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2,435,387

INFLATABLE DILATOR

Filed Aug. 14, 1946

2 Sheets-Sheet 1

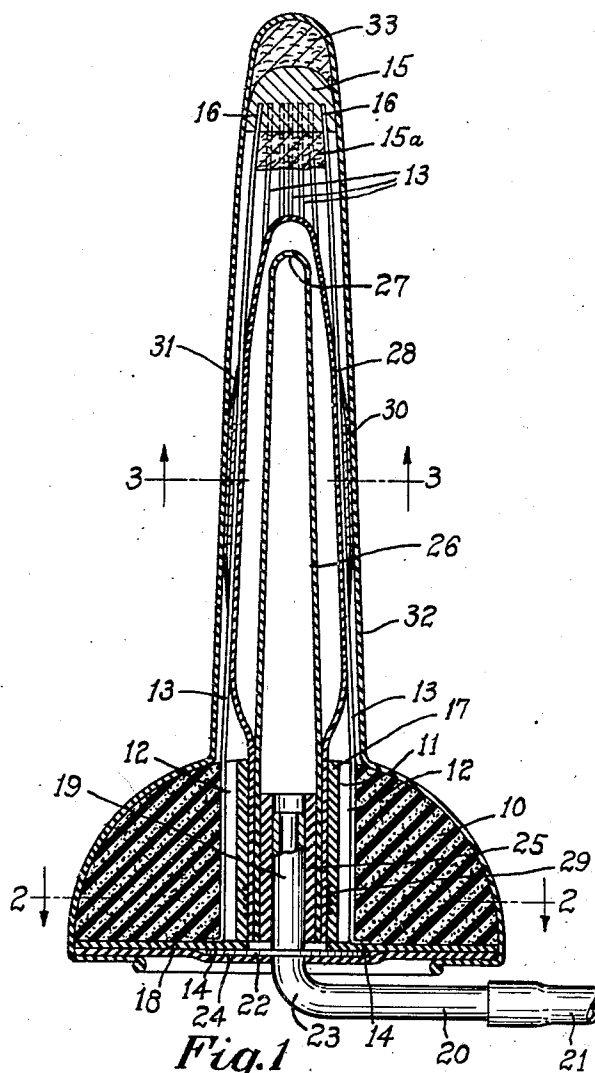


Fig. 1

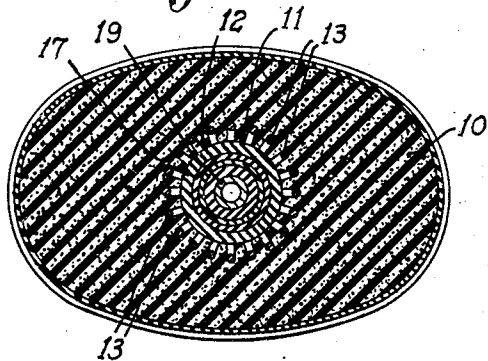


Fig. 2

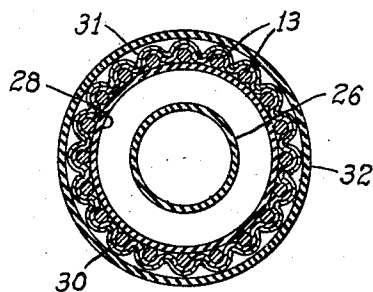


Fig. 3

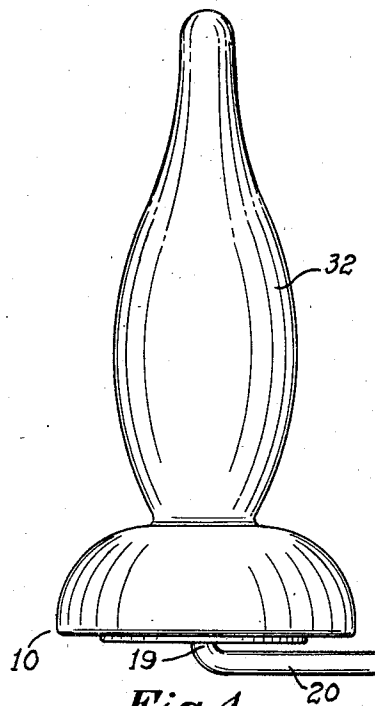


Fig. 4

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2 Sheets-Sheet 2

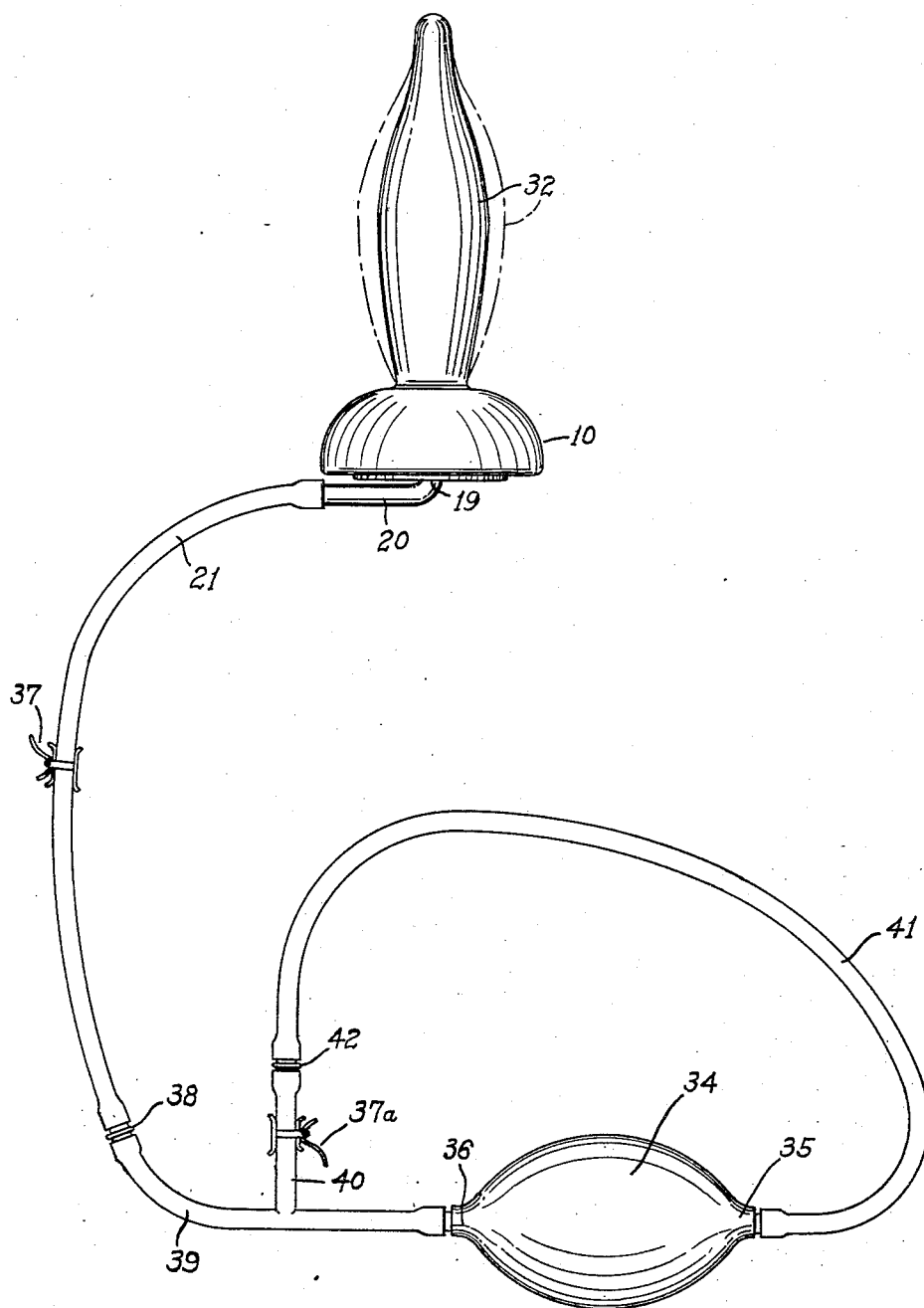


Fig. 5

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INFLATABLE DILATOR

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12 Claims. (Cl. 128—344)

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The invention relates to distendable dilators and more particularly to an improvement upon the type of dilators disclosed in Kennedy Patents No. 1,879,305 of September 27, 1932, and No. 1,965,653 of July 10, 1934, which include generally an inner tube adapted to be expanded, flexible metal guards surrounding the inner tube and an outer tube surrounding said guards whereby when the inner tube is distended the guards and outer tube will be likewise distended.

It is an object of the present invention to generally improve and simplify the construction of dilator disclosed in said prior Kennedy patents.

Another object is to provide a dilator comprising an inner tube or sack of rubber or other stretchable material surrounded by a second tube or sack of similar material, a set of resilient metal guards surrounding said tubes and a sack of rubber or other stretchable material surrounding said guards.

A further object is to provide a dilator of this character in which a band or tube of non-stretchable material is located around and connected to said metal guards to limit the flexing movement thereof.

A still further object is to provide a dilator of this character having a soft rubber base of elliptical shape and novel means for connecting the sacks or tubes and metallic guards thereto.

Another object of the invention is to provide a dilator of this type having a plug of sponge rubber, cotton, wool or other soft material located within the end of the outer sack or tube and covering the metal cap at the ends of the metallic guards.

A further object of the invention is to provide a dilator of the character referred to with means for attaching a pneumatic bulb thereto for distending or expanding the dilator and a novel by-pass arrangement associated with said bulb for permitting the dilator to be pulsated after it has been expanded to the desired extent.

The above objects together with others which will be apparent from the drawings and following description, or which may be later referred to, may be attained by constructing the improved dilator in the manner hereinafter described in detail and illustrated in the accompanying drawings, in which:

Figure 1 is an enlarged longitudinal sectional view through a dilator embodying the invention;

Fig. 2 a transverse section through the base portion of the dilator taken on the line 2—2, Fig. 1;

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Fig. 3 a transverse section through the dilator taken on the line 3—3, Fig. 1;

Fig. 4 a side elevation of the dilator on a smaller scale, showing the same partially distended; and,

Fig. 5 an elevation of the dilator showing the pneumatic bulb connected thereto and the novel by-pass arrangement by means of which the dilator may be pulsated.

Referring to the construction illustrated in the drawings, the improved dilator includes a base 10 of elliptical shape, made of soft spongy rubber, having a central bore 11 which is preferably provided with a plurality of uniformly spaced radial grooves 12 which receive the base portions of the metallic guard members which may be in the form of wires 13 as illustrated, these wires being preferably cemented, vulcanized or otherwise fixedly secured within the grooves 12 and having their lower ends bent outwardly as at 14 and bearing against the lower surfaces of the base 10.

The upper ends of the metal or wire guard members 13 are embedded in a solid dome shaped cap 15, of metal or other suitable material, as indicated at 16 in Fig. 1. These guard members 13 are formed of spring material having sufficient resilience to normally assume the substantially straight or closed position as shown in Fig. 1 and to cause them to return to this position whenever the fluid pressure is released from the interior of the dilator, as will be later explained.

Within the bore 11 is a sleeve 17 of rubber or the like cemented, vulcanized or otherwise securely attached to the base 10 and provided with a flange 18 at its lower end covering the bent over lower ends 14 of the metallic guards and cemented, vulcanized or otherwise securely attached to the lower face of the soft rubber base 10.

Centrally located within the bore of the base is a metal pipe or tube 19, the lower end portion of which is bent outwardly at an angle as indicated at 20 for connection to a rubber hose 21 to which a pneumatic bulb of any usual and well known construction may be provided for distending the dilator as will be later explained.

A metal disc 22 surrounds the lower portion of the metal pipe 19 above the bend 23 therein and is soldered, brazed, welded or otherwise fixed to said metal pipe and abuts the under surface of the rubber flange 18, a sheet 24 of rubber or the like being mounted around said pipe and cemented, vulcanized or otherwise fixed to the under surface of the disc 22 and to the un-

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der surface of the rubber flange 18, as shown in Fig. 1.

A rubber tube 25 surrounds the metal pipe 19 within the bore of the base 10 and is cemented, vulcanized or otherwise secured thereto. The inner stretchable tube or sack 26 formed of rubber or the like has its lower open end surrounding the rubber tube 25 and cemented or vulcanized thereto, the upper end 27 thereof being closed.

A second rubber tube or sack 28, of slightly larger dimensions than the tube 26, has its lower open end surrounding and cemented to the lower end portion of the inner tube 26, and is preferably cemented to the wire guards 13. The sacks or tubes 26 and 28 may be tied to the tube or sleeve 25 as indicated at 29 and the lower portion of the outer tube 28 is preferably cemented or vulcanized within the rubber tube 17.

For the purpose of limiting the expansion of the dilator, a band 30 of non-stretchable material such as cotton fabric or the like, surrounds and is connected to the metal guard members 13 by cementing or other means. This band may be located only around the intermediate portion of the wire guards as shown in Fig. 1, or may extend substantially the full length of the guards if desired.

The non-stretchable band 30 may be made from a sheet or strip of woven fabric or if desired may be formed by wrapping a non-stretchable cord or thread spirally around the wire guards while they are distended to the desired extent, this cord or thread band covering either substantially the length of the wire guards or only the intermediate portion thereof as shown in Fig. 1. The wire guards may be embedded in or located through the band of non-stretchable material if desired.

When in normal or retracted position as shown in Figs. 1 and 3, the non-stretchable band 30 will fold inward between adjacent wire guards 13 as best shown in Fig. 3. A thin layer of latex or the like as indicated at 31 is cemented or vulcanized over the non-stretchable band 30 and preferably extends beyond both ends of the band and is cemented or vulcanized to the wire guards 13 as best shown in Fig. 1.

Surrounding the wire guards 13 and the base 10 is a soft rubber cover 32 within the closed upper end of which is located a soft plug 33 of sponge rubber, wool, cotton or other soft material to cover the solid cap 15 of the wire guards.

For the purpose of protecting the upper end of the outer rubber sack 28 from damage by contact with the upper end portions of the wire guards 13 and the solid cap 15, when the device is inflated, a soft pad 15a of cotton, wool or the like may be placed within the upper ends of the wire guards, beneath the cap 15, to shield the sack 28 therefrom.

In the operation of the dilator, pressure is forced through the hose 21 to the inner stretchable sack or tube 26, the means for creating the air pressure consisting of a standard rubber bulb 34, which as is usual in such bulbs, is provided with an inlet valve of usual and well known construction at its inlet end 35 and an outlet valve of usual and well known construction at its outlet end 36; these valves being so constructed that the inlet valve opens and the outlet valve closes when the bulb 34 is distended, while the inlet valve closes and the outlet valve opens when the bulb is closed so that with each operation of

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the bulb, air enters the rubber inner tube or sack 26 of the dilator and causes the same as well as the sack 28, the wire guards 13 and the outer rubber cover 32 to distend. The amount which the dilator can distend is limited by the non-stretchable band 30.

In Fig. 5 is shown an arrangement of rubber hose and pneumatic bulb by means of which the dilator may be distended to the desired extent, as indicated in full lines, and then pulsated so as to be further distended with each pulsation to the broken line position shown in said figure.

This arrangement comprises a shut-off 37 of any usual and well known construction located intermediate the ends of the hose 21, a detachable coupling 38 being located between the hose 21 and the hose 39 which is connected to the outlet end of the bulb, a T-formation 40 being provided intermediate the ends of the hose 39 and provided with a shut-off 37a of usual and well known construction.

The hose 41 is connected to the inlet end of the bulb 34 and when the dilator is pulsated, is adapted to be connected to the T-formation 40 as by the detachable coupling 42.

Assuming that it is desired to first distend the dilator to the desired extent by means of the bulb and hose shown in Fig. 5, the shut-off 37 is opened, the shut-off 37a is closed and the hose 41 is disconnected from the detachable coupling 42. In this position with each operation of the bulb 34 air is pumped into the dilator until it is distended to the desired extent.

If the dilator is going to be left in distended position for some time the bulb may be removed from the hose 21. To accomplish this the shut-off 37 is first closed after which the hose 39 is disconnected from the hose 21 by the detachable coupling 38.

If however it is desired to pulsate the dilator after it has been distended to this point the hose 41 is connected to the T-formation 40 through the detachable coupling 42 after the dilator has been distended to the desired extent.

The shut-off 37a is then opened and the shut-off 37 remains open. Then with every operation of the bulb 34 the dilator is distended to the broken line position shown in Fig. 5 as the bulb is collapsed, forcing the air from the bulb into the dilator and as the bulb is distended a portion of the air from the dilator will pass back through the hoses 21 and 39, T-formation 40 and hose 41 through the inlet valve of the bulb deflating the dilator to the full line position shown in Fig. 5.

From the above it will be evident that a very simple and efficient dilator is produced, the outer rubber sack 28 protecting the inner rubber sack 26 from damage by contact with the wire guards 13 and the non-stretchable band 30 limiting the degree of enlargement of the dilator so that the patient cannot be injured by expanding the dilator too far. With a sufficient amount of pressure the non-stretchable band will permit the dilator to be expanded to a certain point and not beyond that point.

It will also be obvious that the soft pad 33 within the end of the outer cover will protect the patient from injury by contact with the metal cap 15 at the upper end of the wire guards.

Furthermore it will be obvious that the arrangement of bulb and hose shown in Fig. 5 provides a very satisfactory means for pulsating the dilator when desired by means of the same bulb with which the dilator is ordinarily inflated.

We claim:

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1. A dilator comprising a base, an inner stretchable sack supported by the base, an outer stretchable cover, a set of metal guards between said sack and said cover, a band of non-stretchable material surrounding and attached to said metal guards, and means for distending said sack and cover and said metal guards.

2. A dilator comprising a base, an inner stretchable sack supported by the base, an outer stretchable cover, a set of metal guards between said sack and said cover, a band of non-stretchable material surrounding and attached to said metal guards, a band of stretchable material surrounding and attached to said band of non-stretchable material and said metal guards, and means for distending said sack and cover and said metal guards.

3. A dilator comprising a base, an inner stretchable sack supported by the base, an outer sack surrounding the inner sack, an outer stretchable cover, a set of metal guards between said outer sack and said cover, a band of non-stretchable material surrounding and attached to said metal guards, and means for distending said sacks and cover and said metal guards.

4. A dilator comprising a base, an inner stretchable sack supported by the base, an outer sack surrounding the inner sack, an outer stretchable cover, a set of metal guards between said outer sack and said cover, a band of non-stretchable material surrounding and attached to said metal guards, a band of stretchable material surrounding and attached to said band of non-stretchable material and said metal guards, and means for distending said sacks and cover and said metal guards.

5. A dilator comprising a base, an inner stretchable sack supported by the base, an outer stretchable cover, a set of metal guards between said sack and said cover, a band of non-stretchable material surrounding and attached to said metal guards, a soft pad in the end of the outer cover located over the ends of the metal guards, and means for distending said sack and cover and said metal guards.

6. A dilator comprising a base having a bore therein, a metal pipe located in said bore, a metal disc upon the metal pipe immediately below the base, a rubber sleeve fixed upon the metal pipe within the bore, a rubber sack fitting over and connected to said sleeve, a second sack fitting over and connected to the lower portion of the first named sack, a rubber tube surrounding and connected to the lower portion of the second named sack and connected to said bore, a flange upon the lower end of said rubber tube located between and connected to said metal disc and the lower face of the base, a rubber sheet connected to the lower faces of the metal disc and flange, a set of metal guards surrounding the second named sack and having their lower ends embedded in the base, and an outer stretchable cover over the metal guards and base.

7. A dilator comprising a base having a bore therein, a metal pipe located in said bore, a metal disc upon the metal pipe immediately below the base, a rubber sleeve fixed upon the metal pipe within the bore, a rubber sack fitting over and connected to said sleeve, a second sack fitting over and connected to the lower portion of the first named sack, a rubber tube surrounding and connected to the lower portion of the second named sack and connected to said bore, a flange upon the lower end of said rubber tube located between and connected to said metal disc and

the lower face of the base, a rubber sheet connected to the lower faces of the metal disc and flange, a set of metal guards surrounding the second named sack and having their lower ends embedded in the base, and an outer stretchable cover over the metal guards and base, and a soft pad within the end of the outer cover located over the upper end of the metal guards.

8. A dilator comprising a base having a bore therein, a metal pipe located in said bore, a metal disc upon the metal pipe immediately below the base, a rubber sleeve fixed upon the metal pipe within the bore, a rubber sack fitting over and connected to said sleeve, a second sack fitting over and connected to the lower portion of the first named sack, a rubber tube surrounding and connected to the lower portion of the second named sack and connected to said bore, a flange upon the lower end of said rubber tube located between and connected to said metal disc and the lower face of the base, a rubber sheet connected to the lower faces of the metal disc and flange, a set of metal guards surrounding the second named sack and having their lower ends embedded in the base, a band of non-stretchable material located around and secured to the metal guards, and an outer stretchable cover over the metal guards and base.

9. A dilator comprising a base having a bore therein, a metal pipe located in said bore, a metal disc upon the metal pipe immediately below the base, a rubber sleeve fixed upon the metal pipe within the bore, a rubber sack fitting over and connected to said sleeve, a second sack fitting over and connected to the lower portion of the first named sack, a rubber tube surrounding and connected to the lower portion of the second named sack and connected to said bore, a flange upon the lower end of said rubber tube located between and connected to said metal disc and the lower face of the base, a rubber sheet connected to the lower faces of the metal disc and flange, a set of metal guards surrounding the second named sack and having their lower ends embedded in the base, a band of non-stretchable material located around and secured to the metal guards, a band of stretchable material located around and secured to the non-stretchable band and metal guards, and an outer stretchable cover over the metal guards and base.

10. A dilator comprising a base having a bore therein, a metal pipe located in said bore, a metal disc upon the metal pipe immediately below the base, a rubber sleeve fixed upon the metal pipe within the bore, a rubber sack fitting over and connected to said sleeve, a second sack fitting over and connected to the lower portion of the first named sack, a rubber tube surrounding and connected to the lower portion of the second named sack and connected to said bore, a flange upon the lower end of said rubber tube located between and connected to said metal disc and the lower face of the base, a rubber sheet connected to the lower faces of the metal disc and flange, said bore having a plurality of longitudinal grooves therein, a set of metal guards surrounding the second named sack and having their lower ends secured in said grooves and an outer stretchable cover over the metal guards and base.

11. In combination with an inflatable dilator, a hose connected to said dilator, a bulb connected at its discharge end to said hose, a T in the hose between the dilator and the bulb, a shut-off in said T, and means for making a closed connection between the inlet end of the bulb with said T.

12. In combination with an inflatable dilator, a hose connected to said dilator, a bulb, means detachably connecting the bulb to the hose, a shut-off on the hose located between the dilator and the detachable connecting means, a closed branch connection between the hose and inlet end of the bulb, and a shut-off in said branch connection.

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Number
926,197
1,826,284
1,965,653

Number
627,574

UNITED STATES PATENTS

Name	Date
Kim	June 29, 1909
Newton	Oct. 6, 1931
Kennedy	July 10, 1934

FOREIGN PATENTS

Country	Date
Germany	Mar. 18, 1936

REFERENCES CITED

The following references are of record in the file of this patent: