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WIND INSTRUMENT OF THE REED TYPE

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This invention relates to wind instruments of the reed type, such as the saxophone, the clarinet, the oboe and the bassoon, though it is more especially concerned with the saxophone. The invention aims to provide a system which will faithfully reproduce the notes of the lower register of the saxophone in their first harmonics, or octaves. Another aim is to improve and to simplify the G♯ key mechanism.

A brief explanation of the fundamental principles involved in the octave system will aid in obtaining a clear understanding of the invention. Let us first consider the vibrating air column in a cylindrical or parallel-sided tube such as an organ pipe. When air under pressure is admitted to the inlet end of the pipe, the point of maximum pressure or density of the air is midway between the ends. If we make a large hole (which is equivalent to cutting off the pipe) toward the outlet, the air column is shortened that much, the point of maximum pressure shifts toward the inlet to a point midway between the two ends, and the pitch of the note rises. As this condition changes, the point of maximum pressure retreats toward the inlet, and the pitch rises with the introduction of successive large holes (or cutting off the pipe) toward the inlet.

With a given length of pipe, it is possible to play the fundamental note with a moderate pressure, and without change in the pipe, but with greater pressure, to play the first harmonic, or octave of that note. However, under this condition, the first harmonic, or octave, is unstable and difficult to obtain and maintain. This condition can be removed and a stable, true tone obtained by introducing a small, octave hole at or near the point of maximum pressure, that is, midway or nearly midway of the pipe.

In saxophones as heretofore generally used, two such octave holes are provided—one for use with an air column of one length, and the other for use with a shorter air column (secured by opening large holes near the lower end of the instrument) but as the pipe or tube is tapered, the point of maximum pressure in each case is not midway in the air column but is nearer the upper, or inlet end.

However, even by the provision of two octave holes, a number of false tones, or imperfect octave-harmonics, are produced. All saxophones now on the market have two octave holes to cover the entire upper register. This imperfection of the present instruments is well understood, and various attempts have been made to provide a third octave hole but the mechanisms which have been provided for this purpose are cumbersome, complicated and extremely difficult to operate.

The upper register of the saxophone (sixteen notes in all) theoretically requires an octave hole for each note, because of the peculiar measurements of the saxophone. This, however, is obviously impracticable, and it is necessary to make a compromise. I have discovered that one octave hole, suitably placed, will efficiently accommodate four or five notes (half steps) but no more. Four octave holes will produce a smooth curve of quality of tones for the entire upper register. According to my invention, three or four octave holes are entirely practicable with the utmost simplicity of mechanism and convenience in operation.

The most important features of this mechanism are, (1) the positive opening and closing of two octave holes by one rigid member, (2) the operation of the fourth hole with the side (or knuckle) keys operating the high notes, and (3) the opening of the third octave hole in the upper register with the closing of the first-mentioned two holes. Other features and advantages will appear during the course of the following detailed description.

The invention will be best understood by reference to the following description when taken in connection with the accompanying drawings of one specific embodiment thereof, while its scope will be pointed out more particularly in the appended claims.

In the drawings:

Fig. 1 is an elevation of a saxophone embodying the invention;

Figs. 2 to 6 inclusive are elevations on an enlarged scale as viewed from the left of Fig. 1, illustrating different positions of the octave mechanism;

Figs. 7, 8 and 9 are views partly in elevation and partly in section, on a still larger scale, illustrating different positions of a portion of the octave mechanism;

Fig. 10 is a sectional view, on a still larger scale, on line 10—10 of Fig. 2, looking in the direction of the arrows on said line;

Fig. 11 is a sectional view on an enlarged scale on line 11—11 of Fig. 2, looking in the direction of the arrows on said line;

Fig. 12 is a somewhat diagrammatic development of a portion of a saxophone, illustrating a portion of the octave mechanism;

Fig. 13 is a sectional view on line 13—13 of Fig. 12;