Jan. 2, 1934. W. A. KELSEY 1,941,840

TOOL CLAMP

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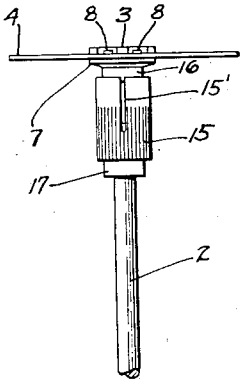

FIG. 1

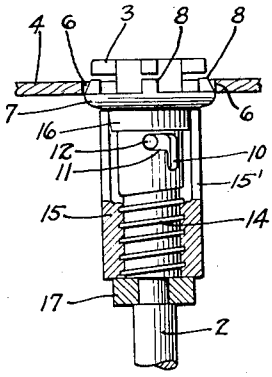

FIG. 2

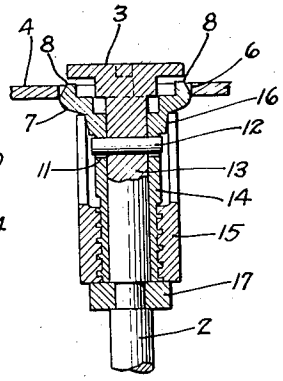

FIG. 3

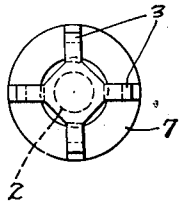

FIG. 4

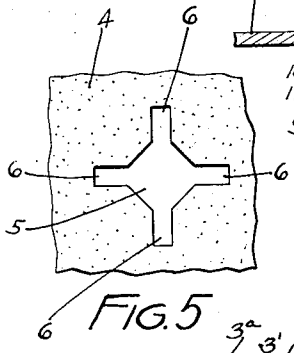

FIG. 5

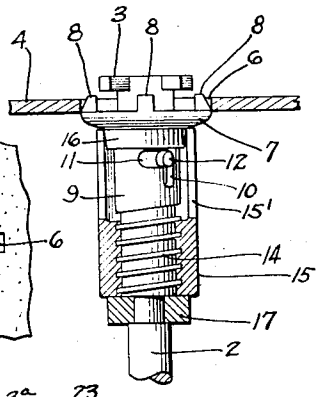

FIG. 6

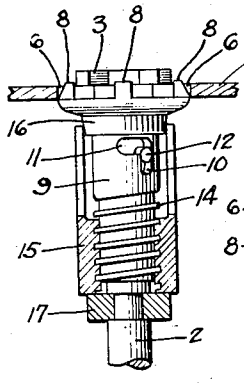

FIG. 7

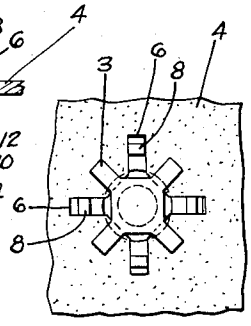

FIG. 8

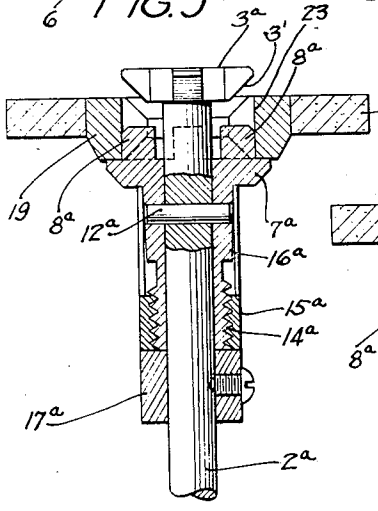

FIG. 9

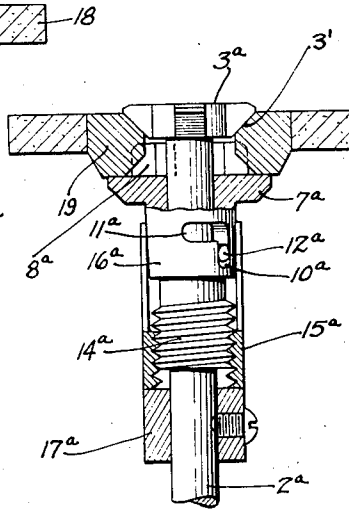

FIG. 10

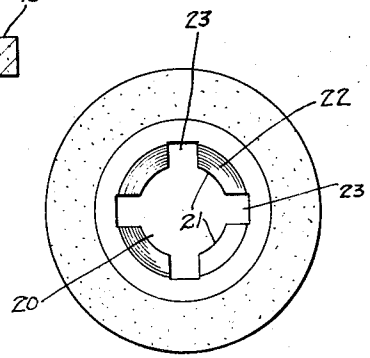

FIG. 11

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TOOL CLAMP

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8 Claims. (Cl. 32—13)

This invention relates to a means for holding a grinding tool, though it may be adapted for use with other tools and the particular purpose of the invention is to provide a means for use with a dental tool whereby the user can easily and quickly clamp a grinding means such as a paper emery disk or a solid emery or carborundum wheel and as readily release the disk or wheel when the work is completed or it is desired to substitute another disk or wheel.

In dental tools as usually made, the clamp device for holding the paper emery disk or a suitable grinding wheel is composed of several parts or pieces which often become separated and mislaid requiring considerable time of the dentist or other operator to assemble the parts and clamp the tool preparatory for use. Difficulty is also experienced where the clamp is made in several separable pieces, by the working loose of one or more of the elements of the clamp while the tool is in use, causing delay for the tightening or re-adjustment of the parts.

The primary object of my invention therefore is to provide a clamp device for general use, but particularly adapted for dental purposes and one in which the operating elements are inseparable and ready for immediate use to clamp the operating tool and further, this self-contained tool clamp is made in such a way that there is no possibility of the clamping elements working loose and requiring tightening or adjusting when the device is in use.

A further object is to provide a dental clamp of such construction that the operator can manipulate the clamping elements with the fingers of the hand holding the tool, it being unnecessary to use both hands as usually is the case in clamps of this kind.

The invention consists generally in various constructions and combinations, all as hereinafter described and particularly pointed out in the claims.

In the accompanying drawing forming part of this specification

Figure 1 is a view of the tool, considerably enlarged, having a paper emery disk mounted in the jaws;

Figure 2 is a detail view, considerably enlarged, showing the jaws in their release position to allow the insertion or removal of the disk;

Figure 3 is a detail view also considerably enlarged, taken on a section line at right angles substantially to the section line of Figure 2;

Figure 4 is a top view of the tool showing the jaws in their release position;

Figure 5 is a detail view of the middle portion of a paper emery disk showing the openings therein to receive the jaws;

Figure 6 is a view corresponding to Figure 3, showing the position assumed by the jaws preparatory to clamping the disk;

Figure 7 is also a similar view showing the jaws in their clamping position;

Figure 8 is a top view showing the relative position of the jaws in clamping the disk;

Figure 9 is an enlarged detail view showing the clamp adapted for use with a solid emery or carborundum wheel, the jaws being in their open position;

Figure 10 is a similar view showing the jaws in their closed or locking position; and

Figure 11 is a plan view of the emery or carborundum wheel.

In the drawing, 2 represents the shank of a dental tool with the clamping means thereon considerably enlarged for clearness of illustration. The end of this shank is provided with stationary jaws 3. There may be any suitable number of these jaws fashioned in any preferred manner, but for convenience in gripping and holding a comparatively thin paper emery disk such as is frequently used in dental work, I prefer to provide the jaw with a central member and four lugs forming the jaws 3 radiating therefrom. The paper disk indicated by numeral 4, has a central opening 5 and slots 6 extending therefrom in opposite directions and adapted to register with the fixed jaws 3 so that when the disk is placed over these jaws, they will enter the slots and permit the disk to be seated on the end of the tool shank. 7 represents a movable jaw having a series of lugs 8 projecting upwardly therefrom around its peripheral upper end and adapted to register with the jaws 3 when it is desired to put the disk on the tool or remove it therefrom, and also having a rotary movement to a position out of alignment with the jaws 3 when it is desired to clamp the disk on the tool shank. The movable jaw 7 has a hollow shank 9 provided with longitudinal slots 10 which merge into transverse slots 11 adapted to receive the ends of a pin 12 that is rigidly mounted in the shank 13 of the stationary jaw. These slots and the pin 12 form a bayonet joint allowing a limited rotary movement of the movable jaw on the stationary one and also a limited longitudinal movement. The shank 9 is exteriorly threaded as at 14 and a sleeve 15 is interiorly threaded to engage the threads 14 and the outer end of the sleeve 15 receives a hub 16 formed on

a movable jaw and on which sleeve the jaw has a sliding movement lengthwise of the tool.

The sleeve has a series of slots 15′ extending longitudinally therein, which allow the outer end of the sleeve to be expanded slightly and grip the surface of the slightly tapered hub 16 with sufficient friction coupled with the frictional engagement of the sleeve with the threads of the movable jaw to rotate this jaw sufficiently to move its lugs into register with those of the fixed jaw or out of register therewith, depending upon the position of the pin in the transverse slot. At such time the sleeve will be in the position shown in Figure 6, with its outer end grasping the slightly tapered surface of the hub 16. When, however, the movable jaw becomes locked against rotary movement, having reached the limit of its stroke on the pin, continued rotation of the sleeve bearing on the stop secured to the shaft will force the movable jaw outwardly so that its lugs will clamp the tool between them and the lugs of the fixed jaw. A collar 17 is secured on the shank 2 of the tool by suitable means and forms a seat for the inner end of the sleeve 15 and with this sleeve in contact with the fixed collar and in threaded engagement with the movable jaw, it is obvious that when the user of the tool rotates the sleeve 15, the movable jaw will be projected or retracted, assuming of course that the longitudinal slots 10 are in position to receive the ends of the pin 12. The degree of movement longitudinally of the movable jaw will of course depend upon the length of the slot 10 and this length is determined when the tool is made so that the movable jaw will have sufficient travel to clamp the disk or other instrumentality that may be positioned for clamping between the fixed and movable jaws. When it is desired to release the tool, the sleeve 15 will be rotated in the opposite direction from that in which it is turned to move the jaw to its clamping position and when the movable jaw has been retracted sufficiently to allow the pin 12 to enter the transverse slots 11, the user may then rotate the sleeve slightly until the fixed and movable jaws are in alignment with one another and then the disk may be easily removed from the tool. This locking or releasing movement of the sleeve may be effected by the user with one hand, it being merely necessary to grasp the sleeve and rotate it in one direction to effect the locking of the disk by the clamping operation of the jaws or the releasing of the disk by loosening the grip of the jaws thereon.

In Figure 9 I have shown the invention adapted for use with an emery or carborundum wheel 18 having a comparatively thick hub 19 provided with a bore 20 and beveled lugs 21 spaced apart around the opening of the bore and projecting into the same. These lugs are substantially wedge shaped, having converging faces 22. The shank 2^a of the tool has jaws 3^a at the outer end provided with beveled faces 3′. These jaws are adapted to slide through the openings 23 between the lugs on the emery or carborundum wheel to allow the insertion of the tool into the jaws of the shank and a movable jaw 7^a has lugs 8^a between which and the beveled faces 3′ of the jaws 3^a and the lugs 21 of the emery or carborundum wheel are gripped and held. The movable jaw has a hub 16^a of greater area than the hub 16 described with reference to the previous figures, and the split end of the sleeve 15^a has a greater bearing surface on this hub and there is sufficient friction between the hub and the sleeve coupled with the friction of the coperating threads to cause a rotary movement of the sleeve when the pin of the bayonet joint described with reference to the previous figures is in position to allow such limited rotary movement. This rotary adjustment of the movable jaw will have the effect of either placing its jaw members in alignment with those of the fixed jaw, or out of alignment therewith, depending upon whether the operator wishes to adjust the tool for its release or locking position. The elements of this modification in the structure of the tool holder and the parts thereof being substantially the same as described with reference to the earlier figures in the case, I prefer to use the same reference numerals with addition of the exponent *a*. In this last described form of the holder, the jaw members when in alignment, allow the insertion of the tool, having the correspondingly shaped central opening into the holder, and when the tool has been properly placed, the movable jaw is first rotated slightly, as previously described, to move the jaw members out of register, and when this is done further operation of the sleeve cooperating with the fixed stop on the shank will cause longitudinal movement of the movable jaw to securely clamp the tool in place.

The operation of the device shown in Figures 9 and 10 is substantially the same as described with reference to the previous figures, the principal difference being in the form of the jaws to adapt them for a tool having a comparatively thick hub necessary for an emery or carborundum wheel. Where the tool is used with the comparatively thin paper disk having an emery face, the hub or central portion is adapted to yield slightly under pressure of the jaws thereon so that the disk may be firmly clamped, and with a tool of this nature it is not necessary to have a heavy hub or central portion as the strain thereon is inconsiderable as compared with that of the thicker or heavier emery or carborundum wheel. Hence the modification that I have shown in Figures 9 and 10, while embodying the same principle as the clamp of the earlier figures, serves to adapt the device for use with the thicker, heavier tool. The sleeve as shown in Figures 9 and 10 engages the collar 17^a and the threads of the movable jaw and as the sleeve is rotated, the jaw is moved longitudinally to its locking or release position, depending upon the position of the pin 12^a in the slots of the movable jaw. In both of these forms or adaptations of the invention, the shaft may be held by the operator in one hand and with the fingers of that same hand the sleeve may be rotated to change its position and move the locking jaw to its clamping or releasing position, as desired. The other hand of the operator is thus free to manipulate the tool itself, either to put it on the shaft or remove it therefrom. Obviously when the rotating sleeve has been adjusted and the tool clamped, there will be no opportunity for the jaws becoming inadvertently separated to release the tool until the sleeve has again been rotated sufficiently so that the pin of the bayonet joint is in alignment with the longitudinal portion of the slot in the movable jaw.

It will be understood that this device is capable of various modifications such as changes in the shape, position and number of the lugs comprising the fixed and movable jaws and hence I do not wish to be confined to the details of construction herein shown and described.

I claim as my invention:

1. A tool of the class described, comprising a shank, a fixed jaw on the end thereof, a movable jaw adapted to slide on said shank and provided with a bayonet joint connection with said shank whereby said movable jaw may be rotated a limited distance to register with said fixed jaw and allow the insertion of a tool between said jaws or its removal therefrom, and a longitudinal movement of said movable jaw when out of register with said fixed jaw to clamp the tool between them and means having a threaded connection with said movable jaw for adjusting it longitudinally through said bayonet joint connection.

2. A device of the class described, comprising a shank having a fixed jaw thereon adapted to enter a central opening provided in a disk-like tool, a movable jaw, a sleeve encircling said movable jaw and having a threaded connection and frictional contact therewith, a stop on said shank against which said sleeve normally abuts and said movable jaw and said shank having means whereby said movable jaw has a limited rotary movement through its frictional engagement with said sleeve to adjust said jaw into or out of alignment with said fixed jaw and a longitudinal movement through said threaded connection and the engagement of said sleeve with said stop to clamp a tool between said movable and fixed jaws when out of alignment.

3. A tool clamp composed of inseparable parts consisting of a shank and a fixed jaw thereon composed of a plurality of radial lugs, a movable jaw on said shank having radial lugs adapted to be moved into or out of register with the lugs of said fixed jaw, a sleeve having frictional engagement with said movable jaw for imparting a rotary movement thereto when said sleeve is rotated and also having a threaded connection with said sleeve, a collar permanently holding said jaws and sleeve in their relative operative position and abutting said sleeve to impart through said threaded connection a longitudinal movement to said movable jaw when said sleeve is rotated to clamp the tool between the lugs of said jaws.

4. A dental tool holder comprising a shank having fixed jaws radiating therefrom, a fixed stop on said shank, a movable jaw disposed between said fixed jaw and said stop and also having radial members adapted to register with the members of said fixed jaw to receive the tool to be clamped or move out of register with the members of the fixed jaw preparatory to clamping the tool, a sleeve having a threaded engagement with said movable jaw and abutting said fixed stop and means whereby said sleeve may be rotated to adjust said movable jaw in a releasing position or where it may be moved lengthwise by the continued rotation of said sleeve to clamp the tool between said fixed and movable jaws.

5. A device of the class described comprising a shank having a fixed jaw thereon, a movable jaw on said shank having a hub and a rotary and longitudinal movement, a stop on said shank, a sleeve abutting said stop and having a portion encircling said hub and in frictional engagement therewith whereby rotation of said sleeve will through said frictional engagement impart a rotary movement to said movable jaw and adjust it into and out of register with said fixed jaw, said movable jaw and said sleeve having means for moving said movable jaw longitudinally on said shank to its clamping position.

6. A device of the class described, comprising a shank having a fixed jaw thereon adapted to enter a central opening provided in a disk-like tool, a movable jaw having a hub thereon and externally threaded, a sleeve encircling said movable jaw and having an end portion in frictional engagement with said hub and internally threaded to engage the threads of said movable jaw, a stop on said shank against which said sleeve normally abuts, said movable jaw and said shank having a means whereby rotary movement of said sleeve through its frictional engagement with said jaw may impart a limited rotary movement thereto to adjust said movable jaw into or out of alignment with said fixed jaw, and said movable jaw also having a longitudinal movement through the engagement of said sleeve with said stop and the threads of said movable jaw to clamp a tool between said movable and fixed jaws when they are out of alignment.

7. A mandrel comprising a shank having a fixed jaw thereon composed of a plurality of radial lugs, a movable jaw on said shank having radial lugs adapted to be moved into or out of register with the lugs of said fixed jaw, and means on its initial rotary movement for adjusting said movable jaw out of register with said fixed jaw, and subsequently during continued rotation of said means adjusting said movable jaw lengthwise of said shank to clamp a tool between said fixed and movable jaws.

8. A mandrel comprising a shank having a fixed jaw thereon, a stop on said shank, a movable jaw disposed between said fixed jaw and said stop and adapted to register with said fixed jaw to receive a tool, or move out of register with said fixed jaw preparatory to lengthwise movement on said shank to clamp a tool, a sleeve abutting said stop and means on the initial movement of said sleeve to adjust said movable jaw out of register with said fixed jaw, and by subsequent movement of said sleeve move said movable jaw lengthwise of said shank to clamp the tool between said fixed and movable jaws.

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