Sept. 6, 1960 G. B. SULLIVAN 2,951,482

SURGICAL SAW

Filed Sept. 22, 1955

Fig. 2

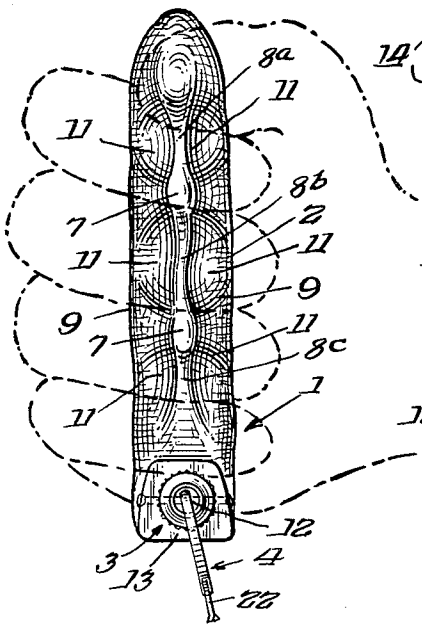
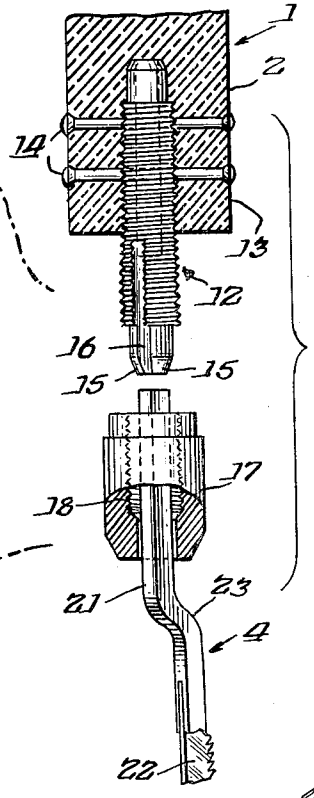
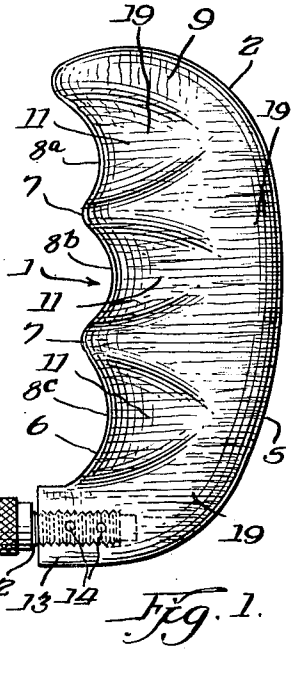


Fig. 3.





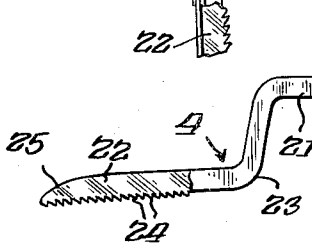
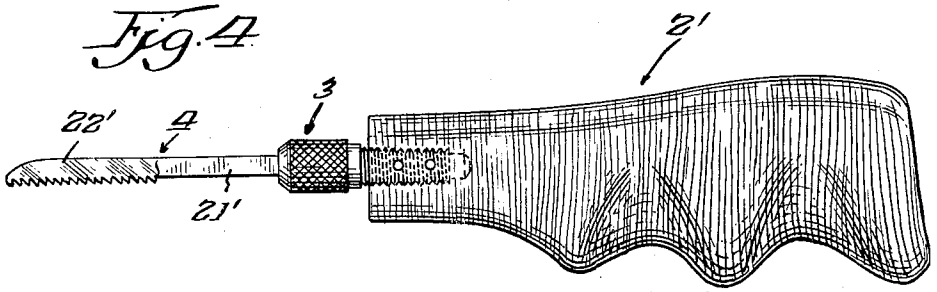


Fig. 1.

Fig. 4



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SURGICAL SAW

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6 Claims. (Cl. 128—317)

The invention relates generally to cutting tools and more particularly to a surgeon's cutting saw.

In the past, surgical instruments of the type here involved have been constructed generally similar to scalpels and the like, utilizing the same type of straight, smooth handle members of metal, with the teeth generally being formed similarly to those of a rasp or the like. Such instruments produce their main or complete cutting action when pushed by the surgeon in a direction from the handle toward the blade. Obviously, cutting by means of a pushing action may be quite dangerous, particularly when cutting on the head, as for example, when cutting bone in the nasal passages, etc., a use to which the present invention is particularly adapted. In such case a slip of the blade while force is applied in a pushing direction could easily result in the blade penetrating the brain with fatal consequences. It will also be appreciated that during the course of an operation, the surgeon's rubber gloves, and thus the handles of the instruments may be covered with blood, increasing the possibility of slippage and other accidents.

The present invention therefore has among its objects, the production of a surgical instrument which eliminates the disadvantages above referred to, an instrument constructed in accordance with the present invention providing the maximum possible safety to the patient, together with maximum ease and flexibility of operation to the surgeon, and which is self-debriding.

More specifically the invention has among its objects and advantages, the production of such an instrument which places the surgeon's hand in a logical, natural and thus comfortable position, with the instrument being carefully balanced and designed to be firmly gripped without undue pressure thereon, whereby fatigue and muscular strain are reduced to a minimum.

Another object of the invention is the production of such an instrument which derives its cutting action from a pulling action toward the surgeon instead of a pushing action, whereby fatal or serious injuries as a result of accidental disengagement of the instrument from the bone or other material being cut, is completely eliminated.

A further object of the invention is the production of such an instrument which is universal in use, either in the right or the left hand, constructed of material which may be readily sterilized, the handle being provided with a novel, non-slipping surface and the blade being of highly efficient metal, constructed to be readily detached from the handle whereby blades may be readily replaced without replacement of the handle.

A further object is the production of such an instrument which is exceedingly simple in construction, durable in use, and relatively inexpensive to manufacture.

Many other objects and advantages of the construction herein shown and described will be obvious to those skilled in the art from the disclosure herein given.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described and more particularly pointed out in the appended claims.

In the drawings wherein like reference characters indicate like or corresponding parts:

Fig. 1 is a side elevation of a surgical saw embodying the present invention;

Fig. 2 is a front elevational view of the saw illustrated in Fig. 1, indicating in dotted lines the approximate position of the hand when grasping the saw;

Fig. 3 is a more or less exploded view of the details of the chuck and blade structure with portions thereof broken away; and

Fig. 4 is a side elevation of a surgical saw embodying the invention, utilizing an in-line handle grip.

Referring to the drawings and particularly to Figs. 1, 2, and 3, the reference numeral 1 indicates generally a surgical cutting instrument having a handle member, indicated generally by the numeral 2, the latter being provided with a chuck structure indicated generally by the numeral 3 and adapted to receive and support a blade member indicated generally by the numeral 4.

The handle 2 may be formed from any suitable material, as for example, an acrylic plastic that will withstand sterilizing temperatures. In the embodiment illustrated, the handle 2 is generally crescent-shaped having a convex outer edge 5, and a generally concave inner edge 6, the latter being provided with outwardly extending projections 7 defining a finger gripping portion 8*b* therebetween and portions 8*a* and 8*c* at each side thereof. The opposite faces 9 of the handle are recessed as indicated at 11 whereby the handle will closely fit the hand when gripped as indicated in dotted lines in Fig. 2 with the forefinger positioned adjacent the portion 8*a*, the index finger adjacent the portion 8*b* and the ring finger adjacent the portion 8*c*.

Extending from the end of the handle 2 adjacent the portion 8*c* is a chuck structure 3, the latter having a threaded stem 12 positioned in the generally rectangular-shaped end 13 of the handle, with the two, in the embodiment illustrated, being threaded together and locked in position by rivets 14. The stem 12 may be provided with tapered free end portions 15 as illustrated in Fig. 3, and is formed with a diametrical, bifurcating slot 16 therein adapted to receive a portion of the blade member 4. A collar 17 may be threaded on the stem 12, the collar having an internal shoulder 18 therein engageable with the tapered portions 15 of the bifurcated end of the stem, whereby the portions 15 are urged toward one another to clamp an object inserted therebetween. If desired, the outer face of the collar 17 may be knurled or otherwise suitably formed to provide a gripping surface.

When held in the hand as previously described, the little finger may overlap the ring finger and rest on the chuck 3, while the thumb may be positioned on the forefinger as indicated in Fig. 2 or rest upon the upper end edge of the handle as viewed in Figs. 1 and 2.

To facilitate gripping of the handle member 2 and preventing slipping, particularly if the hand is wet or bloody, the handle member is preferably formed with numerous small serrations or grooves 19 substantially throughout the gripping areas thereof, the grooves generally extending in appropriate directions whereby they are transverse to the normal direction of slippage, as is believed clear from Figs. 1 and 2 of the drawings.

In the embodiment illustrated in Figs. 1 to 3, the blade member 4 is of offset design having a shank portion 21 of a size to be received in the slot 16 in the stem 12, and a blade portion 22 illustrated as being formed from separate stock and secured to the remainder of the member by suitable means such as brazing, etc., with the blade portion being of thin material and extending on and parallel with the axis of the portion 21 but

spaced therefrom and operatively connected by an intermediate portion **23**, shown as integrally formed with the shank **21**.

As illustrated in Fig. 1, the plane of the blade member **4**, and thus that of the slot **16** may be inclined with respect to the general plane of handle member **2** as indicated in Fig. 1, whereby such plane more or less bisects the clenched portion of the hand and fingers. This construction provides substantially uniform clearance on opposite sides of the hand.

If desired, particularly where the blade is not so inclined, the instrument may be used equally well in either hand.

The blade portion **22**, illustrated in Fig. 3 is provided with cutting teeth **24** in the outer edge thereof, the teeth facing generally in the direction of the shank end thereof whereby cutting action is effected by "drawing" the blade across an object as distinguished from "pushing" the blade. The opposite edge of the blade member is curved adjacent the free end of the blade as indicated at **25** to form a blunt, generally pointed free end.

The instrument just described is particularly efficient in nasal operations, etc., where bone is to be removed from adjacent the nasal passages, and as the cutting action is achieved by drawing the blade away from the patient, there is no danger of penetrating the brain cavity if the blade should slip from the bone.

It will also be appreciated that the instrument is self-debriding, whereby the severed tissue, etc., is moved outwardly instead of inwardly as occurs with prior instruments.

In the embodiment illustrated in Fig. 4, the general construction illustrated in Figs. 1 to 3 is employed, this embodiment, however, utilizing a straight blade member and in-line handle structure whereby the blade portion **22'** and shank portion **21'** of the blade members **4'**, the chuck structure **3** and handle **2'** all substantially lie on a common axis with the other details of construction following those previously described. This construction may be advantageous in certain applications, and if desired, as the shank portions **21** and **21'** are of like cross-sectional dimensions they are interchangeable in the handle members **2** and **2'**.

Both of the embodiments illustrated are nicely balanced and due to the novel arrangement may be used without undue gripping pressure, whereby fatigue and muscular strain are reduced to a minimum. Likewise, when a blade becomes dull it may readily be replaced with a new blade achieving maximum efficiency with low maintenance cost as distinguished from present tools of integral construction requiring periodic sharpening and complete discarding when the blade can no longer be sharpened.

While I have illustrated various types of surgical saws, it will be apparent to those skilled in the art that the present invention may be utilized with other cutting elements as well as the specific saws illustrated.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention; hence, I do not wish to be understood as limiting myself to the exact form, construction, arrangement and combination of parts herein shown and described, or uses mentioned.

What I claim as new and desire to secure by Letters Patent is:

1. A surgical saw comprising a handle member constructed to be grasped in the hand, a chuck structure carried by said handle member, a blade member comprising a relatively thick shank portion removably engageable with said chuck structure, and a relatively thin blade portion extending from said shank, a plurality of cutting teeth formed on an edge of said blade member with said teeth generally facing toward the shank end of the blade portion, whereby cutting action may be effected by a drawing action on the handle member relative to the object being cut, the opposite edge of the blade member being curved adjacent the free end thereof to form a generally pointed relatively blunt free end on said blade member, and the plane of the blade member extending at an angle to the general plane of the handle member whereby the plane of the blade member may approximately bisect the hand of the user when the device is operatively gripped in such hand.

2. A surgical saw comprising a handle member constructed to be grasped in the hand, a chuck structure carried by said handle member, a blade member comprising a relatively thick shank portion removably engageable with said chuck structure, and a relatively thin blade portion extending from said shank, a plurality of cutting teeth formed on an edge of said blade member with said teeth generally facing toward the shank end of the blade portion, whereby cutting action may be effected by a drawing action on the handle member relative to the object being cut, the opposite edge of the blade member being curved adjacent the free end thereof to form a generally pointed relatively blunt free end on said blade member, the chuck structure comprising a threaded stem extending into said handle member and rigidly secured thereto, said stem extending outwardly from said handle member and having a bifurcated end, the shank portion of said blade member having a cross-section generally complemental to the bifurcation of said end, and a collar threaded on said stem operable therewith to rigidly clamp the blade member in the chuck structure.

3. A handle member for a surgical saw comprising a hand-gripping portion of material capable of withstanding sterilizing temperatures, said handle member having a chuck structure carried thereby for receiving and rigidly supporting a surgical blade member, said handle being provided with individual finger-gripping portions and provided with a relatively rough uneven gripping surface, said gripping surface including small ridges and grooves in the face thereof generally arranged to extend transversely to the normal directions of slippage when grasped in the hand, and the chuck structure constructed to receive a generally planar blade member and rigidly support the same in a plane extending at an angle relative to the general plane of the handle member, whereby the plane of such a blade member would approximately bisect the hand of the user when the handle member is operatively gripped therein.

4. A surgical saw handle member adapted for detachably receiving a surgical blade member and comprising a hand-gripping portion of material capable of withstanding sterilizing temperatures, said handle member including a chuck structure carried thereby and adapted for detachably receiving and rigidly supporting a surgical blade member comprising an offset and planar blade member, said chuck structure being constructed to detachably receive the offset and planar blade member and rigidly support the same in a plane extending at an angle relative to the general plane of the handle member, whereby the plane of said blade member will approximately bisect the hand of the user when the handle member is operatively gripped therein.

5. A surgical saw handle member as defined in claim 4, wherein said material of said handle member capable of withstanding sterilizing temperatures is an acrylic plastic.

6. A surgical saw handle member as defined in claim 4, wherein said handle member is provided with individual finger-gripping portions and provided with a relatively rough uneven gripping surface, and said gripping surface including small ridges and grooves in the face thereof generally arranged to extend transversely to the normal directions of slippage when grasped in the hand.

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