April 14, 1970 J. T. DUNTON 3,506,027

FIRE HYDRANT

Original Filed Jan. 18, 1965 3 Sheets-Sheet 1

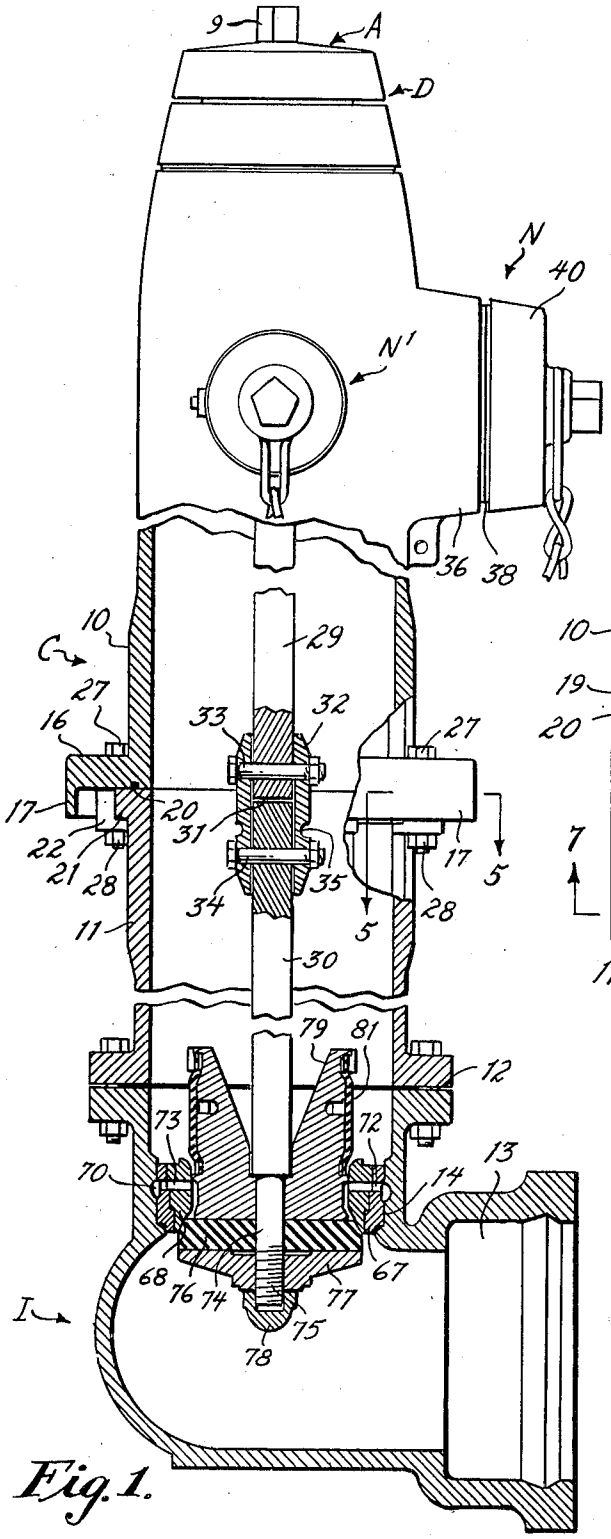


Fig. 1.

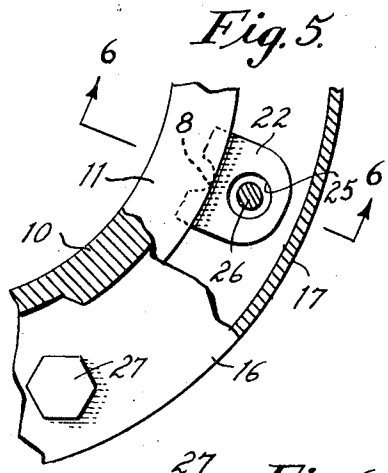


Fig. 5.

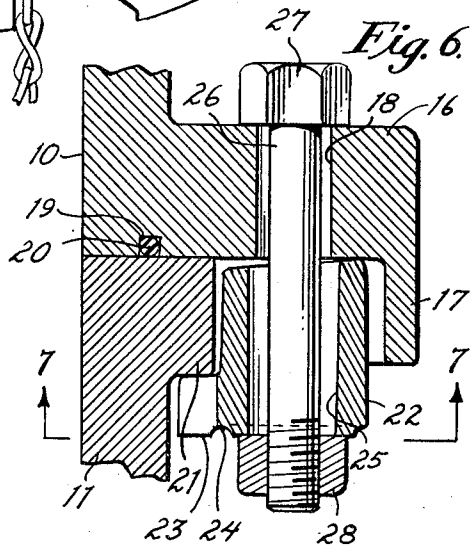


Fig. 6.

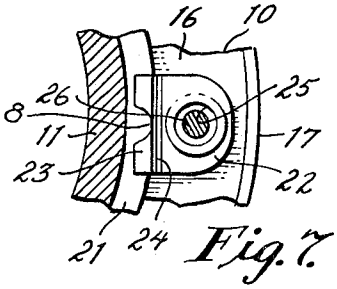


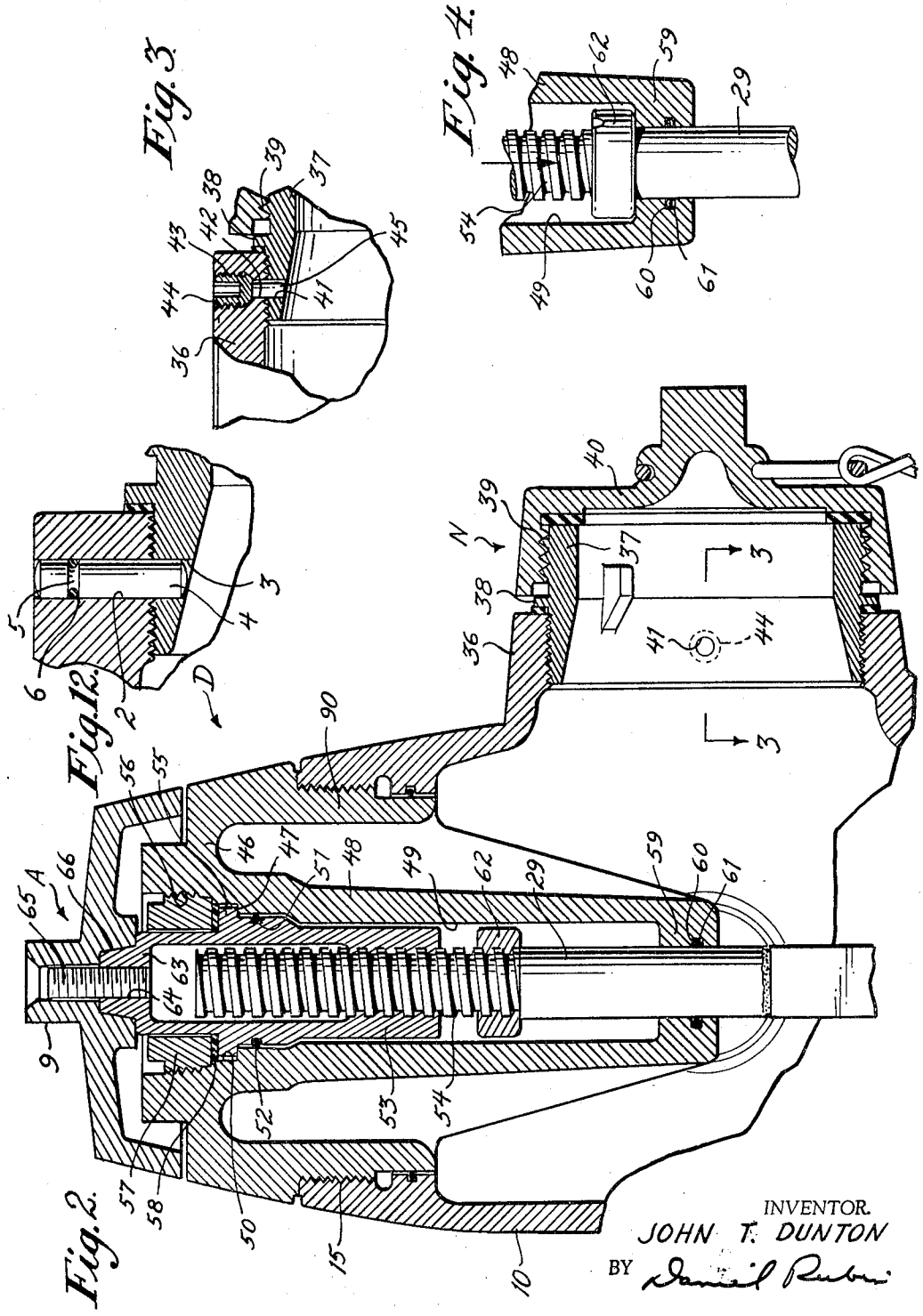
Fig. 7.

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FIRE HYDRANT

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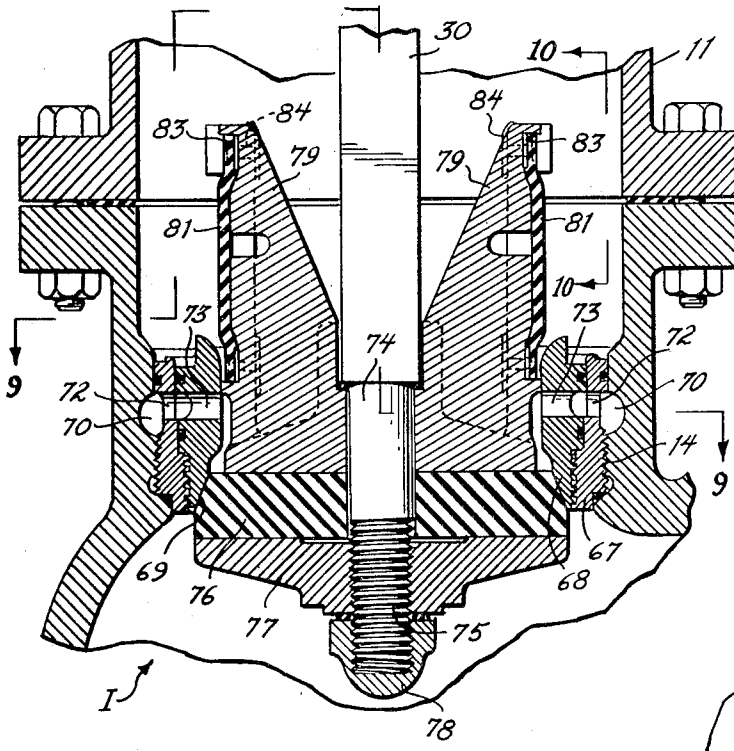


Fig. 8.

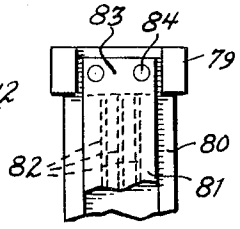


Fig. 10.

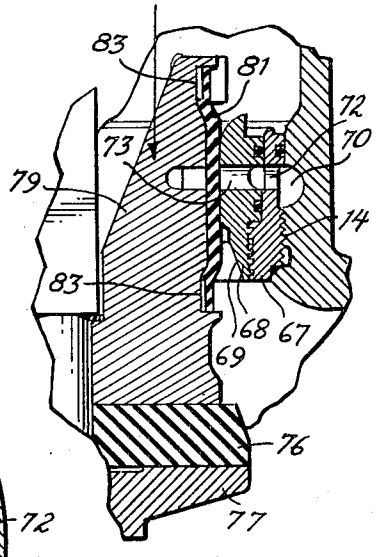
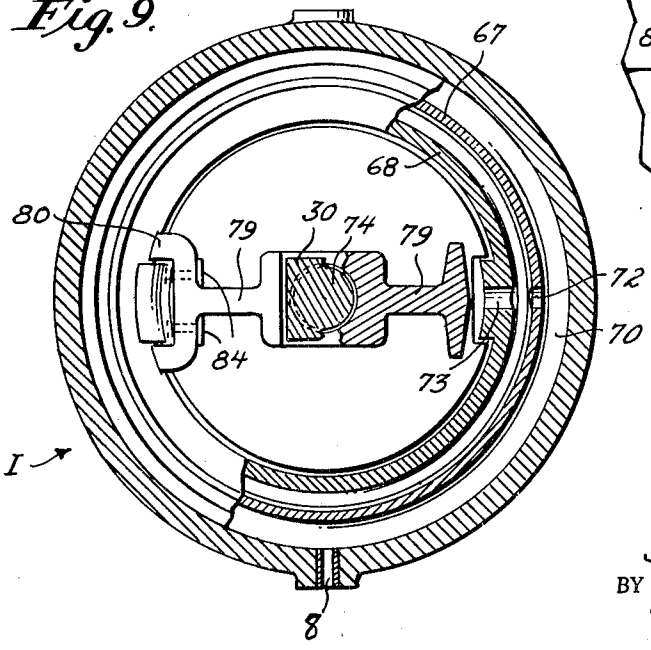


Fig. 11.

Fig. 9.



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FIRE HYDRANT

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Original application Jan. 18, 1965, Ser. No. 421,580. Divided and this application Sept. 20, 1967, Ser. No. 678,139

Int. Cl. E03b 9/14

U.S. Cl. 137—307 7 Claims

ABSTRACT OF THE DISCLOSURE

A fire hydrant having a drain valve operable to permit casing drainage when the hydrant is closed. Water pressure acting when the hydrant is open urges flexible rubber strips against drain ports to render the drain valve self-sealing in preventing drainage while the hydrant is in use.

This is a division of application Ser. No. 421,580, filed Jan. 18, 1965 now abandoned.

The present invention relates to a fire hydrant and is concerned primarily with certain improvements which result in improved utility of such hydrants.

In accordance with present day standards and conventions, a fire hydrant includes a casing comprising two cylindrical parts and a shoe with two cylindrical parts being joined by a bolted flange connection. When the hydrant is installed at its place of usage, this connection is close to the ground surface. It is now recognized as desirable if not absolutely necessary, that the connection between the casing parts be frangible. Thus, if the hydrant is struck by a vehicle, the top part of the casing will come free at the frangible connection without damage to functional parts of the hydrant.

An important object of the present invention is to provide a new and improved frangible connection between the casing parts. This improved connection consists essentially of a wide flange at the lower end of the upper casing part having a depending skirt and formed with bolt holes, a short flange on the upper end of the lower casing part opposite the said skirt, the lugs aligning with said holes in the upper casing flange. Each of these lugs carries an inwardly extending projection which engages the short flange, with the connection between the projection and the lug weakened. Thus, when the upper casing part is struck, the connection is broken at this weakened lug construction. Moreover, this arrangement presents the advantage of permitting assembly between the casing parts through any angular adjustment of the casing parts throughout the full 360°.

The casing encloses a valve stem which extends from the operating mechanism at the top to the main valve at the bottom. This valve stem also should be of two parts which are joined by a frangible connection.

Another important object of the present invention is to provide a new and improved frangible connection between the two parts of the valve stem. The improvement consists essentially of providing a sleeve which establishes the driving relation between the stem parts and which is pinned to the respective stem parts, being weakened by an annular groove that is offset from the meeting ends of the stem parts.

In accordance with conventional practice an intake shoe is connected to the lower end of the lower casing part. The intake is provided with a valve seat and houses a main valve which is normally urged against the seat by pressure of water in the main. The valve is opened by being moved downwardly against the water pressure.

It is now recognized as standard practice to provide a drain valve about the valve seat so that after the valve is closed, any water which remains in the casing will be drained to the exterior thereof. However, when the intake valve is opened, it is desirable that the drain valve be closed so that all the water coming from the intake will pass upwardly to the discharge nozzle at the top.

Another important object of the present invention is to provide a new and improved closure for the drain valve. This improvement consists essentially of a pair of diametrically opposed rubber strips that are mounted on the structure which carries the intake valve and which rubber strips are formed with backing ribs which afford increased flexibility and which permit water to get back of the strips and thus, incorporate self-sealing properties thereinto whereby, water pressure urges the rubber strips against the drain ports.

The upper end of the valve stem is threaded and is received in a threaded stem actuator which when rotated moves the stem longitudinally either upwardly or downwardly. In order for this operation to take place a pressure plate which is integral with the bonnet closes the upper end of the casing. This pressure plate is formed with a shoulder that is engaged by a flange on the actuator and another object of the invention is to provide a self-lubricating thrust bearing such as a Teflon ring between the retaining nut and the flange.

Another object of the invention is to provide a new and improved bonnet which is secured to the upper casing part. This bonnet has an externally threaded skirt that is screwed into the upper casing part and the pressure plate aforesaid is integral with said skirt.

The pressure plate is formed with a sleeve which depends from the shoulder aforesaid and which receives the valve stem in spaced relation. The lower end of this sleeve is formed with an inwardly extending flange which snugly receives the valve stem.

A bonnet or dome is formed with a central opening over the stem actuator and retaining nut. An object of the invention is to provide a closure for this opening in the form of a dust cap that is held in position by a screw bolt passing through the cap and screwed into the stem actuator. This bolt may be removed to permit the introduction of lubricant into the actuating mechanism at the top.

In accordance with conventional practice the upper end of the casing is provided with a pair of discharge nozzles in right angular relation. Each of these nozzles consists essentially of a short sleeve having a central abutment flange. On the inner side of this flange, the sleeve is threaded and screwed into an internally threaded nipple on the casing. On the outer side of the flange, the nozzle is provided with threads which receive either a cap during a period of non-usage or a hose connection when the hydrant is being used. An important object of the present invention is to provide a new and improved means for locking the discharge nozzle in the nipple aforesaid. To accomplish this, the nipple and nozzle are drilled after assembly to form aligned openings which receive a lock pin. When it is desired to remove the nozzle all that is required is to drive the pin inwardly and unscrew the nozzle from the nipple.

The invention therefore comprises a fire hydrant including a casing and a valve stem having new and improved frangible connections, an improved drain valve, a stop at the top for limiting movement of the intake valve, an integral dome and pressure plate, a Teflon bearing between the stem actuator and retaining nut, and an improved lock arrangement for discharge nozzles.

For a full and more complete understanding of the invention reference may be had to the following description and accompanying drawings, wherein:

FIGURE 1 is a side view partly in section and partly in elevation and with parts of the casing broken away, of a fire hydrant embodying the improvements of this invention.

FIGURE 2 is a sectional view on an enlarged scale of the upper end of the hydrant.

FIGURE 3 is a detailed sectional view of the lock for the nozzle being taken about on the plane represented by the line 3—3 of FIGURE 2.

FIGURE 4 is another detail partly in section and partly in elevation showing the stop nut on the valve stem in one limit.

FIGURE 5 is a detailed section through the frangible connection of the valve casing being taken about on the plane represented by the line 5—5 of FIGURE 1.

FIGURE 6 is another detail section taken on an enlarged scale of this frangible connection being taken about on the plane represented by the line 6—6 of FIGURE 5.

FIGURE 7 is still another detail of this connection being taken about on the plane represented by the line 7—7 of FIGURE 6.

FIGURE 8 is a sectional view through the intake end of the hydrant.

FIGURE 9 is a horizonal section through the intake being taken about on the plane represented by the line 9—9 of FIGURE 8.

FIGURE 10 is a detail illustrating one of the rubber strips which closes the drain port in elevation being taken on line 10—10 of FIGURE 8.

FIGURE 11 is a sectional view on an enlarged scale of the drain valve which closes the drain portion (Shown in one limit position), and

FIGURE 12 is a section view similiar to FIGURE 3 of an alternative form of locking pin for the nozzle.

THE GENERAL ASSEMBLY

A fire hydrant embodying the improvements of this invention comprises a casing which is referred to in its entirety by the reference character C. This casing C comprises an upper casing part **10** and a lower casing part **11**. The parts are secured together by a frangible connection to be later described in detail. Secured to the lower end of the lower casing part **11** by a bolted flange connection **12** is an intake shoe I. The shoe I includes an intake opening at **13** which is connected to a water main and has a cylindrical bore **14** which receives a valve seat which will be later described.

The upper casing part **10** carries a plurality of discharge nozzles, each of which is referred to in its entirety by the reference character N and N′ which are in right angular relation. Secured to the upper end of the upper casing part **10** by a threaded connection **15** is a dome D which in turn carries a dust cap A.

THE FRANGIBLE CONNECTIONS

Referring now more particularly to FIGURES 5, 6, and 7, integrally formed with the upper casing part **10** and at lower end thereof is a comparatively wide outwardly extending flange **16** which in turn carries a depending skirt **17**. The flange **16** is formed with a series of bolt holes **18**. The lower end face of the casing part **10** has an annular groove **19** which receives an O-ring packing member **20** that engages the upper end face of the lower casing part **11**.

The upper end of the lower casing part **11** is formed with a comparatively narrow outwardly extending flange **21** that is spaced from the skirt **17**. A plurality of lugs **22** are received in this space, the number of lugs corresponding to the number of bolt holes **18**. The top face of each lug has an inward draft or incline so that only the radially outer edge of each lug engages the underface of the flange **16**. This eliminates the need for accurate machining and insures that the bolts to be later described are not subjected to a bending moment. Each lug **22** has integrally formed thereon an inwardly extending projection **23** with a notch or groove at **24** weakening the connection between the projection **23** and the main body of the lug **22**. This projection **23** engages the under face of the flange **21** and is formed with an arcuate recess **8**.

Each lug **22** aligns with a bolt hole **18** and in turn is provided with a bolt hole **25**. Bolts **26** pass through aligned bolt holes. Each bolt **26** has a head **27** at one end and a nut **28** at the other. When the nuts **28** are tightened, the two casing parts are clamped together in assembled relation and the O-ring **20** provides an effective water seal. It is evident that the casing parts **10** and **11** may be assembled regardless of their angular relation. Thus, there are no bolt holes in the lower casing upper flange because the lugs **22** are movable. When a vehicle or other object strikes the upper part **10** with sufficient force, the connection will break at the grooves **24** which weaken the connection between each projection **23** and lug **22**. When the casing is to be reassembled, all that is necessary is to use new lugs **22**.

A valve stem comprises an upper stem part **29** and a lower stem part **30**, both of non-circular cross section such as the square shape illustrated. These stem parts have confronting end faces at **31**. A connecting sleeve **32** is connected to the upper stem part **29** by a bolt **33** and the lower stem part **30** by a bolt **34**. The sleeve **32** has a bore corresponding in cross section to that of the stem. This sleeve **32** is weakened by an annular groove **35** which will be noted is offset from the confronting end faces **31**. This offset affords increased operational strength yet provides for the breaking of the stem parts when the set is broken. The non-circular cross section of the stem parts and sleeve establishes the driving relation between the stem parts.

The purposes of the improved frangible connection in the stem are three-fold: First, to connect the two parts of the valve stem to provide upward and downward movement of the main valve under normal operation of the hydrant; second, to transmit rotational torque from the upper stem part to the lower stem part when it is desired to remove the main valve and seat ring from the hydrant, and thirdly, to provide for the breaking at a predetermined load. In order to prevent this torsional thrust from passing through the weakened annular groove, the groove is offset from the meeting ends of the stem thereby permitting the transfer of the torque to be through the solid metal section.

THE DISCHARGE NOZZLES

Except for the difference in diametrical dimension, the nozzles N and N1 are substantially duplicates and only one of them is here described in detail as that is believed to be sufficient for the purposes of this specification.

Referring now more particularly to FIGURES 2 and 3, the upper casing part **10** is shown as formed with an outwardly extending nipple **36** which is internally threaded. A sleeve **37** has a central abutment flange **38** and on the inner side of the latter is externally threaded and is screwed into the nipple **36** with a gasket interposed between the two. On the outside of the flange **38**, the sleeve **37** is provided with coarse threads **39** onto which is screwed a cap **40** as shown in the drawing or a hose connection when the cap is removed.

When the sleeve **37** is located in sealing engagement with the nipple by the gasket, a passage **41** is drilled providing an aperture **42** in the nipple **36** with the aperture being counterbored at **43** and the counterbore receiving an externally threaded plug **44**. A lock pin **45** is driven into the apertures **41** and **42** locking the sleeve **37** in the nipple **36**. The plug **44** is then secured into the internally threaded aperture **43** providing sealed closure of the aperture **42** and counterbore **43**. However, then occasion arises, the plug **44** can be removed and lock pin **45** may be removed from its locking position by simply

driving it inwardly whereupon the sleeve **37** may be unscrewed.

An alternative form of locking device for securing the sleeve **37** in the nipple **36** is shown in FIGURE 12. These elements are formed with aligned apertures **2** and **3** and a lock pin **4** is driven thereinto with a tight fit. The pin **4** is formed with a groove **5** which receives an O-ring **6**. The O-ring **6** serves to provide a seal. When removal of the sleeve is desired all that is necessary is to drive the pin **4** inwardly.

THE ACTUATING MECHANISM

The dome or bonnet D comprises a skirt **90** that is externally threaded with the threads being received in internal threads formed in the upper casing part **10** to achieve the threaded connection **15**.

Integrally formed with the skirt **90** is a pressure plate **46** formed with an annular shoulder **47**. Depending from this shoulder **47** is a sleeve **48** providing a bore **49** and a counterbore **50** separated by the shoulder **47**. A stem actuator **53** is screwed onto the upper end of the valve stem part **29** which is threaded such as indicated at **54**. The stem actuator **53** is formed with an annular groove **51** which receives an O-ring **52**. The O-ring **52** provides an effective seal between the stem actuator and pressure plate sleeve **48**.

The stem actuator **53** is formed with an outwardly extending flange **55** which engages the shoulder **47**. The dome or bonnet is formed with a threaded opening at **56** which receives a retaining nut **57**. A Teflon thrust bearing **58** is interposed between the nut **57** and the flange **55**. This Teflon thrust bearing is self-lubricating and serves to reduce friction created by upward thrust of the stem actuator.

The Teflon ring provides three advantages over any existing design, namely: (1) It provides low turning torque with a corrosion resistant material. (2) There is no requirement for lubrication. (3) No danger of seizing due to the failure of the material.

The lower end of the sleeve **48** is formed with an inwardly extending flange **59** which defines an opening snugly receiving the valve stem **29**. The flange **59** is formed with an annular groove **60** which receives an O-ring packing member **61**. The latter provides an effective seal at the lower end of the sleeve **48**. The valve stem **29** also carries an abutment nut **62** which is adapted to engage the flange **59** as shown in FIGURE 4 to limit lower movement of the valve stem caused by rotation of the actuator **53**.

The actuator **53** is closed at its upper end by a top wall **63** formed with a threaded opening **64**. The dust cap A is removably secured in position on the top of the dome over the opening **56** by a screw bolt **65**. This screw bolt **65** may be removed to permit the introduction of lubricant through the opening **64** to the space in the aperture over and about the threaded end of the valve stem **29**. The top plate **63** of the actuator **53** is provided with noncircular surfaces at **66** which in turn fit the corresponding surfaces on the dust cap A. The latter is formed with wrench engaging surfaces **9**. Thus, the dust cap may be rotated to rotate the actuator.

THE VALVES

Referring now more particularly to FIGURES 8–11 inclusive, the bore **14** of the shoe I is threaded. Screwed into this thread bore is a seat carrying ring **67** which is also internally threaded. Screwed into the latter is a valve seat ring **68** formed with a conical valve seat **69**.

The intake shoe I is formed with an inwardly opening annular groove **70** which communicates with the exterior of the intake I through the medium of a drainage port **8**. The seat carriers **67** and **68** are formed with aligned ports **72** and **73** which communicate with the groove **70**. Thus, when the inner end of the port **73** is opened, communication between the interior of the casing and exterior of the intake shoe is provided and any water retained in the casing will be drained off through ports **72** and **73**, groove **70**, and drainage port **8**.

The lower valve stem part **30** is reduced at **74** and the lower end of this reduced portion is threaded at **75**. Mounted on this reduced stem part **74** is a main valve **76** which is held in position by a retaining plate **77** and lock nut **78** with a gasket interposed between the latter to prevent corrosion of threads **75**.

Carried by the valve stem above the valve **76** is a drain valve comprising two webs **79** (identical) with each web **79** having an end structure **80** which carries a rubber strip **81** having integral backing ribs **82**. The rubber strips **81** are reinforced by cross plates **83** at the top and bottom and are rivoted to the end structure **80** by the rivets shown at **84**. The ribs **82** are disposed inwardly and permit water to get in back of the strips **81** when the drain valve is in closed position as shown in FIGURE 11. Thus, the drain valve partakes of the characteristics of a self-sealing valve in which the water pressure urges the rubber strips into sealing position. Moreover, the strip **81** with the ribs **82** are rendered flexible and more readily movable into port closing position.

It will be understood that when the intake valve is closed with the valve member **76** seated on the seat **69** as shown in FIGURE 8, the drain valve is in its upper position in which the drain ports are open. Thus, water may drain from the casing.

When the intake valve is moved downwardly into open position, the drain valve with the rubber strips **81** also move downwardly into position closing the drain ports.

What is claimed is:

1. In a fire hydrant having a casing formed with an inwardly opening annular groove that communicates with the exterior of said casing, a valve seat ring having a face and formed with a port communicating between said face and said groove, a valve stem movable between first and second positions, and a main valve carried by said valve stem and cooperating with said valve seat ring to open the hydrant when said valve stem is in said first position and close the hydrant when said valve stem is in said second position; the improvement comprising: a web structure mounted on said valve stem adjacent to said main valve for movement therewith, and a drain valve in the form of a rubber strip mounted on the exterior of said web structure to be movable from a position closing the port in said valve seat ring when said valve stem is in its first position to a position opening the port in said valve seat ring when said valve stem is in its second position, the backing surface of said strip being supported when the front surface thereof is in closed position against said port to receive fluid pressure for urging the strip against the port in a direction away from the web structure on which it is mounted, at least one of the engaging web and strip surfaces being contoured to effect interrupted engagement therebetween providing interstices for receipt of fluid pressure.

2. In the improvement according to claim **1** in which at least one of said surfaces has a sinuous contour.

3. In the improvement according to claim **1** in which said interrupted engagement is provided by a plurality of raised ribs extending between said strip and web.

4. In the improvement according to claim **3**, in which said ribs are an integral part of said strip.

5. In a fire hydrant having a casing formed with an inwardly opening annular groove that communicates with the exterior of said casing, a valve seat ring having a face and formed with a port communicating between said face and said groove, a valve stem movable between first and second positions, and a main valve carried by said valve stem and cooperating with said valve seat ring to open the hydrant when said valve stem is in said first position and close the hydrant when said valve stem is in said second position; the improvement comprising. a web struc-

ture mounted on said valve stem adjacent to said main valve for movement therewith, and a drain valve in the form of a rubber strip mounted on the exterior of said web structure to be movable therewith from a position closing the port in said valve seat ring when said valve stem is in its first position to a position opening the port in said valve seat ring when said valve stem is in its second position, said strip and web structure having interrupted engaging faces rendering said strip compressible as said valve stem is moved from its said second to its said first position.

6. In the improvement according to claim **5** in which said interrupted engaging faces comprise a plurality of raised ribs extending between said strip and web.

7. In the improvement according to claim **6** in which said ribs are an integral part of said strip.

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U.S. Cl. X.R.

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