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2,221,972

INHALANT DEVICE

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FIG. 1

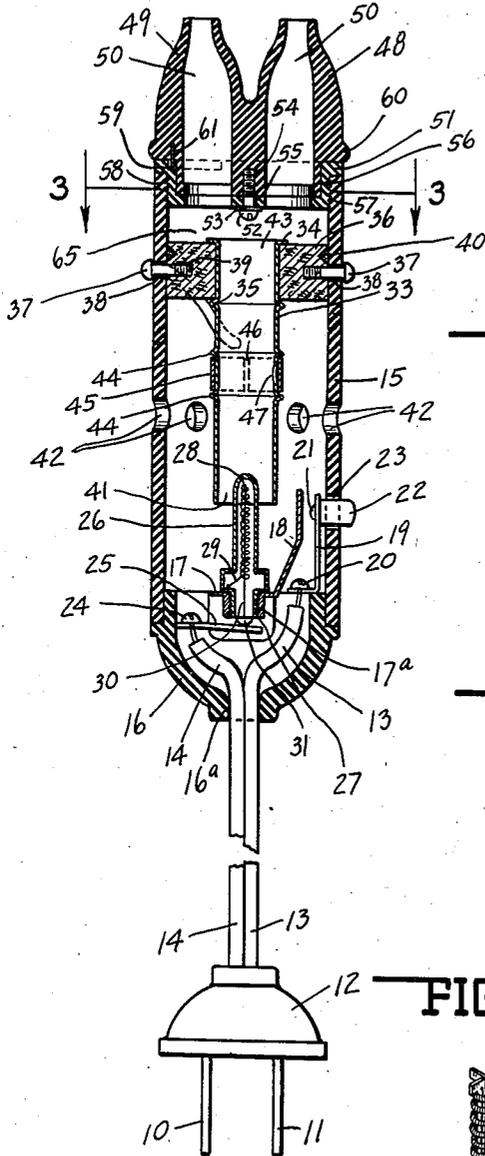


FIG. 2

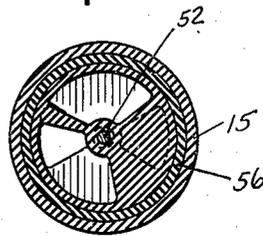


FIG. 3

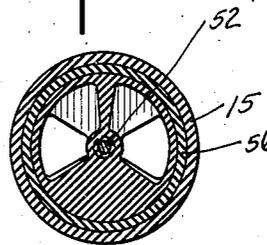


FIG. 4

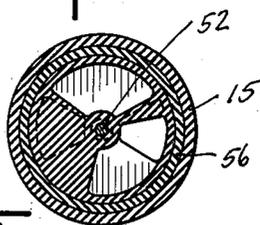
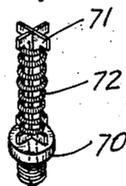


FIG. 5



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INHALANT DEVICE

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10 Claims. (Cl. 128—192)

This invention relates to an inhalator device.

The chief object of this invention is to provide a relatively foolproof, readily adjustable, inhalator device for the relief of nasal and sinus low grade infections, and congestions of the mucous membranes.

It is well known in thermal therapy that the application of heat to mucous tissues, will, if the temperature be sufficient, relieve congestion and inhibit or destroy the growth of attenuated or low grade infections, especially of the common cold character and even as virulent as of gonococcus character.

The present invention is directed to the application of heat to the affected tissue of the nose passages and adjacent cavities, and inasmuch as the thermal sensitivity varies in different individuals, provision is made for the easy regulation of the temperature of the air voluntarily supplied to the aforesaid tissues.

This heated air is supplied to said tissue by the person inhaling the heated air, the air being heated in its passage through the device which is construed so that it can be held in either hand of the person using the same.

As aforesaid, the device is substantially foolproof in that since it is of portable hand character, it is so arranged that when disengaged and not held in the hand, the heat supplying medium is rendered incapable of supplying additional heat.

The device is furthermore constructed so that in the event the aforesaid control is rendered ineffective, a second control in series therewith and of thermostatic character becomes effective.

In the normal operation of the device, the latter is so arranged that it may with relative ease be adjusted to maintain within the range of operation any desired temperature.

Furthermore, the device is so arranged that, on the attainment of a predetermined temperature, an automatic control effects a bypassing of a portion of the cold air supply to the heated air supply for reducing the temperature of the mixture.

The device is also arranged so that while it is of two nostril or outlet character, it may be adjusted for a supply of heated air to but either one of these nostril discharge elements, and in so doing, effectively close the opposite nostril so that air inhaled must pass through the other nostril.

One important feature of the invention is in providing a heated air supplying tube or passage forming element and associating therewith a

heating element, herein illustrated as of electrical character, and associating the same together so that one element is movable relative to the other for the purpose of obtaining an adjusted predetermined temperature of the heated air discharged from the device by effectively controlling the amount of air passing in intimate relation to the heated element.

Another feature of the invention consists in associating several of the parts together in detachable relationship so that the nostril or nose piece may be removed for sterilizing purposes.

Another feature of the invention consists in constructing and arranging the parts so that ease of fabrication is assured and replacement of wearable parts may be readily effected without destroying the utility of the remainder of the device.

Tissues which are infected with infections of the character indicated hereinbefore, are usually in an inflamed or semi-inflamed condition. These tissues may be congested where such inflammation is of acute or semi-acute character.

The walls of the nasal cavity and the turbinates that extend from the walls of said cavity are composed of erectile tissue which possesses the capacity to swell easily. This accounts for the variation in the degree of freedom and openness of the nasal air passages. As in all erectile tissue the degree of swelling of such tissue is dependent upon the state of the blood vessels.

Congestion or swelling of these tissues is associated with dilated blood vessels in the supporting tissue immediately beneath the mucous membrane.

When these erectile tissues are in an inflamed condition for any reason, there is swelling to a greater or less degree with characteristic dilation of the blood vessels with stasis of blood flow depending upon the severity and degree of the inflammatory process.

Such swelling may be great enough to cause the mucous membrane of the opposing walls to come in contact with each other, since normally the space between the medial and lateral walls of the nose is very small.

The abnormal approximation of the opposing walls when inflamed not only prevents air from passing between these walls as it normally does, but it greatly increases the mucous discharge from these membranes, and the mucous discharge accumulates because the restriction of air circulation restricts the evaporation of the moisture from this mucous discharge.

Furthermore, this accumulated mucous secretion forms a favorable medium for the growth and multiplication of bacteria and viruses which are always present on the surface of the mucous membrane. The toxins released by this abundant growth of the aforementioned etiological agents are absorbed by the adjacent mucous membrane and further devitalize it.

This cumulative process of congestion and toxin production tends to invade the adjacent sinus cavities through their orifices which normally connect and drain the sinuses into the nasal cavities. These orifices which are normally small are restricted and frequently completely closed by congestion accompanying infectious inflammatory processes of the mucous membrane aforementioned. This prevents free drainage of exudates from infected and inflamed membranes lining the sinus cavities, with consequent possibility of great damage to the mucous membrane lining of the sinus cavities.

Now it has been recognized for some time that the use of anything which will reduce the congestion in the sub-mucous tissue as by the use of substances which produce vasoconstriction (adrenaline, ephedrine, etc.) and which, therefore, will produce a shrinkage or retraction of the membranes so that air can freely circulate, is good and effective therapy because the sinus orifices are then unstopped and enlarged and drainage is facilitated, the free passage of air effectively drying the excess mucous discharge thereby preventing maintenance of the favorable culture media of the infectious agent.

The heated air supplied by the device described herein has been shown to produce definite shrinkage of the mucous membrane supporting tissue and very markedly opens up and enlarges the air passages with certain reduction of congestion. The desired therapy above described is thereby accomplished and in addition the heated air aids materially in the removal of excess secretion by evaporation. That the orifices of the sinuses are opened and enlarged by the heated air is evidenced by the fact that usually after treatment by the heated air from the device the sinuses often drain very profusely.

Moreover, the temperature of the heated air tolerated with comfort has been shown to be from 145 to 155 degrees F. which is above pasteurization temperature. Inasmuch as it is generally accepted that heat has an adverse effect upon bacterial organisms, air of such temperature will probably reduce, attenuate or mitigate the etiological agent of the disease process.

Furthermore, be it remembered that heat applied to congested and inflamed parts is noted for its capacity to relieve pain associated with such inflammatory reactions. It has been determined that heated air from the device described herein has relieved also the pain associated with congested head cavities of those who have used the device.

The full nature of the invention will be understood from the accompanying drawing and the following description and claims:

In the drawing

Fig. 1 is a longitudinal sectional view through one embodiment of the invention and the preferred form thereof.

Fig. 2 is a transverse, sectional view through the nostril selecting passage valve, and illustrates the left hand port in open relation.

Fig. 3 is a similar view showing both ports

open and taken on line 3—3 of Fig. 1 and in the direction of the arrows.

Fig. 4 is a similar view showing the right hand part open.

Fig. 5 is a perspective view of a modified form of heating element.

In the drawing 10 and 11 indicate prongs of a conventional plug 12 supporting the current conducting wires 13 and 14 in electrical connection with the prongs 10 and 11. 15 indicates an outer casing or main housing member which is of tubular character and open at opposite ends. This tube may be of metal, glass or the like but preferably is of phenol condensation character which is somewhat resistant to the transfer of heat and also is of nonconducting character relative to electric current, so that the device may be held in the hand by grasping the housing portion 15 without danger or discomfort.

A closure 16 is of similar insulation character and suitably supports a metallic threaded socket 17. This socket includes an extension or spring finger 18 and the same may be integral with or rigidly secured to the socket 17. The closure 16 supports an angular flexible current conducting member 19 and the current supply line 13 which extends through the opening 16a of the closure 16, is electrically connected thereto as by means of the anchorage 20 which simultaneously anchors the member 19 to this closure.

The member 19 suitably supports as at 21 an insulation plug or finger piece 22 which normally projects outwardly through the opening 23 in the body portion 15. The circuit wire 14 also extends through opening 16a into the closure 16 and is secured as at 24 to a thermostatic strip 25 supported by the closure 16. This thermostatic strip 25 is adapted to register with the opening through the threaded metal socket 17.

A heating element is receivable by said socket and extends coaxial into the housing from the closed end thereof. Herein such heating element includes a copper tube 26 having a threaded end portion 27 receivable by the threaded portion 17a of the socket 17.

Within the same is mounted a heating element in the form of a helix 28, one terminal 29 of which is suitably connected to the threaded portion 27 and the other terminal 30 of which terminates in a coaxial contact portion 31 which is insulated from the threaded portion 27 and is normally engaged by the thermostatic strip 25.

It will be quite obvious that when the temperature within the housing 15 exceeds that for normal safe operation, the thermostat strip will flex and move from the position shown in Fig. 1 away from the contact 31, thereby automatically opening the circuit through the heating element. The normal operation of the device, however, includes normal contact between members 31 and 25. In operation the person holding the device presses the finger piece 22 inwardly until the portion 21 which, as before described, is an anchorage therefor, engages the member 18 and thus member 21 serves as a switch contact as well. This movement is permitted because member 18 has some flexibility and member 19 is inherently flexible. When the circuit is closed between members 19 and 18 in normal operation, the heating element is energized for the generation of heat.

In the present invention the heating element is of enclosed character, that is, enclosed within the copper tube for protection purposes, both mechanically and chemically, as well as against

accidental short circuiting or the like. The heating element, however, may be of the open or exposed character without departing from the invention.

5 Suitably positioned within the housing 15 is an elongated tube or tubular passage 33 which is coaxial with the heating element and partially telescopes the forward end of the latter at the rearward end of the tube, as shown in Fig. 1. The tube is suitably secured at its forward end as at 10 34 and 35 to a closure or spacing support 36, which may be of cork or insulation material of any well known character. This tube 33 may be of glass, phenol condensation or metal character, as desired.

15 Herein a pair of screws 37 is shown extending through apertures 38 in the housing 15 and are threaded into the spacing support and closure 36 as at 39. These apertures 38 are of elongated and spiral character, as illustrated in Fig. 1. There is sufficient friction between the housing 15 and the closure 36 to normally retain the tube in the adjusted position but insufficient in character to prevent rotation of the housing relative to the tube whenever desired, which rotation moves the tube relative to the heating element to increase the telescopic association or decrease the same.

25 As shown in Fig. 1, the bearing between the closure 36 and the housing may be provided with a seal structure 40 and this bearing also is of sufficient elongated character to prevent material cocking of the tube 33 within the housing, especially at its open lower end, indicated by the numeral 41 herein. The housing is provided with a suitable number of intake apertures or ports 42 and these are positioned adjacent the association between the closure 36 and the housing 15. Thus, cold air is admitted 40 at 42 into the housing, passes rearwardly between the tube 33 and the interior of the housing, and thence passes into the opening 41 of the tube. By so doing the air is heated in its passage into said tube and is discharged from 45 the open end 43 of the tube which is the forward end thereof.

The tube 33 may support by means of the peripheral flanges 44 on the exterior surface thereof, a thermostatic split band 45, split as at 50 46 and the tube may include the aperture 47 which is normally closed by said band. When in the operation the temperature becomes excessive, as determined by the thermal operating characteristics of this band, the same expands and some air is permitted to bypass directly from adjacent the intake openings 42 into the tube 33 through the port 47 without passing through the tube and about the thermal element in the rear end thereof. This constitutes 60 another safe guard feature.

At the forward end of the housing 15, which is of tubular character, there is provided a nose piece 48 having the two extensions 49 provided with passages 50 therein for registration with the 65 nostrils. This nose piece 48 may be of phenol, condensation character or glass, the former being preferred. If the latter be used, it is of the so-called Pyrex character. This is to permit this nose piece to be detached and sterilized in the usual manner.

70 The nose piece is rotatably supported relative to a valve member indicated at 51. This valve member is secured to the nose piece by means of the screw 52, the head of which bears on the washer 53 bearing on the valve member 51 and

the threaded portion of the bolt or screw 52 has threaded connection as at 54 with the nose piece. The bolt 52 is rotatably mounted in the bore 55 in the valve member. The valve member has a rearwardly offset portion which is of cylindrical 5 character 56 externally threaded as at 57 for threaded connection with the threaded portion 58 of the forward end of the housing 15.

Valve member 51 includes a coaxial and arcuate channel 59 and confronts the flange portion 10 60 of the nose piece. This channel is approximately 120° in length. Portion 60 of the nose piece supports a pin 61 that projects into said channel. Thus said nose piece is capable of rotation relative to the valve member only within 15 the limits of the length of the channel or slot 59.

As shown clearly in Figs. 2, 3 and 4, by rotating the nose piece relative to the valve member rigidly secured to the housing, as shown, either passage 50 is in communication with the chamber 20 65 at the forward end of the tube 33 or both passages 50 are in communication therewith—see Fig. 3.

In Fig. 5 is illustrated in perspective, a modified and exposed form of heating element. This has 25 the advantage, upon the second inhalation following switch closing, heated air is obtained. Also, the heating element cools off at a corresponding rate. This form of the device, therefore, is faster both in heating and cooling than 30 that shown in Fig. 1.

In Fig. 5, 70 indicates an insulation base supporting a plurality of intersecting insulation (mica wings). The source of heat is a resistance wire 72 wound about and upon the wings as 35 shown. The ends thereof are arranged for energy supply in any suitable manner.

The plug 12 is associated with a convenience outlet so that the prongs 10 and 11 are in electrical connection with a source of supply of electrical energy. The device is held in one hand 40 with the finger piece 22 depressed into the housing, closing the circuit to the heating element. The two nostril portions 48 and 49 are applied to the nose and inserted in the nostrils thereof. The person then inhales. The air, taken in by this suction action through the openings 42, passes rearwardly, maintaining the outer casing or housing 15 relatively cool for handling comfort. The air then passes into the rear end of the tube 50 33 and the degree of heating of that air is determined by the degree of telescopic association between the tube and the heating element which, as before stated, can be adjusted by rotating the tube 33 relative to the housing 15 which advances 55 or retracts said tube through the cam type slots or apertures 38. The several passages or either passage 50 supplies the heated air to both nasal passages or either passage, as desired, determinable upon the relative positioning of the nose piece with respect to the valve member.

In the event the air becomes heated to that degree which might be dangerous, the thermostatic relief valve 45 automatically bypasses through port 47 a portion of the cold air from the openings 42 directly to the tube 43 and the greater the heat the larger the amount of air so bypassed. The thermostatic switch member 25 is provided so that in the event the device is connected to a suitable source of electrical supply 70 and the device is weighted down on a supporting surface with the member 22 projected inwardly, the circuit to the thermal element will be maintained in open condition so long as the device remains excessively heated by the thermal ele- 75

ment through the operation of the thermal element 25 which, it might be added, is responsive to the air in the housing prior to its contact with the heating element because at this time there would be no passage of air through the device other than by reason of the air circulation induced due to the change in the temperature of the air. This rate of air circulation, of course, is very materially less than the rate of air circulation through the device due to inhalation so that under normal operations, that is, when air is moved through the device by inhalation, the thermostatic switch 25 generally never has occasion to operate and the protection feature in this condition of operation is obtained by means of the relief arrangement indicated by the portions 45 and 47.

The orifices of the nose piece preferably are not less than $\frac{3}{8}$ " inside diameter. The spaced channels through the nose piece terminating in the orifices preferably have an inside diameter not less than $\frac{3}{8}$ ", and each has a cross sectional area correspondingly greater than the orifices. Only at the orifices of the air channels is the diameter restricted to the aforesaid $\frac{3}{8}$ ". These dimensions have been found most important and significant for the reason that channels and orifices of such size will permit free and unobstructed breathing entirely and exclusively through the device for indefinite periods of time without any extra exertion by the user over that required for normal breathing on the part of the person using the device. The distance between orifice axes is approximately 18 mm.

While the invention has been illustrated and described in great detail in the drawing and foregoing description, the same is to be considered as illustrative and not restrictive in character.

The several modifications described herein as well as others which will readily suggest themselves to persons skilled in this art, all are considered to be within the broad scope of the invention, reference being had to the appended claims.

The invention claimed is:

1. A portable hand type inhalator device, including an electric circuit supply connection, an electric heating element, an enclosing body means supporting the element and including an air intake, a nostril receivable and conforming air discharge means supported by the body means, a tubular element within the body means and having communication with the discharge means, said elements having a coaxial alignment and arranged for telescopic association, movement of one element relative to the other element regulating the heated air temperature, the tubular element having an aperture between its ends, and thermostatically controlled valve means for automatically controlling the aperture for bypassing a portion of cool air around the heating element and to the tubular element when the air temperature therein exceeds the selected predetermined operating temperature.

2. A portable hand type inhalator device, including an electric circuit supply connection, an electric heating element, an enclosing body means supporting the element and including an air intake, a nostril receivable and conforming air discharge means supported by the body means, a tubular element within the body means and having communication with the discharge means, the air discharge conforming means including two spaced outlets for nasal reception

and an independent supply passage to each, valve means operatively interposed between the passages and tubular element discharge for heated air discharge to either or both outlets as desired, the tubular elements having an aperture between its ends, and thermostatically controlled valve means for automatically controlling the aperture for bypassing a portion of air around the heating element and to the tubular element when the air temperature therein exceeds the selected predetermined operating temperature.

3. A portable hand type inhalator device, including an electric circuit supply connection, an electric heating element, an enclosing body means supporting the element and including an air intake, a nostril receivable and conforming air discharge means supported by the body means, a tubular element within the body means and having communication with the discharge means, said elements having a coaxial alignment and arranged for telescopic association, movement of one element relative to the other element regulating the heated air temperature, thermostatic means for automatically opening the circuit to the heating element when the air temperature in the body means exceeds the selected predetermined temperature, the tubular element having an aperture between its ends, and thermostatically controlled valve means for automatically controlling the aperture for bypassing a portion of air around the heating element and to the tubular element when the air temperature therein exceeds the selected predetermined operating temperature.

4. A portable hand type inhalator including an electric circuit supply connection, an electric heating element, an enclosing body means supporting the element and including an air intake, a nostril receivable and conforming air discharge means supported by the body means, a tubular element within the body means and having communication with the discharge means and the intake, the heating element having an elongated effective heating portion of less area than the tubularity of the other element, said elements having a coaxial alignment and arranged for telescopic association, movement of one element relative to the other element regulating the heated air temperature by predetermining the duration of air passing in intimate relation to the heated element, the two elements always having some portions in telescoped relation, manually operable normally open switch means supported by the body means for controlling the energy supply to the electric heating element and having a body exposed insulation portion, thermostatic means for automatically opening the circuit to the heating element when the air temperature in the body means exceeds the selected predetermined temperature, the tubular element having an aperture between its ends, and thermostatically controlled valve means for automatically controlling the aperture for bypassing a portion of air around the heating element and to the tubular element when the air temperature therein exceeds the selected predetermined operating temperature.

5. A portable hand type inhalator device including an elongated, tubular, hand engageable body portion open at opposite ends and provided with a laterally directed intake opening means therethrough and positioned remote from both ends, a transverse closure for one open end and including a central aperture, an elongated

gated tube open at both ends and registering with the aperture and forming a continuation thereof and of a length to project at all times from the closure beyond the intake opening means, closure means for the other open end of the body, elongated, electric heating means immediately adjacent the closure means and of lesser cross-sectional area than the elongated tube for telescopic association therewith and of a length sufficient to project into the tube at all times for all longitudinally adjusted positions of the tube, the tube being movable axially within the body and a maximum telescopic association being of non-sealing character, and nostril receivable closure means for the transverse closure supporting end of the body and arranged to discharge heated air from the tube which air is derived from the intake opening means and the tube and heating means telescopic association, cooling the body, maximum heating of the air being substantially confined to the tube included air in normal operation of the device.

6. A portable hand type inhalator device including an elongated, tubular, hand engageable body portion open at opposite ends and provided with a laterally directed intake opening means therethrough and positioned remote from both ends, a transverse closure for one open end and including a central aperture, an elongated tube open at both ends and registering with the aperture and forming a continuation thereof and of a length to project at all times from the closure beyond the intake opening means, closure means for the other open end of the body, elongated, electric heating means immediately adjacent the closure means and of lesser cross-sectional area than the elongated tube for telescopic association therewith and of a length sufficient to project into the tube at all times for all longitudinally adjusted positions of the tube, the tube being movable axially within the body and a maximum telescopic association being of non-sealing character, and nostril receivable closure means for the transverse closure supporting end of the body and arranged to discharge heated air from the tube which air is derived from the intake opening means and the tube and heating means telescopic association, cooling the body, maximum heating of the air being substantially confined to the tube included air in normal operation of the device, the space between the tube supporting closure and the nostril receivable closure comprising a control chamber, the latter closure having two nostril receivable and conforming portions each with a discharge passage, and plate valve means controlling selectively the chamber communication with the passages for heated air discharge from one or both passages.

7. A portable hand type inhalator device including an elongated, tubular, hand engageable body portion open at opposite ends and provided with a laterally directed intake opening means therethrough and positioned remote from both ends, a transverse closure for one open end and including a central aperture, an elongated tube open at both ends and registering with the aperture and forming a continuation thereof and of a length to project at all times from the closure beyond the intake opening means, closure means for the other open end of the body, elongated, electric heating means immediately adjacent the closure means and of lesser cross-sectional area than the elongated tube for telescopic associa-

tion therewith and of a length sufficient to project into the tube at all times for all longitudinally adjusted positions of the tube, the tube being movable axially within the body and a maximum telescopic association being of non-sealing character, and nostril receivable closure means for the transverse closure supporting end of the body and arranged to discharge heated air from the tube which air is derived from the intake opening means and the tube and heating means telescopic association, cooling the body, maximum heating of the air being substantially confined to the tube included air in normal operation of the device, the tube adjacent the intake openings including a bypass opening, and thermally responsive valve means for said bypass opening normally constrained to closed position and opening the bypass opening for heated air cooling when the air in the tube becomes excessively heated.

8. A portable hand type inhalator device including an elongated, tubular, hand engageable body portion open at opposite ends and provided with a laterally directed intake opening means therethrough and positioned remote from both ends, a transverse closure for one open end and including a central aperture, an elongated tube open at both ends and registering with the aperture and forming a continuation thereof and of a length to project at all times from the closure beyond the intake opening means, closure means for the other open end of the body, elongated, electric heating means immediately adjacent the closure means and of lesser cross-sectional area than the elongated tube for telescopic association therewith and of a length sufficient to project into the tube at all times for all longitudinally adjusted positions of the tube, the tube being movable axially within the body and a maximum telescopic association being of non-sealing character, and nostril receivable closure means for the transverse closure supporting end of the body and arranged to discharge heated air from the tube which air is derived from the intake opening means and the tube and heating means telescopic association, cooling the body, maximum heating of the air being substantially confined to the tube included air in normal operation of the device, the space between the tube supporting closure and the nostril receivable closure comprising a control chamber, the latter closure having two nostril receivable and conforming portions each with a discharge passage, plate valve means controlling selectively the chamber communication with the passages for heated air discharge from one or both passages, the tube adjacent the intake openings including a bypass opening, and thermally responsive valve means for said bypass opening normally constrained to closed position and opening the bypass opening for heated air cooling when the air in the tube becomes excessively heated.

9. A portable hand type inhalator device including an elongated, tubular, hand engageable body portion open at opposite ends and provided with a laterally directed intake opening means therethrough and positioned remote from both ends, a transverse closure for one open end and including a central aperture, an elongated tube open at both ends and registering with the aperture and forming a continuation thereof and of a length to project at all times from the closure beyond the intake opening means, closure means for the other open end of the body, elongated,

electric heating means immediately adjacent the closure means and of lesser cross-sectional area than the elongated tube for telescopic association therewith and of a length sufficient to project into the tube at all times for all longitudinally adjusted positions of the tube, the tube being movable axially within the body and a maximum telescopic association being of non-sealing character, and nostril receivable closure means for the transverse closure supporting end of the body and arranged to discharge heated air from the tube which air is derived from the intake opening means and the tube and heating means telescopic association, cooling the body, maximum heating of the air being substantially confined to the tube included air in normal operation of the device, the body and transverse closure having relative rotation for axial adjustment of the tube relative to the heating, said body and transverse closure having an arcuate inclined slot or groove and pin type connection therebetween.

10. A portable hand type inhalator device including an elongated, tubular, hand engageable body portion open at opposite ends and provided with a laterally directed intake opening means therethrough and positioned remote from both ends, a transverse closure for one open end and including a central aperture, an elongated tube open at both ends and registering with the aperture and forming a continuation thereof and of a length to project at all times from the closure beyond the intake opening means, closure

means for the other open end of the body, elongated, electric heating means immediately adjacent the closure means and of lesser cross-sectional area than the elongated tube for telescopic association therewith and of a length sufficient to project into the tube at all times for all longitudinally adjusted positions of the tube, the tube being movable axially within the body and a maximum telescopic association being of non-sealing character, and nostril receivable closure means for the transverse closure supporting end of the body and arranged to discharge heated air from the tube which air is derived from the intake opening means and the tube and heating means telescopic association, cooling the body, maximum heating of the air being substantially confined to the tube included air in normal operation of the device, the space between the tube supporting closure and the nostril receivable closure comprising a control chamber, the latter closure having two nostril receivable and conforming portions each with a discharge passage, and plate valve means controlling selectively the chamber communication with the passages for heated air discharge from one or both passages, the plate valve means including a pair of aperture plates, one rigid with the body and the other rigid with the third mentioned closure means, the body and third mentioned closure means being relatively rotatable for valve operation.

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