

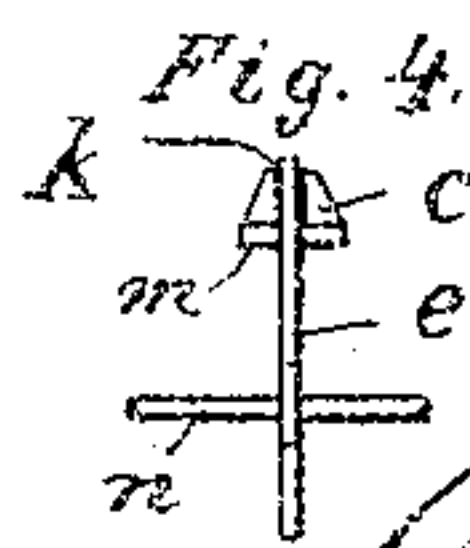
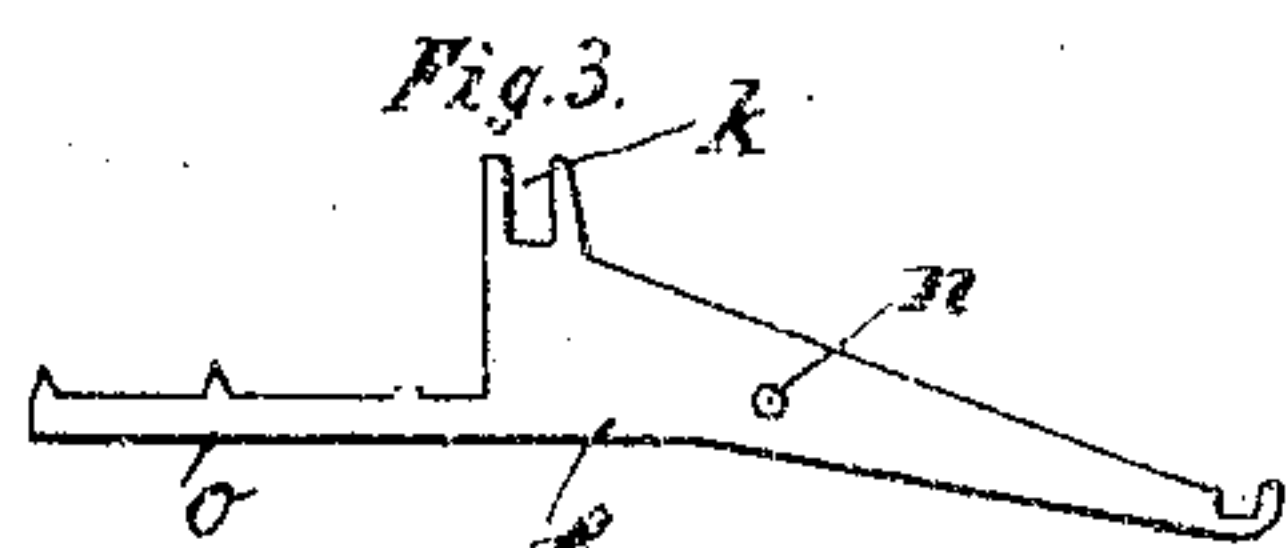
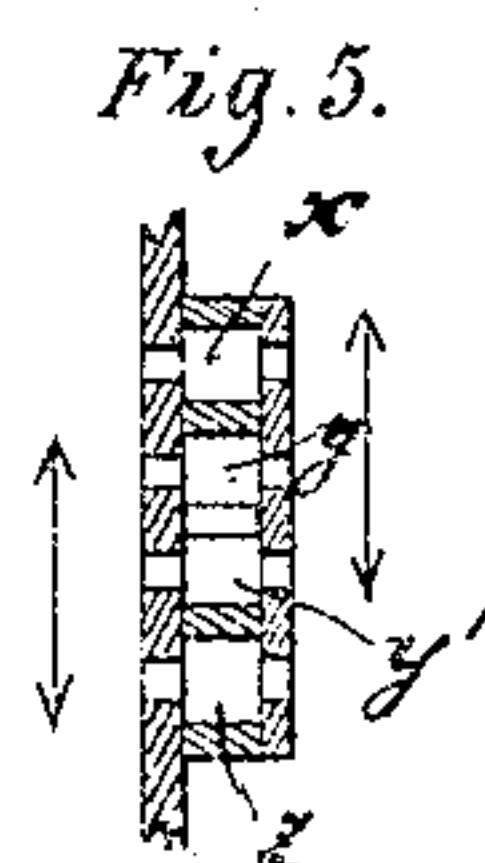
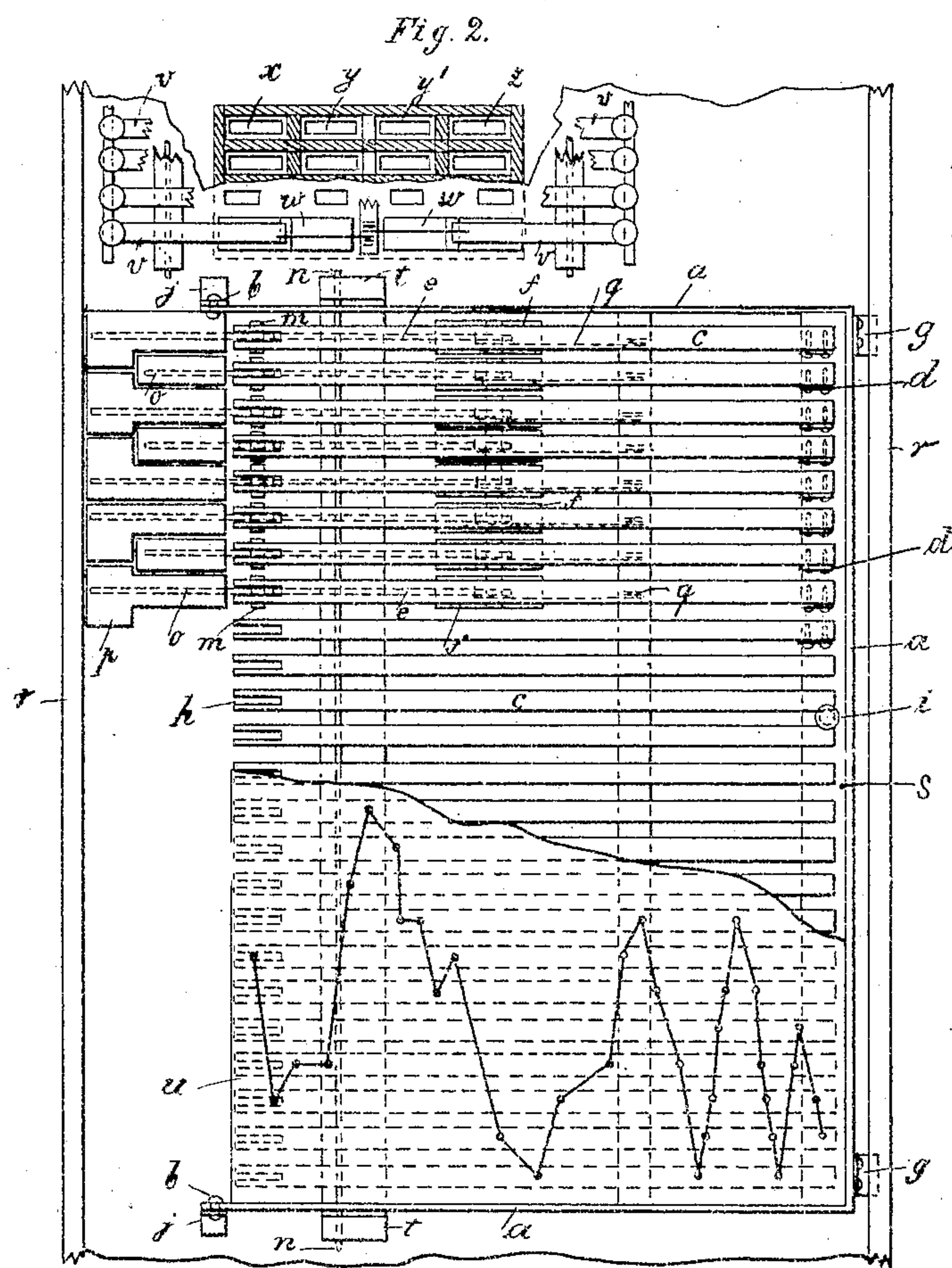
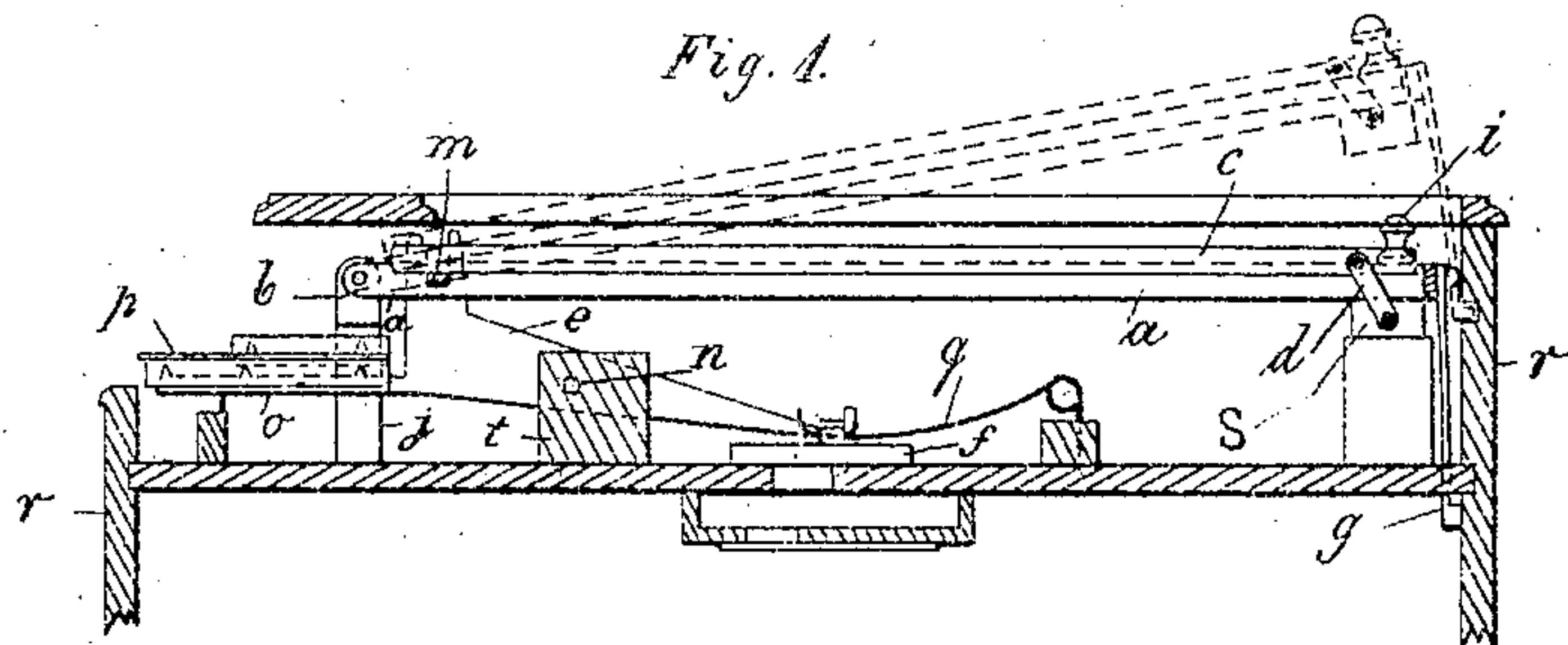
No. 778,545.

PATENTED DEC. 27, 1904.

F. MARTIENSSEN.  
MUSICAL INSTRUMENT.

APPLICATION FILED FEB. 16, 1904.

2 SHEETS—SHEET 1.



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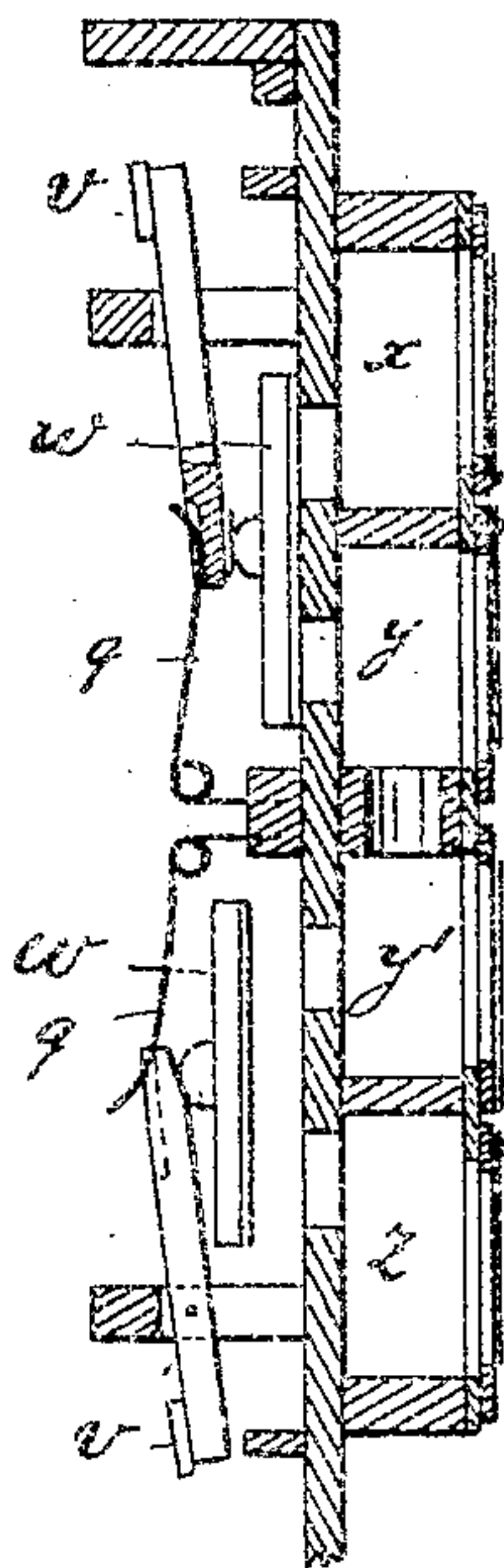
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2 SHEETS—SHEET 2.

*Fig. 6.*



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# UNITED STATES PATENT OFFICE.

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## MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 778,545, dated December 27, 1904.

Application filed February 16, 1904. Serial No. 193,786.

*To all whom it may concern:*

Be it known that I, FERDINAND MARTIENSSEN, a subject to the King of Prussia, Emperor of Germany, residing at No. 20 Neue Winterfeldtstrasse, Berlin, in the Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in Musical Instruments; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to musical instruments of that class in which, as in a harmonium, the sounds are produced by vibrating metal reeds actuated by air under pressure or by suction and in which the valves admitting the air to the reeds are under control of keys; and my invention is particularly adapted for instruments of the kind described in which the keys are played by means of a sheet of soft flexible paper or fabrics directly spread upon the keys and containing the tune by notes printed or written in a manner to allow the performer to follow up the required succession of the notes by striking or tipping with the finger directly on the printed or written note, thereby forcing down the corresponding key below the respective note, and thus producing the sound controlled by said key.

The improvements of my invention are destined, first, to facilitate the play of instruments of the kind described and also to provide suitable means for playing the instrument in the usual manner—i. e., by a common keyboard—without the use of a music-sheet spread upon the keys and indicating the notes to be struck. Performers skilled in the art of playing the instrument in general will prefer to play it by the common keyboard, while performers who are not skilled or who are desirous of learning to play will be able to play the instrument before acquiring any practice of the art by simply spreading the music-sheet upon the keys and tipping the notes in succession, as indicated by the music-sheet; and my invention further relates to an improved construction of the wind-chambers of the accompanying accord-notes to obtain an economy of space in the instrument.

To make my invention fully understood, I will describe the same with reference to the accompanying drawings, in which—

Figure 1 is a cross-section drawn through the upper part of the instrument and showing the keyboard and the frame carrying the same. Fig. 2 is a top view of the keyboard broken away at the sides, the wind-chambers for the accompanying accord-notes being partly shown in horizontal section. Fig. 3 is a side elevation of the lever which, actuated by the key, controls the valve of the respective air-chamber. Fig. 4 is an end view of the said lever carrying one end of the key. Fig. 5 is a vertical section through a set of wind-chambers of the accord-notes drawn to a reduced scale; and Fig. 6 is a vertical section, drawn to a larger scale, through the accompaniment wind-chests with their keys, valves, and reeds in position.

Referring to Figs. 1 and 2, *a* is a frame, preferably of flat iron and pivoted, as at *b*, to suitable standards *j*. The said frame *a* may be provided with a knob or handle *i* for conveniently raising the same into the inclined position. (Shown by dotted lines in Fig. 1.) A spring or springs *g* are secured to the cross-side of the frame *a*, the bent end of said springs catching into a recess of the casing *r* to hold and maintain the frame *a* in the desired inclined position while the play is being performed. The said frame *a* carries a cross-bar *s*, having suitable recesses or being divided into separate blocks, to which are pivoted the lower ends of the links *d*, the upper ends of which are pivoted to the keys *c*, which consist of narrow bars of wood or of strips of sheet metal. The front end of said keys *c*, is provided with a slot *h* to receive the slotted portion *k* of a lever *e*, pivoted, as at *n*, to a cross-bar *t* and engaging with its forward end a valve *f*, normally closed by the pressure of a spring *q*. Within the slotted portion *k* of the lever *e*, or through a corresponding hole of the same, a cross-pin *m*, preferably of elastic material, such as rubber or leather, is lodged to serve as a support to the front end of the key *c*. The music-sheet *u*, of soft supple paper or fabrics, having the notes written or printed on it and connected in suc-



cession by lines in a known manner is spread upon the keys *c*, as shown in Fig. 2, and it may be secured by clamps or other means to prevent shifting. It will be seen that by pressing or tipping upon any of the notes of the said sheet *u* the corresponding key *c* below the sheet will be forced down and the throw of the said key will be exactly the same if the key is struck at or near the front end or at or near the rear end or about the central portion. Owing to the link *d* at one end and the elastic support *m* at the other end of the keys *c*, the said keys will move up and down parallel to the sides of the frame *a*, and the valve *f* will be opened by the respective key when struck. As soon as the finger of the performer ceases to press down the key it will be raised again by the spring *g*, which acts upon the valve *f* and upon the forward end of the lever *e*.

By providing a frame *a*, carrying the keys and capable of being raised into the inclined position, as shown, I obtain the advantage of keeping the notes on the sheet *u* in view of the eyes of the performer during the play, while if the keys are arranged in a plane or horizontal position the hands of the performer will cover part of the notes during the play and it will be difficult to readily follow up the succession of the notes on the sheet *u*.

In order to play the instrument, as desired, in the usual manner with a common keyboard and without the use of a music-sheet spread directly upon the keys, I have formed the levers *e* with a tail *o* projecting toward the performer, and to said tail *o* I secure a key *p* of the usual kind. It will be seen that by playing said keys *p* the front end of the levers *e* will be forced down and the corresponding valves *f* will be opened accordingly. The keys *c* in this case remain out of service during the play, as the levers *e* are free to move down in the slots *h* of said keys *c*. A convenient mode of securing the keys *p* upon the tails *o* of the levers *e* consists in forming points or lugs on the upper edge of the tail *o*. Slots are cut into the lower side of the keys *p*, and the said slots are filled with a suitable cement. Then forcing the tails *o* into said slots the keys *p* will be firmly secured to the levers *e*.

In order to play the accords in accompaniment of the tune, separate keys *v* are used to be arranged at the left side of the tune-keys *c* or *p*. The said keys *v* in the instruments hitherto employed actuate valves, each of which covers three wind-chambers, and on raising the valve the three reeds of said wind-chambers sound at a time, forming an accord. In placing two accords side by side, as usual—for instance, a minor and a major key—six wind-chambers are required and two valves, each of which covers three apertures at a time. Owing to the improved construction of my

invention, only four wind-chambers are required for the two accords, and such economy in space is obtained by providing a communication between two wind-chambers of a set of wind-chambers of two accords. As it will be seen in Figs. 2 and 6, four wind-chambers *x* *y* *y'* *z* are arranged in line, each wind-chamber having a metal reed properly tuned. The reeds of the wind-chambers *x*, *y*, and *y'* sounding at a time form an accord, and the reeds *z*, *y'*, and *y* sounding together form another accord. The chamber *x* is separated from the chamber *y*, and the chamber *z* is separated from the chamber *y'*; but the two chambers *y* and *y'*, juxtaposed, communicate with each other. The controlling-valves *w* instead of covering three apertures at a time, as usual, now only cover two apertures of two wind-chambers placed side by side. As will be seen from Fig. 2, one of the valves *w* covers the two apertures belonging to the two chambers *x* and *y*, and the other valve *w* covers the two apertures belonging to the two chambers *z* and *y'*. It will be understood, then, that by lifting one of the two valves *w*—say that which covers the chambers *x* and *y*—not only the reeds of the said two chambers *x* and *y* will sound, but also the reed belonging to the chamber *y'*, because the said chamber *y'* communicates with the chamber *y*, and though the chamber *y'* be covered by its corresponding valve the air will enter into the chamber *y'* through the adjacent chamber *y*. The sounds of the reeds *x*, *y*, and *y'* form an accord, and to play this accord the corresponding valve *w* of chambers *x* and *y* must be raised. By raising the valve *w* of the two other chambers *z* and *y'* not only the two reeds of the said chambers *z* and *y'*, but also the reed of chamber *y*, will sound at a time, because the chamber *y*, communicating with the adjacent chamber *y'*, receives the air from said chamber *y'*. The sounds of the reeds *z*, *y'*, and *y* form an accord different from the other accord *x* *y* *y'*. It will be evident therefrom that by placing the wind-chambers of two accords either in line or side by side and by establishing communication between two wind-chambers adjacent to each other the reed of each of the two communicating wind-chambers will form part of two accords, determined by opening one or the other of the two valves *w*. In Fig. 5 the two arrows serve to indicate the two sets of chambers forming the two accords, each set consisting of three chambers, and two chambers being common to both sets alternately.

I claim as my invention—

1. In a musical instrument, the combination, with the casing of the instrument, of a frame, keys carried by said frame in parallel arrangement to each other, links supporting said keys at or near one end of the same, levers supporting said keys at or near the other end



of the same, and valves actuated by said levers, substantially as and for the purpose set forth.

2. In a musical instrument, the combination, with the casing of the instrument, of a frame pivoted to be raised into an inclined position, means, substantially as described, for supporting the said frame in its raised position, keys carried by said frame, links supporting said keys at or near one end of the same, levers supporting said keys at or near the other end of the same, and valves actuated by said levers, substantially as and for the purpose set forth.

3. In a musical instrument, the combination, with the casing of the instrument, of a frame carrying keys arranged parallel to each other, links supporting said keys at or near one end of the same, levers supporting said keys at or near the other end of the same, and separate keys carried by tails of said levers, for playing the instrument independently of the keys carried by the frame, substantially as and for the purpose set forth.

4. In a musical instrument, the combination, with the casing of the instrument, of a frame carrying keys slotted at one end and arranged parallel to each other, links supporting said keys at or near one end of the same, levers supporting said keys at or near the other end of the same, cross-pins carried by said levers to provide a bearing-surface for the slot-

ted end of the keys, and valves actuated by said levers, substantially as and for the purpose set forth.

5. In a musical instrument, the combination, with the casing of the instrument, of a frame, keys carried by the same, links supporting said keys at or near one end of the same, levers supporting said keys at or near the other end of the same, and a music-sheet carrying the notes, directly placed upon the keys, substantially as and for the purpose set forth.

6. In a musical instrument, the combination, with a set of keys, of valves actuated by said keys, a set of wind-chambers controlled by said valves, a separate set of keys for playing the accompanying accords, a separate set of valves actuated by said accord-keys, each of said valves controlling two wind-chambers at a time, and a separate set of wind-chambers containing reed tune in accords, of which said accord wind-chambers every two pairs adjacent to each other have one of their chambers communicating with each other, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

FERDINAND MARTIENSSEN.

Witnesses:

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I. CHRIST. HAUFERMANN.