

No. 661,466.

Patented Nov. 6, 1900.

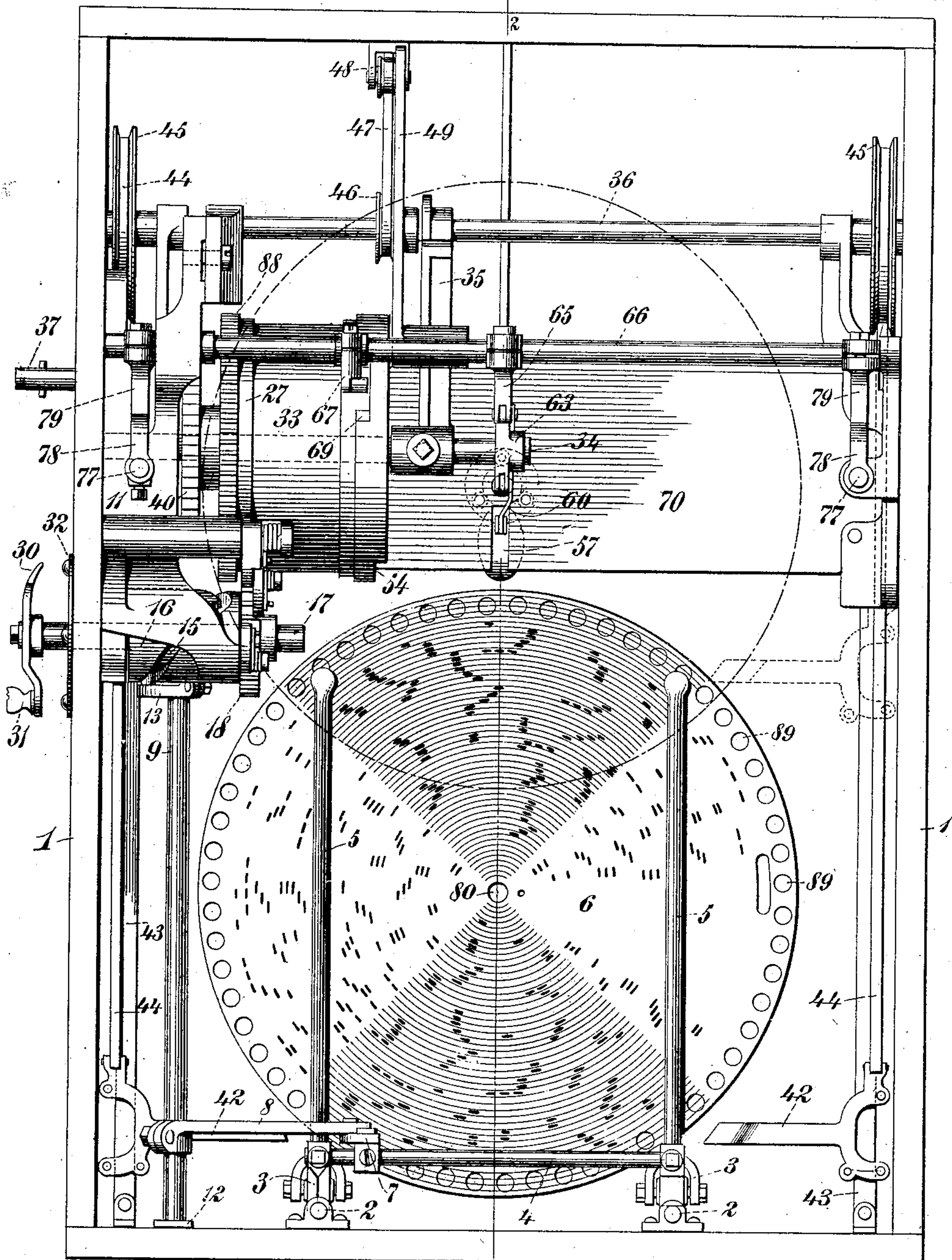
G. A. BRACHHAUSEN.

AUTOMATIC MECHANICAL MUSICAL INSTRUMENT.

(Application filed Apr. 4, 1900.)

(No Model.)

6 Sheets—Sheet 1.



WITNESSES:

INVENTOR

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Fig. 1.

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Fig. 2.

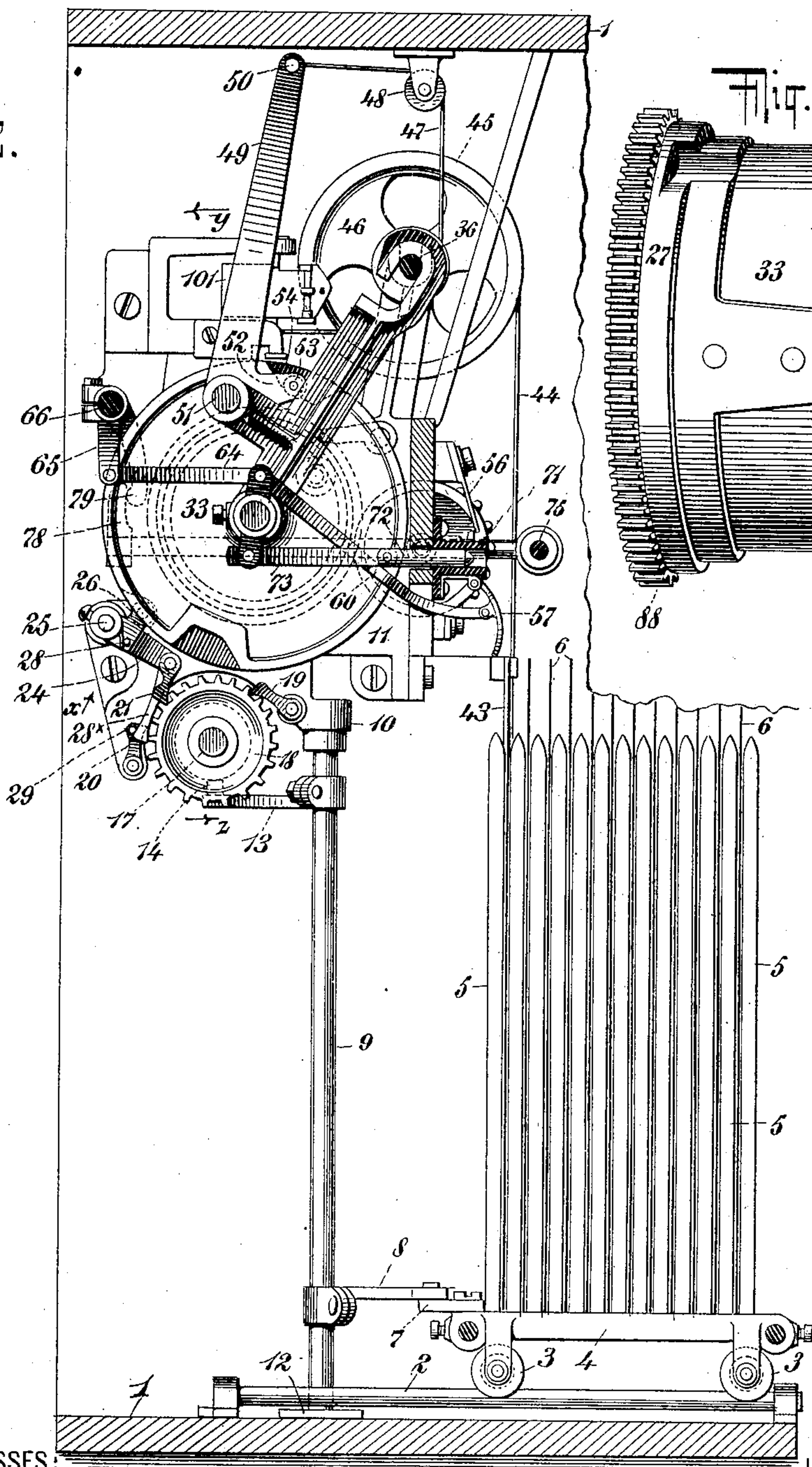
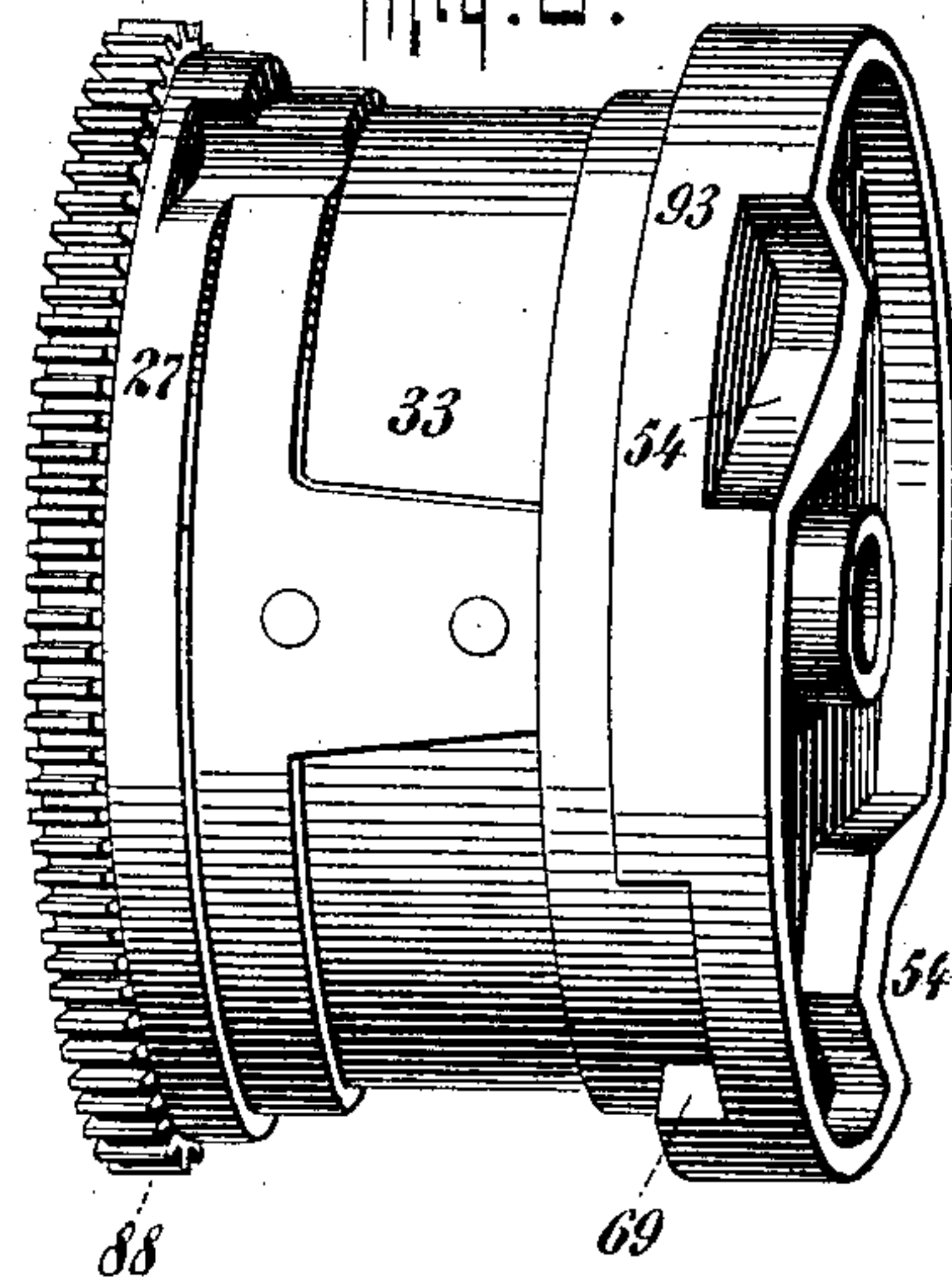


Fig. 3.



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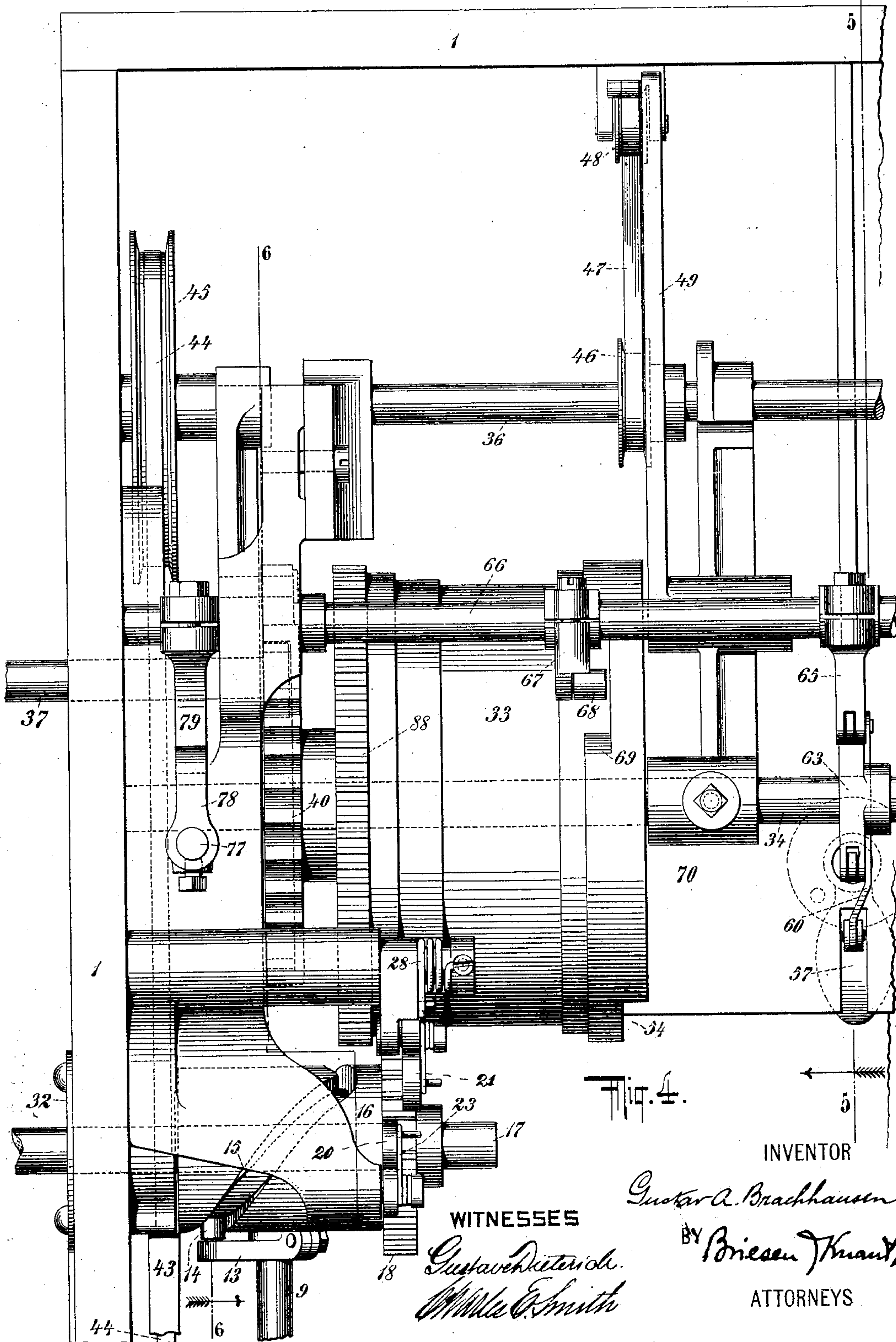
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6 Sheets—Sheet 3.



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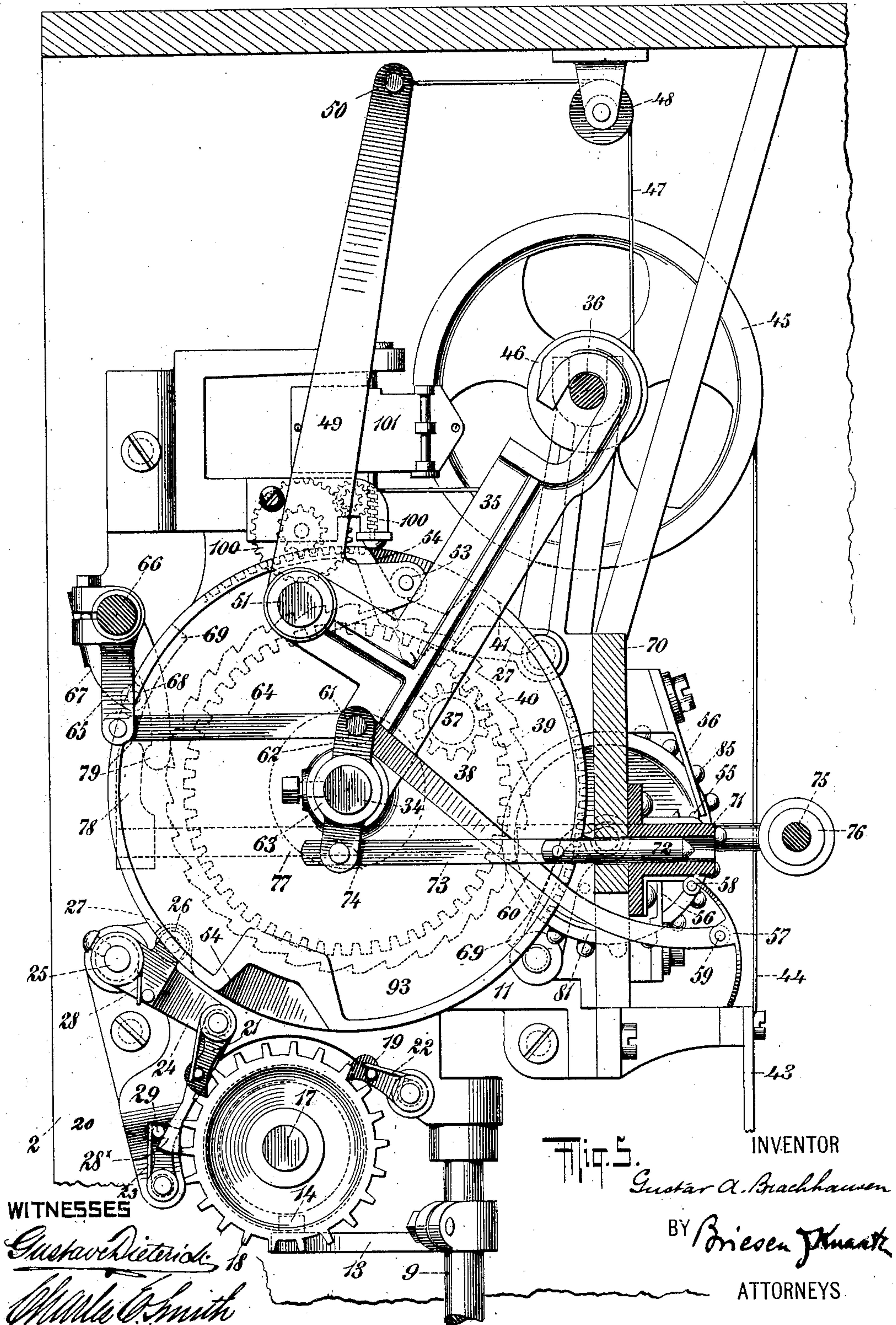
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6 Sheets—Sheet 4.



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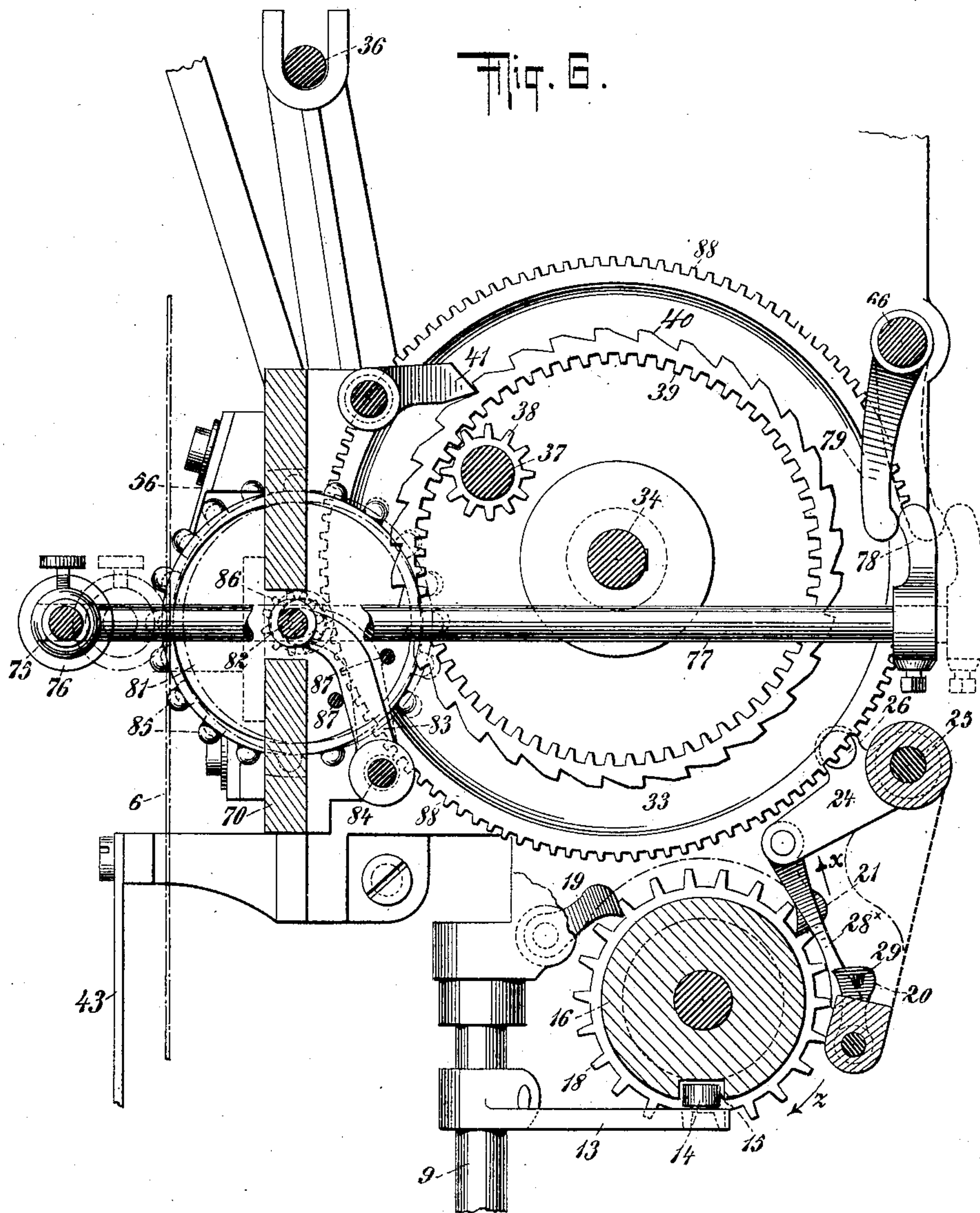
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(Application filed Apr. 4, 1900.)

(No Model.)

6 Sheets—Sheet 5.



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(No Model.)

6 Sheets—Sheet 6.

Fig. 7.

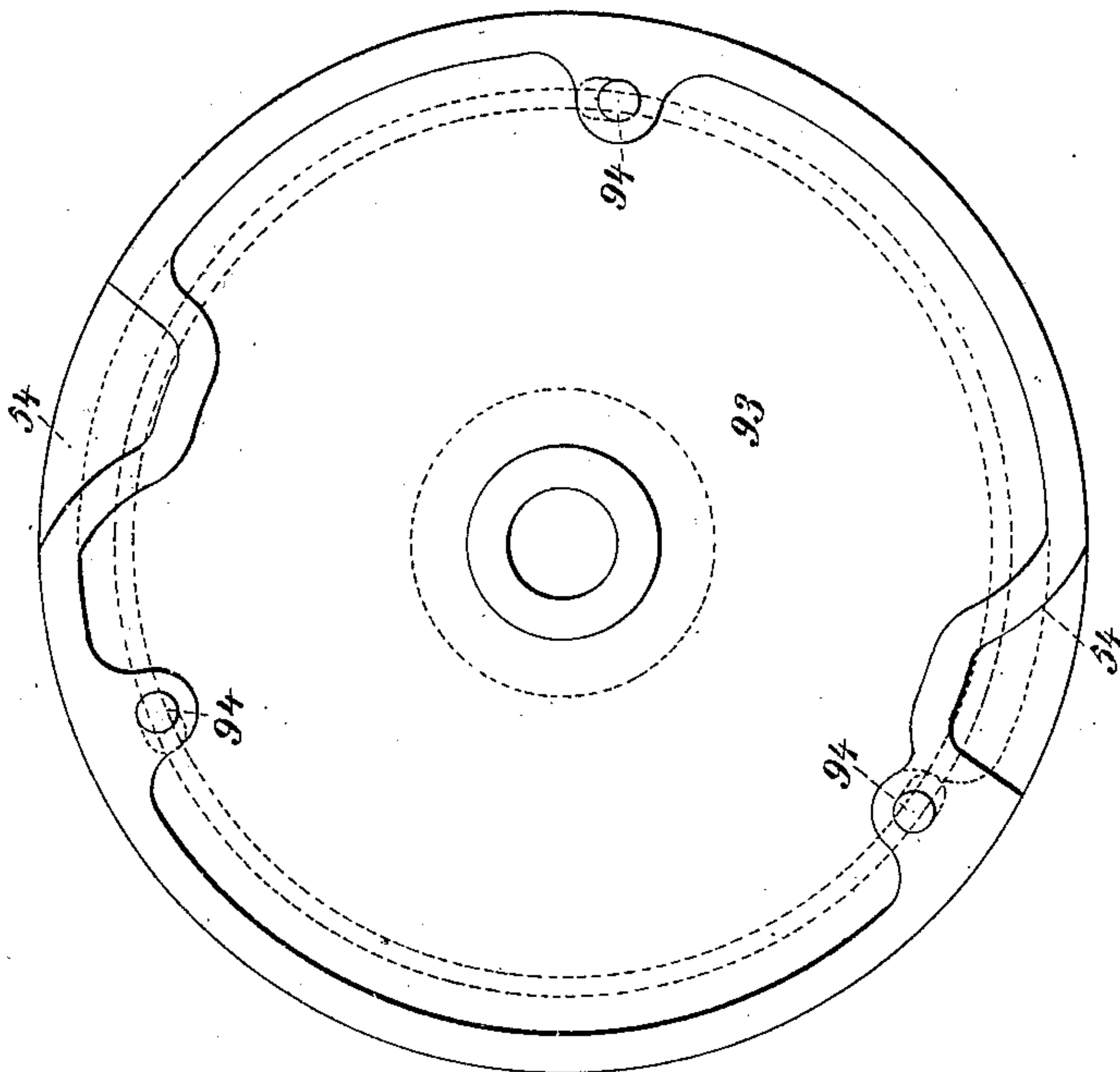
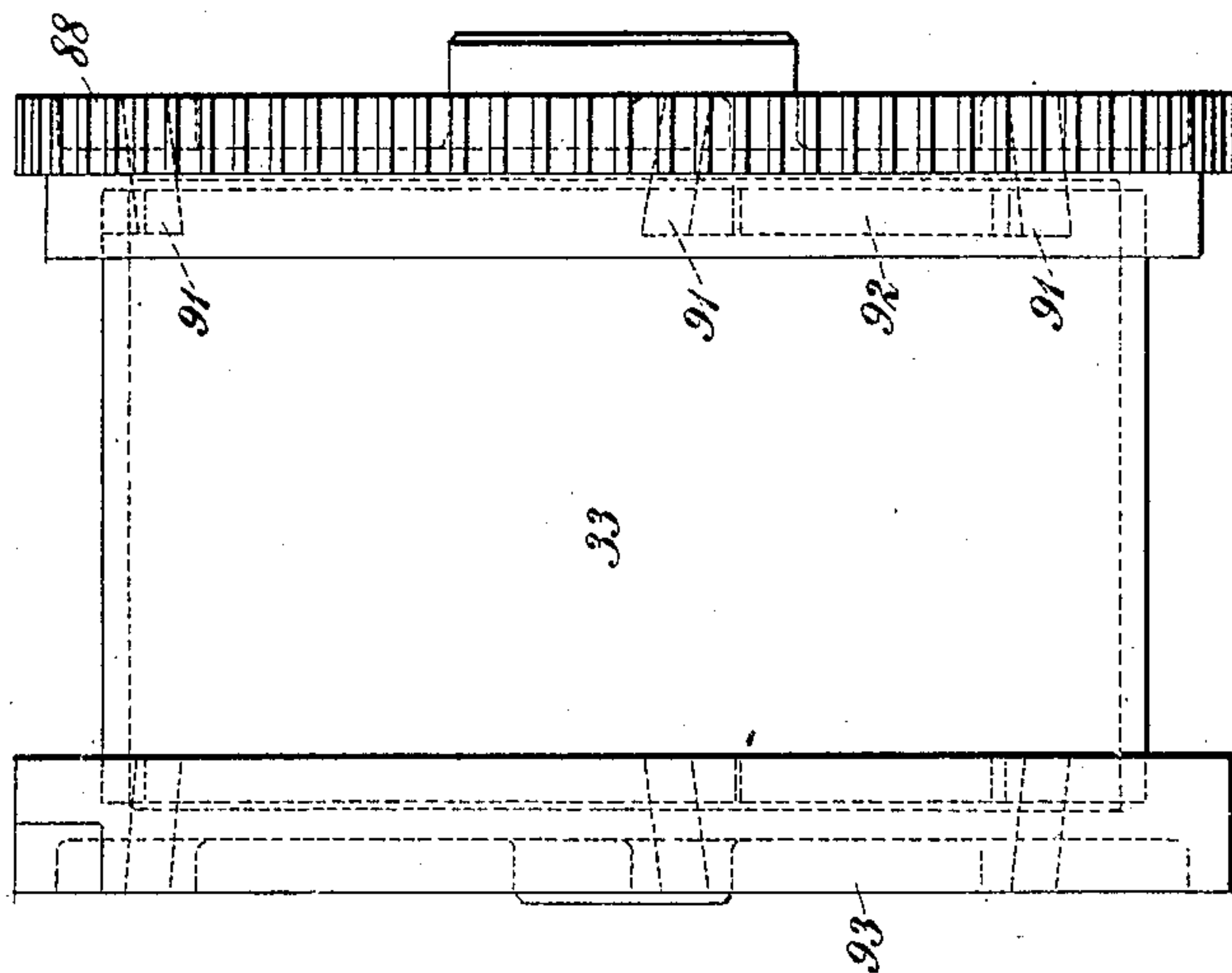


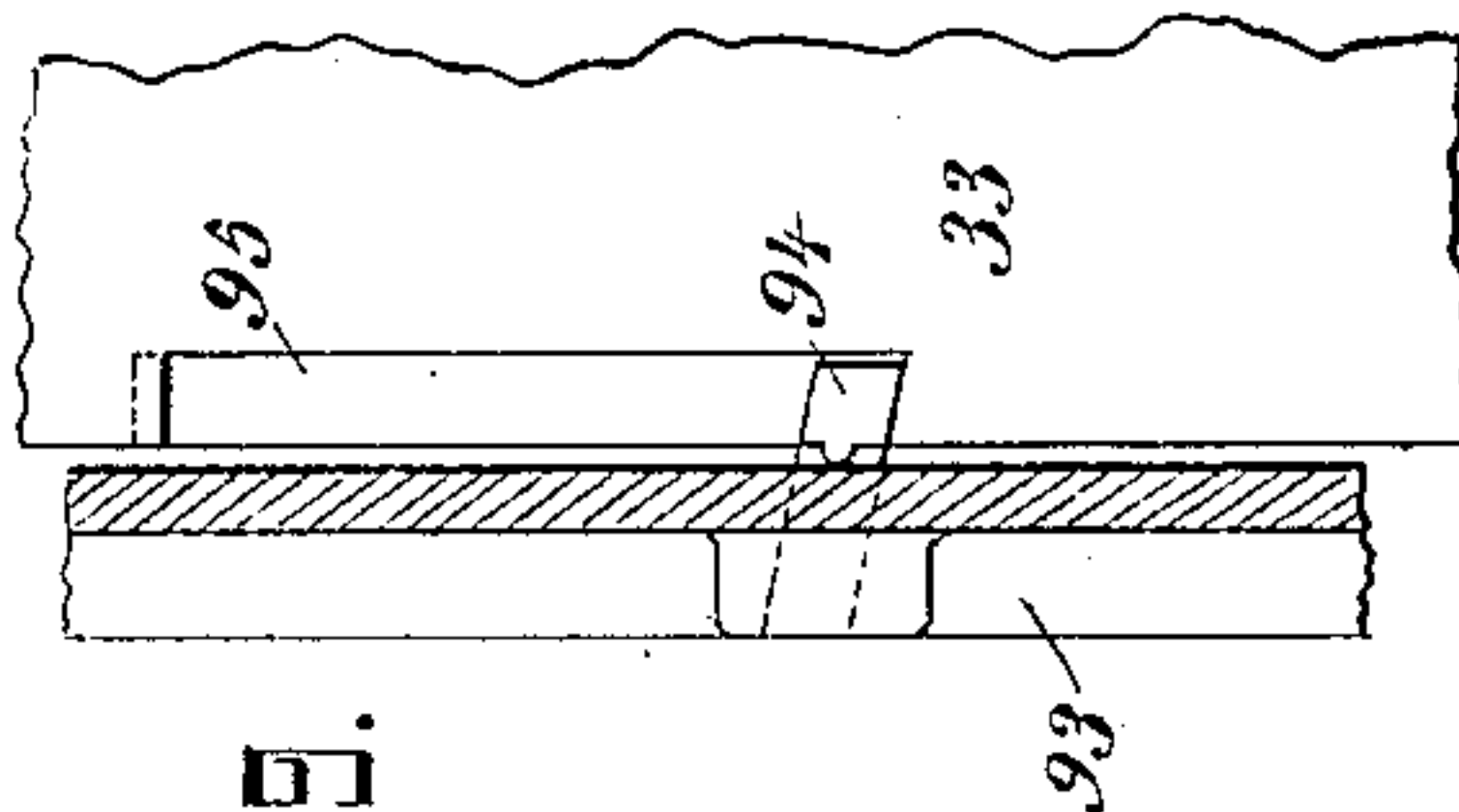
Fig. 8.



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Fig. 9.



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UNITED STATES PATENT OFFICE.

GUSTAV A. BRACHHAUSEN, OF RAHWAY, NEW JERSEY.

AUTOMATIC MECHANICAL MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 661,466, dated November 6, 1900.

Application filed April 4, 1900. Serial No. 11,415. (No model.)

To all whom it may concern:

Be it known that I, GUSTAV A. BRACHHAUSEN, a citizen of the United States, residing at Rahway, Union county, State of New Jersey, have invented certain new and useful Improvements in Automatic Mechanical Musical Instruments, of which the following is a specification.

My invention relates to automatic mechanical musical instruments, and more particularly to that character of mechanical musical instruments wherein separate note sheets or disks are automatically fed to and from operative position in the instrument.

The objects of my invention may briefly be said to be as follows: First, to provide a simple and efficient mechanical musical instrument which is automatic in all its operations and wherein the separate note sheets or disks may be automatically fed to a position to be conveyed automatically to and from operative position in the instrument and wherein the movement of the various portions of the instrument is effected by a single spring-motor, and, second, to provide simple and efficient means to insure against injury to the instrument by improper handling and to assure the automatic operation and accurate movement and operation of the various parts of the instrument.

To these and other ends, which will appear in the following description, my invention consists in the novel arrangement and combination of parts to be hereinafter described and claimed.

In the accompanying drawings, wherein like characters represent corresponding parts in the various views, Figure 1 is a rear view of a mechanical musical instrument embodying my invention. Fig. 2 is a transverse sectional view of the same with parts broken away, the section being taken on the line 2 2 of Fig. 1. Fig. 3 is an enlarged detail perspective view of the spring-drum. Fig. 4 is an enlarged detail rear elevation of a portion of the mechanism to be hereinafter more fully described. Fig. 5 is a transverse sectional view of the same, the section being taken on the line 5 5 of Fig. 4 and looking in the direction of the arrow on the said section-line. Fig. 6 is a sectional view of the portion of the mechanism shown in Fig. 4, the section being

taken on the line 6 6 of Fig. 4, the view looking in the direction of the arrow on said section-line. Fig. 7 is a detailed end view of the spring-barrel. Fig. 8 is a side view of the same; and Fig. 9 is a fragmentary detail sectional view of the same, to be hereinafter more fully referred to.

In mechanical musical instruments employing a carriage that contains note-sheets and having mechanism for moving individual note-sheets from such carriage into operative position and then operating said sheets by revolving them it has heretofore been found necessary to employ two separate and distinct spring-motors, one to rotate the disks and the other to feed the carriage and to move the disks into and out of operative position. My present invention enables me to move the carriage that contains the disks into and out of the disk-distributing position, to move respective disks out of said carriage into operative position and back to the carriage, and to rotate the disks when in operative position all by a single spring-motor, thereby doing away with the additional spring-motor heretofore deemed necessary in such structures.

Referring to the drawings, 1 designates the casing of the instrument in which the various parts are mounted. Secured to the base of the framing are suitable tracks 2, upon which rollers 3 are adapted to bear. These rollers are carried by what I term a "note-disk" carriage 4, which carriage is provided with a plurality of upright rods 5 for maintaining the disks 6 properly spaced apart, the space between each pair of adjacent rods 5 being adapted to receive a note-disk. The note-disk carriage 4 has connected thereto a link 7, which is pivoted to an arm 8, that is fixed upon a rock-shaft 9. This rock-shaft is journaled at its upper end in a bracket 10, constituting a portion of the main casting 11 of the instrument, whereas the lower end of the rock-shaft is journaled in the bed of the casing, as indicated at 12. The rock-shaft 9 is provided with a second arm 13, which is rigidly connected thereto and has at its free end a projection or antifriction-roller 14, that is adapted to enter the cam-groove 15 of the revolving cam-piece 16. The cam-groove 15 is an endless one and during a complete revo-

lution of the cam-piece 16 will cause the arm 13 to be vibrated back and forth and will in this manner cause the carriage 14 to be reciprocated upon its tracks 2 to the full extent of movement of said carriage. The cam-piece 16 is fixed upon a shaft 17, which projects through the casing 1, as indicated in Figs. 1 and 4 of the drawings. This shaft 17 is likewise provided with a gear 18, that is fixed thereto. Coöperating with the gear 18 are locking-pawls 19 and 20 and a stepping-pawl 21. The locking-pawls 19 and 20 are pivoted to a fixed portion of the instrument and are oppositely disposed. These pawls 19 and 20 may be normally maintained in engagement with the gear-wheel by springs 22 and 23, respectively. The vibrating or stepping pawl 21 is pivoted to an arm 24, which arm is pivoted at 25 and carries an antifriction-roller or projection 26, that is adapted to bear upon a cam 27 of the spring-drum. The antifriction-roller 26 is normally maintained in contact with the cam 27 on the spring-drum 33 by a spring 28. Pivoted to the arm 24 is a cam-piece 28^x, the inner face of which bears against the outer edges of the teeth of the gear-wheel 18, whereas the outer face of said cam-piece 28^x takes under the pin 29, carried by the locking-pawl 20. It being understood that the gear-wheel 18, together with the shaft 17, on which it is mounted, and the cam-piece 16 rotate in the direction of the arrow *z* in Fig. 2 of the drawings, it will be seen that when the arm 24 is vibrated in the direction of the arrow *x* the cam-piece 28^x will raise the locking-pawl 20 out of engagement with the teeth of the gear-wheel, so as to permit the free rotation thereof in the direction of the arrow *z*. The cam on the piece 28^x is so proportioned that the locking-pawl 20 will be permitted to engage the teeth of the gear-wheel at the instant that the vibrating or stepping pawl 21 has completed its operative stroke, which is a movement in a direction opposite to that of the arrow *x*. The locking-pawl 19 at all times prevents a reverse movement of the gear 18 and the parts connected thereto. The outer end of the shaft 17, which projects beyond the casing 1, is provided with a pointer 30 and with a handle 31, by means of which the shaft 17 and the parts connected thereto can be moved. This pointer 30 coöperates with a dial 32, bearing indices which indicate the tune to be played—that is to say, each number on the dial corresponds to a disk in the instrument, and when the pointer is opposite any given number it indicates that the particular disk corresponding with the number will be played. The teeth of the gear-wheel 18 and the stroke of the arm 24 are so proportioned that each vibration of the stepping-pawl 21 will cause the carriage to be moved one space to bring a note-disk into the path of the transporting mechanism, as will be hereinafter more fully described. It will thus be seen that automatic means are provided from which to move the note-disk

carriage automatically to a position where the note-disks may be conveyed automatically to and from operative position in the instrument, that hand-operated means are likewise provided to play any desired tune out of its order and to indicate the various tunes being played, and that the carriage is brought into position automatically or by hand.

The drum 33 is mounted upon a suitably-supported spindle 34, secured to the casting 11, and this spindle is suitably supported near its inner end by a bracket 35, loosely supported at one end upon the shaft 36. Projecting through the casing of the instrument is a winding-post 37, which communicates in a suitable manner with the spring contained in the drum 33 to effect a winding of the spring. This winding mechanism is best illustrated in Fig. 6 and in dotted lines in Fig. 5 of the drawings, and consists in the present instance of a pinion 38, carried upon the inner end of the winding-post and meshing with an internal gear 39, which gear has on its outer periphery a circular ratchet 40. A pawl 41, pivoted to a fixed portion of the instrument, is adapted to coöperate with the ratchet-wheel 40 to prevent a backward movement of the ratchet and the parts connected therewith. It will be understood that the combined gear and ratchet-wheel 39 40 is connected in a suitable manner with the inner end of the spring of the drum.

The mechanism for transporting the note-disks to and from operative position in the instrument consists in the present instance of bifurcated fingers 42, one of which is located at each side of the instrument, and these fingers are adapted to project into the path of the note-disks 6, as represented in Fig. 1 of the drawings. Each of the fingers is guided in its movement from the full-line position to the dotted-line position in Fig. 1 by suitable guide-rods 43. Each of the fingers has connected to it a flexible band 44. The opposite end of each of these bands is connected to a band-pulley 45, fixed upon the shaft 36. The shaft 36 is likewise provided with a band-pulley 46, to which a band 47 is connected. This band 47 is guided over a pulley 48, and the free end thereof is connected to a vibratory lever 49, as indicated at 50. The lever 49 is pivoted at 51 to a fixed portion of the instrument, and an arm 52 of this lever carries an antifriction-roller 53, which is adapted to bear upon a cam 54, formed upon the drum 33. It will be understood that a rotation of the drum 33 from the initial position represented in Fig. 2 of the drawings will cause the arm 49 to be moved in the direction of the arrow *y*, which will transmit a movement to the shaft 36, thereby causing the fingers 42 to be elevated to the dotted-line position shown in Fig. 1, and thus convey the note-disk 6 into the operative position in the instrument. A half-revolution of the drum 33 will bring it to a position where

an oppositely-disposed depression in the cam 54 will occur and the note-disk will be conveyed by the fingers 42 back to its proper place in the carriage.

5 During the movement of the note-disk to and from the operative position in the instrument it is desirable that the disk be maintained out of contact with the star-wheels 55 (see Fig. 5) of the instrument, so as not to
10 cause a premature rotation thereof, and thus effect a premature operation or vibration of the comb or combs 56, which in the present instance constitute the sounding device. For
15 this purpose I employ an automatically-operated shield 57, which is pivoted at 58 to a fixed portion of the instrument and is further pivoted, as indicated at 59, to a link 60. The
20 link 60 is pivoted, as indicated at 61, to an arm 62, secured to a collar 63, that is movably mounted upon the spindle 34. This arm 62 is likewise pivoted to a link 64, which has its opposite end pivoted to an arm 65, carried
25 upon a rock-shaft 66. An additional arm 67 on this rock-shaft carries at its free end an antifriction-roller 68, that is adapted to bear upon a cam 69, formed upon the drum 33. It will thus be seen that a rotation of the
30 drum 33 will cause the rock-shaft 66 to be vibrated, which will transmit movement to the intermediate parts between the arms 65 on the rock-shaft 66 and the shield 57, thereby causing the shield to be deflected outwardly when the note-disk is being moved to and
35 from the operative position to prevent contact between the note-disk and the star-wheels 55 of the instrument. It will be understood that the parts are so positioned and the cam so formed that this outward movement of the
40 shield 57 takes place just before a note-disk is to be moved to or from the operative position. In other words, the roller 68 is in the depression 69 the entire time the roller 53 is below the periphery of the drum 33.

Upon the bed-plate 70 of the instrument is
45 secured a hollow spindle or guide 71, (see Figs. 2 and 5,) through which is adapted to be projected a movable pivot-pin 72. The inner end of this pivot-pin is pivotally connected to a link 73, which has its opposite end
50 pivoted to an arm 74. This arm 74, like the arm 62, is formed upon the sleeve 63 and is adapted to move therewith. It will be understood that the movement hereinbefore referred to of the rock-shaft 66 will likewise
55 produce a movement of the movable pivot-pin 72. A clamping-rod 75 extends across the face of the bed-plate throughout the diameter of the note-disk and has mounted thereon antifriction-wheels 76. Each end of
60 this clamping-rod 75 is connected to a movable rod 77, which extends through the bed-plate of the instrument, and each of these rods is provided at its rear end with an abutment 78, with which a wiper-arm 79 coöper-
65 ates. Each of these wiper-arms is fixed upon

the rock-shaft 66 and is adapted to move therewith. The clamping-rod 75 is normally maintained in an outward or released position by suitable springs. (Not shown.) It
70 will be understood that when the rock-shaft 66 is turned a movement is transmitted to the clamping-rod 75 to move the bearing-rollers 76 thereof into or out of contact with the note-disk, which has been transported to the operative position.

75 Briefly stated, the operation of this portion of the instrument is as follows: A note-disk having been elevated to the operative position in the instrument, the rotation of the spring-drum 33 will cause the rock-shaft 66
80 to be vibrated, thus transmitting movement to the various parts connected therewith. The pivot-pin 72 is projected through the central bearing 80 of the note-disk, and the clamping-rod will be simultaneously moved
85 in a direction opposite to that of the movement of the pivot-pin 72, so as to clamp and maintain the note-disk in the operative position. During this movement of the parts the shield 57 has been withdrawn from the
90 path of the note-disk.

After the above operations have been completed it is necessary to engage the note-disk, so as to transmit a rotary movement thereto around its pivot-pin. This movement of the
95 note-disk is effected in the following manner: By referring to Fig. 6 of the drawings it will be seen that the driving-wheel 81 is pivoted, as indicated at 82, upon a link 83, which link in its turn is pivoted to a fixed portion of the
100 instrument, as indicated at 84. The driving-wheel 81 is provided with engaging projections 85 and with a pinion 86. Pins 87, carried by a fixed portion of the instrument, limit the vibration of the link 83, and thereby
105 determine the limit of movement of the driving-wheel 81. In the outward position of the driving-wheel (illustrated in Fig. 6 of the drawings) the pinion 86 is maintained out of engagement with the gear-wheel 88 on the
110 drum 33, and no movement is transmitted to the driving-wheel at this time. When, however, the clamping-rod 75 is moved from the full-line position represented in Fig. 6 to the dotted-line position, the interposed note-disk
115 6 will cause the driving-wheel 81 to be moved inwardly with the clamping-rod 75, and the pinion 86 will be brought into mesh with the driving-gear 88 on the drum. Immediately rotary motion will be transmitted from the
120 gear to the driving-wheel, which in turn will transmit a rotary movement to the note-disk by reason of the projections 85 engaging the apertures 89 in the note-disk. When the clamping-rod is again moved to the full-line
125 position, the driving-wheel will move by its own weight or otherwise to the full-line position, and the pinion 86 thereof will be immediately disengaged from the gear-wheel 88 on the spring-drum and there will be no fur-
130

ther movement of the driving-wheel until it is again operated by the gear-wheel in the manner hereinbefore described.

Considerable difficulty has been experienced heretofore in the construction of musical instruments by reason of the fact that a breaking of the spring thereof or of teeth on the gear is liable to cause injurious results and damage to the entire instrument by reason of the sudden releasing of the parts. I have by my present invention provided means to overcome this disadvantage heretofore found, and for a clearer understanding of the construction employed attention is directed to Figs. 7, 8, and 9 of the drawings, wherein the spring-drum 33 will be shown to be connected to the driving-gear 88, hereinbefore referred to, by a pin-and-slot connection. In the present instance I have provided inclined pins or projections 91 upon the gear-wheel 88. This gear-wheel is made in a separate piece from the drum, and the pins 91 project into undercut elongated grooves 92, as clearly indicated at the upper right-hand portion of Fig. 8 of the drawings. The length of the grooves 92 is considerably greater than the pins or projections are thick, so as to permit a free movement or backlash of the gear with relation to the drum. By inclining the pins in the manner stated the gear-wheel cannot be removed from the drum, but merely has a slight rotary movement independent thereof. The opposite end of the drum has a cam-piece 93 connected thereto in the same manner in which the gear-wheel 88 is connected to the drum. Thus the cam-piece is made of a separate piece from the drum and carries projections or pins 94, which are inclined and project into undercut elongated recesses 95, formed in the drum. The length of these recesses is such as to permit a free movement of the pins 94 therein, so that a free movement or backlash of the parts with relation to each other may be provided in case the spring of the drum is broken. The backlash of these parts prevents injury to the device as a whole in case of a sudden releasing of any of the parts. It will be understood that the instrument is provided with a train of gear 100, Fig. 5, which is operated by the gear 88 on the spring-drum and communicates motion to the governor 101 in the usual or any preferred manner.

It is thought from the foregoing description that a clear understanding of the operation of the various parts can be arrived at without a further detailed description of the operation.

It will be understood that in the present instance a single revolution of the drum will effect the rotation of two note-disks. For this reason I have provided two each of the cams 27, 54, and 69 to effect a corresponding number of operations of the carriage, the transporting mechanism, the clamping mechanism, &c., which are controlled by these

cams. However, it is obvious that a greater or less number of these cams may be provided, according to the number of movements to be transmitted to each of the parts during a single revolution of the drum. The mechanism hereinbefore described for preventing the instrument from becoming damaged by a sudden releasing of the parts is not claimed herein, but will constitute the subject of a separate divisional application.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The spring-drum 33 having cam or cams 54, and mechanism controlled thereby for raising and lowering a note-sheet, cam or cams 69 and mechanism controlled thereby for centrally supporting the elevated note-sheet, and cam or cams 27 and mechanism controlled thereby for moving the carriage that holds series of note-sheets and gear 88 on said drum for revolving the elevated note-sheet.

2. In an automatic mechanical musical instrument, the combination of a sounding device, an automatically-operated note-sheet carriage adapted to convey a note-sheet to a position to be transported into operative position in the instrument, means for engaging a sheet for transportation thereof to and from operative position in the instrument, driving means coöperating with the sheet when it is in the operative position to effect a rotation thereof to play the instrument, a single spring-motor and intervening mechanism between said spring-motor and the carriage and between the spring-motor and transporting means for operating the same at different predetermined intervals.

3. In an automatic mechanical musical instrument, the combination of a sounding device, an automatically-operated note-sheet carriage adapted to convey a note-sheet to a position to be transported into operative position in the instrument, locking mechanism for locking said carriage against movement, means for engaging a note-sheet for transportation thereof to and from operative position in the instrument, driving means coöperating with the sheet when it is in operative position to effect a rotation thereof to play the instrument, a single spring-motor, intervening mechanism between said spring-motor and the carriage and between the spring-motor and the transporting means, for operating the same at different predetermined intervals and intervening means between the motor and the carriage-locking mechanism for automatically operating said locking mechanism.

4. In an automatic mechanical musical instrument, the combination of a sounding device, an automatically-operated note-sheet carriage adapted to convey a note-sheet to a position to be transported into operative position in the instrument, means for engaging sheets for transportation thereof to and from

operative position in the instrument, driving means cooperating with the sheet when it is in operative position to effect a rotation thereof to play the instrument, a single spring-motor, intervening mechanism between said spring-motor and the carriage and between the spring-motor and the transporting means for operating the same at different predetermined intervals, guiding mechanism for preventing the note-sheets from reaching contact with the sounding device in the movement of the sheets to and from operative position and means for operating the guiding means from said spring-motor.

5 5. In an automatic mechanical musical instrument, the combination of a sounding device, an automatically-operated note-sheet carriage adapted to convey a note-sheet to a position to be transported into operative position in the instrument, locking mechanism for locking said carriage against movement, means for engaging a sheet for transportation thereof to and from operative position in the instrument, driving means cooperating with the sheet when it is in the operative position to effect a rotation thereof to play the instrument, a single spring-motor, intervening mechanism between said spring-motor and the carriage and between the motor and the transporting means for operating the same at different predetermined intervals, intermediate means between the motor and the carriage-locking mechanism, for automatically operating said locking mechanism, guiding mechanism for preventing the note-sheets from reaching contact with the sounding device in the movement of the sheets to and from operative position, and means for operating the guiding means from said spring-motor.

6. In an automatic mechanical musical instrument, the combination of a sounding device, an automatically-operated note-sheet carriage adapted to convey a note-sheet to a position to be transported into operative position in the instrument, means for engaging a sheet for transportation thereof to and from operative position in the instrument, driving means cooperating with the sheet when it is in operative position to effect a rotation thereof to play the instrument, a single spring-motor, intervening mechanism between said spring-motor and the carriage and between the spring-motor and the transporting means for operating the same at different predetermined intervals, automatically-operated means for clamping the note-sheet in the operative position and for releasing the sheet after it has been rotated by the driving means, and mechanism for operating said clamping means from the spring-motor.

7. In an automatic mechanical musical instrument, the combination of a sounding device, an automatically-operated note-sheet carriage adapted to convey a note-sheet to a position to be transported into operative position in the instrument, means for engaging a sheet for transportation thereof to and from operative position in the instrument, driving means cooperating with the sheet when it is in operative position to effect a rotation thereof to play the instrument, a single spring-motor, intervening mechanism between said spring-motor and the carriage and between the spring-motor and the transporting means for operating the same at different predetermined intervals, a movable pivot adapted to be received in a bearing in each of the note-sheets and means operated by the spring-motor for automatically inserting said pivot in the bearing of a note-sheet when the same is in the operative position in the instrument.

8. In an automatic mechanical musical instrument, the combination of a sounding device, an automatically-operated note-sheet carriage adapted to convey a note-sheet to a position to be transported into operative position in the instrument, means for engaging a sheet for transportation thereof to and from operative position in the instrument, driving means cooperating with the sheet when it is in the operative position to effect a rotation thereof to play the instrument, means for clamping the sheet in operative position, a movable pivot for the sheet, locking mechanism for locking the carriage against movement and a single spring-motor operatively connected to said transporting means, driving means, clamping means, movable pivot and locking mechanism to effect a movement thereof.

9. In an automatic mechanical musical instrument, the combination of a sounding device and an automatically-operated note-sheet carriage adapted to convey a note-sheet to a position to be transported into operative position in the instrument, means for engaging a sheet for transportation thereof to and from operative position in the instrument, driving means cooperating with the sheet when it is in operative position to effect a rotation thereof to play the instrument, means for maintaining the driving means out of action while a note-sheet is being conveyed to and from operative position, locking mechanism for locking the carriage against movement and a single spring-motor operating the transporting means, driving means, locking mechanism and the means for maintaining the driving means out of action.

10. In an automatic mechanical musical instrument, the combination of a sounding device, an automatically-operated note-sheet carriage adapted to convey a note-sheet to a position to be transported into operative position in the instrument, means for engaging a sheet for transportation thereof to and from operative position, a driving-wheel cooperating with the sheet when it is in the operative position to effect a rotation thereof to play the instrument, means for maintaining the driving-wheel out of action while a note-sheet

is being conveyed to and from operative position, means for clamping the sheet in operative position, a movable pivot for the sheet, locking mechanism for locking the carriage
5 against movement and a single spring-motor
operating the transporting means, driving
means, clamping means, movable pivot, lock-

ing mechanism and the means for maintaining the driving-wheel out of action.

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Witnesses:

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HANS V. BRIESEN.