March 17, 1942. L. K. SIVERSEN ET AL 2,276,424

AUTOMATIC HYDRAULIC SAFETY LOCK FOR OIL BURNERS

Filed Aug. 23, 1940

Fig-1-

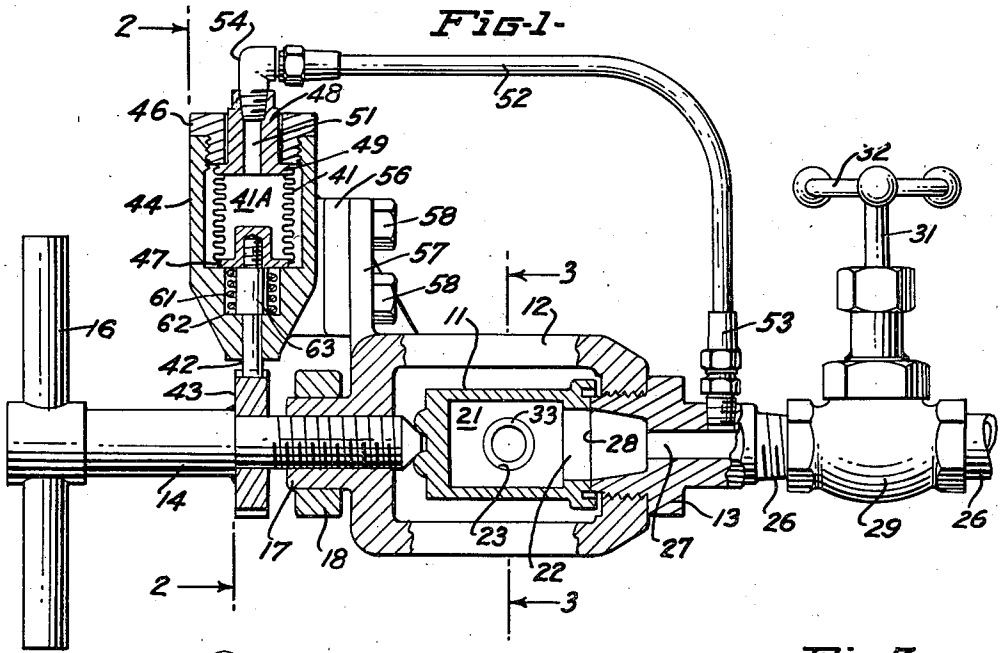


Fig-2-

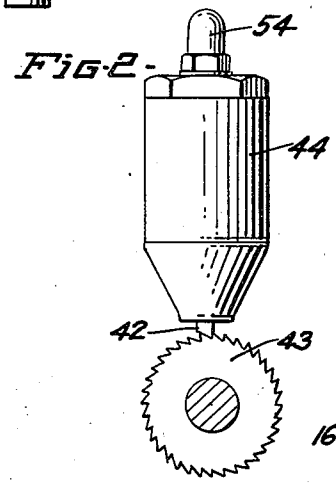
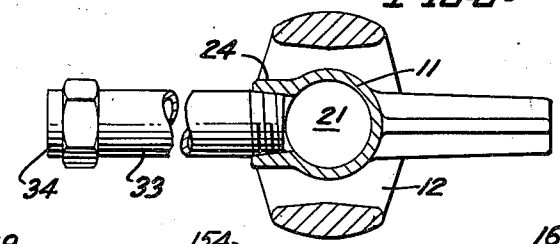


Fig-3-



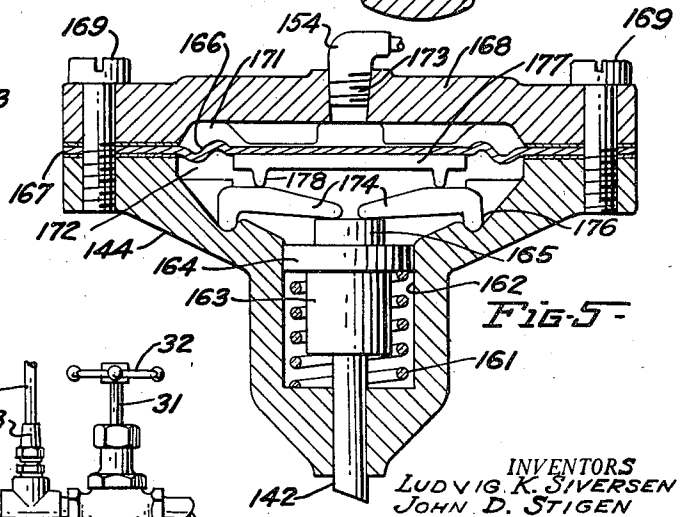
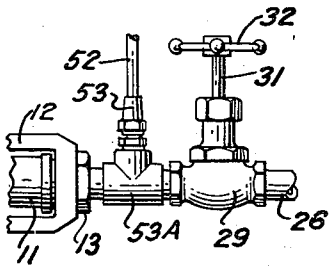


Fig-5-

Fig-4-



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AUTOMATIC HYDRAULIC SAFETY LOCK FOR OIL BURNERS

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5 Claims. (Cl. 158—73)

The invention, in general, relates to safety apparatus. More particularly, the invention relates to automatically operating mechanism for preventing fires and personal injuries that may otherwise occur from escaping hot oil during the operation of repairing or the cleaning of oil burner nozzles.

It is probably well known that many attempts have heretofore been made to reduce the likelihood of property losses or damage and personal injury resulting from careless handling of oil burners. Too often careless operators and repairmen have dismantled an oil burner head to obtain access to a clogged atomizing nozzle without insuring that the fluid supply line is entirely shut off with the result that considerable damage has occurred from fires arising from escaping hot oil, as well as painful injuries to workmen. A number of mechanically operable devices have been developed and installed heretofore in an endeavor to obviate these occurrences but these devices, in general, are or become defective, inoperative or are frequently removed during a repair job and inadvertently not replaced so that the danger alluded to is as potentially present as before equipping the burners with such devices.

A primary object of our invention is to provide means automatically responsive to pressure values in the fluid supply line for preventing the dismantling of the burner head of an oil burner prior to shutting off the fluid flow.

Another object of our improvement is to provide a safety lock for oil burner heads which affords positive control against removal of a burner head while the fluid line is open.

A still further object of the invention is to provide an improved lock for oil burner heads which is mechanically independent of the burner elements and which can not be tampered with or inadvertently be dismantled or removed when dismantling the burner head for repair of the burner atomizing nozzle.

Another object of our invention is to provide an improved automatically actuated lock for oil burner heads which is inexpensive to manufacture, install and maintain.

Other objects of the invention, together with some of the advantageous features thereof, will appear from the following description of a preferred and one modified embodiment of our invention which are illustrated in the accompanying drawing. It is to be understood that while a preferred and a modified embodiment of our improvement are depicted in the annexed drawing, we are not to be limited to the precise embodiments shown, nor to the precise arrangement of the various elements of the combination, as our invention, as defined in the appended claims, can be embodied in a plurality of variety of forms.

Referring to the drawing:

Figure 1 is an elevational view, partly in section, of a preferred embodiment of our invention.

Figure 2 is a view taken on the line 2—2 of Figure 1.

Figure 3 is a view taken on the line 3—3 of Figure 1.

Figure 4 is a side elevational view of a portion of the assembly and illustrating one type of take-off for by-passing a portion of the fluid supply to the burner.

Figure 5 is an enlarged view, partly in section, of a modified embodiment of our invention.

In its preferred form, the automatic hydraulic safety lock of our invention, for application to oil burners, preferably comprises the combination with a burner head, a valve-controlled fluid line for supplying fluid to said head, and a movable member for removably retaining said head in operative position, of an expansible element in communication with said fluid line, a pawl connected to said element, and a ratchet on said member; said expansible element being responsive to fluid pressure in said line to hold said pawl in engagement with said ratchet and thereby prevent movement of said member and dismantling of said head while said fluid line is open.

While the improvement of our invention is entirely appilcable to any fluid system for positively locking elements thereof together to prevent or avoid dismantling of elements while the fluid line is open, it is especially suitable for adaptation to oil burners, whether of the marine type or stationary, to prevent property losses or damages, or injury from escaping hot oil, and we have, accordingly, illustrated our invention and shall described the same in the oil burner environment.

In Figures 1 and 3 of the drawing, we have illustrated a typical oil burner head assembly with which our improved safety lock is combined. The assembly includes a conventional type of burner head 11 which is supported in a yoke 12 in oil-tight engagement with a yoke bushing 13 by means of a jacking screw 14 which bears upon the burner head to hold it in operative position. The jacking screw 14 conveniently carries a handle 16 and is rotatably mounted in an internally threaded boss 17 of the yoke. It will be clear, by reference to Figure 1 of the drawing, that

rotation of handle 16 in one direction will bring the inner end of the jacking screw firmly into engagement with the burner head 11 and hold it against yoke bushing 13, while rotation of handle 16 in the opposite direction will disengage the jacking screw from the burner head and, thus, the head may be dismantled whenever desired. The entire burner head assembly is fastened to the burner front on the boiler, all not shown, by means of a clamping bracket 18. The burner head 11 comprises a hollow body defining an interior chamber 21 which is in communication not only with a burner head inlet 22 but also with its outlet 23 formed in an internally threaded boss 24 on the head. Hot oil is supplied to the burner head 11 from a source, not shown, by means of a pipe 26 which communicates with an axial bore 27 of yoke bushing 13 that leads to bushing outlet 28 which is in registry with burner head inlet 22. A suitable valve 29 is interposed in pipe line 26 for controlling fluid flow therethrough and into the burner head, the valve having a stem 31 extending therefrom which conveniently carries a hand-wheel 32 for turning the valve to open and closed positions, or to any desired position thereby to regulate the flow of oil and pressure in line 26. The hot oil delivered to burner head 11 is supplied to the oil burner through a tube 33 which is externally threaded at the burner head end thereof for removable engagement with the internally threaded boss 24 of the head, and which carries an atomizing nozzle 34 at the burner end thereof, all as shown in Figure 3 of the drawing.

In accordance with our invention, an automatically operating hydraulic safety lock is combined with the burner head 11 and jacking screw 14 for positively locking the head against removal from the supporting yoke 12 while the valve of the oil supply line 26 is open. Our improved lock preferably comprises an element 41 which is movable in response to variations of pressure in the oil supply line 26, a pawl 42 connected to or carried by movable element 41, and a ratchet 43 on the jacking screw 14 so disposed thereon as to be in alignment with the pawl 42 when the jacking screw has been moved so that its inner end is in engagement with the burner head 11 and is holding the head in operative position. In the preferred embodiment of our invention, the element 41 comprises a bellows which is mounted within a hollow, generally cylindrical portion of a body 44 and which defines an expansion and contraction chamber 41A. In order to obtain ready access to bellows 44 whenever desired, the body 44 is provided with a removable screw cap 46. The chamber 41A conveniently is closed at the bottom thereof with a sealing plate 47 having an internally threaded socket for threadedly receiving the inner end of the pawl 42, and the upper end of the chamber 41A is closed with a sealing plate 48 having a flange 49 bearing against the inner surface of screw cap 46 of the body 44. In order to place the expansible and contractible element 41 into communication with the fuel supply line 26, we form the sealing plate 48 of the chamber 41A with a passage 51 therethrough and provide a by-pass conduit 52 leading from the supply line 26 between the valve of the line and the burner head 11 to the passage 51 of the sealing plate 48 of expansion chamber 41A. Suitable pipe fittings 53 and 54, respectively, are provided for establishing communication between the pipe line 26 and the conduit 52 and between the latter and expansion chamber 41A through passage 51 of the sealing plate 48 of the chamber. In the preferred embodiment of the invention, wherein the safety lock is shown combined with a typical burner head assembly, the by-pass conduit 52 is connected directly to the yoke bushing 13. If necessary or desirable, the by-pass 52 may be placed in communication with the oil supply line 26 through a T-fitting 53A interposed in the line between the valve and burner head 11, as particularly illustrated in Figure 4 of the drawing.

It is to be understood that the body 44 which carries the expansible and contractible element 41 is supported adjacent to the jacking screw 14 so that the pawl 42 carried by the expansible element will be aligned with the ratchet 43 of the jacking screw. To this end, the body 44 may be mounted on any suitable support or it may be supported directly on the yoke 12, as shown, by providing a bracket 56 on the body 44 and a cooperating bracket 57 on the yoke, the two brackets being fastened together by means of suitable screw-bolts 58. It is clear, of course, that the yoke 12 and body 44 can be cast as an integral structure, if desired, with the body 44 being disposed substantially vertically.

In accordance with our invention, means are provided for contracting element 41 whenever the valve of oil supply line 26 is shut off, such means being operable to permit the expansion of the element 41 upon opening the supply line 26 to any extent. This means preferably comprises a coil spring 61 which is confined between the bottom closure plate 47 of element 41 and the bottom of a supplementary chamber 62 formed in the body 44 below the element 41, the spring being conveniently coiled around an enlarged portion of the stem of pawl 42. The tension of spring 61 is of such value that, with the fluid supply line 26 closed, the spring urges the bottom closure plate 47 of the element 41 upwardly to hold the pawl 42 out of engagement with the jacking-screw ratchet 43. Thus, with supply line 26 closed and no pressure in by-pass 52 or in element 41, the jacking-screw 14 may be rotated freely in either direction since the pawl 42 has been lifted from ratchet 43 by reason of the lifting of closure plate 47 of the element 41, which carries the pawl. Upon opening supply line 26 to any extent, by turning of hand-wheel 32 of the valve, the oil pressure in the line is communicated to by-pass 52 as well as to the chamber 41A of element 41 to expand the same and thereby compress spring 61. The expansion of element 41 and compression of spring 61 effects a lowering of closure plate 47 and also of the connected pawl 42 to force the latter into firm engagement with ratchet 43, thus preventing the jacking-screw 14 from being unscrewed as long as pressure remains in the expansion chamber 41A. It may be observed, however, that the outer end of pawl 42 is so formed and so engages ratchet 43 that the jacking-screw 14 can be tightened while the line is open and pressure applied on the element 41, so that the burner head 11 can be tightened against yoke bushing 13 to avoid possible leakage of oil at this joint, as clearly shown in Figure 2 of the drawing.

While we have stated that we preferably employ a contractible and expansible element, such as the bellows 41, to raise and lower the pawl 42, it is clear that any other suitable means for this purpose can be employed for movement in response to the pressure in the fluid supply line, without departing from the scope of our im-

provement as defined in the appended claims. In Figure 5 of the drawing, we have illustrated one modified embodiment of our invention exemplifying such equivalent means in so far as actuation of the latching pawl is concerned. In this modification, our automatically operating hydraulic safety lock for oil burners preferably includes a pawl 142 which is movably mounted in a hollow body 144 and which variably projects therefrom for engaging and disengaging a ratchet secured to the burner head jacking-screw of an oil burner head assembly, all not shown in this view. The mounting of pawl 142 is preferably effected by disposing a coil spring 161 in a generally cylindrical chamber 162 within the body 144 and providing an enlarged portion 163 on the stem of the pawl, the enlarged portion having a flange 164 thereon engaging the walls of chamber 162. We also provide an enlarged head 165 on pawl 142 which seats on the flange 164, the coil spring being confined between the bottom of chamber 162 and the lower face of flange 164 and having such tension that it normally holds the pawl free of the jacking-screw ratchet, not shown, when the fluid supply line to the burner head, also not shown, is closed with no pressure on the line.

In order to compress spring 161 and move the pawl 142 downwardly to engage the jacking-screw ratchet, we preferably provide a flexible diaphragm 166 which is flexed in response to fluid pressure in the fluid supply line which is communicated to the interior of body 144 through a by-pass from the fluid supply line, not shown, and pipe connection 154 in communication with the interior of body 144. We also preferably provide, in association with the flexible diaphragm, means bearing upon the enlarged head 165 of the pawl 142 and movable by the flexing of diaphragm 166. To this end, and as illustrated in Figure 5 of the drawing, the diaphragm 166 is securely seated on an interior annular shoulder 167 of the body 144 by means of a body closure cap 168 and suitable screws 169 which pierce the diaphragm. The flexible diaphragm spans an interior chamber of body 144 and divides the chamber into an upper compartment 171 and lower compartment 172. The closure cap 168 of body 144 is formed with an internally threaded inlet 173 communicating with upper compartment 171 as well as with pipe fitting 154 leading to compartment 171 so that when the fluid supply line is open pressure is communicated to such compartment to flex diaphragm 166. In accordance with our invention, this modification also includes a plurality of dogs 174 which, conveniently, may be three in number spaced approximately 120° apart with their inner ends resting in an annular recess 176 formed within the body 144 and with their outer ends resting upon the top of the head 165 of pawl 142. This arrangement provides, in effect, a pivotal mounting for each of the dogs 174. The modification depicted also includes a plate 177 disposed in compartment 172 of body 144 between the flexible diaphragm 166 and the dogs 174, the plate having a depending flange 178 resting on the top of the dogs and serving to press the dogs down upon the head 165 of the pawl whenever the diaphragm 166 is flexed inwardly as a result of fluid pressure on the upper side thereof. In other words, when the valve of the fluid supply line to the burner head is opened to any extent, fluid pressure is communicated to the top of the diaphragm 166 through a by-pass and pipe connection 154. This pressure forces the diaphragm 166 inwardly which, in turn, causes the flange 178 of plate 177 to pivot the dogs 174 and to depress the pawl 142 by the pressure of the inner ends of the dogs on the pawl head. Thus, the pawl 142 is forced into firm engagement with the jacking-screw ratchet so that the screw can not be loosened with the fluid supply open to any extent, and the burner head cannot be dismantled. Conversely, upon closing the fluid supply line, the coil spring 161 urges the pawl 142 upwardly out of engagement with the ratchet of the jacking-screw to pivot the dogs 174 and return the diaphragm 166 to normal position since there is no pressure on the outer face thereof.

The safety lock of our improvement is not only directly responsive to the pressure in the oil burner supply line but is positive in action and makes it impossible for the burner head to be loosened whatsoever before the oil pressure is completely shut off.

It is to be understood that the appended claims are to be accorded a range of equivalents commensurate in scope with the advance made over the prior art.

We claim:

1. An automatically operable hydraulic safety lock for adaptation to oil burners, said lock comprising the combination with a detachable burner head, a valve-controlled oil supply pipe for delivering oil through the head to a burner, and a jacking-screw for tightening the burner head in alignment with the supply pipe, of an expansible and contractible element in communication with the oil supply pipe and responsive to the pressure in the pipe to expand said element, means for contracting said element when no pressure exists in the oil supply pipe, a first latching member carried by said element, and a second latching member on the jacking-screw; said first latching member being held free of said second latching member by said means when the oil supply pipe is closed and being urged into engagement therewith by said element when the oil supply pipe is under pressure to any extent thereby preventing loosening of the jacking-screw and removal of the burner head.

2. In combination with a burner head assembly of an oil burner which includes a movable tubular burner head, a supply pipe for delivering oil to the burner head and a jacking-screw for holding the burner head against movement and in communication with said supply pipe, a bellows in communication with the supply pipe, a pawl actuated by said bellows, and a ratchet on the jacking-screw in alignment with said pawl; said pawl being adapted to be moved into engagement with said ratchet in response to pressure in the supply pipe and in said bellows thereby to prevent loosening of the jacking-screw when the supply pipe is under pressure.

3. In combination with an oil burner head assembly including a burner head, a valve-controlled oil supply pipe communicating with the head and a jacking-screw for holding the head in alignment with the oil supply pipe, a first latching member on the screw, a second latching member supported in alignment with said first latching member, and means responsive to pressure in the oil supply pipe for urging said second latching member into engigement with said first latching member automatically upon opening the valve of the oil supply pipe and for holding said members in engagement while the valve of the oil supply pipe remains open to any extent.

4. An automatically operable hydraulic safety lock adapted to be included in a burner head assembly including a burner head, an oil supply pipe for delivering oil to the burner head and a jacking-screw for tightening and holding the burner head in alignment with the oil supply pipe, a first latching member on the jacking-screw, a second latching member supported in alignment with said first latching member, and means including a flexible diaphragm for moving said latching members into engagement; said diaphragm being in communication with the oil supply pipe and being adapted to be flexed to move said second latching member into engagement with said first latching member when oil under pressure is admitted to the supply pipe.

5. An automatically operative hydraulic safety lock for adaptation to oil burners, said lock comprising the combination with a detachable tubular burner head and a valve-controlled oil supply pipe for delivering oil under pressure through said head to the burner, of a jacking-screw for tightening and holding the burner head in alignment with the oil supply pipe, and means responsive to the pressure in the oil supply pipe for preventing the loosening of said jacking-screw until the valve in the oil supply pipe is closed to shut off delivery of oil to the burner head.

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