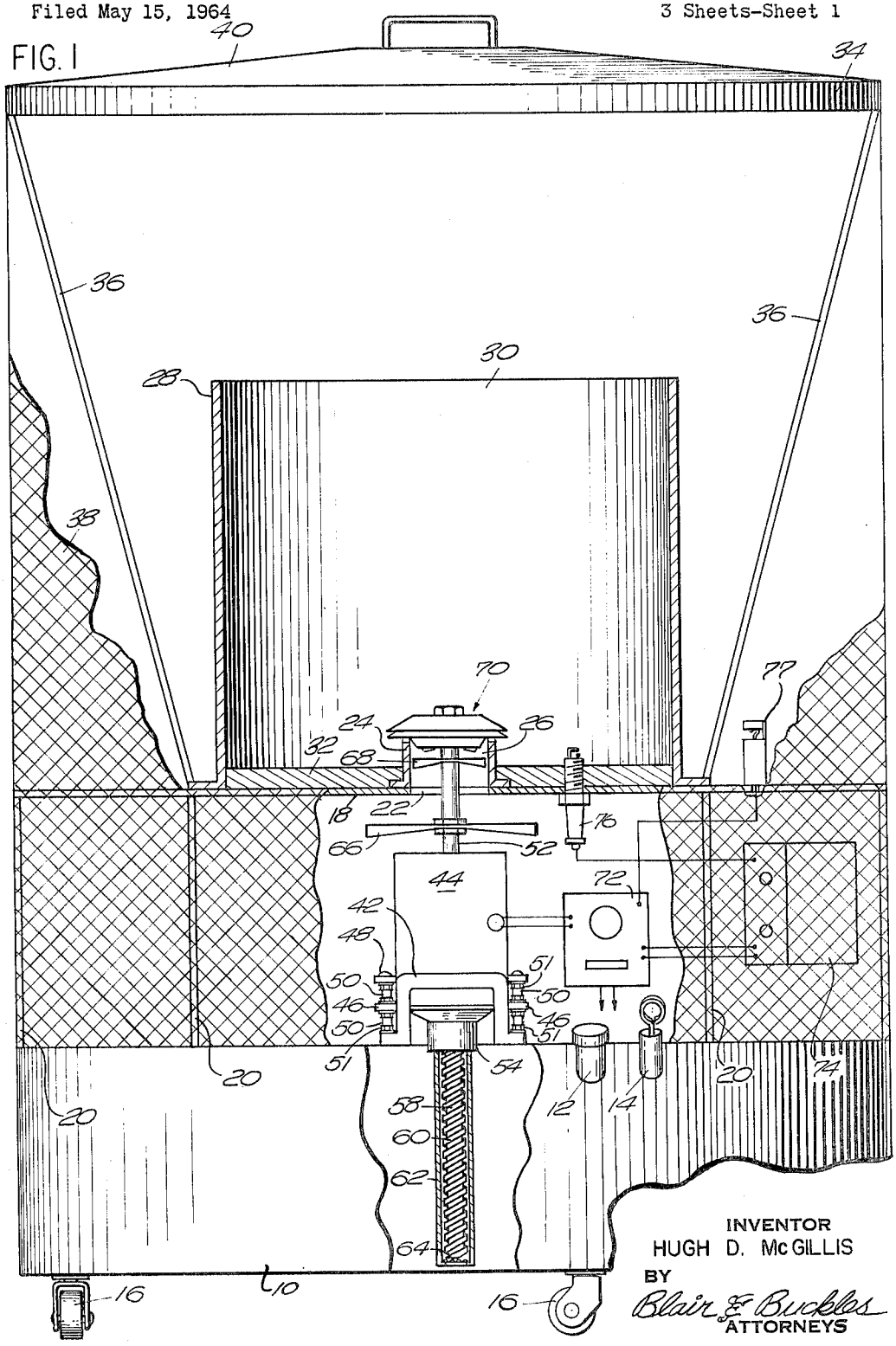
May 24, 1966 H. D. McGILLIS 3,252,497

PORTABLE SPACE HEATER EMPLOYING ROTARY DISCHARGE BURNER

Filed May 15, 1964 3 Sheets-Sheet 1

FIG. 1



INVENTOR
HUGH D. McGILLIS
BY
Blair & Buckles
ATTORNEYS

May 24, 1966 H. D. McGILLIS 3,252,497

PORTABLE SPACE HEATER EMPLOYING ROTARY DISCHARGE BURNER

Filed May 15, 1964 3 Sheets-Sheet 2

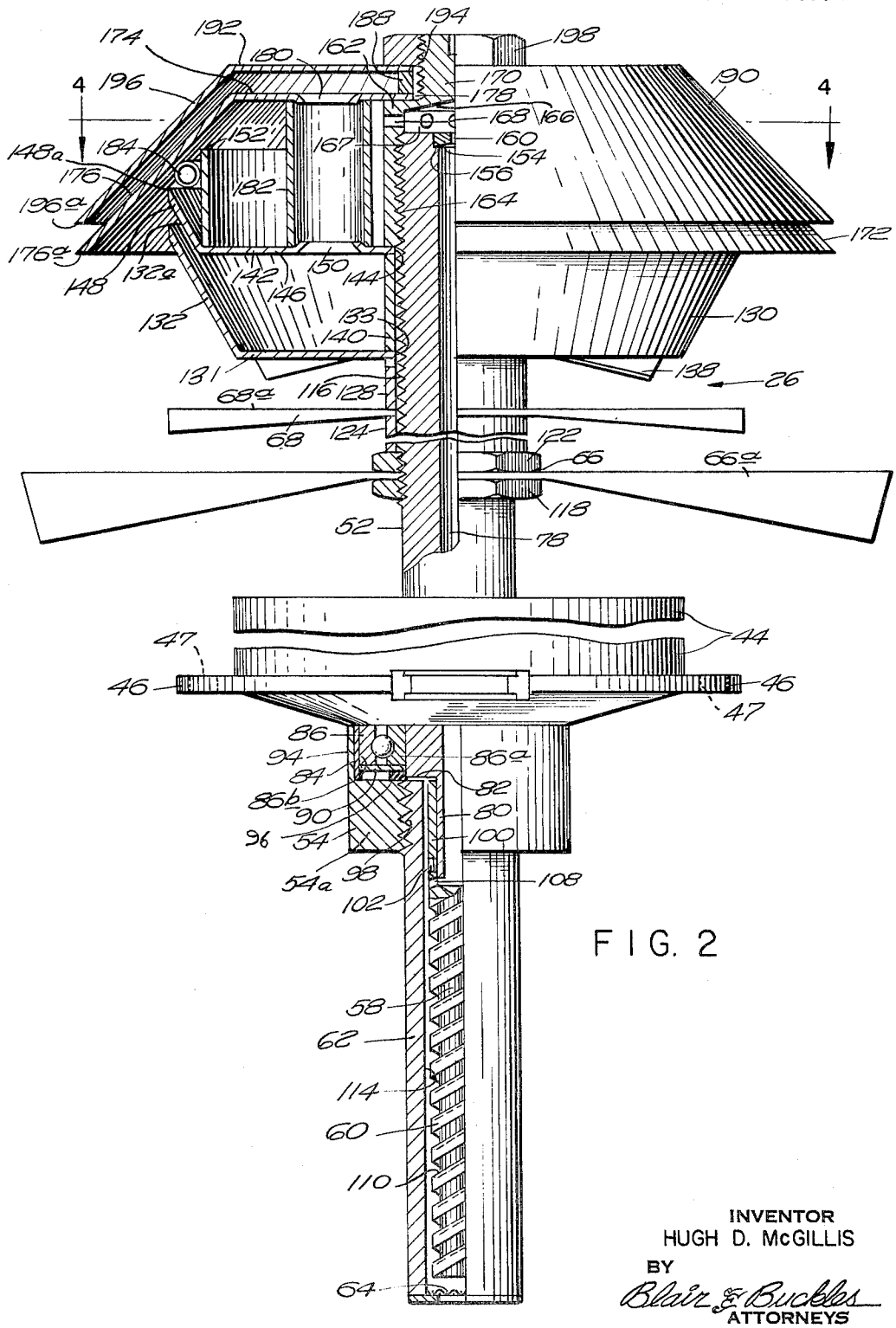


FIG. 2

INVENTOR
HUGH D. McGILLIS
BY
Blair & Buckles
ATTORNEYS

May 24, 1966 H. D. McGILLIS 3,252,497

PORTABLE SPACE HEATER EMPLOYING ROTARY DISCHARGE BURNER

Filed May 15, 1964 3 Sheets-Sheet 3

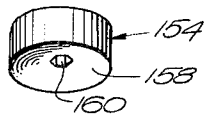


FIG. 5

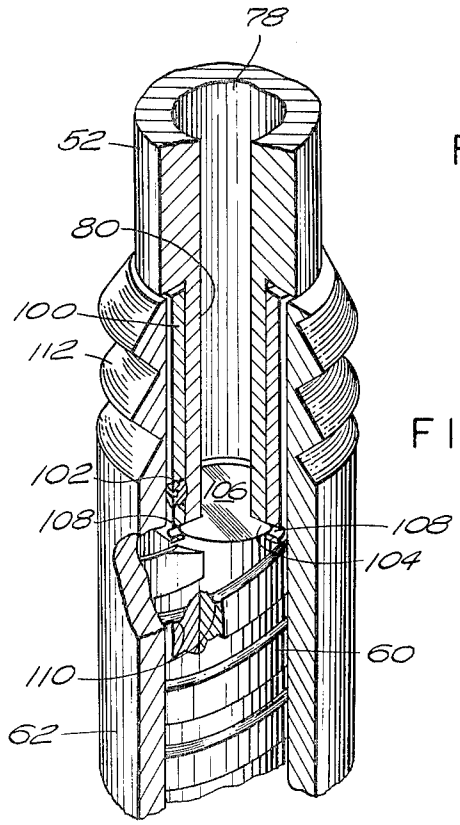


FIG. 3

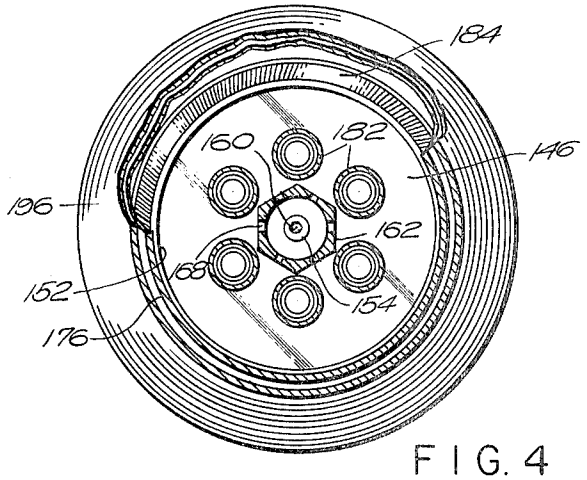


FIG. 4

INVENTOR
HUGH D. Mc GILLIS
BY
Blair & Buckles
ATTORNEYS

United States Patent Office 3,252,497 Patented May 24, 1966

3,252,497

PORTABLE SPACE HEATER EMPLOYING ROTARY DISCHARGE BURNER

Hugh D. McGillis, % McGillis Heating Service Inc., 1554 Main St., Brockton, Mass.

Filed May 15, 1964, Ser. No. 367,623
9 Claims. (Cl. 158—4)

This invention relates to a portable space heater, and more particularly to a portable space heater employing an oil fired burner of the rotary discharge type.

Portable space heaters of this general variety are used widely as temporary heaters. They are employed also to supplement the permanent heating installation in places such as garages, airplane hangars and military installations, and they may be used intermittently in summer camps as the occasion arises.

Portable space heaters may be divided into three general types: there are those that burn a gaseous fuel; those that utilize a liquid fuel but employ wicks, and finally those that utilize a liquid fuel but employ wicks, and finally those that discharge the fuel in a fog-like state for burning. My invention pertains to the last mentioned type in which the oil is discharged from a rotating head. I have found this type to be preferable because the relatively heavy fuel oil employed is stored at atmospheric pressure and while in a relatively noncombustible state until just prior to combustion. It is also more efficient because the oil produces more B.t.u.'s per pound of fuel.

Before my invention, space heaters employing rotary discharge burners have not been used successfully because the burner elements burned up after a relatively short period of time due to the excessive heat developed in the heater. The excessive heat was due to several factors, a principal one being the lack of a flue to encourage rapid movement of cooling air around the burner elements. This lack of fresh air also prevented complete combustion of the fuel, resulting in smoky operation and consequent contamination of the air around the heater. In fact, working elements of the prior heaters became so hot that the fuel oil actually ignited within the burner head itself and the fuel conduits leading thereto, thereby creating a real fire hazard.

This problem can be alleviated somewhat in the case of conventional or non-portable heaters by preventing the cooling air from mixing with the air as in the burner head. However, this solution did not work in the case of portable heaters because the burner elements became so hot that even the very small amounts of air carried into the head by the oil itself sufficed to cause combustion to occur within the head.

Accordingly, this invention aims to provide an extremely efficient portable, flueless space heater which has a large B.t.u. weight ratio.

A further object of this invention is to provide a safe portable space heater whose parts remain relatively cool even after prolonged periods of continued heater operation.

A still further object of this invention is to provide a portable space heater which prevents premature burning of the fuel within the head, and confines combustion to the chamber provided therefor.

It is a more specific object of this invention to provide a portable space heater which not only excludes air from the burner head but also removes all air from the fuel oil prior to its delivery to the burner head.

A still further object of this invention is to provide a portable space heater which maintains continuous circulation of cooling air across all of its operative elements.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

FIG. 1 is a side elevational view of a space heater embodying the principles of my invention with parts thereof shown in section;

FIG. 2 is a side elevational view of a portion of the apparatus of FIG. 1 on a larger scale and with parts thereof shown in section;

FIG. 3 is a side elevational view of a portion of the apparatus shown in FIG. 2 on a larger scale and with parts thereof shown in section;

FIG. 4 is a view on a smaller scale along line 4—4 of FIG. 2, and

FIG. 5 is a perspective view of the restricted opening fuel plug forming part of this invention.

In general, my portable space heater draws relatively heavy fuel oil from a self contained supply and delivers the oil to the burner head. As the oil is being pumped out of the tank supply, air is removed from the oil by a decantering action so that the oil that reaches the burner head is air free.

At the same time, large volumes of air are froced through special passages in the burner head for cooling the head. However, this cooling air is prevented from mixing with the oil within the burner head so that the oil remains in a noncombustible state until it is actually discharged from the edge of the head. Thus, premature burning and flash back are eliminated. The fuel oil is discharged from the peripheral edge of the head by centrifugal force whereupon it unites with air for the first time and forms a very highly combustible mixture whose burning is confined to a combustion chamber.

The operative elements of the heater are arranged relative to the combustion chamber such that the convection currents which arise when the heater is hot draw cooling air all around these operative elements, assuring long lasting, reliable heater service.

Referring more particularly to FIG. 1 of the drawings, my heater comprises a cylindrical tank 10 capable of holding, say, 8 gallons of No. 1 fuel oil. Tank 10 has the usual fill pipe 12 and dip stick gage 14. The tank 10 sevres as a platform for the remaining elements of the space heater. Preferably it is fitted with three or more casters 16 on its underside to facilitate moving the heater from place to place.

A rigid circulate plate 18 is spaced above and parallel to tank 10. It is supported there by a series of rigid braces 20 connected between plate 18 and top of tank 10. A relatively large central opening 22 is formed in plate 18. This is bounded by an upstanding tubular collar 24 which is secured to the top of plate 18 and thus forms a relatively large diameter throat passage 26 connecting the regions above and below plate 18.

A second, even larger diameter tabular member 28 is

butt-welded or otherwise secured to the top of plate 18 concentric with collar 24. Tubular member 28 is preferably constructed of stainless steel or other such heat resistant, but heat conducting material. It extends a substantial distance above plate 18. The region within member 28 forms the combustion chamber 30 of the heater. The surface of plate 18 within the combustion chamber 30 is covered with a suitable fire resistant hearth material 32 which also insulates the region below the combustion chamber from the direct heat of the fire.

Spaced above the tubular member 28 is a circular top frame member 34 which defines the top of the heater. Frame member 34 is supported by a series of braces 36 connected at their opposite ends to the top of plate 18 just outside tubular member 28 and to frame member 34 around its circumference.

A small gage wire mesh screen 38 extends from top frame 34 down to the top of tank 10 all around the periphery of those members to protectively enclose the elements of the heater and to prevent accidental contact with the hot parts thereof. Also a removable upwardly dished cover 40 is provided to close the top opening of the heater.

Still referring to FIG. 1, a mounting 42 is secured to top of tank 10 directly below opening 22 therein for supporting an electric motor 44. The housing of motor 44 has a plurality of side extending ears 46 at its lower end. Vertical passages 47 (FIG. 2) are formed in ears 46 are slidably receiving vertically disposed threaded bolts 48 which are screwed into mounting 42. Grommets 50 are arranged on bolts 48 on each side of ears 46*a* before the bolts are screwed in place. On each side of grommets 50 are positioning nuts 51 and associated washers 51*a*. For extra resiliency, springs may be substituted for each set of grommets, nuts and washers.

The motor 44 has a hollow shaft 52 which extends out the opposite ends of its housing. The lower end of shaft 52 extends through a cover member indicated at 54 secured to the motor 44. Both the cover member 54 and shaft 52 pass freely through an opening 56 in the top wall of tank 10. At this point, the shaft 52 joins a solid shaft extension 58 which extends substantially to the bottom of tank 10. Extension 58 is formed with an exterior thread 60 all along its length.

An open ended sleeve member 62 is disposed around shaft extension 58. The upper end of member 62 is secured within cover member 54. The inside diameter of sleeve 62 is substantially greater than the diameter of shaft extension 58, and the sleeve is arranged concentric with member 58 so that there is considerable clearance all around the shaft extension. The member 62 extends slightly below extension 58. A screen filter 64 is arranged across the open lower end of the sleeve member 62 to exclude dirt and sediment therefrom.

If desired, provision may be made for increasing or decreasing the pumping action of shaft extension 58 by raising or lowering the extension 58 within sleeve 62. When extension 58 is raised within sleeve 62 pumping action increases; when it is lowered below the end of sleeve 62, pumping decreases. This may be accomplished by adjusting shaft extension up or down with respect to shaft portion 80, or adjusting shaft 52 itself.

Any tendency for shaft extension 58 to vibrate or bend may be prevented by rotatively securing its lower end to the bottom of tank by means of a bearing (not shown). Alternatively, the lower bearing within the motor 44 can be lowered even more to accomplish the same thing.

Still referring to FIG. 1, the upper end of the shaft 52 extends up through opening 22 in plate 18 and to a point somewhat above collar 24. Shaft 52 carries a lower, relatively large diameter fan 66 positioned below throat 26 and an upper, smaller diameter fan 68 spaced above fan 66 within throat 26. A burner head 70 is mounted on the upper end of shaft 52. Burner head 70

is positioned so that it just clears the top of collar 24 and is fixed to rotate with the motor shaft 52.

Provision is made under this invention for automatically starting and stopping the heater. For this, a thermostatic control switch 72 is mounted in the space between tank 10 and plate 18. It is connected in the line between motor 44 and its power supply (not shown). Switch 72 is adjusted to turn on motor 44 at a selected room temperature, and subsequently to turn it off at a selected higher temperature. The switch is electrically connected also in the primary circuits of a transformer 74, whose secondary is connected to a spark-type pilot 76 mounted within the combustion chamber 30. A heat responsive safety switch 77 is mounted on plate 18 outside the combustion chamber. Switch 77 is electrically connected to transformer 72 so as to shut off current to the heater if ignition fails or motor 44 fails.

Referring now to FIG. 2 wherein is shown in more detail the fuel feed elements of my heater, the shaft 52 of motor 44 has a central bore 78 extending from end to end. The lower end of the shaft has a reduced diameter portion 80 forming a relatively wide annular shoulder 82.

The housing of motor 44 includes a depending collar 84 spaced outwardly from shaft 52 and extending down to a point opposite shoulder 82, where it bears against the base 54*a* of the cover 54. The region between the collar 84 and the shaft 52 accommodates a greased-packed bearing 86 having an inner race 86*a* engaging shaft 52 and an outer race 86*b* engaging the collar 84. The bearing 86 is positioned between the bottom of the motor housing and a lower spacer 90 and is held in place there by an oil seal 96 resting on the cover base 54*a*. Cover member 54 is formed with a peripheral sleeve 94 which snugly engages over and is secured to collar 84 of the motor housing.

A central aperture 98 through the base 54*a* of cover member 54 threadedly engages the sleeve 62. When the cover member is in place, the shaft 52 extends all the way through aperture 98 with the shoulder 82 positioned slightly above the base 54*a*. The upper end of shaft extension 58 terminates in a collar 100 which is shaped to snugly receive the reduced diameter portion 80 of shaft 52. Shaft extension 58 and shaft portion 80 are secured together by means of one or more set screws 102.

Referring now to FIG. 3, there is a small clearance space 104 between the end of shaft portion 80 and the top solid end surface 106 of the shaft extension 58. Further, radial passages 108 are provided at the base of collar 100 in line with the clearance space 104.

As mentioned previously, the shaft extension 58 is provided with an exterior helical thread 60 extending from the lower end thereof to the base of collar 100 adjacent passages 108. The upper surface of thread 60 has the form of a continuous trough 110 which spirals up from the bottom of shaft extension 58 to the top thereof adjacent passages 108.

Returning to FIG. 2, there is a large clearance space 114 between the inside of sleeve 62 and the thread 60. This clearance space 114 extends from the bottom of shaft extension 58 past the radial passages 108 and all the way to the top of the collar 100 of shaft extension 58 where a fluid tight fit is obtained by oil seal 96.

During operation of the space heater, the motor 44 rotates the shaft 52 and shaft extension 58 at a very rapid rate, say, about 1450 r.p.m. The direction of rotation of the shaft extension 58 is clockwise as viewed from the top of the space heater. In a well known manner, the rotating extension 58 and thread 60 thereon pump oil from within tank 10 up the sleeve 62 and into the shaft bore 78 through passages 108.

The oil being pumped out of tank 10 actually has a considerable amount of air mixed with it. If this oil-air mixture were allowed to reach burner head 70 which becomes very hot in use, it would ignite prematurely within

the head, causing back flash and excessive heating and deterioration of the burner head parts. With my heater construction, however, the air is removed from the oil while it is being pumped to the burner head **70**.

More particularly, as the shaft extension **58** rotates, the fuel oil is caused to ride up the trough **110** formed in the top of thread **60**. In its travel up the trough **110**, the undiluted oil tends to hug the bottom of the trough while the lighter air-laden oil collects near the surface. This top oil-air layer sloshes over the sides of trough **110** and falls down through the clearance space **114** between sleeve **62** and thread **60**. The air-laden oil continues to fall until it is swept into the trough **110** at a point lower down on shaft extension **58**. The air tends to separate from the falling, agitated, oil.

Thus, near the bottom of thread **60**, the oil may have a considerable amount of air mixed with it. But as the oil progresses up the trough **110**, the topmost or air-laden strata of oil having fallen down into clearance space **114**, the oil thus remaining in the trough **110** near the top thereof is substantially air free.

It is important to note that the space **114** must be wide enough to readily permit the outwardly thrown air-oil mixture to drop down the sleeve **62**, but not to unduly reduce the pumping action obtained by the rotating extension **58**.

Applicant has been able to observe the action taking place by constructing sleeve **62** of a transparent plastic material. As the oil proceeds upwardly within sleeve **62**, the top layer of oil which contains a substantial amount of air is thrown outwardly against the inside wall of sleeve **62** forming air bubbles thereon. As the oil proceeds further upwardly along trough **110**, oil is still thrown outwardly against the inside wall of sleeve **62**. However, there are fewer air bubbles formed on the tube indicating that the oil has substantially less air mixed with it. The oil that reaches the top of the threaded shaft extension **58** is substantially free of oil as evidenced by the fact that there are no air bubbles at all seen clinging to the inside wall of sleeve **62** near the upper end thereof.

The oil reaching the top of trough **110** is forced inwardly through the radial passages **108** into the bore **78** of shaft **52**. It arrives at bore **78** under a reasonably large pressure head. The upper end of shaft **52** extends past collar **24** (FIG. 1) and is exteriorly threaded at **116** to accommodate the several elements of the burner head **70** shortly to be described.

Proceeding upwardly from the lower end of the threaded shaft portion **116**, a first nut **118** is screwed onto the shaft. Then fan **66**, having a circular array of relatively long blades **66***a*, is slid onto shaft **52**, followed by a second nut **122** which holds the fan **66** in place. Next is a spacer **124** followed by the second, smaller fan **68**. Fan **68** has a circular array of relatively short fan blades **68***a* whose length is somewhat less than the diameter of collar **24** (FIG. 1). A second spacer **128**, above fan **68**, spaces the elements of the burner head proper at the correct height.

The elements of the burner head **70** itself comprise a first dish member **130** having an annulus **132** extending upwardly-outwardly and terminating in a knife edge **132***a*. The bottom wall **131** of member **130** is flat and has a central opening **133** for receiving shaft portion **116**. Portions of the bottom wall are cut and bent to form downwardly extending triangular flaps **138**. These flaps **138** are so inclined as to function as fan means for scooping up the air fed into the throat **26** by fans **66** and **68** and driving this air at very high velocity into the region above plate **130**.

Another spacer **140**, above plate **130**, supports a second dish member **142**. Member **142** has a flat bottom wall **146** spaced above the bottom wall **131** of member **130**. Bottom wall **146**, however, extends out beyond wall **131** to a point relatively near the knife edge **132***a*. Member **142** has an inclined annulus **148** extending upwardly-outwardly in parallel with annulus **132**. Annulus **148** is

narrower than annulus **132** and terminates in a peripheral knife edge **148***a* which is disposed directly above knife edge **132***a*.

Referring to FIGS. 2 and 4, the bottom wall **146** of member **142** has formed therein an array of circular passages **150** disposed around shaft **52**. An upstanding cylindrical baffle **152** is secured to the bottom wall **146** at the foot of annulus **148**. Baffle **152** extends a considerable distance above the knife edge **148***a* of dish member **146** and serves to break up and direct the oil within the head as will be described.

Still referring to FIGS. 2 and 4, the shaft **52** extends slightly above the baffle **152**. The upper end of the shaft bore **78** is restricted by means of a plug **154**. As best seen in FIG. 5, the plug **154** has a concave bottom **158** and a small central hexagonal passage **160** running from end to end through which the oil from shaft bore **78** flows.

Returning to FIG. 2, an adaptor **162**, provided with an interior thread engaging the thread **116**, holds in place the elements between it and the nut **122**. Above the thread **164** is an inclined or upwardly tapered wall portion **166**. The wall portion **166** is spaced above the plug **154** to form a fairly large closed space or cavity **167**. An array of relatively large, radial passages **168**, extending radially through the adaptor **162** from the cavity **167**, permit oil reaching the cavity from bore **78** to flow outwardly into the burner head **70**.

The upper end of adaptor **162** has a threaded, reduced diameter portion **170** which accommodates the remaining elements of the burner head. These include, first of all, an inverted dish member **172** having a flat top wall portion **174** and a downwardly-outwardly annulus **176** terminating in a peripheral knife edge **176***a*. Member **172** also has an array of circular openings **180** in its top wall **174** arranged directly above openings **150** in plate **142**.

A series of cylindrical conduits **182** are disposed between the openings in plates **172** and **142**. The conduits **182** function to conduct cooling air from below plate **142** to the area above plate **172** in such a way that no air enters the space between those two plate members.

Prior to mounting the plate **172** on adaptor **162**, a coil spring loop **184** is engaged around baffle **152**, and held tightly against the baffle by spring tension. The spring functions further to break up the oil issuing from the head **70**, as will be described.

Above plate **172** is a spacer **188**, followed by another inverted dish member **190**. Member **190** has a flat upper wall **192** and a downwardly-outwardly extending annulus **196**. The annulus **196** terminates in a peripheral knife edge **196***a* spaced directly above the knife edge **176***a* of plate **172**.

The two upper dish members **172** and **190** are held in place by means of a nut **198** screwed onto the end of reduced diameter shaft portion **170**. Thus when the adaptor **162** and nut **198** are tightened down properly, all of the elements of burner head **70** on the shaft **52** are tightly fixed in place so as to rotate with shaft **52**.

The undiluted fuel oil that is pumped up bore **78** encounters plug **154** with its small hexagonal opening **160**, through which it is forced by the pressure in the bore. The concave surface **158** of the plug and hexagonal opening **160** swirl and agitate the oil, thereby preventing the buildup of deposits on the underside of plug **154** as would normally tend to clog or restrict an orifice.

The fuel oil is then forced through the radial passages **168** formed in adaptor **162** and flows to the interior of burner head **70** in a substantially air free condition. These passages can be made larger than usual to prevent their becoming clogged by oil deposits since the self cleaning plug **154** controls the amount of oil entering burner head **70**. The oil is thrown outward by centrifugal force and is heated and broken up by impingement against the cylinders **182** and the upstanding cylindrical baffle member **152**. From these parts it continues on to the annulus **176** and then downwardly along the inner surface thereof.

Rotation of the burner head causes the spring loop **184**

around the baffle **152** to expand or stretch. It increases in radius so that it pulls away from baffle **152** and fills the space between annulus **176** and the edge **148***a* of annulus **148**. Thus spring loop **184** serves as a further means for breaking up and heating the oil as it is thrown to the edge **176***a* for discharge from the head **70**.

As the oil is being pumped to the burner head **70**, the rapidly rotating fan **66** draws air from below the combustion chamber and forces it up into throat passage **26**. The fan **68** then takes this air and accelerates it even more and forces it up against the underside of burner head **70**. Part of this air flows outwardly of the annulus **132** and toward the edge **176***a* for mixing with the oil discharging therefrom. A considerable amount of the air is, however, directed toward the fan means **138** in dish **130**. Fan means **138** further accelerate this air and forces a portion of it up through the space between annulus **132** and annulus **148** where the air mixes with the discharging oil for burning.

Another portion of the air from fan means **138** is forced up through the sleeve members **182** and into the space between plate **190** and plate **172**. This air finally discharges from the gap between edges **196***a* and **176***a*.

It will be seen therefore that cooling air bathes substantially all of the surfaces of the burner head **70**. Yet this cooling air is isolated from the oil within the burner head until the oil actually leaves the interior of the head. Thus, there is substantially no possibility of combustion on flash back within the head **70**.

The fans **66** and **68** and fan means **138** also cause cooling air to circulate over the elements of space heater below the combustion chamber. Thus the top of tank **10**, the motor **44**, the thermostat **72** and transformers **74** are all cooled by air drawn across those elements and up into passage **26** by the fans, thereby materially reducing the failure of those parts due to excessive heat.

The flame produced by the burner **70** is confined to the combustion chamber **30** (FIG. 1). The sleeve **28** is heated by the fire and radiates a considerable amount of heat laterally outward from the space heater.

When the temperature of the room has increased to the desired value, the thermostat **72** turns off motor **44**. The fuel oil is no longer pumped to the burner head **70** and the fire in the combustion chamber **30** is gradually starved.

It will be seen from the foregoing that my portable space heater operates efficiently for prolonged periods of time. It produces substantially no smoke and so requires no flue, yet its burner head is prevented from burning up from excessive heat both by removing all air from the oil prior to its delivery to the burner head, and also by passing cooling air over the hot surfaces of the burner head without contacting the oil within the head. With my heater, air is mixed with the oil only after the oil has left the interior of the burner head. Consequently there can be no premature burning of fuel within the head.

It will thus be seen that the objects set forth above among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above construction without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described the invention, what is claimed as new and secured by Letters Patent is:

1. A portable space heater comprising a fuel tank, a hollow sleeve extending down into said tank, a combustion chamber, a rotatively mounted shaft extending from said combustion chamber down through said sleeve, said shaft having an exteriorly threaded lower portion within said sleeve and a longitudinal bore extending from said lower portion upward to an upper end of said shaft, said lower portion being loosely received within said sleeve so as to form between said sleeve and said lower portion an annular dead air space, fluid passages extending from said bore to the exterior of said shaft adjacent said thread, a burner head mounted for rotation at said upper end of said shaft, means communicating between said bore and the interior of said burner head, and means for rotating said shaft.

2. A heater as defined in claim **1** wherein said communicating means includes a member mounted at the upper end of said bore, said member having a concave lower surface and a central polygonal opening aligned with said bore.

3. A portable space heater as defined in claim **1** wherein the top surface of said shaft thread is grooved to define a concave trough which spirals up from the end of said shaft to said fluid passages.

4. A portable space heater comprising a fuel tank, a flueless combustion chamber spaced above said tank, a rotatively mounted shaft extending from within said combustion chamber down into said tank, said shaft portion within said tank being exteriorly threaded, said shaft portion without said tank having a longitudinal bore running therethrough, at least one fluid passage extending from said bore to the exterior of said shaft adjacent said thread, a sleeve having an inside diameter appreciably larger than that of said shaft, said sleeve being loosely received over the threaded portion of said shaft and extending from the threaded end of said shaft to a point appreciably above said passages for forming between said sleeve and said shaft a cylindrical dead air space, a hollow burner head mounted at the upper end of said shaft, fuel passages connecting said bore with the interior of said head, a motor mounted between said tank and said chamber for rotating said shaft.

5. A portable space heater comprising a fuel tank, a flueless combustion chamber mounted above said tank, said chamber having a central opening in the floor thereof, an upstanding collar surrounding said opening and forming a vertical throat passage, an electric motor disposed between said chamber and said tank, said motor having a rotatable shaft extending from above said throat passage down into said tank, said shaft portion within said tank being exteriorly threaded, said shaft also having a vertical bore running from its upper end down to said threaded shaft portion, a fluid passage extending from said bore to the exterior of said shaft adjacent the upper end of said shaft thread, a sleeve loosely received on said shaft portion within said tank, said sleeve being fixed against rotation, a hollow rotary burner head mounted on the end of said shaft above said throat passage, means connecting said bore to the interior of said burner head, first fan means mounted on said shaft below said throat passage, second fan means mounted on said shaft within said throat passage, means for energizing said motor at a determined temperature, and fuel ignition means mounted within said combustion chamber and for being momentarily actuated by said energizing means.

6. A portable space heater as defined in claim **5** wherein said connecting means includes a member mounted at the upper end of said bore, said member having a concave bottom wall and a vertical passage therethrough, and a cap overhanging said member, said cap having a plurality of radial passages opening into said burner head.

7. A portable space heater as defined in claim **5** wherein said burner head includes a pair of oppositely dished plates arranged concave toward one another and a plurality of air passages extending between said plates for cooling said burner head without permitting air to contact oil delivering to said head.

8. A portable space heater as defined in claim **7** wherein said burner head has an upstanding cylindrical baffle mounted within said head radially outwardly from said air passages.

9. A portable space heater as defined in claim **8** wherein

said burner head has a closed coil spring loop engaging around said baffle, said loop being adapted to stretch under centrifugal force into the gap between said plates upon rotation of said shaft thereby to break up and heat the oil discharging from said burner head.

References Cited by the Examiner

UNITED STATES PATENTS

2,214,027	9/1940	McClammy	158—77
2,592,612	4/1952	Smith	103—88
3,053,314	9/1962	McGillis et al.	158—77
3,175,600	3/1965	Powell	158—36.3 X

FREDERICK L. MATTESON, JR., *Primary Examiner.*

E. G. FAVORS, *Assistant Examiner.*