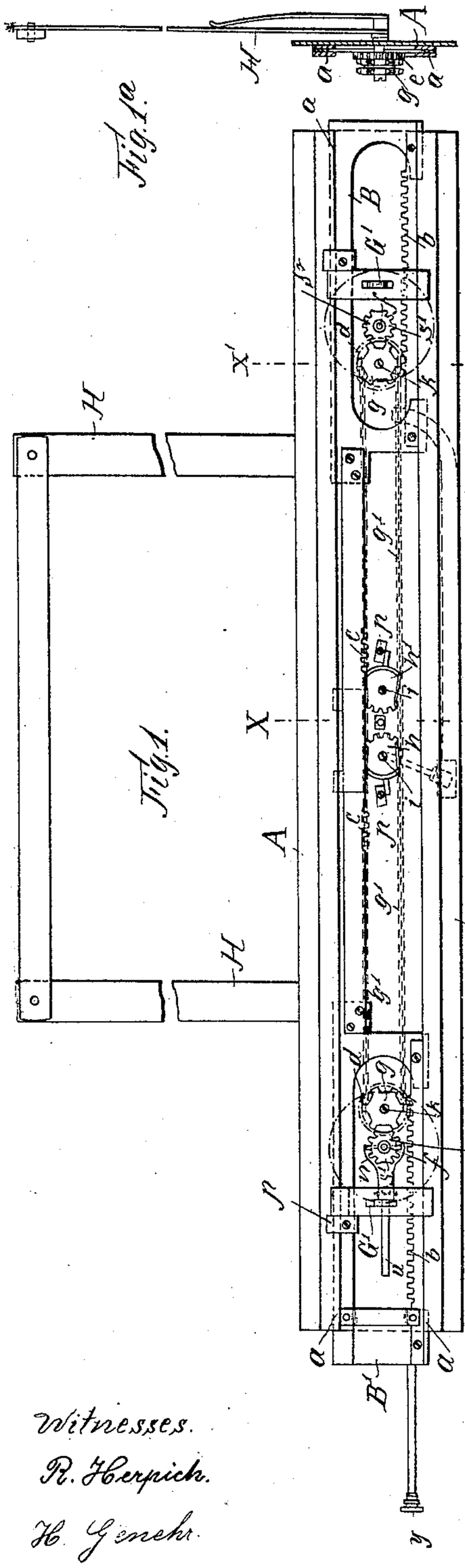
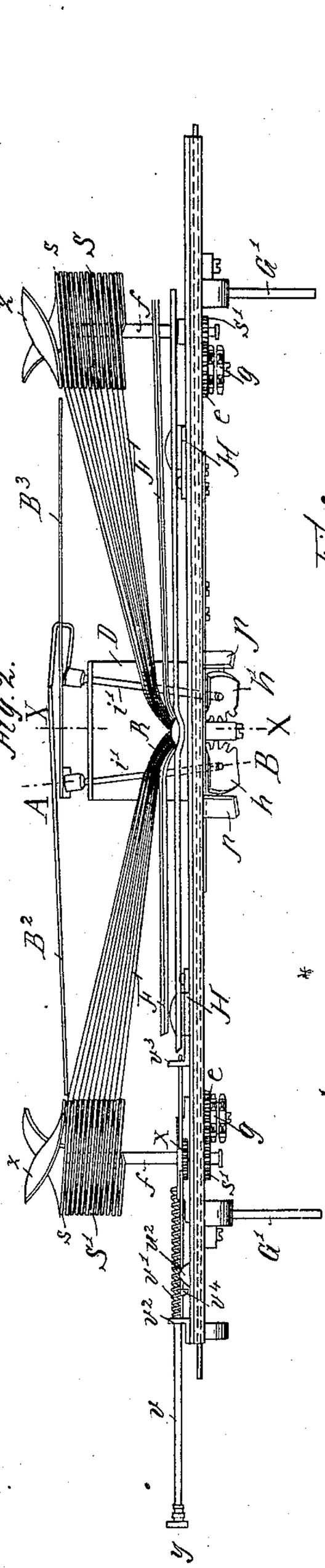
(No Model.) 4 Sheets—Sheet 1.

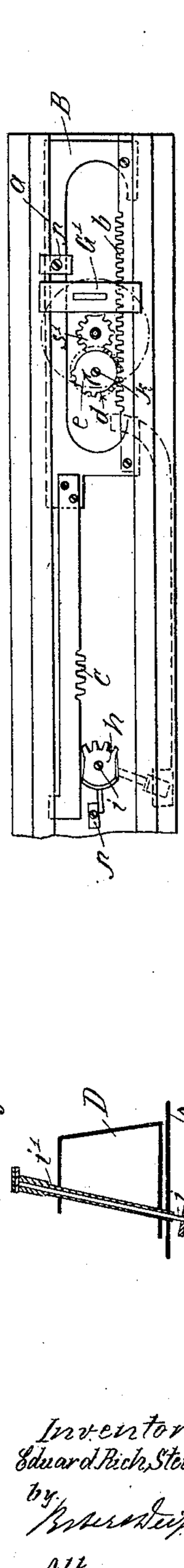
E. R. STEINER.

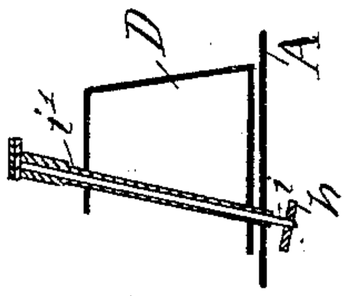
APPARATUS FOR TURNING LEAVES OF MUSIC BOOKS.

No. 568,049. Patented Sept. 22, 1896.









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(No Model.) 4 Sheets—Sheet 2.

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APPARATUS FOR TURNING LEAVES OF MUSIC BOOKS.

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Fig. 4.

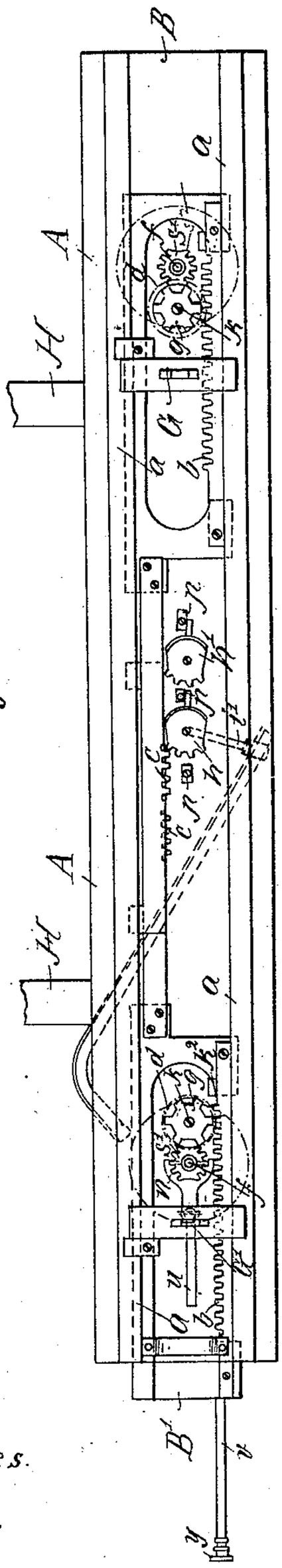

Fig. 5.

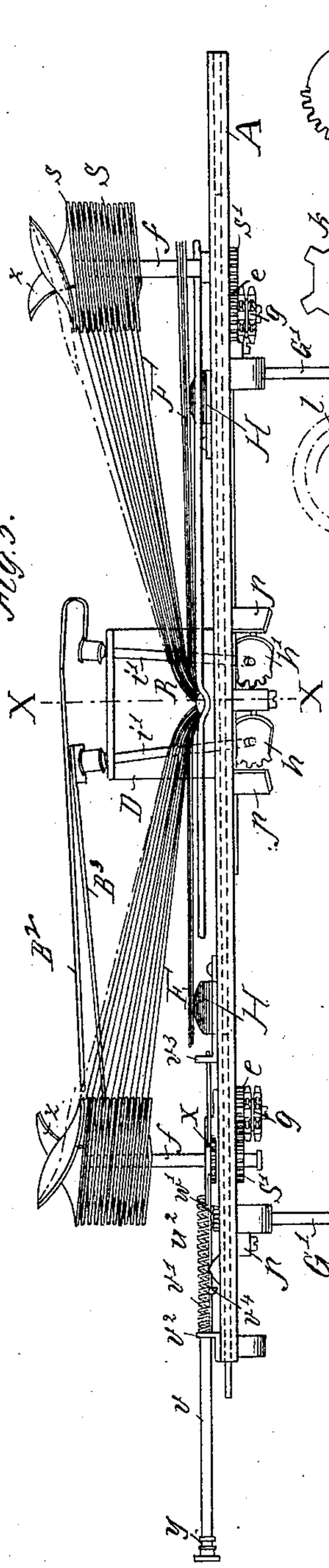

Fig. 6.

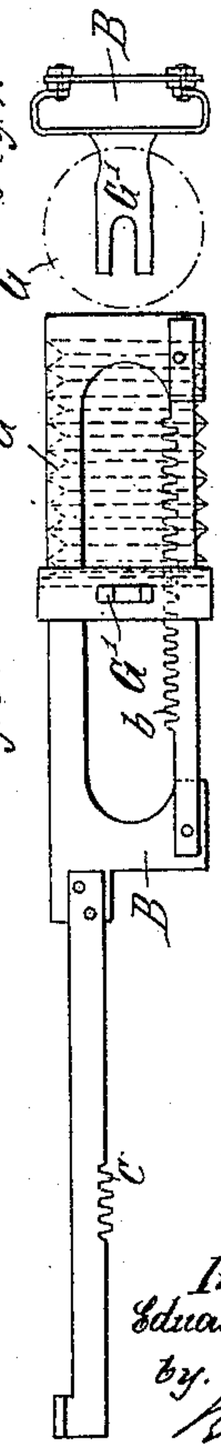

Fig. 7.

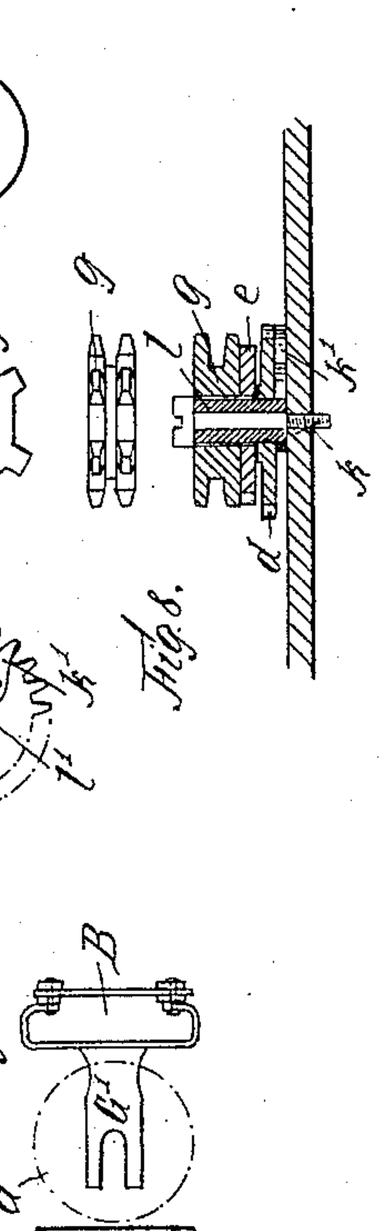

Fig. 8.

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(No Model.) 4 Sheets—Sheet 3.

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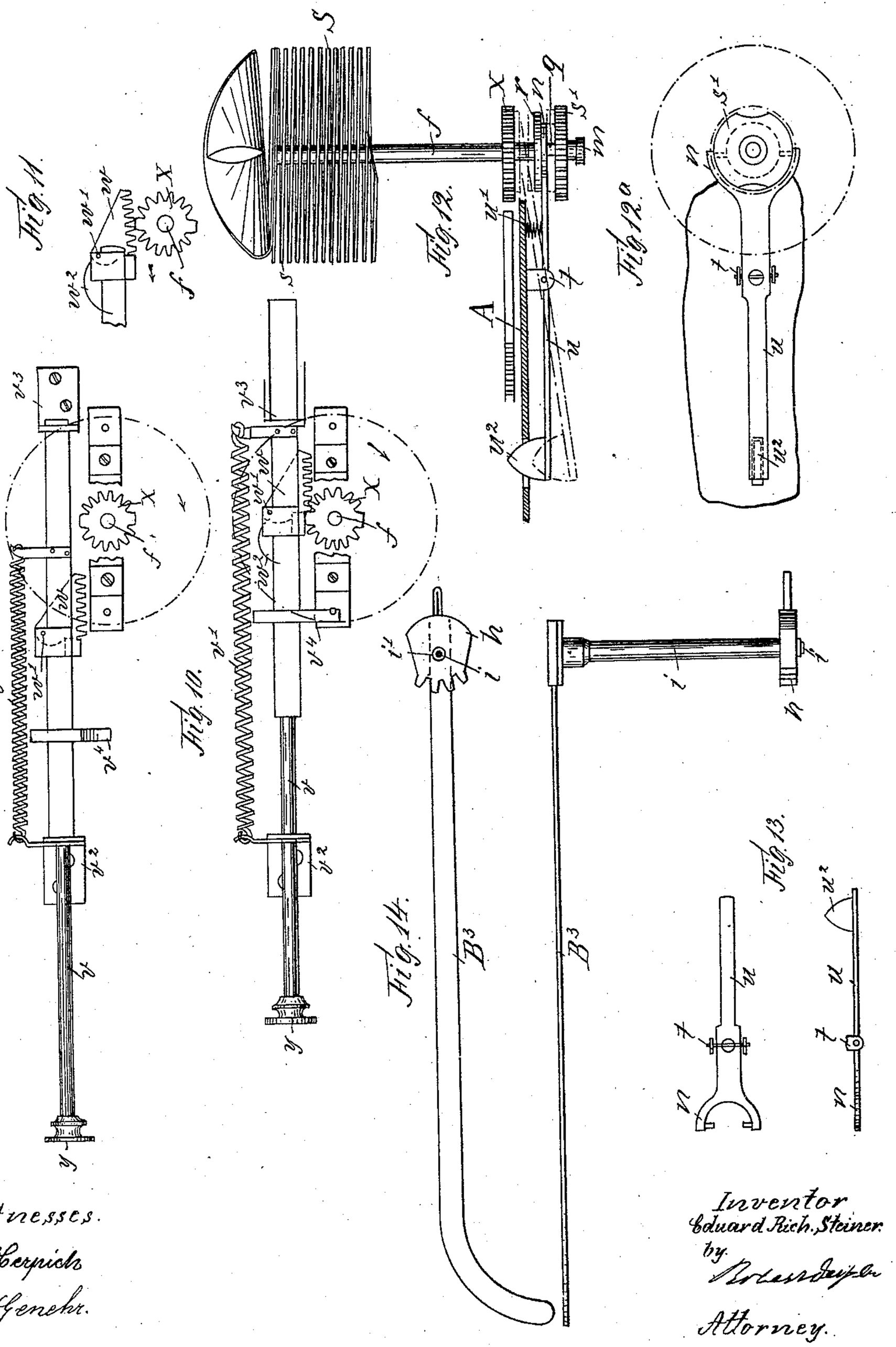
APPARATUS FOR TURNING LEAVES OF MUSIC BOOKS.

No. 568,049. Patented Sept. 22, 1896.



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(No Model.) 4 Sheets—Sheet 4.

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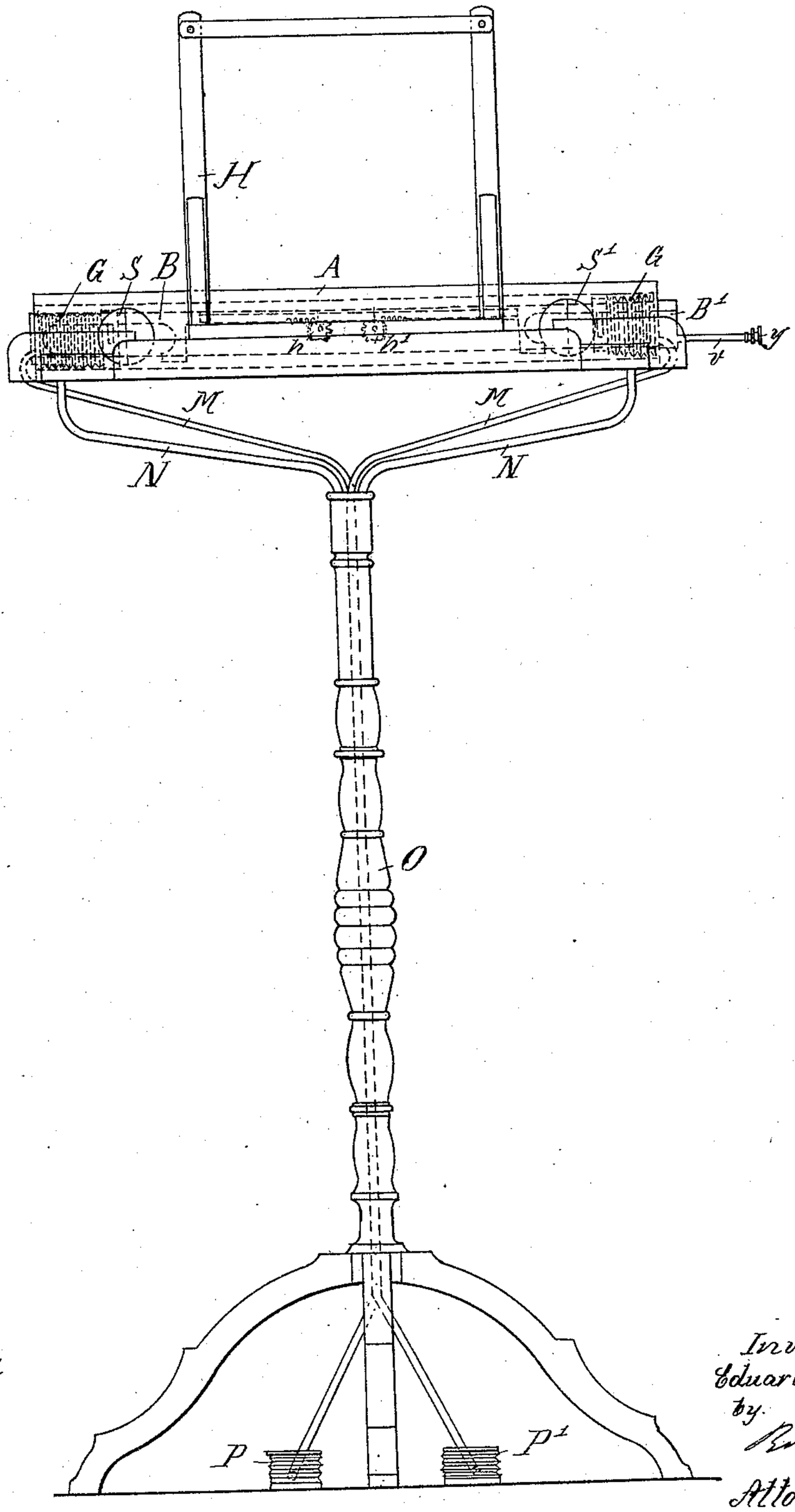
APPARATUS FOR TURNING LEAVES OF MUSIC BOOKS.

No. 568,049. Patented Sept. 22, 1896.

Fig. 15.



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UNITED STATES PATENT OFFICE.

EDUARD RICHARD STEINER, OF HAMBURG, GERMANY.

APPARATUS FOR TURNING LEAVES OF MUSIC-BOOKS.

SPECIFICATION forming part of Letters Patent No. 568,049, dated September 22, 1896.

Application filed August 1, 1892. Serial No. 441,871. (No model.) Patented in Germany November 28, 1891, No. 63,711; in England December 21, 1891, No. 22,291, and in Austria-Hungary September 22, 1893, No. 15,385 and No. 38,220.

To all whom it may concern:

Be it known that I, EDUARD RICHARD STEINER, a subject of the King of Prussia, German Emperor, and a resident of Hamburg, in the German Empire, have invented some new and useful Improvements in Apparatus for Turning Over the Leaves of Music-Books, (for which Letters Patent have been obtained in Germany, No. 63,711, dated November 28, 1891; in Great Britain, No. 22,291, dated December 21, 1891, and in Austria-Hungary, No. 15,385 and No. 38,220, dated September 22, 1893,) of which the following is an exact specification.

My invention relates to a device for automatically turning over the leaves of music-books.

The object of my improvements is to do away with the manipulation of folding the leaves previous to employing the apparatus, which hitherto was necessary in order to allow the lever-arm turning the leaves to grasp the same.

My invention consists in the novel construction, arrangement, and combination of parts, as hereinafter fully described, illustrated in the drawings, and pointed out in the appended claims.

In order to show more clearly the construction and operation of my improved apparatus, I have appended hereunto several sheets of drawings, and will refer to the same in this specification.

Like parts are lettered in a uniform manner throughout the several views.

Sheets 1 and 2 illustrate the general arrangement of the parts and the function of the same. Sheet 3 shows details, and Sheet 4 represents a view of the entire device.

Figure 1, Sheet 1, is a back view of the apparatus, the parts being in the position of rest and both slides in their extreme outer positions. Fig. 1^a, Sheet 1, is a cross-section on line x' x' of Fig. 1. Fig. 2, Sheet 1, is a top plan view, the parts having the same respective position as in Fig. 1 and the leaves of a music-book being shown inserted into the thread of the Archimedean screw and part of said leaves being already turned over, part of the same remaining to be turned. Fig. 2^a shows a section on line A B of Fig. 2. Fig. 3 is a separate view of the right half of Fig. 1, the chain-wheel g shown in the latter being removed in order to disclose the gear by which the Archimedean screw is operated. Fig. 4, Sheet 2, is a back view of the apparatus, the left turning-lever having carried a leaf from the left to the right. Fig. 5 is a top plan view of Fig. 4. Fig. 6 is a rear elevation of the right slide B. Fig. 7 is an end elevation of the same, partly in cross-section. Fig. 8 shows in detail the gear for the Archimedean screw, the chain-wheel g, the wheel e, having a toothed sector, and the arrangement of the wheels d e g. Fig. 9, Sheet 3, is a front view of the sliding mechanism for inserting the leaves of the music-book in the thread of the right Archimedean screw, showing the position of said mechanism when at rest. Fig. 10 is a similar view, the screw having made half a revolution. Fig. 11 is a detail view of the same mechanism, showing its function when the slide returns into its first position. Fig. 12 is a top plan view of the Archimedean screw seen from behind, with a disconnecting-lever, the function of which is explained hereinafter. Fig. 12^a is a back view of Fig. 12. Fig. 13 is a plan and a side view of the disconnecting-lever. Fig. 14 is a plan and a side view of one of the lever-arms for turning over the leaves of the book. Fig. 15, Sheet 4, shows the arrangement of the entire device.

As shown in Figs. 1, 1^a, and 2, the apparatus consists of a frame A, provided with guides a a on both sides, and in these guides move to and fro the slides B and B', which by means of rack and pinion cause one of the Archimedean screws S and S' to rotate and one of the levers B^2 or B^3 to turn over a leaf of the music-book, secured to the apparatus by means of the holders H. The leaves are placed in such manner that the lower edge of the same is about level with the axis of said Archimedean screws and that the leaves themselves are disposed symmetrically in regard to the mentioned screws. The latter are double-threaded, and both threads are terminated at their ends by edges cut off radially. The forward ends of the screws are formed with wing-like extensions z in order to seize the leaves and also to allow the same to be easily

released. The apparatus is constructed almost symmetrically on both sides of the axis X X.

The apparatus permits the leaves to be turned from the right to the left and reciprocally. In order to insert the leaves into the screw S′ or into the thread *s* of the same, a suitable gear is affixed to the frame A. The forward and backward movement of the slides B B′ may be effected by means of a bellows, (indicated at G, Figs. 6, 7, and 15,) which may be inflated from the outside, and the end whereof is fastened to a fork-shaped lug G′, extending from the slide. The course of the latter is limited by the stops *p*, Figs. 1 and 2.

The screws S and S′ are caused to rotate by the movement of the slides B and B′ in the following manner: Each of the slides B and B′ has two racks *b* and *c*. The racks *b* engage with a toothed wheel *d*, being loosely mounted on the nave-box *l* of the wheels *e* and *g*, which lie rigidly together and turn around the pivot *k*. To the toothed wheel *d* there is attached a pawl *k′*, actuated by a spring, but kept out of action in the position of Fig. 1 by a stop k^2, fixed to the rack *b*, as may be seen from Fig. 4. The pawl *k′* falls automatically behind the cam *l′* of the nave-box *l* as soon as the slide B′ is pushed inward. Thus the pawl *k′* will cause the wheels *e* and *g* to rotate with the toothed wheel *d* when the slide B is moved inward by means of the bellows G, as is more fully hereinafter described. This arrangement is provided identically on the left and on the right side of the apparatus. The toothed wheel *s′* is formed with diametrically opposite notches s^2, by means of which it glides during part of its revolution on the smooth part of the edge of wheel *e*. The chain-wheel *g* receives the chain *g′*, designed to transmit the movement to the corresponding chain-wheel *g* on the other side of the apparatus.

The rack *c*, provided in the middle of the apparatus, engages with toothed sectors *h h′*, mounted on the pivots *i i* of the turning-levers B^2 B^3. Said pivots *i* are surrounded by sleeves *i′*, provided in the plate D.

The music-book is placed on the holder II, Fig. 1, and the leaves of the book are inserted in the thread of the Archimedean screw S′ in the following manner:

The mechanism (see Figs. 9 to 14) for rotating the screw S′, when the slide B′ is pushed inward, has already been described. This mechanism which serves for inserting the leaves of the book in the said screw is operated by pressing the knob *y* at the end of the slide-rod *v*, which is guided in bearings v^2 and v^3 and provided with a catch v^4. When pushing the knob *y* inward, the catch v^4 collides with a nose w^2, fixed to a double arm-lever *w* and projecting from behind through a suitable hole provided in the frame A. The lever *w* is pivoted at *t* to a lug extending from said frame, and a spring *w′* tends to drive the nose w^2 through the mentioned opening in frame A. The other end *n* of lever *w* has the shape of a fork provided with two small inward projections. The fork *n* fits over a coupling-ring *r*, which is axially displaceable on a square portion of the axle *f* of the screw. This coupling-ring has two radial grooves, corresponding to two projections *q* on the inner side of the toothed wheel *s′*, which is loosely mounted on the axle *f*. Thus when the lever *w* is actuated by the catch v^4, Figs. 1 and 5, the coupling-ring *r* and the toothed wheel *s′* are thrown out of gear, while in every other position they engage with one another by means of the mentioned grooves and projections. The nut *m* prevents the wheel *s′* from gliding off the axle *f*. By pushing the rod *v* farther inward the teeth of a sector *w*, Figs. 9 to 11, pivoted at *w′* and actuated by a spring w^2, are caused to engage with the toothed wheel *x*, keyed to axle *f*, thus rotating the same in the direction of the arrow from the position in Fig. 9 into that shown in Fig. 10. At each forward movement of the rod *v* the wheel *x*, and consequently the Archimedean screw S′, makes half a revolution and the bent-up ends *z* of said screw seize one of the leaves of the music-book. As soon as the leaf which has been inserted first is transported to the end of the screw opposite *z* each turn of the screw has taken up one leaf. Therefore the apparatus is employable for as many leaves as can be inserted in the screw S′. The screw shown in the drawings, for instance, is capable to receive up to eleven leaves. The rod *v* returns into its first position under the action of spring *v′*, which is fixed on one side at the bearing v^2 and at the rod *v* on the other. At the back movement of the rod *v* the wheel *x* is not rotated by the toothed sector *w*, as the latter may be raised a little turning around its pivot *w′* and not being prevented therefrom by the spring w^2. Thus the sector *w* glides over the teeth of the wheel *x* without actuating it. As will be seen in the drawings, two teeth of the wheel *x* are broader than the rest and provided with a straight edge in order to facilitate the gliding of the toothed sector *w*.

It is apparent that the screws S and S′ may be made of wire instead of sheet metal, as shown in the drawings, and I do not confine myself to the latter construction. I may also employ screws having any number of threads, and not only double-threaded screws, as in the described construction, but in each case the toothed wheel *x* and toothed sector *w* must be made in a different manner to suit the number of the threads.

The leaves being all inserted in one of the Archimedean screws, the apparatus is ready for use. The mechanism for turning the leaves is operated by inflating the bellows G, pressing against the forked piece G′, which is arranged at the slides B and B′, and thereby moving one of these slides. The inflating of the bellows G may be done in any suitable

manner, but preferably in the manner shown by Fig. 15 of the drawings. Here the bellows G communicate with flexible pipes M, leading to the bellows P P′, actuated by the feet of the performer and situated at the foot of the post O, which supports the apparatus for holding and turning the leaves of the music-book by means of the arms N. Now, when the slide B or B′ is driven forward in such manner, the rack *b* engages with the toothed wheel *d* and the movement of the latter is communicated to the wheels *e* and *g* by means of the pawl *k*′. The teeth of wheel *e* engage with those of wheel *s*′ and rotate the same with the Archimedean screw S or S′ through an angle of one hundred and eighty degrees, and thereafter the smooth part of the edge of wheel *e* glides over the notch s^2 of wheel *s*′. During the half-revolution of the screw S or S′ one of the leaves is carried to the end *z* of the same, Fig. 5.

The wheel *g* is connected with the wheel *g* on the other side of the apparatus by means of chain *g*′, so that by the movement of the wheel *g* also the wheels *g* and *e* on the other side are rotated, thereby effecting a simultaneous turning of the screws S and S′. The slide B progressing farther, the rack *c* engages with the toothed sector *h*, and the lever-arm B^3 is turned by one hundred and eighty degrees, grasping with its curved end the leaf N′, taking it out of the screw S′ and bringing the same into the other screw, S. The movement of the slide still continuing, the wheel *g*, driven by the chain *g*′, causes the teeth of wheel *e* to engage with those of wheel *s*′, and the screw S makes half a revolution. The leaf N is thereby drawn into the thread of the same, thus leaving the curved end *z* free to receive the next leaf.

It is apparent that by operating the slides B or B′ the leaves may be turned over forward or backward at will. The turning backward of the leaves N is effected by actuating the bellows P, Fig. 15, and thereby operating the slide B, while by actuating the bellows P′ the slide B′ is moved and the leaves N thereby turned forward. At every forward movement of either of said slides one leaf is drawn out of one of the Archimedean screws and inserted in the other, and both screws make half a revolution in order to be able to release and to receive, respectively, the next leaf.

Having thus fully described the nature of this invention, what I desire to secure by Letters Patent of the United States is—

1. In an apparatus for turning the leaves of music-books forward and backward, the combination with a support, of Archimedean screws S, S′ arranged upon opposite sides of the central axis of said support as described, and adapted to receive the leaves of a music-book both before and after being turned, and means for intermittently rotating the screws for the purpose set forth.

2. In an apparatus for turning the leaves of music-books forward and backward: the combination, with the Archimedean screws S S′, of the bellows G, slides B B′, racks *c*, toothed sectors *h h*′, turning-levers B^2 B^3, racks *b*, toothed wheels *d e s*′, and chain-wheels *g*, substantially and for the purpose as described.

3. In an apparatus for turning the leaves of music-books forward and backward: the combination, with the slide B′, of the rod *v*, toothed sector *w*, pivoted to said rod, spring w^2 attached to sector *w* and rod *v*, and toothed wheel *x* journaled on axle *f* of the Archimedean screw S′, substantially and for the purpose as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EDUARD RICHARD STEINER.

Witnesses:
R. HERPICH,
G. FISCHER.