June 14, 1938. K. FLADER 2,120,553

KEY CAP

Filed Nov. 14, 1935

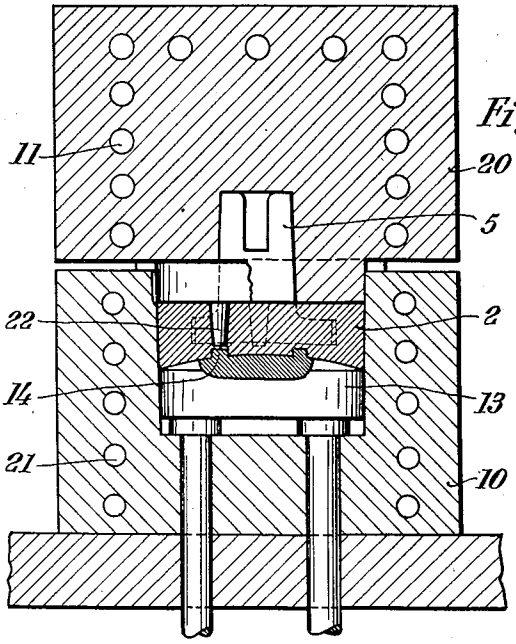


Fig.1

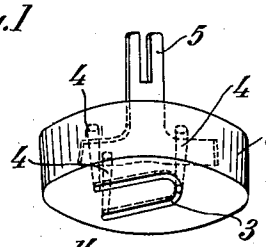


Fig.3

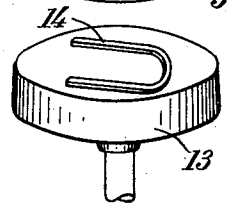


Fig.4

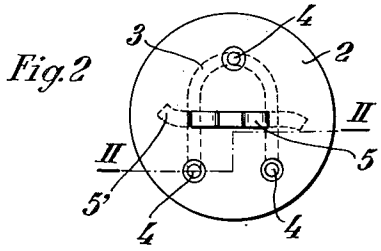


Fig.2

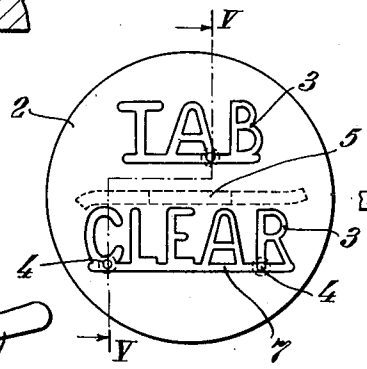


Fig.5

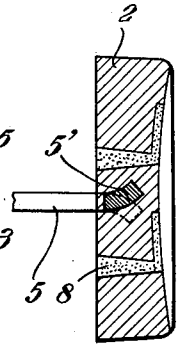


Fig.6

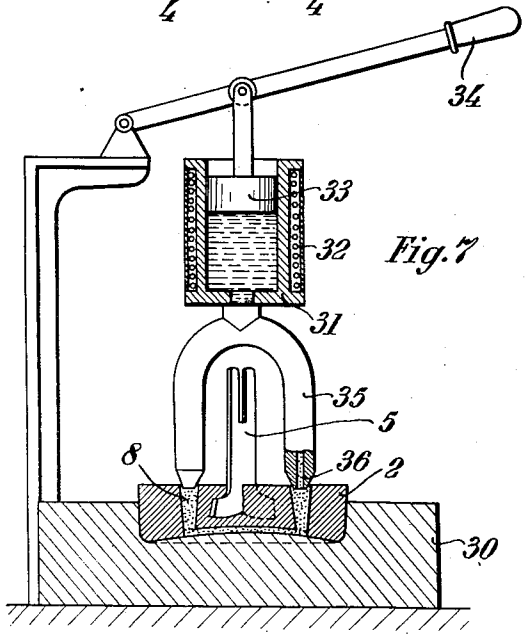
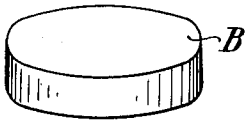


Fig.7

Fig.8



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KEY CAP

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Application November 14, 1935, Serial No. 49,703
In Germany October 31, 1933

7 Claims. (Cl. 197—102)

My invention relates to improvements in key caps for typewriters, calculating and other key operated machines, the key caps of which are usually provided at their upper face with one or more identification marks, such as letters, figures, symbols, stops, collectively hereinafter called "characters", and at their bottom with a shank or stem connecting the cap with the key lever.

The various objects aimed at by this invention and the advantages obtained will be more fully understood by first reviewing some of the principal structural characteristics of and the drawbacks inherent to key caps of known design.

Heretofore characters were applied to the key caps by carving or engraving them in the form of shallow notches or recesses into the upper face of the key cap, filling the recesses with an adhesive, colored paste, paint etc., and allowing the filled in material to dry and become hard, or else the characters were stamped out of thin sheets of celluloid so as to closely match the recesses in the caps and were inserted into the latter, and affixed similarly to the inlaid work of fine furniture and pieces of art.

In both cases the bas-relief patterns or recesses were rather shallow as to their depth, particularly since such tiny patterns having clean cut edges can only be obtained by stamping thin sheets of celluloid.

As a matter of course both kinds of the characters described, viz, those of dried paint and those of celluloid, are subject to rapid wear, viz, to be scratched by the typist's finger-nails, dissolved and discolored by human perspiration, to be loosened, broken and torn out of their places, and are also rather insanitary because dirt and dust would accumulate in the receding edges and corners of those inlaid characters of celluloid, which were not quite flush with the other surface of the cap.

Recently another type of cap has been widely used, the characters of which are printed on small pieces of card board, the latter being covered by thin plates of glass and secured to the cap by nickel or chromium plated clamping rings having a curled upper edge and frictionally engaging the body of the cap.

These caps however are rather costly to make and have another disadvantage, inasmuch as key boards provided therewith, because of presenting so many surfaces of glass and shiny light-reflecting metal rings, have a somewhat glittering and glaring appearance irritating or tiring to the typist.

The principal object of this invention is to overcome the aforesaid drawbacks by providing improved characters for key caps of simple and wear resisting design, which can be made at low cost by mass-production.

Another salient feature of the invention is the provision of simple means for producing and permanently providing the cap with characters which are not detachable, or readily damaged by scratching or discolored by perspiration.

In connection therewith the invention aims at providing also improved means for securing the stem to the cap in a simple and inexpensive manner, thereby further reducing the production costs of key operated machines.

Other objects of this invention will become incidentally apparent hereinafter to experts in this field.

The nature and scope of this invention are briefly outlined in the appended claims and will be more fully understood from the following specification, taken together with the accompanying drawing, in which

Fig. 1 is a fragmentary section taken vertically through a mould, for making caps of improved design according to this invention; the cap proper and the bottom portion of the mould being shown in section along line II—II in Figure 2;

Fig. 2 is a plan showing the cap as seen from below and the stem incorporated therein;

Fig. 3 is a perspective view of the cap as it comes out of the mould;

Fig. 4 is a perspective view of the bottom part of the mould;

Fig. 5 is a top view of a cap provided with somewhat complicated and extensive characters;

Fig. 6 is a section of the cap taken on line V—V in Fig. 5;

Fig. 7 is a diagrammatic lay-out, showing by way of an example a means for filling the channels and recesses (characters) of the cap with a plastic composition, which will subsequently rigidify and then be of relatively great hardness;

Fig. 8 shows perspectively and in an enlarged scale one of the blocks or tablets for recharging the mould shown in Fig. 1; said tablets are obtained by briquetting definite quantities of a composition of matter in bulk, from which the improved caps are preferably made.

In Figures 1–7 of the drawing the key cap is shown in a scale larger than its usual size.

According to this invention the key cap 2 is provided:

(1) At its upper section with relatively deep grooves or recesses, indicated at 3, in the form of the characters or identification marks requisite of the individual key-cap; in Figs. 1–3 said recesses are shown in the form of a U by way of an example;

(2) With channels 4 extending through the cap from top to bottom, of conical shape and relatively small cross section, terminating at the bottom of said recesses 3 and with their small ends merging into the recesses 3 and their side walls extending smoothly to the bottom face of the cap;

(3) With a vitrified formerly plastic mass 8 enclosed in said recesses and channels, the vitrified mass 8 enclosed in said channels 4 acting as anchors and securely retaining the characters of the cap in their position;

(4) With a stem 5 projecting from the lower face of the cap 2 for attaching the latter to the key lever (not shown) of a typewriting or other key operated machine.

The said stem 5 is preferably secured to the cap 2 by incorporating or embedding its upper end into the material, of which the cap is made, and while said material is in plastic condition.

Key-caps re-designed according to this invention are made to advantage as articles of mass production from one of those resinous compositions of matter, collectively called by chemists "phenoplasts" and "aminoplasts" and known to the public under various trade-names.

The characters appearing at the upper face of the cap like inlaid work are preferably made of acetyl-cellulose, which is heated so as to become a plastic mass and is injected under considerable pressure through the channels 4 into the recesses 3 of the cap, completely filling the latter up to the remotest corner, and being flush with the upper surface of the cap.

Using acetyl-cellulose for filling the recesses 3 is advantageous because on becoming rigid it presents a hard and wear-resisting mass having a smooth, vitreous-like surface and substantially the same coefficient of thermic expansion as those resinous materials from which the cap proper is preferably made.

However I wish it to be understood, that my claims are not limited to using acetyl-cellulose for the purpose set forth, since other materials or compositions of matter having the same properties may be found, which are equally useful and applicable.

I have found it advantageous to make key caps re-designed according to this invention by a process described hereinafter and by using apparatus shown by way of examples in Figs. 1 and 7.

Fig. 1 shows a mould, the interior of which is an exact replica of the cap to be made and which consists of a lower section or base 10, an upper section or lid 20; means diagrammatically indicated at 11 and 21 are provided for heating the mould and means (not shown) for reciprocating the lid 20 and keeping it pressed with high pressure against the material in the mould.

The bottom piece 13 of the mould which may be conveniently made exchangeable and designed as an ejector, is formed with the respective character or characters of the cap in haut-relief, namely in the form of relatively high ridges 14 projecting from the upper face of bottom piece 13. The lid 20 of the mould is formed at its lower face with a plurality of conical studs 22 so designed as to terminate closely above the said ridges 14, when the mould is closed and under pressure; in the center of lid 20 a recess is formed closely fitting the stem 5 of the cap which is inserted thereinto before the mould is closed. The depth of the said recess on the lid 20 is so chosen, that on closing the mould the stem 5 is forced into the briquet B and is thus incorporated into the material of the cap.

On opening the mould the cap 2 is allowed to cool and become rigid and will then be ready for the finishing operations, the latter comprising removing the burr formed at the circumferential edges of the cap and in the channels 4, viz., between the opposed faces of the ridges 14 and the conical studs 22 (Fig. 1), and filling the channels 4 and recesses 3 of the cap with a plastic composition, which will become rigid when cold and present a hard vitreous mass of the nature described above.

The said plastic composition is preferably injected into the cap 2 by means of an apparatus, shown by way of an example in Fig. 7 and comprising:

A base plate 30 formed with a recess, the latter fitting the character bearing upper face of the cap, a cylinder 31 containing the plastic composition concerned and being heated preferably by electricity as indicated at 32, a piston 33 operated by a lever 34 for ejecting the plastic composition under pressure from the cylinder 31, and a plurality of pipes 35 having nozzles 36 formed at their ends for injecting the plastic composition into the channels 4 and recesses 3 of the cap.

Various changes and modifications may be conveniently made in the structural details of key-caps of the improved design described hereinbefore, in the materials and compositions used, and in the method and means for making those caps shown by way of examples in the drawing, without substantially departing from the spirit and the salient ideas of this invention.

Inscriptions of key caps, which consist of several letters, symbols etc. spaced from each other, for instance tab-clear (Fig. 5), or are otherwise subdivided into a number of parts may be underlined to advantage as indicated at 7 in Fig. 5, so as to bodily associate and interconnect by a common structural element, namely an additional or auxiliary recess, the various letters concerned, thus keeping them jointly secured within the cap, and also reducing the number of anchors and channels 4 which would be otherwise required for filling the individual recesses pertaining to each of the letters etc. of the inscription. The stem 5 of the cap may be conveniently provided with a crosshead twisted at its ends, as indicated at 5', so as to spread out and enlarge the faces of contact with the material of the cap. It will be noted that the ends 5' are curved away from the line of the straight portion of the cross head between them.

Although resinous compositions, which can be molded in virgin condition under heat and pressure and will be converted when cold into a hard mass of great density and tenacity, not softened by heat subsequently applied, have been found to be suitable materials for making key caps designed according to this invention, particularly because the caps will not be deformed or discolored by the heat subsequently applied by injecting a hot plastic substance into the channels and recesses 3, 4 of the caps (Fig. 7), I do not

wish to limit my claims to resinous compositions, since other substances for making artificial stone, artificial ivory etc. may be conveniently chosen and substituted.

What I claim is:—

1. In a key-cap for key operated machines, the combination with recesses in the form of bas-relief characters on top of the cap, of channels communicating with said recesses and terminating at the bottom face of the cap, a hardened mass enclosed in said channels and recesses, and an element for attaching the cap to a key lever having a shank extending from said cap, said channels being located laterally of and spaced from said shank.

2. In a key-cap for key operated machines, the combination with recesses in the form of bas-relief characters on top of the cap, of channels communicating with said recesses and terminating at the bottom face of the cap, a hardened mass enclosed in said channels and recesses, said transverse channels being of conical shape and converging towards said recesses, and an element for attaching the cap to a key lever having a shank extending from said cap, said channels being located laterally of and spaced from said shank.

3. In a key-cap for key operated machines, the combination with recesses in the form of bas-relief characters on top of the cap, of channels communicating with said recesses and terminating at the bottom face of the cap, a hardened mass enclosed in said channels and recesses, said cap consisting of a resinous composition of matter, adapted to be moulded under heat and pressure, solidifying when cold, and not regaining plasticity on being reheated, and an element for attaching the cap to a key lever having a shank extending from said cap, said channels being located laterally of and spaced from said shank.

4. In a key-cap for key operated machines, the combination with recesses in the form of bas-relief characters on top of the cap, of channels communicating with said recesses and terminating at the bottom face of the cap, a hardened mass enclosed in said channels and recesses, said hardened mass consisting of an acetyl-cellulose composition, adapted to be moulded under heat and pressure and vitrifying when cold, and an element for attaching the cap to a key lever having a shank extending from said cap, said channels being located laterally of and spaced from said shank.

5. In a key-cap for key operated machines, the combination with recesses in the form of bas-relief characters on top of the cap, of channels communicating with said recesses and terminating at the bottom of the cap, a hardened mass enclosed in said channels and recesses, said channels being interconnected by said recesses, and an element for attaching the cap to a key lever having a shank extending from said cap, said channels being located laterally of and spaced from said shank.

6. In a key-cap for key operated machines, the combination with recesses in the form of bas-relief characters on top of the cap, of channels communicating with said recesses and terminating at the bottom of the cap, a hardened mass enclosed in said channels and recesses, and a stem for attaching the cap to a key lever incorporated in said cap, said stem including a bar adapted to be embedded in the cap and extending substantially parallel to the face of the cap and a shank for attachment projecting from said cap and substantially at right angles to said bar, said channels being located laterally of and spaced from said shank.

7. In a key-cap for key operated machines, the combination with recesses in the form of bas-relief characters on top of the cap, of channels communicating with said recesses and terminating at the bottom of the cap, a hardened mass enclosed in said channels and recesses, and a stem for attaching the cap to a key lever incorporated in said cap, said stem including a bar adapted to be embedded in the cap and extending substantially parallel to the face of the cap and a shank for attachment projecting from said cap and substantially at right angles to said bar, said bar having the opposite ends thereof curved in opposite directions, said channels being located laterally of and spaced from said shank.

KONRAD FLADER.