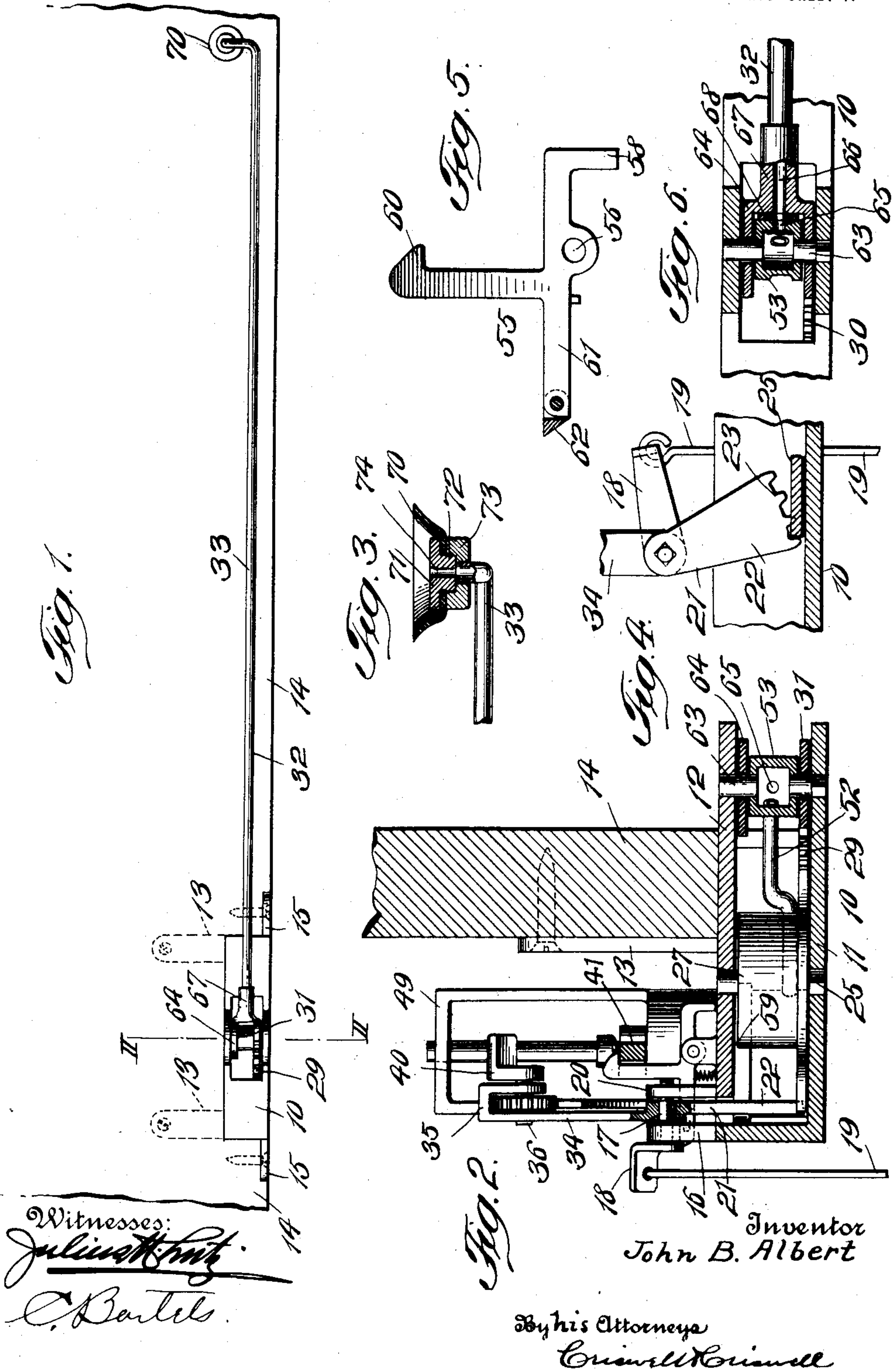


1,166,803.

Patented Jan. 4, 1916.
2 SHEETS—SHEET 1.



Witnesses:
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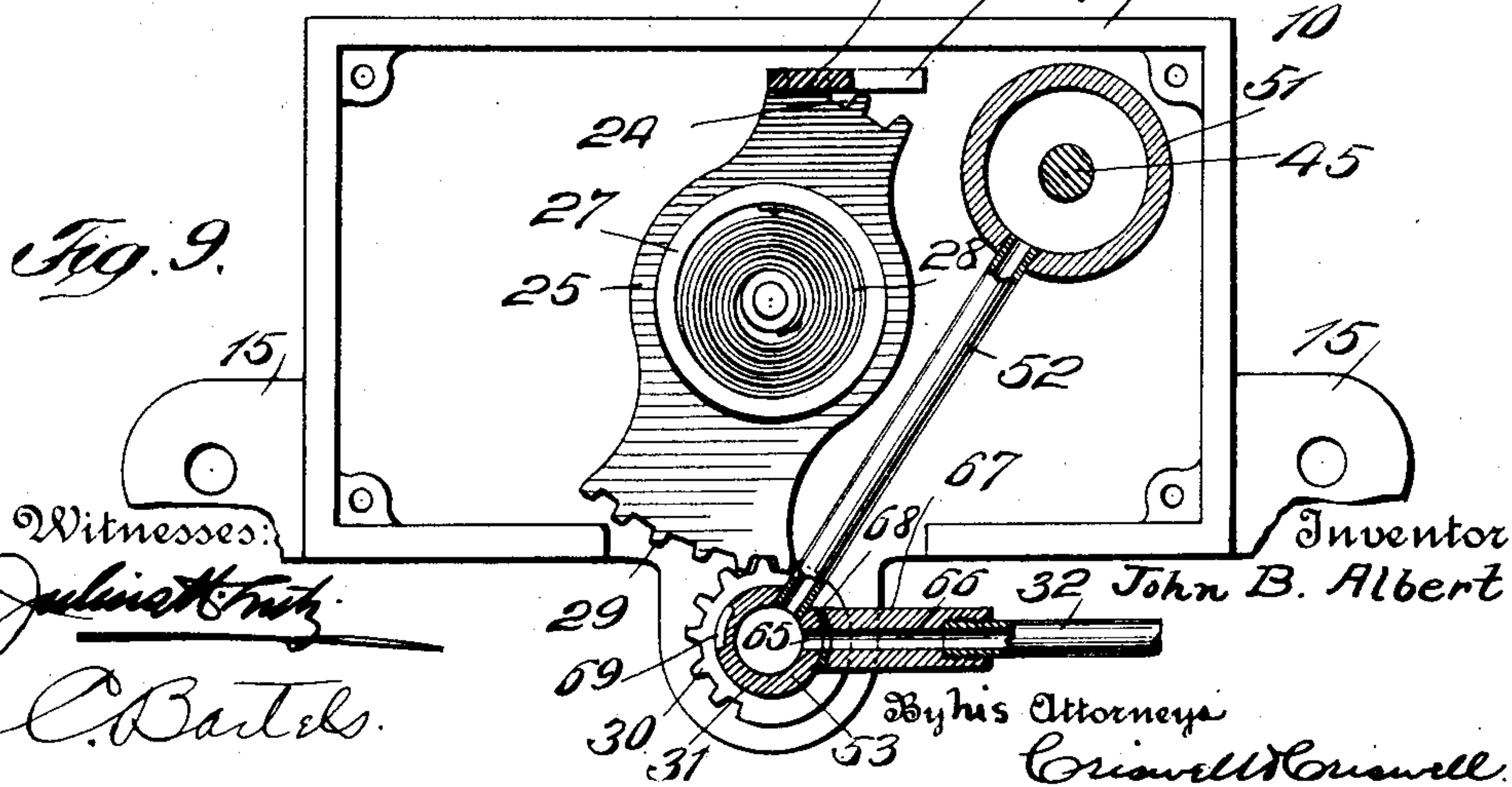
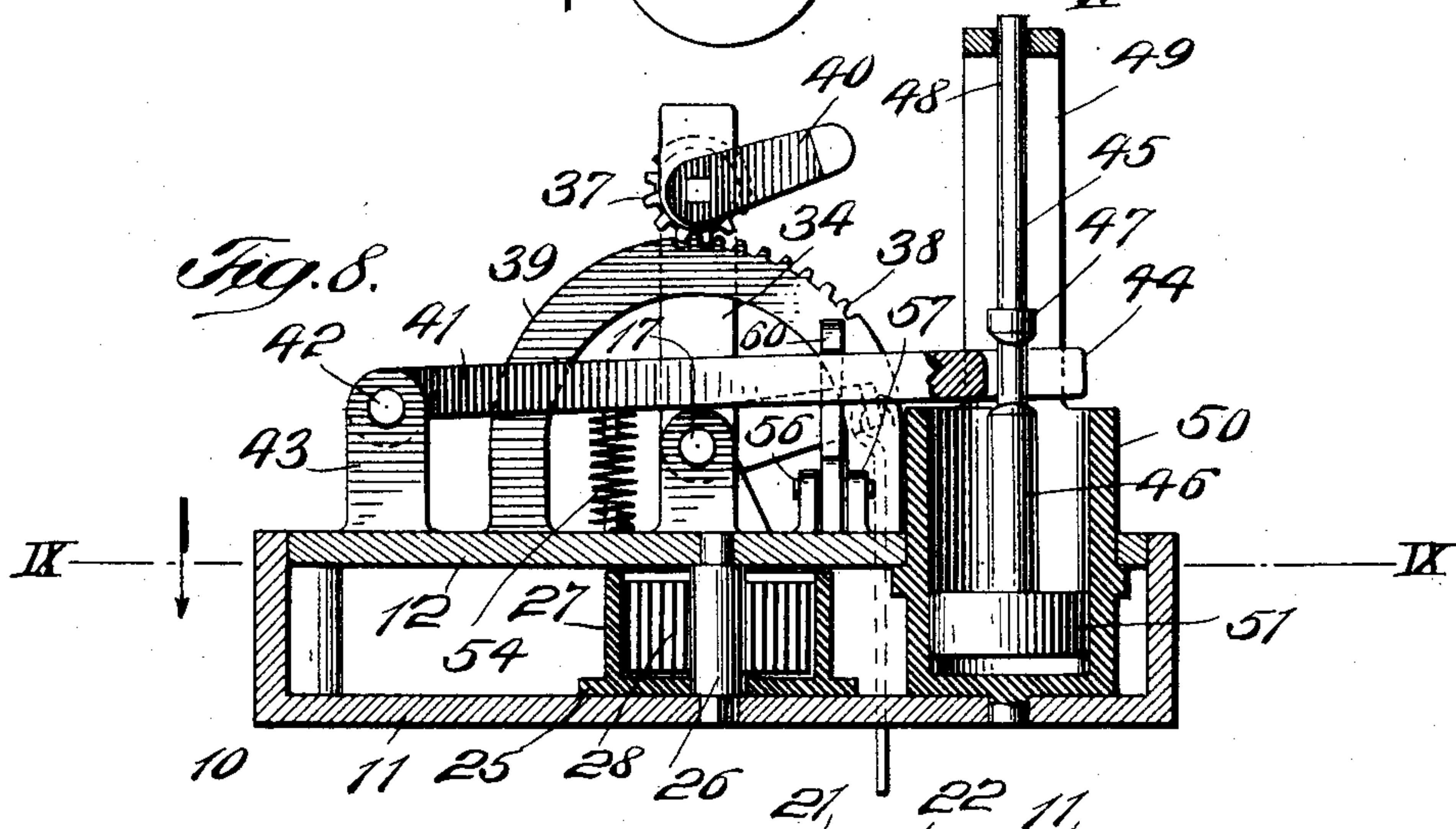
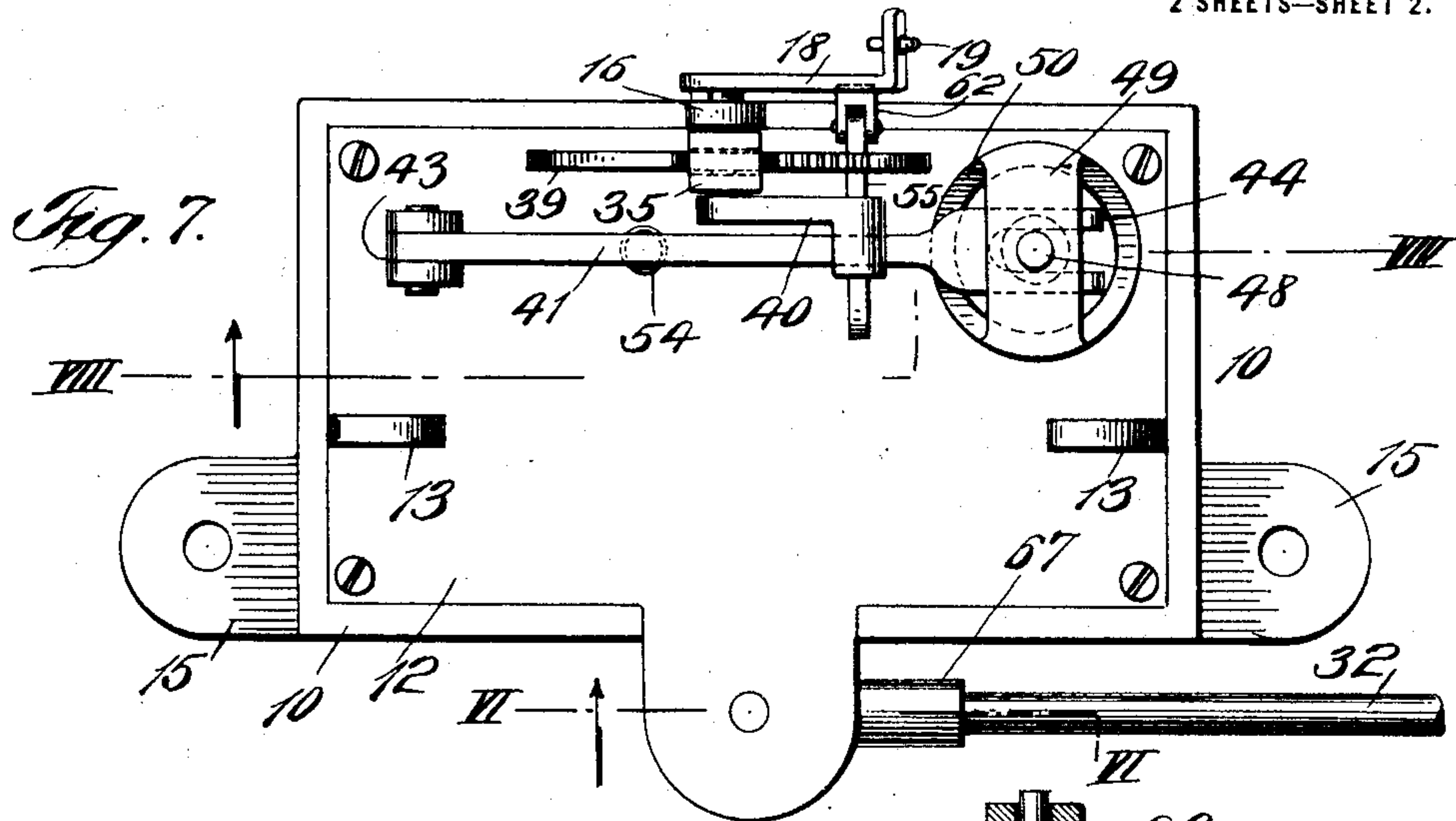
By his Attorneys
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APPLICATION FILED SEPT. 30, 1914.

1,166,803.

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2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

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LEAF-TURNER.

1,166,803.

Specification of Letters Patent.

Patented Jan. 4, 1916.

Application filed September 30, 1914. Serial No. 864,279.

To all whom it may concern:

Be it known that I, JOHN B. ALBERT, a citizen of the United States, and a resident of Danbury, county of Fairfield, and State of Connecticut, have invented certain new and useful Improvements in Leaf-Turners, of which the following is a full, clear, and exact description.

This invention relates more particularly to a device for turning the leaves of music while playing a piano or other instrument.

One of the principal objects of the invention is to provide a device which may be actuated at the will of a person playing an instrument, as a piano, and which after turning one leaf will automatically position itself and hold the next leaf to adapt the operator to turn the same at the proper time, thus overcoming the necessity for turning the leaves in succession by the hands and at the same time avoiding the necessity of providing a separate operating means for each leaf as is common in many devices of this kind as ordinarily constructed.

Another object of the invention is to provide a device which may be conveniently attached to a piano or other instrument and which may be operated by a pedal or other means to move a carrier, which in its movement will carry a leaf to turn the same to present a new page of music, and which carrier in its movement will automatically release the sheet thus turned and move back to its former position and pick up the next leaf ready for turning.

Other objects of the invention are to provide a device which may be variously operated; to provide simple means whereby a carrier may be swung from one position to another and to carry therewith the leaf to be turned; to provide simple means for releasing the leaf; and to provide simple pneumatic means whereby the successive leaves may be automatically moved from one side of the book to the other side.

A further object of the invention is to provide a device which is simple in construction and which may be readily made and assembled.

A still further object of the invention is to provide a device in which successive leaves may be turned by a single carrier.

With these and other objects in view, the invention will be hereinafter more particularly described with reference to the accompanying drawings, which form a part of

this specification, and will then be pointed out in the claims at the end of the description.

In the drawings, Figure 1 is an elevation of one form of device embodying my invention. Fig. 2 is an enlarged transverse section taken on the line II—II of Fig. 1. Fig. 3 is an enlarged fragmentary section of the suction cup or head for moving the leaves from one side of the book to the other side. Fig. 4 is a fragmentary section, partly in elevation, showing a part of the mechanism for moving the carrier. Fig. 5 is a detail view of a detent or latch for the plunger operating arm. Fig. 6 is a transverse section, partly in elevation, taken on the line VI—VI of Fig. 7. Fig. 7 is an enlarged plan view, a part of the carrier being broken away. Fig. 8 is a vertical section, partly in elevation, taken on the line VIII—VIII of Fig. 7; and Fig. 9 is a sectional plan taken on the line IX—IX of Fig. 8.

In the character of device shown, there is an arm forming a part of a pneumatic carrier for the leaves and which is connected to a pump to create suction or a vacuum in said arm. This arm is pivotally held to move horizontally from substantially the center of the instrument to which the device is applied to substantially one-half of a complete movement of one hundred and eighty degrees. Means are provided whereby suction can be created in the arm or destroyed and both the movement of the arm as well as the suction means may be controlled from one of the instrument pedals when applied to a piano or like instrument, though ordinarily the center pedal which is not used to the same extent as the two other pedals is employed for this purpose.

A casing 10 of substantially box-like form is arranged substantially centrally of the instrument and immediately adjacent to the support provided for the music book. This casing comprises a bottom section 11 and a top section 12, the latter being provided with upwardly extending lugs or arms 13 which are adapted to be secured to a part 14 of the usual music support. The lower box section has lugs 15 by which the casing may be held to the lower edge of said support, though the form of the casing and the method of securing the same to a support may be changed. At the rear of the casing is a projecting part or lug 16 in which is rotatably held a shaft 17. On the outer end

of the shaft 17 is a crank arm 18 which may be connected by a wire or rod 19 to a pedal, not shown, or otherwise operated so that when the pedal is depressed, the shaft 17 will be given a partial rotation. The inner end of the shaft 17 is journaled in a lug or projection 20 and between the lugs 16 and 20 the said shaft is made rectangular and is adapted to move a lever 21 which is positively held thereto. The lower end 22 of the lever 21 is provided with teeth forming a sector 23 which is adapted to mesh with teeth 24 of a mutilated or double segmental gear 25. The gear 25 is pivotally held to move about a stud or spindle 26 and carries a drum portion 27 centrally of which the spindle 26 is located, the latter serving as the axis of the gear 25. The drum portion 27 has a coil spring 28, one end of which is fastened to the drum portion 27 and the other end to the spindle 26 so that when the gear is moved in one direction, the spring 28 will be wound in order to permit the spring when released to force the gear 25 to its normal position or that shown in the drawings. The outer end of the gear 25 on one side of its axis is provided with a set of teeth 29 and these teeth are in mesh with the teeth 30 of a pinion or curved rack 31. The pinion 31 need not have teeth about its entire circumference for the reason that it does not make a complete rotation, and held to rotate with the pinion is an arm 32 of a carrier 33. It will be evident that when the pedal is moved to force the arm 18 downward, the lever 21 will cause the segment 22 to move the gear 25 and through the teeth 29 move the pinion 31 and carrier 33 substantially one-half of a complete movement, and when the pedal is released, the carrier will be restored to its normal position or that shown in the drawings.

As a means for creating suction within the carrier in order that the said carrier may successively move the leaves from one side of the book of music to the other side without injury thereto, various means may be employed. As shown, an arm 34 of the lever 21 extends upward above the shaft 17 and has an overhanging substantially bifurcated part 35 in which is journaled a stud or spindle 36. On the spindle 36 is a pinion 37, the teeth of which are adapted to engage the teeth 38 of a sector 39 which is mounted upon the top member 12 of the box casing so that as the lever is moved by the movement of the crank 18, the pinion 37 in its movement around the sector 39 will be rotated and thereby rotate the shaft or stud 36. The stud 36 at its inner end carries a crank 40, the outer end of which in its rotary movement is adapted to engage an arm 41 so as to force the latter downward to the position shown in Figs. 2 and 8, the position of the parts being in their normal posi-

tion or that wherein the carrier has been operated to move one leaf and is now in position to move a second. The arm 41 is pivoted at one end, at 42, to a lug or projection 43 on the casing 10 and at its outer end is bifurcated, at 44, to span a piston or pump rod 45. The rod 45 may be enlarged both above and below the arm, as at 46 and 47, to confine the end 44 between such enlargements, and said rod has its upper end 48 guided in a substantially U-shaped bracket 49 extending upward from a pump cylinder 50. At the lower end of the rod 45 is a piston 51 which on its upward movement is adapted to withdraw the air through a connection 52 leading from the lower end of the cylinder to a suction box, connection or part 53, about which the pinion 33 is adapted to move and which box is axially arranged with respect to said pinion. If the arm 41 at the start of the operation of the movement of the pedal is in its raised position, it will be evident that the rotation of the crank 40 will move the arm downward to the position shown in Figs. 2 and 8, against the tension of a spring 54, one end of which spring bears against the under side of the arm 41, the other end of said spring resting against the casing top 12, said spring tending normally to force the arm in a raised position so that the piston 51 is near the upper part of the cylinder 50. When in the lowered position, a catch or latch 55 holds the arm 41 in such position, as shown, permitting thereby the lever 34 with its crank 50 to return to the position shown. This is the normal position of the parts. The latch 55 is pivoted at 56 between the lugs 57 and has one end forming a stop 58 and is so arranged that a spring 59 will tend normally to force the hooked end 60 over the upper edge of the arm 41 and hold said arm in its lowered position. The latch 55 has a rearwardly projecting arm 61 to which is held a pivoted end 62 and this end is adapted to be engaged by a part of the crank 18 at the initial movement of the pedal. The initial movement of the pedal will release the latch 55 from the arm 41 which will permit the spring 54 to force the arm upward with a very quick action and this will force the piston 51 also upward so as to create suction within the cylinder and the parts connected therewith. The continued movement of the pedal and the arm 18 will rotate the carrier 33 through the segmental gear or lever 25 from the position shown in the figures to the position required to move one sheet of the book to the other thereof and to permit the arm again to be restored through the spring 28, thus during the swinging movement of the carrier 33 and during the downward movement of the crank 18, the pump operating arm 41 is released for suction purposes and is then moved downward and held in such down-

ward position by the latch 55 ready for another movement of the pedal.

The suction box or connection 53 which is connected to the pump by the pipe 52, is immovably held to a stem or spindle 63, Fig. 6. It is substantially cylindrical in form, and closed at the upper and lower portion thereof and is located above the gear or pinion 31 and under the flange 64 of the arm 32 of the carrier 33, the pinion 31 serving as a lower flange for the arm and said gear may be separate therefrom but rigidly held thereto or may be formed as a continuation of the arm with teeth on one side only as shown in the drawings. The suction box 53 has an opening 65 which is adapted to communicate with the passage 66 of the tubular carrier arm 32. This arm is held so that there will be no leakage between the end of the arm 32 of the carrier in order that a vacuum may be maintained in said arm through the suction of the pump during the rotary movement of the carrier to move a sheet of music from one side of the book to the other. The arm 32 is provided with an enlarged portion or part 67 and at its end is a suitable packing 68 which bears tightly against the surface of the suction box so that when the carrier arm is moved through the arc of a circle, the said packing will maintain the vacuum within the arm after it has passed the opening 65 by reason of the engagement of the packing with the surface of the suction box. When the carrier arm makes an extreme movement as already described, the passage 66 of the carrier arm will come into alinement with the groove or channel 69 in the surface of the box so as to permit air to enter the passage in the carrier arm 32 so that the vacuum therein will be destroyed in order to release the leaf and permit the arm to return to its normal position.

At the outer end of the arm 32, Figs. 1 and 3, is a suction or vacuum device which is adapted to engage the surface of the successive leaves at the lower corner thereof and when suction is created in the carrier arm as already described, by the movement of the pump piston, the leaf of music to be turned will be held to said device so as to move therewith in its travel through the arc of a circle. This device may be constructed in various ways. As shown, a cup 70 preferably of light flexible rubber is held to the outer end of the carrier arm 33. A flange nut 71 has a threaded portion or stem 72 for engagement with the threaded socket of a collar or member 73. The nut 71 has an opening 74 therethrough communicating with the passage through the arm, the latter being curved upward as shown, and provided with a threaded end to which is secured the collar 73. As suction is created within the arm 33 and when the outer edge

of the cup is in engagement with the leaf, the suction created within the cup through the pump will cause the leaf to be held positively by said cup so as to move with the arm during the travel thereof until the vacuum is destroyed as already described.

The invention will be readily understood from the foregoing description when taken in connection with the accompanying drawings. Assuming that the parts are in a normal position as shown in the drawings, and connection made with the pedal of a piano or other instrument or other operating means so as to move the crank 18, it will be evident that on slight movement of the said crank the catch or latch 55 will have its hooked end 60 released from the upper surface of the arm 41 so that the latter will be forced upward quickly by the spring 54. This will create suction through the suction box, pneumatic carrier arm 32, and the suction cup 70 so as to cause the leaf of the music to be held thereto. As the pedal continues to move downward through the movement of the lever 21, two mechanisms are operated, that is, the pump mechanism and the pneumatic arm operating mechanism. The upper arm 34 by movement to the right, causes the crank 40 to be rotated and by its engagement against the piston operating arm 41 will force it to the position shown in Fig. 8 at which time the arm is again held by the latch 55 ready for a second movement of the pedal. During the downward movement of the piston pump arm 41, the lower arm 22 of the lever 21 through the teeth at the lower edge thereof moves the mutilated gear 25 and causes the teeth 29 thereof to move the pinion 31 and thereby rotate the carrier arm about the suction box and at the same time wind the spring 28. The movement of the pneumatic arm 32 will carry the leaf of music to be turned therewith and when it is moved to substantially one hundred and eighty degrees, the passage 66 in said tubular arm and in which the vacuum has been maintained through such movement through the arc of a circle, will come opposite to the channel 69 of the suction box 53 so as to permit air to enter therein and destroy the vacuum in the carrier arm 32, thus releasing the turned leaf from the cup 70. At the same time and as soon as the pedal is released, the spring 28 will restore the arm 32 quickly to its normal position ready to turn another leaf and will move the lever arm 34 back to position the crank 40 ready to force the piston or plunger arm of the pump downward as soon as the pedal is again operated.

From the foregoing, it will be seen that a simple and efficient leaf turner is provided which is automatic in its action; that simple and efficient pneumatic means is provided whereby leaves of music or other ele-

ments may be moved in succession; that said turner or device is so constructed that a single carrier may be employed for automatically picking up and turning the leaves in succession; that said device is simple in construction and may be readily made and assembled; that the device is so constructed that it will positively hold the leaf and place it in the desired position when turned; and that said device may be used in connection with various forms of instruments and in various locations.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In a device of the character described, the combination of a casing, a carrier supported to swing on said casing, means for rotating said carrier, a pump having an operating arm and connected to said carrier, a latch adapted to hold the arm in one position, and means for releasing the latch and for moving the operating arm during the same movement thereof.
2. In a device of the character described, the combination of a casing, a pneumatic carrier supported to swing horizontally on said casing, a pump having an operating arm and connected to said carrier, a latch adapted to hold the arm in one position, and means for releasing the latch and for moving the operating arm as well as moving the carrier.
3. In a device of the character described, the combination of a pivotally held carrier, means for moving said carrier, a pump having an operating arm and connected to said carrier, means adapted to hold the arm in one position, and means for releasing said first-mentioned means and for moving the operating arm simultaneously with the movement of the carrier.
4. In a device of the character described, the combination of a casing, a carrier pivotally supported to swing horizontally on said casing, a pump having a cylinder, a piston, and an operating arm and connected to said carrier, a latch adapted to hold the arm in one position, and means for releasing the latch and for moving the operating arm downwardly as well as moving the carrier and during the same movement of said means.
5. In a device of the character described, the combination of a support, a carrier movably held on said support to swing horizontally in the arc of a circle, a mutilated gear mounted on the support and having teeth adapted to mesh with a part movable with the carrier, a drum forming a part of the gear, a spring located in the drum having one end held to the drum and its other end held to a part fixed relatively to the drum, said spring having its tension increased during the movement of said gear and tending

normally to force the gear in one direction, a lever having teeth to engage the teeth of the mutilated gear to move the same, means for moving said lever, and means forming a part of the carrier for engaging a leaf and causing the same to move therewith.

6. In a device of the character described, the combination of a casing, a carrier pivotally mounted on said casing to swing in the arc of a circle and having a toothed part movable therewith, a mutilated gear having a set of teeth on opposite sides of its axis, one set of teeth being in mesh with the teeth of a part of the carrier, a pivotally held lever having teeth in mesh with the other set of teeth and adapted when moved to move said gear, a spring mounted on the gear and adapted to be wound when said gear is moved in one direction, a crank mounted to rotate on one end of the lever, and pneumatic suction means connected to the carrier and adapted to be operated by said crank.

7. In a device of the character described, the combination of a carrier pivotally mounted to swing in the arc of a circle and having a toothed part movable therewith, an oscillatory mutilated gear having two sets of teeth located on opposite parts of its axis, the teeth of one set being in mesh with the teeth of a part of the carrier, a pivotally held lever having teeth in mesh with the teeth of the other set of teeth of said gear and adapted when moved to move the gear, a spring adapted to be wound when the gear is moved in one direction, a crank mounted to rotate on one end of the lever, and pneumatic means connected to the carrier and adapted to be operated by said crank.

8. In a device of the character described, the combination of a casing, a pump having a piston and a rod connected to said piston, a pivotally held arm having a bifurcated end adapted to span the piston rod and to move the same during the movement of said arm, a latch adapted to engage the arm and hold the same in one position, a pneumatic carrier pivotally held to the casing and adapted to swing in the arc of a circle, means connecting the pump to the carrier whereby a vacuum may be produced and maintained in the carrier during the movement thereof and the vacuum destroyed, and means for releasing the latch, operating the arm and moving the carrier during the same movement of said means.

9. In a device of the character described, the combination of a casing, a pump having a piston and a rod connected to said piston, a pivotally held arm for moving the piston rod, a latch adapted to engage the arm and hold the same in one position, a spring for forcing the arm upwardly, a pneumatic carrier pivotally held to the casing and adapted to swing in the arc of a circle, and means connecting the pump to the carrier

whereby a vacuum may be produced and maintained in the carrier during the movement thereof and the vacuum automatically destroyed.

5 10. In a device of the character described, the combination of a plump, a pivotally held arm operatively connected to the piston of the pump, a latch adapted to engage the arm and hold the same in one position, means for
10 moving the arm upwardly, a pneumatic carrier pivotally held to the casing and adapted to swing horizontally in the arc of a circle, means connecting the pump to the carrier whereby a vacuum may be produced and
15 maintained in the carrier during the movement thereof and the vacuum destroyed, and means for releasing the latch, operating the piston moving arm, and moving the carrier during the same movement of said means.

20 11. In a device of the character described, the combination of a casing, a carrier pivoted to swing horizontally thereon, a suction box, a cylinder, a pipe connecting the suction box to the cylinder, said suction box
25 having means for communication with the carrier and for destroying the vacuum when created in the carrier at one part of the movement thereof, a piston adapted to move the cylinder, a rod connected to the piston,
30 an arm pivotally held to the casing and having one end slotted to span a part of the piston rod, a spring normally forcing the arm in one direction, means mounted on the carrier and forming a part thereof to hold a
35 leaf, and means for moving the piston operating arm and carrier.

12. In a device of the character described, the combination of a carrier pivoted to swing horizontally, a suction box, said suction box having means for communication
40 with the carrier and for destroying the vacuum when created in the carrier at one part of the movement thereof, and means for creating a vacuum in the carrier through the box and for moving the carrier.

13. In a device of the character described, the combination of a casing, a carrier pivoted to swing horizontally thereon, a connection, a cylinder, a pipe leading from the
50 connection to the cylinder, said connection having means for communication with the carrier and a channel for destroying the vacuum when created in the carrier at one part of the movement thereof, a piston
55 adapted to move the cylinder, a rod connected to the piston, an arm pivotally held to the casing and adapted to move the piston rod, a spring normally forcing the arm in one direction, means mounted on the carrier
60 to hold a leaf, and means for moving the piston operating arm and carrier.

14. In a device of the character described, the combination of a carrier pivoted to

swing horizontally, a suction box, a cylinder, a pipe connecting the suction box to the
65 cylinder, means for maintaining the carrier in sealing connection with the box, a piston adapted to move the cylinder, a rod connected to the piston rod, an arm pivotally held to the casing and having one end
70 slotted to span a part of the piston rod, a spring normally forcing the arm in one direction, means mounted on the carrier to hold a leaf, and means for moving the piston operating arm and the carrier.

15. In a device of the character described, the combination of a casing, a carrier, a normally fixed suction box axially arranged with respect to the carrier and having an opening therethrough and a vacuum de-
80 stroying channel, means for creating suction in said suction box, means for moving the carrier about the suction box, said carrier having a passage therethrough and having means at one end in sealing contact with
85 the surface of said suction box and adapted to have the vacuum maintained therein during the greater part of its movement, and a suction cup arranged at the opposite end of said carrier.

16. In a device of the character described, the combination of a casing, a carrier, a suction box axially arranged with respect to the carrier and having an opening there-
95 through and a vacuum destroying means, means for creating suction in said suction box, means for moving the carrier about the suction box, said carrier having a passage therethrough and having means at one end in sealing contact with the surface of said
100 suction box and adapted to have the vacuum maintained therein during the greater part of its movement, and leaf holding means arranged at the opposite end of said carrier.

17. In a device of the character described, 105 the combination of a carrier, a fixed suction connection axially arranged with respect to the carrier and having an opening there- through and vacuum destroying means, means for creating suction in said suction
110 connection, means for moving the carrier about the suction connection, said carrier having a passage therethrough and having means at one end in sealing contact with the surface of said suction connection and
115 adapted to have the vacuum maintained therein during the greater part of its movement, and leaf holding means arranged at the opposite end of said carrier.

This specification signed and witnessed 120 this twenty-eighth day of September A. D. 1914.

JOHN B. ALBERT.

Witnesses:

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THOMAS E. McCLOSKEY.