

(No Model.)

P. EHRLICH.  
MECHANICAL MUSICAL INSTRUMENT.

No. 290,672.

Patented Dec. 25, 1883.

Fig.1.

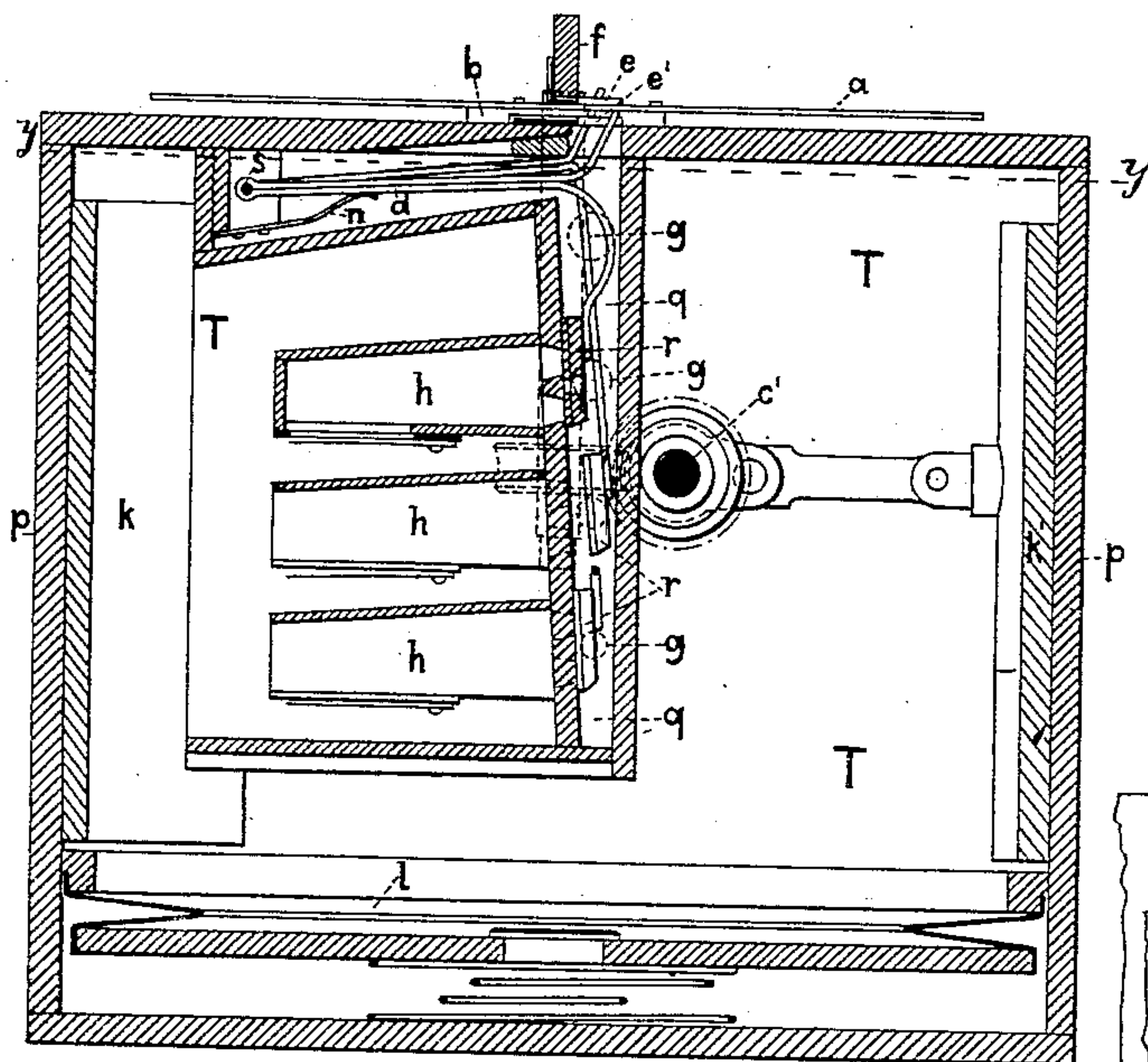


Fig.2.

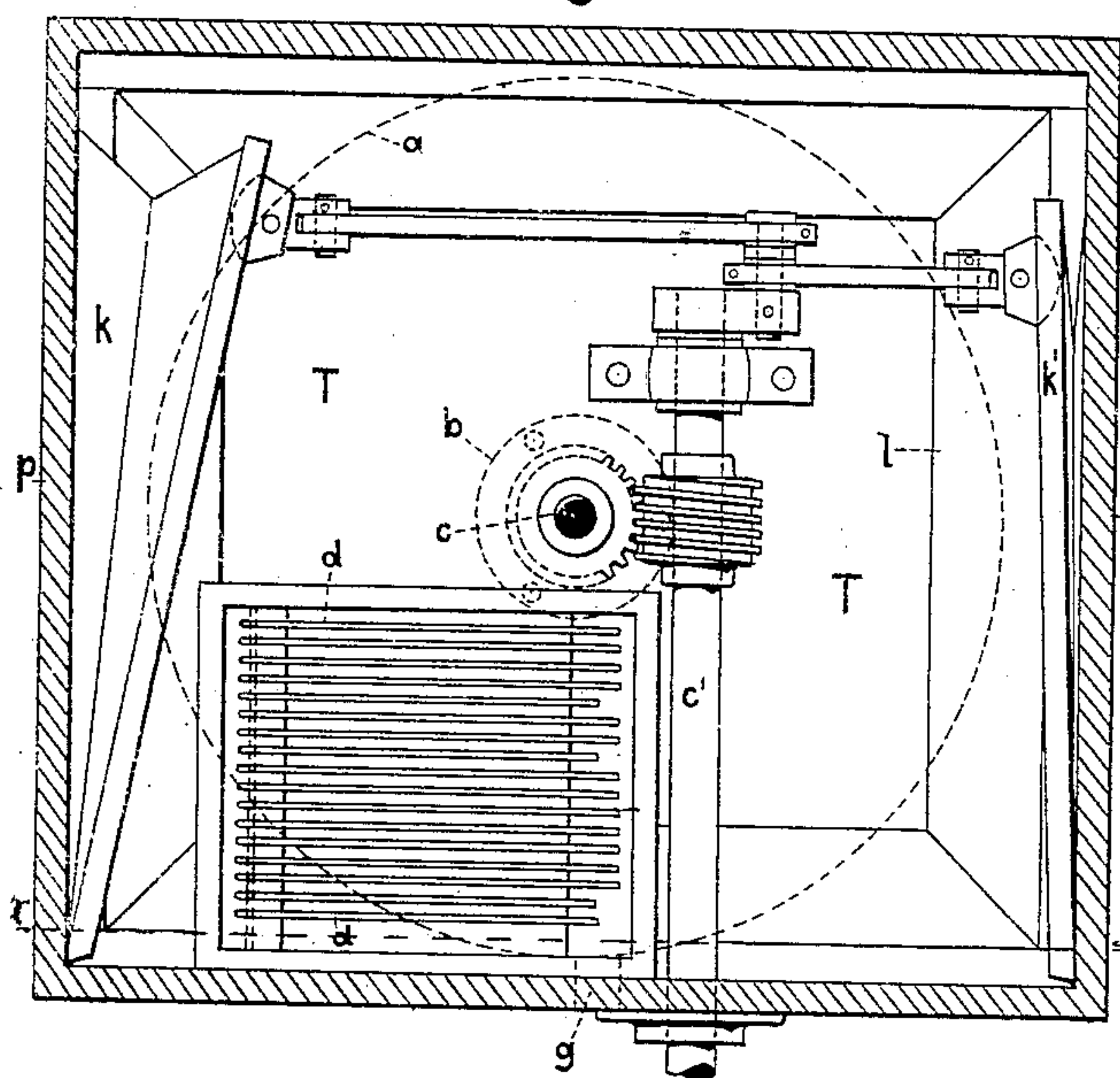


Fig.3.

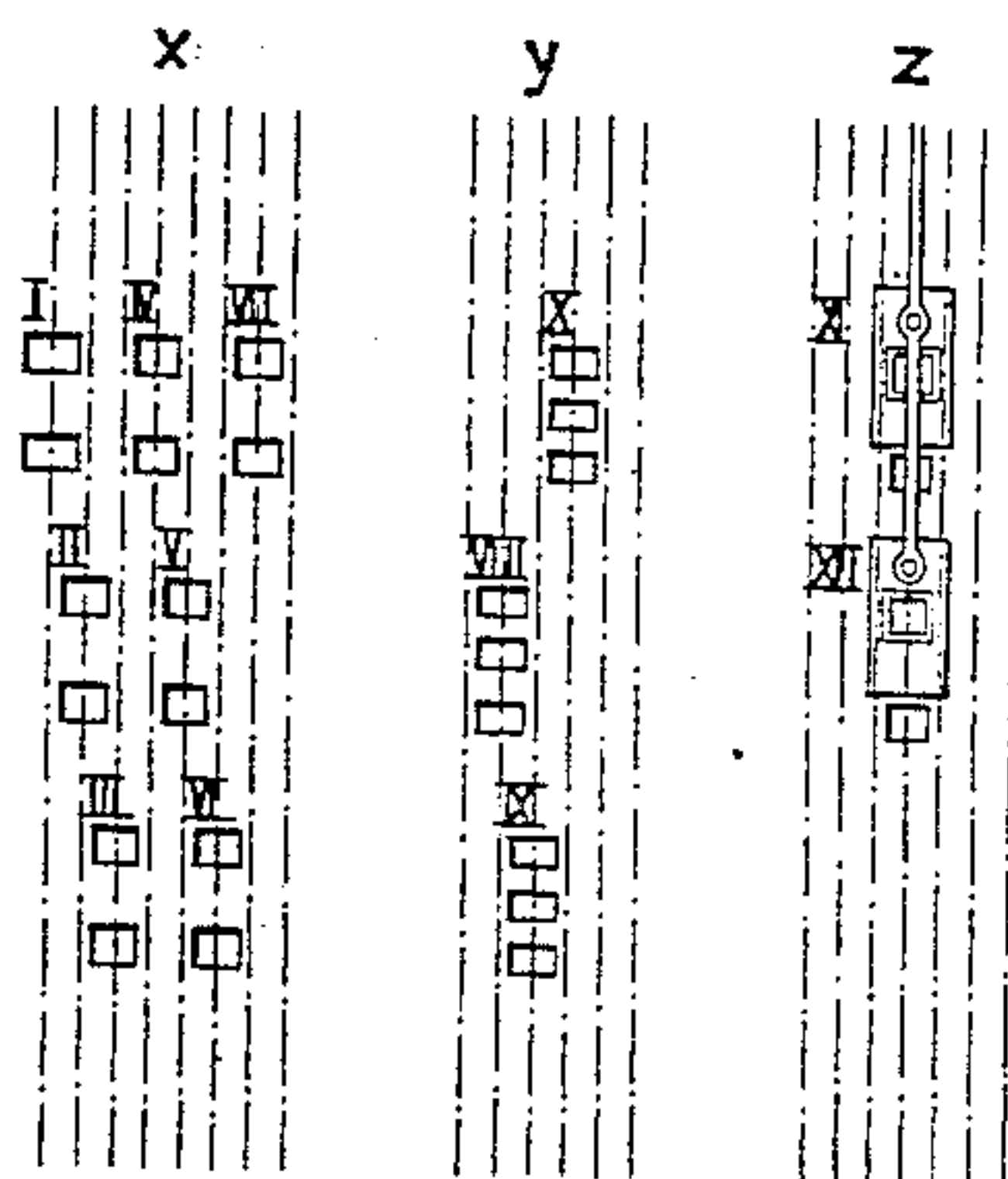


Fig.5.

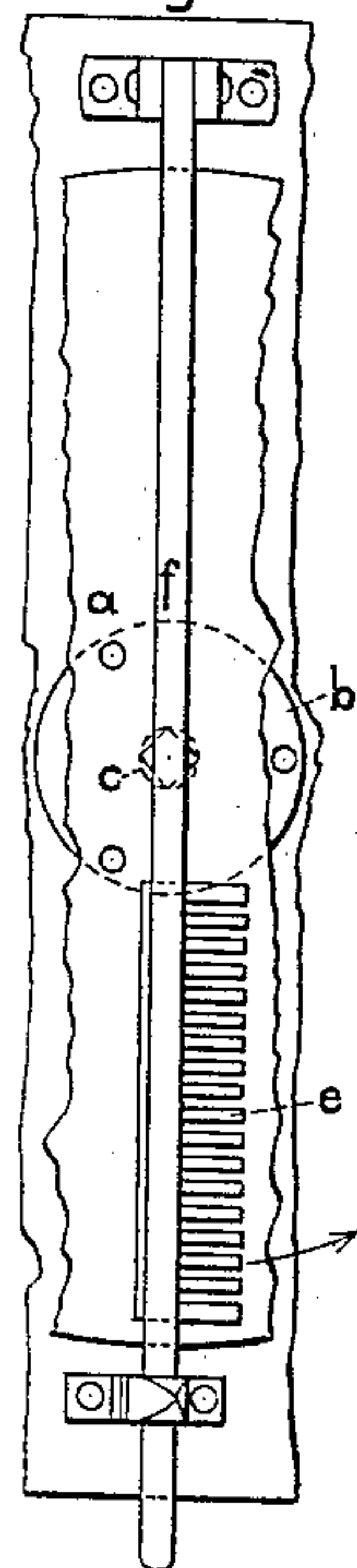


Fig.4.

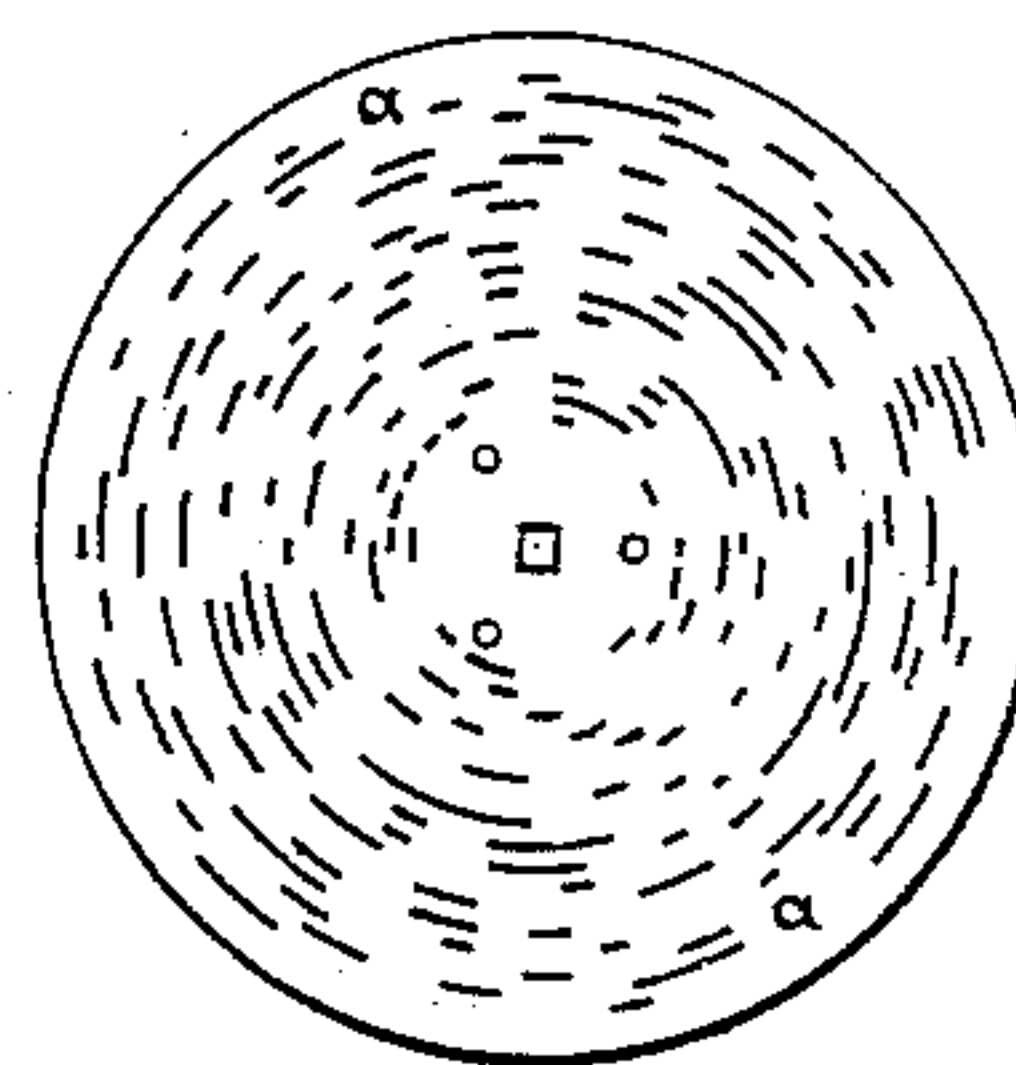
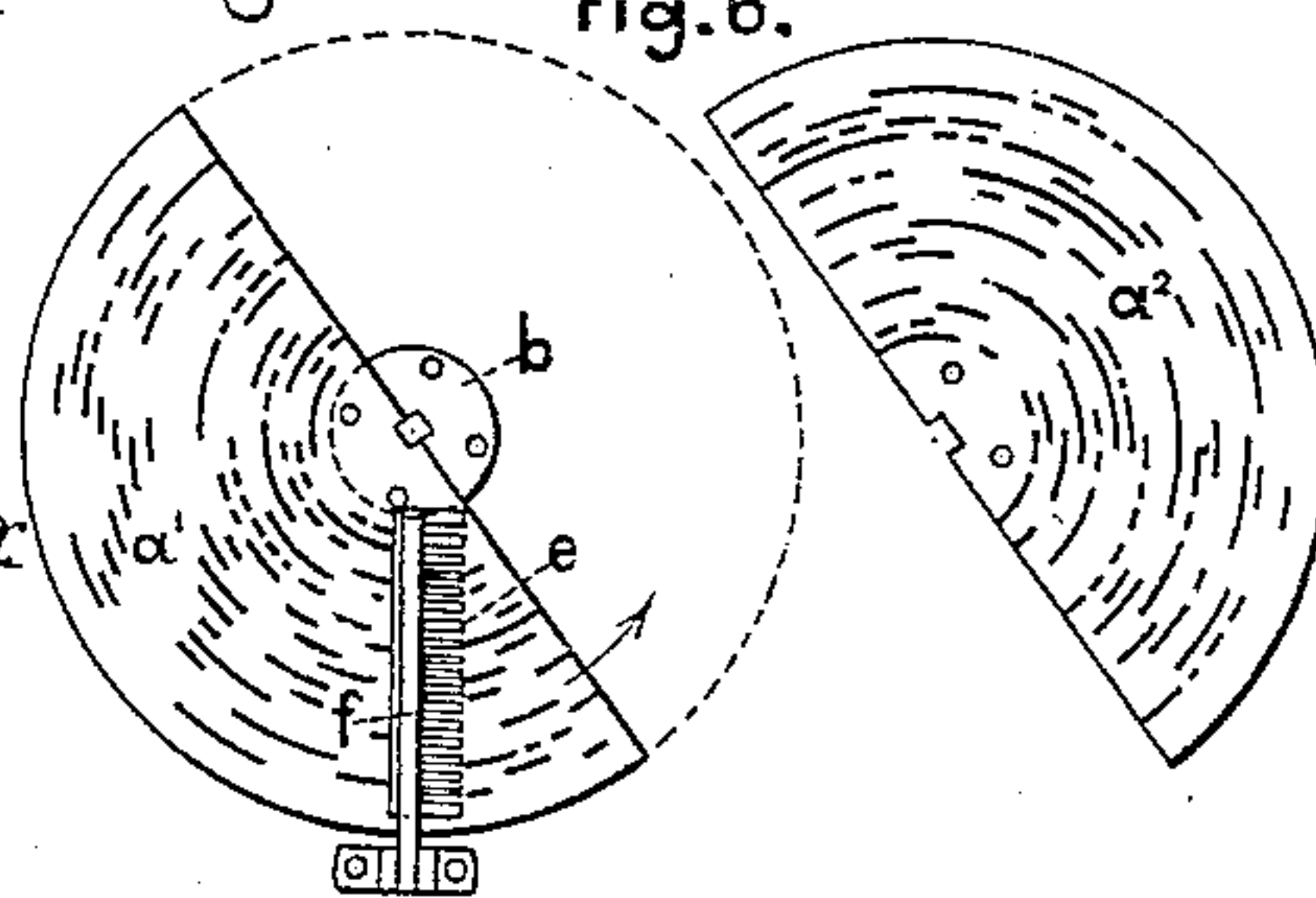


Fig.6.



Witnesses:  
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W. Schaffer

Inventor:  
Paul Ehrlich.  
by Marshall Bailey  
his attorney



# UNITED STATES PATENT OFFICE.

PAUL EHRLICH, OF GOHLIS, NEAR LEIPSIC, SAXONY, GERMANY.

## MECHANICAL MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 290,672, dated December 25, 1883.

Application filed January 29, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, PAUL EHRLICH, residing at Gohlis, near Leipsic, in the Kingdom of Saxony, German Empire, have invented new and useful Improvements in Mechanical Musical Instruments, of which the following is a specification.

My invention relates to that class of mechanical instruments in which the notes or sounds are produced by the passage of a perforated sheet or surface across the levers operating the valves of reeds or pipes; and it consists, mainly, in the means hereinafter described and claimed, by which I am enabled to make use of a perforated disk of circular form, or of a number of like semicircular disks, instead of the ordinary strip or band hitherto used in such instruments.

The invention is represented on the annexed sheet of drawings.

Figure 1 is a sectional elevation, and Fig. 2 a sectional plan, of the instrument. Fig. 3,  $xyz$ , are three diagrams showing the relative position and arrangement of the air-holes in the reeds or pipes. Fig. 4 is a plan of a perforated circular disk; Fig. 5, a top view of part of the instrument, and Fig. 6 a top view of the instrument with semicircular disks, one of which is detached. Figs. 4 and 6 are drawn to a smaller scale than the other ones.

The disk  $a$  is made of thin sheet metal, cardboard, paper, or other suitable material, and perforated in the manner required for producing a given melody. The same is carried by a plate,  $b$ , forming the head of the vertical shaft  $c$ , and provided with a driving pin or pins engaging with holes in the disk. The shaft  $c$  is slowly rotated from the main shaft  $c'$  by worm-wheel gearing or otherwise. The main shaft also operates the bellows  $k$  and  $k'$  by means of a crank and connecting-rods.

$h$  are the pipes or reeds.

The valve-levers  $d$ , which have their fulcrums at  $s$ , are provided each with a projecting stud or finger, which bears, by virtue of a spring,  $n$ , against the under side of the disk  $a$ , so that when, during the rotation of the disk, a perforation thereof comes opposite to one of the said fingers, this finger enters into the perforation, thus permitting the valve to which it belongs to open and the note to sound.

In order to prevent the fingers of the valve-

levers from lifting the disk and from coming out of line with the perforations with which they are to register, the grates or combs  $e$  and  $e'$  are arranged, the former being fixed to a bar,  $f$ , Figs. 1 and 5, the latter to the top of the chest  $p$ . The disk  $a$  rotates between these grates, while the fingers of the valve-levers are guided in the slits between the bars thereof, the said slits registering with the perforations of the disk when these are in a line with the fingers. The latter are thus always guided accurately into the corresponding perforations. The bar  $f$  is hinged at one end to the chest  $p$ , while at the other end it is secured in such a manner that it may with facility be released and lifted in order to allow the disk  $a$  to be exchanged. It may, when hinged at one end, also be kept in its place by a spring in the manner of a clasp-knife. The valves  $r$  and their levers are arranged in a compartment,  $q$ , hermetically separated from the rest of the inside space of the instrument, and communicating with the outer air by the holes  $g$ .

In case a piece of music be too long for one disk, a number of semicircular disks,  $a'$ ,  $a''$ , &c., Fig. 6, may be used, each of which contains a part of the notes, and which may be inserted into the instrument one after the other without interrupting the playing. The bar  $f$ , with the grate  $e$ , is in this case by preference made of such a length as not to reach to the center of the plate  $b$ , as otherwise it would prevent, or at least render difficult the exchange of the disk parts.

In perforated music-sheets of all kinds it is desirable that the perforations for the lower notes have a comparatively greater length than those for the higher ones. Considering that in the circular disk the length of the perforations for notes of the same duration must be in proportion to the distance of these perforations from their center of rotation, the disk presents the advantage that the aforesaid condition will be naturally fulfilled simply by the arrangement of the reeds and the valves in such a manner that the outer perforations will correspond to the lower notes, the inner ones to those of higher pitch.

In order to reduce as much as possible the diameter of the disk, the valve-levers  $d$  must be brought together as close as possible. To this effect the reeds or pipes  $h$  are placed in



vertical ranges, but each reed or pipe is placed out of line in respect to the one which is below or above it, by so much as is required for allowing the valve-levers to pass freely by the side of each other.

For the purpose of reducing the requisite lift of the valves, I prefer to provide each pipe or reed with two air-holes, as shown in section by Fig. 1, and in front view by Fig. 3, *x*, or with three holes, as in Fig. 3, *y*, and to form the valve of as many separate bars, each of which is adapted to cover one of the said holes. The valves may also be arranged in the manner of slide-valves, and in some cases two valves may be connected together in order to produce double notes. (See Fig. 3, *z*.)

In Figs. 3, *x*, and 3, *y*, are also shown the relative positions of the air-holes of the different reeds, I II III being the first range, IV V VI the second, &c. The reeds *h* communicate with the main chamber T of the instrument. This chamber is hermetically closed, and contains the bellows *k k'* and the driving mechanism. The air sucked in by the said bellows is delivered into the chamber T, with which is combined the pressure-regulating bellows *l*. The bellows *k k'* may, however,

also operate in the contrary manner by sucking the air from the chamber T, the pipes or reeds and the regulating-bellows *l* having in this case, of course, to be arranged accordingly.

I claim as my invention—

1. The combination, with the valve-levers *d*, of a perforated disk, *a*, consisting of two parts, *a'* and *a''*, either of which may be exchanged, as and for the purpose specified.

2. In a mechanical musical instrument, the rotative music-sheet, consisting of a disk perforated in accordance with the notes to be produced, in combination with the valve-levers *d* and grates or combs *e e'*, substantially as and for the purposes hereinbefore set forth.

3. The hinged bar *f* and grates or combs *e e'*, in combination with the perforated rotating disk and the valve-levers *d*, substantially as and for the purposes hereinbefore set forth.

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

PAUL EHRLICH.

Witnesses:

OSCAR WEISE,  
OSTO NÖTHER.