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(54) **DEVICE FOR REMOVING A LODGED MASS**

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Appl. No.: **11/256,446**
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(51) **Int. Cl.**

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A61F 13/20	(2006.01)
A61B 19/00	(2006.01)
A61M 1/00	(2006.01)
A61D 1/06	(2006.01)

(52) **U.S. Cl.**
CPC ... ***A61M 1/00*** (2013.01); *A61D 1/06* (2013.01)
(58) **Field of Classification Search**
USPC 604/317, 1–3, 540, 289, 416
See application file for complete search history.

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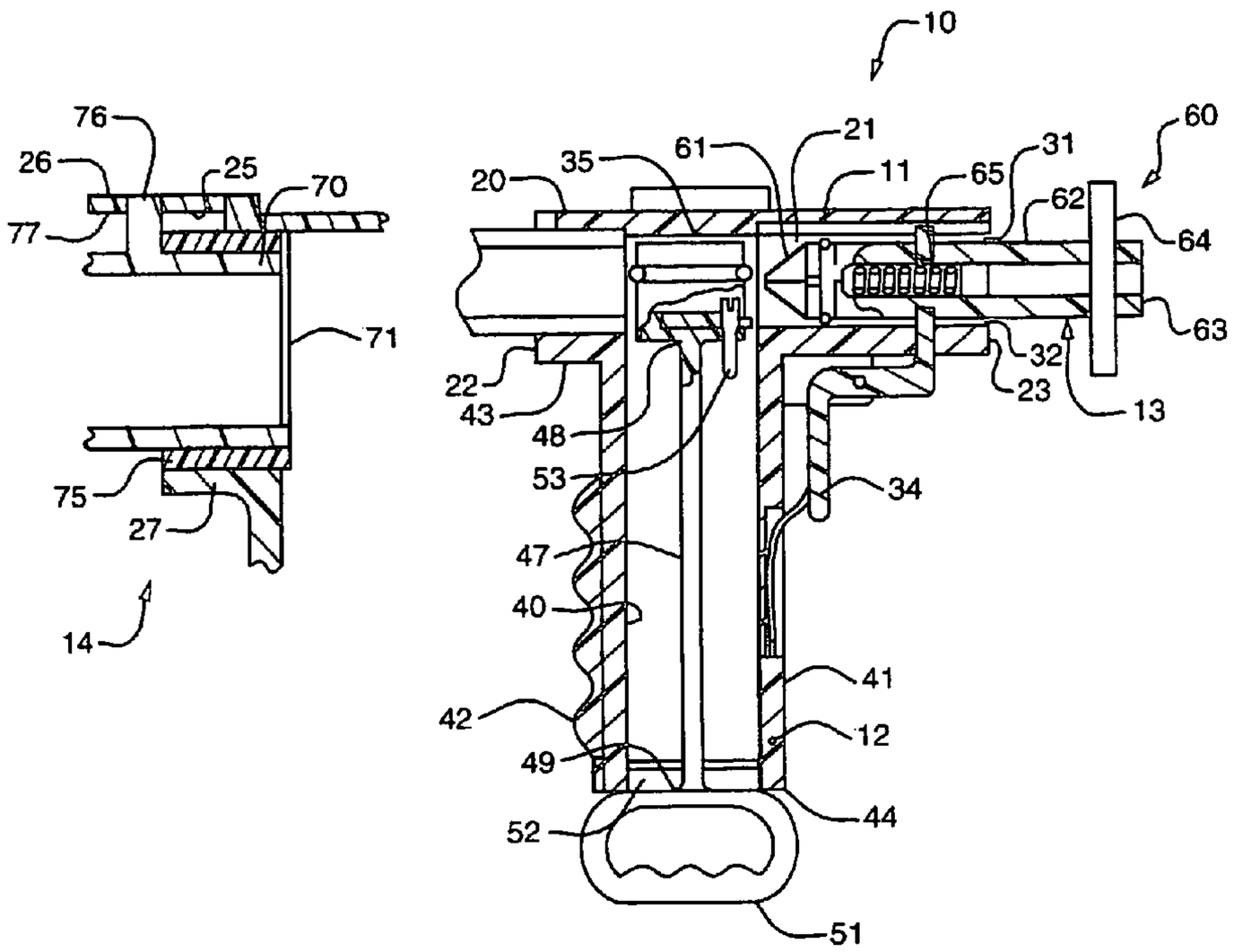
(57) **ABSTRACT**

A vacuum device for removing a lodged mass or bolus from the throat of a choking victim. The device includes a pump for creating a vacuum chamber communicating with a mouthpiece having a frangible membrane. A resilient striker fractures the membrane to generate a substantially instantaneous vacuum to the mouthpiece to dislodge the mass. In one embodiment, the membrane is substituted by a manually displaceable sealing member, which is resealed after use of the device by movement of a vacuum-generating plunger.

76 Claims, 4 Drawing Sheets



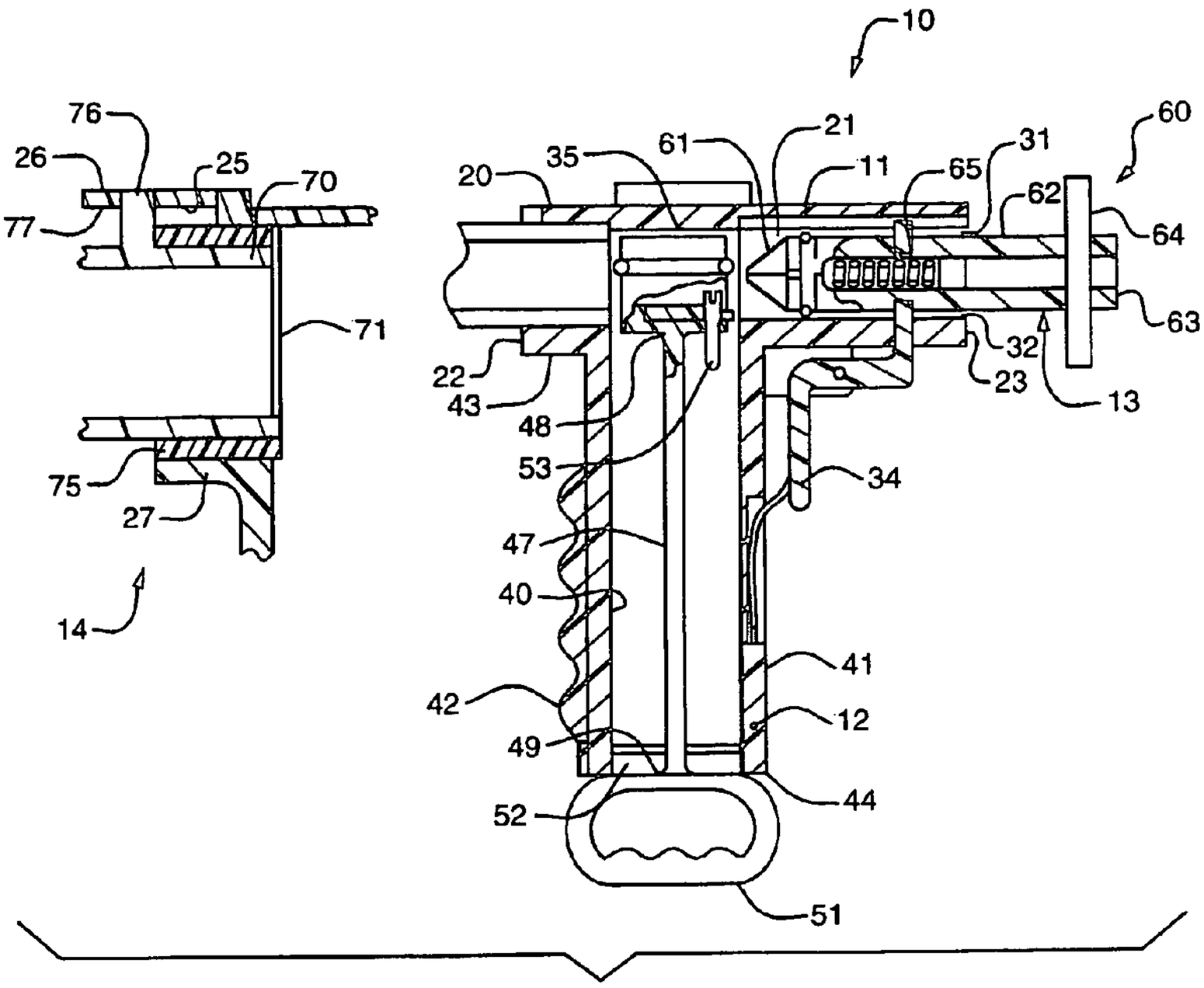

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FIG. 1

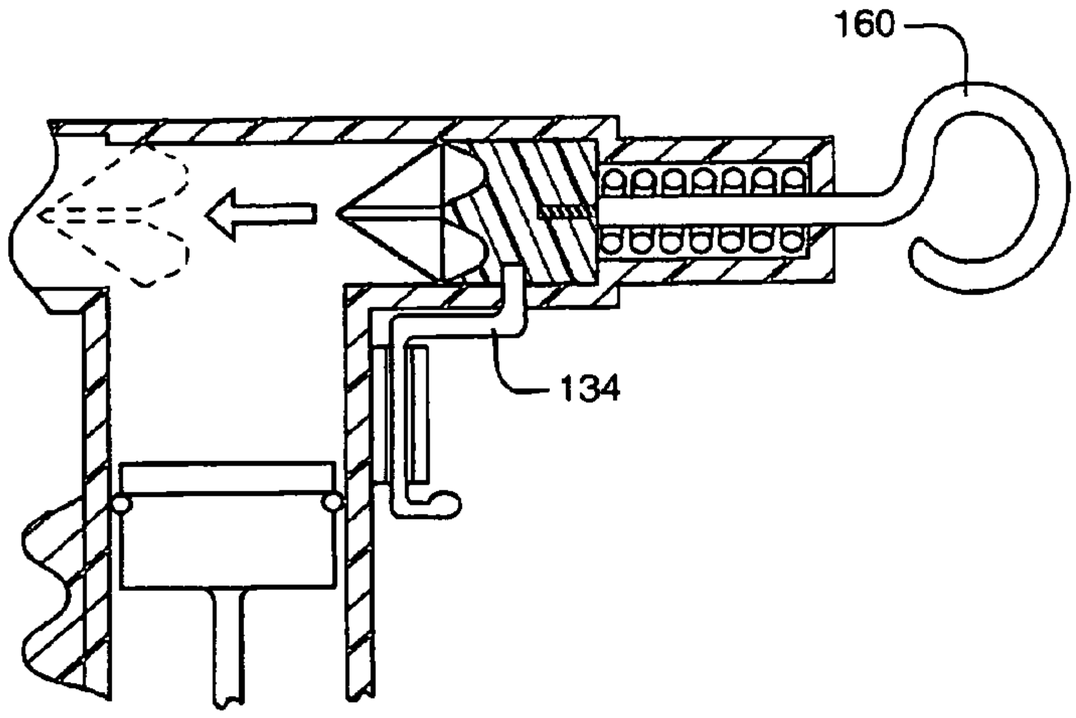
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FIG. 2

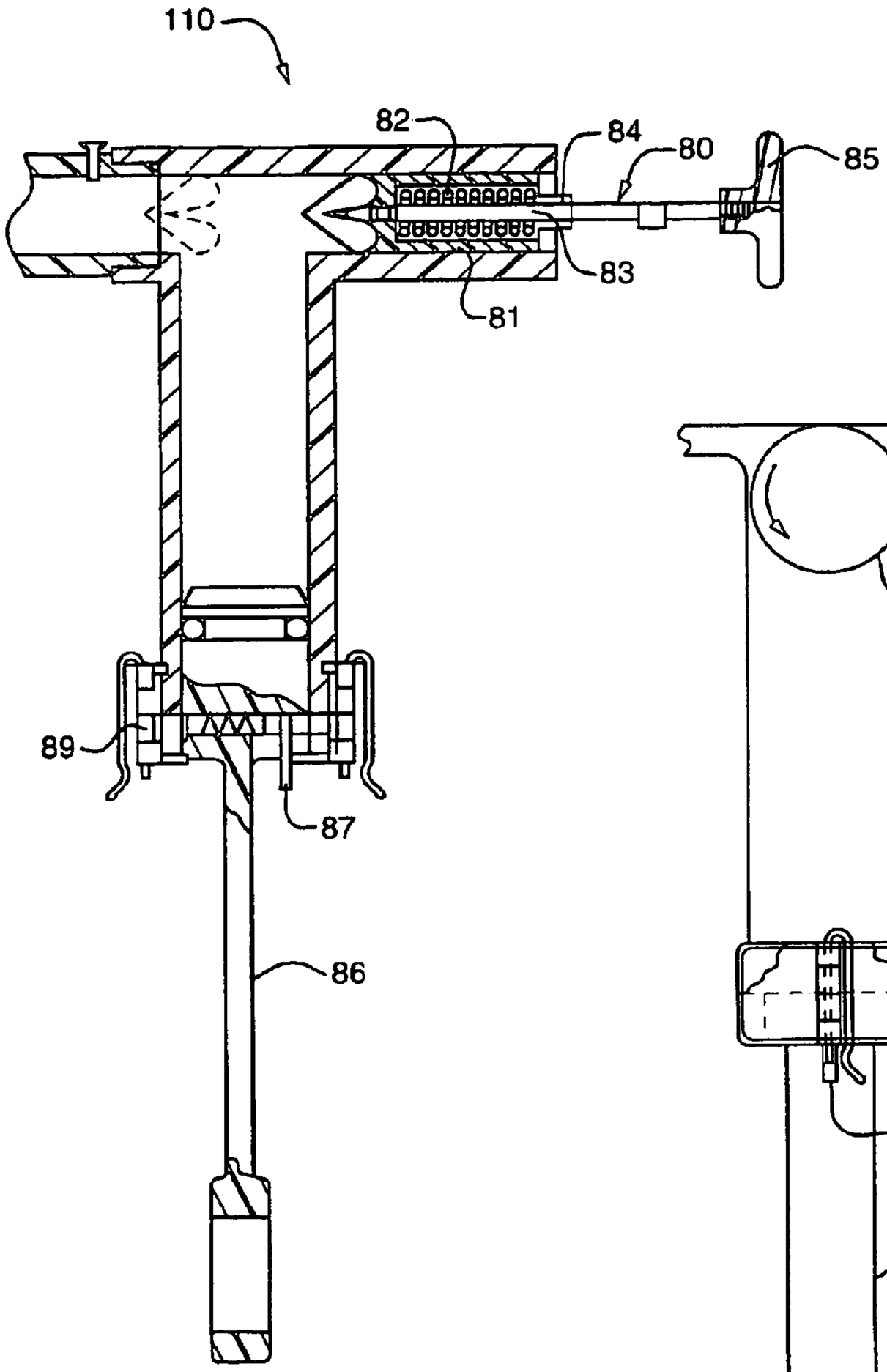


FIG. 3

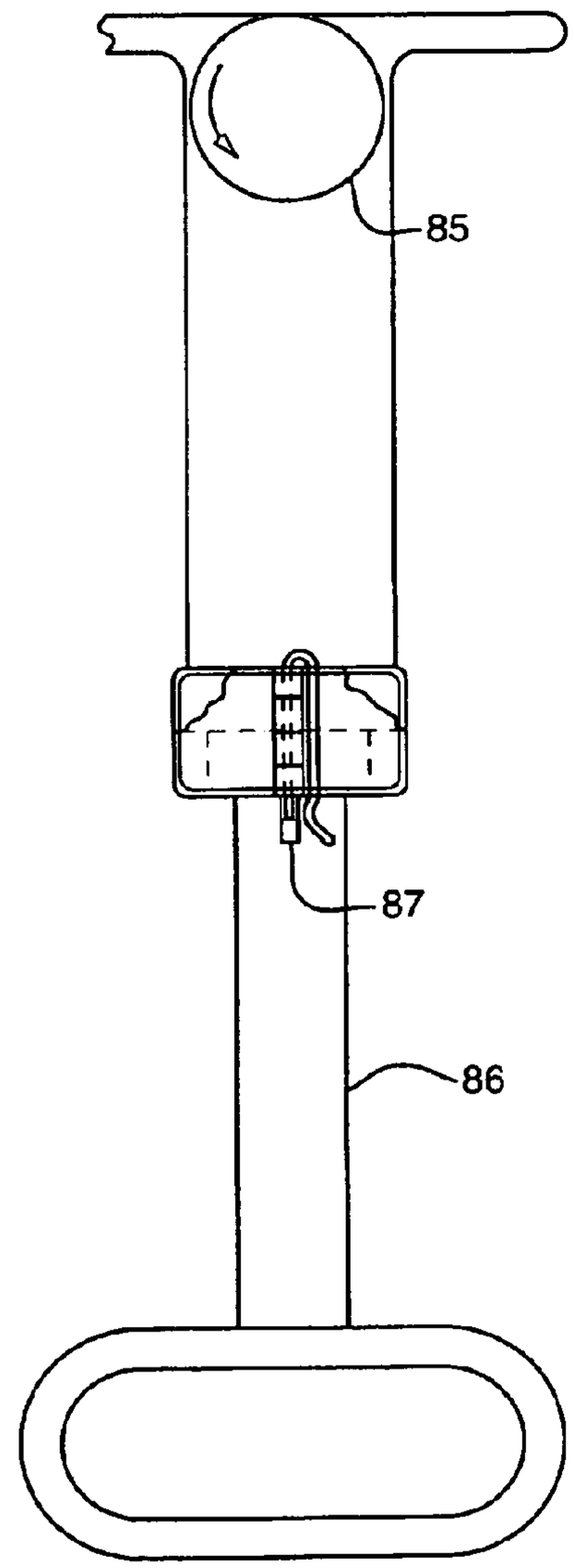


FIG. 4

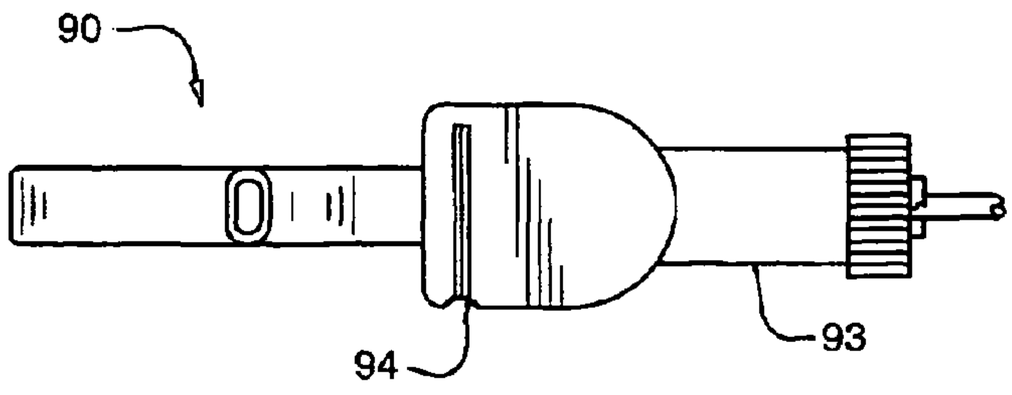


FIG. 5

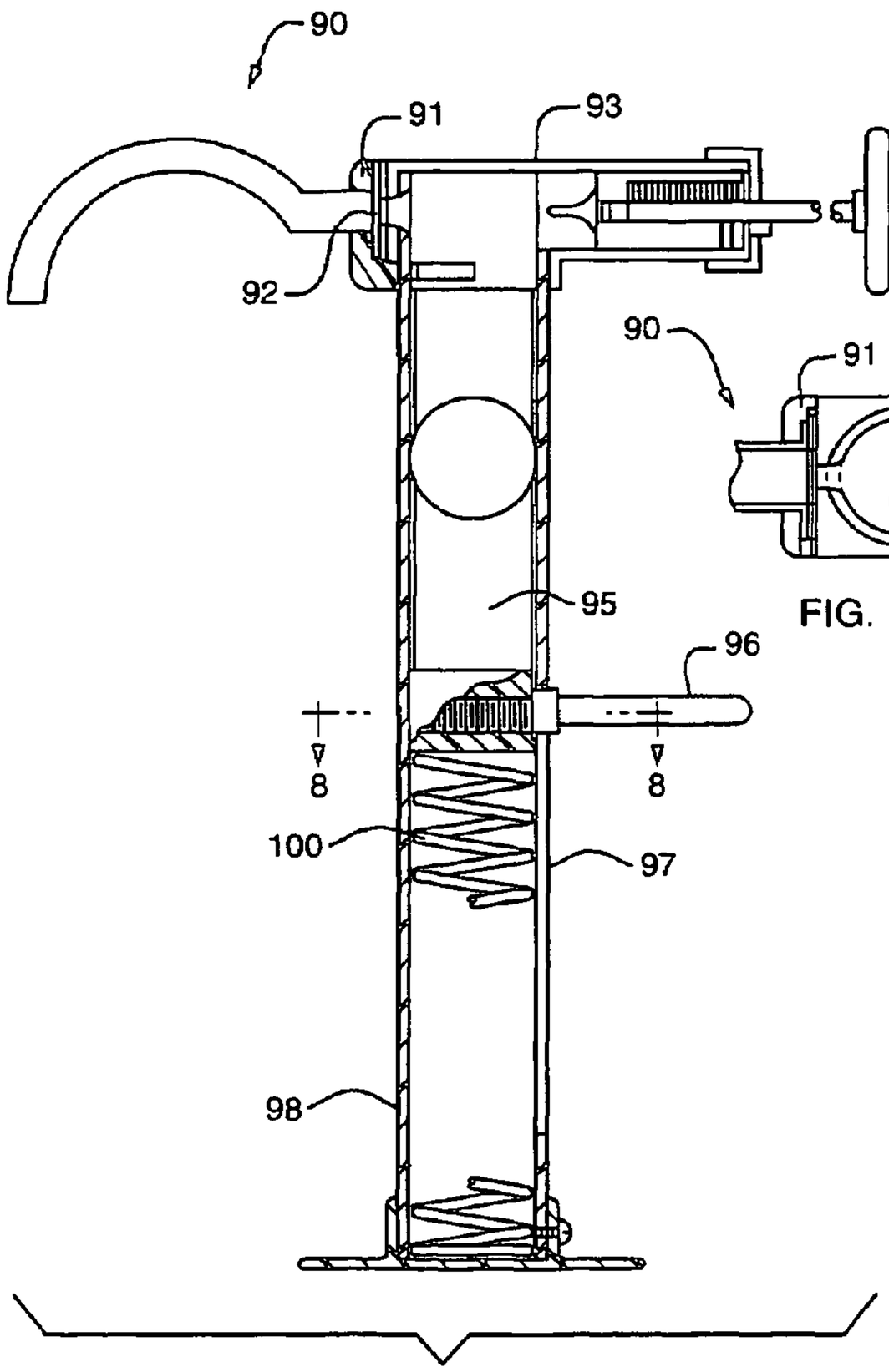


FIG. 6

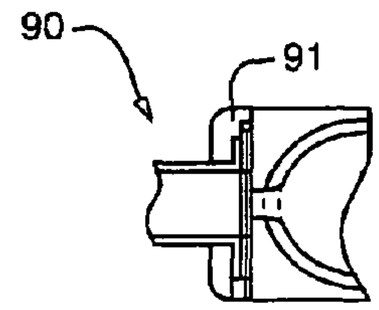
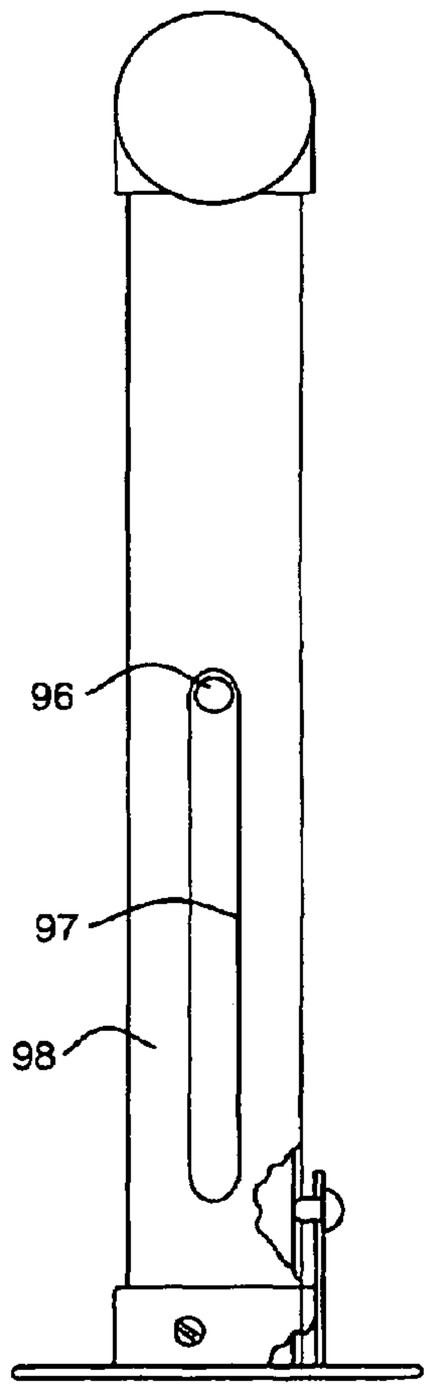


FIG. 7



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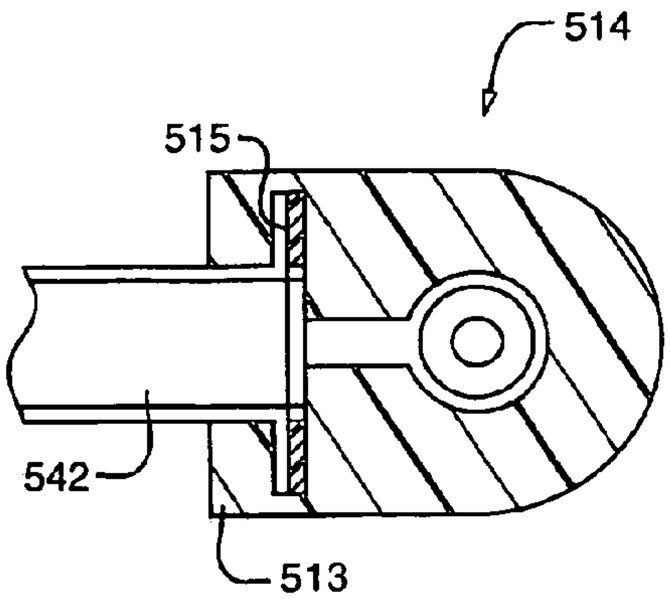

FIG. 11

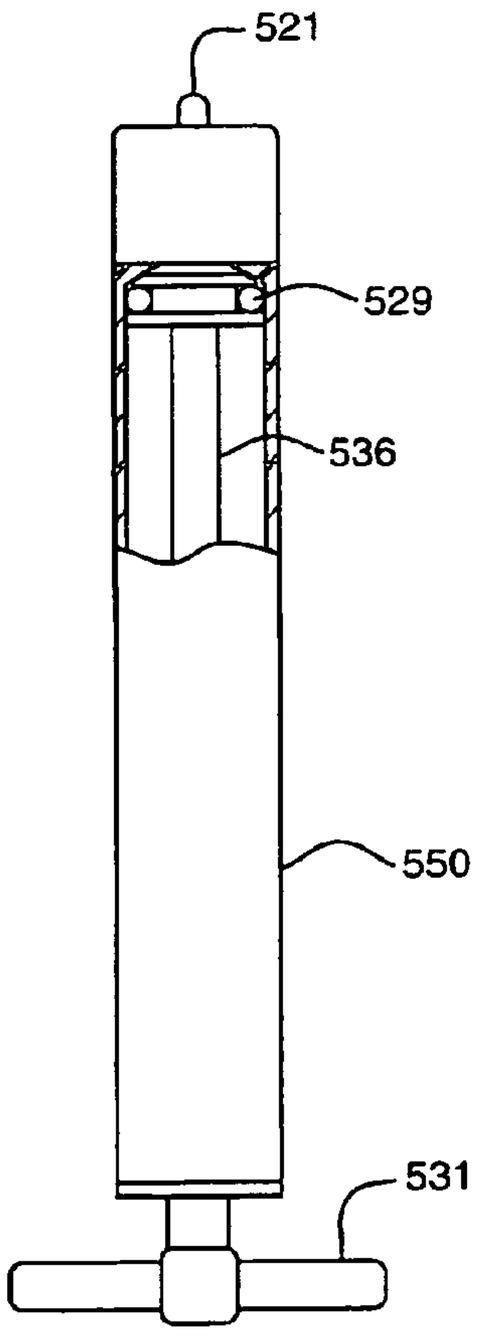

FIG. 12

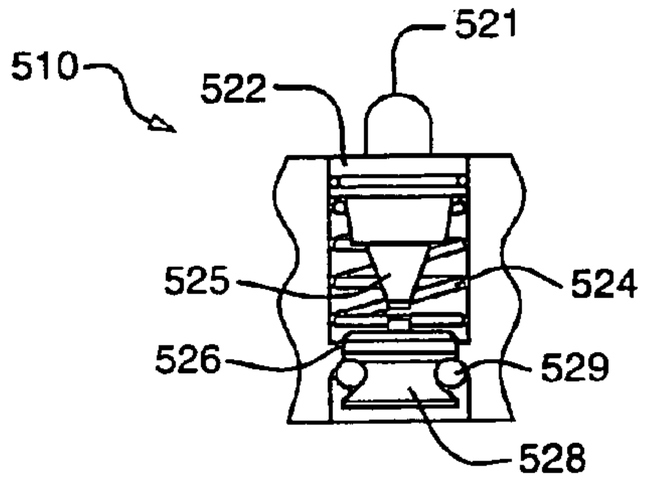

FIG. 10

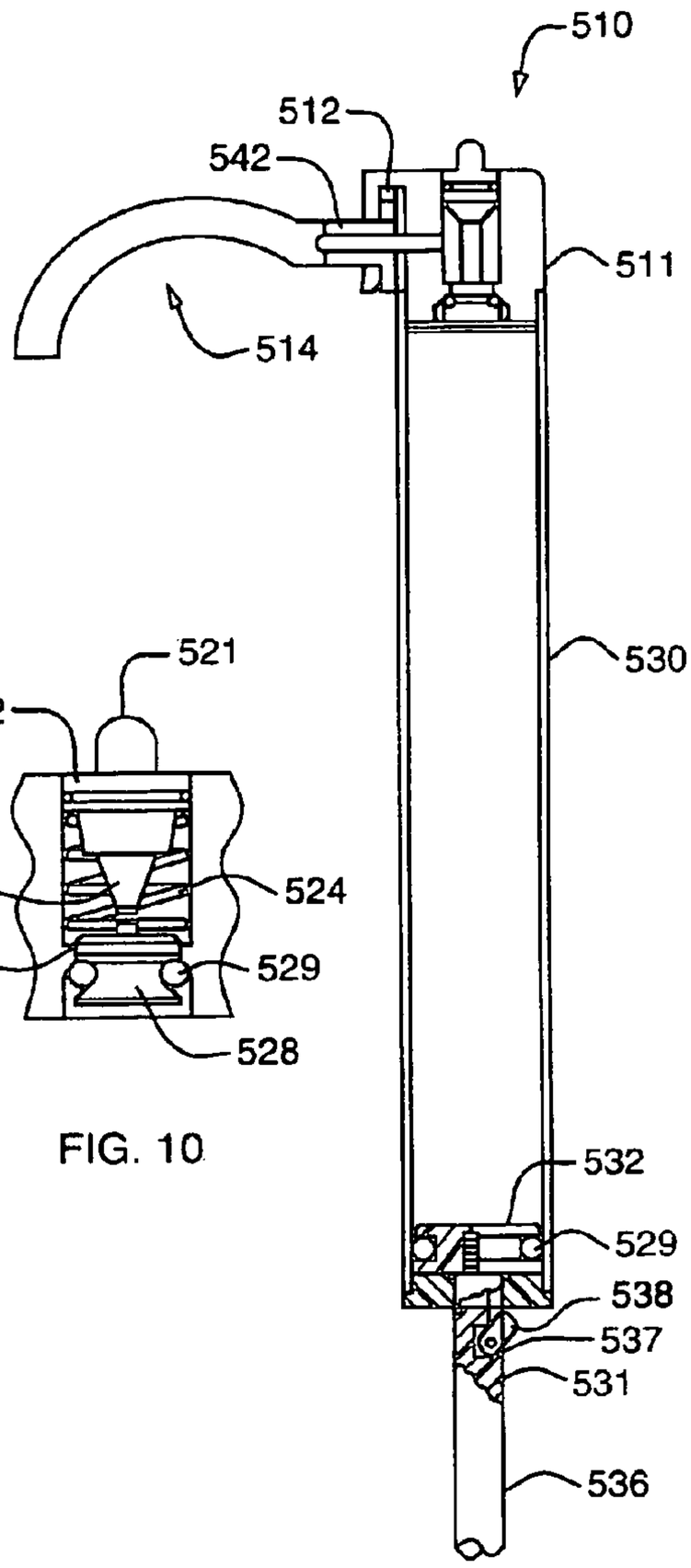

FIG. 9

DEVICE FOR REMOVING A LODGED MASS

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue; a claim printed with strikethrough indicates that the claim was canceled, disclaimed, or held invalid by a prior post-patent action or proceeding.

RELATED APPLICATION

Reference is made to our copending provisional application, Ser. No. 60/644,833; filed Jan. 19, 2005, to which a claim of priority is made.

BACKGROUND OF THE INVENTION

This invention relates to anti-choke devices employed for removing a mass or bolus lodged in the throat of a victim, and more particularly, to a device which is capable of improved operation, which may be produced at relatively modest cost.

As disclosed in U.S. Patent to Litkouhi, et. al., U.S. Pat. No. 6,478,770, when a vacuum pressure is released after positioning a mouthpiece in the throat of a victim, it is desirable that the pressure be created substantially instantaneously, rather than built up gradually by a vacuum pump. As disclosed in that patent, the pressure is provided by a sealed vacuum canister having a penetrable membrane to provide instant vacuum pressure. While this construction is not without utility, it is to be appreciated that with passage of time in storage, the canister will lose vacuum pressure so that unless periodically serviced, the system may be inoperable when it is required.

It is known in the art to provide vacuum pump devices which build up vacuum pressure gradually, as a result of which they do not provide the instantaneous vacuum surge to the mouthpiece for maximum effect.

SUMMARY OF THE INVENTION

Briefly stated, the invention **[**conLemplates**]** *contemplates* the provision of an improved device of the type described in which the above-mentioned disadvantage has been eliminated. To this end, the device includes a cylindrical tube having a spring-loaded striker at one end thereof, and means for engaging an end of the mouthpiece tube in substantially leak-proof relation, which includes a frangible membrane. Extending laterally from the tube is a small hand pump having a lockable plunger, which creates a vacuum with a single outward stroke. When the mouthpiece is positioned, a manually operated means releases the striker which penetrates the membrane to release the vacuum pressure instantaneously to the engaged end of the mouthpiece. The process may be repeated if necessary, using a replacement mouthpiece. In one embodiment, the membrane is replaced by a selectively displaced seal which is repositioned for a second use by movement of the plunger.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, to which reference will be made in the specification, similar reference characters have been employed to designate corresponding parts throughout the several views.

FIG. **1** is a fragmentary schematic sectional view of an embodiment of the invention.

FIG. **2** is a fragmentary schematic sectional view of a second embodiment of the invention.

FIG. **3** is a fragmentary schematic view of a third embodiment of the invention.

FIG. **4** is a view in elevation, partly in section, as seen from the right-hand portion of FIG. **3**.

FIG. **5** is a top plan view of a fourth embodiment.

FIG. **6** is a central sectional view of the fourth embodiment.

FIG. **7** is an elevational view as seen from the right-hand portion of FIG. **6**.

FIG. **8** is an enlarged fragmentary sectional view corresponding to the upper left-hand portion of FIG. **6**.

FIG. **9** is a longitudinal sectional view of a fifth embodiment.

FIG. **10** is a fragmentary enlarged sectional view corresponding to an upper portion of FIG. **9**.

FIG. **11** is a transverse sectional view as seen from the plane **11-11** in FIG. **9**.

FIG. **12** is a longitudinal sectional view of an alternate form of the fifth embodiment.

DETAILED DESCRIPTION OF THE DISCLOSED EMBODIMENTS

In accordance with the first embodiment of the invention, the device, generally indicated by reference character **10**, comprises an elongated tube element **11**, a laterally-extending pump element **12**, a striker element **13**, and a mouthpiece element **14**. It is contemplated that most of the elements can be formed by injection molding techniques of synthetic resinous material known in the art.

The tube element **11** is bounded by an outer surface **20**, an inner surface **21**, as well as first and second ends **22** and **23**, respectively. The first end **22** forms a socket **25** for receiving an outer end of the mouthpiece element **14**, which is provided with a slot **26** and a resilient sealing liner **27**. The second end **23** forms first and second openings **31-32** for supporting the striker element **13**, and forms an opening for a manually-operated trigger **34**. An intermediate section **35** communicates with the pump element **12**.

The pump element **12** is formed to include a hollow cylinder **40**, having an outer surface **41**, including a grip portion **42**, and extends from a connecting end **43** to a free end **44**, which includes a recess for the pivotally-mounted trigger **34**. A vacuum plunger **47** extends from an inner end **48** to an outer end **49** having a manually engageable handle **51**. A recess **52** selectively engages a latch **53** to maintain the plunger **47** in extended condition, thus creating a vacuum within the device.

The striker element **13** extends from a manually-engageable terminal **60** to a penetrating nose **61**. A longitudinal body **62** is provided at its outer end **63** with a cocking member **64**. A spring **65** urges the striker element leftwardly, as seen in FIG. **1**, when released by the trigger **34**.

The mouthpiece element **14** may be of conventional configuration, including an engagement sleeve **70** closed by a membrane **71** held in position by a collar **75**. A laterally-extending projection **76** engages a corresponding slot **77** at the time of interconnection in substantially leak-proof relation. Use of the device contemplates the discarding of the mouthpiece element with each use, thus providing a fresh membrane **71** prior to the commencement of operation.

Operation

The device is normally stored in the condition illustrated in the drawing until needed.

Upon the occurrence of an emergency, the device is used by first cocking the striker element, which is engaged by the manually operable trigger, following which the pump plunger is moved laterally outwardly to create a vacuum. When the plunger has reached its outward excursion, it is latched in position by the latch **53**.

The mouthpiece element is then inserted into the mouth of the victim and positioned in known manner, following which the trigger is pulled to release the striker element which moves inwardly to puncture the foil membrane **71**, thus communicating the vacuum pressure to the mouthpiece element in a substantially instantaneous manner. Should a second application become necessary, the operation is repeated using a replacement mouthpiece element.

Upon completion of the above operation, the mouthpiece element is removed from the victim, and disconnected from the remainder of the device to be discarded. It is replaced by another mouthpiece element, including a new membrane seal.

As compared with prior art devices employing a vacuum pump, all of the required pressure is created with a single pump stroke immediately before use, rather than building up vacuum with repeated pump strokes, and the vacuum pressure created in the disclosed device need be maintained for only a relatively short period of time.

Turning now to the second embodiment of the invention, to avoid needless repetition, parts corresponding to those of the first embodiment have been designated by similar reference characters with the additional prefix "1".

The second embodiment differs from the first embodiment principally in simplification of manufacture, to reduce cost of production. The pivotally-mounted trigger is replaced by a sliding molded trigger. The outward part of the striker element may be formed from bent wire and threadedly engaged with the inner portion of the striker element which may be of molded configuration. The nose portion of the striker element includes axially aligned grooves to facilitate air flow from the mouthpiece element.

Turning now to the third embodiment (FIGS. **3** and **4**), parts corresponding to those of the first and second embodiments have been designated by similar reference characters with the additional prefix "2".

In the third embodiment, the construction is further simplified for manufacture. The striker element **80** is molded to include a recess **81** for a coil spring **82**. A central shaft **83** is threadedly engaged at an inner end. The outer end includes an enlargement **84** and a threaded knob **85** which rotates to maintain the striker in cocked position, thus eliminating the need for a trigger.

The plunger element **86** includes a resiliently urged latch with a release lever **87**, and a retaining ring **88** which maintains spring **89** in position, as shown. The entire plunger element may be injection molded.

Turning now to the fourth embodiment of the invention (FIGS. **5** through **8**, inclusive), the mouthpiece **90** is provided with a flange **91** at the engagement end thereof with the frangible membrane **92** and seal lying in parallel planes. The barrel **93** is slotted at **94** to receive this structure. The striker is generally similar to that of the third embodiment without a separate trigger.

The vacuum plunger **95** includes a laterally-extending handle **96** riding in a slot **97** in the barrel **98**. A latch **99** retains the plunger in vacuum-forming position. When released, a spring **100** moves the plunger to the proximal end of the slot wherein the inner end of the plunger is positioned to block the striker which is maintained in normally cocked position until the vacuum plunger is moved outwardly. Thus, the inner end of the plunger blocks movement of the striker to penetrate the membrane should it be accidentally released.

Turning now to the fifth embodiment of the invention (FIGS. **9-12**), this embodiment differs from the above-described embodiments in the elimination of a frangible membrane to provide instantaneous negative pressure, and the striker means for penetrating the membrane. Instead, the first cylindrical element is modified by considerably shortening the length thereof, and incorporating a finger operated valve which contains generated vacuum pressure for instantaneous application to the mouthpiece element. The valve is returned to closed position by the inner end of the vacuum plunger.

Referring to FIG. **9**, et. seq., the fifth embodiment, generally indicated by reference character **510** includes a molded housing **511** with a laterally-extending recess **512** accommodating the flanged end **513** of a mouthpiece element **514**. The end includes a sealing member **515**, but the frangible membrane of the earlier embodiments is eliminated.

Referring to FIG. **10**, a valving element **520** includes an elongated push button **521** positioned in a cylindrical channel **522** for reciprocation with a return spring**524**. An inner end **525** of the button **521** selectively engages a traversely-extending plate **526** against a sealing member **527**, including a main body **28** and an o-ring seal **529**.

The sealing member is positioned in a laterally-extending barrel **530**, which slidably accommodates a vacuum plunger **531**, which includes a planar valve seating member **532**, as well as an o-ring seal **529**. The vacuum plunger **531** includes a rod **536** having one or more recesses **537** engaged by a locking means **538** as in the earlier-described embodiments. In the alternate form shown in FIG. **9**, plural recesses (not shown) may be provided so that the degree of vacuum obtained may be adjusted in accordance with the individual requirements.

Operation of the fifth embodiment will be apparent from a consideration of the drawings. The device will normally be stored with the plunger element within the vacuum chamber, which will result in the valving element **520** being seated in sealed relation by the spring **524** and movement of the plunger **532**. When the device is readied for use, the plunger element is pulled outwardly by the user to generate the required level of vacuum, following which the plunger locking mechanism is latched. The mouthpiece element is then positioned within the mouth of victim, following which the button **521** is pressed to dislodge the sealing member **526**, whereby vacuum pressure is transmitted through a laterally-extending channel **542** to the mouthpiece element. The sealing member is returned to sealed relation by contact of the inner end of the plunger after use.

We wish to be understood that we do not consider the invention to be limited to the details of structure shown and described in the specification, for obvious modifications will occur to those skilled in the art to which the invention pertains.

We claim:

1. A device for vacuum removal of a lodged mass from the throat of a victim, comprising: a first generally cylindrical tube having first and second ends defining a continuous bore, said first end having means for selectively engaging a mouthpiece element in substantially leak-proof relation; a **[**resilient**]** striker element positioned within said second end of said first tube selectively maintained in relatively cocked position by a manually operable means; a laterally-extending vacuum pump element including a second tubular member having a first end communicating with said first cylindrical tube and a second open end defining a bore, including a recess at a second end of said bore; a plunger slidably positioned in said

bore having a manually-engageable handle and latching means at an outer end thereof, a sealing member, and a mouthpiece element selectively engageable in sealed relation with said first end of said first tube, said element including a frangible sealing means selectively penetrated by said striker element upon activation of said manually-operable means.

2. A device for the removal of a lodged mass from the throat of a victim, comprising: a housing having a principal axis, said housing having a laterally-extending member having means for selectively engaging a free end of a mouthpiece element; said laterally-extending member including a laterally-extending channel; said housing having an axially-extending bore communicating with said laterally-extending channel, and manually operable valving means disposed within said bore; an axially-extending barrel, an elongated vacuum plunger slidably positioned within said barrel, and having locking means thereon, said barrel having corresponding locking means thereon for selectively maintaining said plunger in outward, vacuum-generating position; movement of said plunger to an inward position serving to contact said valving means and return it to closed condition.

3. In a device for removing a lodged mass from the throat of a victim, the improvement comprising: a replaceable mouthpiece element, including a tube having a free end closed by a frangible membrane, and a vacuum-generating source having means for engaging said free end in sealed relation, said source including a resilient striker element for penetrating said membrane following positioning of said mouthpiece element; said vacuum source including a manually-operated single stroke vacuum pump plunger, said vacuum pump including latch means for maintaining said plunger in vacuum-creating position.

4. An antichoking device for removing an object in the throat of a victim, comprising a tube said tube having a length and a first end and a second end, one end of said tube having a mouth piece removably secured thereto, the second end of said tube having a striker, said striker having a cocked and uncocked position and having a trigger for moving said striker from a cocked to an uncocked position, said tube having a pump in communication with said tube, said pump having a first end communicating with said tube and having a plunger slidably movable in said pump from a first position to a second position, said plunger creating a vacuum in said pump when said plunger is moved to said second position said plunger being releasably retained in said second position, said tube having a frangible seal selectively penetrated by said striker upon activation of said striker.

5. The antichoking device according to claim 4 wherein said tube is cylindrical.

6. The antichoking device according to claim 4 wherein said second position of said plunger is further away from said tube than said first position.

7. The antichoking device according to claim 4 wherein said plunger is retained in said second position by a latch.

8. The antichoking device according to claim 4 wherein said striker has a nose for puncturing said frangible member.

9. The antichoking device according to claim 8 wherein said nose of said striker comprises axial grooves, said axial grooves permitting said vacuum to be communicated to said mouthpiece element.

10. The antichoking device according to claim 8 wherein said nose of said striker is generally conical.

11. The antichoking device according to claim 10 wherein said conical nose of said striker has a sharp point.

12. The antichoking device according to claim 4 wherein said striker is restrained by a release member when said striker is in said cocked position.

13. The antichoking device according to claim 12 wherein said release member is toggled to permit unrestrained movement of said striker element.

14. The antichoking device according to claim 4 wherein said vacuum causes said striker to puncture said frangible membrane.

15. The antichoking device according to claim 4 wherein puncturing of said membrane permits said vacuum to be communicated to said mouthpiece element.

16. The antichoking device according to claim 4 wherein said striker is biased by a helical spring.

17. The antichoking device according to claim 16 wherein said helical spring is retained within a recess of said striker, and thereby biases said striker relative to said housing.

18. The antichoking device according to claim 4 wherein said trigger is capable of being toggled from an unengaged position to an engaged position whereby said movement of said striker element is restrained.

19. The antichoking device according to claim 4 wherein said trigger is pivotally mounted to said housing.

20. The antichoking device according to claim 4 wherein said trigger is slidably mounted to said housing.

21. The antichoking device according to claim 4 wherein said housing further comprises a portion that forms a handle grip.

22. The antichoking device according to claim 4 wherein said plunger has an engeagable handle connected by a shaft, said shaft extending laterally from said plunger and protruding from an opening in said housing.

23. The antichoking device according to claim 4 wherein said frangible membrane comprises a foil membrane.

24. A device for vacuum removal of a lodged mass from the throat of a victim comprising a first tube having first and second ends, said first end having a mouth piece removably secured thereto in a substantially leak proof relation, a striker having a cocked and uncocked position and a trigger for moving said striker from said cocked to said uncocked position, a vacuum pump communicating with said tube, said pump including a plunger slidably positioned in said pump said plunger being manually movable from a first position to a second position in said pump and being releasably retained in said second position until said striker penetrates a frangible seal.

25. The device according to claim 24 wherein said device further comprises a biasing means, and wherein said biasing means normally biases said striker from said cocked position toward said uncocked position.

26. In a device for removing a lodged mass from the throat of a victim, the improvement comprising a replaceable mouthpiece, including a tube having a free end closed by a frangible membrane and a vacuum generating source, said vacuum generating source including a striker for penetrating said membrane following positioning of said mouthpiece, said vacuum generating source including a plunger said plunger manually movable from a first position to a second position to generate a vacuum, said plunger being retained in said second position until said frangible membrane is pierced by said striker.

27. A device for use in removing a lodged mass from the throat of a victim, said device comprising:

(a) a mouthpiece, said mouthpiece having a generally tubular sleeve having a first end and a second end, said first end being open and said second end being sealed by a frangible membrane;

(b) a striker, said striker having a first and a second end, said striker further comprising a sealing means and a cocking member;

(c) *a housing, said housing comprising a first bore creating a first end opening and a second end opening, said first end opening having a means for receiving said second end of said mouthpiece; said striker being slidably received within said bore;*

(d) *a release member, said release member adapted to releasably restrain movement of said striker when said striker is moved into a cocked position;*

(e) *a plunger, said plunger further comprising an engageable handle, and a sealing means; and*

(f) *a second bore within said housing; said second bore extending transverse from said first bore to create a third end opening in said housing; said second bore being interconnected to said first bore between said first and second end openings; said plunger being slidably disposed within said second cylindrical bore.*

28. The device according to claim 27 wherein said mouthpiece forms a leak proof connection with said housing.

29. The device according to claim 27 wherein said bores are generally cylindrical.

30. The device according to claim 27 wherein said cocking member is located at said second end.

31. The device according to claim 27 wherein when said striker is restrained by said release member in said cocked position.

32. The device according to claim 31 wherein when said release member is toggled to permit unrestrained movement of said striker; said vacuum thereby causing said striker to puncture said frangible membrane.

33. The device according to claim 27 wherein said mouthpiece is affixed to said first end opening of said housing.

34. The device according to claim 27 wherein said engageable handle is actuated by moving said plunger from a position proximate to said first bore to a position proximate to said third end opening, so as to create vacuum pressure within said first and second bores.

35. The device according to claim 27 wherein cocking member is positioned on said housing so as to limit travel of said striker.

36. The device according to claim 27 wherein puncturing of said membrane by said striker permits said vacuum pressure to be communicated through said first bore to said first end of said mouthpiece element.

37. The device according to claim 27 wherein said striker has a nose.

38. The device according to claim 37 wherein said nose of said striker comprises axial grooves, said axial grooves permitting said vacuum pressure to be communicated through said first bore to said first end of said mouthpiece element.

39. The device according to claim 37 wherein said cocking member of said striker is used to move said striker into said cocked position, and thereby be retained by said release means.

40. The device according to claim 37 wherein said nose of said striker is generally conical.

41. The device according to claim 40 wherein said conical nose of said striker has a sharp point.

42. The device according to claim 27 wherein said sealing means of said striker element is disposed between said striker and said first bore to seal off said second end.

43. The device according to claim 27 wherein said sealing means of said plunger is disposed between said cylindrical striker and said second bore to seal off said third end.

44. The device according to claim 27 wherein at least one of said sealing means of said striker and said sealing means of said plunger are an o-ring seal.

45. The device according to claim 37 wherein said sealing means of said striker is located proximate to said nose.

46. The device according to claim 27 wherein said plunger further comprises a latch, said latch being engageable with said housing so as to oppose said vacuum pressure and maintain said plunger in said position proximate to said third end in said housing.

47. The device according to claim 27 wherein said striker is biased by a helical spring.

48. The device according to claim 47 wherein said helical spring is retained within a recess in said striker, and biases said striker member relative to said housing.

49. The device according to claim 27 wherein said release member comprises a trigger, said trigger capable of being toggled from an unengaged position to an engaged position whereby said movement of said striker is restrained.

50. The device according to claim 49 wherein said trigger is pivotally mounted to said housing.

51. The device according to claim 49 wherein said trigger is slidably mounted to said housing.

52. The device according to claim 27 wherein said release member comprises a threadable connection between said striker element and said housing.

53. The device according to claim 52 wherein said housing includes internal threading proximate to said second end opening, and said striker includes external threading on at least a portion thereof.

54. The device according to claim 53 wherein said cocking member has a knob to rotate said striker element and cause engagement and disengagement.

55. The device according to claim 27 wherein said housing further comprises a portion that forms a handle grip, said handle grip being located in proximity to said second bore.

56. The device according to claim 27 wherein said-plunger has an engeagable handle.

57. The device according to claim 56 wherein said handle and said plunger are connected by a shaft, said shaft being disposed within said second bore, said shaft being of sufficient length to permit said handle to protrude out from said third end when said plunger is located proximate to said first bore.

58. The device according to claim 57 wherein said shaft extends laterally from said plunger and protrudes from a slotted opening in said housing.

59. The device according to claim 27 wherein said plunger is maintained in a position proximate to said first cylindrical bore to prevent inadvertent actuation of said release means and accidental breaking of said frangible membrane of said mouthpiece.

60. The device according to claim 27 wherein said plunger is biased to be normally maintained in a position proximate to said first bore.

61. The device according to claim 27 wherein said frangible membrane is sealed over said second end of said mouthpiece using a collar.

62. The device according to claim 61 wherein said mouthpiece comprises a sealing liner, and a laterally extending protrusion.

63. The device according to claim 62 wherein a portion of said housing receiving said second end of said mouthpiece comprises a socket, said socket having a slot, said slot of said socket being capable of releasably engaging said laterally extending protrusion of said mouthpiece.

64. The device according to claim 63 wherein said frangible membrane comprise a foil membrane.

65. A mouthpiece element for use in a device for removing lodged particles from the throat of a victim, said mouthpiece comprising a first end and a second end with an air passage-

way from said first end to said second end, said first end being adapted to inserted into the mouth of the victim, said second end of said mouthpiece comprised of engagement sleeve with an open end, said open end being covered by a piercable membrane, said membrane being replacably secured to said engagement sleeve, said membrane being held in place on said sleeve by a collar.

66. The mouthpiece according to claim 65 wherein a laterally extending projection extends from said mouthpiece and engages a corresponding slot in same device for removing a lodged particle.

67. A device, for use in removing a lodged mass from the throat of a victim, said device comprising:

a housing, said housing comprising: a first bore creating a first end opening and a second end opening, and a second bore being interconnected to said first bore between said first and second end openings and creating a third end opening in said housing;

a striker, said striker having a first end and a second end, said striker being slidably received within said first housing bore in sealed relation;

a trigger, said trigger being adapted for releasably restraining movement of said striker when said striker is moved into a cocked position being distal from said first end opening;

a mouthpiece, said mouthpiece having a first end and a second end, said first end being open and said second end being sealed by a frangible membrane; said second end of said mouthpiece being received at said first end opening of said housing with said frangible membrane sealing said second end opening and being selectively penetrated by said striker; and

a plunger, said plunger being slidably within said second bore in sealed relation.

68. A device according to claim 67 further comprising a latching means for securing said plunger in a vacuum-pressure producing position.

69. A device according to claim 68 wherein said mouthpiece is replaceable by being releasably received by said housing.

70. A device according to claim 69 wherein said plunger comprises a graspable handle.

71. A device according to claim 70 wherein said striker comprises a sealing means and a cocking member.

72. A device according to claim 71 wherein said first and second bore in said housing are cylindrical, said plunger is generally cylindrical, and said striker comprises a generally cylindrical member transitioning into a nose for penetrating said frangible membrane.

73. A device according to claim 72 wherein said penetrating nose of said striker comprises two or more axial grooves for communicating said vacuum pressure through said mouthpiece.

74. A device according to claim 73 wherein said striker comprises a cocking member.

75. A device according to claim 74 wherein said striker is spring biased toward said first end opening of said housing.

76. A device according to claim 75 wherein said frangible membrane comprises a foil membrane.

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