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This invention relates to heating devices and particularly to "guns" or analogous devices for heating and discharging air flowing under pressure.

It is an object of our invention to provide a compact, portable device for thawing out or warming concealed parts of motor vehicles, such as the crank case, transmission, differential, gasoline line, oil lines, etc.

More specifically it is an object of our invention to provide a comparatively simple, economical and easily controlled device of the class described which may be readily connected with a source of compressed air and which will heat the air in its flow through the device and discharge a hot blast of air conveniently for directional purposes.

Another object is to provide an air heating and distributing gun which includes a heating chamber provided with an electrical heating element and an air conducting coil for connection with a source of compressed air and a discharge nozzle conveniently arranged for manipulation as desired.

Still a further object is the provision of a device as described in the preceding paragraph wherein heating is prevented by means of a mechanism which simultaneously shuts off the electrical heating element and the passage of compressed air through the device and vice versa.

These and other objects will be more apparent from the following description made in connection with the accompanying drawings wherein like reference characters refer to similar parts throughout the several views, and wherein:

Fig. 1 is a sectional view taken longitudinally through an embodiment of our invention.

Fig. 2 is a cross section taken substantially along the line 2—2 of Fig. 1.

Fig. 3 is a sectional view showing a somewhat different mechanism for controlling the flow of compressed air through the device.

Fig. 4 is a sectional view taken longitudinally through a somewhat different form of the invention.

Fig. 5 is a cross section taken substantially on the line 5—5 of Fig. 4, and

Fig. 6 is a view illustrating an auxiliary discharge nozzle with which our device may be equipped for certain uses.

Regarding the form of the invention illustrated in Figs. 1 and 2, a pistol grip P is provided which may be in the form of a casting from suitable material, such as metal, bakelite or the like. The pistol grip, as indicated in the dotted lines, has an air passage 10 extending from the butt of the handle to a small valve chamber '11 provided adjacent the upper and left hand end. A centrally disposed nipple 12 communicates with valve passage 11 and has a restricted bore forming at its inner end an annular seal for a plunger type valve 13. Valve 13 is suitably guided by slide bearings at the rear end of valve passage 11 and an elongated slide bearing 13a formed in the rear and upper portion of pistol grip P.

A second passage 14 is formed in the handle portion of the pistol grip extending from the butt to a recessed portion 15 which extends inwardly from the under side of the upper portion of the member P. Through passage 14 electrical service cord 16 may extend, one of the wires being electrically connected to one of a pair of terminals 17 of a knife blade type switch. The knife blade 18 of the switch is preferably constructed of a dielectric material and is pivoted at its upper end by means of a pin 19 to pistol grip P and is housed within recess 15 having a lower extension or trigger 18a which projects below the member P through a restricted guiding slot 18b at the open end of recess 15. The knife blade 18 carries a conductive contact 18c which may consist in a strip of metal wound about the medial portion of the blade and which engages or spans the two stationary terminals or contacts 17. The second terminal 17 is connected by a wire 20 with one end of an electrical heating element 21. The opposite end of the heating element is connected to a return service wire 22. The plunger valve 13 is connected by slot and pin engagement with the swingable knife blade 18.

An insulated heater casing is secured to the forward or breach end of pistol grip P defining a heating chamber C, and, as shown, comprises inner and outer thimble-shaped shells 23 and 24 respectively spaced apart by a relatively thick layer of heat insulating material 25. The outer shell 24 at its inner end surrounds a reduced portion at the breach end of the pistol grip and abuts a shoulder afforded by said portion, and, as shown, is secured thereto by screws 24a.

An enlarged tube 26 is secured at its flanged inner end to the breach portion of pistol grip P and extends axially of chamber C throughout the greater portion of the length of said chamber. Tube 26 communicates with a passage through nipple 12 and is closed by a cap 26a at its outer end. The electrical heating element illustrated surrounds axial tube 26 and, as shown, comprises...
a dielectric spool 27 having the flanged ends or disks 27a and a helically wound coiled nichrome element 21 which is wound upon suitable grooves in the spool, the ends of said coil being connected with electrical terminals provided in disks 27a.

An air conducting tube 29 communicates with the forward end of enlarged tube 26 and is sinuously formed, the convolution thereof extending longitudinally of and in aggregate surrounding the spool 27. The discharge end 29a of an air conducting tube 29 is projected beyond the forward end of the heater casing and is connected with a suitable nipple 30 which, as shown, has an external thread 20 for engagement with a discharge nozzle 31. Variously shaped discharge nozzles may be readily attached to the discharge nipple 30, for example, the curved form illustrated in Fig. 6.

Electrical service cord 16 may be connected with a suitable electrical outlet or other conventional source of electricity.

Air passage 10 through the pistol grip P is provided at its outer end with a threadable nipple 32 which is adapted to be connected with a rubber hose or other conduit leading from a tank or other source of air or other fluid under pressure.

In operation the device is handled in the manner of a gun or pistol. When the trigger 18a is pulled, simultaneously the electrical circuit through the heating element is closed and the plunger valve 43 is opened releasing the flow of fluid under pressure into the interior of tube 26. The compressed air or other fluid quickly fills and passes through tube 26 where it is initially heated and then passes through the sinusous air conducting tube 29 which surrounds the heating element. The tube is constructed of material having very high heat conductive properties, such as copper, and the flowing air is heated to a relatively high temperature before reaching the discharge end 29a of the tube. The gun is of course manipulated to direct the nozzle 31 against the parts to be treated with the discharged hot fluid.

It will be seen that a hot blast of air or other fluid under pressure may be concentrated on a relatively small object or may be sprayed about, as desired, at the will of the operator. The compressed air passages and their relation to the heating element has demonstrated high efficiency and only a very small amount of heat is dissipated due to the construction and insulation of the heating chamber and the heat reflection afforded by the inner shell 23 which is preferably constructed from shiny metal.

The rapid absorption of heat by the flow of the compressed air or other fluid prevents the device and its enclosed parts from over-heating, and it will be seen that due to the structure of the valve and switch controlling mechanism it is impossible to shut off the flow of air or fluid without also breaking the circuit through the heating element. The device is therefore safeguarded against over-heating and injury to the parts through inadvertence.

In Figs. 4 and 5 a somewhat different form of the invention is illustrated wherein the pistol grip P' is generally similar to the pistol grip of the first form and wherein the heater casing is similarly constructed and attached to the pistol grip in the same manner. The discharge nozzle is also removably attached to the heater casing in the same manner as in the form first described. The heater unit, comprising spool 27 and heating element 21, is also similar and is mounted upon an open ended tube 40 which is attached to the breach or forward end of pistol grip P', extending axially thereof.

In the second form of the invention, however, the valve for controlling the flow of fluid under pressure and the switch for controlling the circuit through the heating element are independently operated.

Air passage 41 extends from the pistol grip P' from the butt thereof to a point disposed somewhat above the trigger 42. Air passage 41 communicates with a suitable valve chamber 43 wherein a screw threaded valve casing 44 is mounted. Valve casing 44 has an axially disposed central chamber 45 and is provided with laterally disposed ports 44a which communicate with a shorter air passage 45 extending forwardly through the breach portion of the pistol grip and communicating with the inner end of air conducting coil 46 through a fitting or thimble 47. A poppet type valve 48 is slidably disposed in valve casing 44, the outer end of its stem projecting through the outer end of casing 44 in engagement with a camming surface on the rear end of trigger 42. The valve 48 as shown has a frusto conical head which is normally held against an annular seat at the inner end of the valve chamber by means of a coiled spring 49. The tubular coil 46 is helically wound and surrounds the heater unit spaced a short distance from the spirally wound heating element 21. The forward end of the tubular coil 46 terminates in a straight discharge 46a which is disposed axially of the heater casing and is connected with a suitable nipple 50.

An electrical service cord 51 extends through a suitable passage in the handle of the pistol 110 and a tumbler switch S is interposed in the line having a finger piece 52 mounted at the upper portion of pistol grip P' for convenient manipulation by the operator.

In this last described form of the invention the flow and discharge of air is controlled by the swingable trigger 42 the trigger being normally held in its forward position by pressure of the spring pressed valve stem thereagainst. The volume of air delivered may be controlled within certain limits by the pull upon the trigger 42. The compressed air or other fluid passes axially through the inner end of valve casing 44 between the head of the valve and the seat when the valve is open and into the chamber within casing 44 and then laterally out of the chamber into the passage 45 and into the coil. The air passes through coil 46 spirally and forwardly and is discharged through the nozzle at the forward end of the heater casing.

In Fig. 3 a somewhat different form of valve for controlling and regulating the flow of air as shown. Air passages 41 and 45 are provided through the pistol grip similar to the air passages in the form shown in Fig. 4. The valve 135 casing 53 is generally similar to the valve casing in the valve casing shown in Fig. 4, with the exception that the inner end has a reduced bore provided with a valve seat at the interior of the chamber. A needle type screw 140 is provided threaded into the outer end of valve casing 53 and having a knurled control knob 54a disposed in the position of a trigger for convenient manipulation for opening and closing, as well as regulating the passage of compressed air or other fluid.

From the foregoing description it will be seen that we have provided a very compact and efficient gun for heating and discharging air flowing under pressure. The device may be manufactured.
at relatively low cost and is adapted for connection with conventional sources of compressed air and electricity. Our improved device is especially adapted for concentrating and directing a hot blast of compressed air or other fluid under pressure, such as in garages and filling stations, for thawing out or warming congealed parts of motor vehicles.

It will, of course, be understood that various changes may be made in the form, details, proportions and parts without departing from the scope of our invention, which, generally stated, consists in a device capable of carrying out the objects as above set forth and as defined in the appended claims.

The term “air heating gun” is used in the claims with the intention of including all compact devices handled in the manner of a pistol grip gun for heating or chilling and delivering fluids, gaseous or liquid.

What is claimed is:

1. An air heating gun or the like comprising a casing forming a heating chamber, heating means in said chamber, a heat transmissive air conducting tube disposed about said heating means, a handle affixed to said chamber, means for connecting said air conducting tube with a source of fluid under pressure, said tube terminating at its outer end in a discharge nozzle, and means for controlling the flow of fluid through said tube.

2. An air heating gun comprising an enclosed casing forming a heating chamber, a heating element mounted within said chamber, a heat transmissive air conducting tube tortuously formed and disposed in close relation to said heating element within said chamber, a handle secured to said casing, means for connecting one end of said tube with a source of fluid under pressure, the opposite end of said tube terminating in a nozzle, and means mounted adjacent said handle for controlling the flow of fluid through said tube.

3. An air heating gun or the like comprising a casing forming a heating chamber, electrical heating means mounted in said chamber, a heat transmissive air conducting tube disposed within said chamber, adjacent said heating means, a handle secured to the rear of said casing, means for connecting the rear end of said tube with a source of fluid under pressure, the opposite end of said tube terminating in a nozzle disposed at the forward end of said casing, means mounted adjacent said handle for controlling said heating means and means for controlling the flow of fluid through said tube.

4. The structure set forth in claim 3 wherein both of said last mentioned means are controlled by the operation of a single element mounted adjacent said handle.

5. A device for heating air comprising a heat insulated chamber, a pistol grip handle, said chamber being secured at one end thereof to said handle, an electrical heating element located within said chamber, a coiled air conducting tube located within said chamber and disposed about said element to receive heat therefrom, a trigger operated air valve mounted in said handle, a connection element adapted for connection to a compressed air hose mounted in said handle, one end of said tube being connected through said valve to said connection element and the other end of said tube extending through the outer end of said casing to serve as an outlet, an electrical cord adapted for connection to a source of electrical energy, and a switch mounted in said handle, said heating element being connected through said switch to said cord.

6. An air heating gun comprising a casing forming a heating chamber, a core mounted in said casing and spaced from the peripheral wall thereof, a heating element surrounding said core and a heat transmissive air conducting coil surrounding said heating element and disposed between the same and said casing, a handle secured to said casing, means for connecting one end of said coil with a source of fluid under pressure, the opposite end of said coil terminating in a nozzle which projects beyond said casing.

7. An air heating gun comprising a casing forming a heating chamber, a hollow core mounted in said casing and extending longitudinally thereof in spaced relation to the peripheral wall of said casing, a heating element mounted upon said core, a heat transmissive air conducting coil mounted in said casing and surrounding said heating element, a handle secured to said casing, means for connecting one end of said coil with a source of fluid under pressure, the opposite end of said coil terminating in a nozzle which projects from one end of said casing.

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