May 1, 1962 R. F. FAUSER 3,032,455

PLASTIC MOLDING FOR COVERING MUSICAL INSTRUMENT KEYS

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FIG. 1

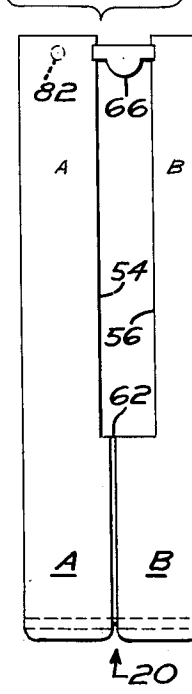


FIG. 2

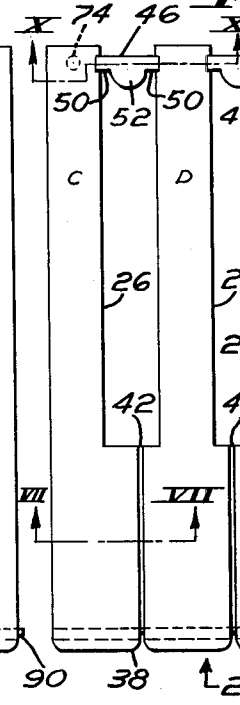


FIG. 3

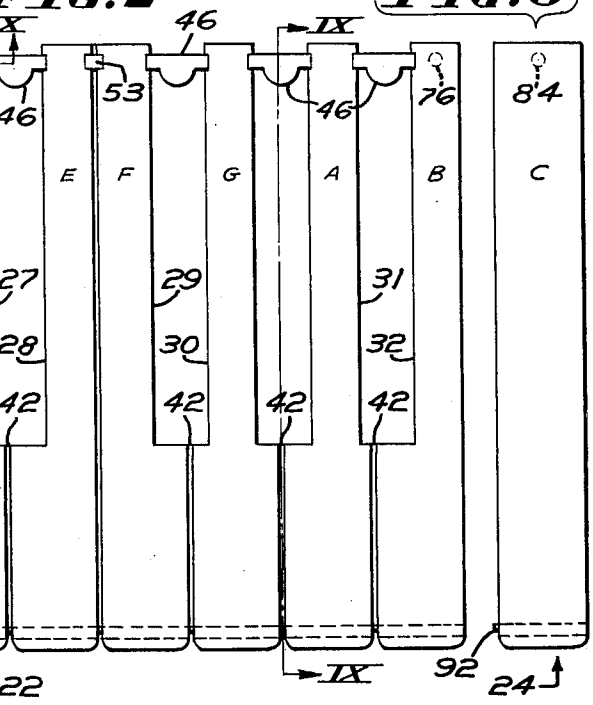


FIG. 4

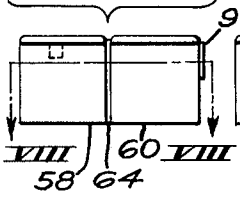


FIG. 5

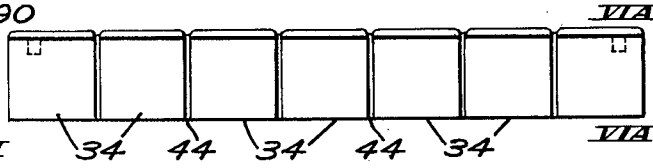


FIG. 6

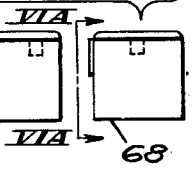


FIG. 7

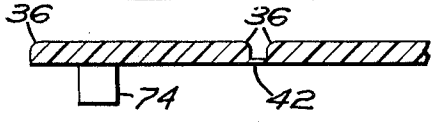


FIG. 8

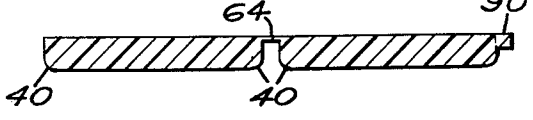


FIG. 9

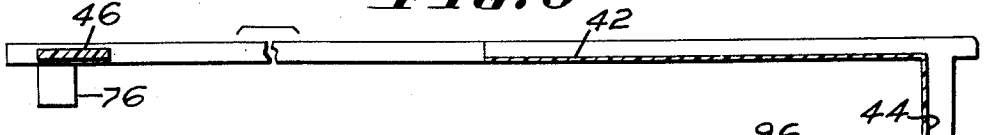


FIG. 10

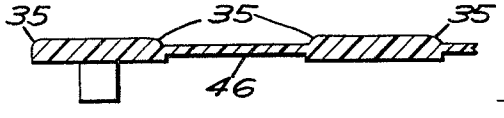
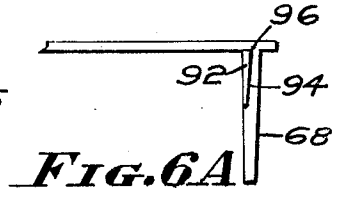


FIG. 6A



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FIG. 11

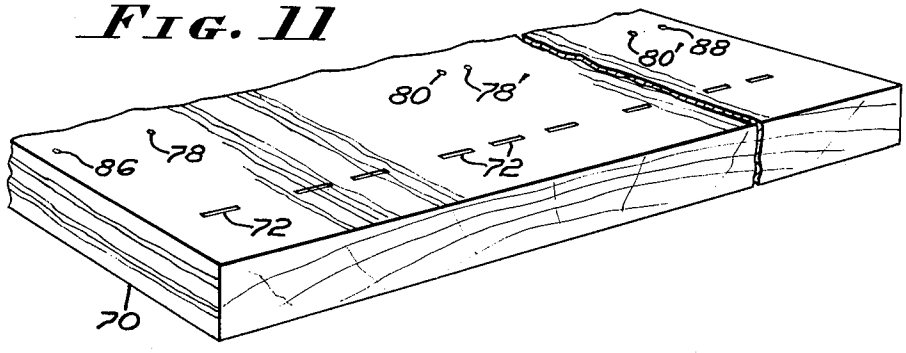
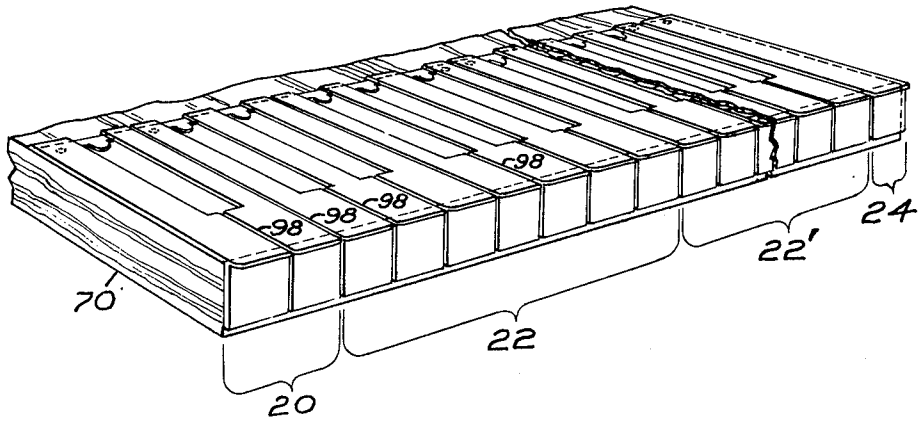


FIG. 12



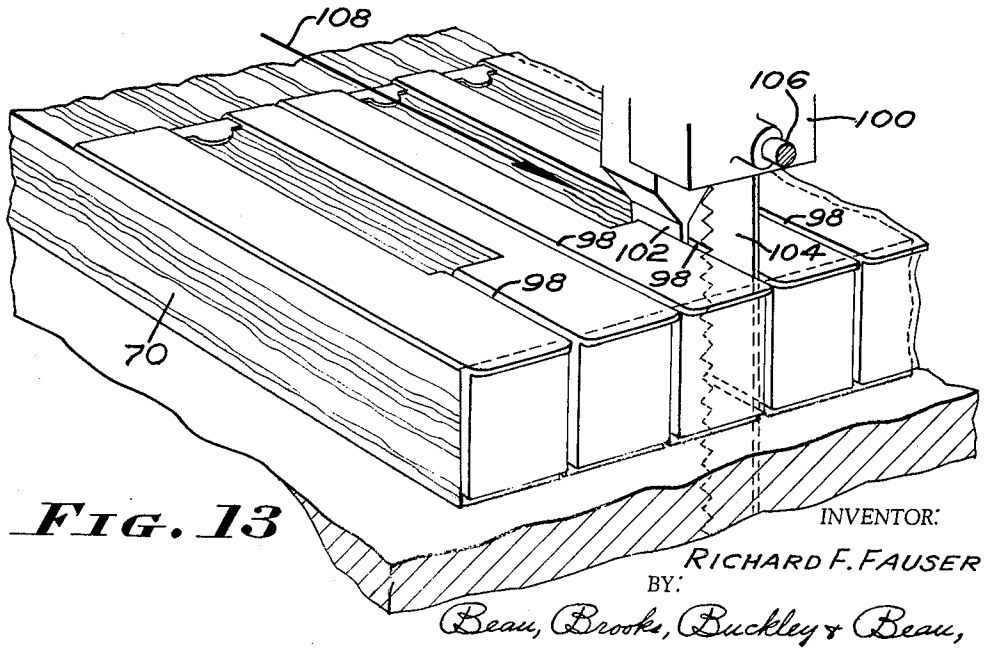


FIG. 13

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3,032,455

PLASTIC MOLDING FOR COVERING MUSICAL INSTRUMENT KEYS

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1 Claim. (Cl. 154—43)

This invention relates to the musical instrument manufacturing art and more particularly to the manufacture of keyboards for pianos and like instruments.

In the manufacture of keyboards for pianos or the like, it is customary to utilize wooden keybodies sawed from a single board of wood corresponding to the finished complete keyboard, covering material being applied to the wood at some stage of the process.

In the case of the white keys of the well known piano-type keyboard arrangement, it has been customary to apply the white covering material to the exposed tops and fronts of the keys prior to the sawing of the board into individual keys, so that the key covering material is cut to the key size and shape concurrently with the cutting of the board into individual keys. On account of expansion and contraction of the keyboard wooden blank with varying atmospheric conditions, it has been found impracticable to apply the key top covering material for an entire board in one piece, and therefore key cover blanks each covering only a few keys, such as an octave or less, have been applied individually to the board with their pre-cut tail parts carefully aligned by sight between the parts of the board which will later become the bases for the black keys. The next steps in the process have been to apply a separate strip of material to the front of the keyboard blank to complete the white covering, and then to saw the division lines between the white keys, by sight and with extreme care. Once the keys are separated completely further steps have been required to round, or at least smooth, the rough saw cut edges along the lines of division, depending on the quality of key to be produced. In addition to requiring these many process steps, which require great care by very highly skilled workmen, the foregoing prior art method has the very important disadvantage of being limited to use of a covering material which can be sawed readily, for example celluloid.

In accordance with the present invention a key manufacturing method, and covering material parts for use therein, are provided wherein octave and sub-octave key cover blanks may be applied rapidly and with neither great skill nor unusual care to a prepared keyboard blank.

The key cover blanks are shaped to comprise individual key covers pre-formed to substantially their final shapes with only thin webs and other readily removable spacer elements, each of which is recessed from all normally exposed surfaces of the keys, to be cut through when the keyboard blank is sawed into individual keys. Since no normally exposed edges of the key cover material are sawed through, very hard key cover material, such as Plexiglas (polymerized methyl methacrylate), may be used without producing chipping at exposed edges, and since the parts actually sawed through are specially shaped to be easily cut, the actual amount of chipping is negligible in practice.

Since the normally exposed edges of the individual key covers are fully formed in the preparation of the blanks, these edges may be, and preferably are, pre-formed to a desired finished roundness as a characteristic of the key cover blank so that no finishing of the key covers is necessary after the keys have been separated. Lines of severance between the white keys are defined by these prepared rounded edges, which are located precisely by the

corresponding interconnecting webs of the key cover blank and other locating means in accordance with the invention, so that precisoin grooves are provided corresponding exactly to the cut lines between the keys, and it is a further feature of the present invention that these grooves are utilized for guiding the saw in separating the keys so that even this operation may be performed in a much more rapid and facile manner, as compared to the aforedescribed prior art method.

Accordingly, major objects of the present invention are to provide an improved method of manufacture of covered keys for piano keyboards and the like, together with key covering parts for use in accordance with that method.

Another object of the invention is to provide improved key cover blanks having prepared rounded edges at the portions thereof which will form exposed key edges in the finished keys whereby all major rounding and polishing operations subsequent to severance of the keyboard blank into individual keys are eliminated.

It is another object of the invention to provide a key manufacturing method and key cover blanks as aforesaid wherein the key covers may be of very hard material.

Still another object of the invention is to provide an improved method of keyboard manufacture wherein the placing of the key covering material on the keyboard base board and the sawing of the covered board into individual keys are accomplished in a rapid and facile manner.

Other objects of the invention will be apparent from the foregoing general discussion, the following detailed description and claim, and from the drawings, wherein:

FIGS. 1–3 are plan views of three basic types of key cover blanks for use in covering a complete keyboard in accordance with the present invention;

FIGS. 4–6 are front views of the key cover blanks shown in FIGS. 1–3, respectively;

FIG. 6A is a fragmentary side view taken along line VIA—VIA of FIG. 6, on an enlarged scale;

FIG. 7 is a fragmentary sectional view taken about along line VII—VII of FIG. 2, on further enlarged scale;

FIG. 8 is a sectional view taken about along line VIII—VIII of FIG. 4;

FIG. 9 is a sectional view taken about along line IX—IX of FIG. 2;

FIG. 10 is a fragmentary sectional view taken about along line X—X of FIG. 2;

FIG. 11 is a fragmentary view of a wooden keyboard blank, a central portion thereof being broken away;

FIG. 12 is a view corresponding to FIG. 11 with key cover blanks of FIGS. 1–3 applied to the keyboard blank; and

FIG. 13 is a fragmentary view illustrative of a step in a method in accordance with the invention whereby individual keys are cut from the covered keyboard blank.

Referring now more particularly to the drawing, the three types of key cover blanks shown in FIGS. 1, 2 and 3 are illustrative of all of the white key cover blanks needed to cover a standard piano keyboard in accordance with a preferred embodiment of the invention. The white keys of such a keyboard consist of seven full octaves flanked on the left by the lowest A and B keys and on the right by the highest C, using the usual musical notation as indicated in those figures. To cover these keys, a key cover blank **20**, FIG. 1 is provided for covering the lowest A and B, seven octave key cover blanks each identical to the one illustrated at **22** in FIG. 2 are provided for covering the seven full octaves of white keys, and a cover blank **24** for a single key as shown in FIG. 3 is provided for the highest C.

The octave key cover unit shown in FIG. 2 comprises seven key covers **26–32** corresponding to the keys for

the notes C, D, E, F, G, A, B of the standard piano keyboard. Each of these keys is molded or otherwise fabricated with a front key cover portion 34 integral therewith, and with all corners along the edges of the key cover which will be exposed on the finished key formed to their finished radii, as shown at 35—35 in FIG. 10, at 36—36 in FIG. 7, and at 38 in FIG. 2, and also along the side edges of the front cover portions 34 in the same manner as the similar front cover edges 40 of the sub-octave unit shown in FIG. 8.

The individual key covers of the octave unit are interconnected by webs 42, 44 between the adjacent top and front portions, respectively, and by bridges 46 adjacent the tail ends of the top covers. The widths of the webs 42, 44 and the lengths of the tail end bridges 46 are so dimensioned that the individual key covers of the octave unit of FIG. 2 occupy precisely the same relative positions as will the corresponding key base portions in the wooden keyboard blank, shown in FIG. 11 and to be described in greater detail hereinafter, and as will the corresponding keys of a finished keyboard.

The webs 42, 44 between the key covers are made as thin as practicable and are co-planar with the under surfaces of the covers, so that when the keys are divided by sawing as will be described hereinafter, any burr left where the web is sawed through is negligible. On the other hand, a burr where the tail end bridges are sawed through is not objectionable since the tail ends of the keys will be covered in an assembled instrument by a part of the piano or other instrument cabinet. Accordingly the tail end bridges can be very much thicker and stronger than the webs 42 and are of importance in giving the key cover octave blank sufficient strength for convenient handling.

Where, as preferred, the key cover blanks are molded from plastic material, it has been found that requirements of moldability dictate that the webs be of a thickness, for example 0.015 inch, which results coincidentally in sufficient strength that in most cases no tail end bridge is needed between key covers which are contiguous to their tail ends and where, accordingly, the intervening web 42 extends to their tail ends, as in the case of the web 42 between the E and F key covers 28, 29. However, if desired, this web may be thickened at its tail end to provide a tail end bridge portion 53 to preclude any possibility of the web splitting during handling of the blank. Nevertheless, provision is made to avoid gross chipping of the hard cover material at the ends of the tail bridges, where they will be sawed through. Accordingly these ends are of a minimum width as shown at 50—50, the mid-portions 52—52 of the bridges being wider for strength.

As aforesaid, the sub-octave units of FIGS. 1 and 3 are provided to complete the left and right hand ends, respectively, of the usual piano keyboard. It will be noted that the key cover blank of FIG. 1 is provided with individual key covers 54, 56 for A and B keys having integral front cover portions 58, 60, and being interconnected by a top cover web 62, a front cover web 64 and a tail bridge 66 which in the illustrated embodiment of the invention are identical to the webs 42 and 44 and the tail bridges 46 of the octave unit 22 previously described and space the key covers 54, 56 in the same manner as corresponding parts of the octave unit are spaced. Since the sub-octave unit required at the right hand of the keyboard consists of a single key, the key cover blank 24 for this purpose is not provided with the aforedescribed webs and bridges, although it does include an integral front cover portion 68 generally as aforedescribed.

In the manufacture of a complete keyboard in accordance with the present invention, a base wooden board such as illustrated fragmentarily at 70, FIG. 11, is provided, pre-formed with chisel cuts 72—72 in position to form the front ends of the black key bases of the keyboard, suitable adhesive is applied to the top and front

areas of the board to be covered, the several white key cover units or blanks are applied thereto as shown in FIG. 12, and then the covered board is sawed into individual keys as shown in FIG. 13. In the showing of FIGS. 11 and 12 parts are broken away, with portions of the second and seventh and all of the intervening full octaves omitted, the units for these octaves being identical to that for the first octave, 22, and being referred to collectively at 22'.

As aforesaid the key covers within the octave and sub-octave units illustrated in FIGS. 2 and 1, respectively, are spacially related prior to being sawed apart by means of the webs and tail end bridges aforedescribed. Further, means are provided to relate the individual key cover blanks to each other and to the board for proper positioning of them on the board during the gluing or cementing operation. For this purpose the tail corner portions of each octave blank 22 are provided at their undersides with locating means, in the illustrated embodiment of the invention comprising integral locating pins 74, 76 and the keyboard base blank or board 70 is provided with companion locating means, in this case locator holes 78, 80 positioned to receive the pins 74, 76 when the octave blank is in proper position on the board; similarly the base blank 70 is provided with additional locator holes 78', 80' positioned for receiving the locator pins of each of the additional octave units 22' which will be applied to the board. For providing a preferred manufacturing tolerance, the octave unit locator holes 78, 80, 78', 80', and those for the sub-octave units, referred to hereinafter, are slightly oversize in the front-to-rear direction, having about .005 inch clearance at the front and greater clearance at the rear so that the front cover portions 58, 60, 68 will surely seat firmly on the board 70 front face, preferably with some tension thereagainst, this seating constituting part of the cover locating means. Accordingly the octave units are positioned with respect to the board and to each other in an accurate and positive manner, and any expansion or contraction of the board will be taken up in an equally divided manner among the spaces between the several octave units.

Similarly, means are provided to locate the sub-octave units of FIGS. 1 and 3 accurately with respect to the board and with respect to the intervening octave units. Since the sub-octave units are relatively narrow as compared to the full octave units, it is preferred that the lateral locating means for these units be operative at the rear and front ends of the units rather than at their two rear corners. Accordingly each of the sub-octave units is provided with an integral locater pin 82, 84 at the underside of the tail end portion of the top cover part thereof cooperative with locator holes 86, 88, respectively, provided in the base board 70, and with a locator shoulder or heel 90, 92 on the upper portion of an edge of a front cover portion thereof 60, 68 respectively. As shown, each locator heel 90, 92 is disposed in position to about the edge of the front cover part of the key cover of the octave unit next to the corresponding sub-octave unit when the several units are in place on the wooden board 70, thereby positively locating the front end of the corresponding sub-octave unit to combine with the location provided to the pins 82, 84 at the rear end of those units for complete and accurate location thereof. As shown in FIG. 6A for example, the sub-octave unit locator heels are thinner and shorter than the front cover portions 60, 68 upon which they are mounted and preferably are generally triangular in cross-sectional shape, with the base of the triangle at the top and the forward faces 94 of the heels inclined forwardly. Accordingly, when the space between the sub-octave unit and the octave unit occupied by such heel is sawed through, the saw will first engage only the corner portion 92 so that the saw cut will be started in a small section of the heel and there will be no likelihood that the heel will be torn

off in a body and carry with it an adjacent part of the key cover. Furthermore since the locator heel or shoulder is located at the top portion of the front cover underneath the overhanging portion of the top cover part and is recessed throughout, progressively more so toward its lower end, any saw marks will be substantially out of view when the keyboard is in its assembled relation in a piano or other instrument.

The accurate location of the key cover blanks in cemented relation on the base board **70** and the webs within the blanks provide accurately located and definite spaces or grooves between each of the key covers, which are employed in accordance with the method of the invention to direct operation of the saw in a precise manner. Accordingly, as illustrated in FIG. 13, a specially adapted saw **100** is employed to make the cuts between the adjacent edges of the key covers from the front of the keys to the chisel cuts **72** or to the rear of the key covers, as the case may be, the saw having a guide block **102** fixedly connected in alignment with the saw blade **104** and shaped to fit exactly and engage against the sides of these grooves **98** between the key covers. The thickness of the saw blade is such that the cut made thereby is substantially the width of the grooves, and being exactly aligned therewith by the guide block **102**, results in the removal of the webs **42, 44** and **62, 64** as well as the locator shoulders **90, 92**. In the arrangement shown, the saw is held in fixed position, as indicated at **106**, and the keyboard is moved in the direction indicated by the arrow **108** to make the saw cut.

As will be understood by those skilled in the art, it is customary to complete the severance of the covered key block into individual keys by sawing from the rear ends thereof, so that saw cuts will be made in a later operation progressing forwardly along the side edges of the tail ends of the key covers across the ends of the tail end bridges **46, 62**. Since these tail end bridges are relatively thick, a noticeable saw cut burr may be left at these points, but this part of the key cover will be covered by the piano or other instrument cabinetry when in assembled relation therein. A similar situation obtains where a thickened portion **53** is provided in or supplementarily to the web **42** between the E and F key covers.

Preferably, the under surfaces of the tail end bridges **46, 62** are raised with respect to the under surfaces of the key covers, as shown in FIG. 10 so that these tail bridges will not have been glued securely to the base board **70** during the cementing operation and therefore will be cut free by the sawing operation so as to leave the intermediate wood portions free to receive the usual black key covers in a later operation.

It should be noted that in addition to providing maximum strength with a minimum thickness, the extension of the webs **42, 44** and **62, 64** substantially throughout the extent of the adjacent cover edges which they join seals those joints against flow of cement upwardly on to the exposed cover faces. Similarly the minimization of the length of the locator shoulders **90, 92** relative to the vertical length of the front cover parts to which they are attached and the location of those shoulders at the upper portion of those front cover parts decreases the likelihood that any substantial amount of cement will be squeezed onto the adjacent front cover portion of the octave unit, particularly in the more noticeable lower part thereof.

It will be appreciated that in accordance with the present invention covered keys may be manufactured wherein the cover material is very hard and not readily sawable without chipping since all parts of the cover sawed through which will be outside the instrument cabinet when the board is installed are recessed from immediate view and are relatively thin and fragile so as not to carry parts of the main cover body with them when sawed away. Furthermore since all exposed edges may be molded to their final contours and are cleared by the saw, all final rounding and polishing operations are eliminated save for such light polishing as may be desired to remove scratches and the like resulting from handling during the manufacturing operation; the customary light sanding of the key side planes for smoothing the wood parts will remove coincidentally the last vestiges of the webs and locator heels.

While only one embodiment of the process of the invention and parts employed therein have been illustrated and described in detail, it will be understood that the invention is not limited thereto but may be otherwise embodied within the spirit of the invention and the scope of the appended claim.

What is claimed is:

A unitary plastic molding for covering a plurality of musical instrument keys of the piano type by application to a keyboard blank member of wood, said molding comprising a main plate portion for covering the top surfaces of said keys and a depending plate portion at an edge thereof for covering the front surfaces of said keys, said molding having a series of parallel grooves in said main plate surface conformning with the division lines between individual keys, the width of each groove being substantially equal to the normal clearance between individual keys and the lines of joinder between the walls of the grooves and the top and front surfaces of the molding being smoothly rounded, and means projecting laterally from said molding a distance substantially equal to the width of one of said grooves to abut an adjacent molding and thus space the moldings from each other a predetermined distance in applying the same to a keyboard blank member.

References Cited in the file of this patent

UNITED STATES PATENTS

174,002	Pratt	Feb. 22, 1876
210,780	Hyatt	Dec. 10, 1878
423,075	Newell	Mar. 11, 1890
483,378	Fuller	Sept. 27,1892
665,989	Bechtold	Jan. 15, 1901
1,014,424	Troeger	Jan. 9, 1912
1,504,255	MacDonald	Aug. 12, 1924
2,584,319	Appel	Feb. 5, 1952
2,626,805	Carlton	Jan. 27, 1953

FOREIGN PATENTS

161,000	Australia	Feb. 8, 1955
249,145	Switzerland	Mar. 16, 1948