June 18, 1963 M. B. CONRAD 3,094,306

TELESCOPIC VALVE

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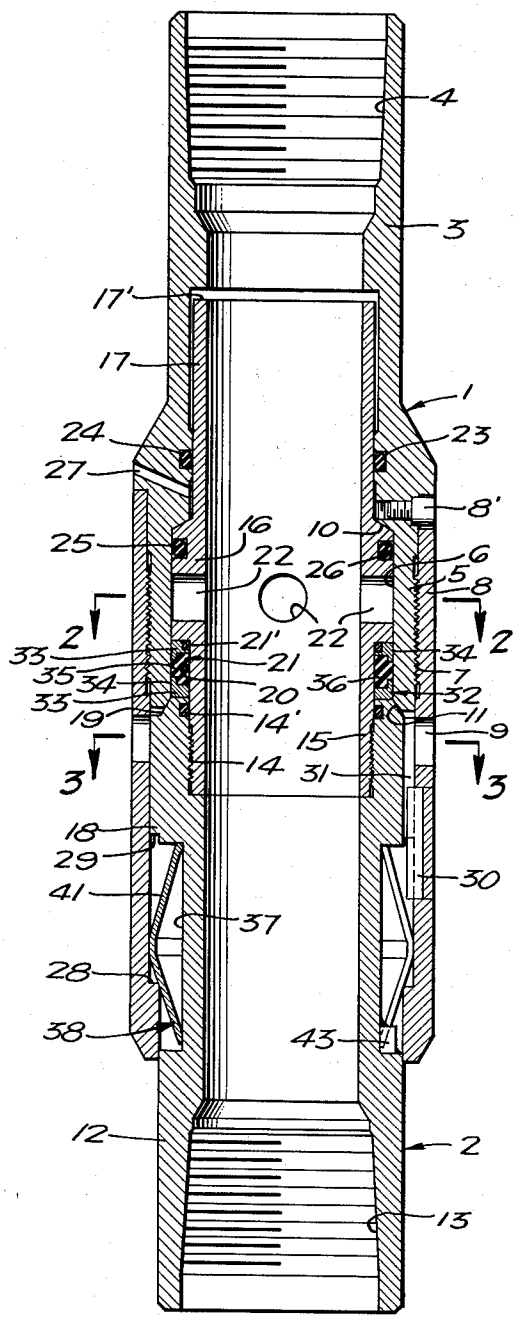
FIG. 1.



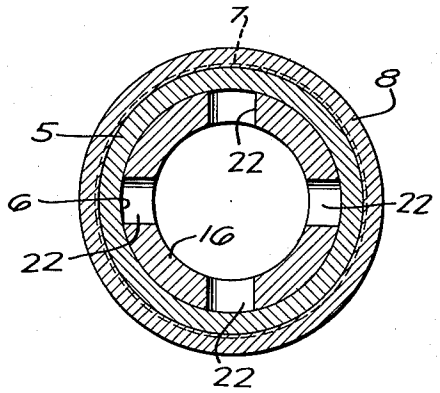


FIG. 2.

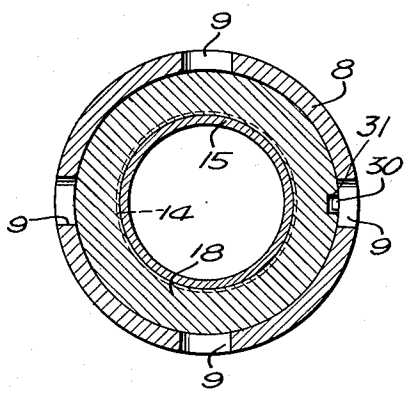


FIG. 3.

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TELESCOPIC VALVE

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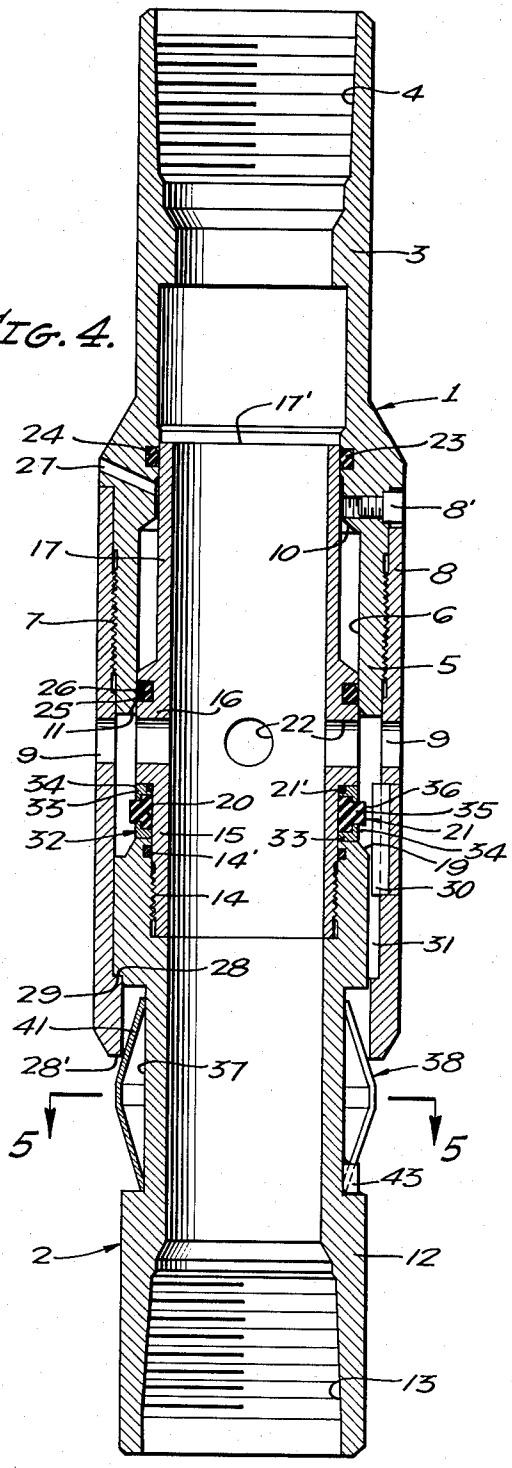
FIG. 4.



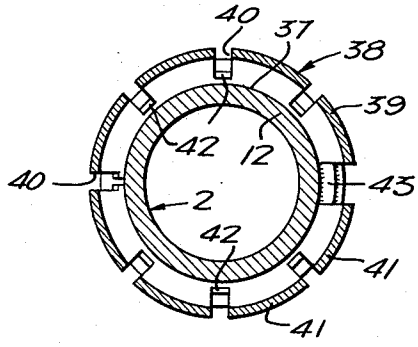


FIG. 5.

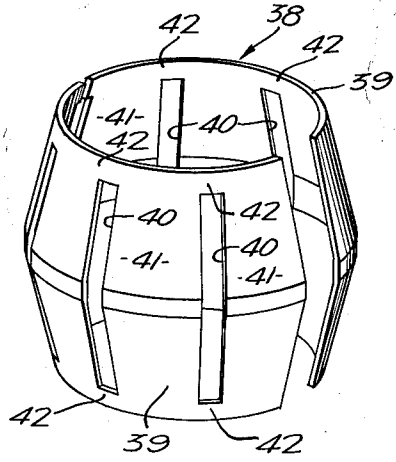


FIG. 6.

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United States Patent Office 3,094,306 Patented June 18, 1963

3,094,306

TELESCOPIC VALVE

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Filed Nov. 17, 1958, Ser. No. 774,483
13 Claims. (Cl. 251—282)

The present invention relates to telescopic valves, and more particularly to an improved telescopic valve having novel means for controlling its operation, together with a novel sealing element adapted to be automatically cut to size upon initial operation of the valve.

In oil and gas well treatments in which it is desired to pump into the well various fluids such as cement, formation fracturing fluids, acidizing compositions, and the like, it may be necessary or desirable to install in the string of pipe to be run into the well, devices for packing off the annulus between the pipe and the well bore or casing to prevent the treating fluid from passing from the lower extremity of the pipe upwardly, exteriorly of the pipe and from the well at the surface.

It is more or less customary in those instances where such packer devices are employed, to also employ in the string of pipe an unloader valve which, when closed, confines the flow of fluid through the pipe to a path extending through the valve but which, when open, permits the flow of fluid from within the valve to the annulus exteriorly of the string of pipe, and vice versa. Such valves are particularly desirable as a means for balancing the hydraulic pressures across the string of well pipe where difficulties are encountered in releasing well packers or the like installed in the pipe string beneath the valve. In addition, such valves are desirable as a means for enabling fluid to pass from within the pipe to the annulus outside of the pipe during running of the packer or other device into the well in the pipe string, thus facilitating the passage of the packer, the pipe and the pipe string, downwardly into existing well fluids by effectively enlarging the by-pass flow area.

In accordance with the objectives of the present invention, the valve hereof is so constructed as to be substantially completely hydraulically balanced so that the hydraulic pressures encountered in a well tend to neither open nor close the valve. However, the valve hereof has a minor area subjected to fluid pressure within the valve assembly tending to open the valve when the latter is closed, and since such opening of the valve is extremely undesirable the present invention, as a further objective, contemplates novel means for restraining the valve assembly against opening as a result of the effect of hydraulic pressure on the aforesaid minor internal area. In addition, the restraining means is also effective to prevent inadvertent closing of the valve as the pipe string in which the valve is installed is being run into a well, whereas otherwise the valve might tend to close, caused by the pipe or packer device therebeneath, encountering resistance due to friction and the like with the borehole or casing of the well.

A further objective of the invention is to provide a telescopic valve assembly of the aforementioned type having novel restraining means for preventing telescopic movement of the valve parts in either direction, say, for example, from an open condition in which the valve is normally run into a well in a pipe string, to a closed position. This novel restraining means, as will hereinafter more particularly appear, is in the form of a spring-like collet carried by one tubular valve part and having radially projecting portions engageable by opposed radial projections on another tubular valve part, so that circumferential constriction of the collet is required in order for the valve to be either opened or closed.

Other objects and advantages of the invention will be hereinafter described or will become apparent to those

skilled in the art, and the novel features thereof will be defined in the appended claims.

FIG. 1 is a longitudinal sectional view through a telescopic valve assembly made in accordance with the invention, the valve being shown in a closed condition;

FIG. 2 is a transverse sectional view as taken on the line 2—2 of FIG. 1;

FIG. 3 is a transverse sectional view as taken on the line 3—3 of FIG. 1;

FIG. 4 is a view corresponding to FIG. 1, but showing the valve assembly in an open condition;

FIG. 5 is a transverse sectional view as taken on the line 5—5 of FIG. 4; and

FIG. 6 is a detailed view in perspective, illustrating the novel collet spring restraining means of the invention.

Like reference characters in the several views of the drawings and in the following description designate corresponding parts.

Referring particularly to FIGS. 1 and 4, it will be noted that the telescopic valve assembly therein shown includes a pair of telescopically interengaged tubular bodies generally designated 1 and 2, the tubular body 1 slidably fitting over the tubular body 2.

The tubular body 1 includes a shank 3, internally threaded as at 4 at its free extremity for connection to a complementally threaded pipe coupling in a string of well pipe or the like. The shank 3 has at its inner extremity a cylindrical seating section 5, having an internal cylindrical seating surface 6 and having threadedly connected thereto as at 7, an axially extended outer sleeve 8, the sleeve 8 being provided with a suitable number of circumferentially spaced radial ports 9.

Internally of the shank 3 of the body 1 is a tapered stop shoulder 10 at the outer extremity of the cylindrical seating surface 6, and at the inner end of the seating section 5 at the inner extremity of the seating surface 6 is a tapered surface 11, for purposes which will hereinafter more particularly appear.

The tubular body 2 is telescopically disposed within the tubular body 1 and includes a base or shank 12 internally threaded as at 13 for connection to a complementally threaded pipe coupling in a string of well pipe or the like, or for connection to a top sub of a well packer or the like (not shown). At its inner end, the base 12 has threadedly connected thereto as at 14, an inner sealing sleeve 15 which is provided with an enlarged central section 16, complemental to and slidable in the seating section of the tubular body 1. Extending axially from the central section 16 of the sleeve 15 is a tubular neck 17 which is slidable within the shank 3 of the tubular body 1.

Telescopic movement of the body sections 1 and 2 in one direction is limited by engagement of the central section 16 of the sleeve 15 with the aforementioned stop shoulder 10, as clearly seen in FIG. 1. Adjacent the zone of attachment of the sleeve 15 to the base 12, the latter is provided with a radially projecting cylindrical enlargement 18 slidable in the outer sleeve 8 of the body 1, the enlargement 18 being provided adjacent its upper end with a tapered surface 19 which is opposed to the tapered surface 11 at the lower extremity of the seating section 5 of the outer body member 1.

Formed between the upper extremity of the annular enlargement 18 and the opposed enlarged central section 16 of the sleeve 15, there is an annular seat 20 adapted to contain a sealing element generally designated 21 which, when the valve is closed, will prevent the passage of fluid from within the valve assembly through a series of radial ports 22 in the enlarged sleeve section 16, so that the flow of fluid through the valve assembly is confined to a path passing from the body section 1 into the body section 2. However, upon extension of the tele-

scopic valve assembly, as shown in FIG. 4, the ports 22 in the inner body member 2, and the ports 9 through the outer body section 1, will be placed in communication with one another so as to permit the flow of fluid from within the valve assembly to the exterior thereof, or vice versa.

Appropriate sealing means are provided between the neck 17 of the sealing sleeve 15 and the inner periphery of the shank 3 of the body section 1, and in the illustrative embodiment such sealing means comprises an O-ring 23 seating in a groove 24 formed in the inner periphery of the body 1 and engaged with the outer periphery of the neck 17. Additional sealing means is provided between the enlarged section 16 of the sleeve 15 and the seating section 5, and again in the illustrative embodiment an O-ring type seal 25 is employed, this seal being disposed in an annular groove 26 in the enlarged section 16 and in sealing engagement with the seating surface 6 of the seating section 5. A further seal, such as an O-ring 14' is also employed at the juncture of sleeve 15 with the base 12.

A vent passage 27 extends through the body section 1 into the interval lying between the O-ring seals 23 and 25, so as to vent the space therebetween during telescopic movement of the respective body sections. In order to limit such telescopic movement of the body sections in a valve-opening direction, the outer sleeve 8 of the body section 1 is provided with a radially inwardly directed projection 28 which is engageable with a circumferentially extended shop shoulder 29 formed on the enlargement 18 of the base 12 of body section 2, as is clearly illustrated in FIG. 4.

In view of the fact that the subject valve is adapted to be installed in a string of well pipe above a well packer or the like, and in view of the fact that such well packers are normally operated by rotative movement of the pipe, means are provided for preventing relative rotation between the respective body sections 1 and 2. Preferably such means includes a key 30 carried by the outer sleeve 8 of body section 1 and slidably engaged in a key-way 31 formed in the enlarged section 18 of the base 12 of body section 2, whereby the body sections are free for relative axial movement within the limits permitted by the stop projections previously described, but rotation of the upper body section 1 will be imparted to the lower body section 2 by the key 30.

In the production of valves of the class here involved, the provision of an appropriate sealing element which will function properly under the adverse conditions of temperature and pressure to which seals are subjected in the use of valves in oil wells, has posed a number of serious problems. One of these problems which has been particularly significant is that of providing a sealing element which has a proper size relationship to the seating surface with which it is adapted to cooperate.

In accordance with a salient feature of the invention, a sealing element is provided which is automatically sized as a result of initial telescopic movement of the valve assembly from an open condition, as shown in FIG. 4, to a closed condition, as shown in FIG. 1. In this connection, referring particularly to FIG. 4, it will be noted that the sealing element 21 comprises a carrier 32 of rigid material, this carrier in the illustrative embodiment comprising a pair of axially spaced annular elements 33 which are substantially L-shaped in cross-section and which are concentrically disposed about the sleeve 15 in axially spaced relation and which provide axially spaced peripheral surfaces 34 extending longitudinal so as to be slidably received within the confines of the seating surface 6 in the seating section 5 when the valve is closed.

Within the space between the annular elements 33 there is defined an internal chamber containing a body 35 of resilient material such as rubber, neoprene, or the like, this body of resilient material having a radially projecting annular protuberance 36 extending between the elements 33 substantially beyond the peripheral surfaces 34 thereof, and constituting a section which is shearable to size upon initial movement therepast of the seating section 5 of tubular body 1.

Accordingly it will be observed that following assembly of the valve hereof or following replacement of a sealing element 21, initial closure of the valve will shear off the protruding section 36 of the resilient body 35 of the sealing element to a size such that effective sealing contact with the seating surface 6 will be assured.

Means are also provided for preventing the access of fluid pressure to the inner periphery of the sealing element 21. In this connection it will be noted that the sealing element lies between the O-ring 14' at one side and an O-ring 21' at the other side. In the illustrative embodiment, the O-ring 21' is disposed in a seat formed in the upper carrier element 33 so as to engage in the seat formed at the juncture of the enlarged section 16 of the sleeve 15 with the body of the sleeve. Accordingly, fluid pressure is precluded from passing O-rings 14' and 21' and gaining access to the inner periphery of the seal as the valve is being opened and the sealing element is clear of the seating section 5 but the ports 22 are still within the seating section, as is particularly desirable under high temperature conditions.

In accordance with another of the salient features of the invention, means are provided for retaining the valve in an open condition as, for example, while the valve is being run into a well in a tubing or pipe string above a well packer or the like, so that fluid may freely pass from within the string of pipe through the ports 9 and 22, and therefore the fluid within the well is not forced to pass solely around the exterior of a well packer or the like disposed in the pipe string beneath the valve. As will hereinafter appear, the means for preventing closure of the valve also serves to prevent the valve from being opened under normal operating conditions, but allows the valve to be forcibly opened when desired.

In this connection the base 12 of the tubular body 2 is provided with an annular seat 37 in which is disposed collet spring means generally designated 38. As best illustrated in FIG. 6, the collet spring means 38 preferably comprises a pair of longitudinally arched and circumferentially extended spring elements designated 39, adapted to be assembled about the base 12 of tubular body 2 within the confines of the seat 37.

Each of the spring elements 39 is longitudinally slotted, as at 40, at a plurality of circumferentially spaced points so as to effectively provide a series of circumferentially spaced arched leaf-like springs 41 interconnected at their upper and lower ends by webs 42.

Inasmuch as the collet spring means 38 is disposed in the space between the outer sleeve 8 of body 1 and the base 12 of body 2, it will be noted, as viewed in FIG. 1, that the radially projecting portions of the leaf spring elements 41 are disposed in the path of the projection 28 so that when the valve is closed, as viewd in FIG. 1, the resistance of the collet spring means 38 must be overcome in order to shift the projection 28 axially therepast in a valve-opening direction. When the valve is in an open condition, as viewed in FIG. 4, it will be noted that the lower extremity of the sleeve 8 of body 1 constitutes a projection 28' opposed to the just-mentioned projection 28, and that the projection 28' is disposed for engagement with the collet spring means 38, the resistance to flexure of which must be overcome in order to close the valve.

The collet spring parts 39 are slightly less than semicircular so as to facilitate their installation about the base 12 of tubular body 2 in the seat 37, and there is preferably disposed within this seat, between a pair of opposed ends of the collet spring parts 39, a spacer block 43 which may be welded or otherwise suitably secured in place. This block 43 is disposed in alignment with the key 30 so as to maintain a clearance between the collet spring parts 39 enabling assembly of the outer sleeve over the body 2

and onto the seating section 5 of the body 1. In order to maintain the sleeve 8 against loosening, a suitable stop such as a screw 8' may be provided, this screw extending through the upper extremity of the sleeve 8 and being secured to the body 1.

The valve assembly herein shown is substantially hydraulically balanced except for the annular area represented by the upper end face 17' of the neck 17. Accordingly there is no tendency of the valve being forced closed by hydraulic pressures, nor is there any significant tendency of the valve to be forced open by reason of fluid pressure acting on the annular area of the end face 17' and an opposing area of the tubular body 1. This will be recognized in the face of the fact that the weight of the pipe string above the valve assembly tends to maintain the valve closed, and in addition the resistance of the collet spring means 38 also serves to retain the valve in a closed condition.

In the use of the valve of the present invention in a pipe string in which a well packer, for example, has been installed, the pipe string will be run into a well with the valve open so as to enable the free by-pass of fluid through the valve, thus substantially reducing the piston effect of the well packer and facilitating filling of the annulus between the running-in pipe and the well wall or casing. Upon reaching the desired elevation in the well, the packer or other device in the pipe string beneath the valve may be manipulated so as to be set in anchoring engagement with the well casing by rotation and axial movement of the pipe in a downward direction, as is customary and well known in the art. Such downward movement of the pipe will also cause the projection 28' at the base of the outer sleeve 8 of tubular body 1 to engage and constrict the collet spring means 38, enabling the valve to telescope in a contracting direction.

As the seating section 5 of the tubular body 1 passes over the sealing element 21 it will shear off the radial protuberance or shearable section 36 of the sealing rubber 35, cutting the sealing element to a proper size for effective sealing contact with the seating surface 6, following which the stop shoulder 10 will limit telescopic movement of the tubular valve bodies as shown in FIG. 1, and the path of flow from within the valve to the exterior thereof, or vice versa, will be shut off, so that fluid may be pumped through the valve assembly from the tubular body 1 into the tubular body 2, and thence into the well through the running-in pipe.

Following the injection of fluid into the well, the well packer or other device beneath the valve assembly may be manipulated so as to be disengaged from the well wall and the entire pipe string retrieved. However, in the event that, for example, the hydrostatic head of fluid outside of the closed valve standing in the annulus between the pipe and the well wall should interfere with releasing of the well packer or other tool beneath the valve so that it will not readily disengage from the well casing, the hydrostatic pressure within the pipe and exteriorly thereof in the well annulus may be balanced off upon opening of the valve by exerting an upward pull on the pipe to overcome the resistance of the collet spring means 38. Preferably the collet spring means is so constructed that a substantial upward pull is required in this connection as, for example, on the order of a number of thousands of pounds, thus assuring that the valve will not become inadvertently opened.

In view of the foregoing it will be recognized that a telescopic valve has been provided which attains the various objectives set out at the commencement hereof, as well as others which are apparent from the foregoing, and while one embodiment of the valve assembly has been herein shown in detail, changes and alterations may be resorted to without department from the spirit of the invention as defined in the appended claims.

I claim:

1. In an unloader valve assembly including a pair of telescopically interconnected tubular bodies, valve means for selectively confining the flow of fluid from one tubular body into the other tubular body when closed and for permitting flow between the interior of one tubular member and the exterior of the other tubular member when open upon telescopic movements of the tubular bodies in opposite directions, said valve means including a cylindrical seat on one tubular body, a resilient sealing element carried by the other tubular body, said sealing element having a radially projecting section of an initial relaxed diameter and volume such that said radially projecting section projects radially past said cylindrical seat upon assembly with the valve means open so as to be sheared by said cylindrical seat to a diameter complemental to the diameter of said cylindrical seat upon initial closure of said valve means.

2. A valve comprising a seating member having a cylindrical seating surface, a cylindrical sealing element shiftable into said seating member, said sealing element having a radially projecting section of an initial relaxed diameter and volume such that said radially projecting section projects past said cylindrical seating surface upon assembly so as to be sheared by said seating member upon initial movement into sealing engagement with said seating surface to a diameter complemental to the diameter of said seating surface.

3. A valve sealing element comprising a pair of axially spaced rigid annular members adapted to be disposed concentrically with respect to a support, and a body of resilient material bonded between said annular members, said body having a radial protuberance extending between said annular members a substantial distance beyond the peripheries of said annular members and being of a volume such that it constitutes a section shearable to size upon initial movement therepast of a cylindrical seating element.

4. A valve sealing element comprising a rigid annular carrier having axially spaced peripheral surfaces extending longitudinally, said carrier having an enlarged internal chamber, and an annular body of resilient material in said chamber, said body having a radial protuberance extending substantially beyond the peripheral surfaces aforesaid and being of a volume such that it constitutes a section shearable to size upon initial movement therepast of a cylindrical seating element.

5. A valve assembly comprising: a first longitudinally extended tubular member having in longitudinally spaced relation thereon a pair of internal inwardly projecting annular shoulders and a cylindrical sealing surface; a second longitudinally extended tubular member telescopically disposed in said first tubular member and having in longitudinally spaced relation thereon an annular seat adjacent one of the shoulders on said first member, a stop shoulder engageable with the other shoulder of said first member, and an annular resilient sealing element slidable into and out of said cylindrical sealing surface upon telescopic movement of said members in opposite directions; spring means disposed in said seat projecting therefrom into the path of said adjacent shoulder of the first member and deflectable by said shoulder upon relative longitudinal movement of said first and second members in opposite directions; sealing means between said first and second members slidable along said cylindrical sealing surface at one side of the stop shoulder on the second member; an extension on said second member slidably disposed in said first member; sealing means between said extension and said first member at the other side of the stop shoulder on said second member, said first member having a passageway extending into the space between the respective sealing means aforesaid, said first member having a passage between one of its shoulders and said cylindrical sealing surface, and said second member having a passage between said sealing element and the stop shoulder on said second member, said passages communicating with one another when

said annular resilient sealing element is out of said cylindrical sealing surface.

6. A valve assembly comprising: a first longitudinally extended tubular member having a longitudinally spaced relation thereon a pair of internal inwardly projecting annular shoulders and a cylindrical sealing surface; a second longitudinally extended tubular member telescopically disposed in said first tubular member and having in longitudinally spaced relation thereon an annular seat adjacent one of the shoulders on said first member, a stop shoulder engagable with the other shoulder of said first member, and an annular resilient sealing element slidable into and out of said cylindrical sealing surface upon telescopic movement of said members in opposite directions; spring means disposed in said seat projecting therefrom into the path of said adjacent shoulder of the first member and deflectable by said shoulder upon relative longitudinal movement of said first and second members in opposite directions; sealing means between said first and second members slidable along said cylindrical sealing surface at one side of the stop shoulder on the second member; an extension on said second member slidably disposed in said first member; sealing means between said extension and said first member at the other side of the stop shoulder on said second member, said first member having a passageway extending into the space between the respective sealing means aforesaid, said first member having a passage between one of its shoulders and said cylindrical sealing surface, and said second member having a passage between said sealing element and the stop shoulder on said second member, said passages communicating with one another when said annular resilient sealing element is out of said cylindrical sealing surface, said spring means comprising a plurality of longitudinally arched leaf springs having oposite ends engaged in said seat with an intermediate portion of said leaf spring projecting into the path of said adjacent shoulder of said first member.

7. A valve assembly comprising: a first longitudinally extended tubular member having in longitudinally spaced relation thereon a pair of internal inwardly projecting annular shoulders and a cylindrical sealing surface; a second longitudinally extended tubular member telescopically disposed in said first tubular member and having in longitudinally spaced relation thereon an annular seat adjacent one of the shoulders on said first member, a stop shoulder engagable with the other shoulder of siad first member, and an annular resilient sealing element slidable into and out of said cylindrical sealing surface upon telescopic movement of said members in opposite directions; spring means disposed in said seat projecting therefrom into the path of said adjacent shoulder of the first member and deflectable by said shoulder upon relative longitudinal movement of said first and second members in opposite directions; sealing means between said first and second members slidable along said cylindrical sealing surface at one side of the stop shoulder on the second member; an extension on said second member slidably disposed in said first member; sealing means between said extension and said first member at the other side of the stop shoulder on said second member, said first member having a passageway extending into the space between the respective sealing aforesaid, said first member having a passage between one of its shoulders and said cylindrical sealing surface, and said second member having a passage between said sealing element and the stop shoulder on said second member, said passages communicating with one another when said annular resilient sealing element is out of said cylindrical sealing surface, said spring means comprising a pair of arcuate longitudinally arched spring units having a plurality of circumferentially spaced longitudinally extended slots therein, said spring units being disposed in said seat and having intermediate portions projecting into the path of said adjacent shoulder of said first member.

8. A telescopic tubular assembly including a pair of tubular members telescopically disposed one within the other, one of said members having an annular groove therein, a circumferentially extended longitudinally arched collet spring seating in said groove and projecting into frictional engagement with the other of said members, said collet spring having a longitudinally extended slot therethrough and said one of said members having a keyway aligned with said slot, and said other of said members having a key slidable in said keyway and being composed of a pair of threadedly interengaged parts adapted to be assembled endwise over said one of said members.

9. A valve assembly comprising: a first longitudinally extended tubular member having in longitudinally spaced relation thereon a pair of internal inwardly projecting annular shoulders, a cylindrical sealing surface, and a lateral port between said shoulders; a second longitudinally extended tubular member telescopically disposed within said first tubular member and having in longitudinally spaced relation thereon an annular seat adjacent one of the shoulders on said first member, a stop shoulder engageable with the other shoulder of said first member, an annular resilient sealing element slidably engaging said cylindrical sealing surface, and a lateral port adjacent the sealing element; spring means disposed in said seat projecting therefrom into the path of said adjacent shoulder of the first member and deflectable by said shoulder upon relative longitudinal movement of said first and second members; sealing means between said first and second members slidable along said cylindrical sealing surface at one side of the stop shoulder on the second member; an extension on said second member slidably disposed in said first member; sealing means between said extension and said first member at the other side of the stop shoulder on said second member, said first member having a passageway extending into the space between the respective sealing means aforesaid, said members being capable of relative axial movement to move said annular resilient sealing element out of said cylindrical sealing surface and to bring said ports into registry.

10. A valve assembly comprising: a first longitudinally extended tubular member having in longitudinally spaced relation thereon a laterally extended shoulder and a laterally extended projection; a second longitudinally extended tubular member telescopically engaged with said first member and having in longitudinally spaced relation thereon a peripheral seat adjacent said projection on said first member and a shoulder adjacent said shoulder on said first member; said first and second members having coengageable sealing means located between said shoulder and said projection on said first member and between said seat and said shoulder on said second member respectively movable into and out of sealing engagement upon telescopic movement of said members; spring holding means disposed in said seat and having a portion projecting into the path of said projection to resiliently resist telescopic movement of said members in opposite directions; and said first and second members having lateral passageways respectively located between said sealing means and said projection on said first member and between said sealing means and said shoulder on said second member.

11. A valve assembly comprising: a first longitudinally extended tubular member having in longitudinally spaced relation thereon a laterally extended shoulder and a laterally extended projection; a second longitudinally extended tubular member telescopically engaged with said first member and having in longitudinally spaced relation thereon a peripheral seat adjacent said projection on said first member and a shoulder adjacent said shoulder on said first member; said first and second members having coengageable sealing means located between said shoulder and said projection on said first member and between said seat and said shoulder on said second member re-

spectively movable into and out of sealing engagement upon telescopic movement of said members; spring holding means disposed in said seat and having a portion projecting into the path of said projection to resiliently resist telescopic movement of said members in opposite directions; and said first and second members having lateral passageways respectively located between said sealing means and said projection on said first member and between said sealing means and said shoulder on said second member, said spring holding means comprising a plurality of longitudinally arched leaf springs having opposite ends engaged in said seat with an intermediate portion of said leaf springs projecting into the path of said adjacent shoulder of said first member.

12. A valve assembly comprising: a first longitudinally extended tubular member having in longitudinally spaced relation thereon a laterally extended shoulder and a laterally extended projection; a second longitudinally extended tubular member telescopically engaged with said first member and having in longitudinally spaced relation thereon a peripheral seat adjacent said projection on said first member and a shoulder adjacent said shoulder on said first member; said first and second members having coengageable sealing means located between said shoulder and said projection on said first member and between said seat and said shoulder on said second member respectively movable into and out of sealing engagement upon telescopic movement of said members; spring holding means disposed in said seat and having a portion projecting into the path of said projection to resiliently resist telescopic movement of said members in opposite directions; and said first and second members having lateral passageways respectively located between said sealing means and said projection on said first member and between said sealing means and said shoulder on said second member, said spring holding means comprising a circumferentially extended longitudinally arched collet spring disposed in said seat and projecting into frictional engagement with the projection on said first member, said collet spring having a longitudinally extended slot therethrough, one of said members having a keyway aligned with said slot, the other of said members having a key slidable in said keyway, and means holding said collet spring with said slot therethrough aligned with said keyway.

13. A valve assembly comprising: a first longitudinally extended tubular member having in longitudinally spaced relation thereon a laterally extended shoulder and a laterally extended projection; a second longitudinally extended tubular member telescopically engaged with said first member and having in longitudinally spaced relation thereon a peripheral seat adjacent said projection on said first member and a shoulder adjacent said shoulder on said first member; said first and second members having coengageable sealing means located between said shoulder and said projection on said first member and between said seat and said shoulder on said second member respectively movable into and out of sealing engagement upon telescopic movement of said members; spring holding means disposed in said seat and having a portion projecting into the path of said projection to resiliently resist telescopic movement of said members in opposite directions; and said first and second members having lateral passageways respectively located between said sealing means and said projection on said first member and between said sealing means and said shoulder on said second member, said coengageable sealing means including a valve seat having a cylindrical sealing surface on one of said members, a resilient sealing element carried by the other member, said sealing element having a radially projecting section of an initial relaxed diameter and volume such that said radially projecting section projects radially past said cylindrical sealing surface of said seat upon assembly of said valve with the valve open so as to be sheared by said seat to a diameter complemental to the cylindrical sealing surface of said seat upon initial closure of said valve means.

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