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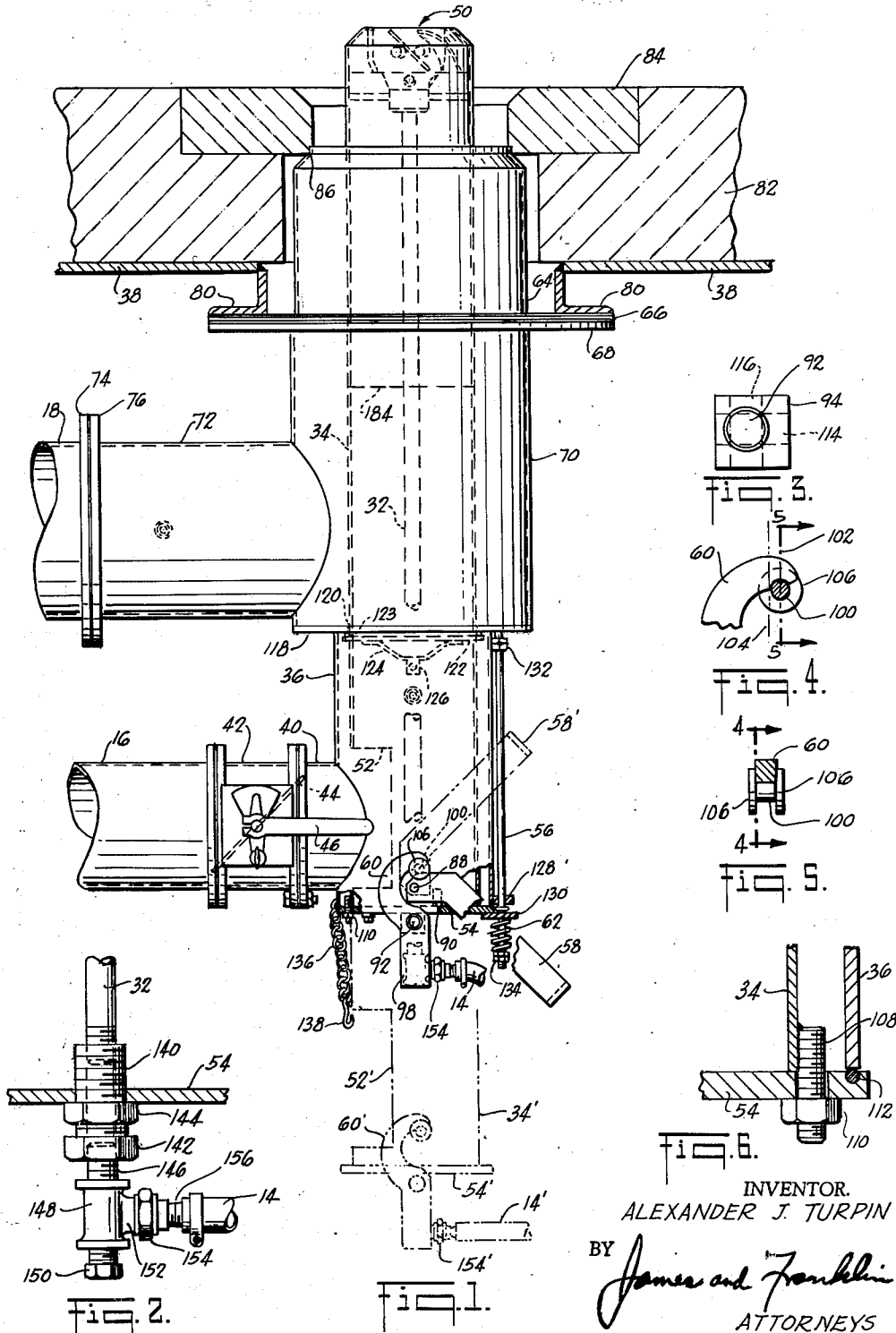
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RAPID COMBUSTION OIL BURNER

Filed March 18, 1958.

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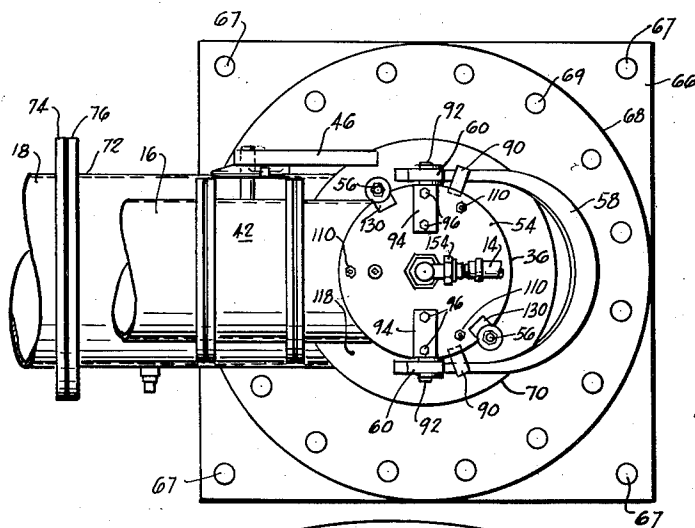


FIG. 7

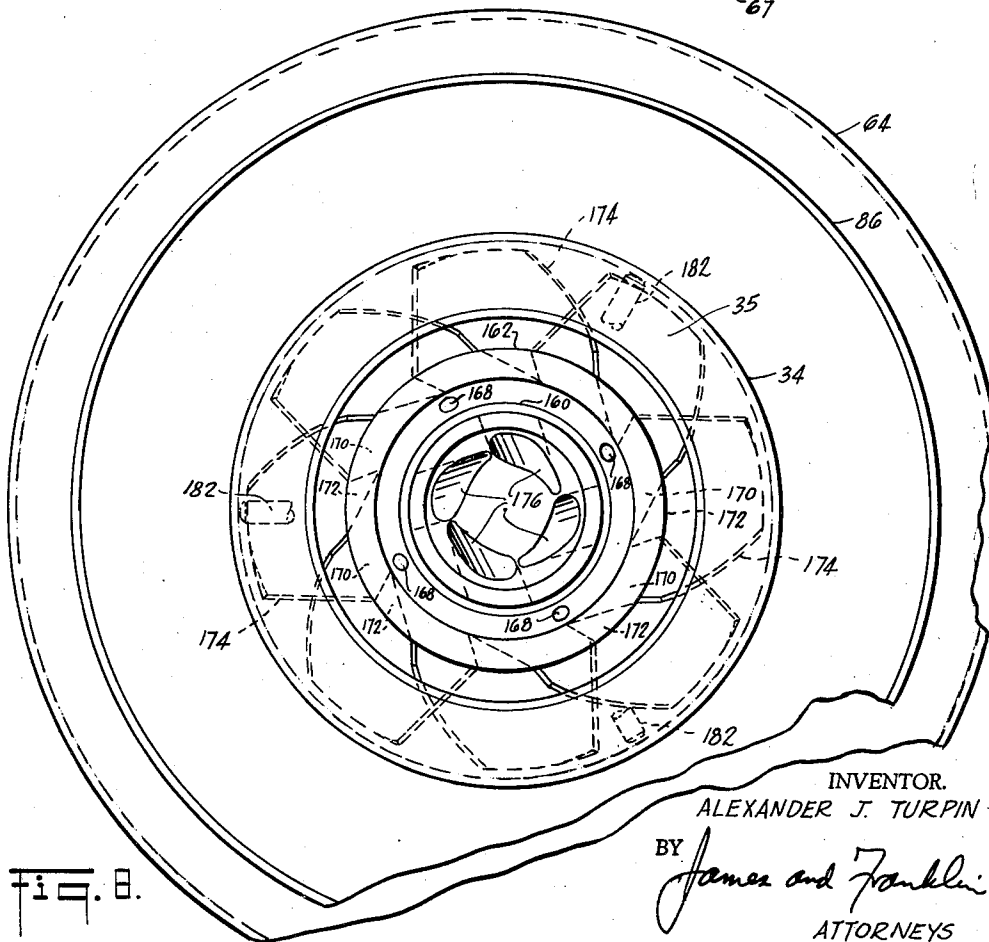


FIG. 8

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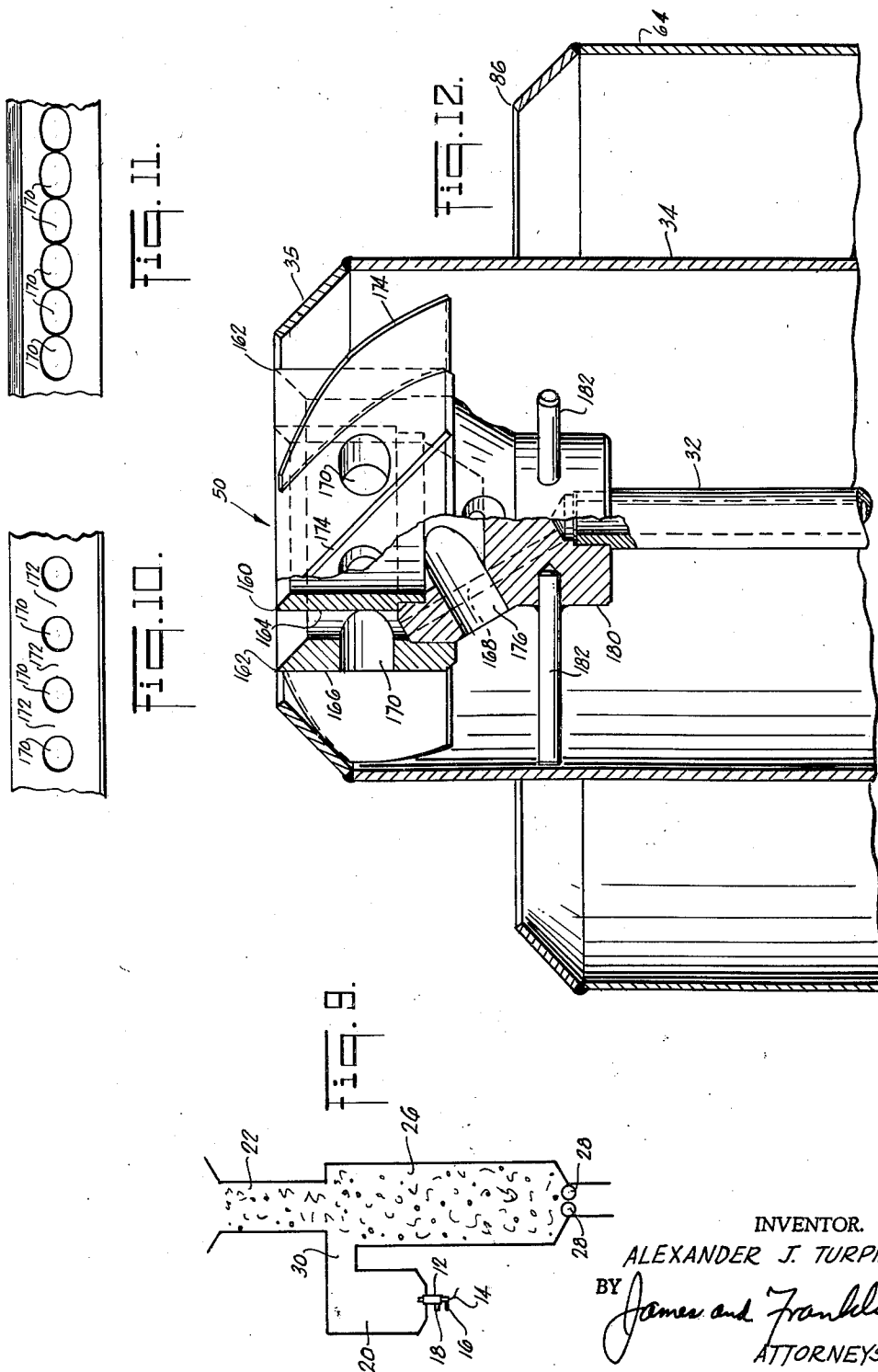
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RAPID COMBUSTION OIL BURNER

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11 Claims. (Cl. 158-76)

This invention relates to burners, and more particularly to a retractable short flame oil burner.

The primary object of the present invention is to generally improve oil burners. A more particular object is to provide a burner which will produce rapid combustion of a large amount of fuel in a short combustion chamber.

I have found that this object is attainable by a combination of two main features. One object and feature centers about the burner tip, and its arrangement which enables the rapid atomization and burning of large quantities of fuel oil in a short bushy flame. For this purpose I provide a plurality of preferably concentric annular knife edges, and in preferred form the fuel oil is fed between the annular knife edges, while air is supplied on both sides of both of the knife edges in order to wipe the oil therefrom in atomized form. The air is preferably directed tangentially in order to spin or whirl the same, so that the atomized mixture tends to fly outwardly by centrifugal force.

Because of the short combustion chamber and flame, and the resulting high temperature, at least the inner end of the burner is preferably made of a high temperature metal. Despite this precaution difficulty may arise on shutting down the burner. This is so because the furnace temperature may be a matter of 2500° F., but the temperature of the burner during operation may be only say 500° F. because of the cooling effect of the large quantities of air and oil passing through the same. However, on shutting down the burner its temperature may rise closer to that of the furnace, with consequent injury to the burner despite the use of high temperature metal. In accordance with a further object of the present invention the atomizing tip and associated working parts of the burner are adapted for quick retraction, with consequent protection from direct radiant heat, and reduction of the temperature to which these parts are exposed. This feature is also of advantage for servicing, because the workmen need not wait for cooling down of the furnace. In preferred form the burner is disposed vertically and may be dropped gravitationally.

To accomplish the foregoing general objects, and other more specific objects which will hereinafter appear, my invention resides in the burner elements and their relation one to another as are hereinafter more particularly described in the following specification. The specification is accompanied by drawings, in which:

FIG. 1 is an elevation of a burner embodying features of my invention;

FIG. 2 is a fragmentary section drawn to larger scale and explanatory of the oil hose connection to the burner;

FIGS. 3, 4, 5 and 6 are explanatory of details of the construction of the specific burner here shown;

FIG. 7 is a bottom view of the burner;

FIG. 8 is an end view looking at the atomizing tip and drawn to enlarged scale;

FIG. 9 is a schematic vertical section showing the application of the burner to the pelletizing of taconite ore;

FIG. 10 is a fragmentary development of the outer surface of the outer oil discharge ring;

FIG. 11 is a fragmentary development of the inner surface of the said oil discharge ring; and

FIG. 12 is a section through the inner end of the burner drawn to the enlarged scale of FIG. 8.

Referring to the drawing and more particularly to FIG.

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9, the burner is shown at 12, and has a fuel oil connection at 14, a primary air connection at 16, and a secondary air connection at 18. The air connections 16 and 18 are large diameter piping and are fixed connections, but the oil connection 14 is preferably a flexible hose which accommodates dropping of the inner or working parts of the burner.

The flame is housed in a combustion chamber 20 which is lined with good quality fire brick. In the present case the combustion gases are used for the baking of pelletized taconite ore. It may be explained that taconite ore is powdered and then formed into pellets about 3/4 inch in diameter by means of a binder of clay and water. These will not maintain their pellet shape under stress or strain, but may be baked to vitrify them, following which they remain safely in pellet form, somewhat like the clay marbles used by children.

The pellets are fed downward through a baking chamber 22, and thence move downward through a cooling chamber 26, following which they pass through breaker rolls 28 the purpose of which is to break apart or separate any pellets which may have become fused or baked together in the baking chamber 22. The hot gases of combustion flow from chamber 20 through connecting passage 30 and upward through the baking chamber 22.

The combustion chamber 20 used for this purpose is large and expensive, and it is desirable to minimize its volume and the area of its fire brick lining. In a typical installation with a chamber seven feet in diameter and eighteen feet high, the present improvement has made it possible to shorten the flame to six feet and to shorten the height of chamber 20 by half.

One contributing feature is the retractable nature of the burner, and referring to FIGS. 1 and 12 of the drawing the oil burner comprises concentric oil and primary air tubes 32 and 34. A chamber 36 surrounds the outer end of air tube 34 and is suitably mounted on the furnace, the wall of which is indicated at 38. There is a fixed primary air connection 40 to the chamber 36, and this may include control means such as a butterfly valve generally designated 42 and including a valve disk 44 operated by a control lever 46. The air pipe coming to the burner is shown at 16.

The burner further comprises an atomizing tip generally designated 50 and located at the inner end of tubes 32 and 34. These tubes and the tip 50 form a unit which is axially slidable relative to the air chamber 36. The part of air tube 34 which is located within chamber 36 is cut away as shown at 52, thus forming a large opening or window through which air coming from pipe 16 may flow into the primary air tube 34. An end plate 54 is secured to the outer end of air tube 34, and is dimensioned large enough to close the outer end of chamber 36 when the slidable unit is in working position.

The oil connection for the oil tube 32 passes through the end plate 54, and these parts are fixedly connected to the end plate. A flexible oil pipe or hose 14 is connected to the outer end of oil tube 32 to accommodate the retraction of the slidable unit as is shown by the broken line position of the parts at the bottom of FIG. 1. In preferred form the burner is disposed vertically as here shown, in which case the quick pull action may be gravitational. In such case the drop of the sliding unit is preferably limited by appropriate means, here illustrated by slidable rods 56 one of which is shown in FIG. 1. There are preferably a plurality of such rods, and in FIG. 7 there are two such rods disposed approximately diametrically of the bottom plate 54.

The slidable unit is held in elevated or working condition by appropriate means here illustrated by a generally U-shaped handle or bail 58 cooperating with hook-like elements 60. Referring to FIG. 1 a movement of the bail

from the lower or solid line position 58 to the upper or broken line position 58' will release the hooks 60 and permit dropping of the slidable unit. The force of the drop may be and preferably is cushioned by appropriate compression springs shown at 62.

As so far described no provision has been made for secondary air, and under some combustion conditions secondary air is not needed. However, provision preferably is made for a secondary air supply, and referring to FIG. 1 there is a secondary air tube 64 having a flange 66 abutting the flange 68 of a tube 70, which may be considered to be either an extension of secondary air tube 64, or a part of a secondary air connection which projects sideward at 72. The secondary air supply pipe 18 is secured to secondary air connection 72 by flanges indicated at 74 and 76. If desired a butterfly or other valve may be interposed, as in the case of the primary air supply. The flanges 66 and 68 may be used also to mount the burner on the furnace, and for this purpose a ring 80 is welded to the metal outer face 38 of the furnace. A ring of bolts, not shown, may be used to secure the flanges 66 and 68 to the ring 80 and thus to the furnace. The refractory furnace lining is indicated at 82, and a special refractory ring may be provided at 84 to fit the inner end 86 of the secondary air tube 64.

Considering the construction in greater detail, the bail 58 is pivoted on diametrically opposite sides of primary air chamber 36 on pivot pins shown at 88. These are preferably disposed on a plane passing through the axis of the burner. The downward motion of the bail is limited by fixed stops shown at 90 in FIG. 7. In this case these stops are L-shape pieces the vertical arms of which are welded to the sides of air chamber 36.

The hooks 60 are pivoted at 92, and referring now to FIG. 3, pivot 92 is formed at the outer end of a short length of square rod 94. Referring next to FIG. 7, rod 94 is secured to the bottom end plate 54 by means of screws 96.

Each hook 60 (FIG. 1) is preferably extended downward as indicated at 98 to act as a counterweight which keeps the hook in generally upright position on its pivot 92.

Referring now to FIG. 4, the hook 60 is shaped downward to form a bearing surface or contact point at 100. This is located on a vertical plane 102 which is displaced sidewardly or offset relative to a vertical plane passing through the axis of the burner and indicated in FIG. 4 by the broken line 104. Reverting now to FIG. 1 the pivots 88 and 92 are in vertical alignment, while the bearing point 100 of hook 60 is disposed to the right and thus tends to move bail 58 downward. However, the bail is held against downward movement by the stops 90 previously referred to. The resulting latch action is self-locking, and there is no tendency for hooks 60 to release. However, when bail 58 is pulled upward the hooks slide off the ends of the bail.

Referring to FIGS. 4 and 5, the bearing surface 100 of hook 60 may be formed by welding a short piece of rod to the hook. Moreover, disks of metal 106 may be welded at each end of the rod and to each side of the hook. These straddle the end of bail 58 and guard against a hook moving sideward from the bail.

The manner in which the bottom end plate 54 is secured to the lower end of primary air tube 34 is best shown in FIG. 6. Short threaded studs 108 are welded to tube 34 and their lower ends pass through holes in bottom plate 54. The plate is then held by nuts 110, and referring to FIG. 7 it will be seen that in the present case there are three such screws and nuts 110.

Reverting to FIG. 6, bottom plate 54 is preferably channel to receive an O ring type gasket 112. This abuts the lower end of primary air chamber 36 when the slidable unit has been raised to working position. The gasket 112 prevents the escape of primary air at the lower end of the burner. The sealing pressure at the gasket may be adjusted, and referring to FIG. 3, it will be seen

that the pivot 92 for the hook is eccentrically related to the square rod 94. The latter has holes 114 and 116 disposed at right angles to alternatively receive the mounting screws 96 shown in FIG. 7. On reflection it will be seen that by rotating the square rod 94 to one or another of its four faces, the pin 92 may be located at four slightly different distances from bottom plate 54, thus providing an adjustment for the contact pressure at the O ring gasket 112. No seal is needed at the lower end of tube 34, because this is anyway open to primary air at the large window 52.

In FIG. 1 the secondary air chamber 70 is closed at its lower end by means of a bottom plate 118. This has a large central hole at 120 through which the primary air tube 34 is slidable. It is desirable to dimension the passage 120 with plenty of clearance for free motion of primary air tube 34, but it is also desirable to seal the passage in order to prevent the flow of primary air into the secondary air tube. For this purpose primary tube 34 carries a sealing ring 122 which is urged upwardly by a plurality of leaf springs 124 each secured to the primary tube at 126. In the present case there are three such springs providing six points of contact against sealing ring 122. The ring has an O ring gasket 123, received in a groove, as in the bottom plate 54 shown in FIG. 6. When the slidable unit is dropped the sealing ring 122 and springs 124 drop with it. When the slidable unit is raised the sealing ring gasket engages the bottom plate 118 somewhat ahead of working position, and thus the springs 124 provide the desired sealing engagement between ring 122, gasket 123 and plate 118.

As here constructed the slidable rods 56 are slidable through ears 128 which may be welded to the outside of the primary air chamber 36. The rods also pass through ears 130 which are welded to the bottom plate 54. Downward motion is arrested by a stop 132 at the upper end of rod 56, and the stop preferably consists of a pair of nuts locked together. The lower end of rod 56 carries compression spring 62 which in turn may be held by another pair of locked nuts 134. With this construction the drop is cushioned. Both stop rods are alike.

For servicing it may be desired to remove the slidable unit from the furnace, and one advantage of the present burner is that this is readily done. It is merely necessary to remove the nuts 132 at the upper ends of the rods 56, or if preferred, the nuts 134 at their lower ends. This operation is facilitated if the stop rods are relieved of the weight of the slidable unit, and for this purpose a chain 136 may be provided with a hook 138 at its lower end. The length of the chain is such that when the hook is used it holds the unit slightly elevated from its lowermost position. Normally the chain may be hooked out of the way, but is available for use when needed.

The method of connecting the oil supply to the oil tube 32 is best shown in FIG. 2 of the drawing. An internally and externally threaded fitting 140 is screwed through bottom plate 54, and for this purpose it has flats at its lower end 142. Its position is adjustable and is locked by means of a lock nut 144. The lower end of oil tube 32 is threaded and is received in fitting 140. Thus the adjustment of the height of the fitting adjusts the height of the oil tube 32, which in turn adjusts the position of the atomizing tip.

A nipple 146 is threadedly received in the lower end of fitting 140 and in turn receives a T 148, the lower end of which is closed by a plug 150. The oil hose 14 is connected to the side branch 152 of the T. In preferred form this side branch preferably has a pipe union with a large nut 154. This facilitates disconnection of hose 14 without separating the hose from its metal nipple-like part 156 because the separation may be made at the union 154.

In FIG. 7 it will be seen that the flange 68 is round, while the flange 66 is square and is provided with four corner holes 67. Reverting to FIG. 1, the mounting ring

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80 is square, like the flange 66. This is convenient because the secondary air tube 64 with its square flange 66 may be temporarily secured to the square mounting plate 80 by means of four corner bolts. Subsequently the air chambers are added, and the sixteen mounting bolts are passed through the ring of holes 69, and these act to secure together all three parts, that is, the circular flange 68, the square flange 66, and the square mounting plate 80.

The construction of the burner tip for its rapid atomization and combustion of large quantities of fuel oil may be described with reference to FIGS. 8 and 12 of the drawing. The tip comprises a plurality of concentric annular knife edges 160 and 162 formed at the inner ends of oil discharge rings 164 and 166 respectively. Oil is supplied through oil passages 168 which lead from oil pipe 32. In the present case there are four such oil passages, the inner ends of which are shown in FIG. 8.

Primary air is supplied through tube 34 and preferably flows on both sides of both oil discharge rings, in order to fully wipe the oil therefrom. For this purpose the oil discharge ring 166 is provided with a series of sloping passages 170. FIG. 11 is a development of a part of the inner face of ring 166, and shows how the passages 170 come into end to end contact. FIG. 10 is a development of the outer face of ring 166, and at this point the passages are spaced, as is indicated at 172. The metal at 172 between passages is also shown in FIG. 8. This metal is triangular in section. The passages are tangentially directed, and impart a whirl or spin to the air passing therethrough. This air is discharged between the rings.

The outer face of ring 166 is provided with a series of helical vanes 174. These may be welded in position, and they impart a whirl or spin to the air flowing around the outside of the ring 166.

In FIG. 12 there is a passage 176 which directs primary air to the inside of the inner ring 164. Referring to FIG. 8, there are four such passages 176, and they too are tangentially directed, in order to spin the air passing therethrough. This air flows through the inner ring 164.

Air flows on both sides of both rings, and wipes past both sides of the two knife edges. All of this air is whirling or spinning in the same direction, and tends promptly to spread outward. Oil is fed between the rings and thus flows on the outer face of the inner ring, and on the inner face of the outer ring.

In general, the oil is brought to a knife edge in order to avoid accumulation of oil at a thick edge. Theoretically, the sharper the knife edge the better, and in practice it is brought down to a wire edge, that is, it is sharp, though not so sharp that one would cut oneself by mere contact with the edge.

To accommodate a large quantity of oil, it is desirable to increase the linear length of the knife edge. The present burner handles say 120 gallons per hour, and the annular knife edges have a diameter of three inches and five inches, respectively, making an overall length of about twenty-seven inches of knife edge, and with this length the oil is brought down to a thickness of only a few microns at the knife edge, despite the high rate of fuel delivery. This is good for atomization.

I have found that the oil may be delivered to the knife edge on one side or the other or both, indifferently, provided, however, that the oil is wiped from the knife edge by air on both sides. Failure to deliver air on both sides will cause oil to accumulate into undesirable droplets on the side having no air, and this is avoided with a flow of air on both sides.

From the foregoing, it will be seen that with two concentric knife edges it is sufficient to deliver oil therebetween, provided that air flows in three streams, that is, on both sides of both knife edges. By similar reasoning, if three concentric knife edges are used, it would be sufficient to deliver oil in the two annular spaces between the knife edges, but air should be delivered not only to these two annular spaces, but also inside the innermost knife edge and outside the outermost knife edge.

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Considering the structure of the atomizing tip, the oil discharge rings 164 and 166 are secured to a hub-like element 180 which in turn is secured to the inner end of the oil tube 32. The element 180 has the air passages 176 and the oil passages 168. It may also carry three dowel-like elements or spacers 182, which serve to center the tip relative to the primary air tube 34. These parts are all made of a high temperature metal, which is hard to machine, and the ring 166 and the hub 180 are preferably cast with the air passages formed therethrough. The vanes 174 might be cast, but are preferably quite thin, say $\frac{1}{16}$ inch in thickness, and would cause difficulty in casting. They are therefore welded in position. The air tube 34 is also made of high temperature metal for a reasonable distance, say at least 18 inches in the present case. Referring to FIG. 1 the upper part of tube 34 may be welded to the lower part at about the line 184, which is much more than 18 inches. The entire oil tube 32 may be made of high temperature metal. The secondary air tube 64 is made of high temperature metal to the flange 66. The entire burner could be made of such metal, but would then be unnecessarily costly.

The particular burner here illustrated is sizable. The primary air pipe has a diameter of 8 inches, the secondary air pipe a diameter of 12 inches, and the square flange for mounting the burner is 28 inches on a side. The drop of the burner is about 18 inches. The knife edges of the atomizing tip are 3 inches and 5 inches in diameter.

In a specific case, the castings of the atomizer tip and the upper end of the primary air tube are made of a type 309 stainless steel which has 25% chromium and 12% nickel. The spacers are $\frac{3}{8}$ " rods of the same metal. The oil tube is made of a type 304 stainless steel which has 18% Cr and 8% Ni.

The primary air may be supplied at a pressure of from say 12 to 60 ounces, and in a typical installation is supplied at a pressure of 20 ounces. The secondary air is supplied at a very low pressure of only say 2 ounces.

The secondary or low-pressure air is added only to the extent needed for more complete combustion of the fuel. The addition of secondary air depends on the condition of the stack gases, and when conditions are just right the burner may be operated even without secondary air.

It will be understood that if the burner is used in horizontal position it may be provided with anti-friction rollers to make it easier to slide the unit out on shutting down the burner.

It is believed that the construction and operation of my improved oil burner, as well as the advantages thereof, will be apparent from the foregoing detailed description. The burner is capable of atomizing and burning huge quantities of oil at a rapid rate in a short distance. When the burner is shut down it may be protected against the high furnace temperature by immediately withdrawing or dropping the working parts of the burner, as by merely releasing the bail 53. These factors have made it possible to halve the size of the combustion chamber, with great saving in construction cost and in maintenance cost for fire brick lining. The quick pull or drop feature is also of advantage in servicing the burner. The normal procedure would be to wait for the furnace to cool down before attempting to release the ring of sixteen bolts on the furnace mounting ring. With the present burner, however, the slidable unit may be instantly dropped, and then readily released with the aid of the support chain by opening the lock nuts on the slidable rods, without waiting for the furnace to cool down.

It will be understood that while I have shown and described my invention in a preferred form, changes may be made in the structure shown without departing from the scope of the invention, as sought to be defined in the following claims.

I claim:

1. A rapid combustion oil burner comprising an air tube and a concentric slender oil tube passing axially

through the air tube, each of said tubes having a forward end, an atomizing tip within the forward end of said air tube, said tip comprising a body secured to the forward end of the oil tube, a pair of concentric cylinders secured to said body and having concentric annular knife edges at their forward ends, a plurality of slender holes passing through said body from the oil tube to the space between said concentric cylinders and knife edges, air passages through said body from the outside to the space within the inner cylinder, and air passages through said outer cylinder leading to the space between the said cylinders, whereby air is delivered to both sides of both knife edges.

2. An oil burner as defined in claim 1, in which the said air tube is a primary air tube, and in which there is a secondary air tube concentrically surrounding the primary air tube, and in which secondary air is delivered around the primary air tube.

3. A rapid combustion oil burner comprising an air tube and a concentric slender oil tube passing axially through the air tube, each of said tubes having a forward end, an atomizing tip within the forward end of said air tube, said tip comprising a body secured to the forward end of the oil tube, a pair of concentric cylinders secured to said body and having concentric annular knife edges at their forward ends, a plurality of slender holes passing through said body from the oil tube to the space between said concentric cylinders and knife edges, air passages through said body from the outside to the space within the inner cylinder, air passages through said outer cylinder leading to the space between the said cylinders, whereby air is delivered to both sides of both knife edges, said air passages being very much larger than said oil passages in order to provide an adequate air supply to atomize oil fed through said oil passages.

4. A rapid combustion oil burner comprising an air tube and a concentric slender oil tube passing axially through the air tube, each of said tubes having a forward end, an atomizing tip within the forward end of said air tube, said tip comprising a body secured to the forward end of the oil tube, a pair of concentric cylinders secured to said body and having concentric annular knife edges at their forward ends, said knife edges being formed divergently, a plurality of slender holes passing through said body from the oil tube to the space between said concentric cylinders and knife edges, air passages through said body from the outside to the space within the inner cylinder, air passages through said outer cylinder leading to the space between the said cylinders, whereby air is delivered to both sides of both knife edges, said air passages being very much larger than said oil passages in order to provide an adequate air supply to atomize oil fed through said oil passages, the air passages through said body being tangential to spin the air, and the air passages through said outer cylinder being tangential to spin the air.

5. An oil burner as defined in claim 4, in which the said air tube is a primary air tube, and in which there is a secondary air tube concentrically surrounding the primary air tube, and in which secondary air is delivered around the primary air tube.

6. A rapid combustion oil burner comprising an air tube and a concentric slender oil tube passing axially through the air tube, each of said tubes having a forward end, an atomizing tip within the forward end of said air tube, said tip comprising a body secured to the forward end of the oil tube, a pair of concentric cylinders secured to said body and having concentric annular knife edges at their forward ends, said knife edges being formed divergently, a plurality of slender holes passing through said body from the oil tube to the space between said concentric cylinders and knife edges, air passages through said body from the outside to the space within the inner cylinder, air passages through said outer cylinder leading to the space between the said cylinders, whereby air

is delivered to both sides of both knife edges, said air passages being very much larger than said oil passages in order to provide an adequate air supply to atomize oil fed through said oil passages, the air passages through said body being tangential to spin the air, the air passages through said outer cylinder being tangential to spin the air, and helical vanes on the outside of the outer cylinder to spin the air.

7. An oil burner as defined in claim 6, in which the said air tube is a primary air tube, and in which there is a secondary air tube concentrically surrounding the primary air tube, and in which secondary air is delivered around the primary air tube.

8. A quick drop oil burner comprising upright concentric oil and primary air tubes having upper ends and lower ends, a chamber surrounding the lower end of the primary air tube, said chamber having a lower end and an upper end and being open at its lower end, means to mount said chamber beneath a furnace, a fixed primary air connection to the chamber, an atomizing tip at the upper end of the oil and primary air tubes, said tip and oil and primary air tubes forming a unit which is readily slidable relative to the chamber, the lower end part of the primary air tube which is within said chamber being largely cut away to receive primary air, an end plate secured to the lower end of the primary air tube and dimensioned also to close the lower end of the chamber when the slidable unit is in working position with said end plate pressed upwardly against the open lower end of the chamber, said oil tube extending through and being fixedly connected to said end plate, a flexible oil pipe connected to the lower end of said oil tube, whereby the sliding unit may be dropped relative to the fixed chamber, a plurality of slidable stop rods passing through said end plate and dimensioned to limit the drop of the burner, compression springs on said rods to cushion the drop, and an instantaneously releasable latch means to hold the slidable unit in its elevated or working position, whereby release of said latch means permits the slidable unit to drop gravitationally until arrested by the stop rods.

9. A quick drop oil burner comprising upright concentric oil and primary air and secondary air tubes having upper ends and lower ends, means to fixedly mount the secondary air tube on a furnace member, a fixed secondary air connection to the lower end of the secondary air tube beneath the furnace, a chamber surrounding the lower end of the primary air tube beneath the lower end of the secondary air tube, said chamber having a lower end and an upper end and being open at its lower end, a fixed primary air connection to the chamber, an atomizing tip at the upper end of the oil and primary air tubes, said tip and oil and primary air tubes forming a unit which is readily slidable relative to the chamber and secondary air tubes, the lower end part of the primary air tube which is within said chamber being largely cut away to receive primary air, an end plate secured to the lower end of the primary air tube and dimensioned also to close the lower end of the chamber when the slidable unit is in working position with said end plate pressed upwardly against the open lower end of the chamber, said oil tube extending through and being fixedly connected to said end plate, a flexible oil pipe connected to the lower end of said oil tube, whereby the sliding unit may be dropped relative to the fixed chamber and secondary air tube, a plurality of slidable stop rods passing through said end plate and dimensioned to limit the drop of the burner, compression springs on said rods to cushion the drop, and an instantaneously releasable latch means holding the slidable unit in its elevated or working position, whereby release of said latch means permits the slidable unit to drop gravitationally until arrested by the stop rods.

10. A quick drop oil burner comprising upright concentric oil and primary air tubes having upper ends and lower ends, a chamber surrounding the lower end of

the primary air tube, said chamber having a lower end and an upper end and being open at its lower end, means to mount said chamber beneath a furnace, a fixed primary air connection to the chamber, an atomizing tip at the upper end of the oil and primary air tubes, said tip and oil and primary air tubes forming a unit which is readily slidable relative to the chamber, the lower end part of the primary air tube which is within said chamber being largely cut away to receive primary air, an end plate secured to the lower end of the primary air tube and dimensioned also to close the lower end of the chamber when the slidable unit is in working position with said end plate pressed upwardly against the open lower end of the chamber, said oil tube extending through and being fixedly connected to said end plate, a flexible oil pipe connected to the lower end of said oil tube, whereby the sliding unit may be dropped relative to the fixed chamber, said end plate being provided with a sealing means to help seal the primary air chamber, said primary air tube being provided with a slidable sealing ring just below the upper end of the chamber in order to prevent passage of primary air, resilient means on said primary air tube bearing upwardly against said ring in order to urge it yieldably into sealing position, a plurality of slidable stop rods passing through said end plate and dimensioned to limit the drop of the burner, compression springs on said rods to cushion the drop, and an instantaneously releasable latch means to hold the slidable unit in its elevated or working position, whereby release of said latch means permits the slidable unit to drop gravitationally until arrested by the stop rods.

11. A quick drop oil burner comprising upright concentric oil and primary air and secondary air tubes having upper ends and lower ends, means to fixedly mount the secondary air tube on a furnace member, a fixed secondary air connection to the lower end of the secondary air tube beneath the furnace, a chamber surrounding the lower end of the primary air tube beneath the lower end of the secondary air tube, said chamber having a lower end and an upper end and being open at its lower end, a fixed primary air connection to the chamber, an atomizing tip at the upper end of the oil and primary air tubes, said tip and oil and primary air

tubes forming a unit which is readily slidable relative to the chamber and secondary air tubes, the lower end part of the primary air tube which is within said chamber being largely cut away to receive primary air, an end plate secured to the lower end of the primary air tube and dimensioned also to close the lower end of the chamber when the slidable unit is in working position with said end plate pressed upwardly against the open lower end of the chamber, said oil tube extending through and being fixedly connected to said end plate, a flexible oil pipe connected to the lower end of said oil tube, whereby the sliding unit may be dropped relative to the fixed chamber and secondary air tube, said end plate being provided with a sealing means to help seal the primary air chamber, said primary air tube being provided with a slidable sealing ring just below the lower end of the secondary air tube in order to prevent passage of primary air into the secondary air tube, resilient means on said primary air tube bearing upwardly against said ring in order to urge it yieldably into sealing position, a plurality of slidable stop rods passing through said end plate and dimensioned to limit the drop of the burner, compression springs on said rods to cushion the drop, and an instantaneously releasable latch means holding the slidable unit in its elevated or working position, whereby release of said latch means permits the slidable unit to drop gravitationally until arrested by the stop rods.

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