

[54] **SOUND PRODUCING PASSAGE FOR MUSICAL WIND INSTRUMENTS**

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[51] Int. Cl. .... **G10d 7/00**

[58] Field of Search ..... **84/380-385**

[57] **ABSTRACT**

In a musical wind instrument, an annular projection such as an annular ring is provided on the inner wall of the tubular neck section, or tubular body section contiguous thereto, or cylindrical joint member connecting the neck and body sections. The annular projection narrows the air passage at the portion in which the projection is provided, and serves to obtain sharp and clear tones which are very quick in rising or building-up thereof.

[56] **References Cited**

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**7 Claims, 6 Drawing Figures**

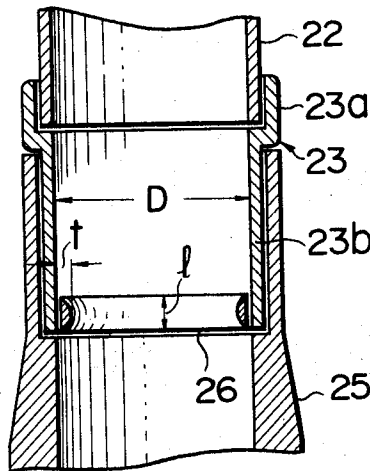


FIG. 1  
PRIOR ART

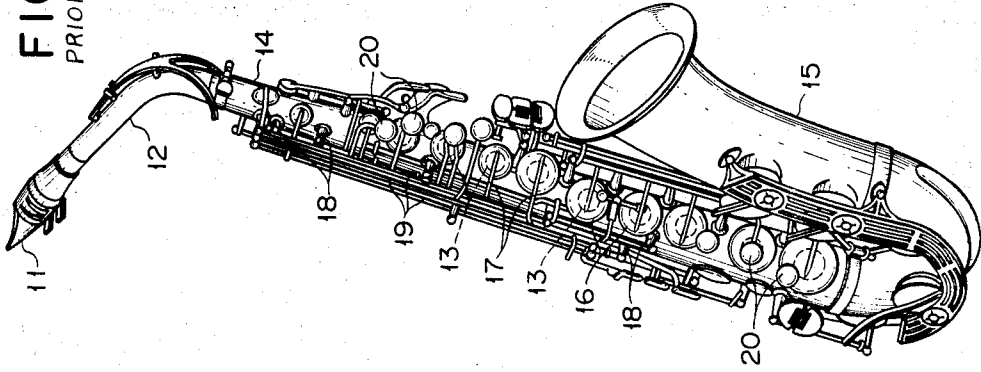


FIG. 2

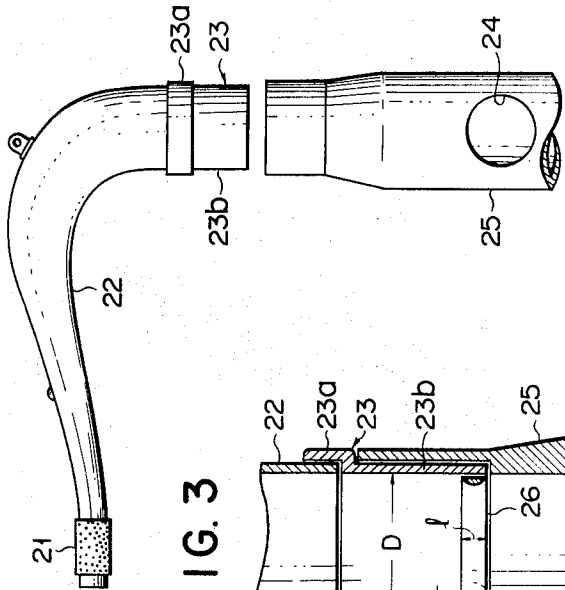


FIG. 3

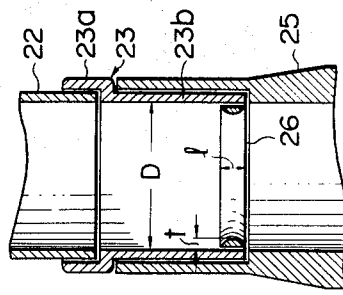


FIG. 4

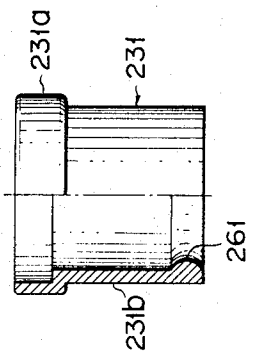


FIG. 5

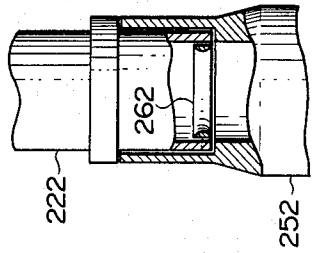
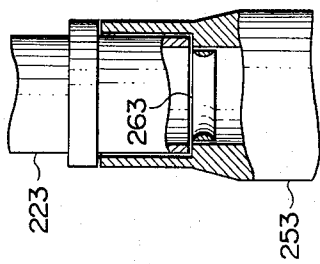


FIG. 6



## SOUND PRODUCING PASSAGE FOR MUSICAL WIND INSTRUMENTS

### BACKGROUND OF THE INVENTION

This invention relates to wind musical instruments, such as saxophones, flutes, clarinets, oboes or piccolos, and more particularly to improved inner wall of the instrument defining its sound producing passage.

It is known to those skilled in the art that the inner wall of the instrument defining its sound producing passage should be made as smooth as possible to obtain musical sounds or tones of excellent characteristics. In its practical applications, therefore, the inner wall of the instrument has heretofore been plated with a metal, such as gold, silver or nickel, or coated with a lacquer. It is also well known that the instrument with a gold-plated inner wall can produce musical sounds of a better or clearer rising characteristic and a more sharp and clearer tone than any instrument with a nongold-plated inner wall. However, it is economically difficult to plate the inner wall of the inexpensive popular wind instrument with gold.

With a nongold-plated inner wall, therefore, the popular wind instrument had the drawbacks that it emanated musical sounds of relatively poor rising characteristics, with the result that respective musical sounds, particularly during performance at a high tempo or speed, became clearly indistinct from each other as well as the resultant musical sounds had an inferior tone color.

Accordingly, it is an object of the present invention to provide an improved wind musical instrument, even where its inner wall is not gold plated, capable of producing musical sounds having an excellent rising characteristic and a tone color substantially equivalent to wind instruments with a gold-plated inner wall and, where its inner wall is gold-plated, capable of producing musical sounds with a clearer rising characteristic.

### SUMMARY OF THE INVENTION

A wind instrument comprises a mouthpiece, a tubular neck section joined to the mouthpiece, and a tubular body section connected to the neck section through a cylindrical joint member. The wind instrument according to a preferred embodiment of this invention is characterized in that an annular projection having an inner diameter smaller than that on the adjacent inner wall is provided on the inner wall of the cylindrical joint member, or neck section or body section. This annular projection is preferably about 5 to 8 mm wide and of a hemispherical shape about 1 to 2 mm thick.

It has been experimentally confirmed by the inventor of the present invention that the wind instrument with such a construction can produce musical sounds of a better rising characteristic and a more sharp and clearer tone than the prior art instruments with the result that, even where its inner wall is not gold-plated, a wind instrument can be obtained having sound producing characteristics equivalent to wind instruments with a gold-plated inner wall and where its inner wall is gold plated, a wind instrument is capable of producing musical sounds with much better rising characteristics.

### BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is an oblique view schematically showing a saxophone as an example of a wind instrument;

FIG. 2 is a front view, partly broken away, illustrating the main part of a wind instrument in accordance with one embodiment of the present invention;

FIG. 3 is an enlarged sectional view, partly broken away, illustrating the cylindrical joint member connecting the neck section and the body section;

FIG. 4 is a partly sectional view illustrating a modification of the joint member shown in FIG. 3; and

FIGS. 5 and 6 are respectively partially sectional views, partly broken away, showing the main parts of wind instruments in accordance with other embodiments of the invention.

### PREFERRED EMBODIMENTS OF THE INVENTION

Before describing the preferred embodiments of this invention, the construction of wind instruments in general is explained below.

As shown in FIG. 1, a wind instrument such as a saxophone includes a tubular neck section 12 having one end attached with a mouthpiece 11, an elongated tubular body section 14 having one end joined detachably to the other end of the neck section 12 and perforated with a plurality of tone holes 13 on a vertically aligned wall portion, and a bell section 15 having one end connected detachably to the other end of the body section 14. The neck section 12, the body section 14, and the bell section 15 are successively combined to form a one-piece cylindrical hollow member which defines the later described sound producing passage. The tone holes 13 on the body section 14 are so designed as to be optionally sealed airtight as described below by the corresponding tone-hole covering assemblies 16 each comprising a relatively shallow cylindrical key cup with an annular pad made of a soft material such as felt on the underside.

Namely, some of the covering assemblies 16 are rotatably pivoted alone by a known method on hinge rods 19 bridged across a plurality of paired key posts 18 projecting at prescribed intervals on the wall portion with predetermined lateral spacings from the tone holes 13 in the longitudinal direction of the body section 14 through laterally extending arms 17, while the others are rotated together upon actuation of a particular assembly associated therewith.

Thus, the tone-hole covering assemblies 16 during performance are selectively depressed to seal the corresponding tone holes 13 airtight so as to control the effective length of the instrument, thereby to produce musical sounds of a predetermined pitch or frequency resonated by the air blown in through one end of the instrument. In this case, the hinge rods 19 are always subject to a rotating force by a needle or a plate spring in order that when released from depression, the tone-hole covering assembly 16 is so designed as to rotate back to its original stable position receding from the corresponding tone hole 13. Note that the reference numeral 20 in FIG. 1 designates operating keys to control the depression of the corresponding tone-hole covering assemblies 16 by the player's right or left hand finger.

With such a construction, the present invention provides a wind instrument improved on the rising characteristics and colors of the resonated musical sounds being produced as described above. Of supreme importance in the instrument is that the various characteristics of the musical sounds are actually determined in

the process for the air blown in through one end of the instrument to reach the tone holes arranged as described above.

Referring now to the drawing, there are described the components of the instrument in the corresponding positions occupied before the air reached the tone holes.

FIG. 2 is a front view showing the main portions of a wind instrument in accordance with one embodiment of this invention. One end of a tubular neck section 22 is connected with a mouthpiece (not shown) through a packing material 21 such as cork and the other end thereof is joined with one end of a relatively narrow cylindrical joint member 23 constructed as described below. The other end of the joint member 23 is joined with a bell section (now shown) through a body section 25 having a plurality of tone holes 24 (only one shown) and tone-hole covering assemblies (not shown) constructed as mentioned above, respectively.

Note that the joint member 23, the body section 25 and the bell section are all made of wood or metal and of a cylindrical hollow shape.

FIG. 3 is an enlarged longitudinal sectional view, partly broken away, showing the joint member 23 of FIG. 2, together with the neck section 22 and body section 25 located at both ends of the joint member 23. The joint member 23 comprises a large-diameter portion 23a joined detachably with the neck section 22 and a small-diameter portion 23b. The small diameter portion 23b extends integrally from the large-diameter portion 23a, with substantially the same inner diameter  $D$  (usually 22.5 to 23.5 mm) as that of the neck section 22 and is joined detachably with the body section 25 on its outer peripheral wall. An annular ring-shaped member 26 having the following dimensions is engaged fixedly with the suitable inner wall, for example, the outermost inner wall as shown of the small-diameter portion 23b of the joint member 23. It has been experimentally confirmed by the inventor that the optimum dimensions of the annular member 26 are about 5 to 8 mm wide ( $l$ ) and about 1 to 2 mm thick ( $t$ ). In the embodiment shown in FIG. 2, the annular member 26 has an inner wall of substantially a semicircle in cross section projecting inward. Since the annular member 26 is inserted into the inner wall of the small-diameter portion 23b of the joint member 23, it should have substantially the same outer diameter as the inner diameter  $D$  of the small-diameter portion 23b.

In a wind instrument with such joint member 23 having the annular ring-shaped member 26 inserted therein, the air is blown in through the neck section 22 during performance to be resonated at a predetermined pitch or frequency in the body section 25 through the joint member 23 and then radiated outward from the bell section, and it has been found that the annular ring-shaped member serves to narrow the air passage, thereby improving the rising characteristics and tone color of the resultant resonated musical sounds. That is, the rising or building-up of the tone becomes very quick and clear, and individual musical sounds during performance especially at a high tempo or speed are so clearly produced as to be distinct from each other. Although the reason still remains unknown, it may be contemplated that the air blown in through the neck

section 22 is presumably compressed at a place where there is the annular member 26 projecting inwardly, so as to be transmitted to the body section 25 at a higher speed.

FIG. 4 shows a modification of the joint member 23. Instead of the annular member 26 of FIG. 2 which is mounted separately on the inner wall of the joint member 23, an annular projection 261 is integrally formed with a joint member 231. A similar effect to the embodiment of FIG. 2 can also be attained in this modification.

FIGS. 5 and 6 are respectively longitudinal views, partly broken away, illustrating the main parts of the instrument in accordance with two other embodiments of the invention. The annular ring-shaped member or annular projection 26 or 261 of FIG. 2 or FIG. 4 is provided on the inner wall of the joint member 23 or 231 interposed between the neck section 22 and the body section 25. In the embodiments of FIGS. 5 and 6, however, such a joint member is not required. In the embodiment of FIG. 5, an annular ring-shaped member 262 is mounted on the inner wall of the neck section 222. In the embodiment of FIG. 6, an annular ring-shaped member 263 is mounted on the inner wall of the body section 253 which is contiguous to or near the neck section 223.

Note that the wind instruments of these embodiments can also obtain an effect equivalent to that of FIG. 2.

The parts of FIGS. 4 to 6 corresponding to those of FIG. 2 are denoted by the corresponding numerals and the description thereof is omitted.

What is claimed is:

1. In a woodwind musical instrument comprising:
  - a body having tone holes therein; a mouthpiece; a section connecting said mouthpiece to said body, said body and said connecting section having a smooth bore therethrough; and a thin annular ring in said bore adjacent the intersection of said connecting section and said body, said annular ring having an external diameter substantially equal to the diameter of said bore at said intersection.
2. The wind instrument according to claim 1 wherein said annular ring is about 5 to 8 mm wide and about 1 to 2 mm thick.
3. The wind instrument according to claim 2 wherein said annular ring is of a substantially semicircular shape in cross section.
4. The wind instrument according to claim 1 wherein said annular ring is formed separately from said cylindrical hollow portion and fitted tightly into the hollow portion.
5. The wind instrument according to claim 1 wherein said annular ring is formed with said cylindrical hollow portion in an integral manner.
6. The musical instrument according to claim 1 wherein said section connecting said mouthpiece and said body is a cylindrical hollow portion constituting a neck section.
7. The wind instrument according to claim 6, further comprising a joint member connecting said neck section and said body.

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