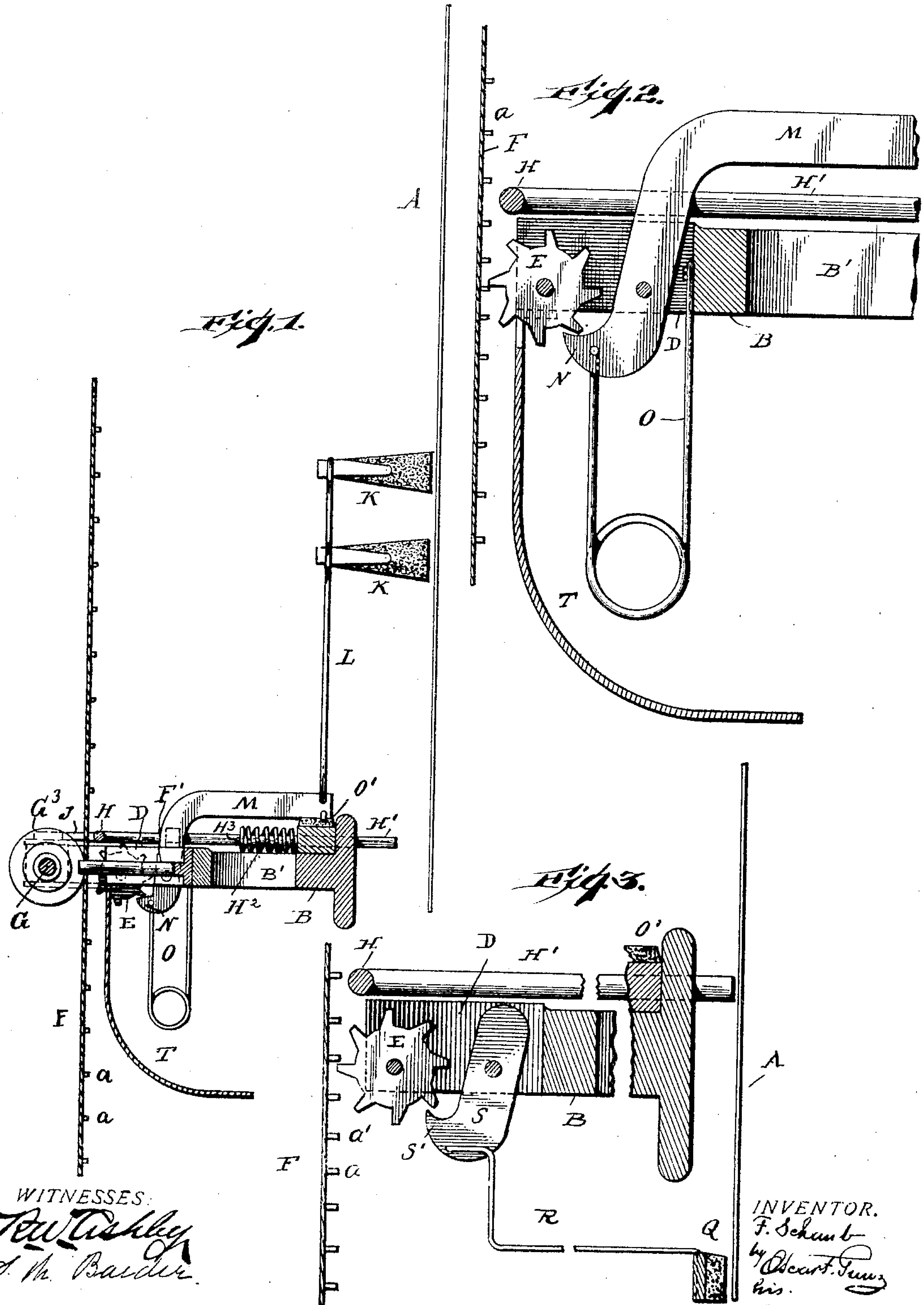
No. 805,989. PATENTED NOV. 28, 1905.

F. SCHAUB.

AUTOMATIC PIANO.

APPLICATION FILED NOV. 10, 1904.

4 SHEETS—SHEET 1.



WITNESSES:

R. W. Ashley

S. M. Barder

INVENTOR.

F. Schaub

by Oscar F. Gunz

his

ATTORNEY.

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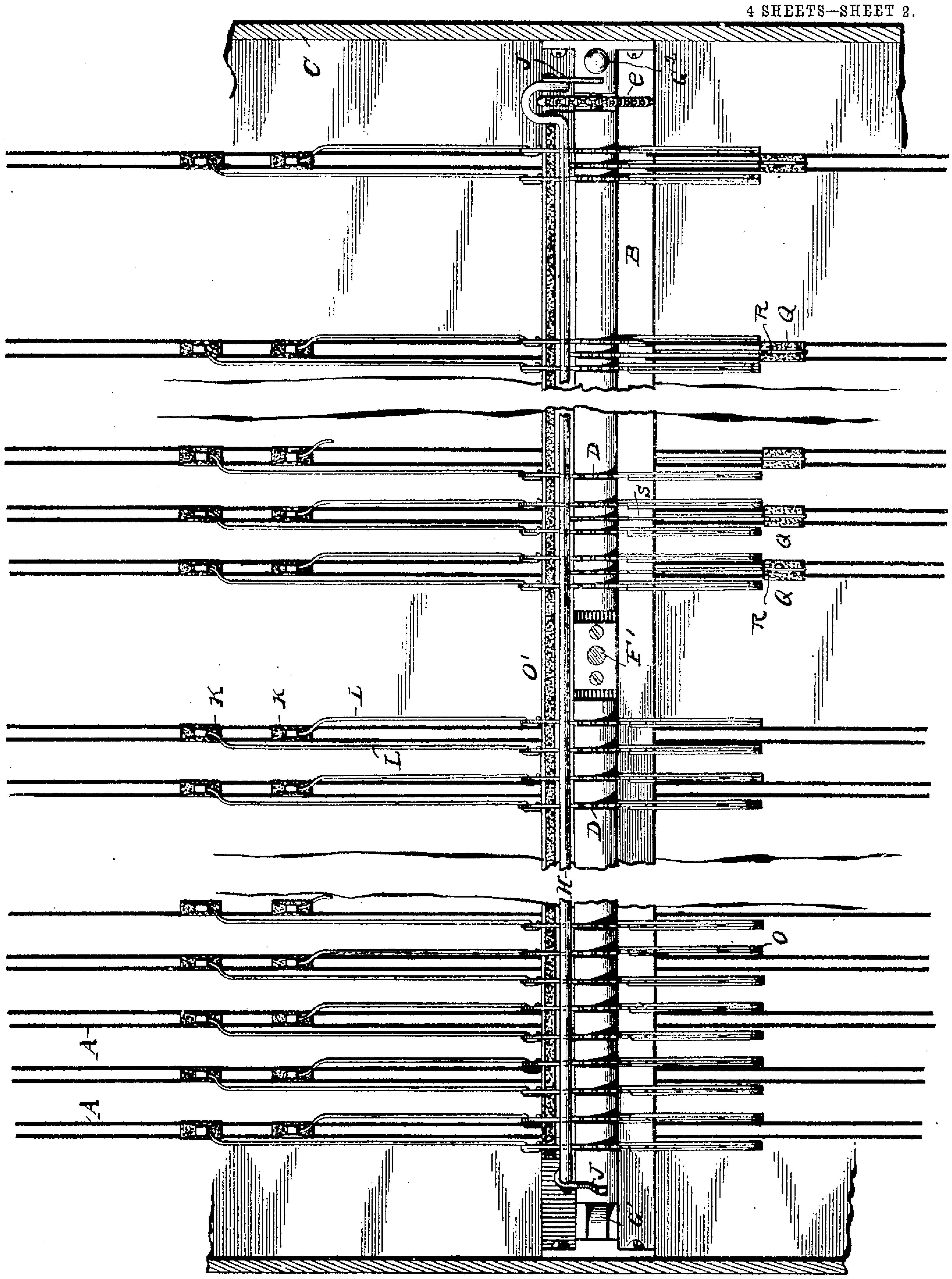

Fig. 4.

WITNESSES:
R. W. Ashley
S. W. Baeder

INVENTOR.
F. Schaub
BY Oscar F. Gunz
his ATTORNEY.

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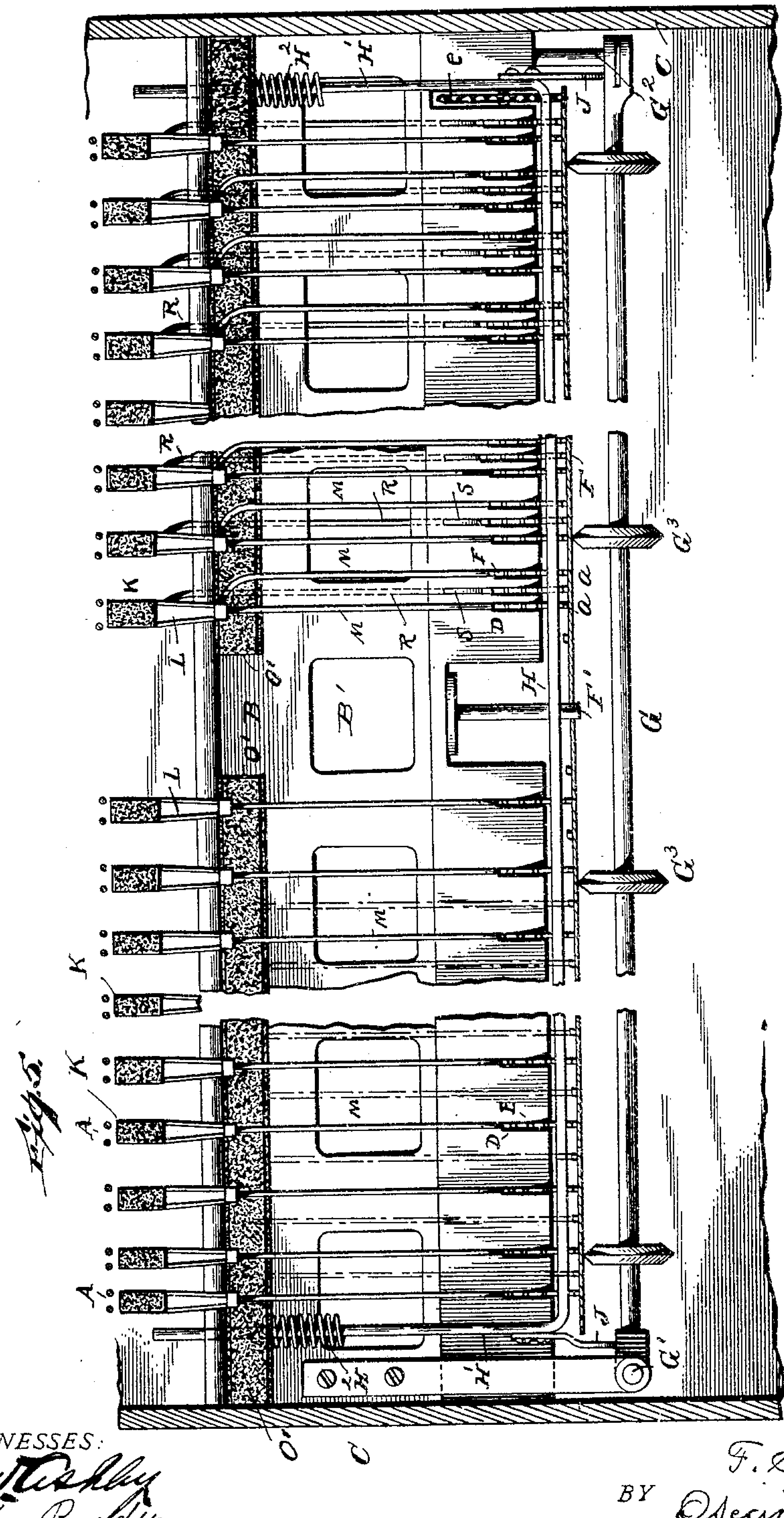

WITNESSES:

R. W. Ashley

S. M. Balder

INVENTOR.

F. Schaub

BY Oscar Tums

his ATTORNEY.

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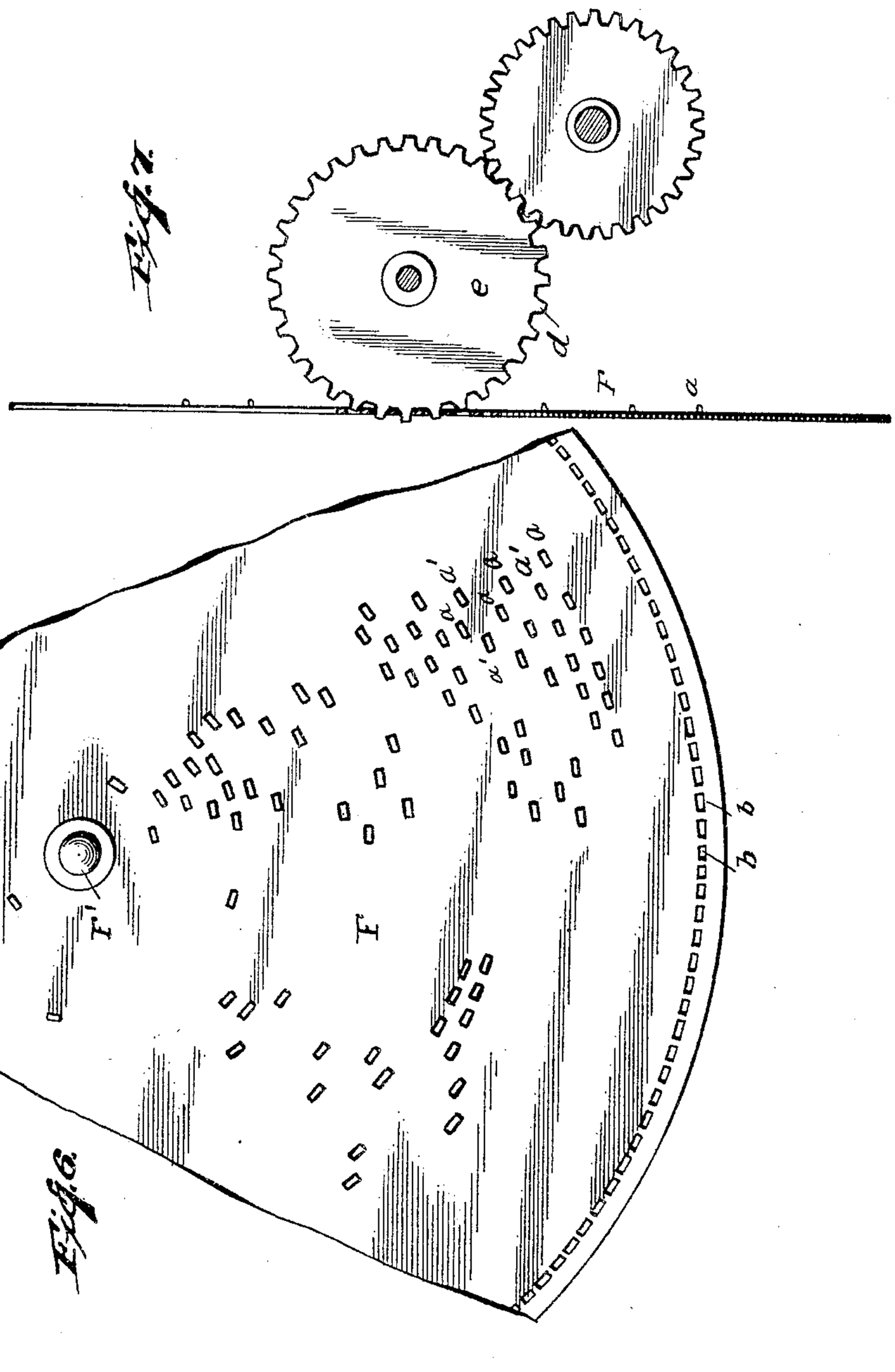

Fig. 2.

Fig. 6.

WITNESSES:

J. W. Ashley Jr.

S. M. Baldwin

INVENTOR.

F. Schaub

BY Occurt Sons

his ATTORNEY.

UNITED STATES PATENT OFFICE.

FERDINAND SCHAUB, OF JERSEY CITY, NEW JERSEY, ASSIGNOR TO EDMOND T. OTTO, TRUSTEE, OF JERSEY CITY, NEW JERSEY.

AUTOMATIC PIANO.

No. 805,989. Specification of Letters Patent. Patented Nov. 28, 1905.

Application filed November 10, 1904. Serial No. 232,085.

To all whom it may concern:

Be it known that I, FERDINAND SCHAUB, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Automatic Pianos, of which the following is a specification.

This invention relates to improvements in automatic pianos, especially that kind in which note-disks having projections are used for operating star-wheels, which in turn operate the sound-producing devices, such as the hammers that strike the strings.

The object of my invention is to provide a new and improved instrument of this kind which is simple in construction, perfect in operation, produces a fine musical effect, repeats with great rapidity, and in which suitable guard devices are provided for the purpose of preventing the accidental turning of a star-wheel while inserting a note-disk and also for preventing the breaking off of the projections on the note-disk.

In the accompanying drawings, in which like letters of reference indicate like parts in all the figures, Figure 1 is a vertical sectional view through the hammer and star-wheel supporting bar, showing the hammers and star-wheels, the note-disk, and other parts. Figs. 2 and 3 are enlarged detailed views of similar parts, showing the mounting of the hammer-levers and damper-levers. Fig. 4 is a front view of the central part of the instrument, showing the arrangement of the star-wheels, hammers, and hammer-levers in relation to the strings, parts being broken away and others shown in section. Fig. 5 is a horizontal sectional view taken directly above the hammers, showing the transverse supporting-bar for the hammers, star-wheels, and note-disk. Fig. 6 is a face view of a note-disk. Fig. 7 is a sectional view showing the driving mechanism for the note-disk.

The strings A are mounted and secured in the conventional manner, as in a piano, and are preferably arranged in pairs, as shown. A transverse bar B, preferably having openings B′, so as to make it lighter, extends from one side wall C of the casing of the instrument to the other, as is shown, for example, in Fig. 5. In the outer edge of the said transverse bar B vertical slits D are cut, in which toothed wheels E, so-called "star-wheels," are mounted, the front part of said bar thus forming a star-wheel rack. Some of these star-wheels serve for operating the hammers and others for operating the dampers, as will be set forth later on. The star-wheels E are so mounted as to project beyond the front edge of the transverse bar B, so that their teeth can be engaged by note projections *a* on the inner surface of a note-disk F, made of sheet metal and mounted to turn on a central bearing-pin F′, projecting beyond the front edge of the transverse bar B. The note-disk is provided along its rim with a series of slots *b*, into which the teeth *d* of a driving toothed wheel *e* pass, which wheel is driven from a suitable motor in the well-known manner. For the purpose of holding the disk F in place in front of the bar B in such a manner that the note projections *a* of the disk can engage the teeth of star-wheels E a presser-bar G is provided, which is pivoted at G′ to a suitable projection on the bar B and is provided at its free end with means for locking it to a pin G^2 or analogous device, said bar G carrying presser-rollers G^3, which press on the outer face of the note-disk. A bar or rod H, parallel with the front of the bar B, is located above the same and has its ends bent rectangular toward the rear to form the two shanks H′, which are suitably guided on the bar B, so as to adapt said shanks H′ to slide in the direction toward and from the strings A, thereby permitting the rod H to move in the direction from and toward the note-disk—that is, to move in a plane parallel with the top of the bar B. Each shank H′ is surrounded by a helical spring H^2, the inner end of which rests against the bar B and the outer end of which rests against a pin H^3 in each shank H′. Beyond the circumference of the note-disk F—that is, at a distance from the center of the central pivot F′ greater than the extreme radius of the note-disk—arms J project from said shanks H′ beyond the rod H. The springs H^2 normally hold the rod H such a distance beyond the outer edge of the bar B that when a note-disk is placed upon the central pivot F′ the note projections *a* contact with said bar H, or the inner surface of the note-disk contacts with the said bar H, thus preventing the note projections from coming in contact with the teeth of the star-wheels E. When the presser-bar or retaining-bar G is swung into position—as shown in Fig. 5, for example—it presses against the arms J on the shanks H′, and thus

presses the bar H back and out of the way, so as to clear the note projections *a*, as shown in Figs. 1, 2, and 3, thus permitting the presser-bar to press the note-disk back a sufficient distance to enable the note projections *a* to engage the teeth of the star-wheels. Whenever the note-disk is to be removed after playing, it is first necessary to disengage and swing outward the presser-bar G, and as soon as the presser-bar is swung outward the expanding springs H^2 force outward the shanks H′ and rod H, which in turn acting on the note-disk presses the same outward and away from the front edge of the transverse bar B. It is clear that this bar H prevents the teeth from coming in contact with the star-wheels before the note-disk is in proper playing position, thus preventing the breaking off of the note projections *a* and also preventing accidental turning or displacement of the star-wheels. At the same time the spring-pressed bar H automatically pushes the note-disk out of playing position as soon as the retaining-bar is swung away from the note-disk, thus preventing accidental bending or buckling of the note-disk in attempting to pull it off the central pivot-pin F′.

As stated, there are two strings A for each note, and two hammers K are provided for each pair of strings, one hammer being located above the other, and each hammer is connected by a separate wire L with a separate L-shaped hammer-lever M, the downwardly-projecting ends of which hammer-levers pass into the slits D and are provided at their lower ends with toes or cam ends N, which are engaged by the teeth of the star-wheels.

A spring O is attached to the lower end of each hammer-lever M and to the inner end of the corresponding slit or notch D, which spring serves for pressing the lower end of each hammer-lever outward, thereby holding the inner end of the hammer-lever on a felt cushion O′ on the bar B and at the same time holding the corresponding hammer-head K a short distance from the strings. As a star-wheel revolves its teeth strike the cam projection N of the corresponding hammer-lever M, thereby pressing the lower or cam end of the hammer-lever in the direction toward the string and thereby, also, bringing the spring O in greater tension. By the movement of the lower end of the hammer-lever toward the strings the corresponding hammer-head is moved from the strings, the distance of movement of the hammer-head from the strings being very much greater than the distance of movement of the lower end of the hammer-lever toward the strings, because the upper arm of the lever M is made longer than the lower one. Whenever a star-wheel tooth snaps off the cam end N of a hammer-lever M and this hammer-lever is thus released, the corresponding spring O instantly expands and throws the corresponding hammer-head K against the string or strings, thus producing the desired sound.

As stated, there are two hammer-heads K for each pair of strings, and each hammer-head is connected with a separate hammer-lever M, and each hammer-lever M has its own star-wheel E.

The note projections *a* on the note-disk are so arranged that one circle of note projections *a* is provided on the note-disk for each star-wheel pertaining to a hammer, and these note projections are generally so arranged that the two hammers pertaining to one pair of strings are operated simultaneously; but when rapid repetition of sounds is necessary the two hammers pertaining to one pair of strings are operated alternately, each by its own star-wheel, and therefore the note projections in the corresponding two circles of note projections on the note-disk must be arranged alternately.

The medium and lower strings require dampers, and one damper-head Q is provided for each pair of strings, which damper-head Q is connected by a wire R with the lower end of a lever S, pivoted in a notch or slot D and also having a cam end S′ on its lower end, which is engaged by a star-wheel E, which star-wheel E is rotated by projections *a*′ on the inner face of the disk F, which projections *a*′ are not note projections, but are damper-operating projections. The star-wheels for the dampers are located between the two star-wheels pertaining to one pair of strings, and therefore the damper projections *a*′ on the note-disk F are located between the two concentric rows of note projections pertaining to the pair of strings upon which the corresponding hammers act. The damper is normally held a short distance from the strings and by the action of the star-wheel on the lever S is pressed against the strings and damps them. The damper projections *a*′ are so arranged and located on the disk that the damper is pressed against the strings a greater or less time after the strings have been sounded, according to the effect to be produced.

It will be observed that all the hammers are located above the bar B and the dampers below. For the purpose of protecting the springs O and the dampers a shield T extends downward and toward the rear from the front edge of the bar B.

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

1. In an automatic musical instrument, the combination with strings, of a plurality of hammers for the strings pertaining to each tone, a single damper for each set of hammers, a star-wheel for each hammer and damper for operating the same, said star-wheels being arranged in groups, and a note-disk having concentric rows of projections for

the star-wheels in each group, substantially as set forth.

2. In an automatic musical instrument, the combination with a series of strings, of hammers, there being two or more hammers for the strings pertaining to each tone, a star-wheel for each hammer-lever, a single damper for each set of said hammer-levers, and a separate star-wheel for each damper-lever, substantially as set forth.

3. In an automatic musical instrument, the combination with a group of strings, of a plurality of hammers for the strings pertaining to each tone, a star-wheel for each hammer, for actuating the same, a single damper for the strings pertaining to each tone, a star-wheel for operating each damper-lever, the star-wheel for the damper-lever being located between the star-wheels for the hammers of each tone, substantially as set forth.

4. In an automatic musical instrument, the combination with a series of strings, of a transverse bar in front of the strings, a series of hammers mounted in said bar and projecting from the same, a series of damper-levers mounted in said bar and projecting downward from the same, and star-wheels mounted in the bar for operating said damper and hammer levers, substantially as set forth.

5. In an automatic musical instrument, the combination with strings, of two hammers pertaining to the strings for each tone, a damper for the strings pertaining to each tone, a star-wheel for each hammer for operating the same, and a star-wheel for each damper for operating the same, two hammers and a damper with their star-wheels, pertaining to the strings for each note being arranged in groups of three, substantially as set forth.

6. In an automatic musical instrument, the combination with a star-wheel rack, star-wheels in the same for operation by a rotating note-disk, of a rod mounted on said star-wheel rack to move toward and from the plane in which the note-disk is to rotate, and means for pressing said rod toward the note-disk, substantially as set forth.

7. In an automatic musical instrument, the combination with a star-wheel rack, and means for supporting a rotating note-disk, of a rod mounted at said star-wheel rack, a retaining-bar movable toward and from the plane in which the note-disk rotates, means for pressing said rod toward the plane in which the note-disk rotates, and means on said retaining-bar for pressing said rod in the direction from the plane in which the note-disk rotates, substantially as set forth.

8. In an automatic musical instrument, the combination with a star-wheel rack, and a support for a rotating note-disk, of a rod mounted on said rack parallel with the rack and to move toward and from the plane in which the note-disk rotates, means for pressing said rod in the direction toward the plane in which the note-disk rotates, a retaining-bar, and means located beyond the circumference of the disk for pressing said rod in the direction from the plane in which the note-disk rotates, by means of said retaining-bar, substantially as set forth.

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

FERDINAND SCHAUB.

Witnesses:

EMIL SCHUMANN,

BERNARD F. SCHLIE.