June 24, 1969 J. J. VAN HOUTTE ET AL 3,451,483

FIRE PROTECTION SPRINKLER SYSTEM

Filed Nov. 13, 1967

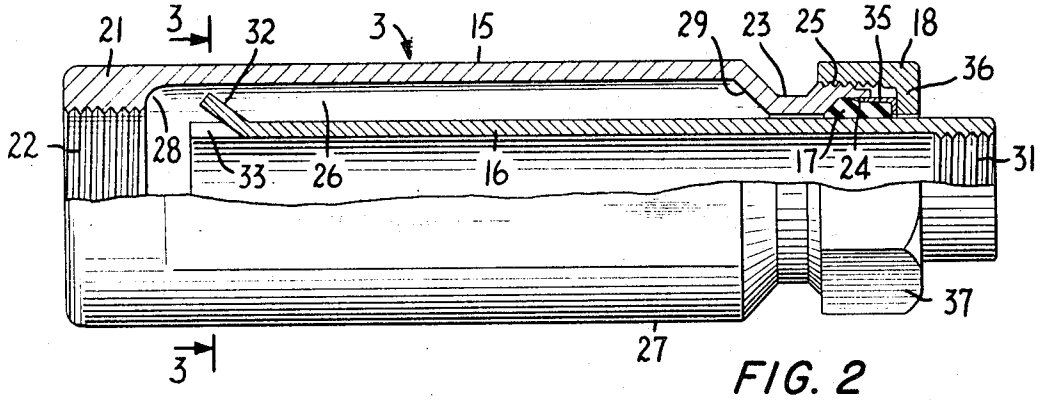


FIG. 2

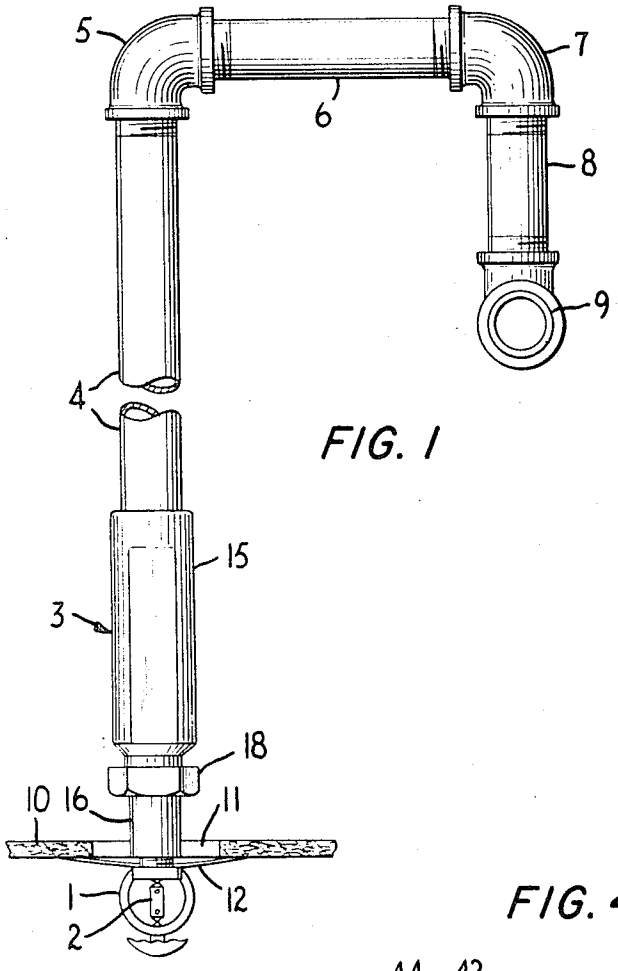


FIG. 1

FIG. 3

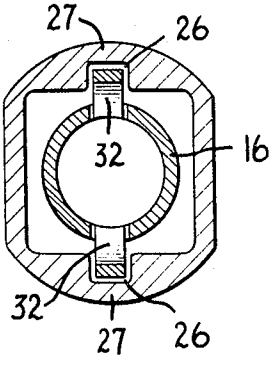
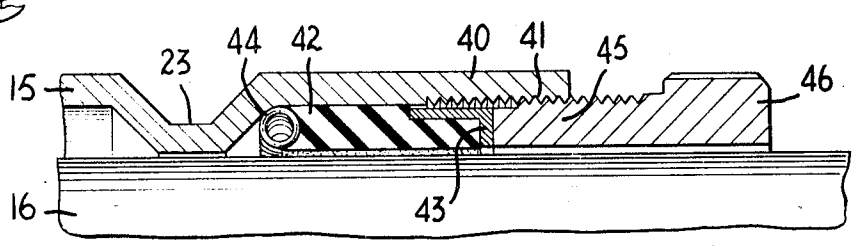


FIG. 4



United States Patent Office 3,451,483 Patented June 24, 1969

3,451,483

FIRE PROTECTION SPRINKLER SYSTEM

James J. Van Houtte and Walter C. Elliott, Bradford, Pa., assignors to Dresser Industries, Inc., Dallas, Tex., a corporation of Delaware

Continuation-in-part of application Ser. No. 601,264, Nov. 10, 1966. This application Nov. 13, 1967, Ser. No. 689,215

Int. Cl. A62c *37/10;* F16l *15/02, 27/12*

U.S. Cl. 169—37 6 Claims

ABSTRACT OF THE DISCLOSURE

A fire protection sprinkler system in which a plurality of fire extinguisher sprinkler heads are connected via fittings to a water distribution supply header. Each fitting includes an adjustable nipple which is slidably received within the body thereof for enabling an attached sprinkler head to be flush mounted to the later installed room ceiling. A rotational lock of the fitting nipple to the body prevents easing of the pressure seals from rotational tightening or loosening of the sprinkler head in its thread mount.

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of application Ser. No. 601,264 filed Nov. 10, 1966, entitled Sprinkler Head Fitting now abandoned.

BACKGROUND OF THE INVENTION

The field of art to which the invention pertains includes the art of Fire Extinguishers, Patent Office class 169 and in particular to fittings for the mounting of sprinkler heads in subclass 37.

In the usual prior art wet type sprinkler system for protection of a building from fire, sprinkler heads are installed at ceiling level and are connected by short vertical drop pipes to horizontally extending distribution pipes running between the ceiling and the next higher floor or the roof. Such a system is exemplified by Patent 2,291,818. During the erection of a building, the sprinkler system is customarily installed and tested before the ceiling is hung. When the ceiling is subsequently installed, it is sometimes found that the sprinkler heads are not at the correct height to be at the ultimate ceiling level. It is then necessary to disconnect the sprinkler heads and cut off drop pipes if too long or replace them by longer pipe lengths if they are too short. One such system permitting final adjustment of the head height is disclosed in Patent 3,194,316.

After the ceiling is in place, it should be appreciated that the pipe fittings and joints of the system become increasingly inaccessible and obscured from view so that leak detection and servicing becomes increasingly difficult. Moreover, final or even subsequent placement or replacement of the sprinkler head, for whatever reason, frequently imposes a strain on the system joints and seals to produce leakage which because they are concealed by the ceiling go unnoticed until serious ceiling damage has occured. Accordingly, it is desirable that the head fittings enable the system to withstand these adjustments in a manner to avoid the consequence of incurred leakage.

SUMMARY

The present invention relates to wet type fire protection systems and fittings therefor. More specifically, the invention relates to piping installations for building fire protection permitting final head height adjustment after ceiling placement and subsequent head servicing without imposing leakage causing strain on the system as is

associated with prior art devices. Moreover, since a building requires a large number of sprinkler heads, it is necessary for such system fittings to be simple and inexpensive in order to be practicable for wide-spread use. Yet further, since the protection of the building from fire depends on the effectiveness and dependability of the sprinkler system, any fittings used in the system must be rugged and wholly reliable.

It is therefore an object of the present invention to provide a novel sprinkler system which permits quick and easy adjustment of the head heights after they have been installed.

It is a further object of the invention to provide novel head fittings for the sprinkler systems of the aforesaid object which resist consequent system leakage as a result of head servicing after the ceiling has been placed.

These and other objects of the invention are achieved in the system of the invention by means of a fitting which is axially adjustable to accommodate precise final placement at the ceiling. At the same time, the fitting provides a positive interlock against relative rotation of the parts whereby rotational strain subsequently imposed in prevented from incurring consequent loosening of the joints or seals thereat.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a sectional elevation through a sprinkler system illustrating a sprinkler head installed with a fitting in accordance herewith.

FIGURE 2 is a side elevation of the fitting with portions broken away and shown in axial section.

FIGURE 3 is a cross-section taken approximately on the line 3—3 in FIGURE 2, and

FIGURE 4 is a fragmentary view corresponding to a portion of FIGURE 2 but showing a modification.

In FIGURE 1, the system of the invention includes a plurality of sprinkler heads **1** each having a fusible or heat sensitive release element **2** shown mounted by a fitting **3** on a drop pipe **4** connected by an elbow **5**, pipe section **6**, elbow **7** and pipe section **8** to a water main supply line **9**. The sprinkler heads are located just below the ceiling of the building indicated as panel **10** having a hole or cut-out **11** to accommodate the connection of the sprinkler head to the supply system. The hole **11** is covered by an escutcheon plate **12**.

In FIGURES 2 and 3, the fitting **3** is shown as comprising a tubular body portion **15**, a sleeve or nipple **16** which is longitudinally movable but non-rotatably retained in the body, a gasket **17** for effecting a fluid-tight seal and for holding the nipple in selected position relative to the body, and a follower **18** for applying pressure to the gasket.

The body portion **15** is of generally tubular configuration and may conveniently be made as a molding or casting. At its upper end, the wall of the body is thickened as indicated at **21** and is internally threaded as indicated at **22** to receive the threaded end of the drop pipe **4**. The threads **22** and the interengaging threads of the drop pipe **4** are preferably tapered so as to provide a tightly wedged connection when the fitting is screwed onto the drop pipe. Near its lower end, the body portion **15** of the fitting **3** is provided with an annular restriction **23** which is spaced a short distance from the end of the body so as to provide a recess **24** to receive the annular gasket **17**. It will be seen that the gasket recess is defined in part by a substantially cylindrical wall and in part by a tapered inner end wall inclined, for example, at an angle of about 45° to the longitudinal axis of the fitting.

Inside the body portion **15** of the fitting **3** there is provided a longitudinally extending track **26** for guiding the nipple **16** and preventing its rotation relative to the body **15**. As illustrated in FIGURES 2 and 3, the track for guid-

ing the nipple is provided by diametrically opposite channels **26** in thickened side wall portions **27** of the body. At their upper ends, the channels **26** are closed by the thickened wall portion **21** as indicated at **28**, while at their lower ends the channels **26** are closed by the annular restriction **23** as indicated at **29**. While two channels **26** have been shown, it will be understood that there may be one or more as desired.

The nipple **16** is essentially tubular and is conveniently formed of tubing or pipe stock. The length of the nipple **16** is approximately equal to that of the body portion **15**, and its diameter is approximately equal to the inside diameter of the restriction **23** of the body with just enough clearance to provide a sliding fit between the nipple and the body. At its outer or lower end, the nipple **16** is provided with threads **31** for receiving a threaded connecting portion of the sprinkler head **1**. The threads **31** are shown as being internal and are preferably tapered to mate with tapered external threads on the sprinkler head.

At its inner end, the nipple **16** is provided with lateral projections or ears **32** which extend radially and relatively close fitting into the longitudinal channels **26** provided on the inside of the body **15**. The ears **32** are formed after insertion of the nipple into the body through the restriction **23**. This is conveniently accomplished by providing the inner end of the nipple with circumferentially spaced cuts **33** to define the ear portions which are bent out laterally by a suitable tool inserted through the upper end of the body. The ears **32** of the nipple cooperate with the longitudinal channels **26** on the inside of the body to guide the nipple and to hold it against rotation relative to the body. This facilitates screwing the sprinkler head onto the nipple **16** after the fitting **3** has been installed on the drop pipe **4** and prevents loosening of the follower nut **18** in the event the sprinkler head is later turned in a counter-clockwise direction to unscrew it from the nipple.

Moreover, the ears **32** are engageable with the lower ends **29** of the channels **26** so as to prevent separation of the nipple **16** from the body **15**. This provides a unitary fitting, the parts of which cannot become separated or lost during shipping, storing and handling. Moreover, when the sprinkler system has been installed and water pressure applied, the internal pressure can never force the nipple **16** out of the body portion **15** even if the gasket **17** and the follower **18** are loosened or removed. The restricted portion **23** of the body **15** fits the nipple **16** sufficiently close as to restrict the flow of water in the event of removal of the gasket and follower and thereby avoids any material pressure loss in the system. The ears **32** of the nipple are also engageable with the inner ends **28** of the channels **26** to limit inward movement of the nipple so as to assure that the lower end of the nipple always projects beyond the follower **18** and is hence accessible for connection of the sprinkler head.

The annular gasket **17** is of approximately trapezoidal cross-section with an inner tapered end conforming approximately to the tapered inner wall of the gasket recess. The gasket is formed of suitable elastomeric material such as natural or synthetic rubber compound having a durometer of the order of 65 to 80. The gasket **17** extends axially outwardly beyond the threaded end portion of the body **15** and the projecting outer end portion of the gasket is capped by a metal retainer cup **35** having a radial flange portion engaging the outer end face of the gasket, and an approximately cylindrical skirt portion embracing the gasket peripherally.

The follower **18** has an end portion **36** which engages the flanged portion of the retainer cup **35** and a skirt portion **37** which is internally threaded to screw onto the threaded end portion **25** of the body **15**. The mating threads of the follower and body are preferably cylindrical as distinct from tapering. It will be seen that as the follower **18** is screwed onto the threaded end portion **25** of the body **15**, it forces the retainer cup axially inwardly to apply pressure to the gasket **17**. Compression of the gasket in an axial direction causes it to increase in radial thickness so as to press tightly against the nipple and the surrounding portions of the gasket recess of the body. This provides a fluid-tight seal between the body and nipple and also grips the nipple tightly so as to hold it in selected position longitudinally of the body **15**. The retainer **35** confines the outer end portion of the gasket **17** to prevent it from expanding into the space beyond the outer end of the body portion.

When installing the system in accordance with the present invention, the piping of the sprinkler system including main supply lines, such as line **9**, branch pipes such as **6** and **8**, and drop pipes **4**, is installed during the erection of the building. Fittings **3** are screwed onto the lower ends of drop pipes **4** and suitable pipe plugs (not shown) are screwed into the threaded lower ends **31** of the nipples **16**. The sprinkler system is then tested for fluid tightness. The ceiling contractor will then install the ceiling and, as he approaches the location of a sprinkler fitting, he or the sprinkler contractor will loosen the follower nut **18** and adjust the nipple **16** vertically so that its lower end is flush with the ceiling level. The follower nut **18** is then tightened to hold the nipple in the desired position. A hole is cut in the ceiling panel to clear the follower nut and the panel is installed. The pipe plug is then removed from the nipple **16** and the escutcheon plate **12** and sprinkler head **1** are installed. During this operation the engagement of the ears **32** of the nipple with the channels **26** provided inside the body holds the nipple against rotation in the body. The fitting is preferably of such length as to permit a vertical adjustment of the nipple of about four inches. This has been found adequate to compensate for variation in ceiling height.

If a fitting requires adjustment after installation of the ceiling, a suitable wrench is inserted through the hole **11** in the ceiling panel to loosen the follower **18** sufficiently to permit vertical movement of the nipple **16** relative to the body **15**. It has ben found that with tapered threads connecting the body **15** with the drop pipe **4** and with interengaging cylindrical threads on the lower end of the body and on the follower nut **18**, the follower can be loosened without unscrewing the fitting from the drop pipe.

In FIGURE 4 there is shown a different arrangement of the gasket and follower. An end portion **40** of the body **15** beyond the restriction **23** is of larger internal diameter than the restriction to provide an annular gasket recess and has internal threads **41** extending part-way from the lower end of the body to the restriction. An annular gasket **42** of generally rectangular cross-section is received in the gasket recess and is provided at its outer end with a retainer cup **43**. An annular coil **44** may, if desired, be imbedded in the gasket at its inner end. An externally threaded follower **45** is screwed into the internally threaded end portion of the body and is provided with an outwardly extending wrench engaging portion **46**. It will be seen that when the follower is screwed into the body it applies pressure to the gasket **42**, so as to grip the nipple **16** and provide a fluid-tight seal between the nipple and body. The construction shown in FIGURE 4 is advantageous in that with a gasket having an axial length materially greater than its radial thickness—for example approximately four times as great—and with the construction shown, it is possible to achieve a high gasket pressure assuring permanent fluid tightness and also holding the nipple very securely against lengthwise displacement.

While preferred embodiments of the invention have been illustrated in the drawings and particularly described, it will be understood that the invention is in no way limited to these embodiments and that modifications may be made within the ambit of the annexed claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A fitting for a building fire protection system to connect a sprinkler head at the underside of a room ceiling

to a water supply pipe in which water is to be maintained under continuous pressure above the room ceiling, said fitting comprising:

(a) a tubular body having means at a first end for connection of said body to the water supply pipe and having a longitudinally extending track, molded or cast integral with said body;

(b) means defining an annular gasket recess at the opposite second end of said tubular body;

(c) an annular gasket is said recess;

(d) a tubular nipple having an inner end slidably received onto the second end of said body and an outer end portion projecting beyond said second end of said body, said nipple having fitting means at its outer end for attachment of a sprinkler head and being movable longitudinally of said body to position an attached sprinkler head at a selected position relative to the underside of a room ceiling;

(e) an annular follower for applying pressure to said gasket, said follower being actuatable to compress said gasket to secure said nipple in selected position and provide a fluid-tight seal between said body and nipple; and

(f) projection tab means on said nipple at its inner end slidably cooperating with said track to interlock said nipple against rotation relative to said body and to limit longitudinal movement of said nipple to prevent its separation from said body.

2. A fitting according to claim **1** in which said track and inner end of said tubular nipple are interior of said body.

3. A fitting according to claim **2**, in which said longitudinally extending track comprises diametrically opposite channels in said tubular body and said projection tab means comprises laterally projecting portions on the inner end of said nipple slidably engaging in said channels to hold said nipple from rotation relative to said body, said channels having closed ends engageable by said laterally projecting portions to prevent separation of said nipple from said body.

4. A fitting according to claim **2**, in which said means for connecting said tubular body to said supply pipe comprises tapered threads adapted to engage tapered threads on said supply pipe to provide a tight wedged connection and in which said second end of said body and said follower have interengaging cylindrical threads for moving said follower axially relative to said body to apply pressure to said gasket by rotation of said follower in a selected direction, whereby said follower is rotatable in the opposite direction to relieve pressure on said gasket without unscrewing said body from said supply pipe.

5. A fitting according to claim **2**, in which said means defining said gasket recess comprises an annular restriction in said body near its said opposite end, said restriction cooperating with said projection tabs means at the inner end of said nipple to prevent separation of said nipple from said body with said restriction fitting said nipple relatively close to restrict flow of fluid between said nipple and restriction in event of removal or loosening of said gasket and follower.

6. A fitting according to claim **2**, in which said projection tab means for limiting longitudinal movement of said nipple also limits inward movement of said nipple relative to the gasket to assure that the outer end of said nipple always projects beyond said follower.

References Cited

UNITED STATES PATENTS

1,714,903	5/1929	Mueller	285—302
1,833,040	11/1931	Rader	285—302
2,779,610	1/1957	Resley	285—343
2,784,933	3/1957	Newell et al.	285—343
2,899,218	8/1959	Creighton	285—302
3,084,869	4/1963	Hutty et al.	285—302
3,135,520	6/1964	Borah	285—342

FOREIGN PATENTS

69,212	4/1914	Switzerland.
413,606	7/1964	Switzerland.

EVERETT W. KIRBY, *Primary Examiner.*

U.S. Cl. X.R.

169—42; 285—302