

April 24, 1962

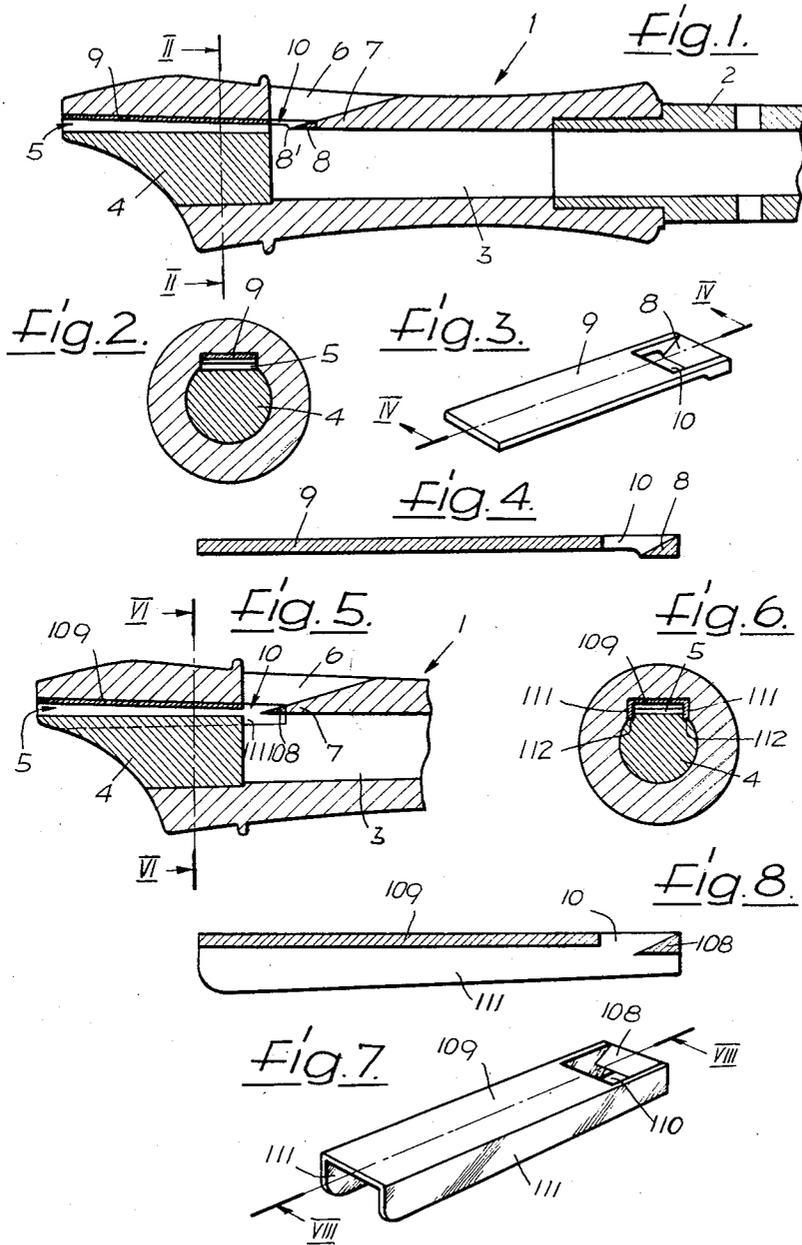
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3,030,845

SOUND HEAD FOR MUSICAL WIND INSTRUMENT

Filed Dec. 13, 1960

3 Sheets-Sheet 1



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Fig. 9.

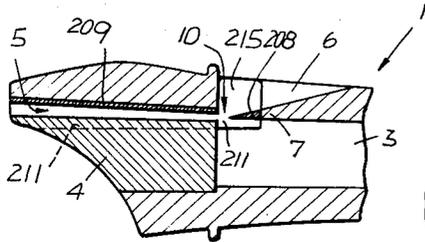


Fig. 10.

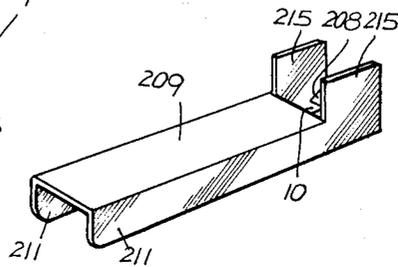


Fig. 11.

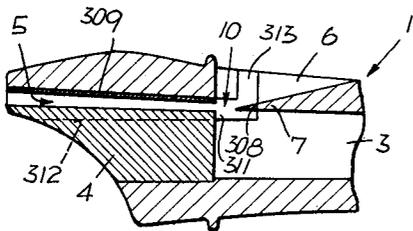


Fig. 12.

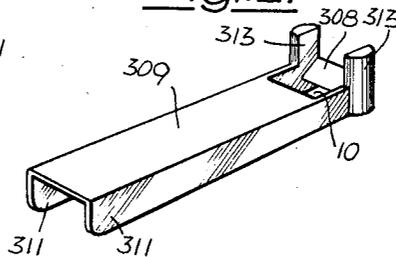


Fig. 13.

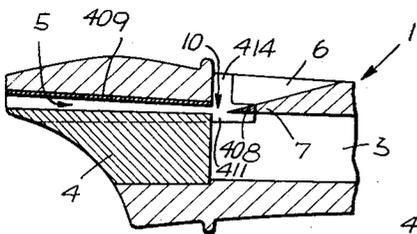
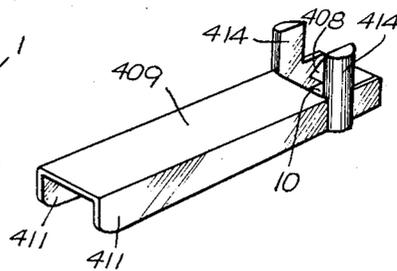


Fig. 14.



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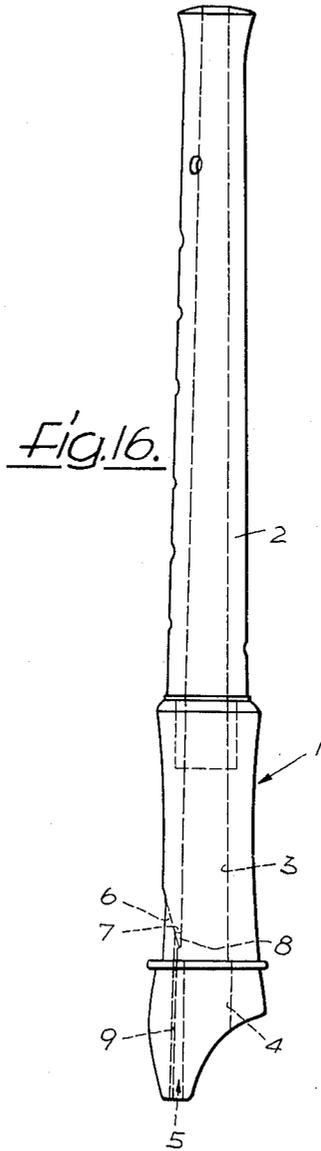
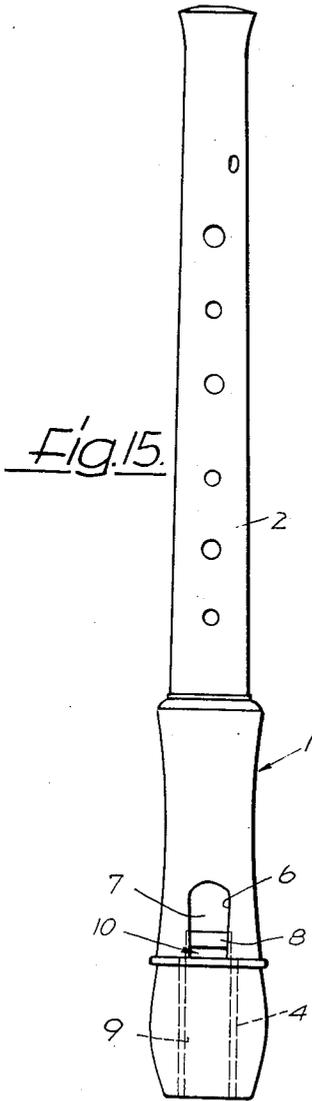
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SOUND HEAD FOR MUSICAL WIND INSTRUMENT

Filed Dec. 13, 1960

3 Sheets-Sheet 3



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3,030,845

SOUND HEAD FOR MUSICAL WIND INSTRUMENT
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 Filed Dec. 13, 1960, Ser. No. 75,506
 Claims priority, application Germany Jan. 8, 1960
 8 Claims. (Cl. 84-384)

The present invention relates to improvements in musical wind instruments, and more particularly to improvements in the sound head of such an instrument in which the sounds are produced by an air current blowing against a blade.

Such a sound head usually consists of a substantially tubular body with a bore therein extending in the axial direction, and provided at one end with a mouthpiece. The outer wall of this body is provided with an air vent which increases in width from the inside to the outside and may be limited by four walls, namely, two side walls extending parallel to the axis of the sound head, a front end wall extending at right angles to this axis, and a rear wall extending in the blowing direction obliquely from the inside to the outside of the sound head.

Fitted into the bore of the sound head between the end in the shape of a mouthpiece and the vent is a core which fills out this part of the bore to such an extent that a wind channel remains of a substantially rectangular cross section which extends parallel to the axis of the sound head. More accurately speaking, the wind channel is generally designed so that the core is spaced at one side from the circular wall of the bore in the sound head so as to define a channel, the original segmental cross-sectional shape of which is enlarged by cutting a recess in the wall of the bore to make the channel of a rectangular cross section, in which one of the longer sides of the rectangle is identical with the chord which defines the original segmental cross section. Such a wind channel is further generally designed so that the walls thereof which are defined by the larger sides of the cross-sectional rectangle converge in the direction toward the air vent, so that the cross-sectional area of the wind channel decreases in the blowing direction. Behind the end of this wind channel, a straight blade is provided which extends transverse to the direction of the wind channel and forms the rear inner edge of the air vent. This blade therefore partly defines the smallest inner cross-sectional area of this vent, and it is disposed within a straight extension of the wind channel so that the air current which is blown through the wind channel will be directed against the knife edge of this blade. This blade is therefore defined by the rear wall of the air vent which extends obliquely from the inside to the outside and by a part of the wall of the bore in the sound head.

In a sound head of the above-mentioned type, which usually consists of wood, plastic, sheet metal, or the like, it is important that the blade is disposed in a very accurate position relative to the wind channel, and that air turbulence within the wind channel will be avoided as much as possible.

It is an object of the present invention to provide a sound head for a musical wind instrument in which these conditions will be fulfilled independently of the material of which the sound head is made.

If, however, the sound head consists of a moisture-resistant material, for example, plastic, the invention further provides that the moisture contained in the air current blown into the wind channel will not be prevented from entering into the channel.

Although the known designs of sound heads of wind instruments, which are made entirely of plastic have the advantage of having smooth walls, they also have the disadvantage that special provisions have to be made

to prevent the shape of the sound head and the position of the parts thereof relative to each other from being changed while it is cooling after being extruded or pressed. In spite of such special provisions, for example, by providing additional cavities within the sound head which themselves are not required therein for conducting the blown air current, it has so far not been possible to prevent entirely any changes in form which affect the position of the blade.

In order to attain a sound head in which the blade is always accurately in the required position relative to the wind channel and in which air turbulence within the wind channel will be avoided as much as possible, the present invention provides the tubular body of the sound head with an insert which consists of a single piece of nonhygroscopic material, for example, plastic or metal, and forms the mentioned blade and a plate which covers at least one wall surface of the wind channel. Since this insert has a considerably smaller size and mass than the body of the sound head, it permits the blade and plate to be very accurately positioned relative to each other, even though it is made of plastic. Since the insert is mounted in a fixed position within the wind channel, the blade will always be in a certain, unchangeable position, relative to the wind channel, while at least one of the walls of this channel is made sufficiently smooth by being covered by the plate.

Since the blade does not consist of a material which is affected by moisture, the invention also avoids the danger, which occurs, for example, if hygroscopic wood is used, that the moisture contained in the blown air current might cause an uncontrollable swelling of the fibers of the material which, in turn, would result in an undesirable air turbulence on the blade. In order to reduce the air turbulence on the blade to a minimum or in order to attain a certain desired, that is, controlled air turbulence on the blade, the surfaces of the blade may be made either smooth or rough, and the blade itself may be made of a straight or curved shape. A series of sound heads according to the invention may, if made of the same material, be provided with identical features and characteristics. Since the surface finish of the blades may be made permanently identical in different sound heads, the sound qualities of different instruments with such sound heads will be exactly alike, which is of great importance, for example, in an orchestra.

Sound heads of wind instruments which consist entirely of plastic do not have the desired property to absorb the moisture from the blown air current, as this is attained by wooden sound heads in which usually the core of the sound head is made of a wood which is especially hygroscopic. For sound heads according to the invention which are to be made of a nonhygroscopic material, for example, plastic or metal, it is therefore advisable to provide a core which is more or less of a conventional type and consists of a hygroscopic wood. This core then forms one wall surface of the wind channel.

For sound heads which are made of a hygroscopic material, it may be advisable and will improve the desired effects of the invention if additional surfaces of the wind channel are made as smooth and nonhygroscopic as possible, so that only the core of the sound head which forms a part of the walls of the wind channel is made of hygroscopic wood so as to take up the moisture contained in the blown air current. Such additional smoothing of the surfaces of the wind channel may be attained by providing a plate unit in which both lateral edges of the blade-carrying plate are provided with rectangularly projecting side walls or plates which will cover the walls of the wind channel which are adjacent to the wall which is covered by the central plate itself.

It may furthermore be advisable to make some parts

of the walls of the air vent in the outer wall of the sound head as smooth and nonhygroscopic as possible. In this event, the rear ends of the lateral plates may be provided with extensions or upward projections which extend beyond and possibly also upwardly of the central plate and cover at least parts of the side walls of the vent either within the area of the smallest cross-sectional size thereof or within the area of the vent at both sides of the blade or in both areas, or also above these areas.

The side plates of the blade-carrying insert may engage into and rest on the bottom of grooves which are provided in the core of the sound head. These grooves serve as guides for the core when the latter is being inserted into the sound head so that the straight upper surface of the core which forms the lower wall of the wind channel will be in the proper position relative to the blade.

The above-mentioned objects, features, and advantages of the present invention will become more clearly apparent from the following detailed description thereof, particularly when the same is read with reference to the accompanying drawings, in which—

FIGURE 1 shows an axial section of the sound head of a block flute;

FIGURE 2 shows a cross section taken along line II—II of FIGURE 1;

FIGURE 3 shows an enlarged perspective view of the blade-carrying plate according to FIGURES 1 and 2;

FIGURE 4 shows a greatly enlarged longitudinal section taken along a line IV—IV of FIGURE 3;

FIGURE 5 shows an axial section of the front part of the sound head of a block flute with a plate unit according to a modification of the invention;

FIGURE 6 shows a cross section taken along line VI—VI of FIGURE 5;

FIGURE 7 shows an enlarged perspective view of the plate unit according to FIGURES 5 and 6;

FIGURE 8 shows a greatly enlarged longitudinal section of the plate unit according to FIGURES 5 to 7 and taken along line VIII—VIII of FIGURE 7;

FIGURE 9 shows an axial section of the front part of a sound head of a block flute with a plate unit according to another modification of the invention;

FIGURE 10 shows an enlarged perspective view of the plate unit according to FIGURE 9;

FIGURE 11 shows an axial section of the front part of a sound head for a block flute according to a further modification of the invention;

FIGURE 12 shows an enlarged perspective view of the plate combination according to FIGURE 11;

FIGURE 13 shows an axial section of the front part of a sound head according to still another modification of the invention;

FIGURE 14 shows an enlarged perspective view of the plate unit according to FIGURE 13; while

FIGURES 15 and 16 show two different plan views, turned at right angles to each other, of the entire flute according to FIGURES 1 to 4.

An example of a musical wind instrument according to the invention is illustrated in the drawings in the form of a block flute which consists of a sound head 1 to which the extension tube 2 of the flute is attached. The body of the sound head is substantially tubular and has an axial bore 3 which continues into a similar bore in tube 2.

The outer wall of sound head 1 is provided with an air vent 6 which increases in size from its narrowest point 10 at the inner end thereof toward the outside. Between this air vent 6 and the front end of sound head 1 which forms a mouthpiece, a core 4, preferably of hygroscopic wood, is fitted into bore 3, and the upper surface of core 4 is flattened so that a wind channel 5 of a rectangular cross section is formed between core 4 and the wall of bore 3. The upper and lower walls of this wind channel taper slightly toward each other from the front end of the mouthpiece to the rear end of channel 5. The air vent 6 is limited at its inner edge, as seen in the direction of

blowing and in continuation of and in line with wind channel 6, by a wedge-shaped part 7 which is provided on its tip with a tapered blade 8, the knife edge 8' of which faces toward the air current which is blown through wind channel 5.

In the embodiment of the invention as illustrated in FIGURES 1 and 2, the upper wall surface of wind channel 5 is covered by a plate 9, as shown specifically in FIGURES 3 and 4, which consists of a nonhygroscopic material and has an aperture of a size corresponding to the smallest cross-sectional size 10 of the air vent 6. The tapered blade 8 therefore forms in this case the inner edge of this aperture, and plate 9 and blade 8 together form a single insert which is fitted into sound head 1. The end of plate 9 carrying blade 8 is made on its lower side of a greater thickness than the remainder of the plate so that blade 8 is disposed slightly below the level of the lower surface of plate 9 and substantially centrally in line with the wind channel 5.

The embodiment of the invention as illustrated in FIGURES 5 to 8 differs from the embodiment according to FIGURES 1 to 4 by the fact that plate 109 which has an aperture 110 and a blade 108 is provided along its longitudinal edges with side walls 111 which projects downwardly therefrom preferably at a right angle, so that plate 109 and its lateral plates 111 cover the upper and lateral surfaces of wind channel 5. The lower edges of the lateral plates 111 of this U-shaped plate unit 109, 111 engage into and rest on the bottom of a pair of grooves 112 in core 4.

FIGURES 9 to 14 illustrate several modifications of the plate unit according to FIGURES 5 to 8, in which the rear ends of the lateral plates adjacent to the aperture in the top plate are provided with upward extensions.

In the embodiment of the invention as shown in FIGURES 9 and 10, these extensions consist of a pair of lugs 215 which project from the lateral plates 211 toward the rear as well as above the central plate 209 and cover the side walls of the air vent 6 at, above, and below the level of blade 208.

In the further embodiment of the invention as shown in FIGURES 11 and 12 the upward extensions 313 of the plate unit 309, 311 cover the side walls of the air vent 6 only upwardly of blade 308.

Finally, in the embodiment according to FIGURES 13 and 14, the upward extensions 414 of plate unit 409, 411 cover the side walls of air vent 6 only upwardly of the inner end 10 of opening 6. As shown in FIGURES 11 to 14, the extensions 313 and 414 may be of a semicylindrical cross section and may extend to the lower edges of side walls 311 and 411, respectively. The side walls of air vent 6 are then notched out accordingly to receive these projecting extensions 313 and 414.

Although the present invention has been illustrated and described with reference to the preferred embodiments thereof as applied to a flute, it should be understood that it is in no way limited to the details of such embodiments, but is capable of numerous modifications and is also applicable to different musical wind instruments in which an air current is blown against a blade.

Having thus fully disclosed my invention, what I claim is:

1. In a musical wind instrument having a sound head with a wind channel therein and a blade member disposed within said sound head in a position so that, when an air current is blown through said channel against said blade, a musical sound will be produced, said sound head comprising a substantially tubular body with an axial bore therein and having an air vent extending through the wall of said body and diverging from the inside to the outside, a core disposed within a part of said bore between one end thereof and said vent and only partly filling out said part so that a gap remains between said core and the wall of said bore, said gap having a substantially rectangular cross section extending longitudinally

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nally substantially parallel to the axis of said body and forming said wind channel, said blade member being of a nonhygroscopic material and having a straight knife edge extending transverse to said axis and forming a part separate from said vent and being in engagement with the rear inner edge thereof, said knife edge being spaced from the rear end of said channel and disposed within a plane substantially in longitudinal alignment with said channel and limiting the size of the smallest inner end of said vent, and a plate of nonhygroscopic material integral with said blade member and covering at least one wall surface of said channel but not a surface of said core nor said vent and extending along the entire length of said channel.

2. In a musical wind instrument is defined in claim 1, in which the walls of said wind channel extending parallel to said knife edge converge toward said knife edge so that the cross-sectional area of said channel decreases toward said knife edge.

3. In a musical wind instrument as defined in claim 1, in which said core consists of hygroscopic wood.

4. In a musical instrument having a sound head with a wind channel therein and a blade member disposed within said sound head in a position so that, when an air current is blown through said channel against said blade, a musical sound will be produced, said sound head comprising a substantially tubular body with an axial bore therein and having an air vent extending through the wall of said body and diverging from the inside to the outside, a core disposed within a part of said bore between one end thereof and said vent and only partly filling out said bore so that a gap remains between said core and the wall of said bore, said gap having a substantially rectangular cross section extending longitudinally substantially parallel to the axis of said body and forming said wind channel, said blade member being of a nonhygroscopic material and having a straight knife

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edge extending transverse to said axis and forming a part separate from said vent and in engagement with the inner edge thereof, said knife edge being spaced from the rear end of said channel and disposed within a plane substantially in longitudinal alignment with said channel and limiting the size of the smallest inner end of said vent, and a plate unit of nonhygroscopic material integral with said blade member and comprising a central plate and a pair of lateral plates connected to the longitudinal edges of said central plate and extending substantially vertically thereto, said plate unit covering the wall surfaces of said wind channel but not the surfaces of said core nor said vent and extending along the entire length of said channel.

5. In a musical wind instrument as defined in claim 4, in which said core is provided with a pair of longitudinal grooves, said lateral plates of said plate unit engaging into and resting on the bottom of said grooves.

6. In a musical instrument as defined in claim 4, in which said lateral plates of said plate unit are provided with extensions covering at least a part of the side walls of said vent at the part of said vent having the smallest cross-sectional size thereof.

7. In a musical wind instrument as defined in claim 4, in which said lateral plates of said plate unit are provided with extensions covering at least a part of the side walls of said vent at both sides of said blades.

8. In a musical wind instrument as defined in claim 4, in which said lateral plates of said plate unit are provided with extensions covering at least a part of the side walls of said vent at the part of said vent having the smallest cross-sectional size thereof as well as at both sides of said blade.

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