No. 715,484. Patented Dec. 9, 1902.

E. DE KLEIST.

AUTOMATIC MUSICAL INSTRUMENT.

(Application filed Mar. 15, 1902.)

(No Model.) 2 Sheets—Sheet 1.

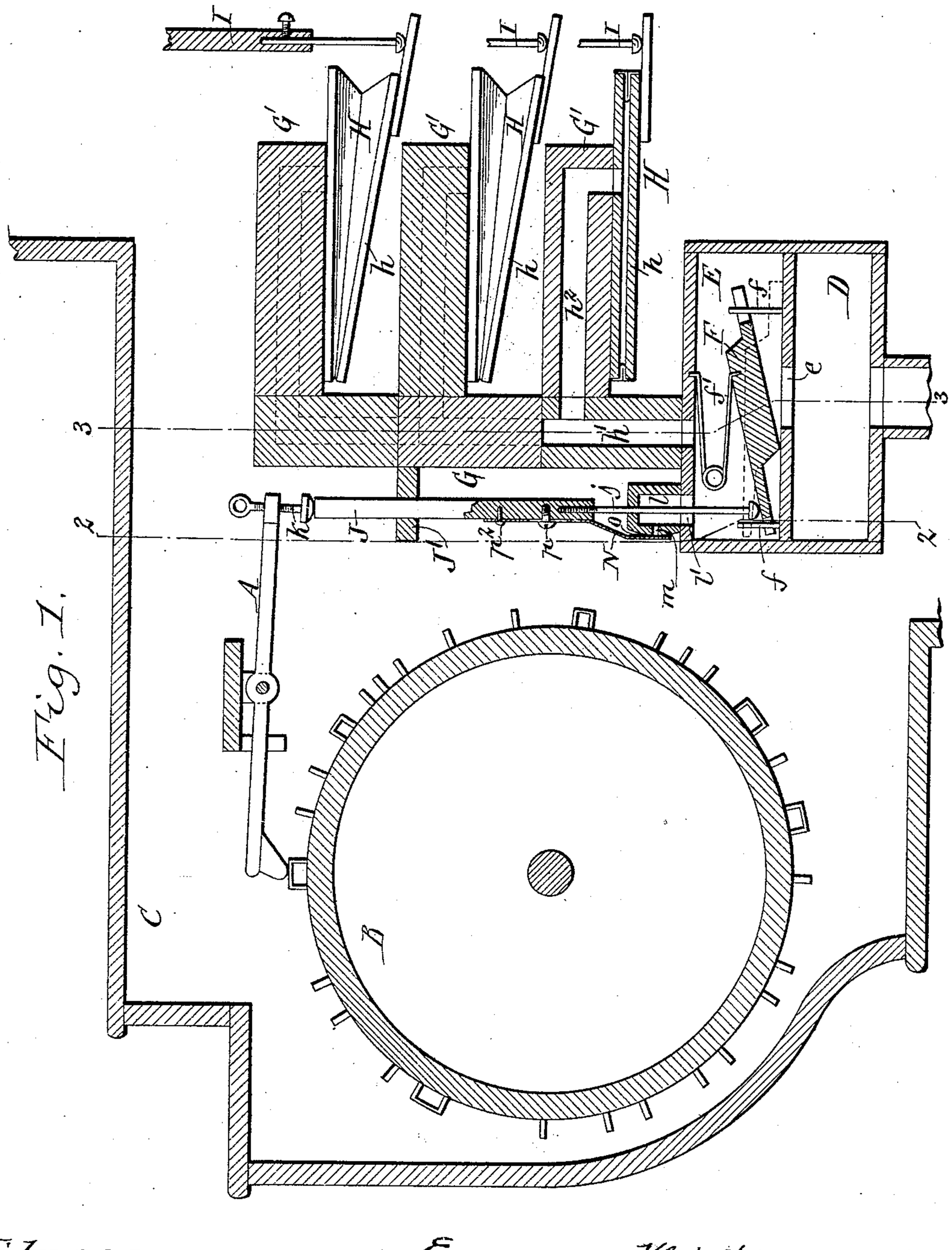

Fig. 1.

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Fig. 3.

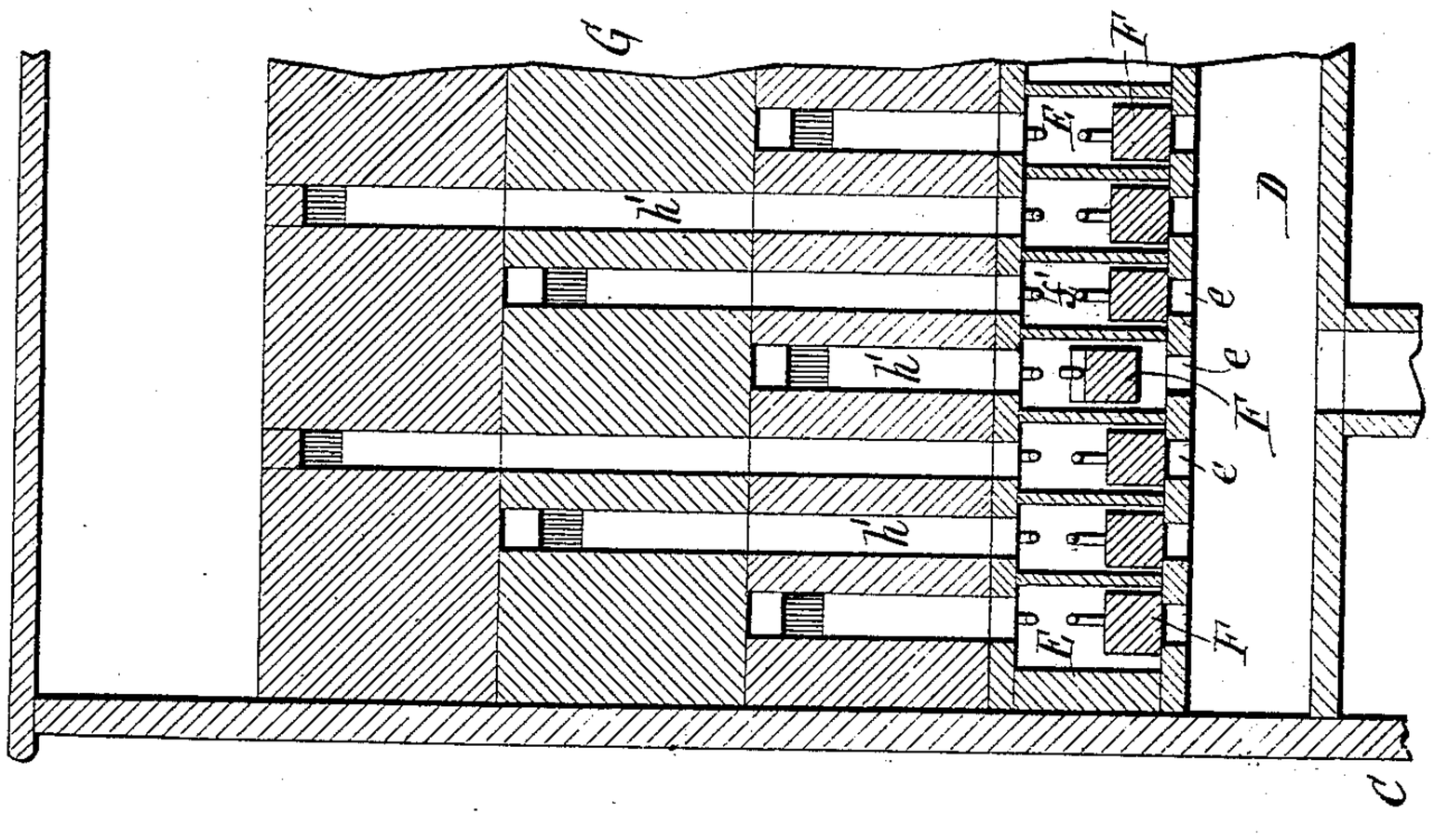
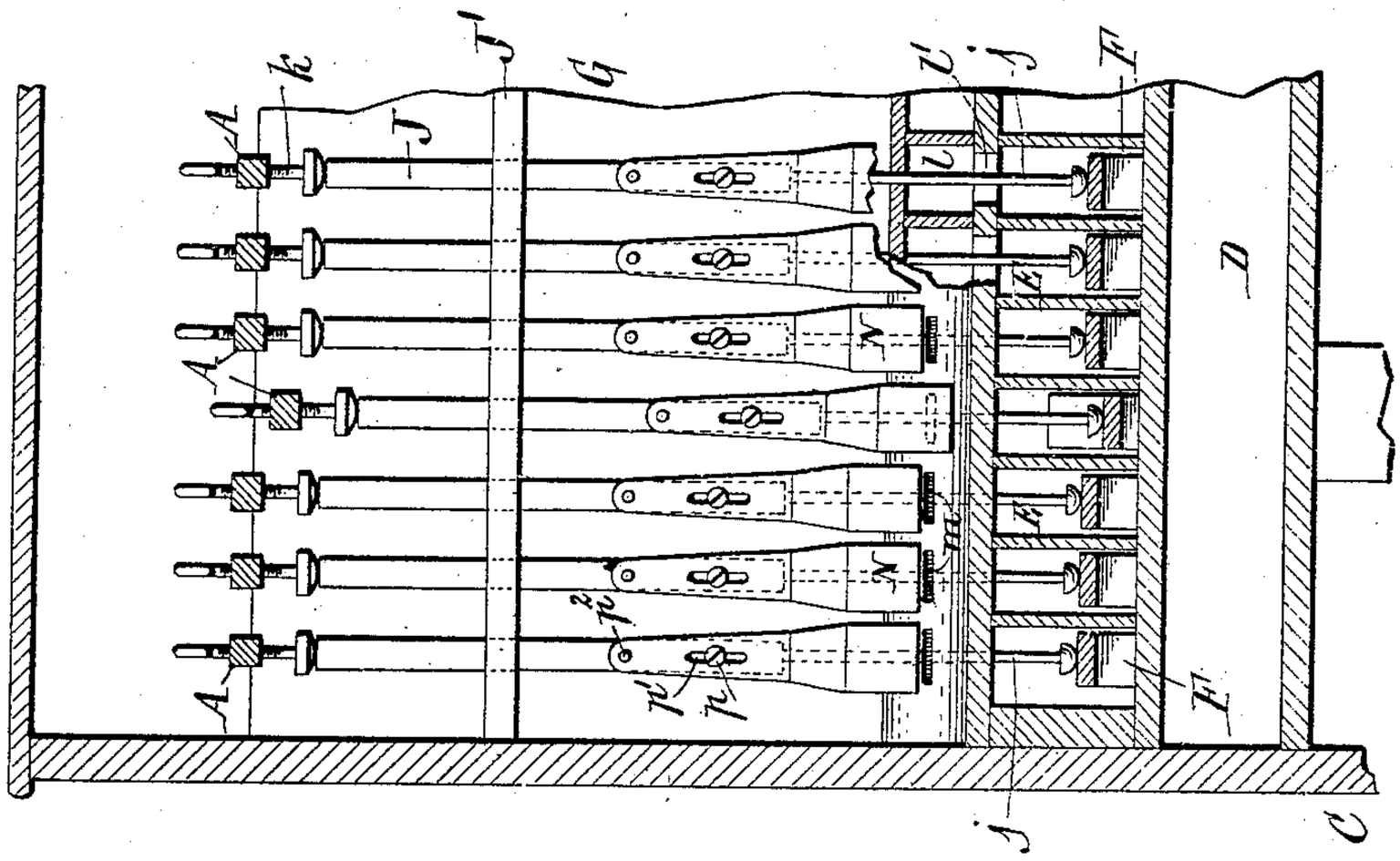


Fig. 2.



Witnesses:
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UNITED STATES PATENT OFFICE.

EUGENE DE KLEIST, OF NORTH TONAWANDA, NEW YORK.

AUTOMATIC MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 715,484, dated December 9, 1902.

Application filed March 15, 1902. Serial No. 98,307. (No model.)

To all whom it may concern:

Be it known that I, EUGENE DE KLEIST, a citizen of the United States, residing at North Tonawanda, in the county of Niagara and State of New York, have invented new and useful Improvements in Automatic Musical Instruments, of which the following is a specification.

This invention relates to automatic pianos, piano-players, and similar musical instruments in which the sound-producing parts are controlled by a pneumatic action and more particularly by actions of this character in which the effective stroke of the motor-pneumatics is produced by exhausting the air from the same. In such actions the valves which close the vent-ports of the various valve-chambers are liable to adhere to their seats or recede sluggishly therefrom, owing to the atmospheric pressure against the valves, and when this occurs the music is rendered in an unsatisfactory manner.

The purpose of my invention is to provide a simple construction of the vent-valves and their seats which overcomes this objection and which also prevents leakage of air, so as to require less power for operating the instrument.

In the accompanying drawings, consisting of two sheets, Figure 1 is a vertical section of the upper portion of an automatic piano embodying my invention. Figs. 2 and 3 are fragmentary vertical sections in lines 2 2 and 3 3, Fig. 1.

In the drawings my invention is shown as applied to an automatic piano in which the valves of the pneumatic action are operated by ordinary pivoted keys A, tripped by a rotary pin-barrel B, of well-known construction.

C indicates the upper portion of the piano-case, which incloses the pin-barrel, and D is the wind or exhaust chest arranged horizontally in rear of the barrel.

E indicates a row of valve-chambers arranged above the wind-chest and communicating therewith by the usual individual passages *e*, and F the exhaust-valves arranged in said chambers, respectively, and applied to said passages. The valves shown in the drawings are of the usual rocking type, the same being guided by vertical pins *f* and closed by springs *f'*; but they may be of any other suitable construction, if desired.

G is the channeled wind-board surmounting the valve-chambers E and having one or more shelves G', each of which carries a row of motor-pneumatics H in a well-known manner. These pneumatics are preferably arranged on the under side of the shelves, so that their movable boards *h* swing upwardly when the pneumatics are exhausted. The pneumatics are connected with their complementary valve-chambers E by the customary channels *h' h²*, extending through the wind-board and the shelves G', as seen in Figs. 1 and 3.

I indicates the usual rods, which are actuated by the movable boards of the pneumatics and which in turn operate the jacks or hammers of the piano-action (not shown in the drawings) or equivalent members of the instrument when the sound-producing parts are of a different type.

The valves F are opened by the rods or stickers J, which slide in a horizontal guide-bar J' and are depressed by the keys A. The latter may be provided at their rear ends with the customary adjustable heads or screws *k*, which bear upon the upper ends of the stickers. The lower portions of the stickers preferably consist of reduced stems *j*, and each of these stems passes through a stuffing-box or vent-chamber *l*, applied to a vent-opening *l'* in the top of the corresponding valve-chamber, and bears upon the tail of the valve F. The vent-opening *l'* in the top of each valve-chamber is larger than the stem *j*; but the opening in the top of the stuffing-box *l* is made to fit the stem *j* as closely as practicable to prevent leakage of air at this point. Each of these stuffing-boxes or air-chambers is provided in one side with a vent-port *m* for admitting the outer atmosphere to the corresponding valve-chamber E, and the complementary sticker J carries a valve N, which is arranged to close said vent-port when the sticker is depressed and to open the same when the sticker is raised by the valve-spring *f'*. This vent-valve preferably consists of a flat strip of elastic material, such as spring-brass, which is secured at its upper end to the enlarged body portion of the sticker and arranged to bear with its free lower portion

against a seat formed at the outer end of the vent-port *m*, as shown in Fig. 1. By this construction and arrangement the valve-strip slides freely across the vent-port when reciprocated with the sticker and yet hugs its seat with sufficient pressure to form a reliable closure when the sticker is depressed. To reduce the friction of the sliding valve-strip to a minimum, the contiguous face of the stuffing-box is convex, as shown at *o*, Fig. 1, and the vent-port is located in the most salient portion of this convex face. In order to facilitate the adjustment of these valve-strips, they are preferably secured to the stickers J by a screw *p*, which passes through a longitudinal slot *p'*, formed in the shank of the strip at a distance from its upper end, and a small nail p^2, which is driven through its upper end. By this fastening the valve-strips may first be conveniently adjusted on the screw *p* and then tightly secured in place by the nail p^2.

In the operation of the instrument the valves F are normally closed and the stickers J are in their elevated position, so that the vent-ports *m* are open to the atmosphere. When a sticker is depressed by the tripping of its actuating-key A, the vent-port of the corresponding valve-chamber E is closed by the descent of the complementary valve-strip N and the exhaust-valve F is opened, as shown in Fig. 1 and in connection with the central valve in Figs. 2 and 3. The air is now exhausted from the corresponding valve-chamber E and motor-pneumatic H, collapsing the latter and operating the corresponding operating-rod I of the piano-action. As soon as the tripped key clears a pin of the rotary barrel the open exhaust-valve closes under the reaction of its spring *f''*, raising the depressed sticker to its former position and withdrawing the valve-strip N from the vent-port *m*. The outer atmosphere now passes into the collapsed pneumatic through the uncovered vent-port, the vent-opening *l'*, valve-chamber E, and channels *h' h²*, allowing the pneumatic to expand and the actuating-rod I to descend.

By employing external vent-valves which open and close by a lateral movement relative to their seat the objections of air-leakage and sticking of the valves incident to the use of internal sliding piston-valves or external valves movable endwise with reference to their seats are obviated, with the desirable result that the valves are actuated in a reliable manner and with promptness and precision. Less power is also required to operate the instrument, this advantage being gained partly by minimizing the leakage of air and partly by avoiding the resistance of springs which are required for unseating the valves in constructions where the same have a tendency to adhere to their seats after the exhaustion of air from the valve-chamber ceases. This improved construction is, moreover, very simple and inexpensive and permits a ready adjustment of the valves to compensate for warping of the parts or imperfections in workmanship.

Although I have herein shown and described my invention as applied to a self-playing piano, the same is shown in that connection only by way of example. It is equally applicable to other automatic instruments having a pneumatic action as well as to pneumatic piano-players.

I claim as my invention—

1. The combination with a sound-controlling member, a motor-pneumatic for the same and a wind-chest, of a valve which controls the connecting-passage between said pneumatic and the wind-chest, a vent-chamber connected with said pneumatic and having a vent-port, a vent-valve applied to said port outside of the vent-chamber and movable crosswise of the port, and means for actuating said valve, substantially as set forth.

2. The combination with a sound-controlling member, a motor-pneumatic for the same and a wind-chest, of a valve which controls the connecting-passage between said pneumatic and the wind-chest, a vent-chamber connected with said pneumatic and having a vent-port provided at its outer end with a valve-seat, an external vent-valve applied to said port and consisting of a strip bearing against said seat and movable crosswise of said port, and means for actuating said valves, substantially as set forth.

3. The combination with a sound-controlling member, a motor-pneumatic for the same and a wind-chest, of a valve which controls the connecting-passage between said pneumatic and the wind-chest, a vent-chamber connected with said pneumatic and having a vent-port provided at its outer end with a convex valve-seat, a flap-valve strip bearing against said seat and movable crosswise of said vent-port, and means for actuating said valve and valve-strip, substantially as set forth.

4. The combination with a sound-controlling member, a motor-pneumatic for the same and a wind-chest, of a valve which controls the connecting-passage between said pneumatic and the wind-chest, a vent-chamber connected with said pneumatic and having a vent-port in its side and a valve-seat at the outer end of said port, a reciprocating rod or sticker operating upon said valve, a valve-strip carried by said sticker and bearing against said external valve-seat, and means for operating said sticker, substantially as set forth.

Witness my hand this 27th day of February, 1902.

EUGENE DE KLEIST.

Witnesses:
CARL F. GEYER,
THEO. L. POPP.

Correction in Letters Patent No. 715,484.

It is hereby certified that in Letters Patent No. 715,484, granted Deember 9, 1902, upon application of Eugene De Kleist, of North Tonawanda, New York, for an improvement in "Automatic Musical Instruments," an error appears in the printed specification requiring correction, as follows: In line 108, page 2, the word "flap-valve" should read *flat-valve;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 23d day of December, A. D., 1902.

[SEAL.]

F. I. ALLEN,

Commissioner of Patents.