United States Patent

Martin et al.

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[45] **Oct. 17, 1972**

[54] **CHORD ORGANS**

[72] Inventors: **Harold B. Martin,** Roselle; **Herman O. Rogg,** Watchung, both of N.J.

[73] Assignee: **Graber-Rogg, Inc.,** Cranford, N.J.

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[52] **U.S. Cl.** .....**84/365,** 84/423, 84/452 P

[51] **Int. Cl.** **G09b 15/06**

[58] **Field of Search**.....84/351, 365, 423, 433, 434, 84/435, 436, 452

[56] **References Cited**

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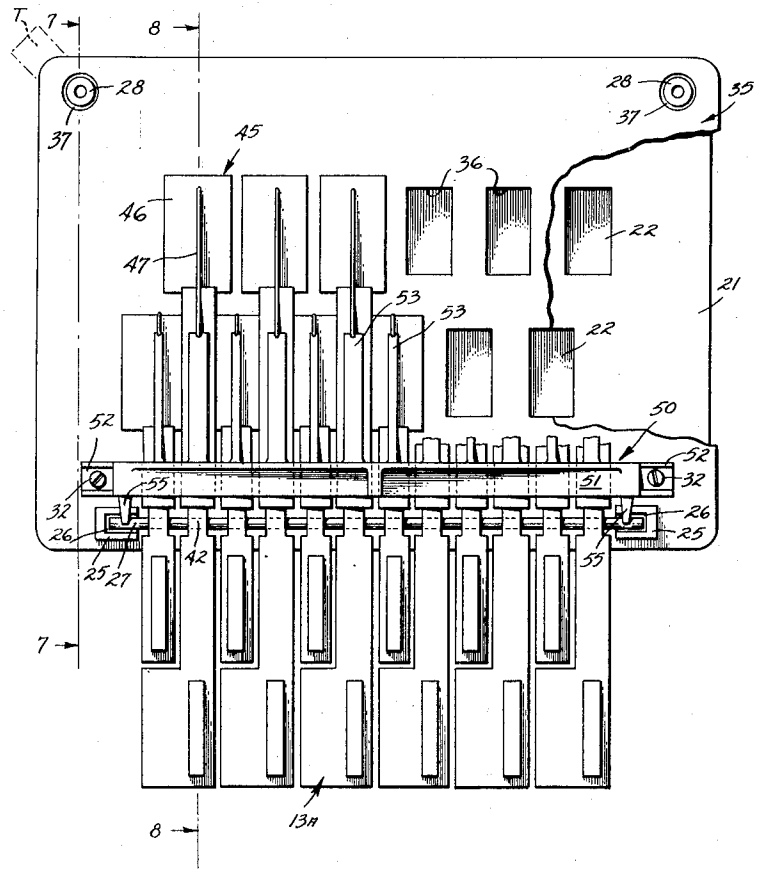
Primary Examiner—Richard B. Wilkinson
Assistant Examiner—John F. Gonzales
Attorney—John J. Lipari

[57] **ABSTRACT**

In an improved chord organ of the type which includes base and keyboard sections having corresponding reed assemblies provided with openings that are normally closed by extending pallets of keys operative by a user, a spring device is provided for normally urging the key pallet against its reed assembly opening. The spring device includes a plastic unitary body having a plurality of compression fingers extending therefrom for contact with the pallets, there being relative sliding movement between the fingers and their respective pallets during movement of the pallets between open and close positions with their reed assembly openings. The organ also features an improved gasket for each reed assembly, said gasket including a plastic unitary body which is located over the top of the reed assembly and possessing an inherent tacky surface for adhering thereto. The organ also features a tonal device which includes a single molded plastic body having a plurality of uniquely arranged pivotally mounted baffle plates located adjacent the sound slots of the organ, said plates being movable with respect to the slots to cause the tonal sounds emanating therefrom to range between a brassy and muted quality.

6 Claims, 11 Drawing Figures



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SHEET 1 OF 4

FIG. 1

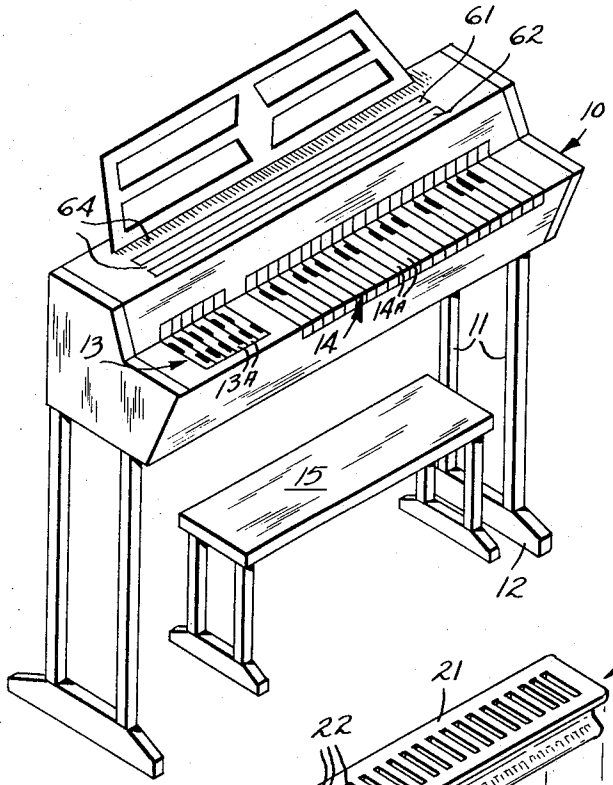

FIG. 4

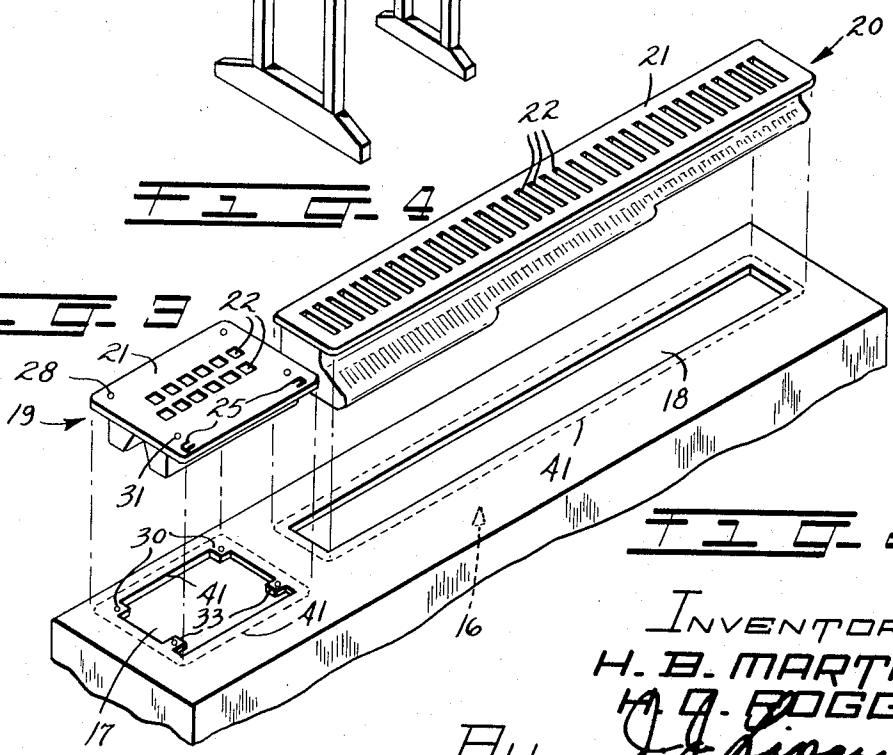

FIG. 3

FIG. 2

INVENTORS
H. B. MARTIN
H. G. BOGG
By J. J. Lipari
ATTORNEY

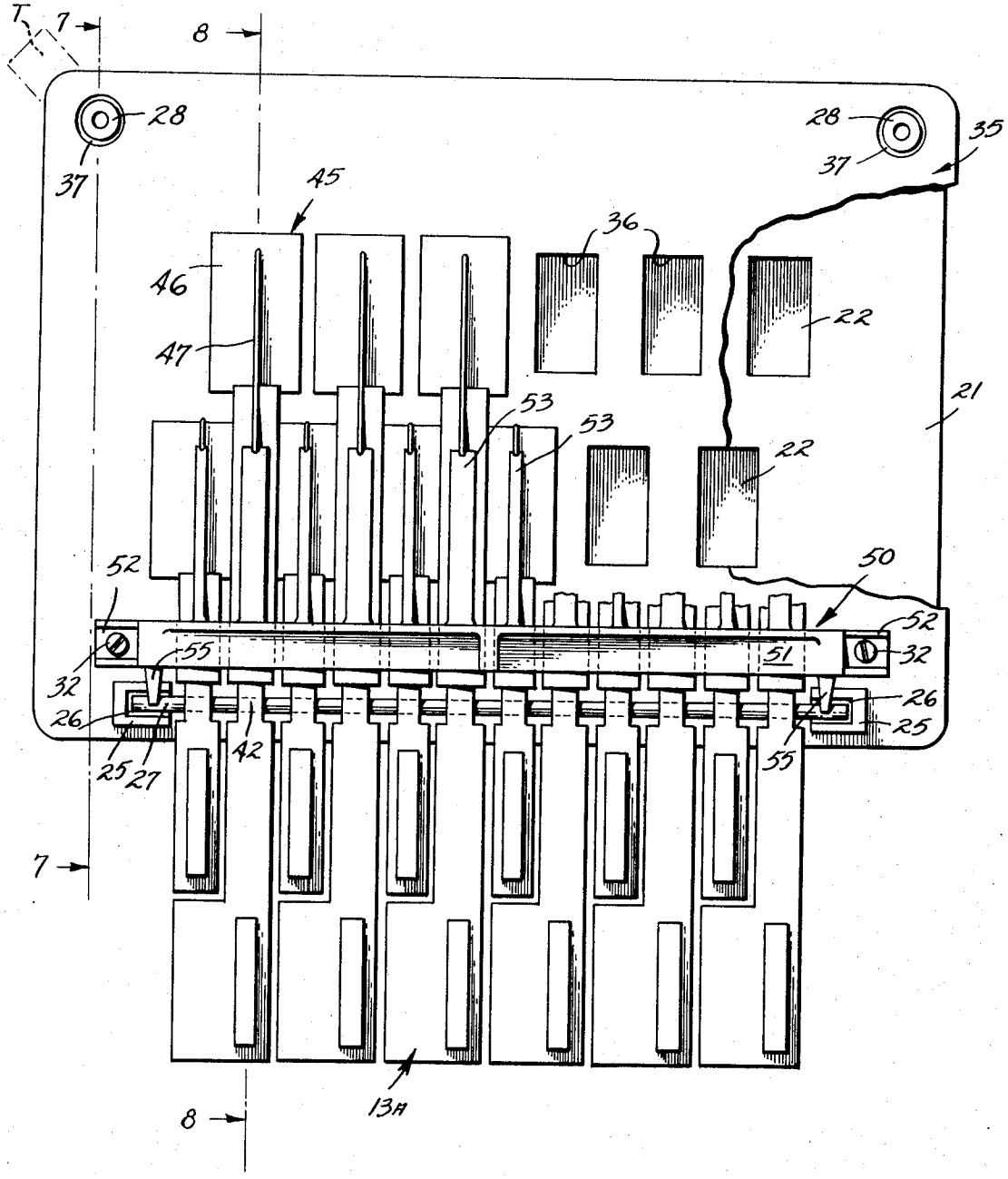

FIG. 5

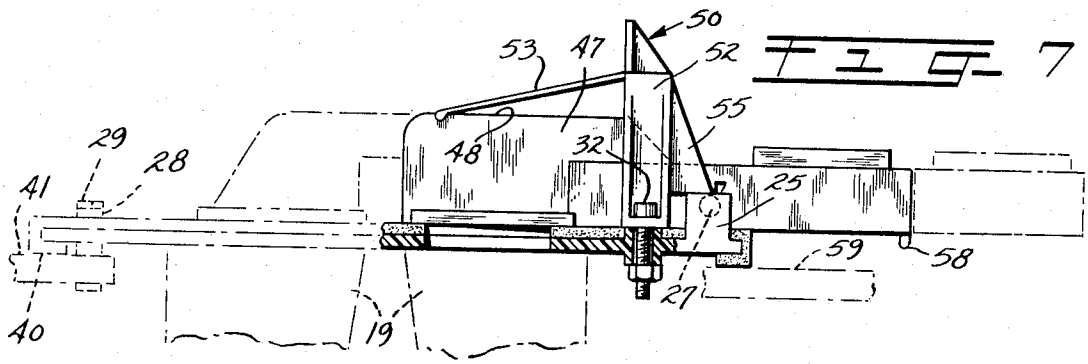

FIG 7

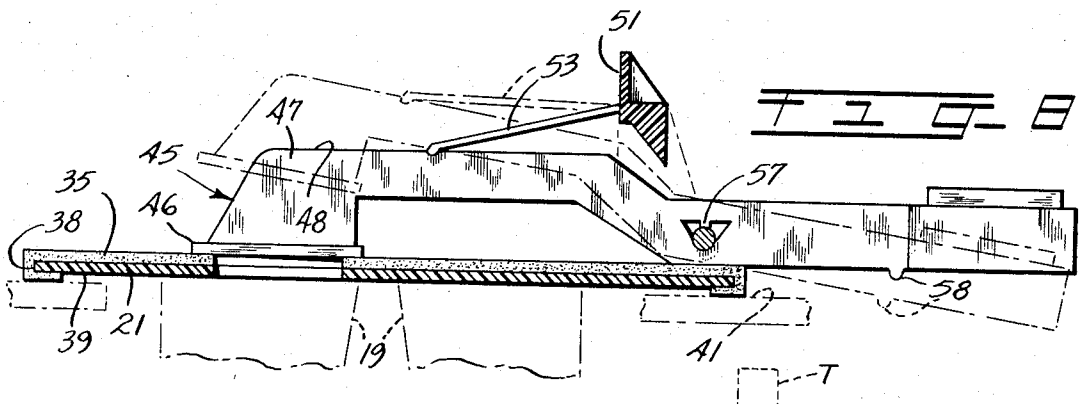

FIG 8

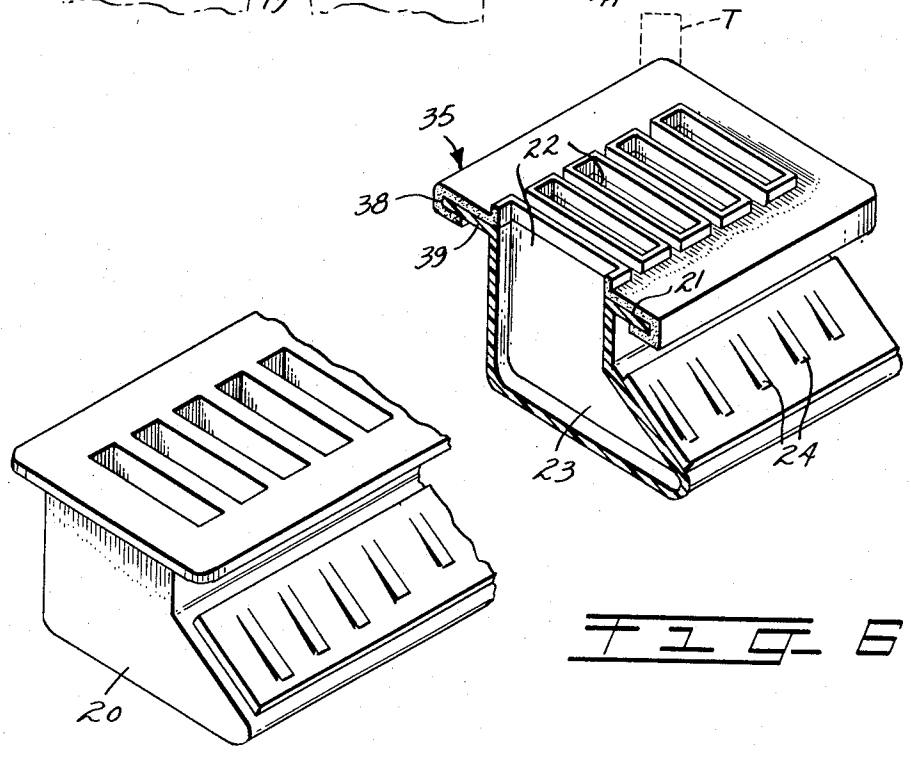

FIG 6

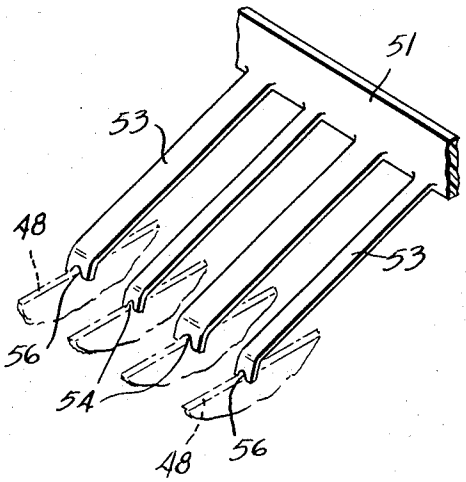

FIG 9

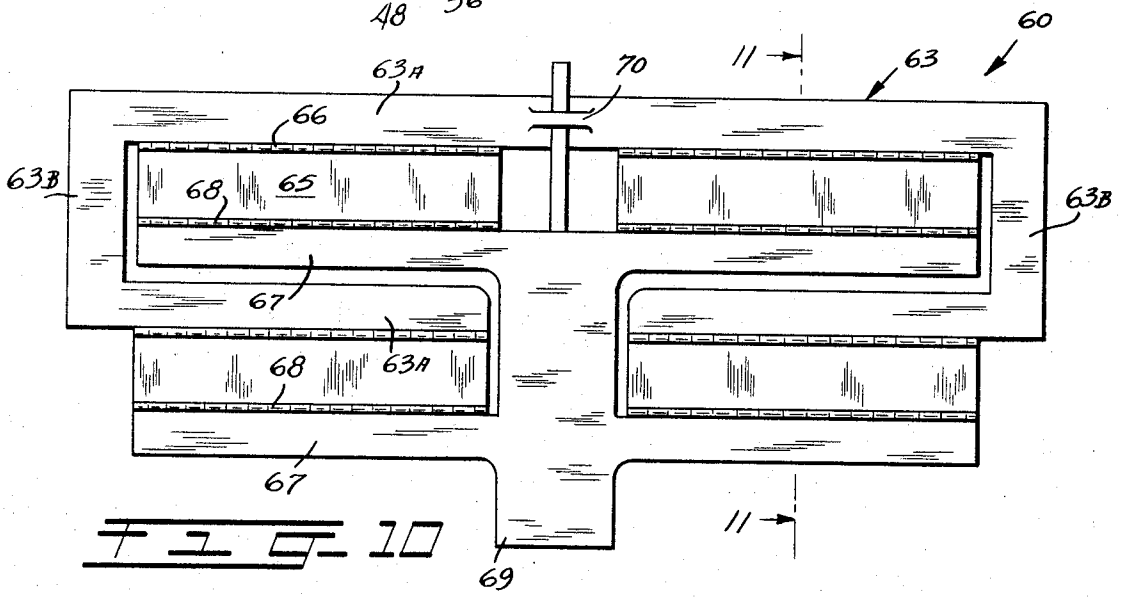

FIG 10

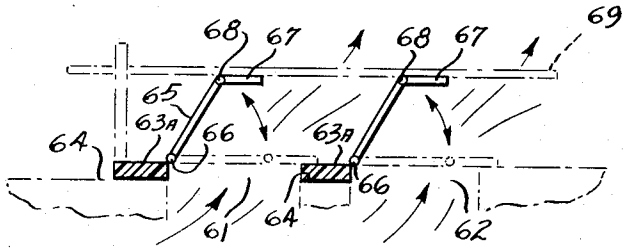

FIG 11

CHORD ORGANS

BACKGROUND OF THE INVENTION

This invention relates to musical instruments, and more particularly to an improved chord organ employing reeds tuned to different pitches and which are activated by keys to sound different notes or chords.

It is well known that chord organs include a treble keyboard section typically having two, three or more octaves, and a chord keyboard section typically having twelve chords. Each of the keyboard sections have reed assemblies which include a plurality of openings that are normally closed by extending pallets of keys operative by a user. Each of the reed assembly openings have channels which communicate with respective reeds of varying lengths and thicknesses. When a key is depressed to lift its pallet from an opening, pressurized air is permitted to pass through the reed and exit through the reed assembly opening, thereby causing the desired note to be sounded.

It is essential to provide in such organs spring means for each key pallet in order to normally urge the key pallet against its respective reed assembly opening to maintain same closed when the keys are in a rest position, and to cause the pallet to be lifted smoothly from said opening when sounding a note. Heretofore, individual metal springs were vertically inserted into and supported within respective prescribed fitted sockets of each pallet, thereby requiring time consuming labor coupled with high cost spring fabrication.

It is also essential that gaskets be located over the reed assembly openings to provide an air tight seal with the bottom surface of the pallet in normal contact therewith so as to prevent the unwanted sounding of notes. Further, gaskets also are essentially located about the peripheral edge of the treble and chord reed assemblies in order to provide an air tight seal with their respective main chamber housing apertures in which they are located, thereby preventing unwanted air pressure losses which would result in reluctant reed starts. Heretofore, such gaskets were of a felt-like material and required an adhesive for joining the gaskets to the treble and chord reed assemblies with their respective housing apertures. Production of the felt material having a constant precise thickness was difficult, the thickness of the felt material being critical since any variation would cause the undersurface of the pallet in contact therewith to be uneven and thereby result in air leakage which would cause the note to be unwantedly sounded.

Further, it is commercially important that various qualitative sounds be derived from chord organs. Heretofore, many chord organs of the prior art were limited to only one quality of sound. For example, some organs emitted loud and brassy sounds, while other organs emitted soft and muted sounds. In an endeavor to provide organs with varying qualitative sounds, complex circuitry and apparatus were used, but, obviously, such use resulted in a relatively high cost to the consumer.

SUMMARY OF THE INVENTION

It is an object of this invention to provide in a chord organ, an improved spring device cooperatively associated with the pallets of the organ keys, said spring device including a plastic unitary body having a supporting member with a plurality of resilient fingers extending therefrom, the free end of each finger having a configuration such that it is complementary with the pallet to not only securely urge the pallet downwardly to provide an air seal with its reed assembly opening, but also to permit relative sliding movement between the finger free end and pallet, while simultaneously preventing lateral movement of the pallet, when the key is depressed to lift the pallet from its opening for sounding a note.

It is a further object of this invention to provide in an organ, an improved gasket for the treble and chord reed assembly boxes of the organ, said gasket including a plastic unitary body having a plurality of openings arranged and shaped similarly to the box openings, and an overlapping periphery capable of extending over and partially under the peripheral edge of the box. The gasket is of a tacky material, thereby permitting the bottom surface of the gasket to adhere to the top surface and peripheral edge of the box. The top surface of the gasket is treated with a quick acting, low cost drying material, such as talc, to provide a substantially non-tacky surface to permit the bottom surface of the pallets to move freely from the gasket openings which communicate with the box openings.

Finally, it is an object of this invention to provide in a chord organ a tonal device capable of permitting various qualitative sounds to be emitted. The tonal device includes a plurality of uniquely arranged baffle plates located over the top surface of the ventilating or sound slots of the organ, said baffle plates capable of being arranged in various positions with the slots for producing either brassy or muted tonal sounds.

DRAWINGS

FIG. **1** is an external view of the improved organ with the tonal device being removed therefrom;

FIGS. **2**, **3** and **4** are a combined partially schematic exploded view of the housing air chamber, treble reed and chord reed assembly boxes, respectively;

FIG. **5** is a detailed plan view of the keyboard chord assembly with a cut-away section;

FIG. **6** is a partial isometric-sectional view of the reed assembly box and gasket;

FIG. **7** is a view taken along the line **7—7** of FIG. **5**;

FIG. **8** is a view taken along the line **8—8** of FIG. **5**;

FIG. **9** is a view depicting the spring device fingers;

FIG. **10** is a plan view of the tonal device for the ventilating slots; and

FIG. **11** is a view taken along the line **11—11** of FIG. **10**.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the drawing, FIG. **1** depicts an illustrative embodiment of the invention wherein the reference numeral **10** designates a housing which may have a flat bottom surface for resting the organ on any desired location, i.e. a table, floor, etc. Alternatively the housing may be provided with legs **11—11** fixedly positioned in respective supporting bases **12—12**. Located on and within housing **10** is a chord keyboard section generally referred to at **13** and comprised of keys **13***a*—**13***a*, and a treble keyboard section generally referred to at **14** and comprised of keys **14***a*—**14***a*. The

chord and treble keyboard sections 13 and 14, respectively, are disposed in the housing such that an operator may play the organ while seated on seat 15.

While FIGS. 3,5,7, and 8 illustrate chord section 13, and FIGS. 4 and 6 illustrate treble section 14, for the sake of brevity, and as far as the invention is concerned, it is understood that section 13 is broadly similar in structure and function to treble section 14, except for differences which are discussed hereinafter. Generally, the only differences between sections 13 and 14 are (a) the key size, (b) treble section 14 is provided with a single treble reed box of either two or three octaves, whereas chord section 13, normally has three reeds actuated by each key and generally contains two or more reed boxes, and (c) the tonal frequencies of the treble and chord sections are different, as is well known, and are not a part of this invention. Thus, similar reference numerals for similar components are used and one will suffice for the other.

Housing 10 includes an air chamber 16 provided with two apertures 17, 18, as seen in FIG. 2 for receiving reed boxes 19, 20 (FIGS. 3 and 4) of sections 13 and 14, respectively. Each reed box is of a suitable plastic material, such as polystyrene, and provided with a top plate 21 having a plurality of openings 22—22 extending therethrough. It can be seen in FIG. 5 that the chord openings are arranged in two horizontally extending rows, while the treble openings, as seen in FIG. 6, are aligned in a single row. The reed box openings 22—22 extend through respective formed passageways 23—23 and terminate with conventional reeds 24—24 which are of varying frequencies.

As seen in FIGS. 5, 7 and 8, located on the top surface of plate 21 are opposing molded end members 25—25, each of which is provided with an arcuately formed groove 26—26 therein for receiving a shaft 27, described in more detail hereinafter. A pair of posts 28—28 are provided at one end of plate 21 for receiving fastening members 29—29 therethrough for connection into receiving slots 30—30 in order to secure the reed box to its respective housing aperture. A pair of posts 31—31 are provided near the other end of the plate for receiving fastening members 32—32 for connection into receiving slots 33—33, for not only securing the plate to its housing aperture but also for securing a resilient unitary spring device, generally referred to at 50, which is described hereinafter.

A unitary gasket 35, as seen in FIG. 5 for the chord assembly and FIG. 6 for the treble assembly, is made of a material having an inherent tacky surface, such as a styrene rubber, commercially known as Kraton. The gasket is molded such that it is provided with a plurality of openings 36—36 arranged similarly to its respective reed box openings 22—22. The gasket also is provided with openings 37—37 for fitting about posts 28—28 and end members 25—25. The peripheral edge of the gasket is bent 90° downwardly from its horizontally disposed top surface and extends the vertical length of plate edge 38, whereupon the gasket is then bent 90° and extends inwardly and under bottom plate surface 39. A tab T is molded to the gasket to facilitate manual handling thereof.

The top surface of the gasket effectively is dried upon the sprinkling of talc or any other drying agent compatible therewith. After drying, the gasket is located over the top of plate 21, and pulled and stretched over peripheral edge 38 and under the bottom surface 39 thereof. As a result, the bottom tacky surface of the gasket adheres to the plate surface with which is has come into contact and the gasket is firmly secured to the plate.

Thus, when each plate 21 is located in its respective housing apertures, the outer tacky bottom portion 40 of the gasket contacts the top surface 41 of housing 10. As a result, a firm seal is formed and such is further assured when fastening means 29—29 and 32—32 are connected through posts 28—28 and 31—31 respectively. Further, air tight seals also are automatically provided about each of plate openings 22—22, thereby insuring no air losses when key pallets 45—45 are in closed contact therewith, now to be described.

With reference to FIGS. 5,7 and 8, there is illustrated chord section 13 having a plurality of keys 13*a*—13*a*, each of said keys being provided with a mid-section 42 interconnecting the key with its respective pallet 45. Each pallet is provided with a flat closure portion 46, generally of a configuration similar to but slightly larger than plate and gasket openings 22 and 36, respectively, which it normally covers. The top portion of each pallet is provided with a rib 47 preferably having either an angular or relatively narrow top surface 48.

A spring device, generally referred to at 50, is made of a material, such as an acetal resin, and includes a body 51 provided with a pair of opposing end mounting posts 52—52 for securing the device to plate 21 via fastening means 32—32, as previously described. Extending from body 51 are a plurality of flexible, compression fingers 53—53, the free end of each finger being provided with a groove 54 of complementary shape to rib top surface 48 which it engages. Body 51 also is provided with a pair of supporting elements 55—55 which extend in an opposite direction to fingers 53—53, said supporting elements securely holding shaft 27 in a fixed position when the spring device is fastened to plate 21.

The angular relationship of the extending fingers 53-53 with respect to the pallet top surface 48—48 are dependent upon the height of the pallet ribs 47—47. Typically, all the ribs are of the same height and extend in the same plane. The fingers extend downwardly from body 51 such that when the spring device 50 is mounted, the grooves 54 of each finger are in contact with rib top surfaces 48 with a predetermined desired force being urged upon the pallets to securely hold them against gasket 35 to close their respective reed openings 22 and thereby prevent any air to be emitted and, in turn, any note to be unwantedly sounded.

In order that a uniform pressure be applied against pallets 45—45, the size of fingers 53—53 are dependent on the length of key ends 13*a*—13*a* with respect to the fulcrum point located over shaft 27 at key mid-section 42. As seen with chord section 13, two rows of pallets 45—45 are provided for the openings 22—22 of reed boxes 19 and, accordingly, the lengths of the key ends to the fulcrum point vary. Thus, the keys which extend a relatively longer length from fulcrum 42 are provided with relatively stronger spring fingers and, as illustrated in FIG 5, such spring fingers are relatively wider and heavier than the fingers engaging the shorter keys. In this manner, an operator need not be con-

cerned that one key will be more difficult to depress than another and, accordingly, the so-called "finger touch" or key response is of a constant value and readily known to the operator, thereby enabling the operator to control his timing and sounding of the notes with a high degree of reliability. It is understood that since all the keys and pallets are of a similar length, the fingers of the spring device on the treble section are of the same size and configuration.

Upon the depression of a key by an operator, its respective pallet is lifted from gasket opening **36** thereby permitting the flow of pressurized air, created by a conventional impeller (not shown), through its respective reed **24** and reed passageway **23** to sound a note. As the pallet is lifted, relative sliding movement occurs between finger groove **54** and rib top surface **48**, thereby enabling the pallet to be lifted easily and smoothly. The spring finger material possesses a high lubricative property and a low coefficient of friction. Simultaneously, due to finger groove walls **56—56** closely overlapping the side walls of the rib, lateral movement of the pallet and, in turn, the key, is prevented, thereby insuring a return of the pallet and key to their normal resting positions when the key is released. To further facilitate a smooth lifting and returning of the key and pallet, as seen in FIG. **8**, a grooved member **57** located on the undersurface of each key, partially envelopes shaft **27** and moves arcuately thereabout as the key is depressed and released. A stop **58** is provided beneath each key for striking housing surface **59** in order to limit the downward travel of the key.

With reference to FIGS. **10** and **11**, there is illustrated a tonal device, generally referred to at **60** which is capable of controlling the quality of sounds emitted between a brassy and muted range. The tonal device generally is disposed over, but optionally may be located under, the ventilating or sound slots **61,62** (FIG. **1**) of the organ, the device having a stationary rectangular frame **63** comprising a pair of parallel disposed arms **63***a*—**63***a* and a pair of parallel disposed end members **6313** **63***b* connected to the arms in a right angular relationship. Frame **63** is secured by a suitable adhesive or fastening means (not shown) to that part of housing surface **64—64** which is located immediately adjacent to and surrounding sound slot **61**. A pair of parallel disposed baffle plates **65—65** are respectively connected along one side thereof to arms **63***a*—**63***a* by hinges **66-66**, the other side of the baffle plates being connected to respective activating members **67—67** by respective hinges **68—68**. The baffle plates **65—65** together with the activating members **67—67** are of a size and configuration similar to but slightly larger than the sound slots **61,62** so as to permit the baffle plates to completely cover the slots when the plates are in a closed position thereover.

A manually operated lever **69** is connected to activating members **67—67** and extends into a slotted guide **70** projecting upwardly from arm **63***a*. Thus, as lever **69** is lifted, activating members **67—67** are caused to move upwardly therewith and, in turn, baffle plates **65—65** are pivotally removed from their respective sound slots **61,62** to permit a variation in the quality of sound being produced. As a result of said baffle plates opening the sound slots, the initial sound emitted is muted and progressively transcends to that of a brassy quality when the baffle plates are fully open. It is understood that while a manually operated lever has been described, it is apparent that conventional drive means can be connected to the lever and be operable in response to a foot lever or switch controlled by the operator.

Tonal device **60** preferably is made of a polypropylene material, such as Escon, a trade named material of Enjay Corp., Cranford, N.J., or Pro-Fax, manufactured by Hercules Powder Co. Such material possesses unusual and unique mechanical properties so as to withstand fatigue from flexing in relatively thin sections. As a result, tonal device **60** is easily molded as a unitary structure and hinges **66—66** and **68—68** are integrated therewith. Hinges **66—66** and **68—68** are the thinnest part of the tonal device and their strength characteristics are superior to those of other parts of the device. It has been found that optimum hinge flex life is obtained by having a desired molecular orientation at the hinge section, as influenced by fabrication techniques and conditions. Preferably, the molecular weight of the material utilized for the molded-in hinges are within a range of 240,000 to 300,000 in order to facilitate obtaining the desired molecular orientation so as to provide an unusually strong hinge.

Although this invention has been described with a certain degree of particularity, it is apparent that other embodiments can be provided without departing from the scope and spirit of thereof.

We claim:

1. In a chord organ having a chamber; a reed assembly box located within the chamber, said box being provided with a plurality of openings each of which communicate with a respective reed; a keyboard section having a plurality of keys pivotally movable about a shaft, each key being provided with a pallet extending therefrom for normally closing a reed opening; means for creating a flow of pressurized air within the chamber to permit a note to be sounded responsive to a lifting of the pallet from its respective reed opening; the combination with a unitary plastic spring device which comprises:

a body, and

a plurality of compression fingers integrally connected to and extending from the body, each of said fingers being in contact with a respective pallet to urge the pallet downwardly with sufficient force to normally close its respective reed box opening, said fingers being disposed with the pallets such that relative sliding movement occurs therebetween in response to a raising and lowering of the pallets from and to their respective reed openings.

2. In a chord organ, according to claim **1**, wherein each pallet is provided with a rib portion and each finger is provided with an angular end surface for sliding contact with said pallet rib.

3. In a chord organ, according to claim **1**, wherein the size and strength of each finger is dependent upon the length of the key end nearest an operator to its fulcrum point located over said shaft in order that the touch response of each key is of a substantially constant value, the keys which extend a longer length from its fulcrum being provided with fingers having a rela-

tively greater width and density than the fingers for keys which extend a shorter length from its fulcrum.

4. In a chord organ having a chamber; a reed assembly box located within the chamber, said box being provided with a plurality of openings each of which communicate with a respective reed; a keyboard section having a plurality of keys pivotally movable about a shaft, each key being provided with a pallet extending therefrom for normally closing a reed opening; means for creating a flow of pressurized air within the chamber to permit a note to be sounded responsive to a lifting of the pallet from its respective reed opening; the combination with a spring device which comprises:

a body, and

a plurality of compression fingers extending from the body, each of said fingers being in contact with a respective pallet provided with a rib portion to urge the pallet downwardly with sufficient force to normally close its respective reed box opening, each finger being disposed with its respective pallet rib for permitting relatively sliding contact therebetween and being provided with an angular end surface which includes a pair of opposing walls, each finger wall overlapping a respective upper lateral surface of the rib to prevent any lateral movement of the pallet during the raising and lowering of said pallet from and to their respective openings.

5. In a chord organ having a chamber; a reed assembly box located within the chamber, said box being provided with a plurality of openings each of which communicate with a respective reed; a keyboard section having a plurality of keys pivotally movable about a shaft, each key being provided with a pallet extending therefrom for normally closing a reed opening; means for creating a flow of pressurized air within the chamber to permit a note to be sounded responsive to a lifting of the pallet from its respective reed opening; the combination with a spring device which comprises:

a body; and

a plurality of compression fingers extending from the body, each of said fingers being in contact with a respective pallet to urge the pallet downwardly with sufficient force to normally close its respective reed box opening, said fingers being disposed with the pallets such that relative sliding movement occurs therebetween in response to a raising and lowering of the pallets from and to their respective reed openings; said body being provided with a pair of opposing end posts for mounting the spring device to a section of the chord organ and wherein at least one supporting member extends from the body in a direction opposing to the extending fingers for securely holding the key shaft in a fixed position.

6. In a chord organ having a chamber; a reed assembly box located within the chamber, said box being provided with a plurality of openings each of which communicate with a respective reed; a keyboard section having a plurality of keys pivotally movable about a shaft, each key being provided with a pallet extending therefrom for normally closing a reed opening, each pallet having a rib portion; means for creating a flow of pressurized air within the chamber to permit a note to be sounded responsive to a lifting of the pallet from its respective reed opening; the combination with a single molded unitary spring device made of a plastic material which comprises:

a body,

a pair of opposing end posts integrally connected to the body for mounting the spring device to a section of the chord organ,

a plurality of compression fingers extending from the body, each finger free end being made of a material having a highly lubricative property and a low coefficient of friction and provided with an angular configuration for contact with the top and upper lateral surfaces of its respective pallet rib, said fingers being disposed such that relative sliding movement occurs therebetween in response to a raising and lowering of the pallets from and to their respective reed openings, and

at least one supporting member extending from the body in a direction opposite to the extending fingers for securely holding the shaft in a fixed position.

* * * * *