No. 663,622. Patented Dec. 11, 1900.

F. BOYER.

LEAF TURNER.

(Application filed Apr. 12, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

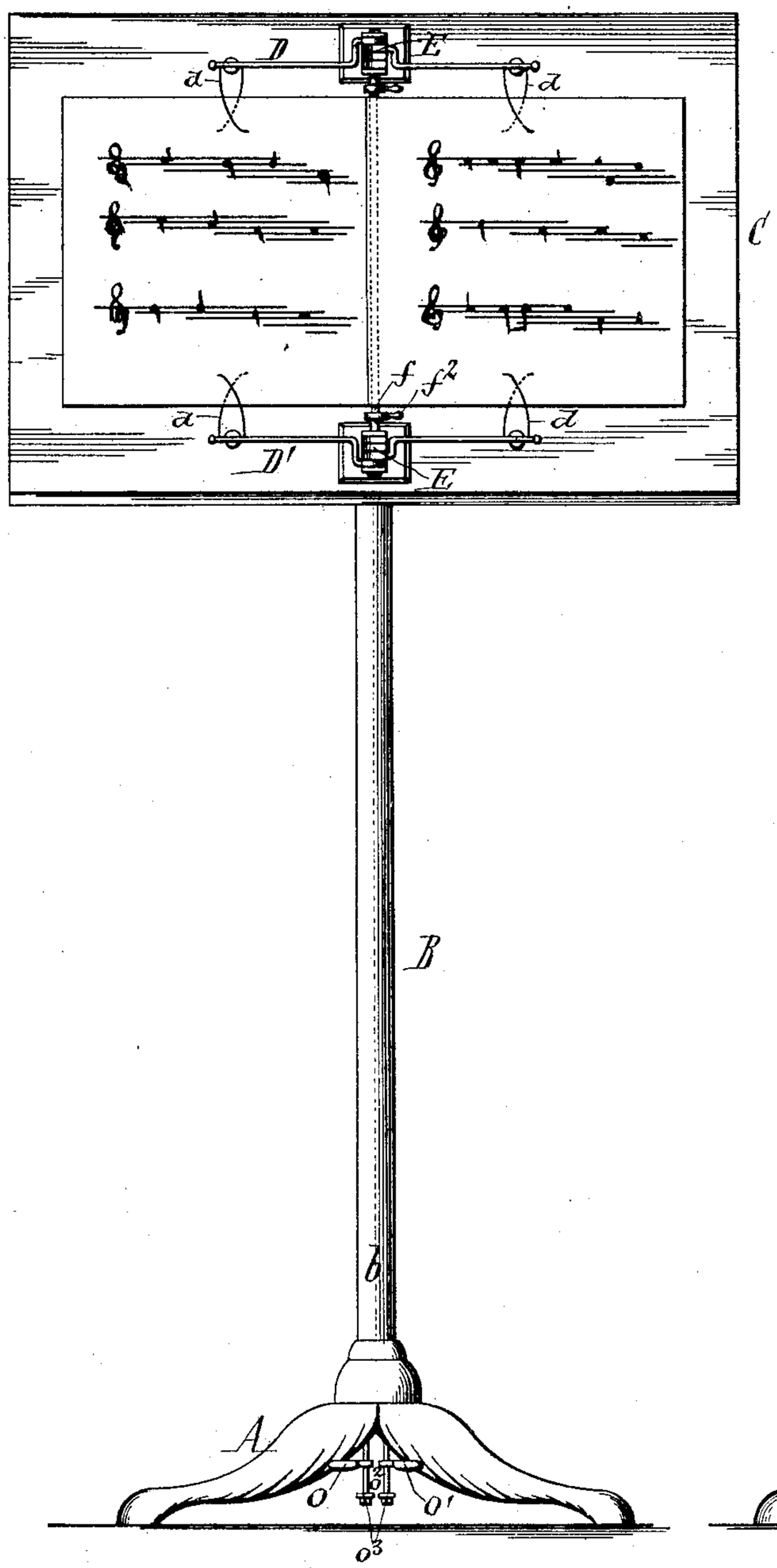
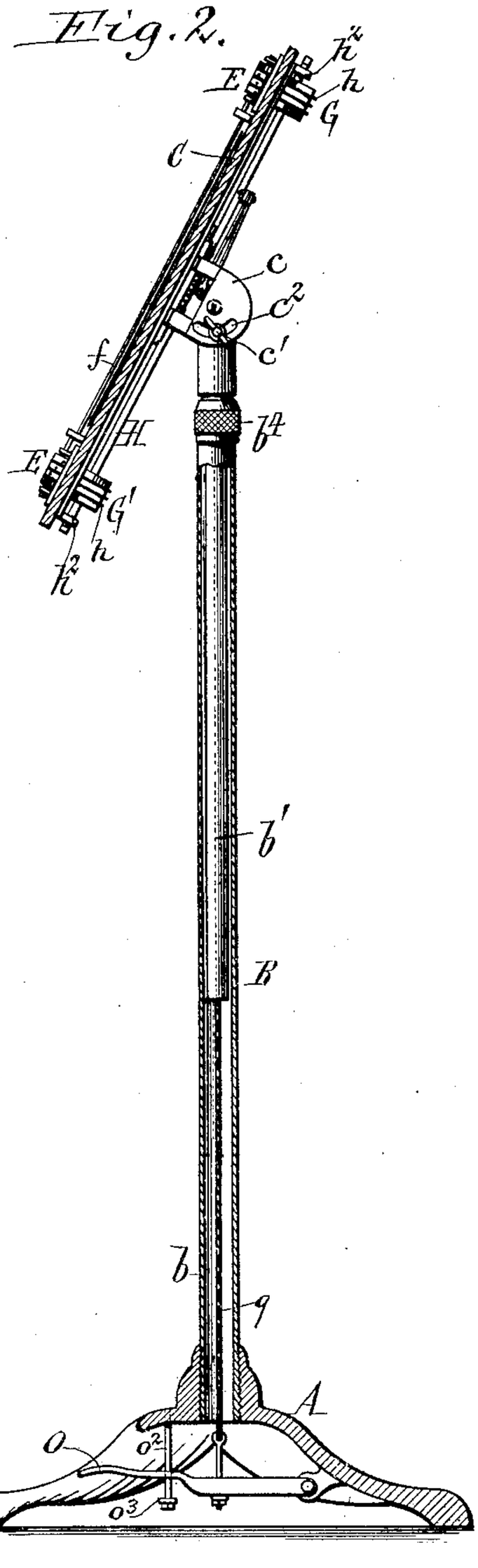


Fig. 2.



Witnesses;
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Henry L. Deck.

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(No Model.) 3 Sheets—Sheet 2.

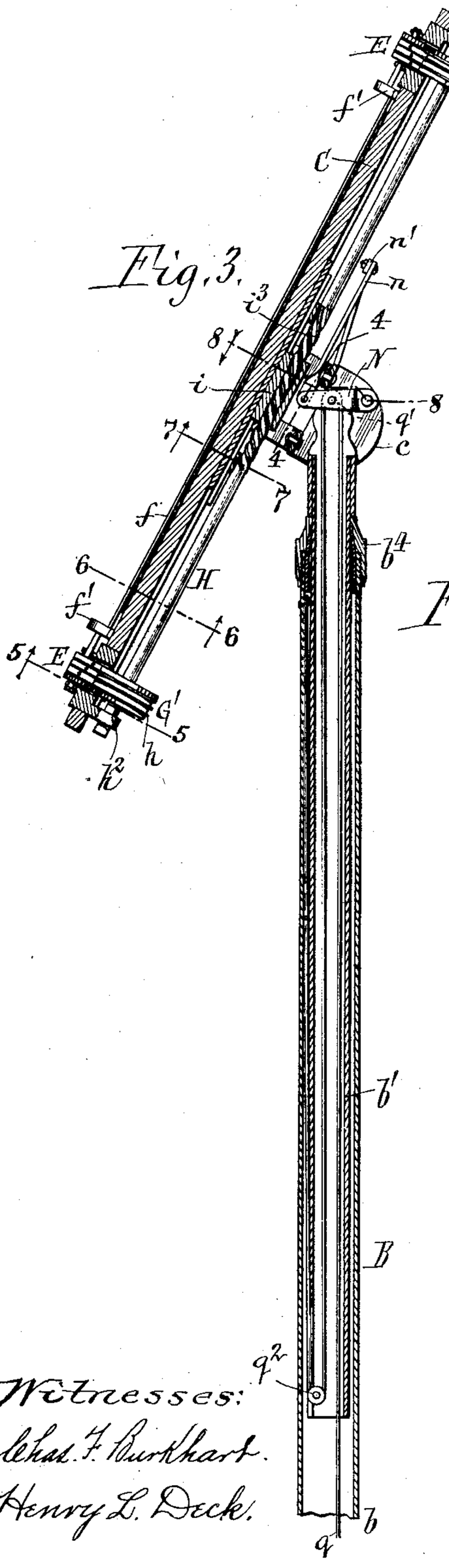

Fig. 3.

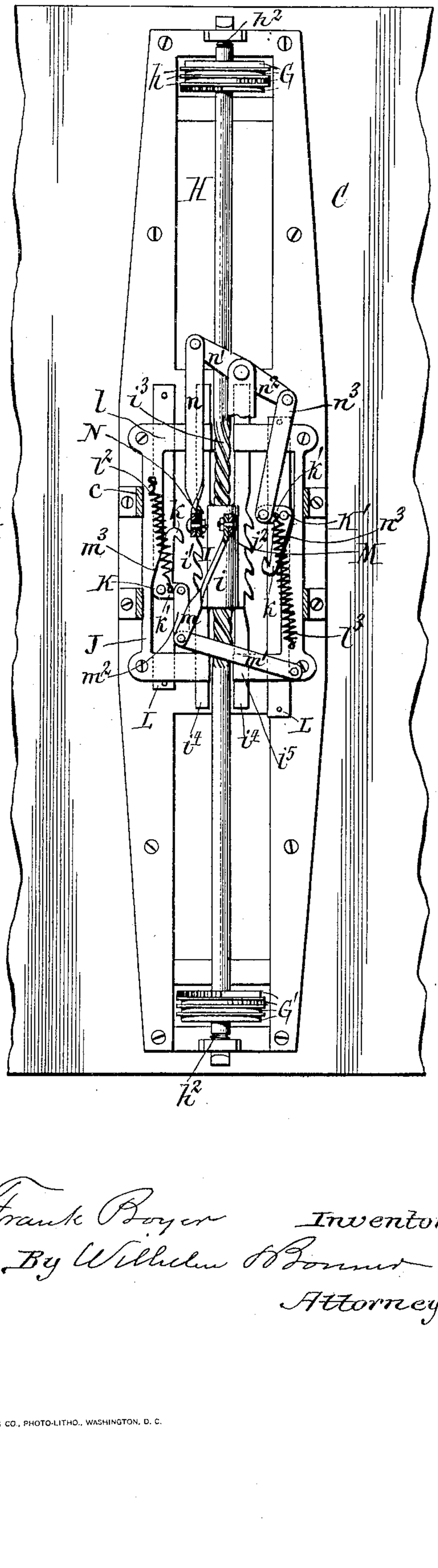

Fig. 4.

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(No Model.) 3 Sheets—Sheet 3.

Fig. 5.

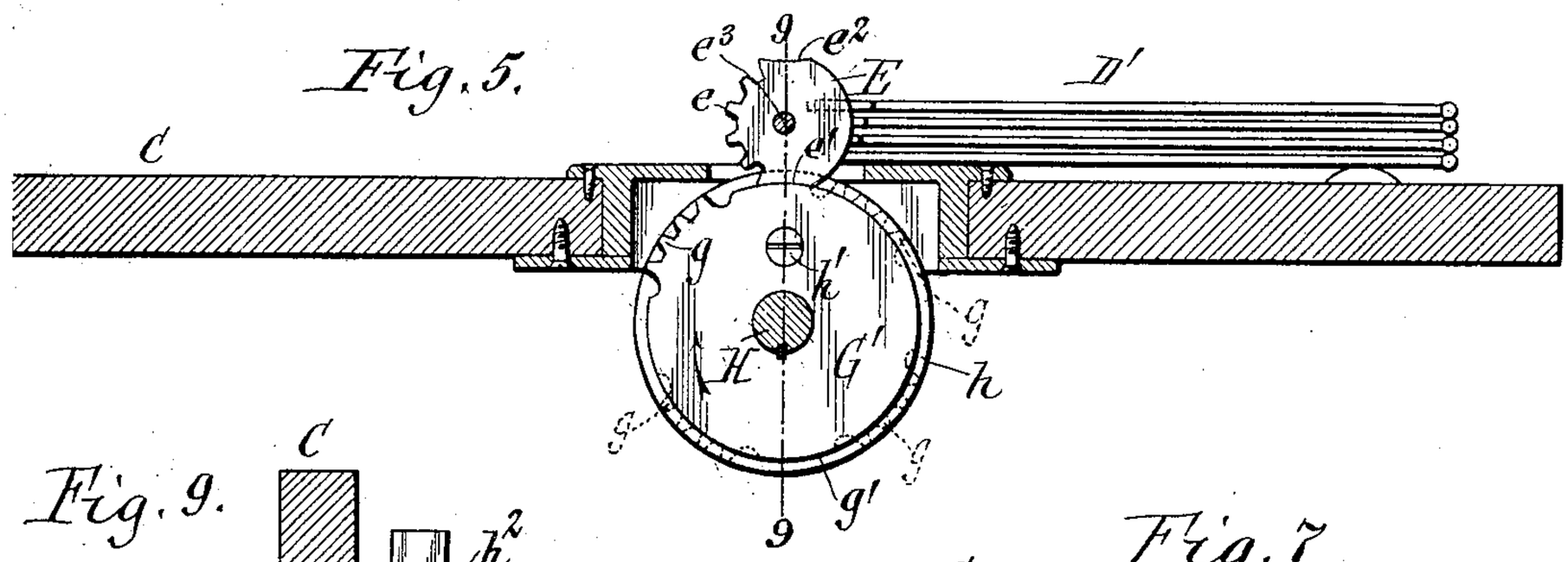


Fig. 9.

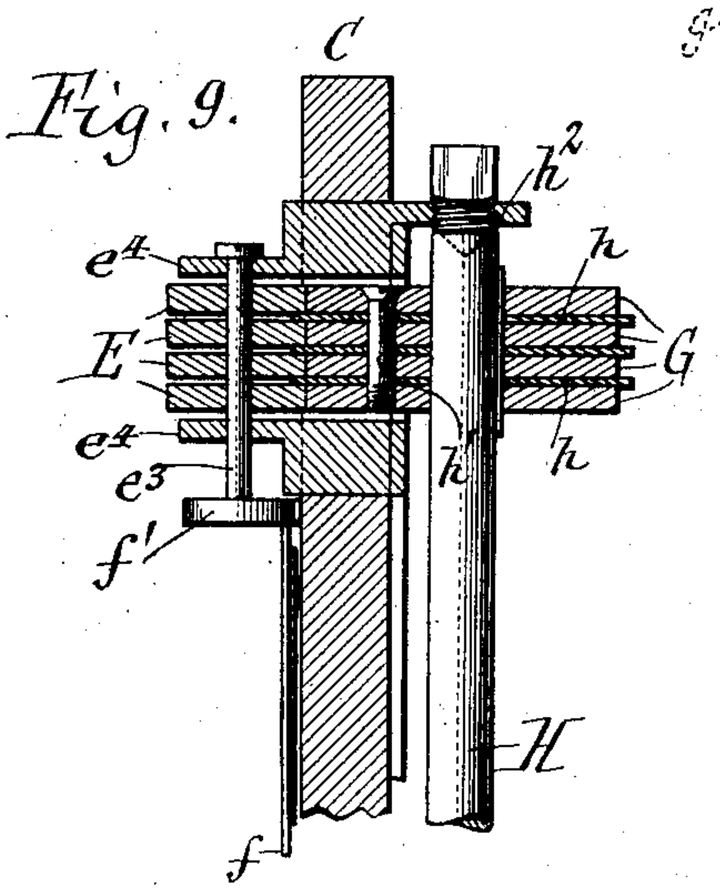


Fig. 7

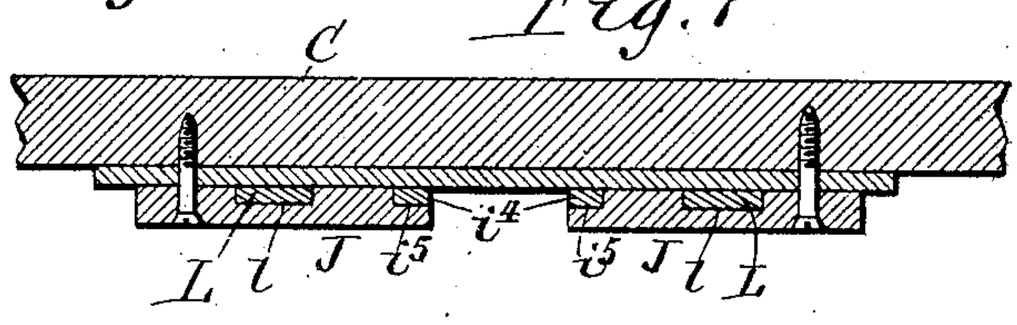


Fig. 8.

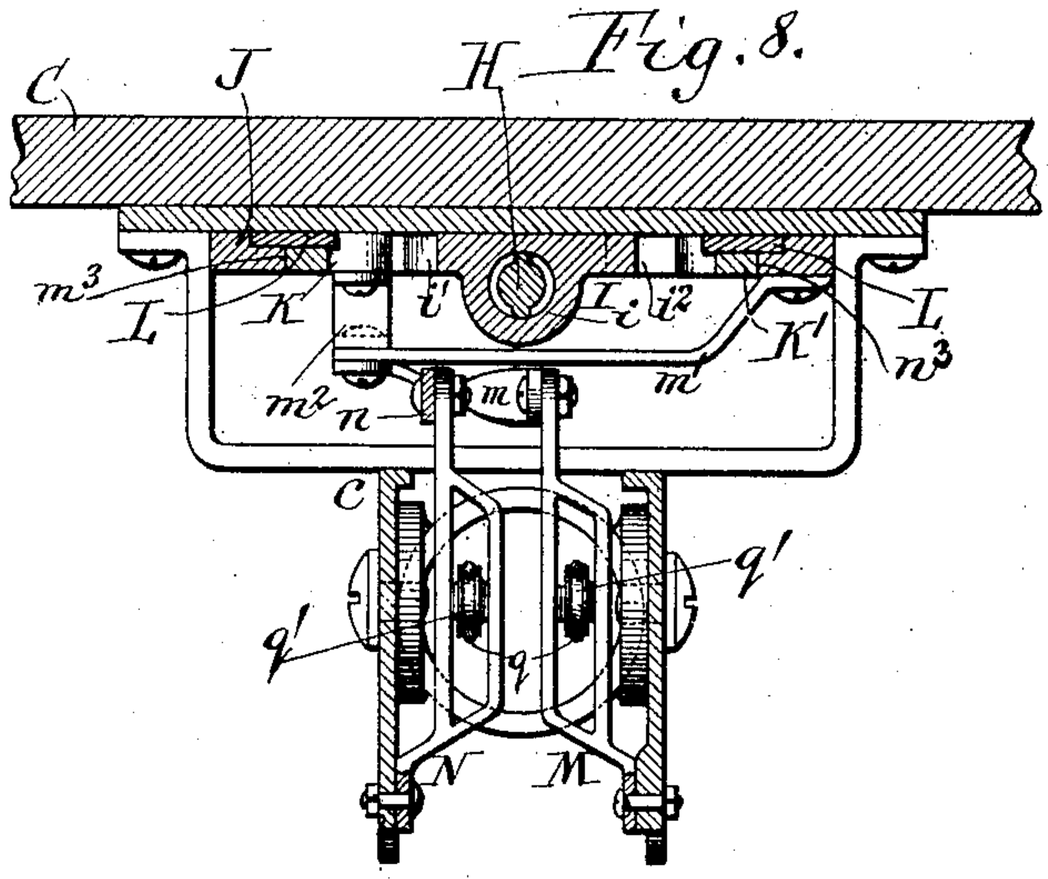


Fig. 10.

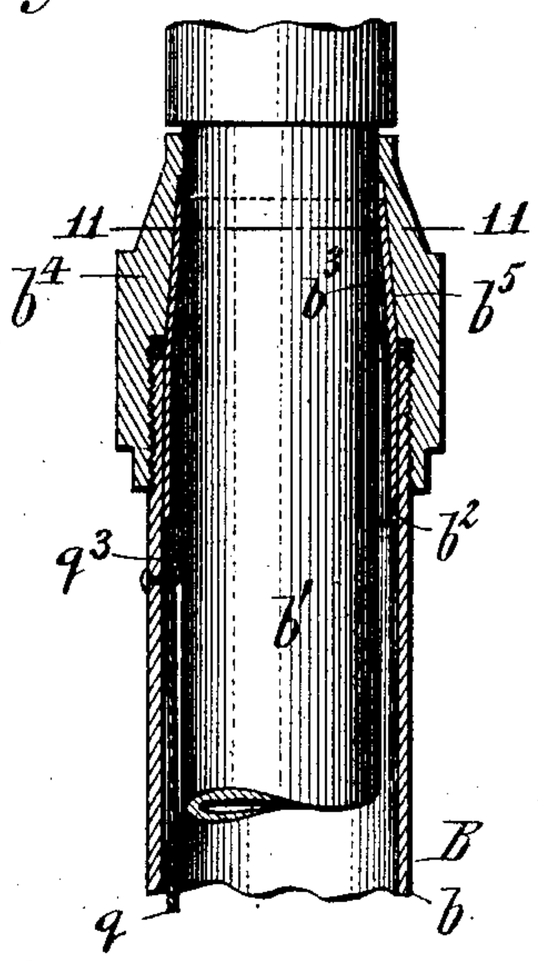


Fig. 11.

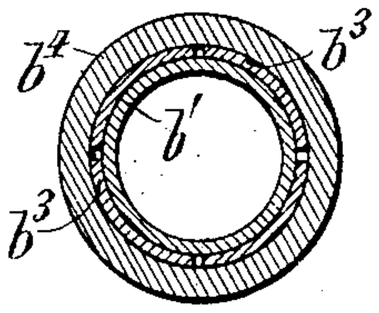
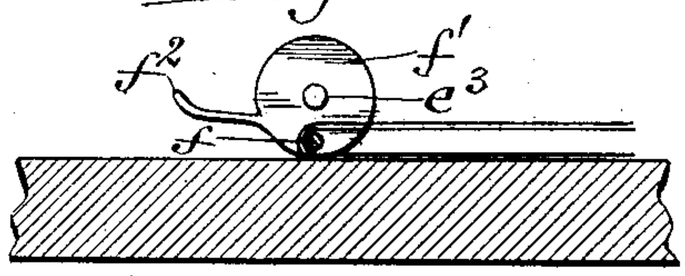


Fig. 6.



Witnesses:
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UNITED STATES PATENT OFFICE.

FRANK BOYER, OF SYRACUSE, NEW YORK, ASSIGNOR OF ONE-HALF TO THOMAS RYAN, OF SAME PLACE.

LEAF-TURNER.

SPECIFICATION forming part of Letters Patent No. 663,622, dated December 11, 1900.

Application filed April 12, 1899. Serial No. 712,721. (No model.)

To all whom it may concern:

Be it known that I, FRANK BOYER, a citizen of the United States, residing at Syracuse, in the county of Onondaga and State of New York, have invented new and useful Improvements in Leaf-Turners, of which the following is a specification.

This invention relates to a leaf-turner in which the swinging arms by which the leaves are moved are provided with segmental gear-pinions which are operated by segmental gear-wheels actuated by treadles or other suitable means.

The object of my invention is to produce a leaf-turner of this kind which is efficient and convenient and in which the leaf-turning arms are securely held by simple means against accidental movement—such, for instance, as would be liable to be produced by the suction created by a moving leaf against the underlying leaf.

In the accompanying drawings, consisting of three sheets, Figure 1 is a front elevation of a music-stand provided with my improved leaf-turner. Fig. 2 is a side elevation thereof with the leaf-supporting desk or table and part of the standard shown in section. Fig. 3 is a fragmentary vertical section of the same, on an enlarged scale, taken centrally through the leaf-supporting table and the standard. Fig. 4 is a sectional rear elevation, on a still larger scale, the section being taken in line 4 4, Fig. 3. Figs. 5, 6, and 7 are horizontal sections, on an enlarged scale, in lines 5 5, 6 6, and 7 7, Fig. 3, looking upward. Fig. 8 is a similar section in line 8 8, Fig. 3, looking downward. Fig. 9 is a fragmentary vertical section in line 9 9, Fig. 5. Fig. 10 is a fragmentary vertical section, on an enlarged scale, showing the clamping device for adjustably connecting the upper and lower sections of the standard. Fig. 11 is a horizontal section of the same in line 11 11, Fig. 10.

Like letters of reference refer to like parts in the several figures.

The music-stand shown in the drawings consists, essentially, of a base A, a standard B, rising from the base, and a supporting desk or table C, mounted on the upper end of the standard. The latter is preferably made of two telescopic tubular sections, the lower section *b* being secured at its lower end to the base, while the upper section *b'* carries at its upper end the desk, rack, or table and is arranged with its lower end in the upper end of the lower section, so that by sliding the upper section up or down or turning it in the lower section the desk can be raised or lowered or turned sidewise, as may be desired. The upper section is held in its adjusted position by means of a sleeve b^2, Figs. 3, 10, and 11, secured to the upper end of the lower section and split lengthwise to form jaws b^3, and a clamping-sleeve b^4, having a screw connection with the upper end of the lower standard-section and provided with a conical bore b^5, which engages with said jaws and presses the same against the upper standard-section upon tightening the clamping-sleeve. The desk is provided centrally on its rear side with a bracket *c*, which is pivoted to the bifurcated upper end of the upper standard-section, so that the desk can be tilted in a vertical plane. The desk is held in its adjusted position by a clamping-screw *c'*, arranged on the upper standard-section and passing through a segmental slot c^2 in one side of the bracket *c*.

D represents an upper set of arms which turn the leaves, and D' a lower set of such arms arranged, respectively, on the upper and lower portions of the front side of the desk. As shown in the drawings, each set of arms is composed of four arms, and each arm is provided near its free end with a spring-clasp *d*, whereby the edge of a sheet of music is attached to the arm. The number of arms in each set can be increased or reduced, as may be required. Each of these clasps consists, preferably, as shown, of two spring-jaws, which cross each other and which grasp the leaf when placed between them. The inner end of each turning-arm is secured to a gear-pinion E, which is provided on the side diametrically opposite the arm with a segmental row of teeth *e* and at opposite ends of the row of gear-teeth with two concave locking faces or seats *e' e²*, Fig. 5. The gear-pinions of each set of arms are arranged one above the other and pivoted concentrically on a spindle e^3, which is supported in lugs e^4, arranged centrally one above the other on the desk. The spindle of the upper set of gear-

pinions is axially in line with the spindle of the lower set of gear-pinions, so that the arms of both sets turn concentrically. The arms of each set are bent up or down, so that the portions thereof which carry the sheet-clasps are all arranged in the same plane and lie one on top of the other when the arms are all swung to one side of the desk. In the position of the parts represented in Fig. 5 the sheet-supporting arms are all turned to the right and the sheet-music supported thereby is resting in a closed position on the right side of the table.

The sheet-music is clamped along its fold against the desk by a clamping-rod *f*, which is arranged parallel with the spindles e^3 and movable toward and from the desk and the fold of the sheet resting against the same. This movement of the clamping-rod is effected by two rotary arms f' f', preferably of disk form, which are pivoted on the inner ends of the spindles e^3 and to which the ends of the clamping-rod are secured eccentrically, as shown in Figs. 1, 3, 6, and 9. Upon turning the arms f' by means of thumb-pieces or handles f^2 formed thereon the arms move the clamping-rod toward or from the sheet-music and press the same against the table or release the same therefrom.

G is an upper set, and G' a lower set, of gear-wheels, whereby the gear-pinions of the upper and lower sets are turned successively. The gear-wheels are the same in number as the gear-pinions, and each gear-wheel engages with a gear-pinion in the adjacent set. Each gear-wheel is provided on its periphery with a segmental row of teeth *g* and a plain circular or convex face *g'*, which occupies that part of the periphery which is not provided with teeth. In the normal position of each gear-pinion and its coöperating gear-wheel the pinion bears with one of its concave locking-faces against the plain convex face of the gear-wheel. In the position of the parts represented in Fig. 5 the lower pinion of the lower arm carrying the first leaf engages, with its concave locking face or seat *e'*, with the convex face of its companion gear-wheel. In this position of the parts the arm is held against turning in either direction, because the plain-faced part of the gear-wheel projects into the concave seat of the pinion and prevents the same from turning. All the other pinions of the same set are also locked in the same way by the respective gear-wheels, and any moving leaf which is being turned is thereby prevented from dragging the underlying leaf or leaves with it by the suction created by the moving leaf. Upon turning the gear-wheel meshing with the lowermost pinion in the direction of the arrow, Fig. 5, the convex face of the gear-wheel moves along the concave face *e'* of the gear-pinion until the advancing tooth of the gear-wheel meshes with the first tooth of the pinion adjacent to the seat *e'*, after which the continued turning movement of the gear-wheel causes the gear-pinion to be turned in the opposite direction by its intermeshing teeth. When the last or trailing tooth of the gear-wheel leaves the last tooth of the pinion, the latter has been turned so far that its opposite concave seat e^2 engages with the plain convex face of the gear-wheel, whereby the pinion and the arm connected therewith are again locked against turning. By reversing the movement of the gear-wheels the pinions and arms are turned the other way in the same manner. The length of the intermeshing gear-segments of the wheels and pinions is such that the pinion is turned one-half of a rotation and the leaf is shifted thereby from one side of the desk to the other. The four gear-wheels of each set are secured together and have their tooth-segments arranged on different quarters of the periphery of the gear-wheels, whereby the combined gear-wheels during a complete rotation engage their tooth-segments successively with the tooth-segments of their companion gear-pinions, and thereby turn the leaves connected therewith successively from one side of the table to the other.

The pinions and arms are arranged on the front side of the desk, and the gear-wheels are arranged on the rear side thereof and project through openings in the desk. The upper and lower sets of gear-wheels are both mounted on opposite ends of a shaft H, arranged on the rear side of the desk, and both sets of gear-wheels are turned back and forth together by turning said shaft. The pair of gear-wheels in the upper and lower sets which turn the pair of pinions connected with the same leaf have their teeth arranged in line, so that the upper and lower ends of the leaf are turned at the same time.

In order to hold each gear-pinion opposite the periphery of its companion gear-wheel, a washer or guide-disk *h* is arranged between adjacent gear-wheels, as shown in Fig. 9. The washers project beyond the periphery of the gear-wheels and between the pinions and form guides, which prevent the pinions from becoming displaced and engaging with the teeth of an adjacent gear-wheel. The wheels and washers are secured together by a screw *h'*, so that these parts turn together.

The shaft carrying the two sets of gear-wheels is journaled at its ends in bearings h^2, arranged on the back of the desk, and is rotated intermittently for turning one leaf at a time by the following mechanism:

I represents a ratchet-slide composed of a nut or sleeve *i*, which has internal screw or spiral threads and on opposite sides ratchet bars or wings i' i^2. The internally-threaded sleeve or nut engages with a spiral thread i^3, formed on the central portion of the shaft H. The slide I is capable of moving lengthwise on the shaft, but is held against turning therewith by means of longitudinal guide-bars i^4, which are extensions of the ratchet-bars and engage with ways i^5, formed in a frame J, so-

cured to the back of the desk. Upon moving this slide up the shaft is turned in one direction, and upon moving it down the rotation of the shaft is reversed. The teeth of the ratchet-bar i' have their abrupt sides facing upwardly, while the teeth of the bar i^2 have their abrupt sides facing downwardly.

K K', Fig. 4, represent two pawls which engage with the ratchet-bars and whereby the ratchet-slide is moved lengthwise on the driving-shaft. Each of these pawls has the form of an elbow-lever, one arm k of which is arranged substantially lengthwise of the shaft and is provided with a head which engages with the ratchet-teeth, while the other arm k' projects inwardly. Each of the pawls is pivoted to a longitudinally-movable sliding carrier L, which is guided in ways l, formed on the frame J. The heads of the pawls project in opposite directions, and their transverse arms are connected by springs l^2 l^3 with the adjacent parts of the frame J. These springs act primarily on the pawls and hold the same normally in such a position that their heads are disengaged from the opposing ratchet-teeth, and the springs also act through the pawls on the sliding carriers and hold the same and the pawls in their retracted positions. The arrangement of these springs is such that one of the pawl-slides is retracted upwardly, while the other pawl-slide is retracted downwardly.

M N, Figs. 4 and 8, represent two rock-arms whereby the pawls are operated and which are arranged in a plane which stands at right angles to the plane of the frame J. These arms are pivoted at their rear ends to the bracket c above the upper standard-section and are capable of swinging vertically. The rock-arm M is connected at its front end by a downwardly-extending link m with an intermediate rock-arm m', which is pivoted to the frame J, and this intermediate arm is connected by a link m^2 with the transverse arm of the pawl K. Upon depressing the rock-arm M this movement is transmitted by the link m, intermediate rock-arm m', and link m^2 to the pawl K, the intermediate arm serving as a locking-guide. During the first portion of the downward movement of the rock-arm M the pawl is turned until its head is swung inwardly into engagement with the opposing teeth of the ratchet-slide, and during the remainder of the downward movement of the arm M the pawl K, together with its carrier and the ratchet-slide, is moved downwardly to the extent of one tooth on the ratchet-slide. Upon releasing the arm M the pull of the spring l^2 first swings the pawl K backwardly out of engagement with the tooth of the ratchet-bar until it strikes a stop-surface m^3 on the adjacent part of the frame J, after which the spring l^2 retracts the pawl and its sliding carrier to the position in which the head of the pawl is ready to engage with the next tooth of the ratchet-bar. During the retracting movement of the pawl and its carrier the rock-arm M is also returned to its initial position by the intermediate arm and connecting-links.

The rock-arm N is connected at its front end by an upwardly-extending link n with one arm n' of a rock-lever pivoted on the frame J. The other arm n^2 of this lever is connected by a downwardly-extending link n^3 with the transverse arm of the pawl K'. Upon moving the arm N downwardly the pawl K' is first turned inwardly by the connecting mechanism into engagement with the adjacent ratchet-bar, and then the ratchet-slide I and the pawl K' are moved upwardly together the extent of one tooth. Upon releasing the arm N the pull of the spring l^3 of the pawl K' first moves the latter away from the teeth of the adjacent ratchet-bar until the pawl engages the stop-surface n^3 on the frame J and then retracts the pawl, together with its carrier and the parts connected therewith, to its initial position, so that the pawl stands in a position to take up the next tooth of the ratchet-slide. The extent of the forward movement of each pawl and the lead of the screw connection between the driving-shaft and the ratchet-slide is such that the shaft is turned a quarter of a revolution every time one of the pawls moves forward one space. Each of the ratchet-bars is provided with as many teeth as there are gear-wheels in one set, four teeth being shown in the drawings. When the pawl has engaged successively with these teeth and moved the ratchet-slide intermittently forward four spaces, the shaft has been turned one complete rotation and four leaves have been turned. When it is desired to turn the leaves back, the other pawl is actuated for moving the ratchet-slide and the shaft in the opposite direction.

O O', Figs. 1 and 2, represent two treadles whereby the arms M N are actuated for turning the leaves either forward or backward. These treadles are pivoted at their rear ends to the under side of the base and preferably guided at their front ends on depending rods o^2, each of the latter having a shoulder o^3, which limits the downward movement of the treadle. Each of these treadles operates one of the rock-arms M N by means of a cord, chain, or cable q, which is connected at its lower end to the treadle and passes upwardly through the lower and upper sections of the standard and over a guide or roller q' on the respective arm M N, Fig. 3, thence downwardly through the upper standard-section and outwardly around a guide or roller q^2 on the lower end of the upper section, and thence upwardly between the upper and lower standard-sections to the upper portion of the outer section, to which the cord is secured by a hook q^3 or otherwise, Fig. 10. Upon depressing one of the treadles its cord draws the respective rock-arm downwardly and actuates the pawl connected therewith for turning the leaves in one direction, and upon depressing the other treadle the other rock-arm is de-

pressed and the other pawl is actuated for turning the leaves in the opposite direction. Upon raising the upper standard-section for adjusting the height of the desk the length of the bight in the cord formed in that portion of the cord between the guide-roller q' and the top of the outer standard-section is shortened or let out the required extent by passing around the lower end of the upper section to make up for the increased height of the desk, and when the desk is lowered the length of the bight is again increased and the slack in the cord taken up, thereby automatically adjusting the cord to the height of the desk and always maintaining the same in proper working condition.

When my improved leaf-turner is applied to a piano, organ, or similar musical instrument, the standard is of course omitted and the device mounted on the casing of the instrument.

I claim as my invention—

1. The combination with the desk, of two upright spindles supported in line with each other, respectively, in front of the upper and lower portions of the desk, rotary clamping-arms which are mounted, respectively, on the lower end of the upper spindle and the upper end of the lower spindle, and an upright clamping-rod secured to the free ends of said arms, substantially as set forth.

2. In a leaf-turner, the combination with the desk, of two rotary arms secured to upright spindles journaled on the front side of the desk and carrying an eccentrically-arranged clamping-rod, segmental pinions mounted loosely on said spindles and carrying the leaf-turning arms, segmental gear-wheels, whereby said pinions are actuated, and a shaft to which said wheels are secured and which is arranged on the rear side of the desk, substantially as set forth.

3. The combination with the leaf-turning arms and their actuating-wheels, of a shaft to which said wheels are secured and which is provided with a screw-thread, a traveling nut or sleeve engaging with said thread and provided with ratchet-bars facing in opposite directions, and actuating-pawls, adapted to engage with said ratchet-bars and to move the sleeve or nut in one direction or the other, substantially as set forth.

4. The combination with the leaf-turning arms and their actuating-wheels, of a shaft to which said wheels are secured and which is provided with a screw-thread, a traveling nut or sleeve engaging with said thread and provided with ratchet-bars facing in opposite directions, actuating-pawls facing in opposite directions and mounted on sliding carriers, retracting-springs applied to said pawls and arranged to hold said pawls out of engagement with the ratchet-bars and to retract the pawl-carriers, and actuating devices connected with said pawls, substantially as set forth.

5. The combination with the desk, the upper hollow standard-section on which the desk is mounted and which is provided near its lower end with a cord-guide, leaf-turning arms and mechanism mounted on said desk, and the actuating-arms of the leaf-turning mechanism carried by the upper standard-section and each provided with a cord-guide, of a hollow lower standard-section in which the upper section can be raised and lowered, pedals arranged at the lower end of the lower standard-section, and flexible connections extending from the pedals upwardly through both standard-sections to said actuating-arms and over their cord-guides, thence downwardly through the upper standard-section and around its cord-guide, and thence upwardly to a point of attachment near the upper end of the lower standard-section, substantially as set forth.

Witness my hand this 1st day of April, 1899.

FRANK BOYER.

Witnesses:
WILLIAM I. JENNEY,
JOSEPH M. MEATYARD.