June 9, 1931. E. J. GULICK 1,809,380

CLARINET AND THE METHOD OF MANUFACTURE THEREOF

Filed Oct. 12, 1928 2 Sheets-Sheet 1

Fig. 1.

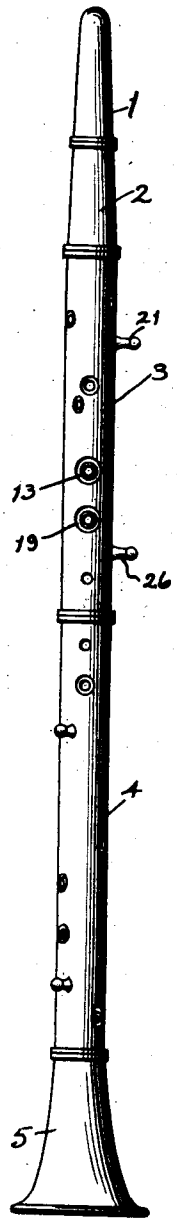


Fig. 2.

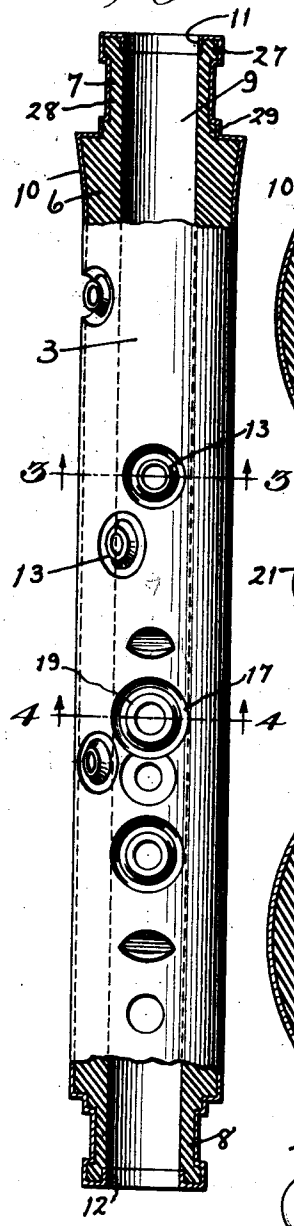


Fig. 3.

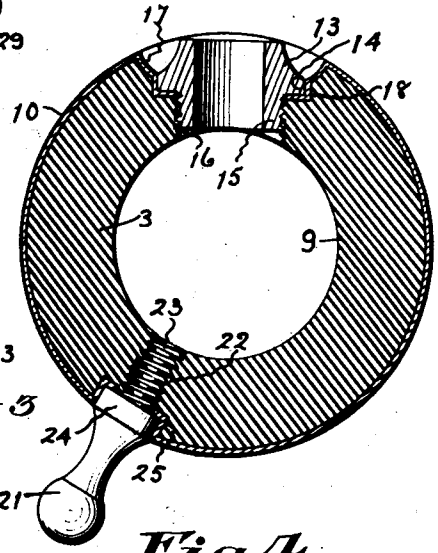


Fig. 4.

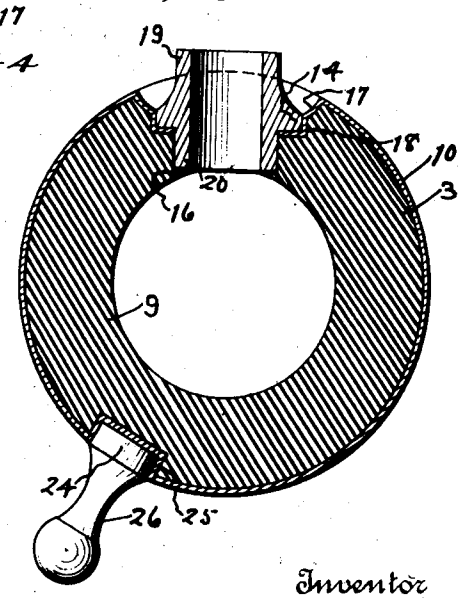
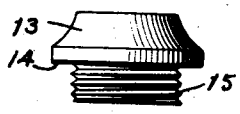


Fig. 5.



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CLARINET AND THE METHOD OF MANUFACTURE THEREOF

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Fig. 10.

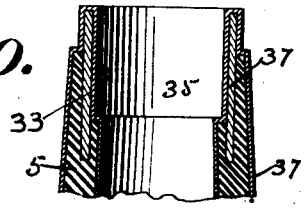


Fig. 13.

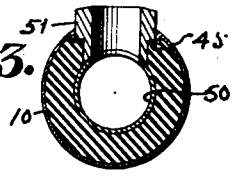
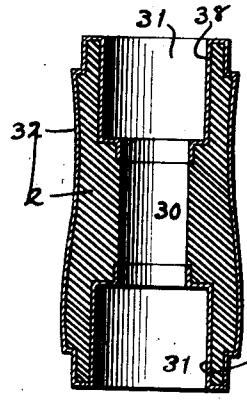


Fig. 7.

Fig. 6.



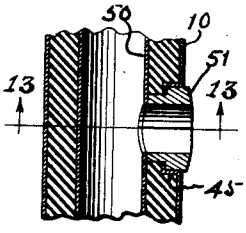


Fig. 12.

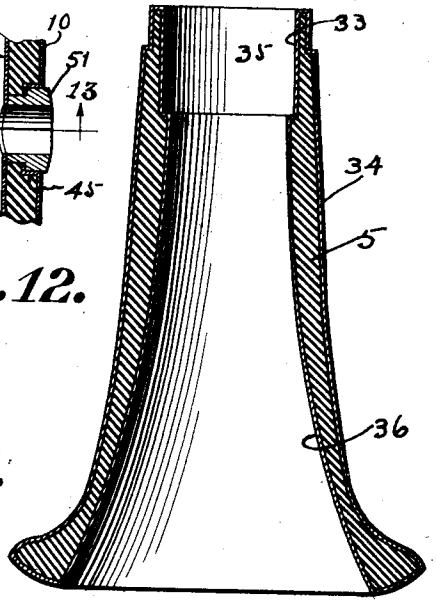


Fig. 14.

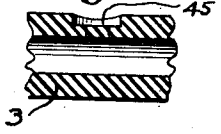


Fig. 15.

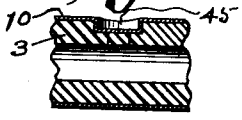


Fig. 8.

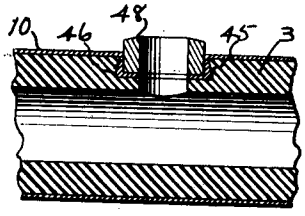


Fig. 16.

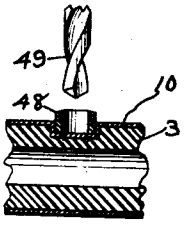


Fig. 9.

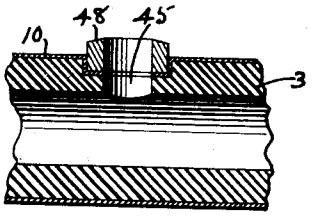


Fig. 11.

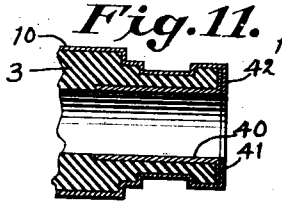
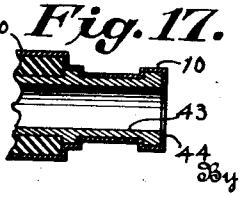


Fig. 17.



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UNITED STATES PATENT OFFICE

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CLARINET AND THE METHOD OF MANUFACTURE THEREOF

Application filed October 12, 1928. Serial No. 312,089.

This invention relates to improvements in musical instruments, particularly clarinets and the like.

An object of the invention is to provide an instrument of this type in which the weight is considerably reduced as compared with the ordinary metal instrument without sacrificing the appearance or any of the other desirable qualities of the metal instrument.

Another object of the invention is to provide a new and improved method of application of the key-seats in cooperation with the formation of the tone openings in the instrument body.

It is, furthermore, an object of the invention to provide an instrument of this type of a material which readily lends itself to molding and to subsequent finishing work on a lathe or other machine tool, whereby the shape of the instrument may be improved over the known shape of the same instrument, or may be greatly altered in other respects as desired.

A further object of the invention is to provide an instrument of this type the cost of manufacture of which is considerably less than the cost of heavy metal clarinets, while simultaneously reducing the weight of the instrument, without detracting from its appearance.

With these and numerous other objects in view, embodiments of the instruments are described in the following specification in which reference is had to the accompanying drawings.

In the drawings:

Fig. 1 is a side elevation of the body of the instrument;

Fig. 2 is partly a side elevation and partly section on a larger scale of one of the sections of the instrument;

Figs. 3 and 4 show cross-sections on lines 3—3 and 4—4 respectively of Fig. 2, on a still larger scale;

Fig. 5 is a side elevation of a key seat of the type shown in section in Fig. 3;

Fig. 6 is a sectional view of another section of the instrument;

Fig. 7 is a similar sectional view of an end section of the instrument;

Fig. 8 is a sectional view through a portion showing a modified key seat and the manner in which it is placed in the body of the instrument;

Fig. 9 illustrates another form of key seat in section, associated with a portion of the instrument also illustrated in section;

Fig. 10 is a sectional view of a modified end portion of a section of the instrument;

Fig. 11 is a sectional view of another modification of the end portion of an instrument section;

Fig. 12 illustrates in sectional view another type of key seat and its mounting in the body of the instrument;

Fig. 13 is a sectional view on line 13—13 of Fig. 12;

Figs. 14 to 16 inclusive show sectional views of a portion of the body of an instrument to illustrate the method of providing a socket for a key seat in proper position on said body, and

Fig. 17 again illustrates in sectional view a modified end portion of a section of the instrument.

The customary practice in the manufacture of certain wind instruments is to make them entirely of metal by shaping a tubing to proper size, and combining the various sections of metal tubing of which the instrument is composed to complete the entire body.

Contrasted with this customary practice, the present invention contemplates the production of an instrument of this type of non-metallic material, particularly of material which lends itself to molding and at the same time to a finishing treatment on the lathe or other machine tools, and to combine with this body of non-metallic material an outer covering closely adhering over the entire surface or any portion thereof to the non-metallic body so as to have the appearance of the ordinary brass instruments of this type.

The instrument, as shown in Fig. 1, is composed of several alined sections 1 to 4 inclusive, which are properly assembled and of which the sections 3 and 4 constitute the sections of the body proper of the instrument, while section 2 is an intermediate section to connect the body proper with the mouth-

piece 1, and section 5 is the usual bell shaped or enlarged terminal section of the instrument. The sections 2 to 5 inclusive in almost all instruments heretofore produced were made of metal tubing and had relatively heavy weight. The attachment of the various seats for valves or keys, and the attachment of posts for supporting the valve actuating arms provided difficulties owing to the relatively small thickness of the metal tubing.

According to the present invention the various sections heretofore made of metal are produced from non-metallic material, as hard rubber, or of some phenol condensate product, as bakelite or the like; it is also contemplated to produce these bodies of other suitable material, as for instance of suitable wood like ebony. Some of the materials enumerated lend themselves to casting or molding operations, and all of them may be given their final shape by tools on the lathe, boring tools or any other of the numerous tools for altering the shape of objects.

As shown in Fig. 2 illustrating the body section 3 on a larger scale, this section comprises a main or body portion 6 and reduced end portions 7 and 8 adapted to facilitate the connection of this section 3 with the adjacent alined sections 2 or 4 of the instrument body. The section 3, as shown in Fig. 2 has a central axial bore 9 of substantially uniform diameter extending from one end to the other, and this section, as well as the other sections 2 to 5, is suitably coated with a layer of metal to create the appearance of a metal instrument.

This layer 10 of metal may be applied in any desired way to the outer surface of the section although it is preferred to apply it by electroplating. In spite of having the appearance of a metal instrument, the new instrument will retain the light weight of the non-metallic mass of which it is produced and will be as durable or more so—as the metallic instruments. The thickness of the plating is shown exaggerated to make it appear clearer, although in reality this thickness is greatly reduced compared with the thickness of the non-metallic material of the various sections. The thickness may range from 0.001 inch upward to any desired thickness, and obviously any finish may be applied to the electroplated layer, by polishing or buffing the same, or in some other way. The metal deposited by the electric current on the outer surface of the various sections may either be the same over the entire instrument or it may be different in different sections, or may even be different at different portions of the same section. Any of the metals as they are now used for wind instruments to improve their appearance may be deposited, as for instance silver, copper, gold and other metals.

The attachment of the plating 10 to the body is solidified by causing this plating to extend over the end portions of the section and also into the interior of the same, at least for a part thereof, as indicated in Fig. 2 at 11 and 12. It is advisable to provide a suitable counter-bore at the ends of the bore 9 of these sections and to deposit the material on the wall of the counter-bored portion of a thickness to render the bore 9 substantially smooth over its entire length from one end to the other end of the section.

The attachment of key seats to the instruments of non-metal material, according to the present invention, is greatly improved by the fact that the wall thickness of the non-metallic body is greater than that of the metallic bodies, whereby the key seats or other parts to be fixed to the outer surface of the instrument may be provided with extensions fitted into suitable sockets of said wall portions. According to Figs. 3 and 5, a key seat 13 comprises an upper portion of substantially conical shape and terminating in a shoulder 14, said conical portion having a reduced extension 15 which is seated in a socket or radial hole 16 in the wall of the instrument. For the purpose of firmly seating the metallic key seat in the wall of the body the extension 15 is screw threaded and the radial socket 16 is tapped to receive the threaded extension. The base of the conical portion and the shoulder formed thereon, however, are firmly united with the metallic coating of the non-metallic body. For this purpose the circular depression 16 which receives the key seat 13 also is provided with a metallic coating 17 forming a layer integral with the coating 10 which covers the main portion of the section. The socket 17 also is provided at its inner end with a counter-bore 18 from the bottom of which the tapped opening 16 readily extends inward. The metallic layer, therefore is extended to cover the cylindrical surface and bottom surface of the counter-bored portion 18 of the depression 17, and this portion also forms one integral layer with the outer coating of the instrument. The shoulder 14 of the key seat, therefore rests on a metallic surface formed by the continuation of the outer metallic coating into the circular depression 17 and counter-bore 18 thereof, and owing to the presence of this metallic layer, the key seat 13 may be soldered to this metallic layer while the threaded extension is received in the tapped radial bore of the body.

The key seat 19 illustrated in Fig. 4 is similar to the key seat shown in Figs. 3 and 5, but instead of being provided with a threaded extension axially of the shoulder part of this key seat, the extension 20 has a smooth cylindrical surface and is forced into a smooth radial bore 16 extending through the wall of the instrument.

The post 21 which may serve for supporting an arm or lever for actuating of the valves also is secured according to Fig. 3 in a radial tapped bore 22 owing to the provision of a threaded extension 23 on said post. The post itself terminates in a cylindrical short base 24 seated in a circular depression 25 of the body 3, and here also a firm durable connection between the post and the body of the instrument is established through the provision of a circular layer of metallic material covering the cylindrical wall of the depression and continued to cover also the bottom of said depression. This layer also is integral with the outer layer surrounding the entire body of the instrument.

According to Fig. 4 the threaded extension of the post 26 is omitted and obviously the tapped bore in the body also is eliminated, the post having a cylindrical base 24 which is seated in a suitable cylindrical depression 25 extending inward from the outer surface of the body, this depression again having a coating integral with the outer metallic coating of the body and the post merely being soldered into the plated socket so as to be firmly retained therein.

In order to assure that sliding fit which is necessary for the proper assembly of the various sections in alinement with each other, it is advisable that the surfaces which are placed into contact with each other upon assembly should be metal surfaces. According to Fig. 2 the section 3 has end portions 11, 12 terminating in a slightly enlarged shoulder 27 which forms the continuation of a reduced neck 28, and this reduced neck again is joined to the body of the section by another shoulder 29 of the same outer diameter as the first named terminal shoulder 27. The cylindrical surfaces of the two shoulders and the neck are covered by a metal layer integral with the metal coating 10 surrounding the body of the section itself. This layer is also continued over the end face of the shoulder 27 and even into a part of the bore of the instrument, for which purpose this bore is provided adjacent the end faces with a slight counter-bore, as shown.

The intermediate section shown in Fig. 6, and which is also plated on the outside with a layer 32 similar to that of the section 3 also has a central bore 30 which is considerably enlarged adjacent the two ends of this section, as shown at 31. This section also is reduced in diameter at the ends but the internal diameters of the bore adjacent the ends is sufficiently large to permit this section to be placed over an end portion 7 or 8 of the section 3. The wall of the enlarged bore 31 is protected by a metal layer 38 forming one contiguous coating with the outside layer 32, and upon positioning this section on the section 3 the inner plating 38 on the enlargement 31 will come into contact with the outer surface of the shoulders 27, 28 so as to provide a suitable contact between metallic surfaces, whereby a better assembly of the parts is assured. A suitable packing ring or disc, not shown, may be placed around the reduced neck portion of the end 7, and between two adjacent sections as customary in devices of this kind.

A similar cylindrical metal sleeve 33 integral with the outer cover 34 of the section 5 is provided on the enlarged bore 35 of that end of the bell shaped section 5 which is to be joined to the next adjacent section, as for instance section 4 of the instrument. Here also the sleeve 33 tightly placed against the end part of the adjacent section provides a metal to metal contact. In the bell shaped section 5 the metallic coating is extended over the entire inner surface of this section, as shown at 36, joining the outer layer at both end faces. In the use of the instrument the interior of the bell shaped section 5 remains partly visible to create the impression that the entire instrument is made of metal in the ordinary way.

It is obvious that at the points where adjacent sections are to be fitted to each other, the wall thickness of some of these sections will be slightly reduced as compared with the main portion of the section. In order to overcome the reduction in strength which that end portion may suffer thereby, reinforcing elements may be combined with the end portions as shown for instance in Figs. 10, 11 and 17.

Fig. 10 may be considered as a fragmentary section through the upper or inner end of the bell shaped section 5. This end portion is materially increased in strength by embedding into the body of non-metallic material a ferrule 37 of cylindrical form and suitable strength. As shown in Fig. 10 the metallic deposit 34 which completely envelops the outer surface of this section also is continued above the projecting marginal portion of the cylindrical ferrule 37 and is turned over the outer edge of the same to be extended at 33 into the cylindrical enlargement 35 of this section. Owing to this arrangement of a reinforcing element embedded in the non-metallic body, the latter is considerably strengthened at those points where its wall dimensions otherwise are reduced.

In the embodiment illustrated in Fig. 11 the reinforcing cylindrical ferrule is secured to the end portion of a section, which end portion is constructed similar to the end portion of section 3 shown in Fig. 2. The cylindrical ferrule 40 is provided with a flat laterally projecting flange 41 covering the outer end face of this section, and this ferrule is held in position against outward displacement by means of the outer layer 10 of metallic material which surrounds the section. The outer layer also terminates in an end

flange 42 which may be secured to the end flange 41 of the reinforcement 40 by solder or in some other suitable way.

Similarly also in Fig. 17, the end portion of the section is reinforced by a ferrule 43 inserted into the body of the instrument and extending part way through the bore. While according to Fig. 2 the body of the instrument is provided with the projecting shoulders 27, 28 and a reduced neck, according to Fig. 17, the reinforcing element 43 is provided with these shoulder and neck portions to permit the proper assembly of this section with the next adjacent section. The reinforcing ferrule 43 is maintained in position against displacement axially outward owing to the metallic deposit 10 not only surrounding the non-metallic cylindrical surface but also extending over the outer surface of the ferrule, and the end 44 thereof.

The insertion of key seats or similar circular elements in sockets provided in the walls of the instrument may be effected by methods different from those illustrated in Figs. 3 and 4. According to Fig. 8, for instance, the circular depression 45 extending radially part way through the wall of the instrument has an undercut or conical surface 46. This undercut or conical surface is provided with a deposit of metallic material forming an integral layer with the coating 10, and is then finished to present a cylindrical surface; the bottom of the cylindrical depression also is covered by a circular extension of the metallic layer. A key seat 48 in the form of a ring may then be placed in position against the layer for the conical wall, and it may be united therewith as by soldering.

The manner in which key seats may be positioned is illustrated by way of example in Figs. 9 and 14 to 16.

After having produced a cylindrical depression 45 in the outer wall of the instrument, as shown in Fig. 14, extending through a portion of this wall only, the metallic material 10 is deposited to extend also into said depression so as to cover the cylindrical and bottom wall thereof, as shown in Fig. 15. The key seat 48 is then positioned in this plated socket, as shown in Fig. 16, and may be soldered or in some other way permanently secured thereto. After having been permanently fixed in position, the depression 45 is made deeper to form a tone opening, as for instance by a drill 49 shown in Fig. 16 which is forced not only through the circular plating at the bottom of the socket 45 but also through the non-metallic wall of the instrument, to produce that assembly of the elements which is shown in finished form in Fig. 9.

A modified form of the instrument and particularly of the key seat to be secured thereto is shown in Figs. 12 and 13. In this modification a layer 10 of metallic material is not only deposited on the outer surface of the body of the instrument, but also on the interior wall thereof, and this internal layer 50 may be utilized for holding key seats in position. As shown in Figs. 12 and 13, the key seat 51 is provided with an enlarged head portion embraced by the larger portion of the socket 45 and resting on the circular shoulder of the socket. A cylindrical extension of this key seat 51 is positioned in the extended socket 45 with the inner end of the key seat resting on the internal layer 50 of metallic material to which it also may be secured by soldering or in some other suitable way.

It will be seen from the above that the invention provides an instrument which in quality of tone is equal to the known metal instruments or superior thereto owing to the elimination of the overtones due to the vibration. In spite of this improvement in the tone quality of the instrument, the weight of the same is considerably reduced while the instrument retains the appearance of a metallic instrument. All of the attachments as key seats, posts, etc. are securely held in position and the action of these instruments therefore is the same as of the well known instruments.

I claim:

1. A metallic instrument of the type described, comprising a body portion of non-metallic material to which a layer of metallic material is applied, the body portion having a socket for a key seat into which socket the layer of metallic material extends, and a key seat secured in said socket and attached to the extension of the metallic layer.

2. A musical instrument of the type described, comprising a body portion of non-metallic material to which a layer of metallic material is applied on the surface, the body portion having a depression for seating a post, into which depression the layer of metallic material extends, and a post seated in said depression and secured to the extension of the metallic layer.

3. A musical instrument of the type described, comprising a body composed of a plurality of sections, said sections consisting of non-metallic material and being provided with terminal portions for securing adjacent sections to each other in axial alinement, and means on said terminal portions of the sections for producing a metal to metal contact of said sections on said terminal portions.

4. A musical instrument of the type described, comprising a body portion of non-metallic material and terminating in a reduced end portion and a metallic layer extending over the outer surface of said body portion and of said end portion and also over the end face of said last named portion.

5. A musical instrument of the type de-

scribed, comprising a body portion of non-metallic material, a layer of metallic material covering said non-metallic body and a reinforcement for a part of said non-metallic body.

6. A musical instrument of the type described, comprising a body portion of non-metallic material having a terminal, a layer of metallic material enclosing said body portion and terminal and a metallic reinforcement for said body portion adjacent the terminal.

7. A musical instrument of the type described, comprising a body portion of non-metallic material, a layer of metallic material enclosing said body portion and a metallic ferrule firmly united with an end part of the body portion and covered by said layer of metallic material.

8. A musical instrument of the type described, comprising a body portion consisting of a mouthpiece, an intermediate section and bell shaped end section, said sections being made of non-metallic material, the outer surface of said intermediate section and the inner and outer surfaces of the bell shaped section being covered with metal by electrodeposition.

9. The method of applying a key-seat to a non-metallic tubular clarinet body section and the formation of the tone opening therein which comprises, first, the formation of a key-seat recess in the exterior of the body section, then securing a bored key-seat within said recess, then drilling a tone opening in the body section to the interior thereof through the bore of said key-seat element.

10. The method of applying a key-seat to a tubular clarinet body section and the formation of a tone opening therein which comprises, first, the formation of a key-seat recess in the exterior of the clarinet body section, then electro-plating the body section exteriorly including said recess, then rigidly securing a bored key-seat element within said recess, and then drilling a tone opening in the body section and said plating through the bore of said key-seat element.

11. The method of applying a key-seat to a tubular non-metallic clarinet body section and the formation of a tone opening therein which comprises, first, the formation of a key-seat recess or socket in the exterior of the clarinet body section, then electro-plating the body section exteriorly including said recess or socket, then soldering a bored key-seat within said recess or socket to said plating, and then drilling a tone opening in the body section and said plating through the bore of said key-seat element.

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