W. E. HASKELL.

ORGAN PIPE.

APPLICATION FILED MAR. 3, 1909.

965,896.

Patented Aug. 2, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

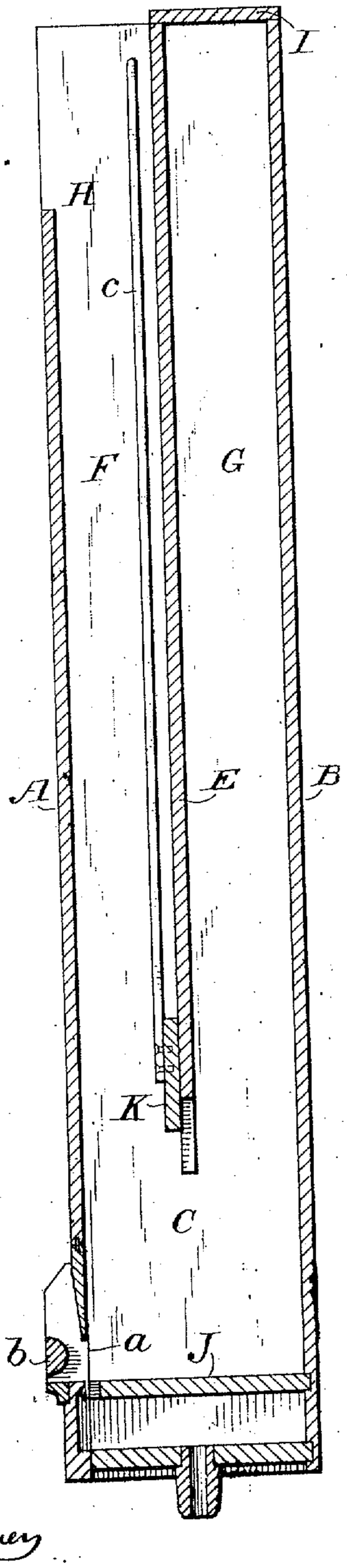


Fig. 2.

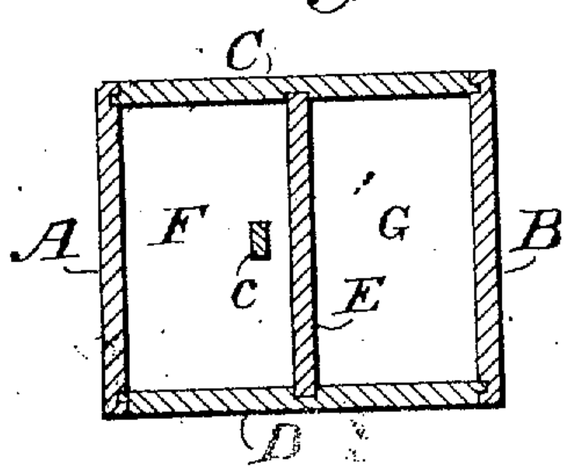


Fig. 3.

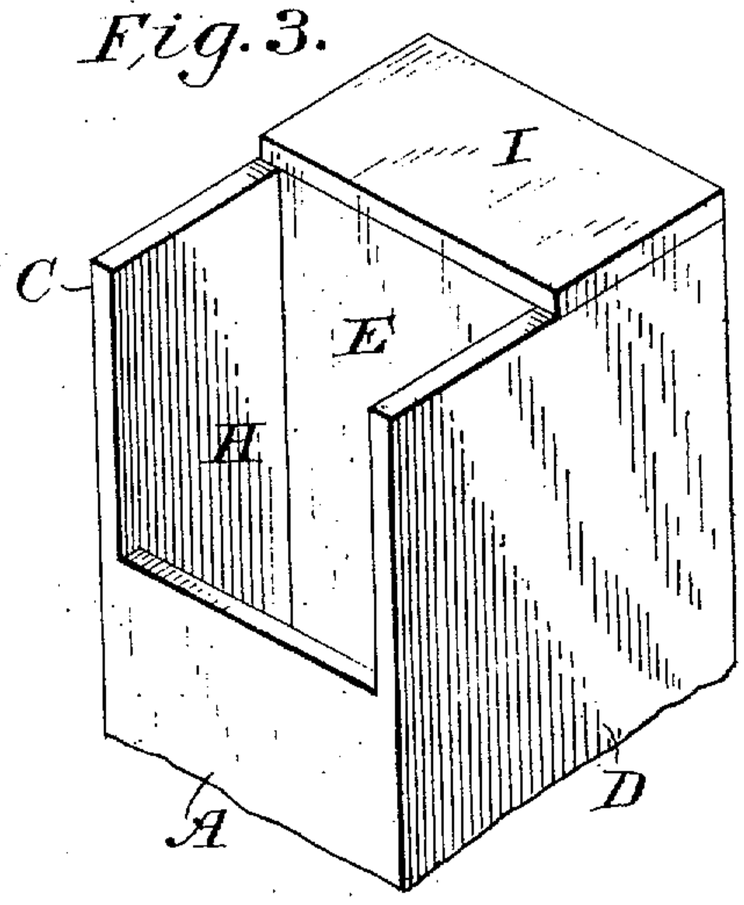
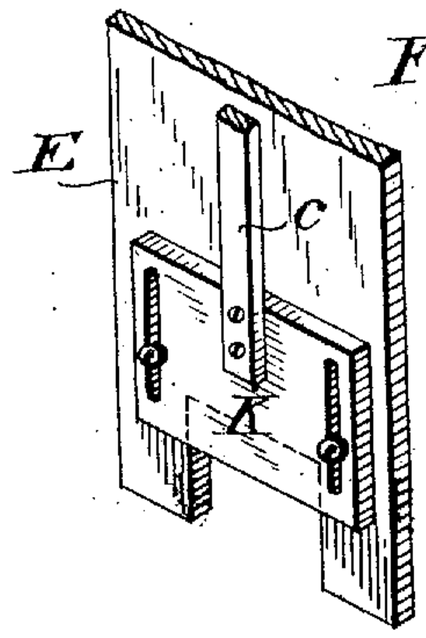


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

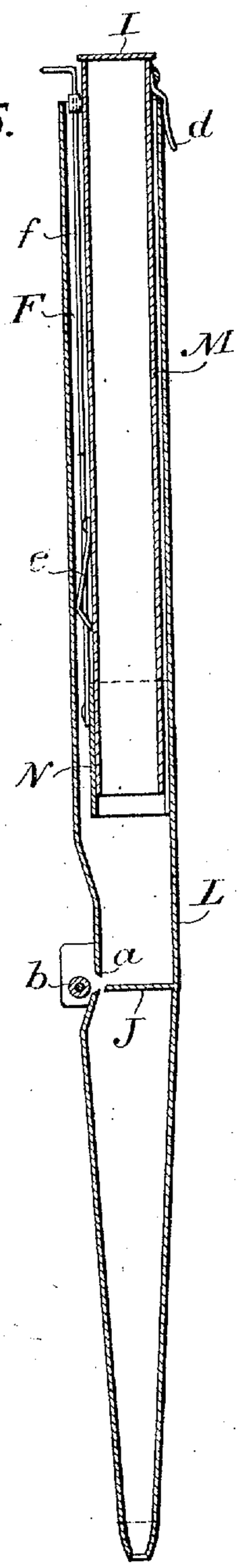


Fig. 7.

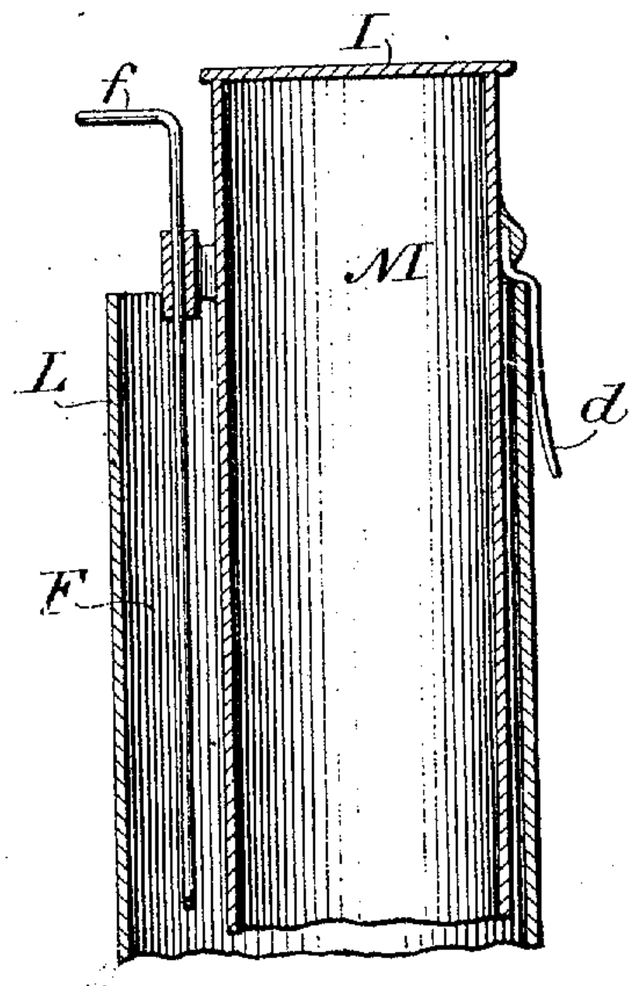


Fig. 6.

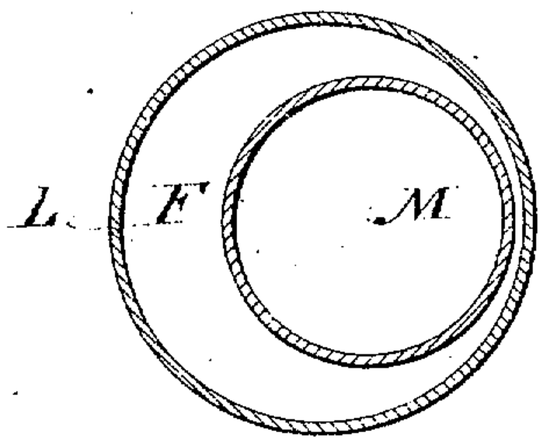
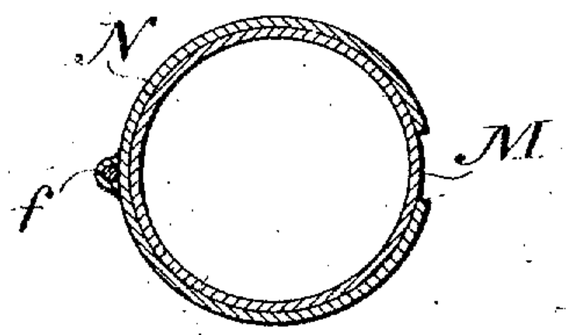


Fig. 8.



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UNITED STATES PATENT OFFICE.

WILLIAM E. HASKELL, OF BRATTLEBORO, VERMONT, ASSIGNOR TO ESTEY ORGAN COMPANY, OF BRATTLEBORO, VERMONT, A CORPORATION OF VERMONT.

ORGAN-PIPE.

965,896. Specification of Letters Patent. Patented Aug. 2, 1910.

Application filed March 3, 1909. Serial No. 481,018.

To all whom it may concern:

Be it known that I, WILLIAM E. HASKELL, of Brattleboro, in the county of Windham and State of Vermont, have invented certain new and useful Improvements in Organ-Pipes, of which the following is a specification.

The special object of the present invention is to enable open organ pipes to produce tones of low pitch without deleteriously affecting the tonal quality and with a much shorter length than has heretofore been necessary.

It has from the earliest period in the history of organ pipes been well known that increasing the length of the pipe lowered the pitch and that a tone of the octave below a given note involved a pipe having double the speaking length. This acoustic law has necessitated the use of very long pipes in order to produce notes of low pitch. In an organ of any capacity open pipes giving a sixteen-foot tone must be employed, involving a speaking length of approximately sixteen feet. There are many situations, however, in which it is desired to use pipe organs in which there is not available room for pipes of such length. Of course it is well known that stopped pipes of a given length produce the octave below open pipes of the same length, but stopped pipes give a different quality of tone from open pipes, with inferior carrying power, so that they cannot be used for the lower octaves of a set or stop of pipes the upper octaves of which are composed of open pipes. Heretofore, therefore, in order to employ open pipes of greater length than the height of the apartment in which the organ is placed, it has been necessary to miter the pipes, which is an expensive construction taking up much room and appreciably affecting the quality of the tone.

Open pipes made in accordance with the present invention give the desired low pitch with a length materially less than heretofore employed, and preserve the desired tonal quality and, in fact, with added carrying power and sonority, the tone being notably more resonant and pervading than that of the orthodox full length pipe. Other advantages of the new pipes will be set forth in connection with the detailed description thereof.

The present improvements are applicable both to wood and to metal pipes and are illustrated in the accompanying drawings in connection with both.

In the accompanying drawings—Figure 1, is a longitudinal section of a wood pipe constructed in accordance with the present invention. Fig. 2, is a cross-section thereof. Fig. 3, is a perspective of the top of the pipe. Fig. 4, is a detailed view showing one way of tuning. Fig. 5, is a longitudinal section of a metal pipe. Fig. 6, is a cross-section thereof. Fig. 7, is an enlarged detailed section of the top of the pipe. Fig. 8, is a cross-section through the tuner.

There is illustrated in Figs. 1, 2, 3 and 4, a wood organ pipe, the one selected for illustration belonging to the open diapason stop. The general construction of the pipe may be identical with that of an ordinary wood pipe except as hereinafter described. For the sake of identification, the wall A, of the pipe in which the mouth *a*, is located will be designated as the "front" wall; B, is the rear wall, and C, and D, are the two side walls. The distance between the front and rear walls is the "depth" of the pipe and the distance between the two side walls is the "width" of the pipe. In case the pipe is to give a particular tone, the depth and width of the pipe will be the same as if the pipe were to be of the full length heretofore employed for giving such a tone. The pipe is divided longitudinally by means of a partition E, which extends across the pipe between the two side walls C, and D. This partition divides the pipe into two chambers F, and G, and for identification these will be referred to as the "main chamber" and the "complementary chamber," respectively. The main chamber F, has an open top H; whereas the complementary chamber G, has a closed top I. As illustrated, the side walls C, and D, extend upwardly for the full depth of the pipe to the top of the complementary chamber, but the front wall A, does not extend to the full height of the complementary chamber. The effective height, therefore, of the main chamber, is determined by the top of the front wall A, subject to the qualifying effect of the upwardly extending side walls. The side walls C, and D, so far as they constitute the side walls of the main chamber F, might extend no higher than the top of the front wall A, in which case the front wall would be somewhat higher. Now,

the speaking length of this pipe is equal to that of an open pipe whose length is the same as that of the main chamber F, plus that of the complementary chamber G. In determining this aggregate length the length of the main chamber from the top of the front wall A, to the bottom J, of the pipe, is to be reckoned and also the length of the complementary chamber from the bottom to the top of the partition E. The partition E, can be carried down as low as the plane of the top of the mouth *a*, so that the pitch of the pipe can be as low, almost, as that of an open pipe of nearly twice the height. For example, if there is taken as the standard an open pipe of the speaking length of eight feet, namely, CC, by the employement of the closed top complementary chamber a tone can be produced of the pitch of CCC sharp, with the same total length of pipe above the bottom J. The complementary chamber need not be used of the maximum length but can be of varying lengths, in which case pipes of the same height will give different, pitches, depending upon the length of the complementary chamber. Thus, the lower octave of a set or stop of pipes can be composed of pipes all of the same length, their differing pitches depending upon the length of the complementary chamber.

Several details are important. If the complementary chamber be short relatively to the main chamber it can be either at the front or the rear. If, however, the partition E, extends down more than half the length of the pipe, it is desirable that the complementary chamber should be at the rear of the pipe and this is imperative in case the partition extends near the plane of the mouth if the quality of tone is to be preserved. Accordingly, as a matter of practice, the closed top complementary chamber is uniformly at the rear of the pipe and the open top main chamber is at the front.

The partition E, should divide the pipe in half so that the areas of the complementary chamber and of the main chamber on the opposite sides are equal. The complementary chamber should extend above the top of the main chamber to an extent equal to the width of the pipe. That is to say, if the width of the pipe is fourteen inches, then the vertical distance between the under side of the complementary chamber top I, and the upper edge of the front wall A, should be fourteen inches.

In order to obtain a desired resonance and sonority of tone a harmonic bridge *b*, with a curved face, opposite the mouth *a*, may be employed; but it is not necessary.

A pipe thus constructed has the same quality of tone as an open top pipe of the same voicing and if the complementary chamber is of approximately maximum length it gives a tone of the same pitch as an ordinary open top pipe of nearly double the length above the bottom J, while preserving the same area in cross-section. For example, a pipe nine feet six inches high above the bottom J, an give the same pitch as an orthodox pipe sixteen feet high above said bottom. At the same time, the new wood pipe has important structural and mechanical advantages. With an ordinary open top pipe giving a sixteen-foot tone, for example, the wooden walls must be of substantial thickness in order to avoid independent vibration thereof which would affect the tonal quality, thus rendering the pipe of great weight, difficult to handle, and expensive to construct on account of the quantity of wood employed. In case of the present new pipes the partition E, stiffens and strengthens the pipe so that thinner wood can be employed than in the case of a pipe having the same physical length and hence materially less wood is employed than in case of the ordinary open pipe having the same pitch.

The pipe is tuned by varying the effective length of the partition E, at its bottom. There is shown in Fig. 4, an ordinary tuning slide K, at the bottom of the partition, with an upwardly extending rod *c*, which extends upward through the main chamber F, and accessible through the open top thereof. This tuner K, constitutes the effective bottom of the complementary chamber.

Open metal pipes can also be constructed on the same principles and a metal pipe is shown in Figs. 5 to 8 of the drawings. As shown in these figures the body L, is cylindrical in cross-section and the complementary chamber M, is cylindrical in cross-section. Both body and complementary chamber are made of the usual metallic composition used in making metal pipes. The area of the complementary chamber in cross-section is one-half the area of the body L, in cross-section, so that the area of the complementary chamber is substantially equal to the area of the main chamber F, which section is one-half the area of the body L, which surrounds the complementary chamber. Since thin metal may be used for the complementary chamber the space occupied by the circular complementary chamber wall may be neglected in the calculation of the areas. The body L, and hence the main chamber F, is open at the top and is of the same height throughout its periphery. The complementary chamber has a closed top I, and the complementary chamber extends, as shown, above the main chamber to a distance one-half the diameter of the body L. That is to say, the vertical distance between the top of the body L, and the under face of the complementary chamber

top I, is one-half the internal diameter of the body. The complementary chamber may be placed either centrally or eccentrically within the body L. The eccentric arrangement is shown. The complementary chamber is supported within the body by means of a hook *d*, fastened to the outer wall of the said chamber which engages the top edge of the body L, and determines the proper vertical position of the complementary chamber with respect to the main chamber. A spring *e*, fastened to the outer wall of the complementary chamber bears against the interior wall of the body, thereby holding the complementary chamber in place and preventing any lateral vibration or rattling thereof. The pipe is tuned by varying the effective length of the complementary chamber at its lower open end. As shown, an ordinary split sliding tuning sleeve N, is employed, frictionally embracing the lower open end of the complementary chamber and having secured thereto a vertically extending rod *f*, which extends above the body L, where it is readily accessible for raising and lowering the tuning sleeve.

When the eccentric complementary chamber is employed it is preferably located at the rear of the pipe, as shown in the drawings, especially when the complementary chamber is a long one reaching down close to the mouth *a*. It is desirable to employ a harmonic bridge *b*, with the metal pipe, but it may be omitted.

A particular shape of the complementary chamber in cross-section is not essential for either the wood or the metal pipe. In fact, a cylindrical metal complementary chamber can be practically used with a wood pipe rectangular in cross-section. Whatever the shape or location of the complementary chamber may be, however, it is important that its area in cross-section should be substantially equal to the area of the open top main chamber.

The projection of the complementary chamber above the main chamber F, is not subject to an arbitrary rule, but depends to some extent on the quality of tone produced, as well as to the treatment given the pipe at the mouth. Differences in the height of this projection above the main chamber F, may be compensated for by adjustment of bridge.

To further aid in an understanding of the invention, the exact details will be given of two pipes (one wood, the other metal) of CC pitch, giving an eight foot tone. Poplar is a suitable wood. The exterior walls A, B, C, D, are three-fourths (3/4) of an inch thick. The partition E, is three eighths (3/8) of an inch thick. The height of the open main chamber F, from the upper face of the bottom J, to the upper edge of the front wall is four (4) feet, one and one-half (1½) inches. The height of the complementary chamber G, from the bottom edge of the partition E, to the under face of the top I, is three (3) feet, five and three-fourths (5 3/4) inches. The "depth" of the pipe is six and three-eighths (6 3/8) inches, and the width is five and one-eighth (5 1/8) inches. The vertical distance between the upper edge of the front A, and the bottom of the top I, is five and one-eighth (5 1/8) inches. The height of the mouth *a*, is one-fourth (1/4) of the width of the pipe. The diameter of the bridge *b*, is the same as the height of the mouth. The effective speaking length of the pipe is the sum of the heights of the two chambers, namely, seven (7) feet, seven and one-fourth (7 1/4) inches. This pipe gives the same pitch as ordinary open pipes of the same width and depth and seven (7) feet, nine (9) inches high; the difference in effective length being due to the shading or flatting effect of the bridge *b*, and of the complementary chamber. In the case of a metal pipe, the height of the main chamber is four (4) feet, two (2) inches; and of the complementary chamber, three (3) feet, nine and one-fourth (9 1/4) inches, giving a total speaking length of seven (7) feet, eleven and one-fourth (11 1/4) inches. The internal diameter of the pipe is four and one-fourth (4 1/4) inches; and of the complementary chamber two and fifteen-sixteenths (2 15/16) inches. The vertical distance between the top of the body L, and the under face of the top I, is two and one-eighth (2 1/8) inches. The walls of both pipe and chamber are three sixty-fourths (3/64) of an inch thick. The height of the mouth is one-third (1/3) its width, and its width is two-ninths (2/9) the circumference of the pipe. The diameter of the bridge is the height of the mouth. Zinc is the metal used. Such a pipe has the same pitch as an open metal pipe of the same diameter and eight (8) feet, one (1) inch high.

The foregoing details are taken from pipes in commercial use in organs made under the direction of myself.

I claim:—

1. An open wood organ pipe having its mouth in its front wall, a partition extending between the side walls of the pipe from a point above the mouth to a plane above the front wall equal to the width of the pipe, and a top extending from the partition to the rear wall and between the side walls, thereby forming a closed top complementary chamber at the rear of the pipe.

2. An open wood organ pipe having a stiffening partition extending between its two side walls and dividing the pipe into a front open top main chamber having the pipe-mouth at its front and a complementary chamber at the rear, said complemen-

tary chamber having a closed top and an open bottom communicating with said main chamber.

3. An open wood organ pipe having a stiffening partition extending between two of its walls and dividing the pipe into an open top main chamber and a complementary chamber, said complementary chamber having a closed top and an open bottom communicating with said main chamber.

4. An open wood organ pipe having a partition extending between two of its walls and dividing the pipe into a main chamber having the pipe-mouth at its front side and a complementary chamber of different length at the rear, said complementary chamber having an open bottom above the pipe-mouth and communicating with said main chamber.

5. An open wood organ pipe having a stiffening partition extending between two of its walls and dividing the pipe into a main chamber and a complementary chamber, said complementary chamber having a closed top and an open bottom above the pipe-mouth communicating with said main chamber.

6. An organ pipe having an open top main chamber, a closed top complementary chamber communicating at its lower end with said main chamber, a tuner at the lower end of said complementary chamber, and means accessible through the open top of said main chamber for adjusting said tuner.

7. An organ pipe having an open top main chamber, a complementary chamber communicating at its lower end with said main chamber, a tuner at the lower end of said complementary chamber, and means accessible through the open top of said main chamber for adjusting said tuner.

8. An organ pipe having a main chamber, a complementary chamber communicating at its lower end with said main chamber, and a tuner at the lower end of said complementary chamber.

9. An organ pipe having a main chamber, a complementary chamber communicating with said main chamber, and a tuner at the communication between said complementary chamber and main chamber.

10. An organ pipe having an open top main chamber, a closed top complementary chamber communicating with said main chamber at its lower end, a mouth below the bottom of said complementary chamber, and a harmonic bridge with a curved face opposite said mouth.

11. An organ pipe having an open top main chamber, a closed top complementary chamber communicating with said main chamber at its lower end, a mouth below the bottom of said complementary chamber, and a harmonic bridge opposite said mouth.

12. An organ pipe having a main chamber, a complementary chamber communicating with said main chamber, a pipe-mouth below the opening of said complementary chamber into the main chamber, and a harmonic bridge with a curved face opposite said mouth.

13. An organ pipe having an open top main chamber and a closed top complementary chamber of substantially equal area in cross-section, said complementary chamber communicating at its lower end with said main chamber.

14. An organ pipe having an open top main chamber and a closed top complementary chamber of substantially equal area in cross-section, said complementary chamber communicating with said main chamber above the pipe-mouth.

15. An organ pipe having a main chamber with the pipe-mouth in its front wall and a complementary chamber of substantially equal area in cross section, said complementary chamber communicating with said main chamber below the top thereof and above the pipe-mouth.

16. An organ pipe having an open top main chamber, and a closed top complementary chamber communicating with said main chamber at its lower end and extending at its closed end above the open top of said chamber.

17. An organ pipe having an open top main chamber and a closed top complementary chamber communicating with said main chamber below its top and above the pipe-mouth and extending above the open top of said main chamber.

18. An organ pipe having an open top main chamber and a closed top complementary chamber communicating at its lower end with said main chamber below the top thereof.

19. An organ pipe having a main chamber and a closed top complementary chamber communicating at its lower end with said main chamber below the top thereof.

20. An organ pipe having an open top main chamber and a closed top complementary chamber communicating with said main chamber below the top thereof.

21. An organ pipe having a main chamber and a complementary chamber of different lengths but substantially equal area in cross section, said complementary chamber communicating with said main chamber above the pipe-mouth and below the top of the main chamber.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

WILLIAM E. HASKELL.

Witnesses:
H. F. C. FOEDT,
L. W. HAWLEY.