one end with the usual cross-head, 34, the opposite ends of which are provided with outwardly-projecting studs 2, and the shaft of the folding-roll 97 is provided with a revolving disk, 36, in the face of which is formed a cam-groove, 37. The parts are so timed that as the forward edge of the blade arrives in position to fold the sheet off the cylinder the stud 2 of the forward arm of the cross-head 34 will enter the forward end of the cam-groove 37, and thus as the cylinder and roll continue their revolution this stud will remain in the groove until the blade has completed nearly a half-revolution and folded the sheet into the bite of the rolls 96 97. As the stud passes out of the rear end of the groove 37 it will come into engagement with the stationary cam 38, which will cause the blade to complete its half-revolution and bring the stud upon the other arm of the cross-head to the front and into position to enter the cam-groove 37 upon the next revolution of the cylinder.

The remaining features of construction in the mechanism just described will be referred to in connection with the explanation of its operation, which is as follows: The web of paper, having been perfected by any suitable form of web-printing mechanism, will be entered into the bite of the cylinders 98 99 in such position that its leading end will be impaled upon the pins 10 and carried around upon the surface of the cylinder 98. As the cylinders continue their revolution and arrive at the position shown in Fig. 3, the stud 25 of the rock-arm 24 will come into engagement with the projection 7 of the cam 86, so as to open the jaw 21, and at the same time the stud 18 of the rock-arm 17 will come into engagement



with the cam 92, so that as the cylinders continue to advance from this position the pins 10 will be retracted to release the forward end of the web, and at the same time the blade 29 will be rocked outward beyond the periphery of the cylinder 98, so as to raise the fold-line of the paper away from the cylinder and press it and the plate 3 into the recess 6 of the cylinder 99. Immediately after this takes place the stud 25 of the rock-arm 24 will come into engagement with the cam 85, so as to close the jaw 21 over onto the paper and the edge of the blade 29, and thus grasp the paper upon the fold-line, as shown in Fig. 4. As the cylinders continue their revolution from this point the blade 29 will be withdrawn, as shown in Fig. 5, so as to leave the fold of the paper in the bite of the jaw 21 and the plate 3, and cause it to be carried forward upon the cylinder 99.

It will be observed that after it is folded, as just described, the sheet is held by the jaw 21 in such position that there is no abrupt bend in the sheet just in the rear of the fold-line, as is the case where the portion of the sheet held by the nipping-jaws extends inward toward the axis of the jaw-cylinder. This is a desirable feature, as it permits the sheet to be more readily stripped from the cylinder at the proper time. The first transverse fold having been made in the manner just described, the fold will be held by the jaw 21 and carried around upon the cylinder 99 until the blade 93 and groove 95 come into co-operation, when the first sheet will be severed from the web, and at the same time the freshly-cut end of the web will be impaled upon the pins 10, as already described. As the parts arrive in the position shown in Fig. 6, the stud 2 upon the forward arm of the cross-head 34 will enter the cam-groove 37, and at the same time the stud 25 of the rock-arm 24 will come into engagement with the projection 8 of the cam 86, so as to open the jaw 21 and release the sheet. As the cylinder 99 and rolls 96 97 continue their revolution, the blade 33 will be caused to make a half-revolution, so as to fold the sheet into the bite of the rolls, as shown in Fig. 7, and thus the second transverse fold will be made. As the cylinders continue their revolution from the position shown in Fig. 1, the stud 25 of the rock-arm 24 will again come into engagement with the projection 7, and the operation just described will be repeated. As the sheets emerge from the rolls 96 97, they may be conducted to any suitable folding mechanism, to be further folded, or directly to a piling mechanism.

If it should be desired to associate the sheets in pairs before they are folded, it can be done by simply removing the part 40 of the cam 92, so that the pins 10 and blade 29 will be operated only at each alternate revolution of the cylinder 98. When this is done, the first sheet taken by the pins will be carried around upon the cylinder during one revolution and have the second sheet imposed upon it, after

which, upon the second revolution of the cylinder, the two sheets thus associated will be folded off the cylinder together, and will then receive their second fold and be delivered in the manner already described.

Instead of two, three or more sheets may be associated and folded in the same manner by making the cam 92 of proper form, and so proportioning the gears 89 90 that the cam will make but one revolution to three or more of the cylinder.

If it should be desired to impart only one instead of two transverse folds to either the single or associated sheets, it may be done by simply shifting the part 51 of the cam 86 to the position shown in Fig. 2, and bringing the guides or switches 39 into position to direct the sheets between the rolls 96 97 without being folded. When this is done, the jaw 21 will be opened so as to release the folded edge of the sheets just before they arrive at the bite of the rolls 96 97, and as soon as this takes place the plate or fingers 3 will move outward, so as to direct the end thus released between the guides 39 and the roll 97, as indicated in Fig. 2.

It is of course to be understood that the web before passing to the cylinders 98 99 to be operated upon, as just described, may receive one or more longitudinal folds, or may be split into sections, and have its sections associated, so that the web as it enters the bite of the cylinders 98 99 may consist of a single, or of more than a single, ply or thickness.

It is to be remarked in conclusion that many modifications may be made in the details of the mechanism herein described without departing from the invention. Figs. 8 to 11 illustrate one such modification in the mechanism for forming the first fold. In this construction the portion 22 of the cylinder, upon which the jaw 21 closes, is not depressed below the remaining portions of the cylinder, so that the jaw in closing passes into the opening 30 of the cylinder 98, as shown in Fig. 10. The recess 6 is also, as will be observed, somewhat modified in form, so that the paper has a slightly more abrupt bend just in the rear of the fold. Fig. 8 shows the parts of this modified construction in the position they will occupy just after the jaw 21 is opened; Fig. 9, in the position they will occupy just after the blade 29 has been rocked outward; Fig. 10, in the position they will occupy just after the jaw 21 has been closed, and Fig. 11, in the position they will occupy just after the blade 29 has been withdrawn from beneath the jaw. In these figures the spring-controlled fingers 3 are not shown; but it is to be understood that these fingers or some other device to perform the same function will be employed to direct the sheets between the rolls 96 97 when the second fold is omitted.

Figs. 12 and 13 illustrate a modification in the cams for operating the folding-blade of the cylinder 99. In this case the stationary cam



38 is omitted, and the cam-groove 37 in the disk 36 is made very much shorter than in the construction first described. The shaft of the roll 96 is, however, provided with a disk, 42, in which is formed a cam-groove, 41, said disk and cam-groove being so positioned that as the stud 2 of the cross-head 34 passes out of the groove 37 it will enter the groove 41, in which it will be retained until the blade has completed its one half-revolution.

Fig. 12 shows the parts in the positions they will occupy just as the stud 2 enters the groove 37, and Fig. 13 shows the parts in the positions they will occupy just as the stud 2 is leaving the groove 37.

In either of the constructions shown the jaw 21, instead of extending the entire length of the cylinder, may be made of a number of short sections arranged at a suitable distance from each other upon the shaft 20.

What I claim is—

1. The combination, with two rotating cylinders, as 98 99, provided with collecting and folding mechanisms, of means by which said folding mechanisms can be operated to impart either one or two transverse folds to the associated sheets, all substantially as described.

2. The combination, with two rotating cylinders, as 98 99, provided with collecting mechanism and folding mechanisms for imparting two transverse folds to the sheets, of means by which said collecting mechanism can be rendered inoperative, all substantially as described.

3. The combination, with two rotating cylinders, as 98 99, provided with collecting and folding mechanisms, of means by which said collecting mechanism can be rendered inoperative, and by which said folding mechanisms can be operated to impart either one or two transverse folds to the single or associated sheets, all substantially as described.

4. The combination, with two rotating cylinders, as 98 99, provided with cutting, collecting, and folding mechanisms, of means by which said collecting mechanism can be rendered

inoperative, and by which said folding mechanisms can be operated to impart either one or two transverse folds to the single or associated sheets, all substantially as described.

5. The combination, with the cylinder 99, provided with the jaw 21, of the cylinder 98, provided with the blade 29, and means for operating said blade to press the fold-line of the paper against said cylinder 99, substantially as described.

6. The combination, with the cylinder or carrier 98, provided with the oscillating blade 29, arranged to lift the fold-line of the paper from the carrier, of the cylinder or carrier 99, provided with the jaw 21, arranged to fold the paper backward across the edge of the blade and then grasp it by the fold-line, substantially as described.

7. The combination, with the cylinder or carrier 98, provided with the blade 29, arranged to hold the fold-line of the paper away from the carrier, of the cylinder or carrier 99, provided with the jaw 21, arranged to fold the paper backward across the edge of the blade, and then grasp the fold-line and carry it forward without bending the sheet abruptly in the rear of said fold-line, all substantially as described.

8. The combination, with the cutting-blade 93, provided with yielding cheek-pieces, as 9, of the cylinder 99, provided with the cutting-groove 95, the sides of which project beyond the periphery of the cylinder, substantially as described.

9. The combination, with the cylinder 99, carrying the rotating folding-blade 33, of the folding-rolls 96 97, provided with cams, as 37 41, for operating said blade, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LUTHER C. CROWELL.

Witnesses:

T. H. PALMER,

J. A. HOVEY.