United States Patent [19]

Kidwell et al.

[11] **3,909,186**

[45] **Sept. 30, 1975**

[54] **IGNITER MECHANISM**

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[22] Filed: **May 13, 1974**

[21] Appl. No.: **469,350**

[52] **U.S. Cl.** **431/254;** 126/59.5

[51] **Int. Cl.** **F23q 1/04**

[58] **Field of Search** 431/254, 255, 257, 72; 126/59.5

[56] **References Cited**

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Primary Examiner—Edward G. Favors

[57] **ABSTRACT**

Ignition apparatus for a gaseous fuel-burning orifice of a space heater, such as an orchard heater, is disclosed to comprise spark-producing elements located proximate to said orifice and caused to have relative movement derived from an expansible/contractible chamber responsive to the presence or absence of fluid fuel under pressure in a fuel supply communicating with said orifice.

6 Claims, 5 Drawing Figures

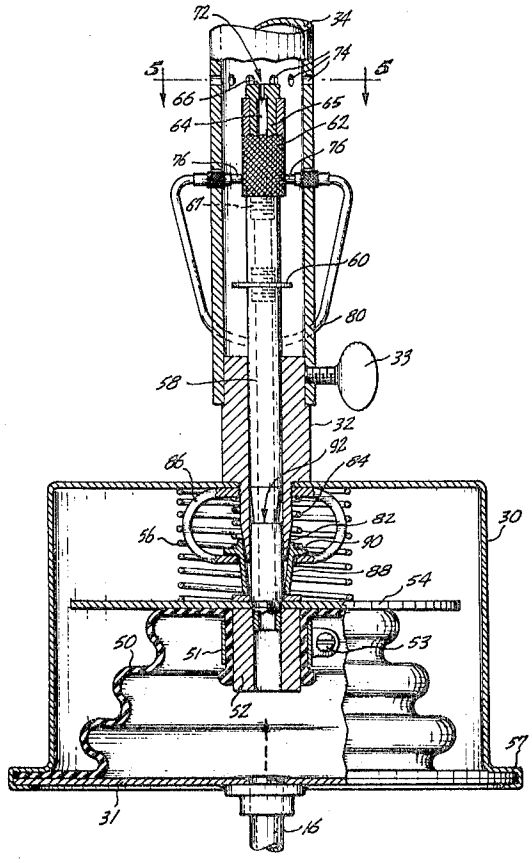
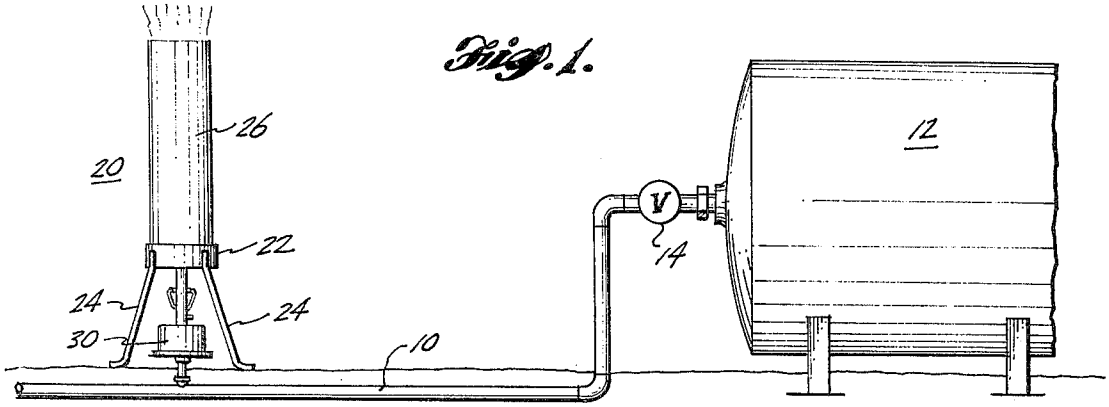


Fig. 1.



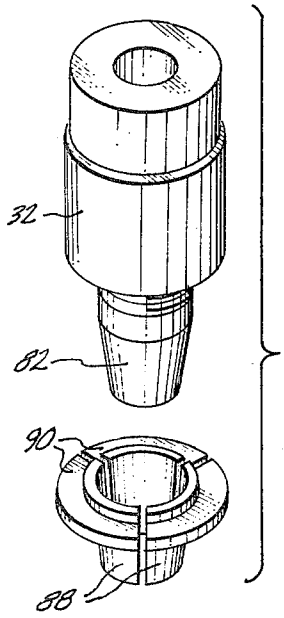


Fig. 3

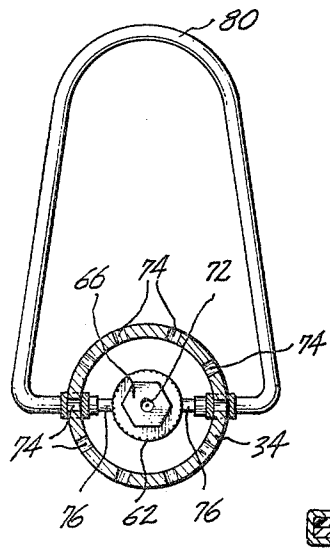


Fig. 5.

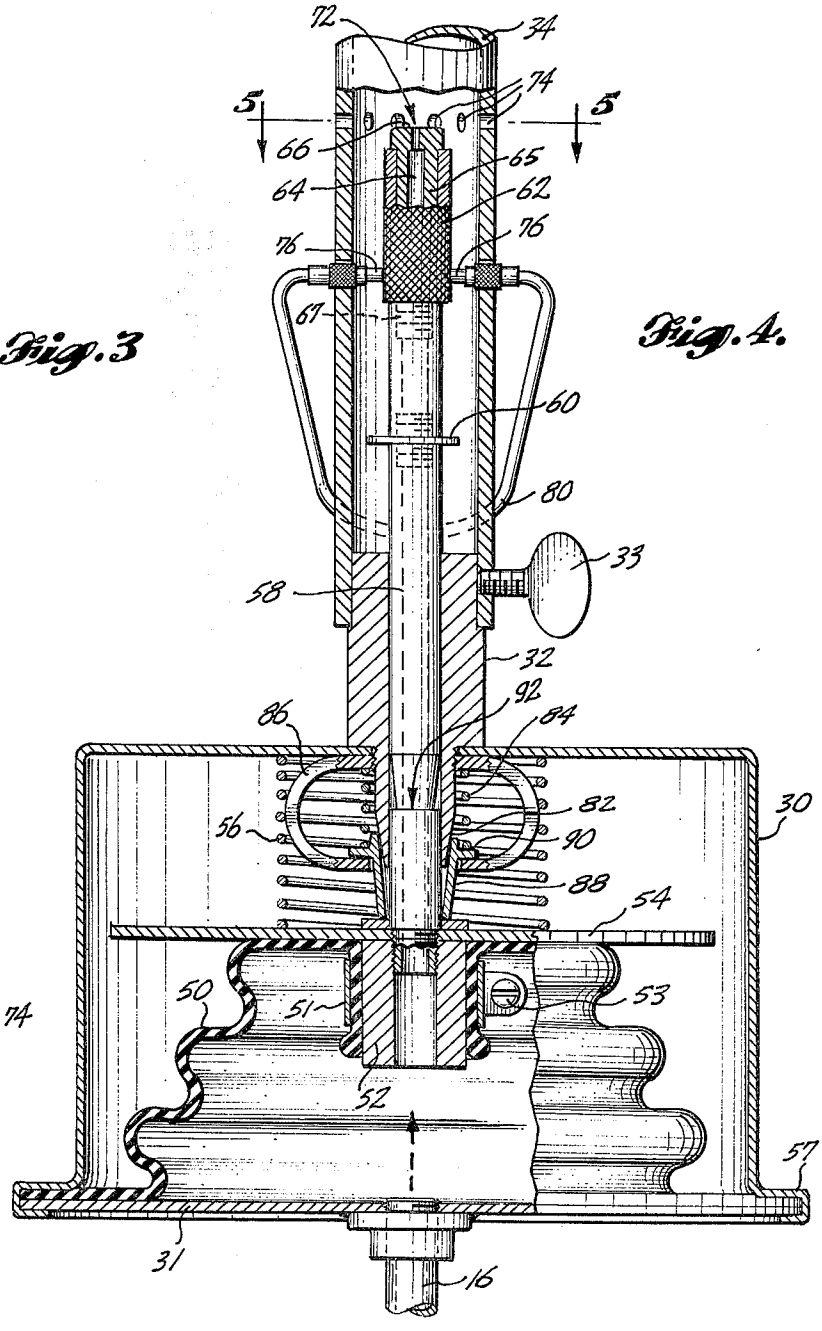


Fig. 4.

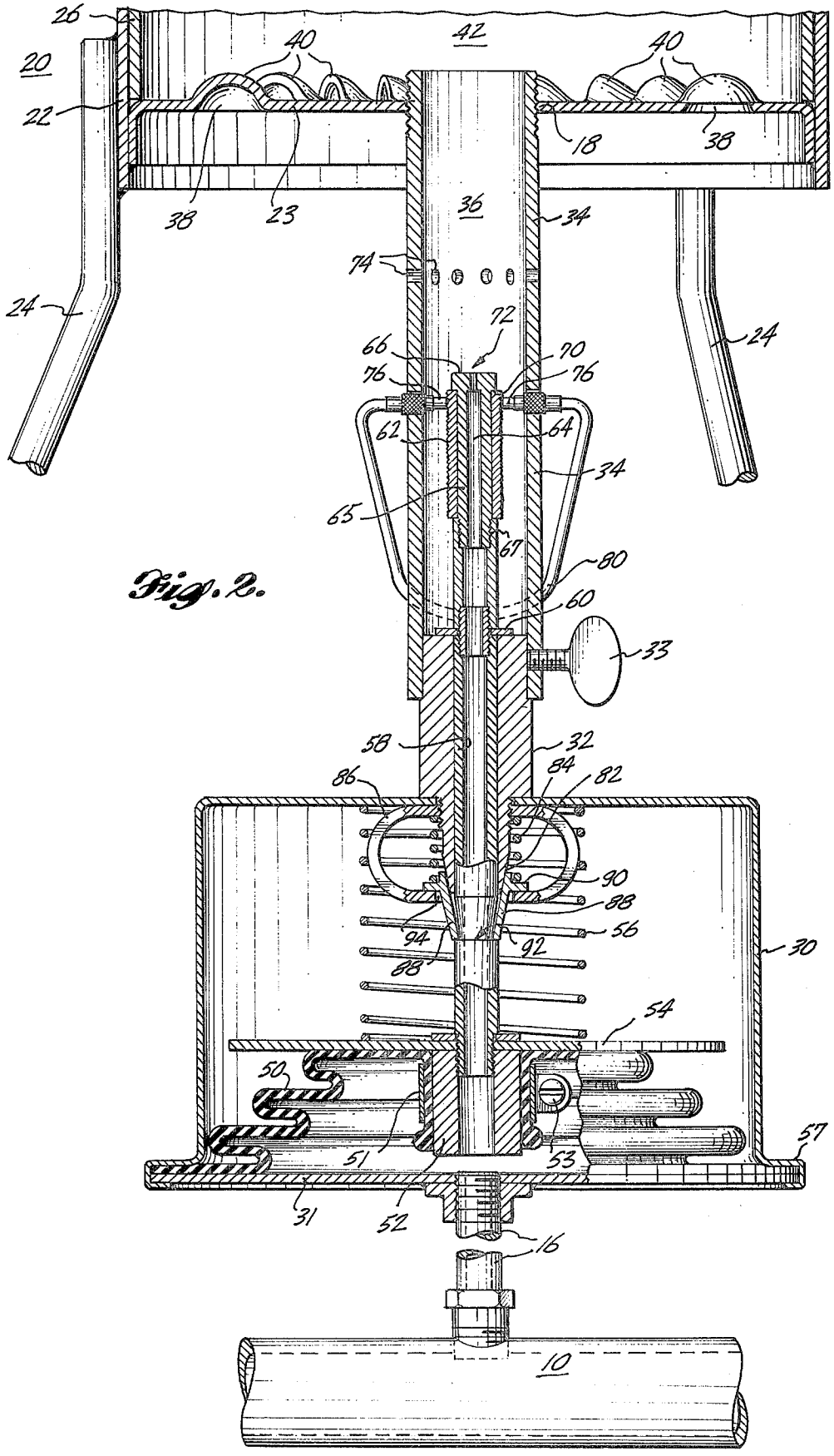

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Fig. 2.

IGNITER MECHANISM

SUMMARY OF THE INVENTION

The invention will be described as in use with a space heater for orchards and the like, being a typicial field of use. Normally modern orchard heaters include an upright tube providing an elongated radiant combustion chamber. The burner means including a discharge orifice are mounted below or in the lower part of said chamber.

Flame produced thereby propagates and develops within said chamber. The chamber wall is heated for radiation purposes, and the products of combustion discharge upward into the atmosphere.

In this invention, an upright tubular nozzle stem is mounted for upright reciprocal movement derived from an expansible/contractible chamber which is associated with the gaseous fuel supply line. The chamber is responsive to the presence or absence of fuel under pressure in said line. Spark-producing means is associated with the reciprocal nozzle stem in close proximity to its fuel discharge orifice and functions to create a shower of sparks into outflowing gaseous fuel to ignite the same. The spark-producing means comprise an abrader and flint material which, upon relative movement provides the sparks. Cycling of the reciprocal nozzle stem is accomplished remotely by manipulation of valve means controlling fluid fuel flow in the supply line.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic showing of a space-heating system incorporating this invention;

FIG. 2 is an enlarged, vertical sectional view showing the fuel burner and igniter means of this invention;

FIG. 3 is an exploded view in perspective of chucking or clutching apparatus associated with the igniter mechanism;

FIG. 4 is a view similar to FIG. 2 showing the igniter apparatus as it appears following ignition; and

FIG. 5 is a cross-sectional view taken on line 5—5 of FIG. 4.

DESCRIPTION OF PREFERRED EMBODIMENT

A gas main 10 is connected to a supply source, such as tank 12, by a conduit system which includes control valve 14. A riser 16 communicates from the main 10 to a burner unit 20 which will be one of several such burners spaced along the main in an orchard or grove to be protected against frost. Such a system is centrally controlled at the head-end by valve 14 to provide initiation of gas flow, ignition at the various burners, control of the heat level, and termination of operation when the danger of frost damage has passed.

A burner unit 20 generally comprises a pan 22 supported above the ground by legs 24,24. Stack 26 rises above the pan 22. Fire is produced in the lower portion of the unit 20 and the gaseous fuel burns to heat the stack 26 to near incandescence. The products of combustion and the heat radiated by the burner unit raises the surrounding temperature and tends to combat the inroads of frost which may damage nearby vegetation.

The igniter mechanism comprises the housing 30 from which rises guide bushing 32 which supports tube 34 that forms the initial ignition and mixing chamber 36. Tube 34 telescopically fits bushing 32 and is secured by thumb screw 33. The open upper end of tube 34 enters pan 22 through hole 18 in its bottom 23. Perforations 38 permit air to enter the chamber 42 within the stack 26. Fins or blades 40 adjacent the perforations 38 function to impart a swirling or vortical pattern on the incoming air to enhance flaming of the ignited gas.

Housing 30 contains the somewhat conical bellows 50 which is anchored in a gas-tight manner at its periphery 57 to housing 30 at the outer edge of bottom 31. The upper center of bellows 50 is secured about bushing 52 and beneath plate 54 by bellows collar 50 and clamp 53. Normally bellows is collapsed (as shown in FIG. 2) under pressure or bias exerted downward on plate 54 by spring 56 which is positioned within the upper end of housing 30. Gas through riser 16 enters bellows 50 and, when the gas pressure is sufficient, expands the bellows upward against the bias of spring 56.

Tube 58 is securely sealed at its lower end in bushing 52 and passes upward and through guide bushing 32, terminating in ignition chamber 36. Annular flange 60 on tube 58 limits downward movement of the tube 58 and of the bellows 50 by coming to rest on the upper end of guide bushing 32. At its upper end tube 58 supports abrader unit 62.

A longitudinal axial passage 64, in communication with the interior of tube 58 ends at orifice 72.

From the foregoing it will be seen in this embodiment that gas flowing from tank 12, through valve 14 and main 10 enters the burner unit 10 through the bellows 50 from whence it flows upward through tube 58 and passage 64 of abrader plug 62 to the ported burner nozzle 66. In this preferred structure shown, the abrader unit 62 and nozzle 66 has an elongated tube shank 65 threaded at its lower end 67 into the upper end of tube 58. The abrader 62 is cylindrical and surrounds the shank 65 of nozzle 66 and rests on the upper end of tube 58. Shoulder 70 of nozzle 66 secures the abrader unit 62 in place. Nozzle 66 has a carefully chosen, reduced orifice 72 for the emission of a measured amount of gas into chamber 36. A series of air intake parts 74 in the wall of tube 34 permit the entry of air into chamber 36 to mix with inflowing gas to insure and facilitate ignition and combustion.

Tube 34 is removably secured to guide bushing 32 at its upper end by thumb screw. The external surface of abrader member 62 is roughened by scoring the metal from which it is formed. Opposing sparking elements 76,76 in holes 78,78 of tube 34 are pressed against the abrader by the inwardly biased arms of coiled spring 80. When the abrader is forcibly and rapidly moved relative the sparking elements 76 a shower of sparks is produced and thrown into the gas/air mixture in the vicinity of nozzle 66.

The tapered lower end 82 of bushing 32 extends into housing 30 and is surrounded by spring 84 contained within yoke 86. A plurality of collet-type chucking elements or jaws 88, having flanges 90 form a chucking device surrounding tube 52, the lower edges of which are engaged against the annular shoulder 92 of tube 58. This chucking device is nested in opening 94 in the lower part of yoke 86. Spring 84 bears on flanges 90 causing the chuck elements 88 to press against tube 58 with the lower edges seated on shoulder 92.

When the system is to be in stand-by mode, valve 14 is closed and there is no gas under pressure in the conduit system including main 10. When valve 14 is

opened gas under pressure enters bellows **50** causing the same to expand upward. Some gas will bleed out through tube **58** and orifice **72** to be discharged into chamber **36.** As the bellows expand tube **58** and abrader **62** rise within chamber **36.** Spring **56** is compressed by the rising bellows and spring **84** is compressed by the rising flanges **90** of the chucking device under pressure transferred thereto by the rising of shoulder **92** of tube **58.** As the chucking device is forced upward it climbs the flared surface **82** at the end of bushing **32** which expands or separates the chuck elements **88** until, eventually, they are dislodged from their seating on shoulder **92.**

The dislodgment of chuck device **88** from engagement with tube **58** is abrupt and sudden. The stored energy of gas in bellows **50** is thus suddenly released to drive plate **54** up as bellows **50** expands. Tube **58** rapidly ascends and the roughened surface of abrader unit **62** is smartly driven upward across the faces of sparking elements **76,76** to create forceful and substantial showers of sparks which fly into the gas/air misture near orifice **72** within chamber **36.** Ignition immediately occurs and the initial flame moves upward in tube **36** and expands and propagates in chamber **42** of stack **26.**

An operator usually initiates ignition in a system by introducing gas into the main at about **3** psi. This is sufficient to overcome spring **56** and expand bellows **50.** The sparking actions will occur as described. When all the heaters in a system are fired and burning the operator usually adjusts his line pressure between about **1** and **15** psi depending on the amount of heat generation which circumstances require. Bellows **50** remains expanded during burning and tube **58** and its nozzle **66** remain in the upper position.

When the line pressure falls below about **1** psi, the downward bias of spring **56** collapses the bellows **50,** and draws the tube **58** downward and the jaws **88** of the chucking device are re-engaged against shoulder **92** of tube **58.** The apparatus is then ready to be operated again.

In compliance with the statute, the invention has been described in language more or less specific as to structural features. It is to be understood, however, that the invention is not limited to the specific features shown, since the means and construction herein disclosed comprises a preferred form of putting the invention into effect. The invention is, therefore, claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims, appropriately interpreted in accordance with the doctrine of equivalents.

What is claimed is:

1. An igniter mechanism for association with the nozzle of a gaseous fuel burner for a space heater, comprising:

a valved supply line for gaseous fuels;

means forming an expansible/ contractible chamber in communication with said supply line to be expanded upon the occurrence of gaseous fuel under pressure in said supply line;

an elongated stem communicably associated with said expansible chamber, said stem terminating in a fuel discharge orifice;

abrader means carried by said stem in close proximity to said discharge orifice;

releasible clutch means surrounding and engageable with said elongated stem when said espansible element is non-expanded;

means operable upon a predetermined degree of expansion of said expansible member to release said clutch means to permit forcible movement of said elongated stem; and

at least one spark-producing flint forcibly pressed to said abrader element and operable to produce a shower of sparks into a discharge of gaseous fuel from said orifice.

2. The structure of claim **1** in which the abrader means comprises an opposed pair of abrading surfaces carried by said stem, and there is a spark-producing flint pressed to each of said surfaces.

3. The structure of claim **1** in which the means forming the expansible chamber comprises a normally collapsed resilient bellows.

4. The structure of claim **1** in which the releasable clutch means comprises a collet-style chuck, and said stem has a shoulder engaged by said chuck.

5. The structure of claim **4** in which the means to release said clutch means comprise a fixedly mounted wedging member operable to open said collet-style chuck and disengage the same from the shoulder on said stem.

6. An igniter mechanism for association with a space heater, comprising:

an upright, tubular stem mounted for the vertical, reciprocal movement, said stem having a discharge orifice at its upper end;

a source of gaseous fuel under pressure including a supply line communicating with said stem;

expansible/contractible means responsive to the presence or absence of fuel under pressure in said supply line, said expansible/contractible means being associated with said stem to impart reciprocal motion thereto; and

spark-producing means associated with the upper end of said stem operable to produce a shower of sparks adjacent said discharge orifice upon upward movement of said stem.

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