

[54] COMBINATION MYRINGOTOMY  
SCALPEL, ASPIRATOR AND OTOLOGICAL  
VENT TUBE INSERTER

3,636,954 1/1972 Weston..... 128/321  
3,645,268 2/1972 Capote..... 128/329

OTHER PUBLICATIONS

Morgan, Myringotomy Tube Insertor, In. Arch. Otolaryng, Vol. 84, Sept. 1966, p. 131.

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[57] ABSTRACT

A surgical instrument constitutes a myringotomy scalpel, aspirator, and otological vent tube inserter comprising a hand grip member having a trigger hingedly mounted thereto; an aspirator tube projecting outwardly from the hand grip member and having a free, outer end which terminates in a scalpel-defining tip; and a sleeve slidably carried by the aspirator tube and connected to the trigger, wherein pivotal movement of the trigger imparts linear movement to the sleeve along the aspirator tube.

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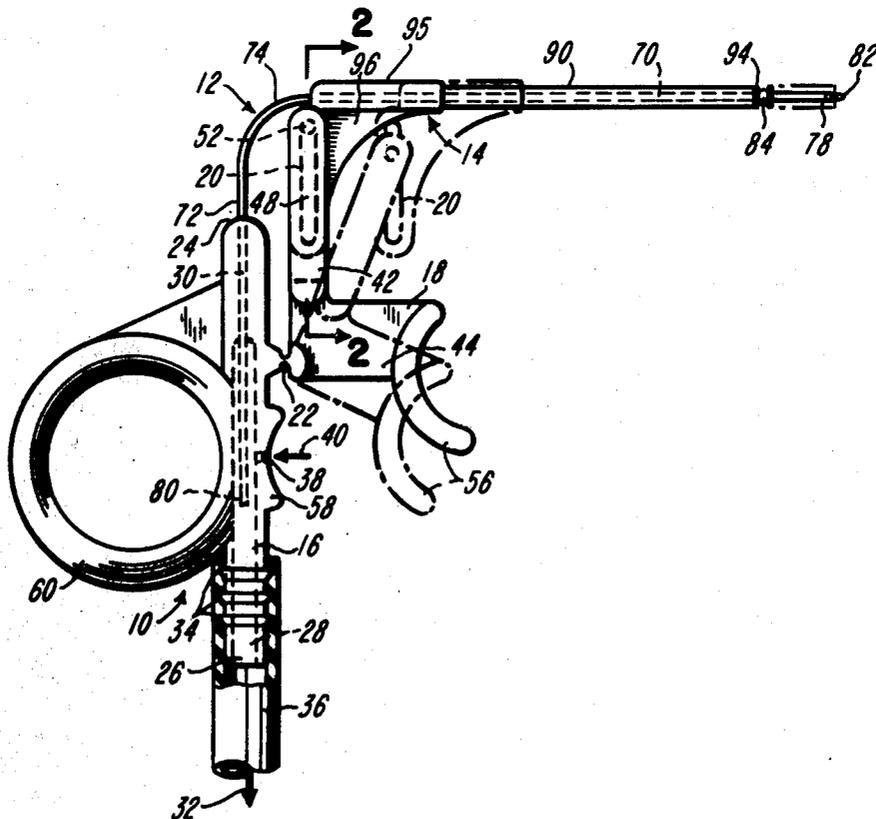
[58] Field of Search ..... 128/2 B, 2 M, 218 R, 220, 128/221, 297, 302, 303 A, 304, 305, 314, 329-330, 347, 348, 350 R, 321; 227/51, 55, 68

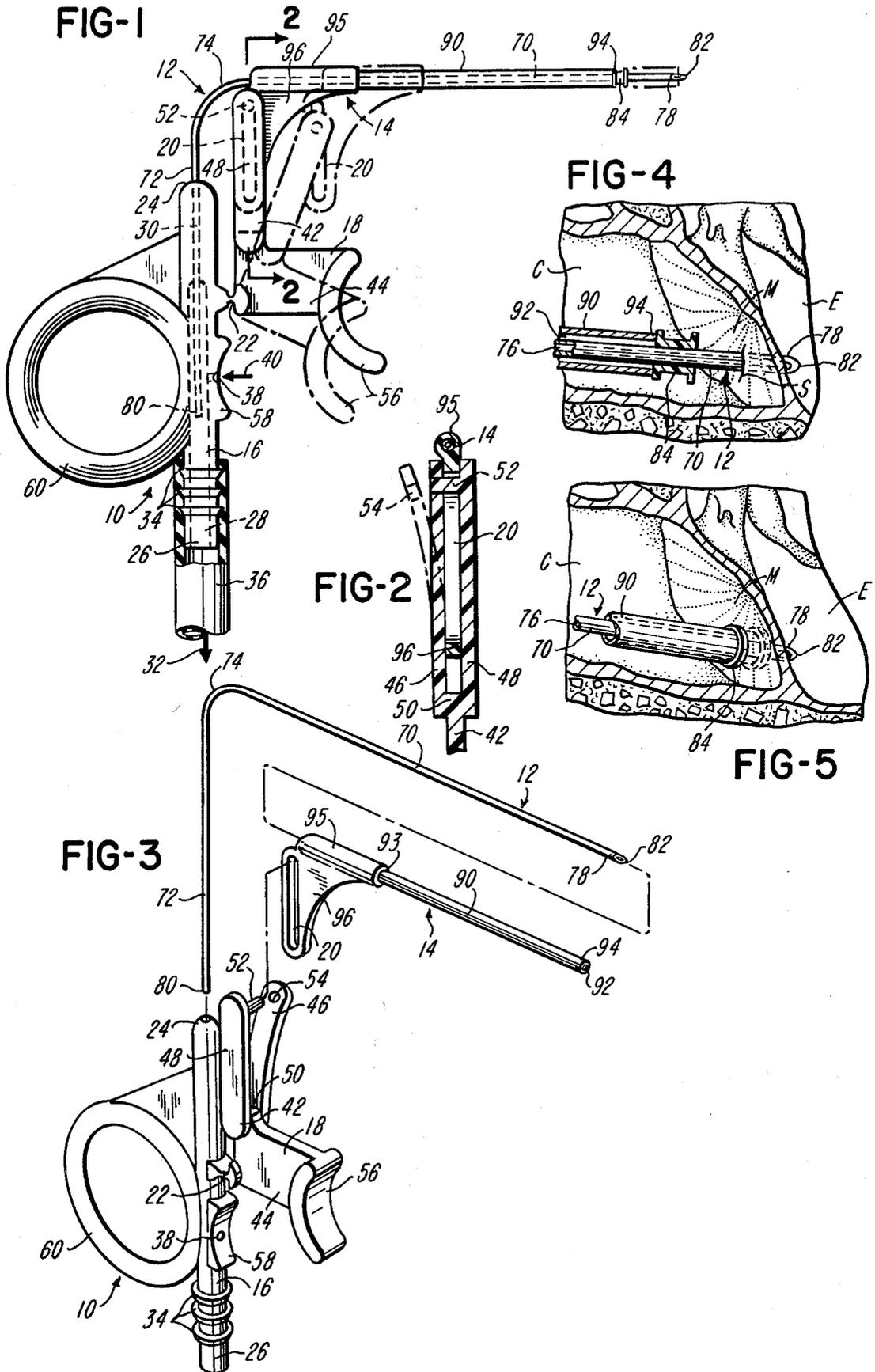
[56] References Cited

UNITED STATES PATENTS

3,530,860 9/1970 Majoros..... 128/329

11 Claims, 5 Drawing Figures





# COMBINATION MYRINGOTOMY SCALPEL, ASPIRATOR AND OTOLOGICAL VENT TUBE INSERTER

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

The present invention is directed to a surgical instrument constituting a myringotomy scalpel, aspirator and otological vent tube inserter wherein an otologist may incise the tympanic membrane of a human ear, withdraw fluids from the middle ear, and implant an otological vent tube in the incision after once entering the ear canal.

### 2. Description of the Prior Art

The myringotomy procedure is a surgical procedure wherein an otological vent tube is inserted in an incision in the tympanic membrane of a human ear by way of the ear canal after fluids have been withdrawn from the middle ear. Heretofore, the procedure involved three separate and distinct steps, wherein an otologist would insert a perforating instrument such as a scalpel into the ear canal and incise the tympanic membrane. The scalpel would then be withdrawn and an aspirator would be inserted in the ear canal and through the incision into the middle ear for withdrawing fluids therefrom. The aspirator would then be withdrawn and an otological vent tube inserter would be advanced through the ear canal and into the incision for implanting a vent tube in the tympanic membrane.

The procedure has been simplified with the introduction and use of combination aspirator/vent tube inserters which enable the otologist to withdraw fluids from the middle ear through an incision previously made in the tympanic membrane, and to thereafter advance a vent tube mounted adjacent the free, outer end of the aspirator into the incision for implanting the vent tube in the membrane. Thus, the prior art includes various types of myringotomy instruments for making an incision in the tympanic membrane, for aspirating the middle ear and for inserting vent tubes in the incision. While many of these instruments are adapted to perform but one single step of the myringotomy procedure, more recent designs provide a variety of instruments which allow the otologist to perform a combination of steps after once entering the ear canal.

### SUMMARY OF THE INVENTION

The present invention is directed to a surgical instrument which constitutes a myringotomy scalpel, aspirator and otological vent tube inserter. The instrument comprises a hand grip member having an elongate, substantially tubular handle with an integral trigger hingedly mounted thereto; an aspirator tube removably associated with the handle having a free, outer end which terminates in a scalpel-defining tip; a sleeve slidably carried by the aspirator tube; and means connecting the sleeve to the trigger for imparting linear movement to the sleeve along the aspirator tube when a trigger is pivoted about the hinged connection.

Preferably, the instrument is autoclavable, and the hand grip member is manufactured from a moldable material such as polypropylene or the like with the handle and trigger portions hingedly connected to one another by an integral, "living" hinge.

The hand grip member includes an elongate, tubular portion having opposite, open ends one of which is adapted to receive an end of the aspirator tube, the

other end of which is adapted to be coupled to a source of negative pressure.

The aspirator tube is substantially L-shaped, having a first leg removably receivable in the one end of the handle portion and a second which projects outwardly from the first leg and handle portion at a substantially right angle with the axis thereof. The free, outer end of the second leg of the aspirator tube is adapted to slidably receive the bore of an otological vent tube or the like, and in the preferred embodiment forms a snug, slip-fit relationship therewith precluding the accidental or premature dislodgment of a vent tube during the myringotomy procedure. The sleeve carried by the aspirator tube includes a free end adapted for abutting engagement with the vent tube disposed on the aspirator tube. Pivotal movement of the trigger imparts linear movement to the sleeve along the second leg of the aspirator tube.

The instrument of the present invention enables the otologist to comfortably hold and manipulate the instrument with one hand in such a manner as a pistol or handgun, wherein the tympanic membrane of the human ear may be successively incised, fluids may be withdrawn from the middle ear, and an otological vent tube may be implanted in the incision with one insertion of the instrument into the ear canal of a patient.

It is, therefore, an object of the present invention to provide an autoclavable surgical instrument for use in a myringotomy procedure, wherein the instrument constitutes a combination myringotomy scalpel, aspirator and otological vent tube inserter.

It is further an object of the present invention to provide an instrument having a hand grip member of unitary construction, wherein the moving parts thereof are interconnected with one another via an integral, "living" hinge.

Other objects and features of the present invention will be readily apparent from the accompanying drawings and description.

### DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a surgical instrument which embodies the teachings of the present invention.

FIG. 2 is a sectional view taken at line 2—2 of FIG. 1, enlarged for clarity of detail and understanding.

FIG. 3 is an exploded view of the instrument of FIG. 1, illustrating in detail the interrelationship of the various components thereof.

FIG. 4 illustrates the instrument of FIG. 1 inserted into an ear canal wherein the scalpel defining forward end of the aspirator tube has cut an opening in the tympanic membrane and the free end of the tube is positioned to aspirate the middle ear.

FIG. 5 is similar to FIG. 4 illustrating the manner in which an otological vent tube is implanted in the incision of the tympanic membrane.

### DESCRIPTION OF THE PREFERRED EMBODIMENTS

The surgical instrument of the present invention constitutes a myringotomy scalpel, aspirator and tube inserter comprising hand grip member 10, aspirator tube 12, and sleeve 14 as illustrated in FIG. 3. The aforesaid components are assembled as shown in FIG. 1, wherein the first or short leg of aspirator tube 12 is inserted in the elongate handle 16 of hand grip member 10, sleeve

14 is slidably mounted on the long leg of the aspirator tube 12 and interconnected with trigger 18 at slot 20, wherein pivotal movement of trigger 18 about hinge 22 imparts linear movement to sleeve 14 along the long leg of aspirator tube 12, as illustrated in phantom in FIG. 1.

### THE HAND GRIP MEMBER

The hand grip member 10 includes an elongate tubular handle 16 terminating in opposite, open ends 24 and 26, and having a central bore 28 extending axially therethrough. The upper end 24 of the handle is adapted to receive the shorter leg 72 of aspirator tube 12, and where desired, bore 28 may include a reduced diameter portion which is in snug, slip-fit relationship with tube 12, forming a substantially air and fluid tight relationship therewith, as illustrated in FIG. 1. The lower end 26 of the handle is adapted to be connected to a source of negative pressure (diagrammatically illustrated by arrow 32) and may include, by way of example, a plurality of spaced, radially projecting, peripherally extending ribs 34 which provide a suitable coupling for hose 36 or the like. A normally-open passageway 38 is provided in the wall of handle 16 intermediate the open ends thereof in communication with central bore 28, wherein a flow of air (arrow 40) is established through the open passageway 38 into bore 28 and through opposite end 26 and into hose 36 when negative pressure is applied at 32. It should of course, be understood when passageway 38 is closed, the negative pressure applied at 32 will draw air through open end 24 of handle 16 into hose 36.

Trigger 18 is pivotally mounted on handle 16 at and by hinge 22. In the preferred embodiment the hand grip member 10 is of unitary construction having handle 16 and trigger 18 interconnected via an integral, thin, flexible, hinge-defining web of material comprising a "living" hinge at 22.

The trigger is generally L-shaped and includes a pair of arms 42 and 44 which intersect at the pivot point defined by hinge 22, wherein arm 42 terminates in a clevis-like member comprising a pair of legs 46 and 48 interconnected at 50, as best illustrated in FIG. 2. Pin 52 extends outwardly from the upper end of leg 48 and is received by a pin receptive seat or aperture 54 in leg 46 to define a coupling member which is adapted to slidably engage slot 20 of sleeve 14. Legs 46 and 48 are resilient, permitting separation of the legs as shown in phantom in FIG. 2, thereby facilitating removal and/or insertion of pin 52 through slot 20.

Arm 44 of trigger 18 terminates in contoured, finger-receptive pad 56 which augments the handling of the instrument with one hand, wherein the forefinger is placed on pad 56 for readily pivoting trigger 18 about hinge 22, in much the same manner as a pistol or handgun. A second contoured, finger-receptive pad 58 is provided on the peripheral surface of handle 16 and is in longitudinal alignment with hinge 22 intermediate the hinge and open end 26, thereby permitting the hand grip member to be readily and securely held between the thumb and middle finger with the forefinger resting on trigger 18 at pad 56. In the preferred embodiment, thumb-receptive loop 60 is mounted on handle 16 opposite pad 58 to further enhance the manipulation of the instrument.

Passageway 38 is conveniently positioned in the surface of pad 58, facilitating opening and closing thereof

with the middle finger while holding and using the instrument.

Uniformly satisfactory results have been achieved with a hand grip member constructed from polypropylene or the like, which is autoclavable, flexible when reduced to a thin web as at hinge 22, and resilient when formed into an elongate, projecting member as at legs 46 and 48.

### THE ASPIRATOR TUBE

Aspirator tube 12 comprises a first, shorter leg 72 and a second, longer leg 70, said legs being interconnected at substantial right angle relationship by radius 74. Central bore 76 (see FIGS. 4 and 5) extends axially throughout the length of the aspirator tube 12 and terminates in open ends 78 and 80 thereof. The shorter leg 72 of the aspirator tube is adapted to be inserted in open end 24 of handle portion 16 and the outer diameter thereof forms a snug, slip-fit relationship with reduced portion 30 of bore 28, thereby disposing bore 76 in communication with the source of negative pressure (arrow 32). Thus, when passageway 38 in handle 16 is closed, air is drawn into open end 78, through the aspirator tube and handle and into the hose 36.

The free, outer end 78 of the aspirator tube terminates in a sharp, scalpel-defining tip 82 which is capable of incising the tympanic membrane of a human ear or the like. The outer diameter of the longer leg 70 is adapted to slidably receive an otological vent tube such as, by way of example, button-type vent tube 84 as shown in FIG. 1. Preferably, the outer periphery of leg 70 and the bore of vent tube 84 are in snug, slip-fit relationship with one another, precluding accidental or premature dislodgment of the vent tube during the myringotomy procedure.

The short leg 72 of the aspirator tube is readily inserted in handle portion 16 and forms a substantially sealed relationship with the bore thereof without requiring the use of special tools. Therefore, if and when the scalpel-defining tip becomes dull through repeated use, or is damaged, the aspirator tube 12 may be readily disassociated from and a replacement may be associated with hand grip member 10. Generally, the aspirator tube and scalpel tip are constructed from autoclavable material such as stainless, surgical steel, or the like.

### THE SLEEVE

Sleeve 14 includes an elongate, tubular portion 90 having central bore 92 extending axially therethrough. The bore of the sleeve is slidably received on leg 70 of the aspirator tube, wherein the outer end 94 thereof is disposed adjacent the free, outer end 78 of the aspirator tube and wherein the sleeve is movable between retracted and advanced positions relative thereto, as illustrated in FIG. 1. As sleeve 14 is advanced along leg 70 of aspirator tube 12 toward end 78 thereof, end 94 abuttingly engages and linearly advances vent tube 84 along the aspirator tube.

The opposite end 93 of sleeve 14 terminates in a tube-receptive seat 95 which includes plate 96 depending therefrom in a plane substantially parallel to the axis of handle 16. The plate includes an elongate slot 20 substantially parallel with the axis of the handle which is receptive of pin 52. When the sleeve, aspirator tube, and hand grip member are assembled as illustrated in FIG. 1, it can be seen that pivotal movement

of trigger 18 in a clockwise direction about hinge 22 imparts linear movement to sleeve 14 via pin 52 and slot 20, thereby advancing the sleeve or leg 70 of the aspirator tube toward free outer end 78.

It should be noted that sleeve 14 may be readily dissociated with tube 12 and hand grip member 10 by separating the resilient legs 46 and 48 of trigger 18 (see FIGS. 2 and 3), removing pin 52 from slot 20 and sliding tubular portion 90 of the sleeve over outer end 78 of the aspirator tube, thereby facilitating removal and replacement of the aspirator tube without the use of tools.

The sleeve 14 is generally constructed from an autoclavable material, and where desired, may be manufactured from a material similar to that used in the manufacture of base 10 and/or aspirator tube 12.

OPERATIONAL MODE

After the surgical instrument of the present invention has been assembled as illustrated in FIG. 1, free, outer end 78 of aspirator tube 14 is inserted into ear canal C as illustrated in FIG. 4. The scalpel-defining tip 82 incises the tympanic membrane M and the outer end 78 is inserted through the incision S into middle ear E. Negative pressure is then applied to the middle ear E by closing normally-open passageway 38, thereby withdrawing fluids from the middle ear. Otological vent tube 84 is then implanted in the tympanic membrane as illustrated in FIG. 5, by pivoting a trigger 18 about hinge 22 thereby advancing sleeve 14 toward outer end 78 of the aspirator tube, implanting vent tube 84 in incision S. The aspirator tube is then withdrawn from the ear canal and the myringotomy procedure is complete.

What is claimed is:

1. A surgical instrument constituting a myringotomy scalpel, aspirator and otological vent tube inserter comprising:

- a hand grip member including an elongate, substantially tubular portion having opposite ends and a passageway therethrough;
- a trigger hingedly connected to said tubular portion intermediate the ends thereof;
- an elongate, hollow, aspirator tube associated with said hand grip member, said tube having opposite ends, one of which is disposed in open communication with one end of the passageway through said hand grip member, the other end of said tube terminating in a free, outer end which defines a hollow, scalpel-defining tip;
- an elongate sleeve slidably carried by said aspirator tube;
- means operably interconnecting the sleeve and trigger whereby pivotal movement of the trigger imparts linear movement to the sleeve along said aspi-

rator tube; and

a coupling in association with the other end of the passageway through said hand grip member for connection to a source of negative pressure.

2. An instrument as called for in claim 1, wherein the outer diameter of the aspirator tube is adapted to slidably receive the bore of an otological vent tube, and wherein an end of said sleeve is adapted to abuttingly engage and move a vent tube along said aspirator tube in response to pivotal movement of said trigger.

3. An instrument as called for in claim 1, wherein the hand grip member is of unitary construction and includes an integral, thin, flexible, hinge-defining web of material hingedly connecting said trigger to said tubular portion.

4. An instrument as called for in claim 1, wherein the aspirator tube comprises a substantially L-shaped, hollow, open-ended tube, and wherein one end of the tube is releasably secured to and carried by the tubular portion of the hand grip member.

5. An instrument as called for in claim 1, wherein said coupling member comprises a plurality of integral, spaced, radially projecting, peripherally extending ribs which circumscribe the outer periphery of said tubular member.

6. An instrument as called for in claim 1, which includes a passageway in the wall of and intermediate the length of the tubular portion of the hand grip member and in open communication with the passageway extending through said tubular portions.

7. An instrument as called for in claim 6, which includes a raised, contoured, finger-receptive pad on the outer peripheral surface of said tubular portion and wherein an end of the first mentioned passageway is located within said pad.

8. An instrument as called for in claim 7 which includes a thumb-receptive loop secured to and carried by said tubular portion at a location diametrically opposite said finger pad.

9. An instrument as called for in claim 1, wherein said trigger is substantially L-shaped having a first leg and second leg intersecting and interconnected at the hinged connection, one of said legs terminating in a clevis-like end portion, and wherein said sleeve includes a planar, depending end-plate adapted to be coupled to and engaged by said clevis-like end portion.

10. An instrument as called for in claim 9, wherein said end plate includes an elongate slot and wherein said clevis like end portion includes a post slidably received by said slot.

11. An instrument as called for in claim 9, wherein the other leg of the trigger terminates in a contoured, finger-receptive pad.

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