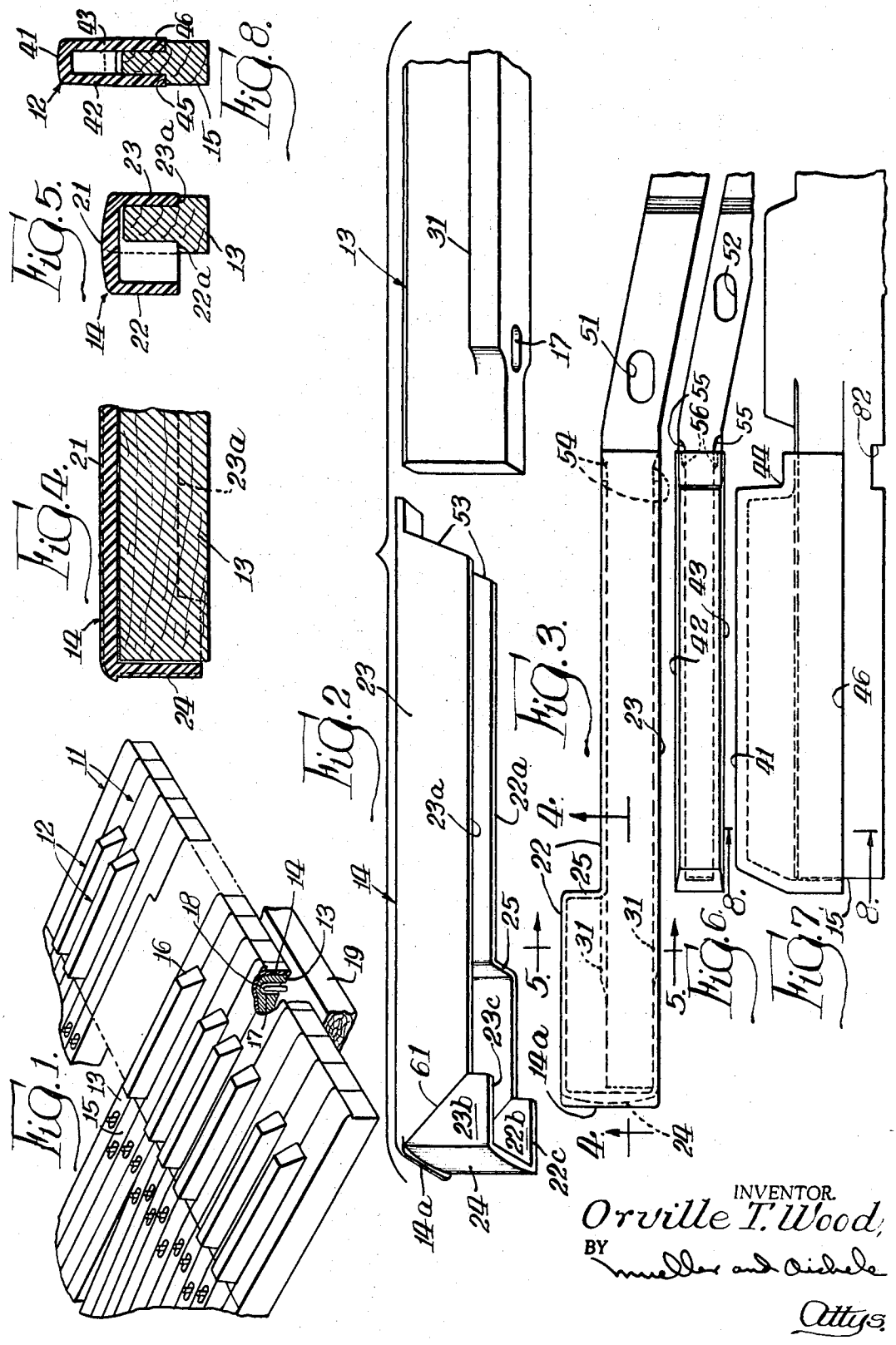
Dec. 24, 1968 O. T. WOOD 3,417,649

KEYBOARD CONSTRUCTION

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Dec. 24, 1968 O. T. WOOD 3,417,649

KEYBOARD CONSTRUCTION

Filed Sept. 4, 1964 2 Sheets-Sheet 2

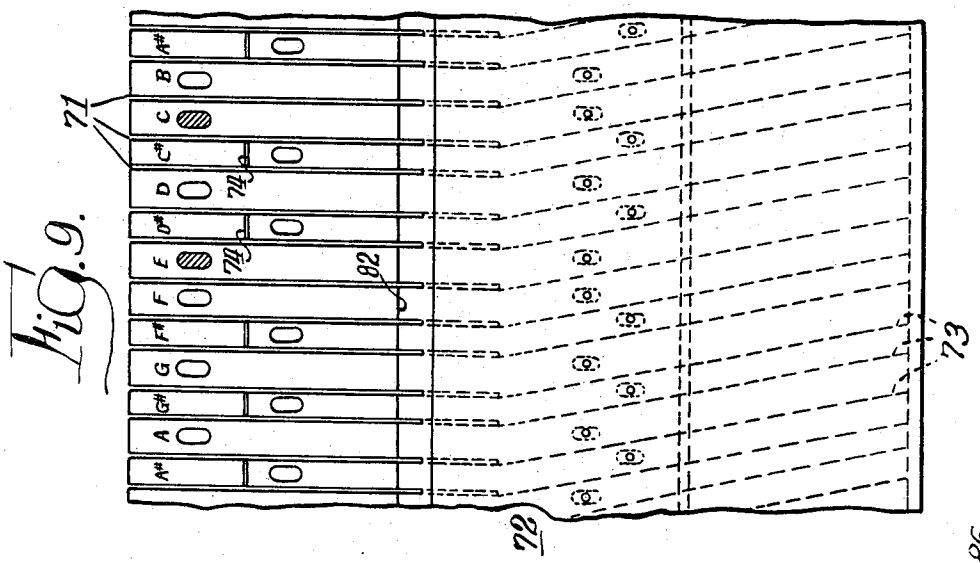


FIG. 9.

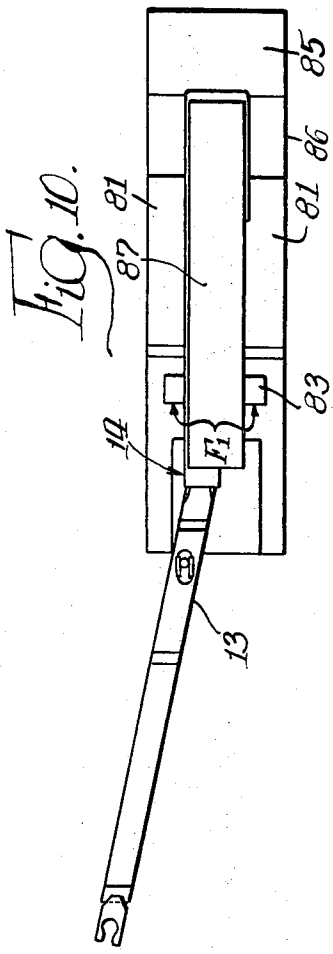


FIG. 10.

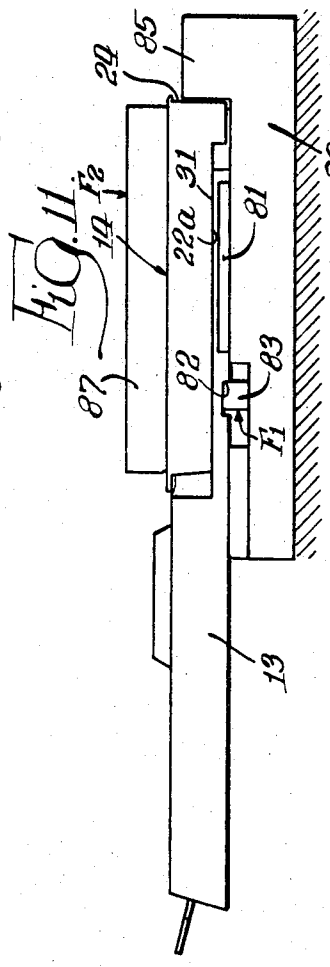


FIG. 11.

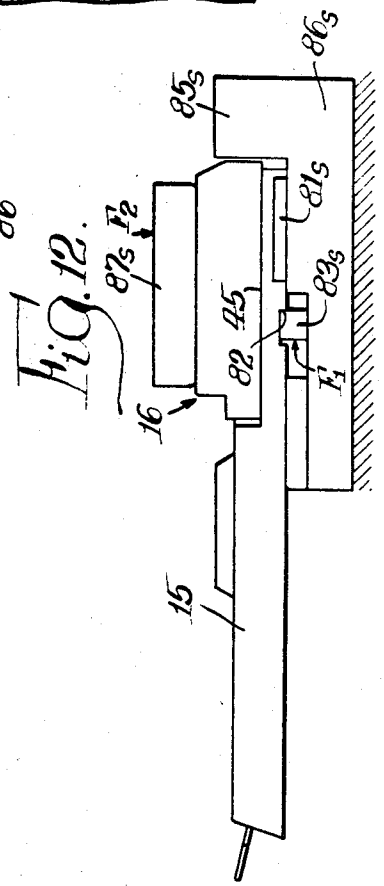


FIG. 12.

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KEYBOARD CONSTRUCTION

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17 Claims. (Cl. 84—433)

ABSTRACT OF THE DISCLOSURE

Musical instrument keyboard including keys with wooden shanks and molded plastic key caps thereon. The key caps have tops with sides extending downwardly having edges engaging shoulders on the shanks, and fronts extending downward below the edges positioned on the shoulders with sides extending back therefrom. The caps are molded with a parting line protuberance extending from the front and top of the cap rearwardly and downwardly to the edge of the sides.

This invention relates to musical keyboard instruments, and more particularly to an improved key construction therefor.

In the past, keys for pianos and other musical instruments have been formed of a solid piece of wood to which matched pieces of ivory have been glued to form an ivory veneer over the top and front of the piece of wood. The individual keys were then sawed in the desired shapes from the solid piece of ivory veneered wood. Substitute materials for the ivory were occasionally used, such as mother of pearl, glass porcelain, enamel and Celluloid or plastic. Recently, modern Celluloid and plastic materials substantially replaced the more expensive ivory for veneer over the wood in the manufacture of keyboards.

The synthetic plastic materials offered more flexibility in the manufacture of keyboards than had been possible with ivory. Grain matching and color matching was no longer necessary and the synthetic plastic materials could be manufactured in much larger sheets. The art of keyboard manufacture progressed to the point where the plastic veneer for the top and front of the keyboard octave was molded in a single piece. This is described and illustrated in the patent to Good No. 3,060,074, issued Oct. 23, 1962, and assigned to the assignee of the present invention.

A further step forward in the keyboard manufacturing art occurred with the introduction of individually molded plastic key caps. Such caps permitted the wooden key shanks to be sawed out of a single wood piece before any plastic veneer was applied thereto. The individual caps were then secured to the key shanks to form the completed key assembly. Such a development is described and illustrated in the patent to Stiles, No. 3,120,146, issued Feb. 4, 1964, and assigned to the assignee of the present invention. As this patent pointed out, because the natural keys must have offset shapes to accommodate the adjacent sharp keys, molding the key caps to the desired form eliminates costly cutting and machining operations. Furthermore, the key cap leaves no exposed wood which can become tarnished and unsightly and, in the case of sharp keys, which must be dyed black to be less noticeable. Molded key caps are generally more uniform and are smoother and without sharp corners for greater playing comfort. Key capped keyboards also facilitate replacement and repair of damaged keys in the field.

Construction of keyboards by the use of individual molded key caps as shown in the Stiles patent cited above, has proved very successful. However, although this technique is better than previous constructions, some difficulties exist. Because of the size of the key cap, the draft of the mold cavities in which it is made may be quite deep, prolonging the cooling time. A taper is required in the mold cavity to permit the removal of the molded cap from the cavity, and such taper, of course, also exists in the finished molded cap. This taper can present difficulties in achieving uniform spacing of keys and may detract from the appearance of the finished keyboard in that exceptionally large spaces may be left between adjacent keys. In addition, when molding a key cap, the separable portions of the mold result in a flash at the parting line. If this flash is not polished or machined off, it may abrade the fingers of a person playing the piano. Sufficient machining and polishing to completely remove the flash is expensive and time consuming.

Other difficulties may be presented in the assembly of molded key caps to the wooden key shanks or sticks. When the key cap is designed such that its interior surfaces mate with and adhere to the surfaces of the wooden key stick, the stick must be sanded smooth to exacting tolerances in order to effect proper alignment of the cap on the stick. It is also desirable that the wooden stick extend to the front of the key cap in order to provide structural support for withstanding the percussive blows to which the keys are often subjected during the playing of a piano. Where the key stick does not extend all the way to the front of the key cap, other strengthening measures may be necessary such as the provision of additional plastic material for reinforcement, and the provision of additional fastening means for securing the cap to the stick. These all add cost to the manufacture of the keyboard. On the other hand, if the key sticks are extended to the front of the key caps, additional machining may be necessary since provision must be made in the natural keys for offsets to accommodate the adjacent sharp keys.

Accordingly, it is an object of this invention to provide a keyboard for musical keyboard instruments, and in particular pianos, which is of improved construction and has an attractive appearance.

Another object of the invention is to provide an improved construction for a piano key which permits the use of a molded key cap and which facilitates alignment of the key cap on the wooden key shank.

A further object of the invention is to provide a piano key construction which is strong throughout the length of the key and which is of substantially lower cost than prior constructions.

Still another object of the invention is to provide a piano key construction comprised of a wooden key shank and a unitary molded key cap secured to the shank, which molded key cap is molded in an improved manner with minimum noticeable taper.

Another object of the invention is to provide an improved method for assembling a unitary molded key cap to a wooden key shank.

A feature of the invention is the provision of a key construction comprising a wooden shank having recessed sides along its top and front, and the further provision of a channel shaped unitary molded key cap having sides complementary to the recessed sides and fitting thereon. The shank extends the full length of the key and is of substantially uniform width, and the molded natural key cap has a sharp offset to form the usual key shape.

Another feature of the invention is the provision of a key shank having longitudinally extending shoulders on the sides thereof, and the further provision of a key cap which is mounted on the shank with the lower edges of its sides bearing against the shoulders on the shank.

Another feature of the invention is the provision of a molded unitary piano key cap having a top with down-

wardly extending sides and a front with rearwardly extending sides, and a parting line extending along the juncture between the sides extending from the front and top, rearwardly and downwardly to the lower edge of each of the sides. The front of the cap is of substantially uniform width from top to bottom.

Still another feature of the invention is the provision of a method for assembling molded key caps to wooden key shanks, wherein the shank is driven forward against the front of the key cap by means of a force applied to the key shank proximate the front end thereof, while simultaneously applying downward force on the key cap with respect to the shank thereof.

In the drawings:

FIG. 1 is a perspective view of a piano keyboard comprised of a plurality of keys constructed in accordance with the invention;

FIG. 2 is an enlarged exploded perspective view of the underside of the shank and cap of a natural key constructed in accordance with the invention;

FIG. 3 is a top view of a natural key constructed in accordance with the invention;

FIG. 4 is a sectional view taken along the line 4—4 of FIG. 3;

FIG. 5 is a sectional view taken along the line 5—5 of FIG. 3;

FIG. 6 is a top plan view of a sharp key constructed in accordance with the invention;

FIG. 7 is a side elevational view of the sharp key of FIG. 6;

FIG. 8 is a sectional view taken along the line 8—8 of FIG. 7;

FIG. 9 is a bottom plan view of an unfinished keyboard illustrating the sawing operations performed thereon;

FIG. 10 is a schematic plan view illustrating a step in a method of assembling a natural key in accordance with the invention;

FIG. 11 is an elevational view schematically illustrating the method step of FIG. 10; and

FIG. 12 is a schematic elevational view, similar to FIG. 11, illustrating the assembly of a sharp key.

In accordance with the invention, the piano keys each include an elongated wood shank having a longitudinally extending shoulder on each side. The key caps for both natural and sharp keys each comprise a top and two substantially parallel sides extending from the top to form a channel therewith adapted to be mounted on the key shank. Each of the key caps further comprises a front closing the channel formed by the top and sides at one end thereof. The lower edges of the sides of the key caps engage respective ones of the shoulders on the shanks. The shanks extend all the way to the front of the keys and are of substantially uniform width. The key cap for each natural key is formed in the usual key shape with sharp offset or offsets, and has a front of uniform width from top to bottom. Such key caps are molded of plastic material and have tops with side portions extending downwardly therefrom, and fronts with side portions extending rearwardly therefrom and joining the side portions extending from the top. A parting line protuberance is formed at the junction of the side portions on each side of the key caps and extends from the front and top rearwardly and downwardly to the lower edge of the sides.

An improved method for assembling the unitary molded key caps to the wooden shanks is also contemplated by the force placed thereon manually. The shank is then aligned and driven forward into the key cap by means of force applied to the shank proximate the front end thereof. Simultaneously with this, downward pressure is exerted on the key cap to force it against the shank. In this manner, the cap is aligned on the shank with the lower edges of the channel abutting the shoulder along the sides of the shank for proper alignment. To enable

the application of driving force to the shank proximate the front end thereof, the shank is provided with a bearing shoulder, such as a notch or projection, on the underside thereof.

Referring now more particularly to the drawings, the perspective view of a fragment of keyboard shown in FIG. 1 shows the keyboard comprised of natural keys **11** and sharp keys **12**. The sharp keys **12** are positioned in offsets in the natural keys **11** and extend above the natural keys in a known manner. Each of the natural keys comprises an elongated wooden key shank **13** and a unitary molded plastic key cap **14** mounted upon the key shank. The sharp keys **12** similarly are each comprised of an elongated wooden key shank **15** and a unitary molded plastic key cap **16** mounted thereupon. The inner ends of shanks **13** and **15** are flared at various angles as is required to permit the shanks to extend portions of a piano action (not shown). Each of the wooden shanks **13** includes an opening **17** for receiving one of a plurality of pins **18** extending upwardly from key frame **19**.

FIG. 2 illustrates, in an exploded view, the construction of one of the natural keys **11** comprising a key cap **14** to be mounted on a wooden shank **13**. FIGS. 3, 4 and 5 illustrate various other aspects of this key when in assembled condition. The key cap has a top **21** and two parallel sides **22** and **23** extending downwardly therefrom to form a channel. A front **24** encloses the channel at one end thereof. The front **24** extends down below the bottom edges **22***a* and **23***a* of the sides **22** and **23** and is of substantially uniform width from top to bottom. The sides have portions **22***b* and **23***b* which extend rearwardly from the front **24**, with bottom edges **22***c* and **23***c* adjacent the front **24** which are flush with the bottom edge of the front and extend back from the front a distance substantially the same as the distance between the top **21** and the bottom edges **22***a* and **23***a* of sides **22** and **23**. The bottom edges **22***c* and **23***c* of the side portions **22***b* and **23***b* are lower than the edges **22***a* and **23***a* so that a step is formed on each side of the key cap. Side **22** has a right angle portion **25** to form an offset in the natural key for accommodating the adjacent sharp key therein. The right angle portions **25** may be on one or both sides of the keys and may be of different lengths for different keys, according to the particular note and relation thereto of the adjacent sharp key, as is well known in the art.

The wooden shank **13** is formed to accommodate the key cap **14** by milling a recessed portion in the sides thereof which extends along the top of the key and down the front. This recessed portion leaves a shoulder **31** extending outwardly from the side of shank **13** and beginning a short distance from the front of the shank. The sides **22** and **23** of key cap **14** follow a generally mating configuration with the recessed sides of the shank, leaving lower edges **22***a* and **23***a* respectively which are raised somewhat above the level of the lower edge of the front. Key cap **14** is mounted on the end of shank **13** with lower edges **22***a* and **23***a* engaging the shoulder **31** on appropriate sides for aligning the key cap with respect to the shank. The alignment problem becomes especially significant when, as indicated in the drawings, the top **21** and front **24** of key cap **14** are crowned slightly on their outer surfaces. A more attractive external appearance for the keyboard is presented by crowned keys, but external alignment of the key caps with respect to the shanks may be difficult. It should be noted that shank **13** extends into the channel of cap **14** all the way to the front thereof to provide strength for the cap in order to withstand the percussive blows to which keys are generally subjected in playing a piano.

Referring to FIGS. 6, 7 and 8, a sharp key constructed in accordance with the invention is shown. The key cap for the sharp key is a unitary molded piece of thermosetting material such as a phenolic resin and may be

molded in a press. It is formed in generally the shape of a channel with a top **41** and sides **42** and **43**, and has a step **44** toward the rear of the cap. Shoulders **45** and **46** are formed in the sides of the shank **15** and the lower edges of the sides **42** and **43** bear against shoulders **45** and **46** for aligning the key caps with respect to the shanks in a manner analogous to the alignment of the natural key caps on their respective shanks. Here, as was the case with the natural keys, the shank extends the full length of the cap for strength and rigidity. The side skirts on the sharp or black keys extend downwardly far enough to make it unnecessary to apply black dye to the wood adjacent the cap, or to finish machine the shank after the cap is mounted.

At the inner ends of both the natural key caps and the sharp key caps, it is important that the milling cuts for recessing the sides do not extend to the flared portion of the key. This is so that they do not come too close to the balance pin bushing openings **51** and **52** in the respective shanks so as to weaken the shanks. To avoid this, the sides **22** and **23** of the natural key cap are terminated before the rear edge of top **21** in order to leave a recess **53** at the inner end of the key cap. Accordingly the milling cuts in the shank may be terminated at point **54**, prior to the beginning of the flares. Similarly with the sharp keys, the milling cut **55** is terminated prior to the flare, but instead of recessing the ends of the sides as was the case in the natural keys, the sharp keys are provided with a small radius at their ends **56** in order to clear the radius formed by the milling cutters at **55**.

In molding the natural key caps, the caps are improved in their design to prevent unsightly appearance of the parting line and possible abrasion of the fingers of the person playing the piano. Furthermore, the key caps are molded so that the width of the front of the key cap **14** is substantially uniform from the top to the bottom thereof. This is accomplished by designing the key cap **14** wherein the parting line of the mold extends across the underside of the projecting lip **14***a* of the key cap and down the sides at about a 45 degree angle to the right angle portion of the lower edges **22***a* and **23***a* of the sides **22** and **23** respectively. The parting line divides the sides into portions which extend from the top and portions which extend from the front. This permits the front and the side portions extending therefrom to be a greater distance from the top than the remainder of the sides to reduce the draft of the mold.

When the key cap is molded, a flash will result along the parting line and it need not be fully removed but only reduced somewhat by a polishing operation. This leaves a parting line protuberance **61** which will not be readily apparent when adjacent keys are pressed, nor is it in a position to abrade the fingers of a pianist. By extending the parting line as described and then along the lower edges **22***a* and **23***a* of the key cap, the separable parts of the mold cavity may be opened simultaneously. In this way the mold cycle time is minimized because the draft of any one cavity need not equal the full key height, and the molded part will release more easily from the split mold cavities. The distribution of required draft among the various separable parts of the mold minimizes the draft requirements. Warpage is also reduced and, in addition, this construction will permit the front vertical exterior edges of the key caps to be parallel or without taper, which is desirable for more even spacing of the keys. The mold taper is outward from the front and top of the key toward the parting line so that variation in dimensions of the key due to mold cavity taper is not noticeable but is concealed by the adjacent keys.

The advantages provided by the foregoing described structure are numerous. In addition to providing a more structurally solid key construction and more attractive appearing individual keys, the overall appearance of a keyboard composed of such keys is enhanced due to the diffusion or reflected light from the crowned tops and fronts of the natural or white keys and to a superior highlighting effect. Alignment of the keys with respect to each other is also less critical due to the crowned tops and fronts. Sanding to exacting smoothness and tolerance requirements on the wooden key shanks is unnecessary because the milled shoulders on the sides of the key shanks are used for aligning the key caps thereon. The key caps need not even touch the top of the shank and adherence may be achieved by bonding between the lower edges of the key caps and the shoulders on the sides of the key shanks. This is especially significant where the key caps are molded from a phenolic resin or thermosetting material. In order to glue such material, the skin must be roughened somewhat and since bonding takes place only between the lower edges of the cap and the wooden key shank, only the lower edges of the cap need be roughened.

The key construction permits a number of manufacturing operations to be eliminated. Since the entire key cap is in a single molded piece, sorting and assembly problems are minimized, as is the need for sanding and polishing to remove rough edges. Sawing operations in sawing out the wooden shanks are reduced because it is not necessary to cut offsets for the sharps in the shanks for the natural keys, even though the key shanks extend to the front of the caps. Thus the sharp and the natural shanks may be cut out at the same time. The sharp shanks are later shortened by a break off operation.

Referring to FIG. 9, the sawing operations are illustrated schematically. The front parts of the wooden key shanks are shaped by making a plurality of linear saw cuts **71** in the front of a unitary wooden piece **72**. The cuts are spaced according to the width of the keys desired, as illustrated by the appropriately marked keys in the drawing. The flared inner ends of the wooden key shanks are formed by a plurality of angled cuts from the back of the piece **72** which intercept the cuts **71**. The direction and location of these angled cuts are illustrated by the dotted lines **73** in FIG. 9. Both front and rear cuts may be made by ganged saws of the circular type, as is well known in the art of keyboard manufacturing. Sharp break off is made along the lines **74**. The result of the eliminated operations is non only an overall reduction in production time, but a lessening of floor space requirements because of the fewer operations and lower in-process inventory. This latter fact also reduces the materials investment required in the manufacturing operations for the keyboards. Fewer operations also mean less handling, cutting down the possibility of damage to the keyboards requiring in-process repairs or scrapping.

The invention further contemplates an improved method for assembling key caps to the wooden key shanks. In this method, the key shank is driven forward into the key cap by applying force proximate the front end of the shank. Simultaneously with this, downward force is exerted on the cap to abut the lower edges thereof against the shoulders on the sides of the shank. Because the forward driving force is applied to the shank near the front end thereof, there is less danger of misalignment and breakage. Provision for applying such force is made in the underside of the shank by means of a shoulder formed thereon.

Referring now to FIGS. 10 and 11, there is schematically illustrated a semi-automated manufacturing process incorporating the inventive method described above. The operator draws the wood key stick manually through a cement applicator with one hand and uses the other hand to place an appropriae key cap on the wood stick at approximate location. The operator then places this assembly in a machine, aligning the wooden key shank in two guides represented in FIGS. 10 and 11 as **81**. It will be noted that the underside of the key shank is provided with a notch **82** toward the front. This notch may be cut in the keyboard prior to sawing the individual key shanks. A machine element **83** mates in the notch and drives the wooden key shank forward into the key cap with a force

F_1, compressing the front 24 of the key cap between the wooden key shank and the end 85 of the machine fixture 86. At the same time, a further machine element 87 presses down on the top of the key cap with a force F_2 firmly abutting the lower edges 22*a* and 23*a* of the cap 14 against the appropriate shoulders 31 on the wooden shank 13. This method of assembly is fast and economical, further reducing the production cost of the keys.

A corresponding manufacturing process for the sharp keys is illustrated in FIG. 12. The machine elements corresponding to the elements of FIGS. 11 and 12 are designated by identical numbers and a subscript S. The operation of the process is the same as for the natural keys.

Although the invention is herein described as utilizing wooden key shanks, it is to be understood that other materials such as metal or plastic might be used for for the shanks, within the scope of the invention. In addition to pianos, the invention has application to keyboards for other types of musical instruments, such as organs and harpsichords.

From the foregoing it will be seen that the invention provides an improved piano key construction of attractive external appearance and adequate strength. The key structure permits very uniform and close spacing between keys because the structure lends itself to precise manufacturing methods at low cost. The structure, although very different from traditional keyboards, effects no significant change in the balance or "weigh-off" of the keys making it possible to easily substitute this keyboard structure for traditional keyboards. Production costs are considerably reduced due to the elimination of a number of manufacturing steps. The invention further provides a method for assembling molded key caps to key shanks which effects a substantial reduction in cost and time.

I claim:

1. In a keyboard for a musical instrument having natural and sharp keys, the combination including a plurality of elongated key shanks, each having a longitudinally extending shoulder on each side thereof, and a plurality of molded plastic key caps each having a top and two substantially parallel sides extending from said top to form a channel therewith, each of said key caps further having a front closing the channel formed by said top and sides at one end thereof, each of said key caps being secured on a respective one of said shanks with the lower edges of said sides engaging respective ones of said shoulders on said shank to align said key cap with respect to said shank, each of said key caps for said natural keys having a crowned top and a crowned front, whereby said natural keys collectively diffuse reflected light and may be readily aligned with respect to each other.

2. A key for use in a keyboard instrument including in combination, an elongated shank with the sides thereof being recessed along the top and front thereof, a key cap having a top and two substantially parallel sides extending from said top to form a channel therewith, each of said sides generally corresponding to the shape of said recesses in the sides of said shank, said key cap further having a front closing the channel formed by said top and sides at one end thereof, said key cap being secured on said shank with said sides of said key cap being accommodated by said recesses in said sides of said shank, said shank extending to said front of said key cap.

3. A key for use in a keyboard instrument including in combination, an elongated shank having a longitudinally extending shoulder on each side thereof, and a key cap having a top and two substantially parallel sides extending from said top to form a channel therewith, said key cap further having a front closing the channel formed by said top and sides at one end thereof, said key cap being secured on said shank with the lower edges of said sides engaging respective ones of said shoulders on said shank.

4. A key in accordance with claim 3 wherein said key cap has a crowned top and a crowned front.

5. A key in accordance with claim 3 wherein said key cap is a unitary structure of molded plastic material and said front thereof is of substantially uniform width.

6. A key in accordance with claim 3 wherein said key cap is a unitary structure of molded plastic material having a parting line protuberance on each of said sides extending from the juncture between each of said sides and said front and top rearwardly and downwardly to the lower edge of said side.

7. A key in accordance with claim 3 wherein said key cap is a unitary structure of molded plastic material and wherein each of said sides thereof has a step therein with the portion of each side adjacent said front extending from said top a greater distance than the portion of said side rearwardly of said step.

8. A key in accordance with claim 3 for use as a natural key in a keyboard having natural and sharp keys, and wherein said top and one of said sides of said key cap are formed to provide an offset for accommodating an adjacent sharp key.

9. A key for use in a keyboard instrument including in combination, an elongated shank having a longitudinally extending shoulder on each side, and a molded plastic key cap having a top and two substantially parallel sides extending from said top to form a channel therewith, said key cap further having a front closing the channel formed by said top and sides at one end thereof, said key cap being secured on said shank, with the lower edges of said sides engaging respective ones of said shoulders on said shank to align said key cap with respect to said shank.

10. The combination of claim 9 wherein said key cap is secured to said shank by means of a bond between the lower edges of said sides and said respective ones of said shoulders on said shank.

11. The combination of claim 10 wherein said key cap is molded of a thermosetting material and wherein the lower edges of said sides thereof are roughened.

12. A natural piano key including in combination, an elongated shank of substantially uniform width, said shank having a longitudinally extending shoulder on each side, and a molded plastic key cap having a top and two substantially parallel sides extending from said top to form a channel therewith, said top and one of said sides being formed to provide an offset in said key cap for accommodating an adjacent sharp key, said key cap further having a front closing the channel formed by said top and sides at one end thereof, said key cap being secured on said shank with the lower edges of said sides engaging respective ones of said shoulders on said shank to align said key cap with respect to said shank, said shank extending to said front of said key cap.

13. A sharp key for a keyboard instrument, including in combination, an elongated wooden shank having a substantially uniform width and having a longitudinally extending shoulder on each side, and a key cap molded of thermosetting material and having a top and two substantially parallel sides extending from said top to form a channel therewith, said key cap further having a front closing the channel formed by said top and sides at the front end thereof and having a vertically disposed step on said top at the rear end thereof, said key cap being secured on said shank with the lower edges of said sides being roughened and engaging and being bonded to respective ones of said shoulders on said shank to align said key cap with respect to said shank and secure the same thereon.

14. A piano key including in combination, an elongated wooden shank having a front portion with a longitudinally extending shoulder on each side and a rear portion disposed at an angle to said front portion, and a molded plastic key cap having a top and two substantially parallel sides extending from said top to form a channel there-

with, said key cap further having a front closing the channel formed by said top and sides at one end thereof, said key cap being secured on said front portion of said shank with the lower edges of said sides engaging respective ones of said shoulders on said shank to align said key cap with respect to said shank, said shank having means on the underside proximate the front end thereof for receiving the application of force to said shank proximate the front end thereof for assembling said cap to said shank.

15. The combination of claim **14** wherein said means comprise a notch formed on the underside of said shank proximate the front end thereof.

16. A key for use in a keyboard instrument, including in combination, an elongated shank having a front portion and a flared portion extending angularly with respect to said front portion, a longitudinal milled recess extending along each side of said front portion of said shank and terminating proximate the juncture between said front portion and said flared portion of said shank, and a key cap having a top and two substantially parallel sides extending from said top to form a channel therewith, said sides mating with respective ones of said recesses on said front portion of said shank and terminating at one end of said key cap at the termination of

said recesses, said top of said key cap extending beyond the termination of said sides to extend at least partially over said flared portion of said shank.

17. A key for use in a keyboard instrument, including in combination, an elongated shank having a front portion and an angularly disposed rear portion, said front portion having longitudinally extending recesses on either side thereof terminating proximate the juncture between said front portion and said rear portion of said shank, and a key cap having a top and two substantially parallel sides extending from said top to form a channel therewith, said sides of said key cap mating with said recesses on said sides of said front portion of said shank, said sides being reduced in thickness proximate the rearward edge thereof and extending beyond the termination of said recesses in said front portion of said shank.

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RICHARD B. WILKINSON, *Primary Examiner.*

GARY M. POLUMBUS, *Assistant Examiner.*