

No. 641,167.

Patented Jan. 9, 1900.

F. SZYMANSKI.

MACHINE FOR SPLITTING RAW OR CRUSHED FIBER.

(Application filed May 9, 1899.)

(No Model.)

3 Sheets—Sheet 1.

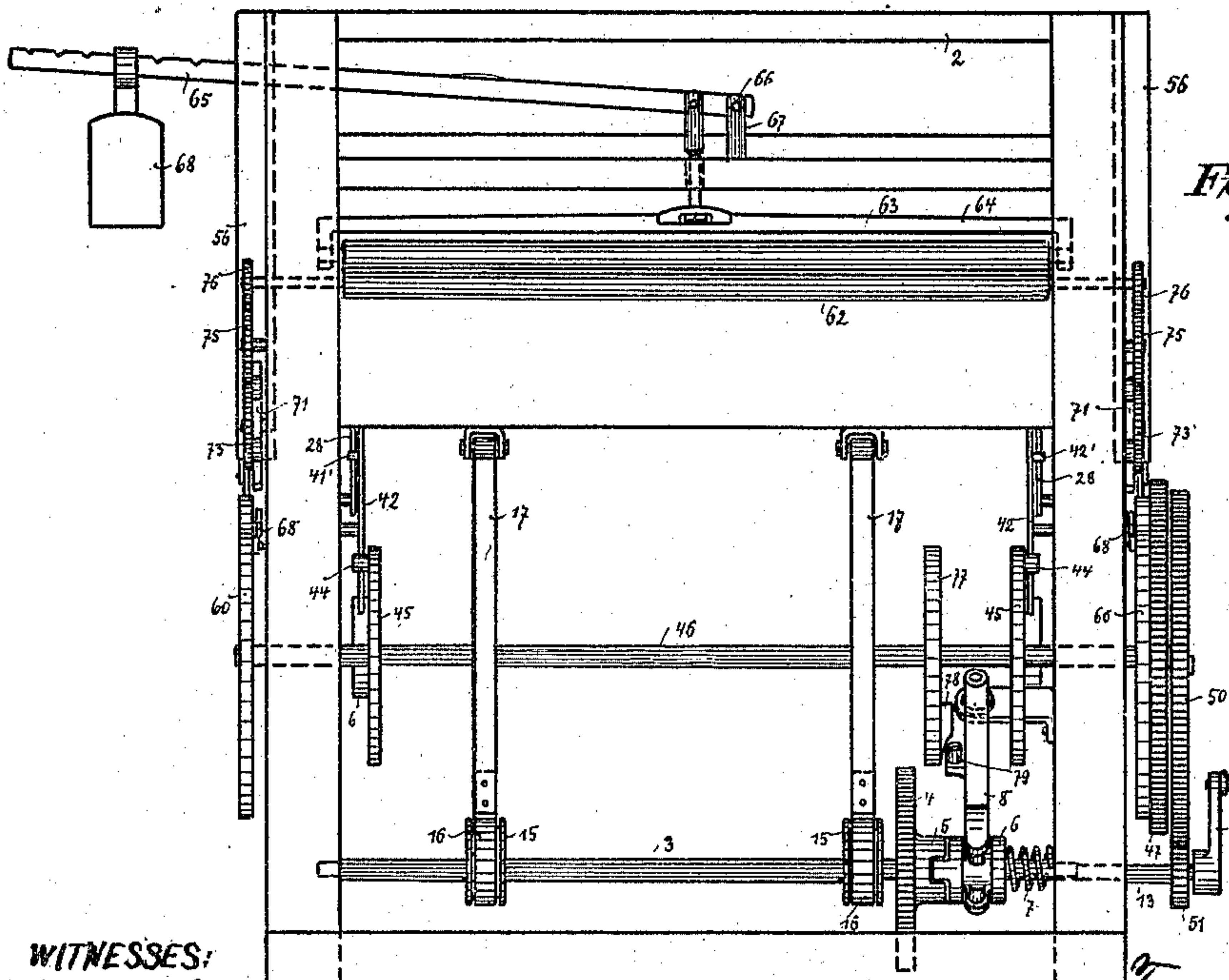
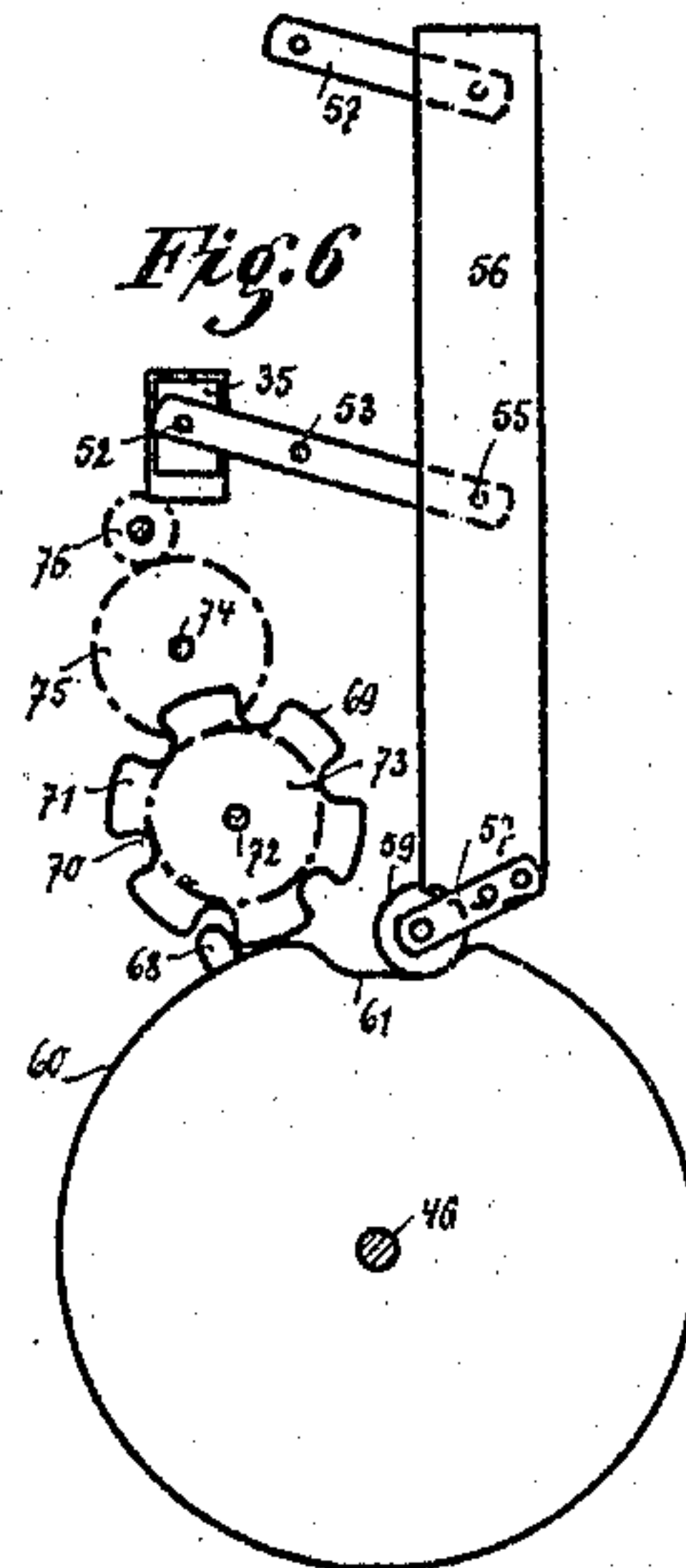
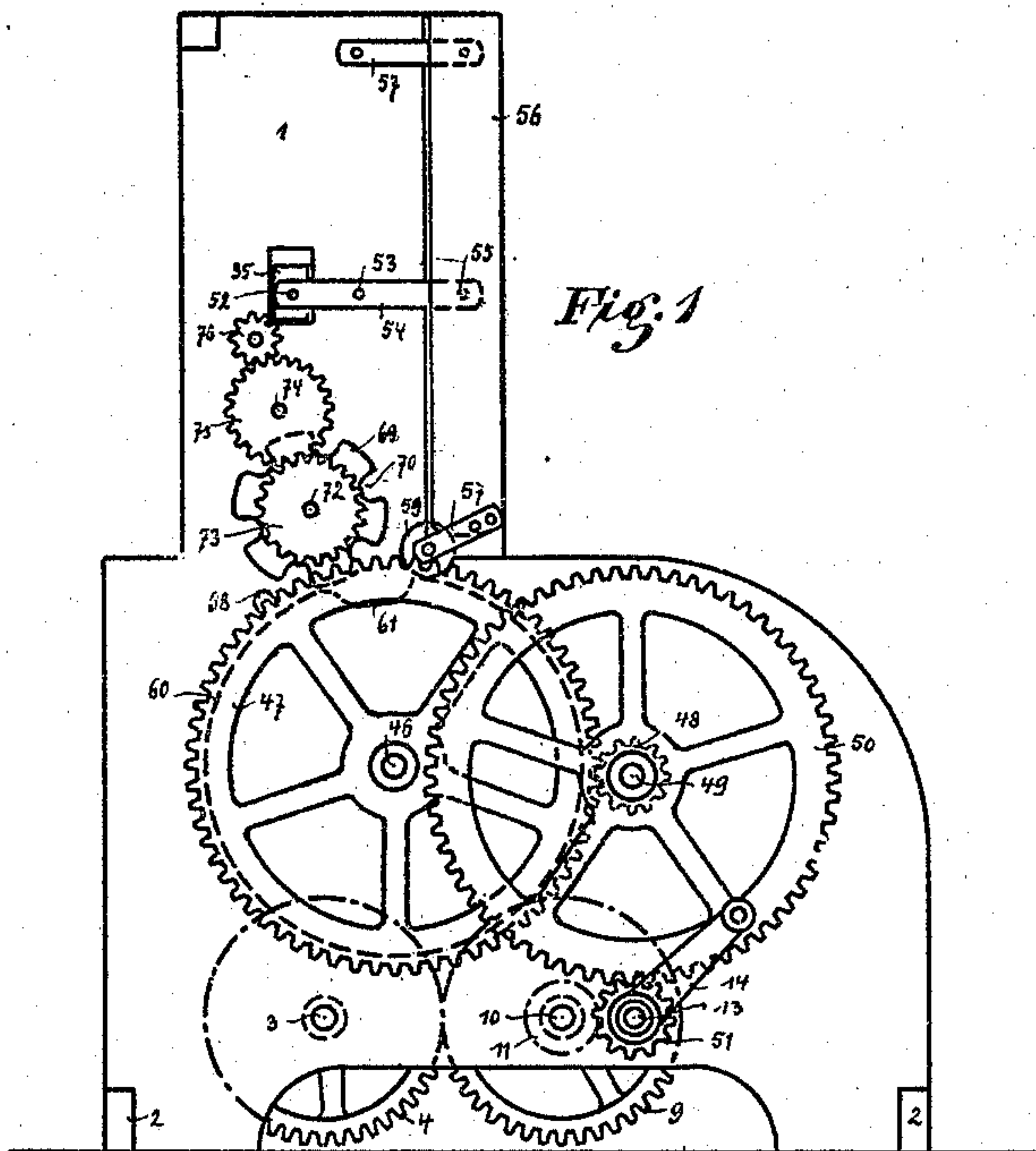


Fig. 2

Fig. 2a

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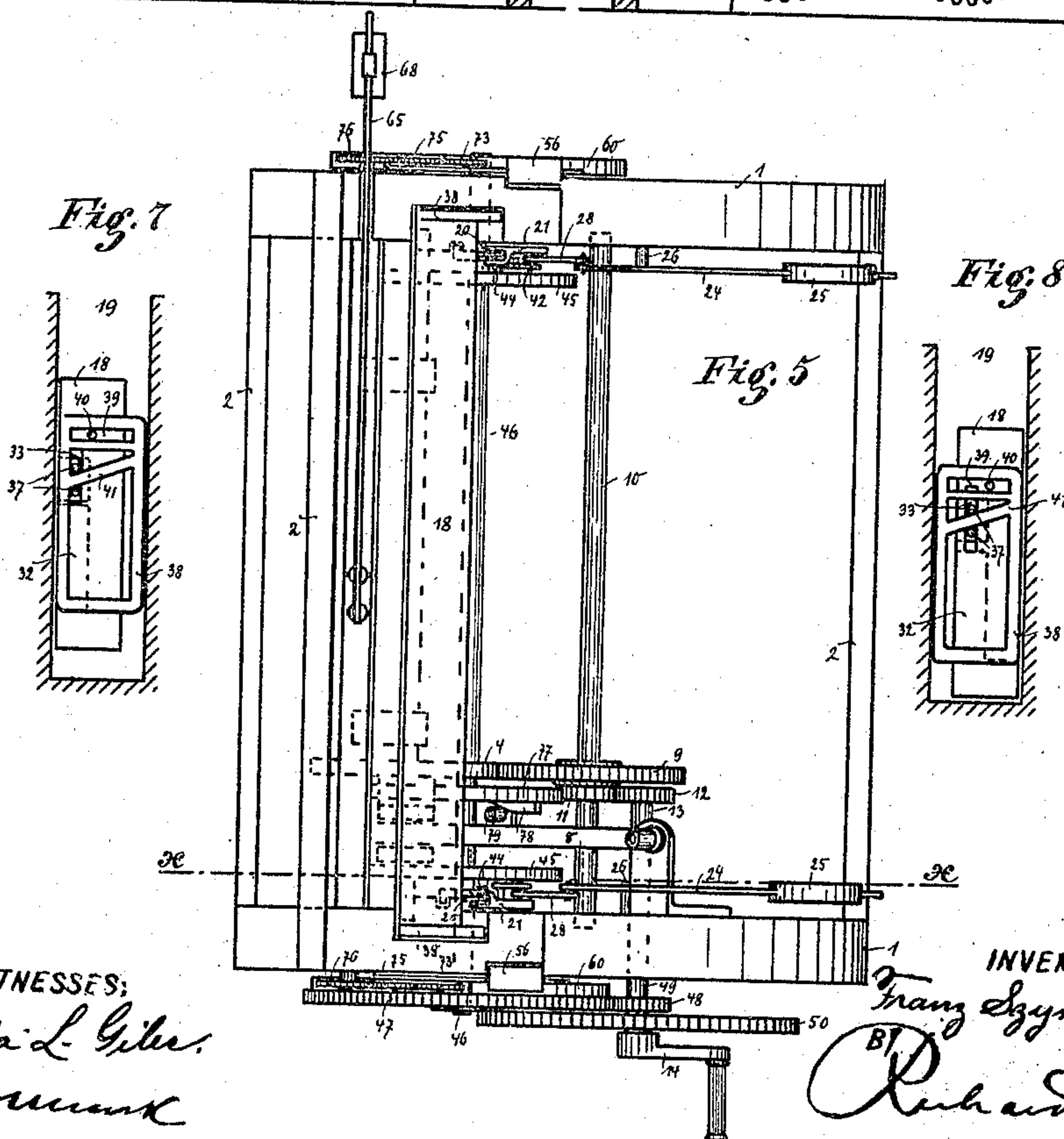
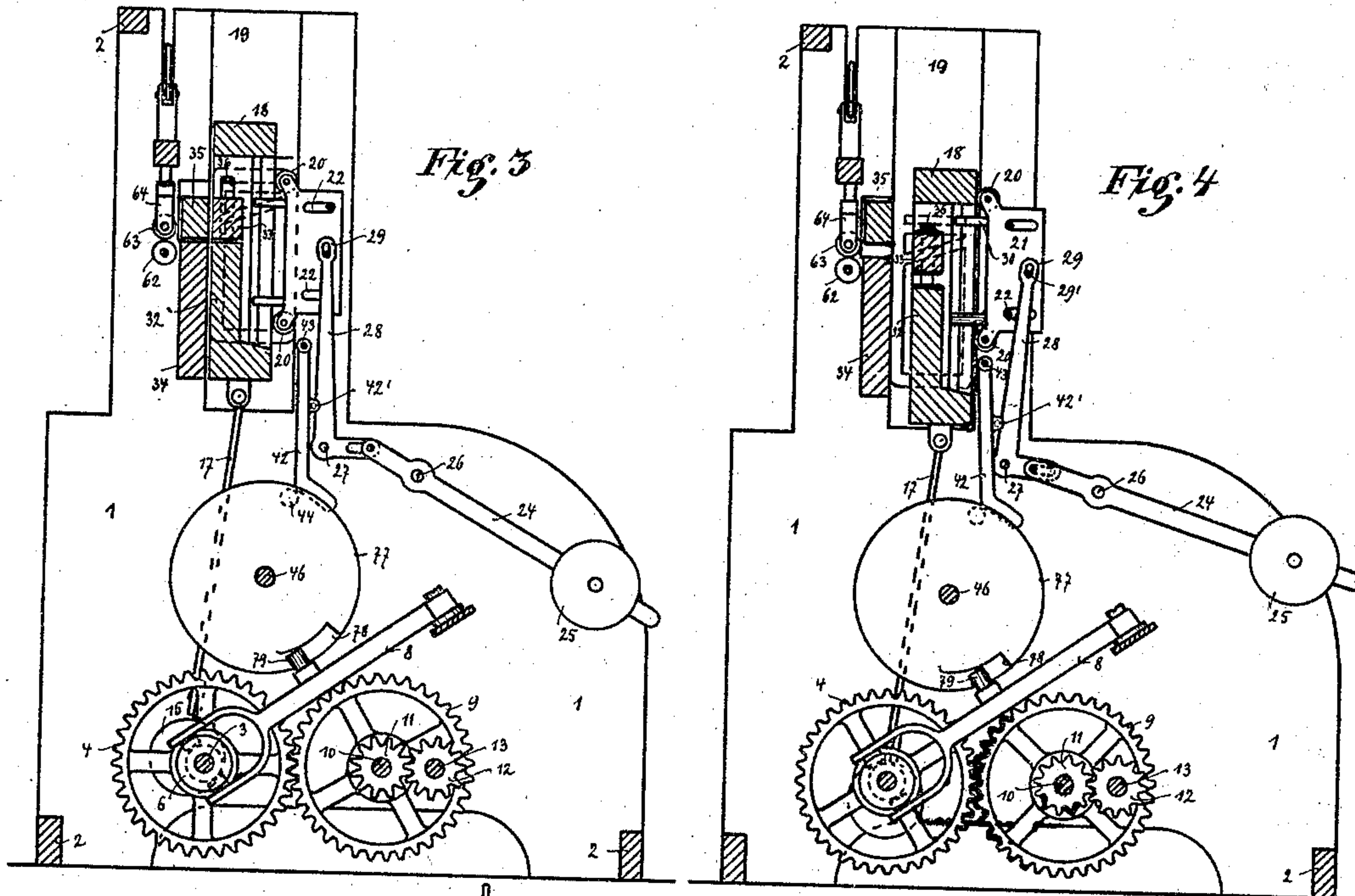
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3 Sheets—Sheet 2.



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Fig. 4a

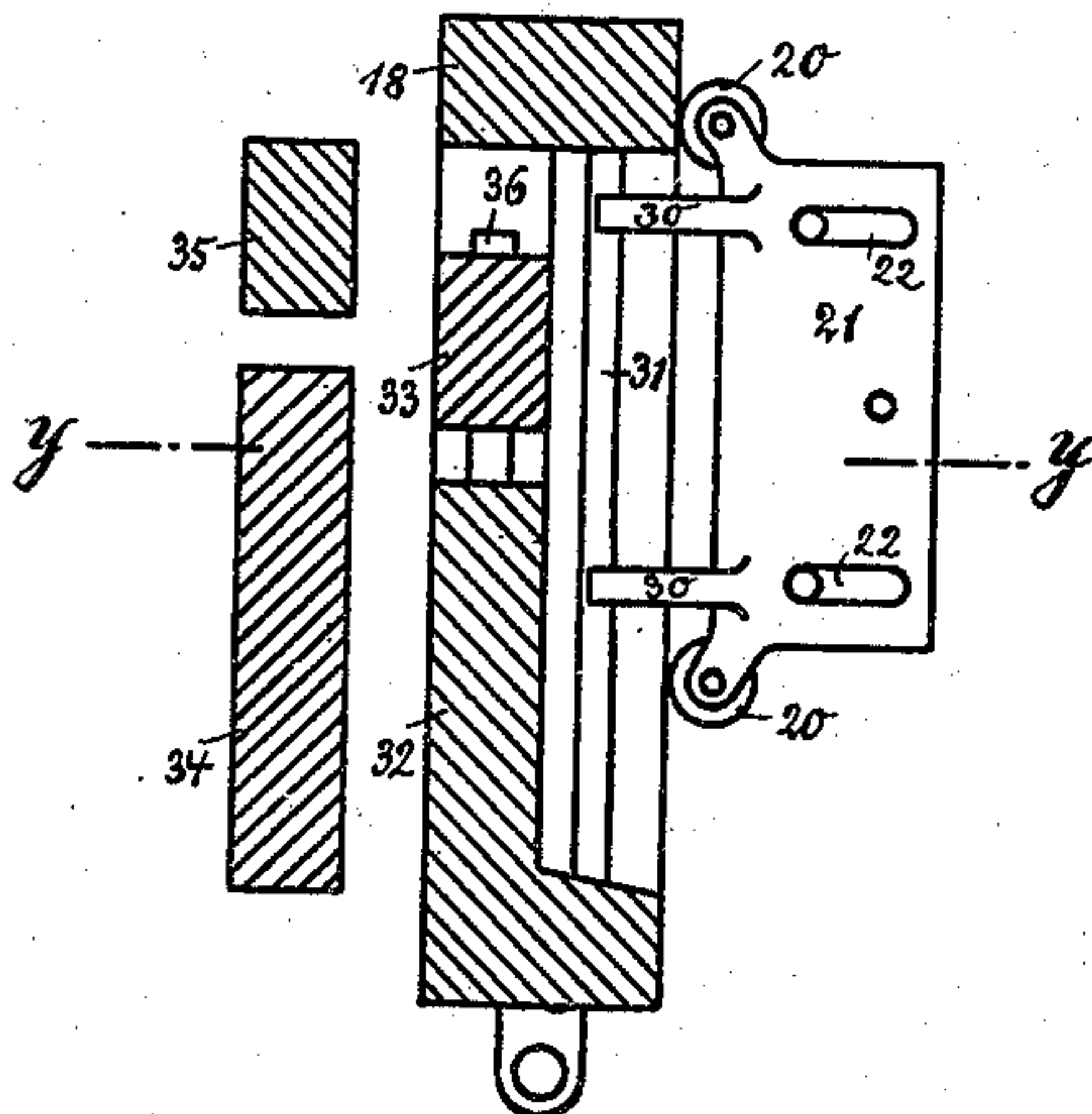
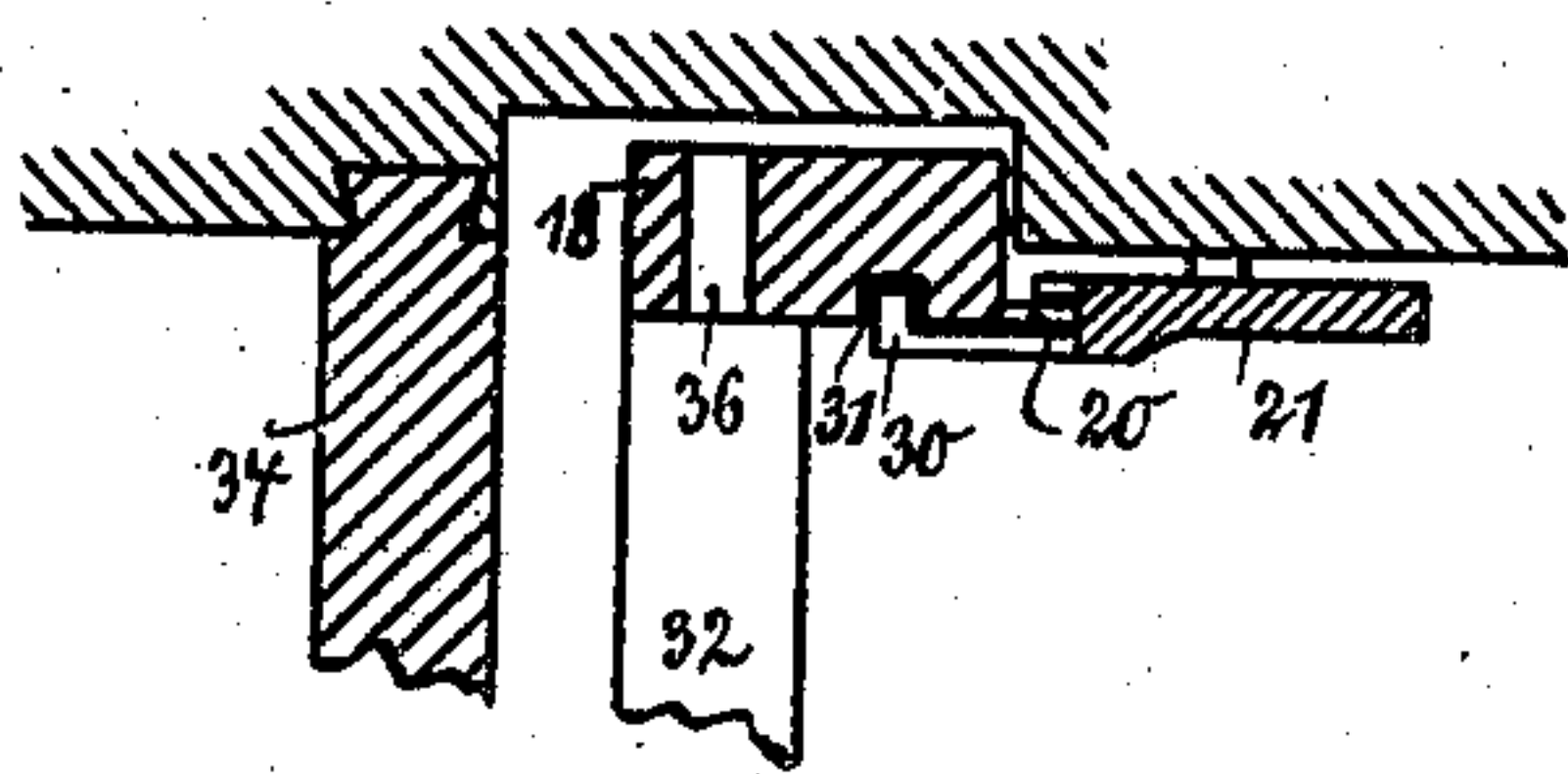


Fig. 4^b



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UNITED STATES PATENT OFFICE.

FRANZ SZYMANSKI, OF BERLIN, GERMANY.

MACHINE FOR SPLITTING RAW OR CRUSHED FIBER.

SPECIFICATION forming part of Letters Patent No. 641,167, dated January 9, 1900.

Application filed May 9, 1899. Serial No. 716,165. (No model.)

To all whom it may concern:

Be it known that I, FRANZ SZYMANSKI, chemist, a subject of the German Emperor, residing at Langestrasse 78, Berlin, in the German Empire, have invented certain new and useful Improvements in Machines for Splitting Raw or Crushed Fibers, of which the following is a full, clear, and exact description.

The present invention relates to a machine for splitting raw or crushed banana fiber into a larger number of filaments capable of being spun. Other fibrous substances as well as those of the banana—such as sisal, aloe, and the like—can be treated in the same manner. The splitting is effected by means of two pairs of bars, between which the fiber is always firmly clamped by each pair of bars at a short distance apart and is rubbed under suitable pressure after the approach of the two pairs of bars. In consequence of this friction the fiber is divided up into such slender filaments that they are capable of being spun. From time to time the pairs of bars are opened and the fiber moved far enough to enable another piece to be operated on. This operation is continued until the whole length of the fiber has been treated. To carry this into practice it is requisite that the friction of the bar device should take place by mechanical means, that the pairs of bars be opened automatically after each piece of fiber has been sufficiently treated, and also for the fiber to be automatically moved on at the proper moment.

A suitable machine for this purpose is illustrated in the accompanying drawings, in which—

Figure 1 shows the machine in side elevation. Fig. 2 is the front elevation. Fig. 2^a shows a detail of construction. Fig. 3 is a section on the line X X of Fig. 5. Fig. 4 is a similar section in another position of the operating parts. Figs. 4^a and 4^b are enlarged detail views at right angles to each other, Fig. 4^b being a section along line *y y* of Fig. 4^a. Fig. 5 is the ground plan of Fig. 1. Fig. 6 illustrates the apparatus for opening the one pair of bars and shifting the fiber. Figs. 7 and 8 illustrate the arrangement for opening the other pair of bars in two different positions.

The framework of the machine consists of the two side walls 1, connected underneath

by cross-bars 2. In the framework is supported the shaft 3, on which the cog-wheel 4 freely revolves. The cog-wheel 4 has a projection 5, forming part of a clutch-gear, of which the other part 6 can be moved on the shaft 3 horizontally and engages with its feather 6^a in the corresponding slot 6^b of the shaft, so that the part 6 of the clutch mechanism must rotate with the shaft 3. The clutch-gear 6 is under the influence of a spring 7, which continuously presses it against the piece 5 so long as it is not moved away by the lever 8, as hereinafter described. The cog-wheel 4 engages with the cog-wheel 9, which is placed on the shaft 10 in the frame 1. The cog-wheel 11 is connected with the cog-wheel 9, and the wheel 12 engages in cog-wheel 11.

The wheel 12 is situated on the shaft 13, which can be rotated by means of the crank 14. On the shaft 3 are situated the eccentric disks 15, on which engage the eccentric rings 16. The latter are connected by means of the rods 17 to a frame 18, which is movable perpendicularly in two guides 19 of the framework. The guides 19 are wider than the frame 18, so that the latter can also be moved slightly in a horizontal direction. On each of the two side parts of the frame 18 act the contact-rollers 20 of each slide 21, in slots 22 of which the pins 23, fastened in the framework 1, engage. The slide 21 can consequently be moved horizontally and is controlled by a weighted lever 24, on the longer arm of which the weight 25 can be adjusted. The shorter arm of the lever, pivoted at 26, actuates the angle-lever 28, pivoted at 27. The lever 28 engages by means of the slot 29 with a pin 29', fastened on the slide 21. Consequently the slide 21, and likewise the frame 18, is pressed toward the left with greater or lesser pressure, according to the position of the weight 25. On the slide 21 are placed the arms 30, the hooked ends of which engage in a vertical slot 31 of the frame 18. This arrangement is for the purpose of carrying the frame 18 with it on the displacement of the slide 21 toward the right and is shown more clearly in Figs. 4^a and 4^b.

In the frame 18 the lower bar 32 is fixed, while the upper bar 33 is vertically adjustable with regard to the bar 32. In the position illustrated in Fig. 3, where the frame 18

is caused by the weight 25 to move toward the left and is shown exactly in the middle of its vertical displacement, a second pair of bars 34 35 stands opposite to the pair of bars 32 33. The lower bar 34 of this second pair is rigidly fixed to the framework 1, while the upper bar 35 is vertically adjustable therein.

In order to be able to open the pair of bars 32 33, the bar 33 is provided at each end with the pins 37, engaging in a slot 36, and likewise a frame 38 is provided on each side. The latter is vertically adjustable in the groove 19 and is carried along by means of the pin 40, engaging in a slot 39 in the frame 18 on the vertical movement of the latter.

Between the pins 37 is a frame 38 with a sloping bridge 41, along which the pins 37 slide as soon as the frame 18 is moved horizontally. Owing to the inclination of the bridge 41, the bars 32 33 are closed when the frame 18 is immediately before the pair of bars 34 35, Fig. 3, whereas they are open when the frame 18 is moved toward the right in the groove 19 from the pair of bars 34 35, Fig. 4. The horizontal displacement of the frame 18 is effected by means of the levers 42, pivoted at 43 at both sides of the machine, and the pins 44 of the disks 45 press against the under ends of the said levers 42 at a certain position of the disks. Consequently the levers 42, with their pins 42', cause a displacement of the angle-lever 28 and also, therefore, of the slides 21, which take the frame 18 with them by means of the levers 30. The disks 45 are situated on the shaft 46, which is supported in the framework 1. On the shaft 46 is placed the cog-wheel 47, with which the pinion 48 on the shaft 49 engages. On the shaft 49, moreover, is the cog-wheel 50, with which engages the pinion 51 on the shaft 13, actuated by the crank-handle 14.

For the purpose of opening the pair of bars 34 35 the bar 35, vertically adjustable in the framework 1, is provided with pins 52, one on each end, which engage in the levers 54, pivoted at 53. The levers 54 are attached by means of pivots 55 to the rails 56, which are, moreover, so joined to the framework 1 by means of the jointed lever 57 that they can be moved vertically. To the lower part of each rail 56 is fixed the arm 57^a. At the free end of this latter there is a pin 58, on which the contact-roller 59 revolves. The roller 59 rolls on the periphery of a disk 60. This latter has at one point of its periphery a groove 61. As soon as the roller 59 arrives at the groove 61 the bar 56 is depressed, so that the bar 35 is thus removed by means of the lever 54 from the bar 34, and consequently the pair of bars 34 35 is opened.

In front of the bar 34, rigidly fixed to the framework, a roller 62 is revolvably supported in the framework 1. Above the roller 62 there is placed a second roller 63, which is suspended in a cross-piece 64. The latter is movable vertically in the framework 1 and is controlled by a lever 65, which is pivoted at

66 in an arm 67, fixed to the framework. The free end is provided with a movable weight 68, so that the pressure of the movable roller 63 against the roller 62 can be regulated as required. The roller 62 can be rotated from the shaft 46. For this purpose the disk 60 has on its circumference a projection 68, which at every revolution of the wheel 60 engages in a groove 70 of the wheel 71, provided with cogs 69, and thereby moves the wheel 71 one cog 69 forward. The wheel 71 is placed on the shaft 72, the cog-wheel 73 of which engages in the cog-wheel 75, revolving on 74. The wheel 75 engages with a cog-wheel 76, connected with the roller 62. At each revolution of the disk 60 the roller 62 will consequently rotate a certain amount.

For disconnecting the aforesaid clutch-coupling a cam 77 is keyed on the shaft 46, on the circumference of which there is a projection 78, which at a given position of the disk 77 strikes against the roller 79, which is carried on a side piece of the lever 8. Consequently the projection 78 causes the lever 8 to move outward, and thus draw out the coupling 6 from the clutch 5 of the cog-wheel 4.

The operation of the machine described is as follows: The fiber to be operated on is brought between the pairs of bars 32 33 and 34 35, respectively. On lifting the upper roller 63 the fiber is easily passed between the two rollers 62 63, so that when the lower roller 62 revolves the fiber is moved in the direction of the arrow. In order that the rollers 62 and 63 may better lay hold of the fiber, they are preferably covered with rubber. After the fiber has been supplied to the machine with the pairs of bars in the position indicated in Fig. 4 and the roller 63 raised the shaft 13 is rotated by means of crank-handle 14. In consequence of this, on the one hand, the disks 60 are rotated by means of the cog-wheels 51, 50, 48, and 47, and on the other hand the wheel 4 is also set in motion by means of the wheels 12 11 9. The clutch 6, however, has previously been taken out of engagement with the clutch 5, so that the shaft 3 remains stationary. In consequence of the revolution of the disks 60 the rollers 59, which carry the rails 56, come out of the grooves 61 on the periphery of the disk 60. Consequently the rails 56 are lifted, the bars 35 drop, and thus the fiber is firmly gripped between the bars 34 and 35. Thereupon the pin 44 on the disk 45 slips from the lever 42, so that the slide 21 under the influence of the weight 25 and of the angle-lever 28 is moved toward the left. Thus the sloping bridge 41 of the frame 38 presses on the lower pin 37 of each end of the bar 33, whereby at the horizontal movement of the frame 18 the bar 33 is depressed, and in this manner also the pair of bars 32 33 is automatically closed. There is consequently now a certain length of fiber between the two pairs of bars, and it is held there securely. Thereupon the projection 78 on the disk 77

slips off the contact-roller 79 of the arm 8. The spring 7 causes the coupling 6 to engage in the clutch 5, so that the shaft 3 now revolves. After a quarter-revolution of the shaft 3 the frame containing the pair of bars 32 33 reaches the position shown in the drawings, and after each quarter-revolution, respectively, reaches the position shown in the drawings. Thus it may be seen that under a certain pressure depending on the position of the weight 25 the pairs of bars are displaced with regard to one another, whereby the fiber is firmly gripped in two places at short distances and is rubbed between the two pairs of bars. This friction is repeated until the strip of fiber is sufficiently operated on, which will be the case after a certain number of revolutions of the shaft 3. According to the proportion of the transmission (ratio of gearing) between the shafts 13 and 3 on the one hand and that of the shafts 13 and 46 on the other hand after a certain number of revolutions the projection 78 of the disk 77 will then again cause the coupling 6 to disengage from the clutch 5, so that the frame 18 again becomes stationary. The proportion of the transmission is arranged in such a manner that after the rubbing process is finished the disengagement or uncoupling of the shaft 3 leaves the frame 18 again in its position. Immediately after the shaft 3 has uncoupled, the rollers 59 again fall into the grooves 61 of the disks 60. The bar 35 is consequently raised. Then the projection 44 of the disk 45 pushes the lever 42 outward. This latter presses with its piece 42' against the angle-lever 28, so that the movement of the slide 21 takes place and on account of the lever 30 engaging in the slot 31 a displacement of the frame 18 also takes place. The pair of bars 32 33 is thus moved away from the pair of bars 34 35 and at the same time the bar 33 is raised. Now, therefore, both pairs of bars are opened and at a distance from each other. Thereupon the projection 68 of the disk 60 reaches a groove 70 of the wheel 71 and moves the latter one cog 69 farther. The rotation of the wheel 71 is transmitted to the roller 62 by means of the wheels 73, 75, and 76. As the roller 63 is caused by the weight 68 to press against the roller 62 the roller 63 also revolves and the fiber is moved to a corresponding extent. The described operation then is repeated, whereby the next strip of fiber is gripped and treated. The fiber throughout its whole length is thus consequently treated in the manner described and mechanically and automatically transformed into a number of filaments capable of being spun. Obviously the machine can be operated with any desired motive power by means of belt-pulleys or the like instead of being worked by hand.

Having now particularly described and as-

certained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. A machine for splitting raw or crushed fibers into textile fibers suitable for spinning and other purposes, consisting of two pairs of bars movable with regard to one another, and capable of holding the fibers at short distances apart, means for applying pressure to said bars to press them toward each other and for giving them a reciprocating motion relative to each other, and means for automatically displacing the fibers between the gripping-bars after a predetermined interval substantially as described.

2. A machine for splitting raw or crushed fibers into textile fibers suitable for spinning and other purposes, consisting of two pairs of bars movable with regard to one another and capable of holding the fibers at short distances apart, means for pressing said bars toward each other and for giving them a reciprocating motion relative to each other and a vertically-adjustable roller in combination with a fixed roller, and means for rotating said rollers from time to time and thus moving the fibers to an extent corresponding to the finished work, substantially as described.

3. A machine for splitting raw or crushed fibers into textile fibers suitable for spinning and other purposes, consisting of two pairs of bars movable with regard to one another and capable of holding the fibers firmly at short distances apart, means for pressing said bars toward each other and for giving them a reciprocating motion relative to each other, a driving-shaft for operating said means, a clutch for coupling and uncoupling said shaft, and means for automatically displacing the fibers between the gripping-bars after a given number of revolutions of the driving-shaft substantially as described.

4. A machine for splitting raw or crushed fibers into textile fibers suitable for spinning and other purposes, consisting of two pairs of bars movable with regard to one another and capable of holding the fibers firmly at short distances apart, means for pressing said bars toward each other and giving them a reciprocating movement relative to each other, a driving-shaft for operating said means, means for automatically displacing the fibers between the gripping-bars after a given number of revolutions of the driving-shaft and means for automatically opening the gripping-bars by means of gearing from said shaft, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

FRANZ SZYMANSKI.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.