C. SCHWERDTFEGER.

LEAF-TURNERS.

No. 193,781. Patented July 31, 1877.

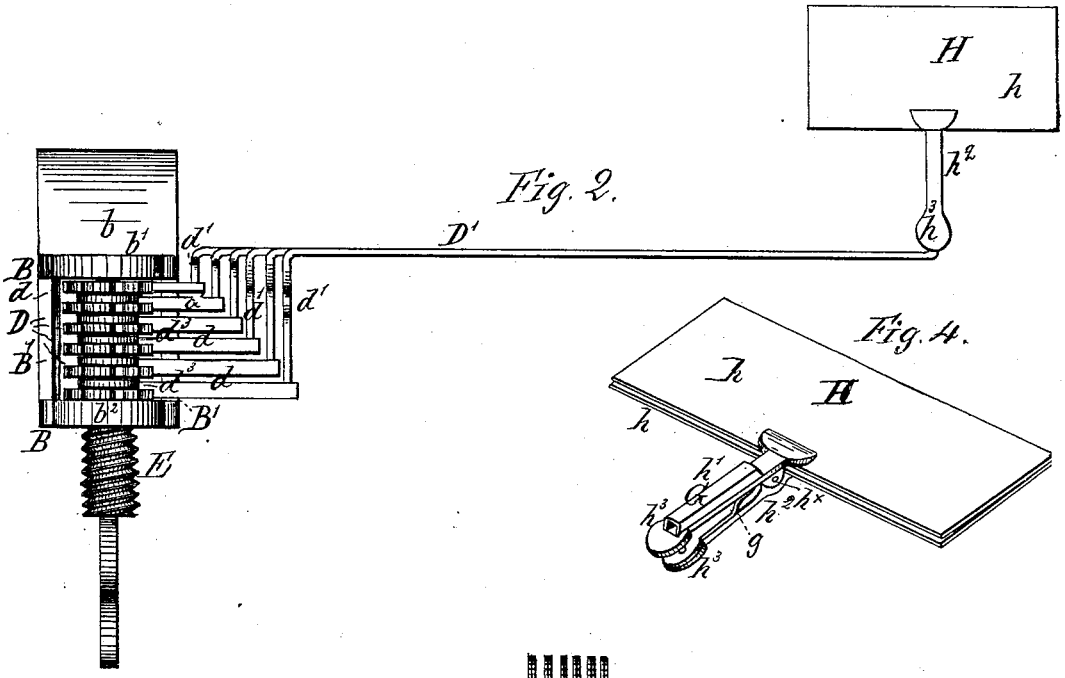

Fig. 2.

Fig. 4.

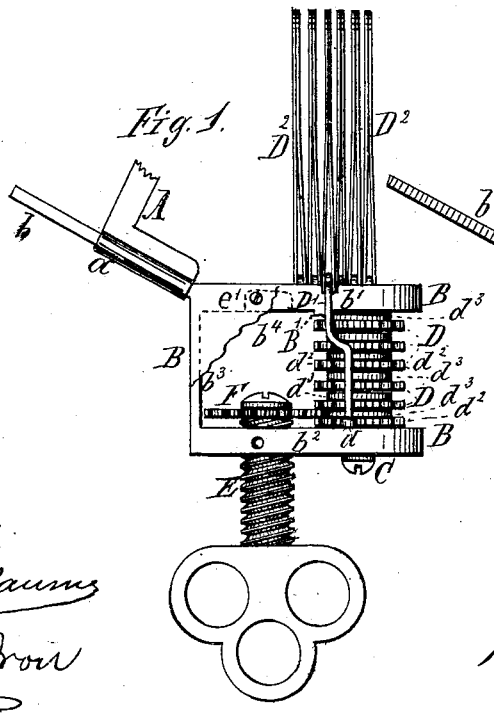

Fig. 1.

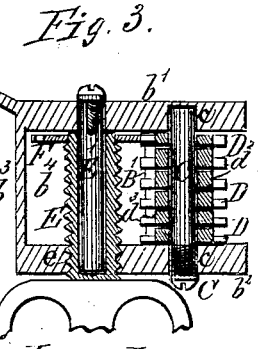

Fig. 3.

Witnesses.

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CHARLES SCHWERDTFEGER, OF PALMYRA, MISSOURI.

IMPROVEMENT IN LEAF-TURNERS.

Specification forming part of Letters Patent No. **193,781**, dated July 31, 1877; application filed February 15, 1877.

To all whom it may concern:

Be it known that I, CHARLES SCHWERDTFEGER, of Palmyra, in the county of Marion and State of Missouri, have invented certain new and useful Improvements in Leaf-Turners, of which the following is a specification:

My invention consists, first, in the use of an actuating-screw, having a thread of predetermined pitch, and carrying at one extremity a toothed wheel, the diameter of which, as well as its thickness or diameter in cross-section, and the number of its teeth, are regulated according to the pitch of the thread on the screw.

Secondly, my invention consists in the use of a series of flanged cog or toothed wheels, carrying each an arm, one end of which is provided with spring-fingers, to hold the leaves, or, preferably, bent at right angles, to form a shank for the support of a removable spring-clamp. These toothed or cog wheels are so constructed that the flanged portion thereof is of a less diameter than the toothed portion, the difference being equal to the depth of the teeth at least, the diameter of said flanged and toothed portion in cross-section, as well as the axial diameter of the said toothed portion, and the number of teeth thereon, being regulated according to the pitch of the screw above referred to.

Thirdly, my invention consists in the combination, with the wheel-arms, of a series of removable spring-clamps or leaf-holders, adapted to be supported on or removed from said arms, as more fully described hereinafter; and, lastly, the invention consists in the construction of the supporting or carrying frame, so constructed as not only to hold the operating devices, but also to adapt it to be connected to or disconnected from a music stand or holder.

In the accompanying drawings, Figure 1 is a side elevation, showing the general arrangement, a part of the casing being removed to show the mechanism. Fig. 2 is a vertical transverse section, showing the manner in which the screw and toothed wheels are mounted. Fig. 3 is a front view, showing the arrangement of the turning-arms; and Fig. 4 is a perspective view of the removable spring-clamp on a larger scale.

Similar letters of reference are employed in all the figures of the drawings to indicate corresponding parts wherever they may occur.

A represents the lower portion of a music stand or support, upon which the book is placed, and *a* is a metallic slide, screwed or otherwise secured thereto, for the reception and support of the inclined shank *b* of the carrying frame or casing B, which latter is in this manner removably connected with the music-support, though it may be permanently attached thereto, if desired.

B is the casing or carrying frame, consisting of the inclined shank *b*, above referred to, the upper and lower bearing or supporting plates b^1 b^2, respectively, the back-plate b^3, and the sides b^4, which are, preferably, removably connected with the rest of the frame, as shown.

The upper and lower plates b^1 b^2 are connected together, at or near their front edges, or at a point immediately in rear of the shaft C, by means of two vertical connecting-braces, B′, which not only serve the purpose of strengthening the carrying-frame, but also act as stops to prevent the turning-arms D^1 from being carried around too far, as will be readily understood.

The shaft C carries a series of flanged and toothed wheels, D, which are loosely mounted thereon, while the shaft itself is rigidly mounted in its bearings *c* in the frame B, and acts as a fulcrum-pin to said flanged and toothed wheels D. Each flanged toothed wheel D carries an arm, *d*, to which is connected a vertical connecting or supporting rod, d^1, carrying the turning-arms D^1, to the outer end of which are pivoted a series of spring-fingers, D^2, to hold the leaves.

I prefer, however, to bend the outer end of the arms D^1 at right angles, thus forming a supporting-shank, to hold and support a removable spring-clamp, more fully described hereinafter.

All the arms D^1 rest one upon the other, and as the wheels D are mounted one by the side of the other, horizontal shanks or arms *d* of increasing length, and vertical connecting-rods of increased height, have to be employed to accomplish this result, the vertical

rods d^1 being bent to the right and left of the arm on the center-wheel D, to bring the other arms D^1 on top and below said center-arm. This arrangement, however, is well known in devices of this character, and needs, therefore, no particular description.

E is the actuating-screw, the thread of which may have any desired pitch, whereby the wheels D and their arms may be caused to describe a half-circle by either one-quarter, one half, three-quarters, or an entire revolution of the screw E on its axis. The diameter of the toothed portion and the flanged portion, as well as the diameter in cross-section, and the number of teeth on said flanged and toothed wheels D, and the diameter in cross-section, and the axial diameter, and the number of teeth on the toothed wheel F on the screw E, must, in every case, be in direct ratio to the pitch of the screw-thread, or the distance traveled by said screw, by imparting to it one-quarter, one-half, three-quarters, or one entire revolution, to permit the arms D^1 to describe a semicircle.

I have here shown a leaf-turner having six arms, describing a half-circle, or turning a leaf from either side of a book to the other by one-half revolution of the screw E on its axis.

The toothed portion and the flanged portion d^2 d^3, respectively, are of a width equal to one-half of the distance traveled by the screw E in one-half of a revolution, and the width or diameter in cross-section of the toothed wheel F, rigidly mounted on the inner end of the screw E, is also equal to one-half of said distance traveled by the said screw.

The flanged portion of the flanged and toothed wheels D serves the following purpose: If the wheels D were all of equal thickness, placed side by side, the toothed wheel F, when traveling with the screw from one wheel D to another, would not have time to be entirely disengaged from the first wheel D before engaging the teeth of the next adjoining wheel D, and would therefore actuate both wheels at the same time, the first completing one-half of a revolution, while the second or next flanged and toothed wheel will begin its one-half revolution before the completion of that of the first. The wheels D, however, being flanged or provided with an annular projection, and so mounted that the flanged portion d^3 on one wheel, D, is adjacent to the toothed portion d^2 of the next preceding it, a space is formed between each toothed portion of two wheels, D, to permit the toothed wheel F to disengage its teeth from those of the wheel D it has rotated prior to the commencement of the next half-revolution.

It will also be readily understood that the diameter in cross-section of the wheel F must be equal to the diameter in cross-section of the flange portion d^3, or that of the toothed portion d^2 of the wheel D, or equal to one-half the distance the screw has traveled in one-half of a revolution on its axis. Should this wheel be of a greater diameter in cross-section, it would engage the teeth of the succeeding wheel D too soon, and if of a less diameter in cross-section, not soon enough to impart thereto the necessary one-half revolution whereby the arms D^1 are caused to describe a semicircle to turn the leaves.

The number of teeth on the wheels D F in the apparatus as above described are as follows: the former have seven teeth, the latter has sixteen. If the distance to be traveled by the screw is increased the number of teeth and the respective diameters of the wheels D F must be correspondingly increased; and if that distance is diminished the number of teeth and the respective diameters of the wheels D F must be diminished accordingly; hence it follows that the width of the space between the teeth of two wheels, D, the diameter in cross-section, or the width of the teeth of said wheels, the number of such teeth, and the axial diameter of the toothed portion, together with the axial diameter of the wheel F, its diameter in cross-section, or the width of its teeth and the number of such teeth, must always be in a direct ratio to the pitch of the thread on the screw.

The wheels D may be constructed in various ways to produce the required space. For instance, a disk of smaller diameter but of the same thickness as the wheel, may be riveted to the toothed portion of the wheel D, taking the place of the flange, or its face may have a series of projecting pins of the required length, which bear on the face of the adjacent toothed wheel; or each toothed wheel may be separated from the other by means of a collar of the required width, which latter is firmly keyed to the shaft, so as to prevent its rotation with the wheel, and to prevent the rotation of the next adjoining wheel by friction, or any other suitable means may be employed to effect the desired result.

The screw E has its bearings in a correspondingly-threaded perforation, e, in the lower plate b^2 of the casing B, and terminates at its outer end in a handle or ring or bow, like that of a key, while the toothed wheel F is rigidly mounted on its inner end by means of a screw, the head of which enters a recess, e^1, in the upper plate b^1 when the screw E has been driven home.

When, however, a greater number of turning arms are used, which necessitates an actuating-screw of greater length, its bearing in the lower plate b^2 would not be sufficient to prevent it from swaying when actuated by hand and meeting with resistance. In this case I mount it as shown by Fig. 3, where the screw is hollow and rotates upon a shaft, E^1, one end of which is rigidly connected to the upper plate b^1 of the casing, thus forming a guide for the screw E.

H is a spring-clamp consisting of two wings or leaves, h, each connected to one end of a leg, h^1 h^2, which terminate in enlargements or thumb-pieces h^3. The two legs are pivoted together as at $h^\times$, and held closed by means of

a spring, *g*. One of the legs h^1 is provided with a sleeve, G, for the reception of the outer bent portion of the arms D^1, to hold said clamp H in a vertical position; and to prevent its rotation the bent shank on the arms D^1 is formed square, or nearly so, and the interior of the sleeve G is a corresponding form. The clamp may thus be connected to or removed from the arms D^1, as desired.

By the use of this clamp the arms D^1 may be made much shorter than is the case with those heretofore employed, and need not extend farther than a short distance toward the center of the ordinary music-leaf.

The arrangement and construction of the various parts are such as to produce a leaf-turner occupying a small space. The mechanism, being exceedingly simple, produces a durable device which is not liable to get out of order, and also admits of a certain amount of ornamentation.

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

1. The actuating-screw E, in combination with a toothed wheel, F, and suitable intermediate mechanism to turn one or more leaves, said toothed wheel F being rigidly mounted upon one extremity of the screw E, the diameter, thickness, and number of teeth of the toothed wheel F being determined by the pitch of the screw, all constructed and arranged substantially as described, for the purpose specified.

2. In combination with the screw E, and toothed wheel F, a series of loosely-mounted flanged and toothed wheels D, carrying leaf-turning arms D^1, substantially as and for the purposes specified.

3. The flanged and toothed wheels D, loosely mounted upon a rigid shaft, and arranged thereon so that a space between the toothed portion of the wheels D, as specified, in combination with the screw E, and toothed wheel F, all constructed and arranged to operate as set forth.

4. The combination of the arms D^1, carrying spring-fingers, or their equivalents, at one end, and the other connected to a series of flanged and toothed wheels, D, with the toothed wheel F, and screw E, all constructed and arranged to operate substantially as set forth.

5. The casing B, and vertical connecting shank or arm *b*, in combination with a music-support having a slide, *a*, as and for the purposes specified.

6. In combination with the outer bent portion of the arms D^1, a spring-clamp, H, having a sleeve or socket, G, on one of its legs, substantially as described, for the purpose set forth.

In witness that I claim the foregoing I have hereunto set my hand this 10th day of February, 1877.

CHARLES SCHWERDTFEGER.

Witnesses:

I. L. DAVENPORT,

C. MITCHELL.