Feb. 17, 1953 H. SHERMAN ET AL 2,628,671

WICK-TYPE LIQUID FUEL HAND TORCH HAVING WICK-FED RETORT

Filed Feb. 8, 1949

FIG. 1.

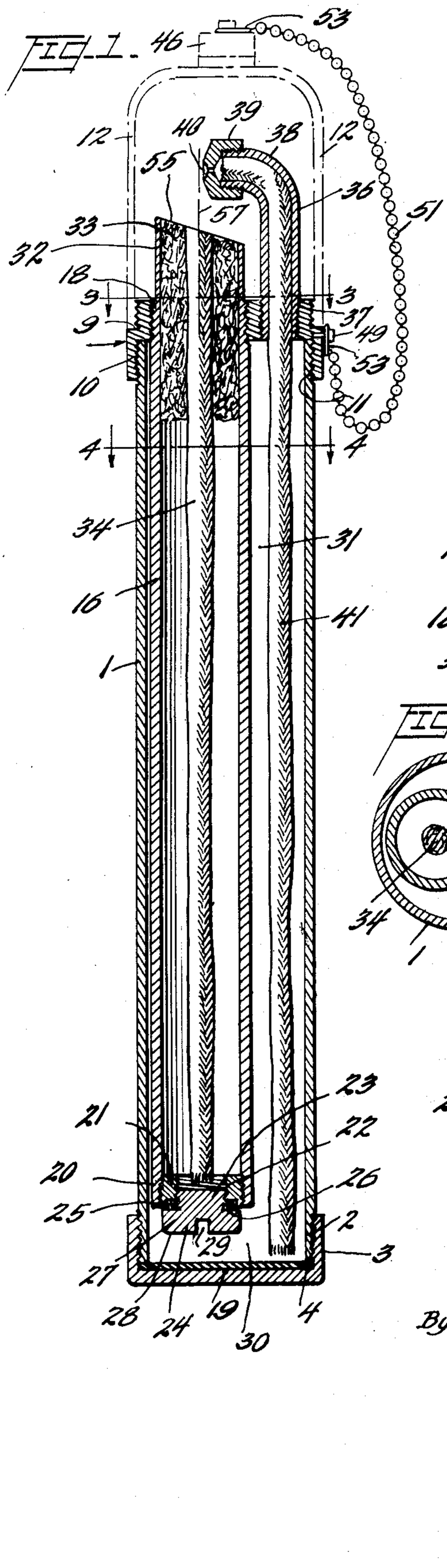


FIG. 2.

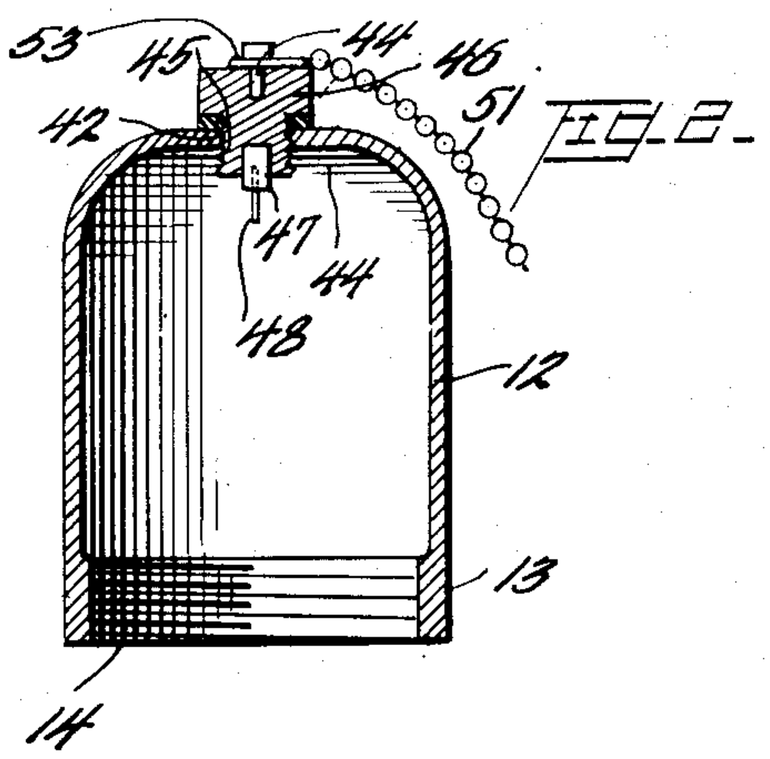


FIG. 3.

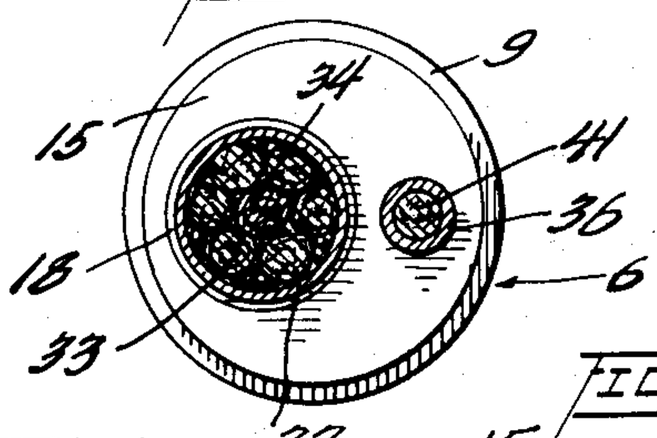


FIG. 4.

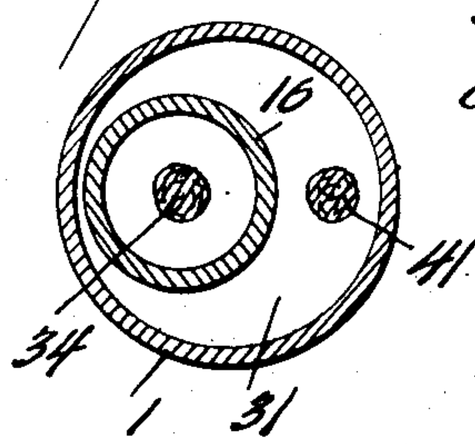


FIG. 5.

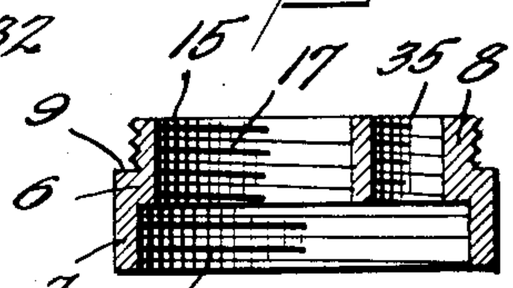
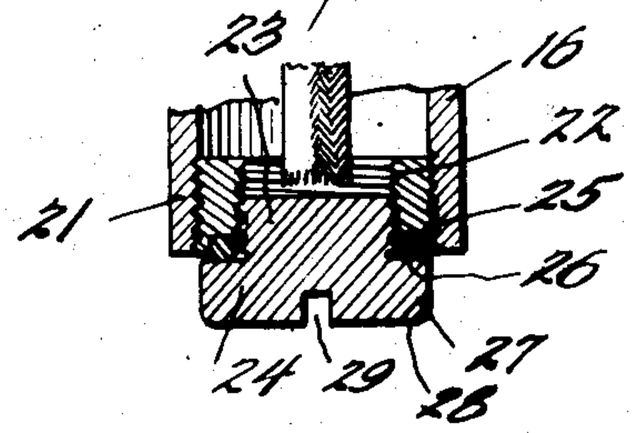


FIG. 6.



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WICK-TYPE LIQUID FUEL HAND TORCH HAVING WICK-FED RETORT

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6 Claims. (Cl. 158—35)

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This invention relates to the art of flame or heat propagators principally of the type including liquid and gaseous fuel burners adapted to provide a concentrated heating effect at a predetermined area or point, as in connection with mechanical operations. More particularly it pertains to heating devices of the portable flame producing type, and in its preferred adaptations, the invention is directed to liquid fuel blast lamps, especially exemplified by hand torches.

The age-old and widely diversified industrial use of blast lamps reflects the generally acceptable function of these devices available to the prior art. Possibly in some measure the comparatively limited activity in the progressive development of some types of these appliances may be attributable to this situation. Nevertheless commercially available devices in this category are not entirely free from legitimate elements of criticism. Thus by way of illustration, notwithstanding the generally satisfactory functioning of hand torches in their innumerable fields of adaptation, various difficulties and objectionable details have been experienced in their characteristics.

Illustrative of the difficulties and shortcomings attributable to hand torches, for example, has been their unnecessary complication. This is indicated by involving in their structure movable parts introducing the necessity for periodic adjustment and resulting in points of mechanical weakness as well as undue wear. Moreover such difficulties as troublesome fuel leakage have been manifested by prior art devices due to their inherent mechanical characteristics both with respect to structure and the restricted angular position in use for which they have been designed. In addition there has been a necessity for recurrent cleaning of the torches heretofore available, in view of the charring and clogging effects of carbonaceous material developed by their operation. In general the prior art devices have not afforded the maximum efficiency attainable either with respect to the heating characteristics developed or in connection with the functioning time for a given size of hand torch. Nor have they afforded optimum simplicity, compactness and sturdiness of structure together with an efficiency of operation pursuant to the features of the present invention.

The optimum embodiment of structure on which the present invention is predicated involves a complementary positioning of the flame or primer tube in contiguous association with a power or pressure chamber. While the broad aspects of such an association have been contemplated by the prior art, there has been a

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complete lack of realization concerning the relative coordination of these members in a manner affording maximum efficiency in heating effect as well as in functioning time for a given size of device involving a given volume of fuel. In addition the device described herein is constructed in accordance with features of maximum simplicity both from the standpoint of initial assembly as well as in connection with maintenance during operation, and involves a minimum number of parts which are expediently coordinated at the time of manufacture and thereafter require essentially no adjustment or maintenance within reasonable limits.

It is an object of this invention to obviate difficulties and uncertainties of the type hereinabove indicated.

Another object is to provide a liquid fuel burner of the flame producing type adapted to afford a maximum efficiency of heating effect at a predetermined area or point of concentration for a given size of device and volume of fuel utilized.

An additional object is a portable blast lamp of enhanced heating and operative efficiency, adapted to afford a maximum functioning time under optimum conditions for a given size of device and volume of fuel utilized.

An important object is to attain a hand torch of comparative structural simplicity, compactness and sturdiness, and adapted to afford an enhanced heating and operative efficiency including a maximum functioning time under optimum conditions for a given size of device and volume of fuel utilized.

An additional significant object is to produce a hand torch manifesting comparative structural simplicity, compactness and sturdiness, adapted to afford an enhanced heating and operative efficiency including a maximum functioning time under optimum conditions for a given size of device and volume of fuel utilized, said device being essentially free from detrimental carbonizing and clogging effects and requiring a minimum of adjustment and maintenance.

Other objects, advantages and features of the invention will become apparent from the following description read in connection with the accompanying drawing, in which similar elements are designated by like numerals.

Fig. 1 is a vertical section of a preferred embodiment of hand torch within the purview of the present invention.

Fig. 2 pertains to a vertical section of a cap structure applicable to the upper portion of the hand torch as a top closure when the device is not in use.

Fig. 3 is directed to a cross section taken along the line 3—3 of Fig. 1.

Fig. 4 comprises another cross sectional view, applicable to line 4—4 of Fig. 1.

Fig. 5 relates to a vertical section of the coupling or bushing at the upper end of the torch housing as shown in Fig. 1.

Fig. 6 represents a cross sectional detail showing the closure assembly at the bottom of the flame or primer tube.

A preferred embodiment of the invention described herein comprises the outer housing of the device determining the power or pressure chamber, with a primer or flame tube chamber, the open-ended upper or outlet portion of which projects upwardly from the power chamber housing with the remainder thereof positioned within the said power chamber and in substantial measure coextensive therewith. The volume capacity of the power chamber, apart from that utilized by the flame tube positioned therein, is preferably in excess of that of the said flame tube, and desirably the volume relationship for fuel retention by the two members bay be in the proportion of approximately 2:1, and may be substantially larger. Both the power chamber and flame tube are provided with contiguous, easily removable bottom caps, whereby the tube chamber and power chamber are expediently supplied with fuel from the bottom portion of the device. The gooseneck, provided with an orifice nozzle, projects from the upper portion of the power chamber in preadjusted relationship relative to the outlet of the flame tube. Both the wicking of the flame tube and the wick extending from the gooseneck into the power chamber may be of cotton or glass fiber, and the device as a whole, free from soldered joints as well as from movable operative parts, is susceptible to expedient threaded assembly of the various members thereof under essentially leakproof conditions.

Referring more particularly to the features of invention embodied in the modification shown by the various figures of the drawing, the torch device may involve an outer housing 1, comprising the power or pressure chamber. The bottom end portion 2 of said housing 1 is surface threaded for coordination with the internally threaded cap member 3, which determines the closure for the said housing. Desirably a washer element 4 is appropriately seated within said cap member 3 for attaining a leakproof attachment of the cap member with the aforesaid housing 1. The said element 4 may expediently be in the form of a disc having a diameter conforming with that of the inside surface 19 of the said cap member and desirably sufficient to result in its being fittedly wedged therein, thereby completely covering the said surface 19. If desired, a slight groove may be provided in the walls of cap 3 adjacent surface 19 wherein the periphery of washer 4 may be fittedly wedged.

The upper end 5 of housing 1 is fitted with a coupling or bushing 6, which is in effect the integral top member of the housing. It will be noted that this coupling in effect comprises a lower portion 7 and an upper portion 8 of relatively reduced dimension, with a peripheral shoulder or flange 9 between the said portions. The said lower portion 7 of the coupling is provided with an internal thread 10 for coordination with the externally threaded portion 11 of the housing whereby the said coupling or bushing 6 is attached to the said housing.

The upper portion 8 of coupling 6 is threaded

on its peripheral surface to permit the attachment thereto of top cap 12 which is supplied at the lower portion 13 thereof with internal threads 14 adapted for association with the said surface threads of coupling portion 8. Thus as will be seen from the dotted line indication of Fig. 1, the cap 12 affords a fitted removable top closure for the housing 1, and thereby for the entire torch assembly, with the bottom portion 13 of the cap being seated on the aforesaid annular flange 9 of coupling 6.

An opening 15 is provided through the top of coupling 6, this being of a diameter adapted to receive the primer or flame tube 16. Thus the internal threads 17 on the inner surface of upper portion 8 of the bushing or coupling 6 are coordinated with the peripheral threaded section 18 of flame tube 16, whereby the flame tube is in effect supported by the said coupling 6 or housing 1 to which the coupling it attached. It will be seen that the flame tube 16 extends from a point outside housing 1, through opening 15 of bushing 6 to which it is threadedly attached, and thence to a point substantially near the bottom of the housing 1, determined by the inner surface 19 of cap member 3, or at least by the washer element 4 seated therein.

The lower end portion 20 of tube 16 is desirably threaded on its internal surface in order to receive the externally threaded surface of bushing 21. The threads 22 on the internal surface of said bushing 21 are adapted to receive the externally threaded end or stem 23 of filler plug 24. The said filler plug thus in effect determines the bottom closure of flame tube 16, and thereby defines the flame tube chamber having a closed bottom and an open upper or outlet portion 32.

In order to render the bottom closure of flame tube 16 leakproof, bushing 21 is countersunk on its bottom surface adjacent the opening therethrough to provide a seat 56 for washer element 25. The said washer element 25 is of the conventional design having an opening through which stem 23 of plug 24 may pass. Thus the screwed attachment of plug 24 to bushing 21 results in the compression of the said washer element at least partly into said countersunk seat 56 as well as against flange 26 determined by head 27 of the said plug 24. As an expedient for facilitating the attachment or removal of filler plug 24, the outer surface 28 of head 27 may be supplied with a slot or groove 29 for the purpose of effecting the use of a screwdriver or coin.

The said outer surface 28 of plug 24 is shown as desirably positioned relatively close to the inner surface of cap member 3, said inner surface being shown as a resilient gasket 19, but preferably affording an intervening space 30 determining a zone between the bottom of the flame tube and that of the power chamber within which some of the fuel contained within the said housing 1 may be present. It will however be understood that notwithstanding the desirability of providing such an intervening zone, this is not entirely essential to the operative functioning of the device. Thus the outer surface 28 of filler plug 24 may be in contact with inner surface 19 of cap member 3 with the effect that the volume content of the power chamber determined by annular space 31 circumventing flame tube 16 is accordingly diminished.

The upper portion 32 of flame tube 16 substantially projects above housing 1, as shown in Fig. 1. The said end portion 32 of flame tube 16 is substantially filled with an appropriate wick ma-

terial which may desirably extend from opening 55 of the tube to some expedient point therein which may desirably be below the comparable level of the lower end of bushing 6 to which the flame tube is attached as previously indicated. Thus the mass of wick material 33 in effect may extend within flame tube 16 from its opening 55 to a portion thereof which is within housing 1, and it may be retained in position by the frictional contact of the mass against the inner wall surface of the flame tube 16 by virtue of the quantity of wick material utilized, or in any other expedient manner, as by a wire spring element coordinated with the wick mass. Extending from the lower portion of this mass 33 of wicking, a wick 34 of relatively lesser diameter is provided, extending from the lower portion of wick mass 33 to substantially the bottom of flame tube 16 contiguous the inner end of filler plug 24. In order to appropriately support wick 34 in its extended position, the upper end thereof may be expediently positioned within wick material 33. If desired, the upper end of wick 34 may extend through wick material 33 to any expedient point up to opening 55, it being understood that the upward extent of wick 34 is determinable by discretion from the standpoint of the requisite retention thereof in its functioning position within the flame tube. Thus wick 34 is adapted to be immersed in any fuel contained within flame tube 16, and the portion thereof within end 32 of the flame tube is desirably enveloped by the aforesaid mass 33 of wick material. The wick material utilized may be of cotton or glass derivation as desired.

The actual power chamber comprises the aforesaid annular space 31 between the outer surface of flame tube 16 and the inner surface of housing 1. The said power chamber 31 is preferably in excess of the volume content of flame tube 16, as previously stated. Without intending to restrict the relative volumes of power chamber 31 to flame tube 16 within the scope of the invention, an optimum type of torch is afforded where the volume content of said power chamber 31 is in the proportion of approximately 2:1 with respect to the flame tube volume, or greater. Thus while the device is effectively operative where the relative volume relationship of the flame tube and power chamber may approximate 1:1 in view of the other features applicable thereto, the optimum embodiments of the invention contemplate for the relationship between the fuel volume content of the power chamber and that of the flame tube the proportion of approximately 2:1 and even substantially in excess thereof, such as 3:1 or 4:1 for example. The significance of the coextensive relationship of flame tube and power chamber, with the former positioned within the latter, and the latter affording a relatively larger volume content, will be referred to in the consideration hereinbelow.

Referring again to coupling 6, a second and relatively smaller opening 35 is provided adjacent to the aforesaid opening 15. As previously described, flame tube 16 projects above coupling 6 through said opening 15 as well as being attached to and supported by the coupling along the peripheral surface of this opening. On the other hand, gooseneck 36 is affixed to coupling 6 at the said opening 35 from which it projects upwardly. Thus the lower portion 37 of the gooseneck is surface threaded for coordination with the threads on the surface of the coupling

within said opening 35. The upper curved end 38 of gooseneck 36 is likewise peripherally threaded for reception of the internal threads provided on orifice nozzle 39. The orifice is designated at 40.

As will be seen from Fig. 1 showing the torch retained in upright position, the opening 55 at end 32 of flame tube 16 is inclined rather than occurring in a horizontal plane. The lower end of the opening is relatively contiguous to gooseneck 36, and desirably adjacent the lower portion 37 thereof, as at a point substantially midway between the curved portion of the gooseneck and the end thereof attached to coupling 6. The angle of inclination from the horizontal of said opening 55, that is, its angular disposition relative to the transverse axis of the flame tube, may desirably be between approximately 20° and 30°, although it will be understood that this may be subject to reasonable variation without departing from the fundamentals of the invention herein. This angular disposition of opening 55 may be of material significance particularly with respect to the coordination of the said opening with the various parts of the gooseneck 36.

Thus when the gooseneck is affixed and adjusted for use, nozzle orifice 40 is positioned above and in reasonable proximity to said opening 55 of flame tube 16, and it is desirably spaced somewhat off center, that is, offset from the vertical or longitudinal axis 57 extending through the center of flame tube 16. Pursuant to the preferred adaptation of the invention, orifice 40, while being opening 55, does not approach the projection of axis line 57 which passes through substantially the center of flame tube opening 55. The extent of deviation from the axis may be relatively small, and by way of illustration approximately $\frac{1}{64}$'' to $\frac{1}{32}$'' has been found quite satisfactory. This expedient results in a substantially enhanced heating effectiveness in the flame emanating from orifice 40.

Without intending to be restricted to any theory or explanation, it will be seen that the angular disposition of opening 55 provides an enlarged wick surface and corresponding flame generated by the said flame tube 16. The correlation of the lower end of the opening in relative contiguity with portion 37 of gooseneck 36 serves to preheat the latter and thereby the vapors passing therethrough. At the same time, the flame at 55, by virtue of its position relative to curved end 38 of gooseneck 36 functions to substantially envelop the entire nozzle, particularly when the torch is in relatively upright position, thereby likewise preheating the vapors passing through 38 as well as the nozzle 39. In effect the coordination of the gooseneck with flame tube opening 55 as described affords a preheating of the fuel, including the volatilized portion thereof, in its passage through a substantial extent of the gooseneck. In addition the aforesaid angular characteristics of opening 55 serve to provide an effective flame for vapors evolved at orifice 40 at substantially any practicable position in which the torch may be retained for utilization. Thus the flame at opening 55 is operatively and efficiently coordinated with vapors issuing from orifice 40 at substantially any torch angle, except possibly when the torch is supported in inverted position.

Accordingly the improved heating efficiency attributable to the coordinated features of angularly disposed flame tube opening 55 and gooseneck 36 appears to be attributable in substantial measure to a more complete ignition of the pressure

flow of combustible vapors emitted through orifice 40. A further advantage is the added range of torch operativeness provided, this comprising the efficient functioning of the torch at substantially any angle from its upright position, short of complete inversion. This latter feature may be understood from a realization that the tendency of the flame at opening 55 is to seek an upward direction, irrespective of the angle at which the torch is held for use, and the offset positioning of nozzle 40 retains the flow of vapors therefrom in an area of combustible relationship with opening 55 notwithstanding the said angular disposition of the torch assembly until the torch approaches substantially complete inversion. In contradistinction, any substantial angular retention of prior art torches results in the orifice being out of combustible relationship with the flame intended to ignite the vapors issuing therefrom with the result that the device is rendered essentially inoperative and useless at any substantial departure from the vertical or upright position of the torch.

A wick 41 is seated within gooseneck 36 and extends from the orifice nozzle attached thereto to a point substantially contiguous inner surface 19 of cap member 3. Thus wick 41 is positioned within power chamber 31 and is coextensive with flame tube 16 as well as wick 34 positioned within the latter. Similarly to wick material 33 and wick 34, said wick 41 may effectively be of cotton or glass fibre derivation.

As shown in Fig. 1, cap 12 comprises a closure for the entire torch assembly, by virtue of its threaded attachment to the upper portion 3 of coupling 6, the latter being in turn integrally attached to housing 1. Thus cap 12 envelops the portion 18 of flame tube 16 which projects beyond housing 1, as well as the gooseneck 36 and the orifice nozzle 39 in unitary attachment relative thereto. When thus enclosed by the said cap member 12, it will be apparent that the operative portions or members of the device are enclosed and substantially protected from disturbance or damage, with the assembly as a whole comprising a simple, compact, sturdy structure. In the interest of expediency, attachments are applied to cap member 12 for maintaining the same in convenient position with respect to the torch, and also for affording an effective means removably mounted on the cap member and adapted for obviating any clogging of orifice 40.

Thus cap member 12 is provided with opening 42 through the top thereof, said opening being appropriately threaded to receive the peripheral threads on threaded stem portion 45 of cleaning pin plug 46. Integral with stem 45 and positioned within the same is member or tube element 47 which serves as the support for cleaning wire or pin 48, the said pin or wire being in unitary attachment to member or tube 47. Said pin 48 is necessarily of a dimension adapted for insertion within orifice 40 for the purpose of removing obstructions therein resulting from any extraneous material, illustrated by carbonaceous formation as a result of the fuel combustion taking place during the operation of the torch. In view of the association of the various parts as described, the pin plug 46 is attached to cap member 12 when not in use, thereby being conveniently supported in a manner which minimizes the possibilities of its loss or of any inconvenience relative to the operation of the device. In order to utilize pin 48 it is merely necessary to unscrew pin plug 46 from cap member 12 and to insert the pin in orifice 40.

For purposes of an expedient leak proof attachment, the washer 50, having an opening adapted for a relatively snug fit over stem 45 of pin plug 46, is resorted to and on affixing the plug to the threaded opening 42 of cap member 12, the washer will be compressed between the head of the plug and the outer surface of said cap member.

An expedient manner for attaching the pin plug 46 and cap member 12 to the torch assembly comprises a bead or link chain 51 provided with eyelets 53 at the respective ends thereof. One eyelet is retained in position on the top surface of pin plug 46 through the expedient of headed pin 44, the latter being permanently attached to the pin plug, but projecting above the same sufficiently to afford a swivel or free association therewith of the said eyelet 53. Similarly the other eyelet of the chain is attached in the same type of loose or swivel association to portion 7 of bushing or coupling 6 through pin 49 which is integral with the said coupling portion 7. With this attachment of chain 51 to coupling 6 at one end and pin plug 46 at the other, the pin plug will remain suspended from the torch during the use thereof without any hazard of loss. In this manner, the cleaning pin plug is always maintained in a convenient position for use with a minimum hazard of loss.

This situation will apply whether or not cap member 12 is attached to housing 1 in its capacity as a closure of the assembly or during the interval when the cap member is removed from the housing in order to permit the use of the device. If the plug 46 remains affixed to cap member 12 when the latter is unscrewed from housing 1, it will be apparent that the cap member will be retained in suspended proximity with respect to the body or housing of the torch. Conversely, if desired, the cap member may be separated from plug 46 during the interval of torch use, and in that event merely the pin plug per se will be supported by chain 51.

It should be further noted that other expedients for attachment of pin plug and cap member may be relied upon. Illustratively the opening 42 of the cap member may be threaded to receive the peripheral threads of a bushing, the lower portion of the latter within the cap member being in the form of a flange. This bushing may be internally threaded to receive the threaded stem 45 of the cleaning plug. As in the showing of Fig. 2, stem 45 may be supplied with a tube member 47 to which pin 48 is integrally affixed. By resort to a chain provided with clips at the respective ends thereof, one clip may be seated over the aforesaid flange at the lower portion of the bushing and may desirably be seated in a groove provided on the said flange. Thus upon attachment of the bushing to the opening of cap member 12, the chain clip will be retained in situ between the flange and the inner surface of the cap member. Under such circumstances, the cap member is in a more or less permanent association with the chain. The clip at the other end of the chain may envelop the vertical portion 37 of gooseneck 36. By such an association, the chain plug and cap member are retained in substantially permanent association with the chain, with the pin plug being removable from the cap member for use of the cleaning pin.

In the operation of the torch, it is first supplied with the fuel contemplated for use. The fuel utilized is within the discretion of those skilled in the art, and may desirably be an alco-

hol, such as ethyl or denatured alcohol. In this connection, the housing is held in inverse position, with the knurled surface cap member **3**, comprising the bottom closure, positioned at the top. The cap member is detached by unscrewing the same from housing **1**, and filler plug **24** is then similarly removed from flame tube **16**, by resort to some such expedient as a screwdriver or coin inserted in slot **29** for rotating the said plug from its closed position. The liquid fuel is then supplied to flame tube **16** until the receptacle is substantially completely filled, whereupon filler plug **24** is reattached. Liquid fuel is then added to power chamber **31**, and when this chamber is substantially but not entirely filled, to afford a space for pressure development, cap member **3** is again attached to housing **1**, thereby completely closing the assembly, with the fuel content therein. During this interval of supplying the predetermined fuel, cap member **12** may or may not be retained in its position as a top closure for the assembly. With the device supplied with fuel, it is adapted for utilization, when the said cap member **12** has been removed from attachment to upper portion **8** of coupling **6** integral with housing **1**. In order to propagate the heating flame, it is merely necessary to ignite the fuel absorbed by the wick material **33** at the opening **55** of flame tube **16**.

Without intending to be restricted to any theory or explanation concerning the operation of the device, it is submitted that as the resultant flame develops at the tube opening **55**, the heat propagated is conducted by the walls of the flame tube chamber, including flame tube **16** and the bottom closure **24** thereof, in heat exchange relationship with the fuel within power pressure chamber **31**. As a result of immersion of the flame tube chamber **16** in the fuel of power chamber **31**, with the latter preferably being of a substantially enlarged volume content as compared with the said flame tube chamber, the temperature within the flame tube containing wick **34** and a wick material **33**, is maintained under comparatively controlled conditions which in effect prevent any excessive temperature that might cause boiling over of fuel from the said flame tube chamber. Thus the fuel in power chamber **31** is adapted to function as a cooling bath for the flame tube chamber immersed therein, and is in turn subjected to heating by the aforesaid heat exchange to the extent that vaporization or volatilization of liquid fuel within power chamber **31** is manifested. At the same time, the coordinated association of flame tube opening **55** with gooseneck **36** results in the flame at opening **55** heating a substantial portion of the gooseneck, including particularly the nozzle thereof which, as previously indicated, may be substantially enveloped by the flame, as well as the curve portion **38** and an adjacent part of upwardly extending portion **37** of the gooseneck.

With the generation of vapor or gas from the liquid fuel in power chamber **31**, a pressure is developed therein, and through the expedient of wick **41** at its upper portion within gooseneck **36**, the volatilized fuel is directed to orifice **40** of said gooseneck **36**. The predetermined relative position of orifice **40** to the flame at opening **55** of the flame tube results in projecting and igniting the gas or volatilized fuel emanating from orifice **40**, under the prevailing pressure conditions within power chamber **31**, as augmented by the supplementary heating effect of the gooseneck as described above, through the said flame and opening **55** resulting in the ignition of the gas, and the flame blast is thereby propagated for utilization.

By immersing the flame tube chamber within the power chamber of relatively greater volume, with the immersed portion of the flame tube being substantially coextensive with the power chamber, an enhanced efficiency of heat exchange and attendant torch operation is attainable. As previously indicated, due to the heat conductivity of the flame tube chamber, the fuel within the power chamber is subjected to requisite heating throughout the body of fuel therein, and at the same time the flame tube is desirably subjected to an effective cooling.

In other words the cooling and the heating effects are attained by heat exchange at precisely the proper zones within the torch housing to avoid undue propagation of vapor within the flame tube and the desired pressure development within the power chamber. There is thereby afforded a maximum interval of operation before refueling becomes necessary, under the most efficient conditions, for a given quantity of fuel within a torch of a given volume content. This improved efficiency is manifested by a maximum concentration of heat in the pressure chamber **31**, with an attendant acceleration of vapor development therein and a comparatively increased attendant pressure. In effect this situation serves to render the torch quicker starting, with an increased rate of heating, and a higher flame temperature development than that heretofore attainable with blow torches of comparable size. Indicative of the efficiency of hand torches pursuant to the present invention, a flame blast of approximately 4 inches to 6 inches, dependent upon the size of the torch, and of substantial maximum heating effect, may be attained within approximately ten seconds from the time the wick at opening **55** is ignited, and the temperature attainable is approximately 1800° F.

Moreover the preferred embodiment of device as described requires merely an adjustment of the parts involved during the course of assembly, since the details of construction lend themselves to a permanent or fixed association of the various members determining the construction. Thus the stationary power chamber and gooseneck attached thereto, as well as the stationary flame tube are relatively positioned at the time the device is assembled, and in view of the elimination of moving parts, no periodic adjustments are necessary for optimum operation. Furthermore by virtue of the structural characteristics, the torch contemplated by the invention generally lends itself to utilization in a diversification of angular positions without any substantial hazard of leakage or effect on the heating efficiency determined by the flame blast developed. Thus the torch within the purview of the invention is essentially foolproof in its function and efficiency of operation.

The novel characteristics of the device are additionally manifested by the simplicity, compactness and sturdiness of the assembly, as well as the substantial elimination of maintenance and repair requirements. In contradistinction to conventional practice, the blow torch of the present invention is substantially exclusively dependent upon a threaded attachment of the various members to each other, and the usual brazing and soldering resorted to in connection with these devices is avoided. In this manner,

the assembly of the parts is facilitated, and the possibility of leakage at soldered, brazed or welded joints is essentially eliminated. At the same time, the respective parts of the device are easily accessible for any replacement, and the device as a whole lends itself to expedient cleaning or substitution of parts, should this be deemed advisable. As previously indicated, the elimination of moving parts in connection with the operation of the device reduces structural wear and mechanical difficulties to a minimum, although in the event of any defective members, these may be expediently replaced.

Contributing to the facilitated maintenance of the structure contemplated is the substantial lack of carbonization tendency manifested by the torch of the present invention in the use of cotton wicking. This advantageous effect appears to be attributable to the burning characteristics of the torch, including the enhanced pressure of the volatiles issuing from the orifice **40**, and the substantially complete combustion of these volatiles as well as the fuel propagating the flame at opening **55** of the flame tube by virtue of the temperature and conditions of combustion attained by the operation of the device.

This substantial reduction in carbonization avoids the necessity for frequent replacement of wicks even under extreme conditions of torch use. Moreover the adaptation of wicks of glass fibre derivation to the torch of the present invention essentially obviates any charring or carbonization, even under the most adverse conditions of operation, and including the situation where the fuel supply within the torch is permitted to run dry, since glass wicking affords a maximum resistance to the effect of temperature under the conditions prevailing in a blast lamp and in effect manifests no charring action. Thus either with cotton or glass wicks relied upon for the functioning of the device of the present invention, the necessity for frequent replacement of wicks is not encountered.

It will be understood that the specific material of which the various members and parts are fabricated has no critical bearing on the features of the invention and is determinable from expedience as well as preference. Thus while the flame tube **16** should preferably be of a heat conducting material, desirably metal, the particular choice of metal is subject to variation within reasonable discretion. Metals affording effective heat conducting characteristics which are adapted for the flame tube are illustrated by copper, copper alloys, aluminum and so-called red brass or duralumin. An expedient metal utilized comprises high quality brass plated with a chromium finish.

Similarly the housing may be of any expedient material, although in this connection, the heat conducting properties may not be especially significant, dependent upon the characteristics of the device. Thus the housing may effectively be made from any expedient heat non-conducting materials as well as from the usual metals used in fabricating torch housings.

Likewise the washers utilized are subject to variation as to the material involved, although neoprene washers have been found quite satisfactory in view of their wear resistant attributes and heat insulating properties. Moreover as stated hereinabove, the resort to glass wicking may comprise a preferred type of material for the pertinent parts of the structure, in view of the characteristics thereof, although as previously stated, the use of cotton wicking in the devices of the present invention has been quite satisfactory. With further reference to the wicking, the mass in end **32** of the flame tube may result from one or more wads of appropriate material, the total amount being sufficient to retain its position in the indicated part of the tube. It will, however, be understood that any expedient manner or means may be resorted to for retaining in desired position either the wicking in **32** or any of the other wicks utilized. In brief it will be understood that the latitude of the invention contemplates the utilization of other types of materials than those mentioned, dependent upon the particular characteristics of the torch contemplated as well as the discretion of those skilled in the art.

It will accordingly be noted that the invention is predicated on a novel type of blast lamp, particularly that in the category of a blow or hand torch, and embraces among its features structural simplicity, compactness, sturdiness and particularly an enhanced efficiency and facility of construction as well as operation. The attributes and advantages of the invention described are apparent from its novel features as manifested by its details of construction. Moreover in view of its utility, the invention lends itself to a wide field of adaptation.

While we have described our invention in accordance with a preferred embodiment thereof, it is obvious that many changes may be made in the details of construction and in the combination of parts and materials, without departing from the spirit of the invention as defined in the following claims.

Having thus set forth the invention, we claim:

1. A blow torch comprising a closed housing having a removable bottom closure and a top member, said housing determining a power chamber, means forming a flame tube chamber of a volume content less than that of the power chamber, said flame tube chamber having an open upper end and a removable bottom closure and mounted within said housing, said flame tube chamber being substantially coextensive in length with said power chamber but short of the lower end of said power chamber and supported only by said top member, the open ended portion of said flame tube being positioned above said top member outside the housing, a comparatively short conduit communicating with said power chamber, said conduit being provided with an orifice outlet and attached to said top member of the housing, said orifice outlet being positioned above and substantially directly over the open end of said flame tube chamber, in proximity to and in heat exchange relation with any flame at said open end, wick means within said flame tube chamber adapted for conveying liquid fuel from said flame tube chamber to the open end thereof, and wick means within said conduit and power chamber for conveying fuel from the power chamber to said orifice.

2. A blow torch as in claim 1, including a fitted top closure for said housing removably attachable to said top member and adapted to envelop both the open ended portion of the flame tube positioned outside the housing and the comparatively short conduit communicating with the power chamber.

3. A blow torch as in claim 1, wherein the comparatively short conduit communicating with the power chamber comprises a gooseneck provided with said orifice outlet.

4. A blow torch as in claim 3, wherein the said orifice outlet is offset from the longitudinal axis extending through the center of the flame tube and the open end thereof.

5. A blow torch as in claim 3, wherein the open end of the flame tube determines an opening in an inclined plane relative to the transverse axis of the flame tube, the said opening extending downwardly toward said gooseneck and terminating in relative proximity to the vertical portion of the said gooseneck, said open end of the flame tube being substantially filled with a wick mass.

6. A blow torch as in claim 5, wherein the said orifice outlet is offset from the longitudinal axis extending through the center of the flame tube and the open end thereof.

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