March 17, 1964 A. E. KRUG 3,125,094

SUCTION DEVICE

Filed Jan. 5, 1962 2 Sheets-Sheet 1

FIG. 1

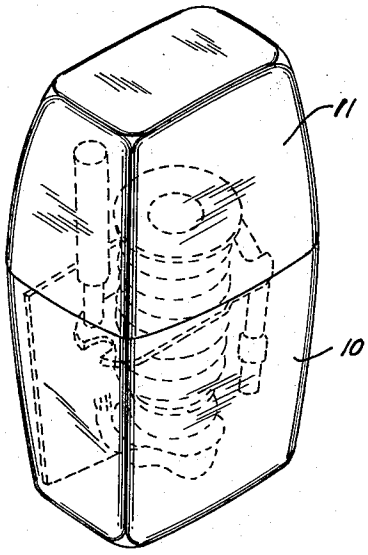


FIG. 2

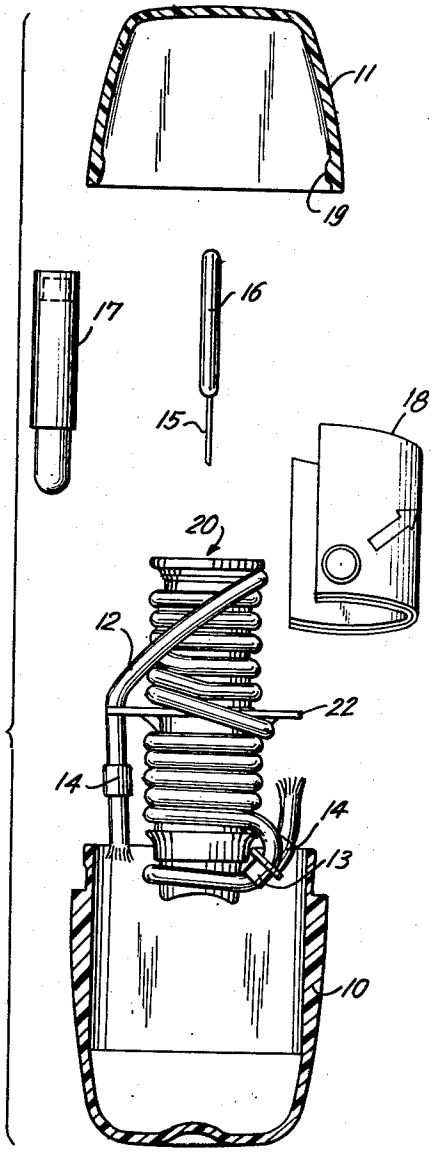
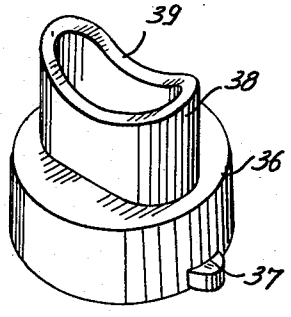


FIG. 8



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March 17, 1964 A. E. KRUG 3,125,094

SUCTION DEVICE

Filed Jan. 5, 1962

2 Sheets-Sheet 2

FIG. 3

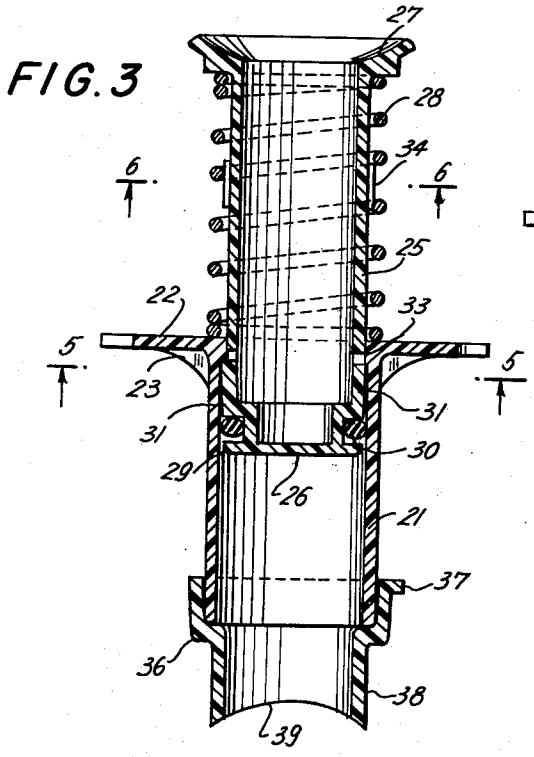


FIG. 4

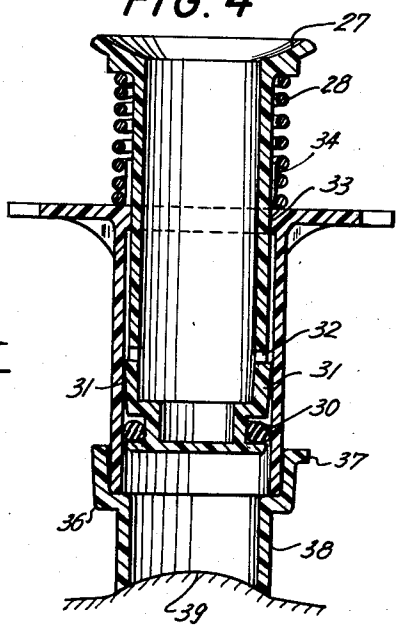


FIG. 7

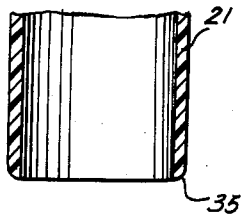


FIG. 5

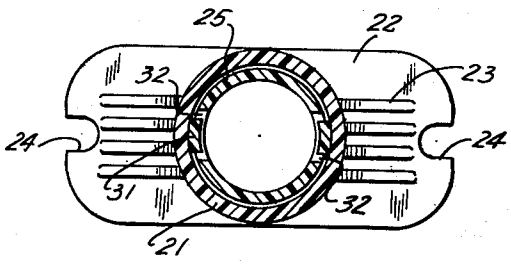
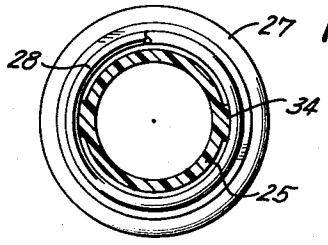


FIG. 6



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3,125,094

SUCTION DEVICE

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Filed Jan. 5, 1962, Ser. No. 164,547
2 Claims. (Cl. 128—300)

This invention relates to a structurally and functionally improved suction device primarily intended for removing venom and which device will preferably form part of a snake bite kit.

It is a primary object to furnish a suction device of simple design which may readily be operated by one hand in order to develop a suction such that venom will be effectively withdrawn from a wound; the device—incident to the vacuum created—even remaining supported in sealing contact with the surface of the skin. Under these conditions, and with the wound, for example, on a forearm surface, the hand of the other arm will be free to manipulate other implements and appliances.

A further object is that of providing a unit of this character which will be of simple design and capable of economical production, and which will be available for instant operation even though it has been stored for long periods of time.

Moreover, the suction device will embrace an assembly such that it may be applied to function with maximum efficiency whether the wound be of a smaller or larger area; the unit being additionally capable of housing and retaining implements which may, for example, form a part of a complete snake bite kit.

Further objects of my invention are to provide a suction device, the barrel portion of which is free from obstructions and the plunger of which provides maximum displacement when reciprocated so that maximum displacement of the barrel is provided when plunger is shifted downwardly and maximum suction is provided when the plunger is shifted upwardly and a nozzle portion having a contoured skin engaging surface so that it forms a sealing fit when maximum suction is applied to the skin surface.

With these and other objects in mind, reference is had to the attached sheets of drawings illustrating one practical embodiment of the invention, and in which:

FIG. 1 is a perspective view of a complete kit including the present suction device;

FIG. 2 is an exploded sectional side view of the kit and contained implements or accessories;

FIG. 3 is a sectional side view in enlarged scale showing the suction device with its parts in one position;

FIG. 4 is a similar view showing the parts of the suction device in an opposite extreme position;

FIGS. 5 and 6 are transverse sectional views taken respectively along the lines 5—5 and 6—6 in the direction of the arrows as indicated in FIG. 3;

FIG. 7 is a fragmentary sectional view of the lower portion of the barrel forming a part of the assembly; and

FIG. 8 is a perspective view of an adapter cap as shown in section in FIGS. 3 and 4.

Referring primarily to FIGS. 1 and 2, the suction device preferably forms a part of a kit which is housed within a receptacle conveniently embracing a base portion 10 and a cover 11. A tourniquet is provided and may embrace a cord 12 slideably mounting an eyelet 13 at a point intermediate its ends to furnish a loop portion. Adjacent those ends it will be conveniently encircled by fixed metallic parts 14 which prevent the cord from being withdrawn from the eyelet.

It is also preferred that the kit include a blade 15 provided with a handle 16 and an antiseptic unit 17. The latter will be housed within a covering portion and may

embrace a capsule containing iodine with which a swab is associated. That capsule will be susceptible to being crushed to release the antiseptic for flow into the body of the swab. An instruction sheet such as 18 may also be included in the assembly and set forth the procedure to be followed in the event of a snake bite occurring. Such instructions may also appear on the exterior of the receptacle or casing.

The latter will preferably be formed of a thermoplastic material and may include a detent structure as at 19 such that the cover will not become accidentally detached from the base, so that the parts of the kit contained within the latter will be properly housed under all conditions. Among those parts is the suction device generally indicated by the numeral 20 and upon which the present invention is based.

That device, as shown in FIGS. 3 and 4, will include a tubular barrel 21, the rear end of which mounts an actuating flange 22 to be engaged by the fingers of the user. It is preferred to form this barrel of polystyrene and ribs 23 are provided between the outer surface of the barrel and the under faces of flange 22 to reinforce the latter. Those ribs or gussets are blended into the surfaces of the parts as especially shown in FIG. 5. In that view it will also be noted that the outer ends of the actuating flange 22 are conveniently formed with notches 24 of a diameter such that they may accommodate the cord of the tourniquet.

The bore of the barrel slideably receives a plunger. That plunger is conveniently formed of high impact styrene, embracing a cylindrical body 25 closed at one end by a wall 26, and having at its opposite outer end an actuating head 27 for engagement by the thumb of the user. A spring 28 encircles the plunger and has one end bearing against the under face of head 27 while its opposite end bears against the outer surface of flange 22 to thus urge the plunger into a position retracted with respect to the barrel. Rearwardly of wall 26 the plunger is formed with a groove 29. Within the latter, there is disposed a packing ring or part 30 which wipes against the bore surface of the barrel as the plunger is reciprocated to establish a proper seal.

In accordance with the present teachings, the plunger is retained in association with the barrel. Also, its movements with respect to the latter may not exceed predetermined limits. To achieve this result, tabs 31 form a part of the plunger and yieldingly extend in a direction outwardly therefrom. These tabs are conveniently provided by having the plunger slitted as indicated at 32 to define their rear and side edges and cause them to assume positions at angles to the axis of the plunger. Thus, these tabs define a taper embracing one diameter at their ends which are attached to the plunger and a diameter of, for example, several hundredths of an inch greater at their free rear ends. The barrel is provided with a stop. This preferably takes the form of a flange 33 extending inwardly of its bore at a point in line with actuating flange 22. The aperture defined by flange 33 will be slightly greater than the diameter of the plunger body, but of less diameter than that defined by the rear ends of the tabs 31.

Accordingly, when the plunger, under the influence of spring 28, is moved rearwardly from the position shown in FIG. 4 to that illustrated in FIG. 3, the free ends of the tabs will engage the stop to prevent the plunger from being retracted beyond a predetermined position. To similarly prevent too great a projection of the plunger, projections 34 extend outwardly from its side face. These projections are spaced from the tabs a distance equal to the desired stroke of the plunger. It is again apparent that as the plunger is moved from the position shown in FIG. 3 to that illustrated in FIG. 4, these projections will contact that part of flange 33 which lies in the plane of the outer

face of actuating flange 22. Therefore, further projection of the plunger is prevented. No assembly problem will be involved in that the plunger, prior to association with the barrel, will receive the encircling spring 28. Thereafter, and with the ring 30 in position, the forward end of the plunger will be introduced into the bore of the barrel and projected within the latter. In such projection tabs 31 will be flexed inwardly to override the edge of stop flange 33 and thereupon spring outwardly to function as pawl or latch members to prevent a subsequent withdrawal of the plunger from the barrel. With the parts thus disposed, it is obvious that the plunger will remain in association with the barrel but be free to reciprocate with respect to the latter under the influence of digital pressures and spring 28.

The lower end of the barrel, as shown in FIG. 7, preferably terminates in an edge portion 35 of reduced thickness. This facilitates the establishment of an effective seal between the lower or outer end of the barrel and the surface of the skin. Such direct contact should occur when the bite is located on relatively flat skin surfaces. In the case of rounded surfaces being involved, such as fingers, toes and ankles, an adapter which forms a part of the suction device assembly is conveniently employed. This adapter, as shown in FIGS. 3, 4 and 8, embraces a cap 36 having an interior diameter smaller than the exterior diameter of barrel 21, so that it will snugly fit on the latter.

The application of the adapter to the barrel is facilitated as a consequence of the somewhat rounded surface beyond edge portion 35 of that barrel. Removal of that cap may be facilitated by having is provided with a projecting portion 37 which will serve as a bearing point for a finger such that this result may be effected. A reduced nozzle portion 38 extends outwardly from cap 36 and is provided with a skin contacting edge 39 of curved contour so that a seal of maximum effectiveness may be established by this edge as shown in FIG. 8. The adaptor which embraces a cap 36 an a nozzle 38 is generally elliptical in cross section with its major transverse axis being substantially greater than its minor transverse axis and with the outer face 39 thereof being curved concavely inwardly towards the central portion of the side walls which extend along the major axis.

Such parts as involve surfaces requiring lubrication may receive a coating of proper material such as silicone lubricant. This will assure that the plunger may readily be reciprocated within the barrel and that a proper seal will be established with the bore of the latter, by sealing part or ring 30. If the suction device forms a part of the kit, it should be disposed in a position such that it together with accessory parts included in the kit assembly will be readily available.

The procedure involved following a snake bite will, of course, call for proper application of the tourniquet at a point beyond that at which the bite or bites occurred. Thereupon, the bite will be cleaned with the saturated antiseptic swab. Blade 15 will be cleaned by the antiseptic solution and proper cross-incisions will be made over the fang marks. The plunger of the suction device will be projected and that device will be applied to overlie the incisions. By releasing the thumb from contact with actuating head 27, the plunger will rise under the action of spring 28 and a suction will be exerted. When the plunger has been completely retracted, the device is removed from sealing engagement with the skin and emptied. Reapplication of the unit to the incised area with a repetition of the suction action may be resorted to as many times as appear desirable. It will be noted that the hollow interior of the plunger provides a compartment such that accessory parts or implements of a kit are conveniently housed therein in contact with each other, and the bore surface of the plunger so that the resultant frictional engagement will retain them in position until they are deliberately withdrawn.

The device may serve as a mounting for a tourniquet cord. To this end, it may be wrapped around the barrel and plunger portions in the manner shown in FIGS. 1 and 2. The free end of the tourniquet is retained in convenient position by having that end lie within one of the notches 24 of the actuating flange.

Thus, among others, the several objects of the invention as specifically aforenoted are achieved. Obviously, numerous changes in construction and rearrangement of the parts may be resorted to without departing from the spirit of the invention as defined by the claims.

1. A suction device for removing venom comprising: a cylindrical barrel of plastic material having an open upper end provided with laterally projecting, finger-engaging flange means and with an open lower end provided with a fitted nozzle portion which is generally elliptical in cross section with its major transverse axis being substantially greater than its minor transverse axis and with the outer face thereof being curved concavely inwardly towards the central portion of the side walls thereof which extend along the major axis so as to provide a contoured skin engaging surface; a tubular plastic plunger projecting into the open upper end of the barrel and being closed at its lower end and open at its upper end to provide a receptacle for accessories in the interior thereof and having a packing ring extending around the exterior of its lower end to form a sealing fit with the interior of the barrel and an outwardly flared operating head extending around the open upper end with a concave surface for engagement by the thumb of the operator, the outside diameter of the plunger for the major portion of the length thereof being slightly smaller than the inside diameter of the barrel so as to provide a sliding and guiding fit therebetween; and a helical spring disposed around the plunger and extending between the open upper end of the barrel and the outwardly flared operating head of the plunger so as to normally urge the plunger in a direction outwardly of the barrel, said barrel being formed with an inwardly projecting retaining collar extending around the inner surface of the open upper end thereof and said plunger being formed with a plurality of outwardly projecting lugs spaced a short distance from the operating head which are engageable with the retaining collar to limit the inward shift of the plunger and said plunger also being formed with a plurality of resilient retaining tabs spaced around the periphery thereof a short distance above the packing ring with the lower end of said retaining tabs being integral with the lower portion of the plunger and flaring outwardly and upwardly at an angle terminating in upper ends providing shoulders projecting beyond the peripheral surface of the plunger so as to engage the retaining collar when the plunger is shifted outwardly by the spring and thereby limit the relative outward movement of the plunger, said tabs being shiftable inwardly so as to be substantially flush with the plunger whereby the plunger may be assembled with the barrel, the lower end of said plunger being completely closed and sealed so that there is no access from the interior of the plunger to the interior of the barrel and the interior of said barrel being free from obstructions so as to provide maximum displacement as the plunger is shifted inwardly and maximum suction as the plunger is shifted outwardly.

2. A suction device for removing venom comprising: a cylindrical barrel of plastic material having an open upper end provided with laterally projecting, finger-engaging flange means and with an open lower end provided with a fitted nozzle portion which is generally elliptical in cross section with its major transverse axis being substantially greater than its minor transverse axis and with the outer face thereof being curved concavely inwardly towards the central portion of the side walls thereof which extend along the major axis so as to provide a contoured skin engaging surface; a tubular plastic plunger projecting into the open upper end of the barrel

and being closed at its lower end and open at its upper end to provide a receptacle for accessories in the interior thereof and having a packing ring extending around the exterior of its lower end to form a sealing fit with the interior of the barrel and an outwardly flared operating head extending around the open upper end with a concave surface for engagement by the thumb of the operator, the outside diameter of the plunger for the major portion of the length thereof being slightly smaller than the inside diameter of the barrel so as to provide a sliding and guiding fit therebetween; and a helical spring disposed around the plunger and extending between the open upper end of the barrel and the outwardly flared operating head of the plunger so as to normally urge the plunger in a direction outwardly of the barrel, said barrel being formed with an inwardly projecting retaining collar extending around the inner surface of the open upper end thereof and said plunger also being formed with a plurality of resilient retaining tabs spaced around the periphery thereof a short distance above the packing ring with the lower end of said retaining tabs being integral with the lower portion of the plunger and flaring outwardly and upwardly at an angle terminating in upper ends providing shoulders projecting beyond the peripheral surface of the plunger so as to engage the retaining collar when the plunger is shifted outwardly by the spring and thereby limit the relative outward movement of the plunger, said tabs being shiftable inwardly so as to be substantially flush with the plunger whereby the plunger may be assembled with the barrel, the lower end of said plunger being completely closed and sealed so that there is no access from the interior of the plunger to the interior of the barrel and the interior of said barrel being free from obstructions so as to provide maximum displacement as the plunger is shifted inwardly and maximum suction as the plunger is shifted outwardly.

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