

No. 751,229.

PATENTED FEB. 2, 1904.

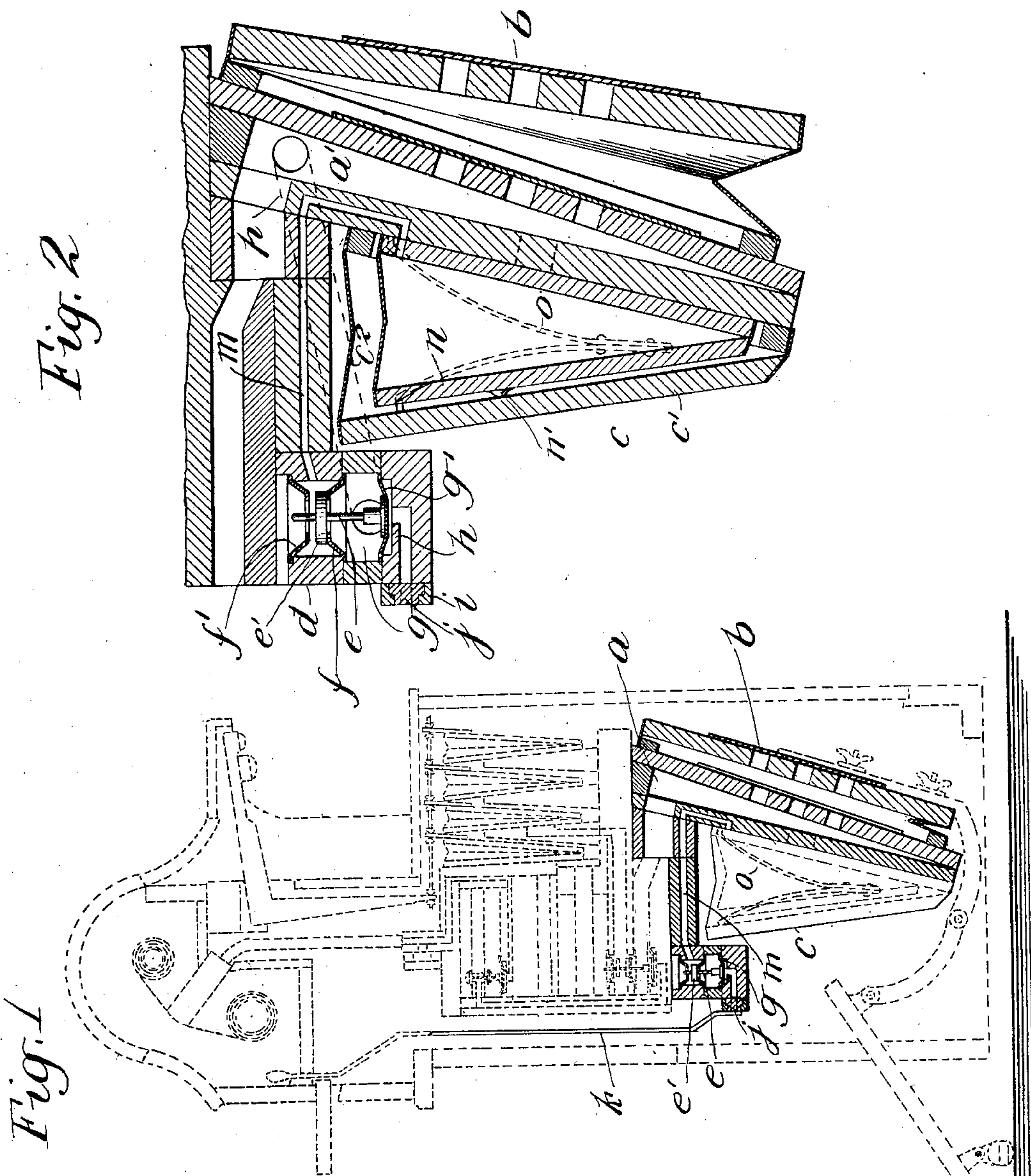
E. S. VOTEY.

PNEUMATICALLY OPERATED MUSICAL APPARATUS.

APPLICATION FILED APR. 15, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

Olin A Foster

Geo. L. Wheelock

-INVENTOR

Edwin S. Votey

BY

Dickerson Brown Ryzene & Rinney
ATTORNEYS

No. 751,229

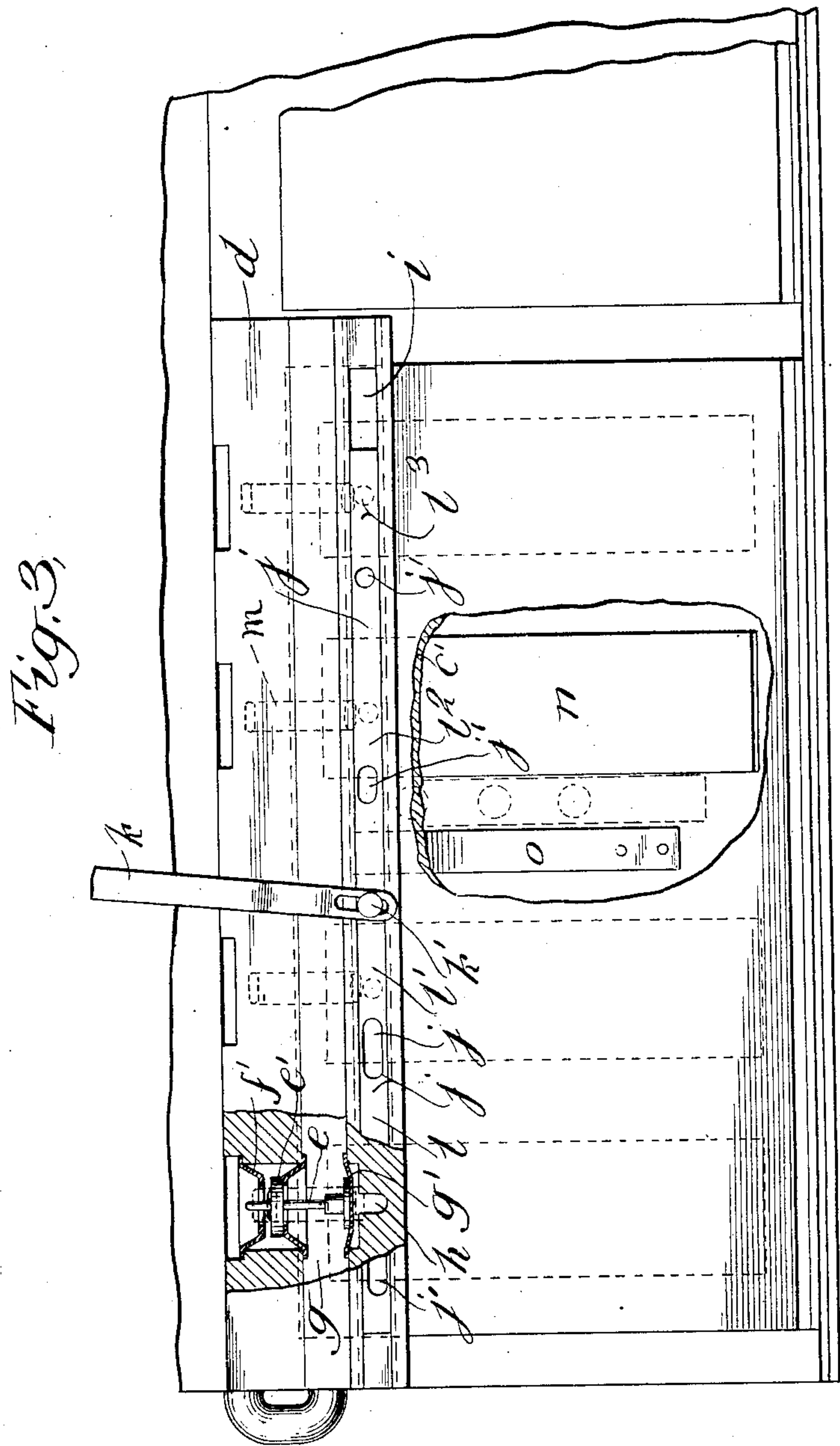
PATENTED FEB. 2, 1904.

E. S. VOTEY.
PNEUMATICALLY OPERATED MUSICAL APPARATUS.

APPLICATION FILED APR. 15, 1903.

NO MODEL.

2 SHEETS—SHEET 2.



WITNESSES:

Lin A Foster
Geo. L. Wheelock

INVENTOR

Edwin S. Votey

BY

Dickerson Brown Racy & Roney
ATTORNEYS

UNITED STATES PATENT OFFICE.

EDWIN S. VOTEY, OF SUMMIT, NEW JERSEY, ASSIGNOR TO THE AEOLIAN COMPANY, OF NEW YORK, N. Y., A CORPORATION OF CONNECTICUT.

PNEUMATICALLY-OPERATED MUSICAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 751,229, dated February 2, 1904.

Application filed April 15, 1903. Serial No. 152,638. (No model.)

To all whom it may concern:

Be it known that I, EDWIN S. VOTEY, a citizen of the United States, and a resident of Summit, New Jersey, and doing business in the borough of Manhattan, city, county, and State of New York, (post-office address Aeolian Hall, No. 362 Fifth avenue, New York city,) have invented certain new and useful Improvements in Pneumatically-Operated Musical Apparatus, of which the following is a specification, accompanied by drawings, which illustrate a preferred form thereof.

The object of my invention is to obtain piano and forte effects, or, in other words, to control the expression by means which are simpler and better than those heretofore employed. Heretofore at least two equalizers or elastic reservoirs of different value have usually been employed. The present invention furnishes means for applying pressure to vary the effective tension or pressure in a single equalizer. In other words, the invention provides, in connection with the main expansible reservoir or equalizer and means for producing the required flow, a means for varying the effective force and action of said equalizer in performing its work and means for automatically controlling such modifying influence.

The invention is described and illustrated in one preferred form in the accompanying drawings as applied to a certain known and much-used form of instrument. The pianola and the improvements constituting the present invention are enumerated in the claims.

In the accompanying drawings, Figure 1 shows in dotted lines certain well-known apparatus to which the new invention is applied and shown in section in full lines. Fig. 2 is a detail section, on an enlarged scale, of a portion of the apparatus embodying the present improvements; and Fig. 3 is a front elevation of part of the apparatus, showing the series of controlling-valves preferably used. Some parts are shown broken away.

It is not necessary to describe in detail the old and well-known parts of the pianola.

The following is a preferable construction of the present invention.

The wind-chest *a*, suitably supported within the casing of the apparatus, may be supplied with the necessary wind, be it pressure or suction, by the usual bellows *b*, operated in any desirable manner—for example, by foot-power. The chamber *a'* of the wind-chest supports on its wall and communicates with an expansible reservoir or equalizer *c*, comprising, as is usual, a board *c'* and flexible leather sides *c''*, this reservoir being of ample dimensions to provide the elastic reserve volume of wind, as required.

At the front of the wind-chest *a* and suitably supported thereon is a valve-box *d*, provided, preferably, with a plurality of pneumatically-controlled valves *e'*. These valves are constructed and operated pneumatically to control passages *m*, as will presently be seen, and each consists of a valve-stem *e*, supporting a valve *e'*, which may seat either against a valve-seat *f* or a valve-seat *f'*. The valve-seats *f, f'* are supported in any suitable manner in the valve-box and are spaced a suitable distance apart to allow just sufficient play to the valve. The opening in the valve-seat *f'* communicates with atmospheric pressure, and the opening in the valve-seat *f* communicates with the tension wind-chamber *g*. Each valve-stem is so supported in its chamber *g* that its valve will normally be seated by gravity on the valve-seat *f*. Each has a pneumatic or diaphragm *g'*, constructed in a well-known manner, sufficient leakage or "bleeding" being provided to enable the valve to fall whenever the passage or duct *h* beneath the diaphragm is closed. Whenever atmospheric air is admitted through the duct *h*, the valve-rod and valve are driven upward, opening *f* and closing *f'*. The ducts *h* are controlled by means of a set of connected valves, shown manually operated. A guideway *i*, extending transversely of the apparatus, is arranged in front of the valve-box, and in this is guided a valve-slide *j*, which may be reciprocated by means of a manually-operated controlling or "expression" lever *k*, suitably pivoted to the casing of the apparatus and connected, as by a pin-and-slot connection *k'*, with said slide.

The slide is in the form of the invention shown provided with four valve-apertures j' , corresponding in number with the number of valves e' . These apertures are of different lengths, 5 so that as the slide is reciprocated from the left to the right the ducts h from the left to the right will successively connect with atmospheric air through the successive apertures j' . The slide, with its four apertures, 10 constitutes four separate valves. Therefore it will be apparent that separate, loose, or suitably-connected valves of various forms may be substituted therefor. For convenience the portions of the slide which constitute the 15 said valves are indicated by the letters l , l' , l'' , and l''' . Also for convenience the valves l l' l'' l''' may be termed "primary" control-valves, and the valves e' will be "secondary" control-valves.

20 A passage m leads through the wind-chest from each valve e' to a bellows-pneumatic n , located inside the expansible reservoir c . There are four of these bellows-pneumatics n , shown arranged within the expansible reser- 25 voir c in a row suitably spaced instead of constructing the bellows-pneumatic as a mere division of the equalizer, as of course could be done. The bellows-pneumatics n are each preferably provided with a buffer n' to abut 30 against and deaden the noise incident to the sudden contact of the walls of the bellows-pneumatics with the walls c' of the expansible reservoir when they expand suddenly. The expansible reservoir or equalizer contains 35 the usual spring or springs o to give the normal high effective tension (or pressure) required when the pneumatics n are supplied with atmospheric air.

In the operation of the apparatus described 40 the pumping-bellows b are operated as usual to produce high tension in the wind-chambers. The invention is not limited, however, to tension. The expansible reservoir or equalizer c acts to give an elastic reserve of wind, as 45 well known, and to prevent pulsations due to the pumping action. Worked in this manner the apparatus will operate to give such changes of expression as the limits of the spring o permits; but when the slide j is actu- 50 ated so that a primary control-valve l will open the duct to atmospheric air air will enter the duct h and raise the diaphragm g' , close the valve f' , cutting off atmospheric pressure from the corresponding bellows- 55 pneumatic n , and opening the valve-seat f , so that the same tension will now exist within such bellows-pneumatic as in the wind-chamber a' and equalizer c . It will be seen that the pipe p leads from the chamber a' of the 60 wind-chest directly to the valve-chamber g . The expanding effect of one bellows-pneumatic being now removed, the pneumatic tension produced by the spring o and equalizer c is reduced by that amount and a diminuendo

effect produced. By moving the slide j farther 65 to the right the second duct h communicates with the atmosphere, and the second bellows-pneumatic is cut out, so that as each duct successively communicates with the atmosphere 70 atmospheric air is successively cut out of the bellows-pneumatics n . By moving the slide j swiftly all the bellows-pneumatics are cut off from the atmosphere practically instantaneously, thus enabling sudden pianissimo effects to be produced. By moving the slide 75 gradually from the left to the right, so as to gradually cut out the bellows-pneumatics, diminuendo is produced.

In the apparatus shown four bellows-pneumatics are illustrated; but one bellows-pneumatic alone may be employed, though with 80 less advantageous results, of course.

Having thus described my invention and without limiting myself to details, I claim as new therein, and desire to secure by Letters 85 Patent, the following:

1. In combination in pneumatically-operated musical apparatus, and with means for producing the required flow and effective tension or pressure of the actuating-air, means for ap- 90 plying pneumatic pressure to vary and control the said effective tension or pressure, the last-said means including a passage-way independent of the first-said means.

2. In combination in pneumatically-operated musical apparatus, and with means for producing the required flow and effective tension or pressure of the actuating-air, one or more bellows-pneumatics for varying and control- 95 ling the effective tension or pressure, and means including a passage independent of the first means for admitting different pressures at will to the said bellows-pneumatics to operate them. 100

3. In combination in pneumatically-operated musical apparatus, and with an expansible reservoir for the actuating-air, and means for applying force to said expansible reservoir to give the normal effective pressure or tension required, and pneumatic means including a 105 passage independent of the first means for applying pressure to vary the said effective pressure or tension in the said reservoir, for substantially the purposes set forth. 110

4. In combination in pneumatically-operated musical apparatus, and with an expansible reservoir for the actuating-air, and means for applying force to said expansible reservoir to give the normal effective pressure or tension required, pneumatic means for varying the 115 said pressure or tension in said reservoir, a valve for directly controlling the said pneumatic means, a passage governed by said valve, said passage being out of communication with the expansible reservoir and connections for operating the valve, for substantially 120 the purposes set forth. 125

5. In combination in pneumatically-opera-

ted musical apparatus, and with an expansible reservoir for the actuating-air, and means for applying pressure to said expansible reservoir to give the normal effective pressure or tension required therein, one or more bellows-pneumatics within the said reservoir acting against the wall thereof, a control-valve, and wind connections controlled thereby, leading to said bellows - pneumatics for admitting either of two different pneumatic pressures within said bellows-pneumatic to modify the said effective pressure or tension of the said reservoir, for substantially the purposes set forth.

6. In combination in pneumatically-operated musical apparatus, and with an expansible reservoir for the actuating-air, and means for applying pressure to said expansible reservoir to give the normal effective pressure or tension required therein, one or more bellows-pneumatics within the said reservoir acting against the wall thereof, a control-valve, and connections controlled thereby, leading to said bellows-pneumatic for admitting either of two different pneumatic pressures within said bellows-pneumatic to modify the effective pressure of the said reservoir, and pneumatic

valve-controlled means for actuating the said control-valve, for substantially the purposes set forth.

7. In combination with a plurality of bellows-pneumatics for changing the effective pressure or tension in a pneumatically-actuated musical apparatus, a series of valves for controlling said bellows - pneumatics, said valves being connected to open and close in succession, and means for opening and closing them.

8. In combination with an expansible reservoir for pneumatically-actuated musical apparatus and a spring for producing its effective action in performing work, separately and successively operated internal devices within the reservoir for modifying the effect of said spring either slightly or to a greater extent at will, for substantially the purposes set forth.

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

EDWIN S. VOTEY.

Witnesses:

GEORGE B. KELLY,

W. C. MANSFIELD.