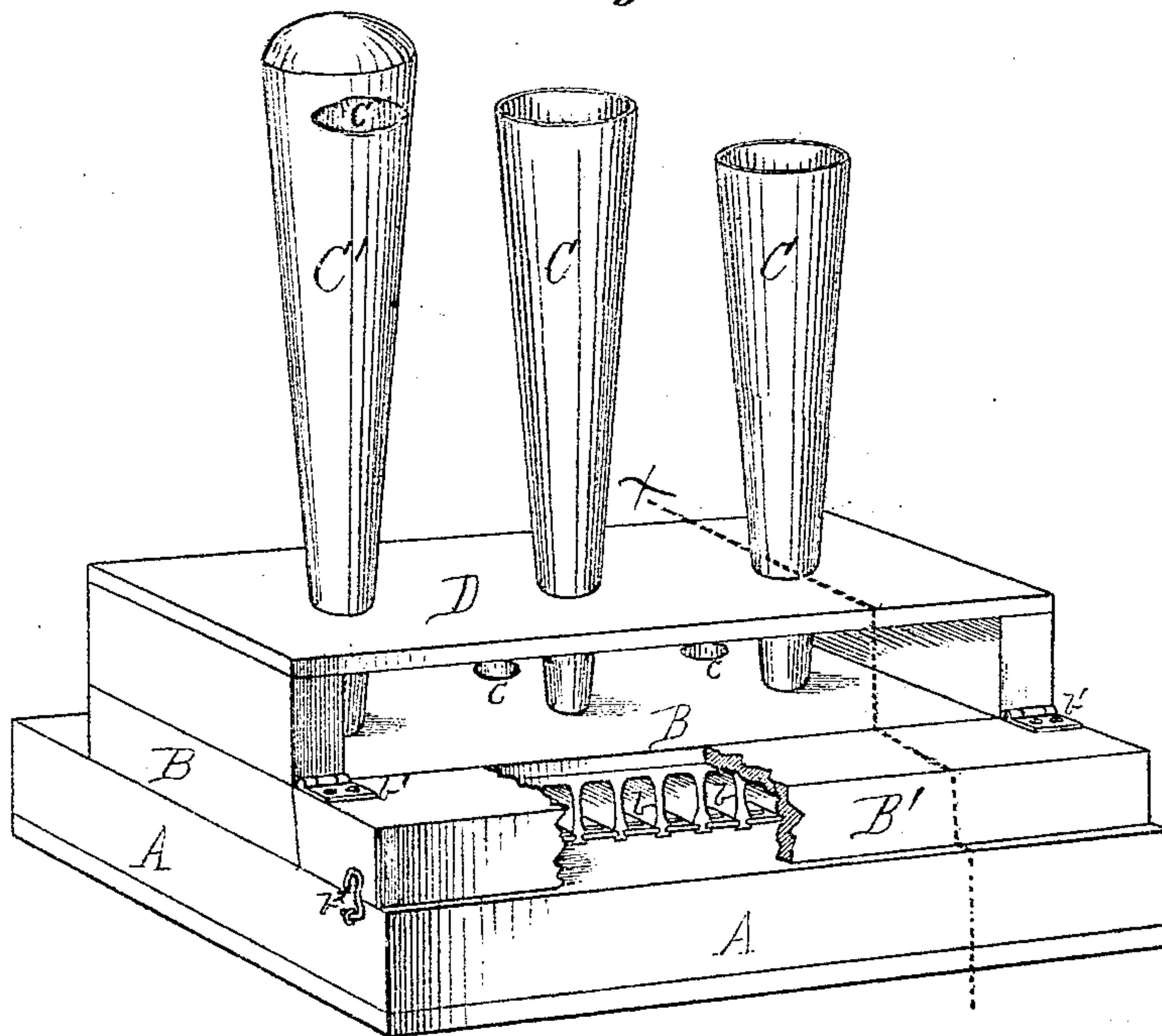


H. N. GOODMAN.
Cabinet Organs.

No. 133,851.

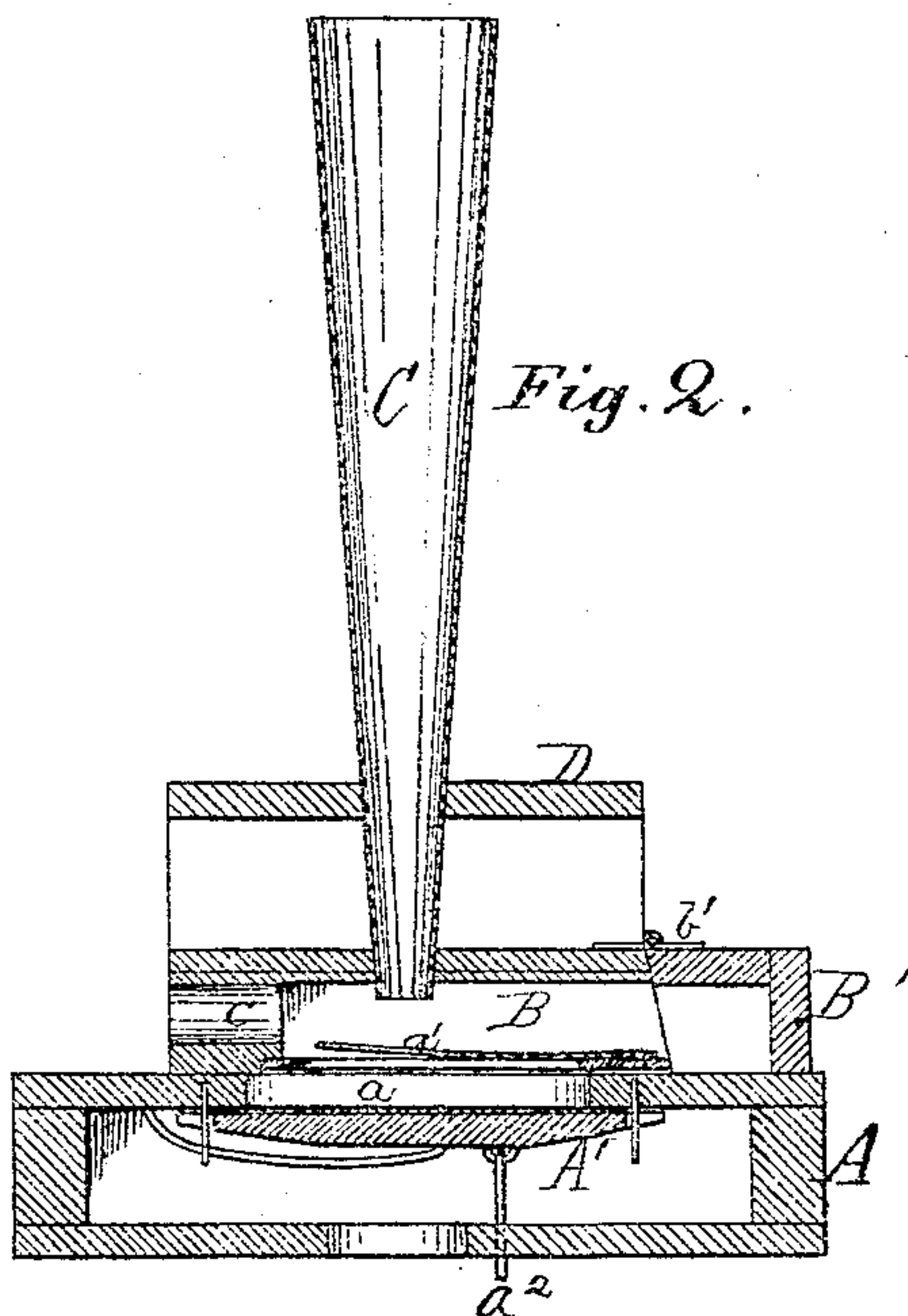
Patented Dec. 10, 1872.

Fig. 1.



y

Fig. 2.



Witnesses.

Alex. Mahon
A. B. Smith

H. N. Goodman
by his Attorney
A. M. Smith

UNITED STATES PATENT OFFICE.

HORATIO N. GOODMAN, OF SYRACUSE, NEW YORK.

IMPROVEMENT IN CABINET-ORGANS.

Specification forming part of Letters Patent No. 122,851, dated December 10, 1872.

To all whom it may concern:

Be it known that I, HORATIO N. GOODMAN, of Syracuse, county of Onondaga, State of New York, have invented certain new and useful Improvements in Reed Instruments, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing making part of this specification, in which—

Figure 1 is a perspective view of so much of a reed-organ as is necessary to illustrate my invention; and Fig. 2 is a vertical transverse sectional view taken on line *xy*, Fig. 1.

Similar letters of reference denote corresponding parts in both figures.

Reed instruments may be divided into two general classes—to wit, those in which the reed is actuated by a direct blast of air from a blast or forcing bellows, and those in which the reeds are vibrated by a current set in motion by suction or by an exhaust-bellows.

In the first-named class—that is, the blast instruments—the current or column of air is forced from the bellows against the reed, and escapes from said reed into the open air, or into a modifying-chamber, or, when pipes are used, into and through the pipes. In this construction the current of air that acted upon and vibrated the reed passed from the reed directly into and through the pipe, having no other outlet.

This class of instruments was very faulty and imperfect in many respects, as follows: First, the tones produced were harsh and reedy in the extreme—in fact, they were so disagreeable that none but an uncultivated ear could endure them. A second defect was the slow manner in which the reeds would speak, particularly in the middle and lower registers, this slowness precluding the playing of rapid music upon them, and in many instances causing the bass-notes to lag far behind their time.

These two objections were so fatal to the success of reed instruments that prior to the year 1846 the use of seraphines and æolians, as they were usually called, was very limited, and they occupied a position of little or no importance as articles of manufacture.

At this point in the history of these instruments, namely, in 1846, Jeremiah Carhart successfully introduced the second class—that is, those in which an exhaust is used, and in

which the current of air which actuates the reed passes from said reed into the exhaust-chamber, the operation being exactly the reverse of that employed in the old construction.

It is well known that this invention of Carhart's—that is, reversing the direction of the actuating-current of air—and the subsequent improvements thereto, has entirely revolutionized the manufacture of reed instruments in this country, and that nearly all of the inventions of the past few years have been made with reference to, and adapted for use in connection with, this particular class of instruments, until a cabinet-organ has come to be almost as well known and in as general use as a piano, and a manufacture of great and growing importance. But they are yet far from being perfect: First, they have not a sufficient variety of stops. Although Mr. Carhart's invention, and the subsequent improvements based thereon, have largely increased their capabilities, yet there has long been felt a necessity for a stop which shall be the equivalent of the flue-pipes of an ordinary church-organ, as, for instance, the dulciana or the flute-stop, and which shall, like them, serve as solo-stops. A second objection to the present reed-organ is found in the bass, particularly when a pedal or sub-bass is employed, as these notes require heavily-loaded reeds, which cannot, on account of their extreme weight, be made to speak quickly, and which, when they do speak, give forth harsh guttural tones.

In order to remedy the above-recited defects, I have made this invention, which consists essentially in combining with the reeds, in that class of reed instruments which are operated by an exhaust, a series of resonant-tubes of varying sizes, for the purpose of increasing the volume or modifying the tones produced by the reed, as will be hereinafter fully described.

Having thus explained the nature of my invention, I will proceed to describe one method which I have adopted for carrying it into effect.

In the drawing, A represents the exhaust-chamber, from which, in this class of instruments, the air is exhausted by an exhaust-bellows or a series of bellows in such manner that when the instrument is being played upon the reeds are actuated or vibrated by

a current of air which is drawn past said reeds into the chamber A with the flow in one direction only—that is, from the external air through the reed-tubes into the exhaust-chamber, and thence out through the exhaust-bellows. I usually prefer to make chamber A elastic or yielding, in order to avoid the unpleasant pulsations in the tone which might otherwise be produced at each stroke of the bellows. Above chamber A is placed the reed-board B, constructed substantially in the ordinary manner—that is, with a series of grooves or chambers, *b*, forming reed-tubes upon its upper surface, each groove or chamber being separated from its neighbor by a partition, as plainly shown in Fig. 1. Each of these reed-tubes is made to communicate with the exhaust-chamber A by means of a slot, *a*, Fig. 2, and the reed *a'* is secured in the reed-tubes substantially in the manner which is customary in this class of instruments. Valve *a'* may be operated by tripping-rod *a''*, or its equivalent. B' is a reverberatory chamber extending transversely across in front of the ends of the reed-tubes, substantially as shown in the drawing. The size of this chamber is not governed by any arbitrary rule, so far as I know, but in practice I have found the best size to be about the same height as the tubes, and of a width equivalent to about one-third their length. C C' are resonant tubes or pipes inserted in perforations in the reed-tubes, (preferably one to each reed,) for the purpose of modifying the tone produced by said reed. These pipes may be made of either wood or metal, though, on account of economy and convenience in working, I usually prefer to make them of metal. I place them preferably over the reed, about midway of its length; but this position may not be essential. D is a guide or rest board placed parallel to the reed-board, and a short distance above it, for the purpose of steadying the resonant-tubes which pass through it, as plainly shown in the drawing. Each of the reed-tubes is provided with one or more perforations or inlets, *c*, through which the air is admitted to the reed, one of these perforations being shown in the end of the tubes in Fig. 2, and others in the tops of the tubes in Fig. 1. I regard the end of the tube opposite the reverberatory chamber as being the best place for these inlets, and under some circumstances I find it advisable to place a board or wing in an upright position a short distance in front of the inlets in the ends of the reed-tubes.

When the size of the pipes is such as to make it necessary, I adopt the following plan or system of arranging them: I place one as near as possible to the front of the reed-board. I then place the next one a little in its rear; then the next one a little in rear of that, until there is room for another in front. Then I proceed as before, thus placing them in diagonal rows. This arrangement enables me to utilize the entire surface of the reed-board and make a compact construction. Resonant-pipes

C are shown as having open tops, while pipe C' is closed at its upper end, and has an opening, *c'*, in one side, for the escape of the sound. I also make some of my pipes with flat caps at the upper end, provided with small outlet-tubes similar to the flute-stop of an ordinary organ, and by means of these various forms I am enabled to produce a greater number of combinations than can be obtained in reed-organs in any other manner.

I connect the shell forming the reverberatory chamber with the reed-board by hinges *b'*, so that I can raise said shell for the purpose of having more ready access to the reeds and reed-tubes, and confine said chamber in proper position when closed by means of hooks *b''* or their equivalent.

By varying the size of the pipes to correspond with the size of the reed, and also varying the form of the open pipes, making them more flaring as I approach the upper register of the instrument, I am enabled to give each stop greater uniformity of quality, character, and strength of tone throughout its entire compass, imitating the diapasons, both open and stopped, the principal, the dulciana, and even the flute-stops with a degree of fidelity never before attained.

The employment of the inlets *c* of various sizes and in different positions affords ready ingress for air enough to produce the required vibration of the reed without using the pipes for that purpose. This allows the column or wave of sound to be thrown back from the reverberatory chamber and out through the pipes without being disturbed by a counter-current of air, and the size and position of these inlets seem to affect the purity of the tone in a manner analogous to the changes produced in ordinary wooden or metal blast-pipes by the various methods of voicing employed by organ-builders.

I have found that by the employment of these resonant-pipes, in combination with the reed, at the lower register I am enabled to dispense with the double heavily-loaded reeds in present use, which produce an objectionable guttural tone, and which are, on account of their great weight, very slow to speak, substituting in their place a single flexible reed, which is actuated quickly, and which, in combination with my pipe, will produce a rich, deep, sonorous tone, far superior to that found in any instrument now in use.

From the above description it will be seen that my method of employing the resonant-tubes is materially and essentially different, both in arrangement and principle, from the manner in which the pipes are employed in an ordinary blast-organ.

In the blast instrument the current of air which actuates the reed passes directly from the reed into and out through the pipe as its only outlet; whereas in my improved organ the current never under any circumstances passes through the resonant-tube after leaving the reed, but goes at once into the ex-

haust or vacuum chamber; and, more than this, I, by preference, connect several of the reed-tubes with each other, as explained above, in order that there shall be no direct current whatever through the tube corresponding to the speaking-reed. But, in addition to this, the pipe of a blast-reed stop operates entirely differently from my resonant-tube. Thus, if we introduce a slender sensitive reed into a pipe, the vibration of the column of air within the pipe will control the vibrations of the reed, making the tone emitted correspond to the length of the pipe, from the fact that the current of air passes out from the reed through the pipe, and is modified by said pipe; whereas in my construction no such effect is produced, as the current of air, after actuating the reed, passes from the reed away from the tubes into the exhaust-chamber, the tubes serving merely as resonant-chambers.

In this application I have shown and described a construction which embodies many features and improvements which I have invented and adapted for use in connection with my new combination of reeds and resonant-

pipes, for the purpose of improving and perfecting the operation of my new organ, and for which I took out Letters Patent, dated May 24, 1870. But these last-named devices are merely in the nature of details of construction; therefore I do not wish to be limited to their use, as many modifications of them may be adopted without departing from the spirit of my invention.

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

The combination, in a reed or cabinet organ, of an exhaust-chamber (in which the air is rarefied by the action of an exhaust-bellows) with a series of reeds vibrated by a current of air produced by suction, and a series of graduated resonant pipes or tubes for increasing the volume and modifying the quality of the tone produced by the reeds, substantially as set forth.

H. N. GOODMAN.

Witnesses:

HARRY GIFFORD,
GEORGE W. GIFFORD.