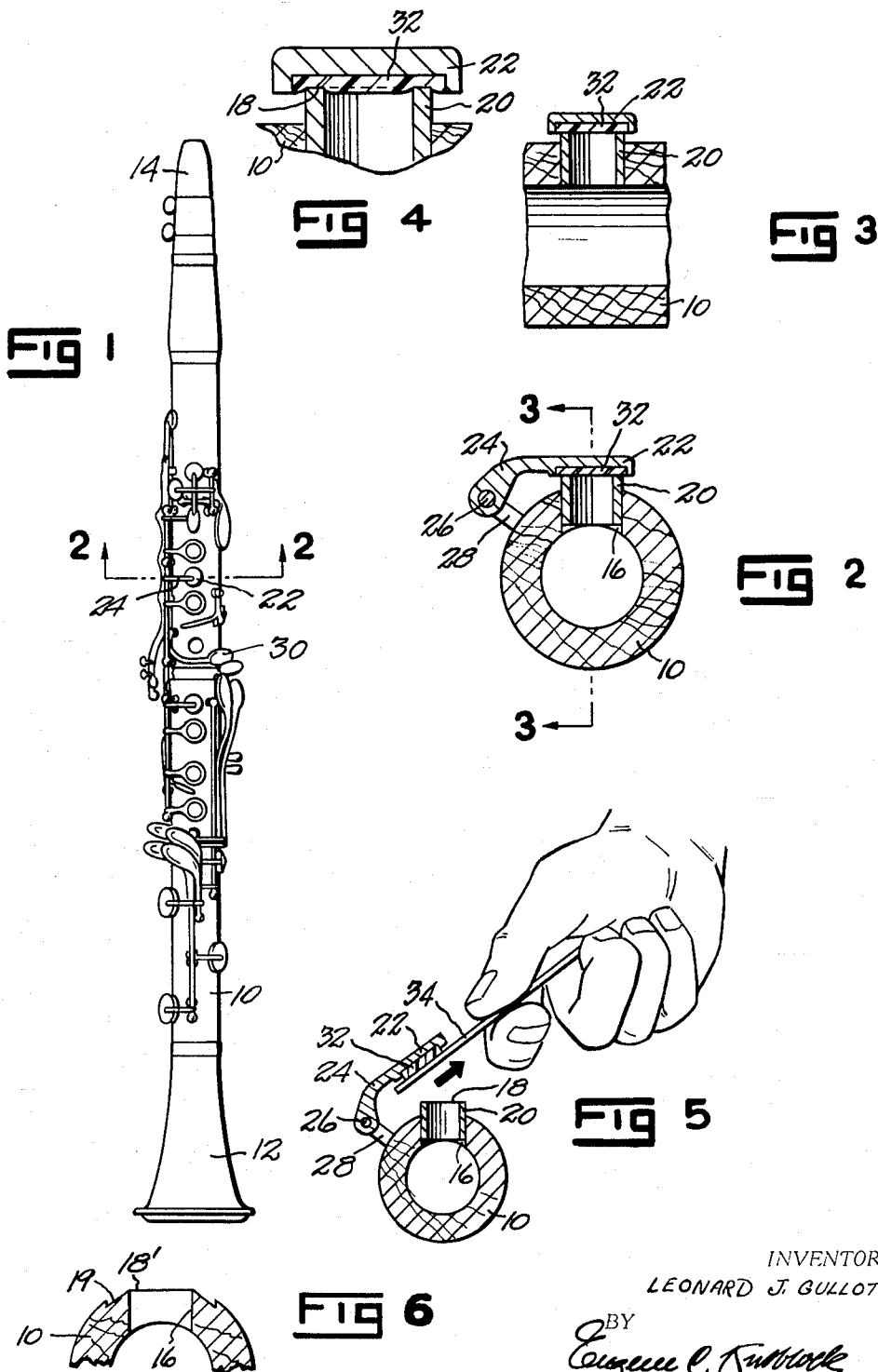


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MUSICAL INSTRUMENT VALVE PAD AND
METHOD OF MAKING THE SAME
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MUSICAL INSTRUMENT VALVE PAD AND METHOD OF MAKING THE SAME

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This invention relates to a musical instrument valve pad and method of making the same.

Valve keys of woodwind instruments and of some brass musical instruments are critical elements in the operation and maintenance of the musical instruments. Many types of materials have been used for valve pads of such valve keys and various methods of preparing them for use have been utilized with varying degrees of success. The valve pads used heretofore for such instruments have been subject to certain defects and disadvantages, one of which has been a tendency to deteriorate. Such deterioration has been caused because of the fragility of the pad or because of hardening of the pad by exposure to moisture and repeated usage. Such deterioration can lead to failure of the valve key pad to function properly, thus disabling the instrument at least partially.

Whenever any musical instrument of the woodwind or brass type which is played with the human breath requires valve pads, there has heretofore been a problem because of the moisture from the breath being applied to the pads. This moisture tends to swell conventional pads, thus tending to disable them. Other instances in which pads become moistened occur when an instrument is played out of doors in rainy or snowy weather, as occurs frequently with school bands which perform at intermissions of football games and on other occasions.

Conventional valve pads have also been subject to the possibility of damage thereto resulting from friction. Thus instruments are polished to maintain an attractive appearance and this requires rubbing of the pad cups and the areas adjacent to tone holes with a polishing cloth. Such polishing usually cannot be accomplished without rubbing the pad itself, and the rubbing of conventional pads subjects them to breakage and to deterioration.

Valve pads of woodwind and other instruments played with the breath require "creasing" to set the valves with their pads for proper relationship and sealing at the tone holes during use. Conventional pads which are of the bladder type, i.e., which have a bladder covering around a felt body, require careful and laborious and time-consuming processing to properly "crease" a pad of the instrument, not only when it is initially constructed, but each time that the valve pad is replaced in the instrument. Thus present methods usually require the wetting of bladder pads, followed by clamping of the pad against the tone hole margin or valve seat, as by the use of clamps or of wedges. These clamps and wedges usually must remain in place for at least three hours, and the application and removal of the clamp or wedge is time-consuming.

Some plastic pads are now available on the market. Such pads are usually "creased" by placing the instrument, after assembly thereof, into an oven for a period of time with the valve keys clamped closed to cause the valve pad to adjust or reform itself in the tone hole valve seat. In the case of a wood instrument, such heating tends to bleed the wood of its oils and leave it vulnerable to cracking. Also plastic pads are usually not completely satisfactory to the average musician because the "feel" thereof during playing of the instrument does not come up to the standard of conventional bladder pads now in use.

It is the primary object of this invention to provide a musical instrument valve pad for instruments played with the human breath which will eliminate, or at least min-

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imize the aforementioned problems which exist with conventional pads.

A further object is to provide a musical instrument valve pad which is characterized by a high resistance to moisture and to abrasion, which will not be affected in its function by extremes of humidity and temperature conditions, which is highly durable, and which imparts to a musical instrument utilizing such pads, a "feel" of the character desired by musicians.

A further object is to provide a novel method by which a valve pad may be "creased" rapidly and inexpensively and with minimum items of equipment.

Other objects will be apparent from the following specification.

In the drawing:

FIG. 1 is a view of a clarinet embodying the invention;

FIG. 2 is a transverse sectional view of an instrument, taken on line 2-2 of FIG. 1;

FIG. 3 is a longitudinal sectional view taken on line 3-3 of FIG. 2;

FIG. 4 is an enlarged fragmentary longitudinal sectional view illustrating the manner in which the pad is creased;

FIG. 5 is a transverse sectional view illustrating the step of applying heat to the pad during the process of producing the pad "crease";

FIG. 6 is a fragmentary transverse sectional view illustrating the valve seat at the tone hole of a clarinet.

Referring to the drawing which illustrates one embodiment of the invention as applied to a clarinet, the numeral 10 designates the body of the clarinet which is of the usual construction and which terminates in a bell portion 12 at one end and which mounts a mouthpiece 14 at its opposite end, all of which is of conventional construction. The body may be formed of wood or other suitable material. It will be understood that the clarinet is illustrated for purposes of convenience and that the invention may be applicable to other woodwind instruments, such as flutes, saxophones, English horns, piccolos, oboes and bassoons. The invention is not limited to use upon woodwind musical instruments, however, and may be applicable to some brass musical instruments which utilize valve keys, such as trombones and trumpets.

The body 10 of the instrument is provided with the usual tone holes 16 at selected positions and of selected sizes. Each tone hole 16 has a projecting annular valve seat 18 at the outer end thereof. For purposes of convenience, the tone holes are here illustrated in FIGS. 2, 3 and 4 as being lined by a tube 20 which projects outwardly from the outer periphery of the body 10 so as to provide the projecting valve seat, although in some wood instruments the valve seat is formed integrally with the body by grooving thereof at 19 around valve seat 18', as seen in FIG. 6. Each tone hole has associated therewith the usual valve key cup 22 which is mounted upon a valve arm 24 pivoted at 26 as upon a pivot rod, which pivot rod 26 in turn is journaled in brackets 28 carried by the body 10. Each valve cup is associated with and operated by a key lever 30 having a finger button engageable by the finger of the musician during playing of the instrument. It will be understood that the arrangement of the keys and the respective tone holes and valves may be conventional.

Each valve cup 22 carries a valve pad 32 which is of a larger diameter than the valve seat 18 surrounding the tone hole controlled thereby, and is adapted to bear against and upon the valve seat to seal the tone hole when in its closed position illustrated in FIGS. 2 and 3. I have found that a pad 32, which is formed of Corfam simulated leather produced by E. I. Du Pont de Nemours & Co., is particularly well suited for use in a musical in-

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strument. This material is described by its manufacturer as being "poromeric" and as possessing the property of having minute pores throughout. The material is a polymeized synthetic resin and is characterized by compressibility and resilience, a thin dense surface portion and a backing portion of less density and greater compressibility. The term "poromeric" is defined in Van Nostrand's International Encyclopedia of Chemical Science, 1964 edition, as "A micro porous and permeable coriaceous sheet material comprising a urethane polymer material reinforced with polyester. This pad material possesses the properties of resistance to moisture, resistance to hardening and resistance to surface abrasion, and effects an air seal when engaging and spanning a valve seat. Also it possesses the property of being softenable by heat. This pad material is mounted in the pad cup 20 in the usual manner, as by adhesion thereof, with the dense surface exposed or outermost, and when softened by heat is readily shaped to form a "crease" or "seat" therein.

By virtue of the properties of the Corfam simulated leather or poromeric pad 32, an instrument equipped with such pads is readily conditioned for playing operation and for seating or creasing of the pads. Thus, after the instrument is assembled, a smooth metal blade or "slick" 34, which has been heated preferably to a temperature in the range between 160° F. and 220° F., and preferably between 180° F. and 200° F., may be passed over the dense sealing surface of a pad 32 in the manner illustrated in FIG. 5, being sure to make total contact therewith and to warm the entire surface of the pad. The pad cup is then moved to closed position engaging the valve seat 18 around the complementary tone hole of the instrument, and a pressure of from five to twelve pounds, and preferably from eight to ten pounds, is applied against the pad cup to hold it closed and thereby form a crease in the dense surface of the pad, as best seen in FIG. 4. The pressure need be applied only for the short period of time in which the pad cools, and the pad crease is complete and permanent by the time the pad has cooled during the application of pressure, as aforesaid. The fact that the pad crease is permanent is of substantial importance in musical instruments since it insures that the regulation of the instrument will remain constant.

While the preferred embodiment of the invention has been described and illustrated, it will be understood that the invention may be embodied and practiced in other forms and procedures within the scope of the appended claims.

I claim:

1. In a musical instrument operated by the breath of a player and including a tubular body having a tone hole defined by a valve seat controlled by a shiftable valve member carrying a valve pad, the improvement consisting of the use of a pad formed of poromeric material.

2. In a musical instrument operated by the breath of a player and including a tubular body having a tone hole defined by a valve seat controlled by a shiftable valve

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member carrying a valve pad, the improvement consisting of the use of a pad formed of poromeric material characterized by compressibility and resilience with maximum density at its exposed face and reduced density adjacent its opposite surface.

3. In a musical instrument operated by the breath of a player and including a tubular body having a tone hole defined by a valve seat controlled by a shiftable valve member carrying a valve pad, the improvement consisting of the use of a pad formed of poromeric material having minute pores throughout and having a thin dense flexible surface defining portion and an integral backing of reduced density and increased compressibility and resilience.

4. The method of making a musical instrument valve wherein a valve key cup is pivoted to the instrument body to move between open and closed positions relative to a valve seat, consisting of adhering in said key cup a pad formed of poromeric material, applying to the entire surface of said pad a member having a smooth surface and heated to a temperature between 160° F. and 220° F. to warm said pad, and pressing said pad key against said valve seat with finger pressure until said pad cools.

5. The method of making a musical instrument valve wherein a valve key cup is pivoted to the instrument body to move between open and closed positions relative to a valve seat, consisting of adhering in said key cup a pad formed of a poromeric material, heating a thin flat metal member to a temperature in the range between 160° F. and 220° F. and passing said metal member across the surface of the pad uniformly, and pressing said valve key and pad against said valve seat with a pressure of from five to twelve pounds while said pad cools.

6. The method of making a musical instrument valve wherein a valve key cup is pivoted to the instrument body to move between open and closed positions relative to a valve seat, consisting of adhering in said key cup a pad formed of a poromeric material and characterized by resilience, compressibility and a thin relatively dense flexible surface, warming said dense pad surface by passing uniformly thereacross a member having a flat surface and heated to a temperature in the range between 180° F. and 200° F., and then pressing said key and pad against said valve seat with a pressure between six pounds and eight pounds until said pad cools.

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