

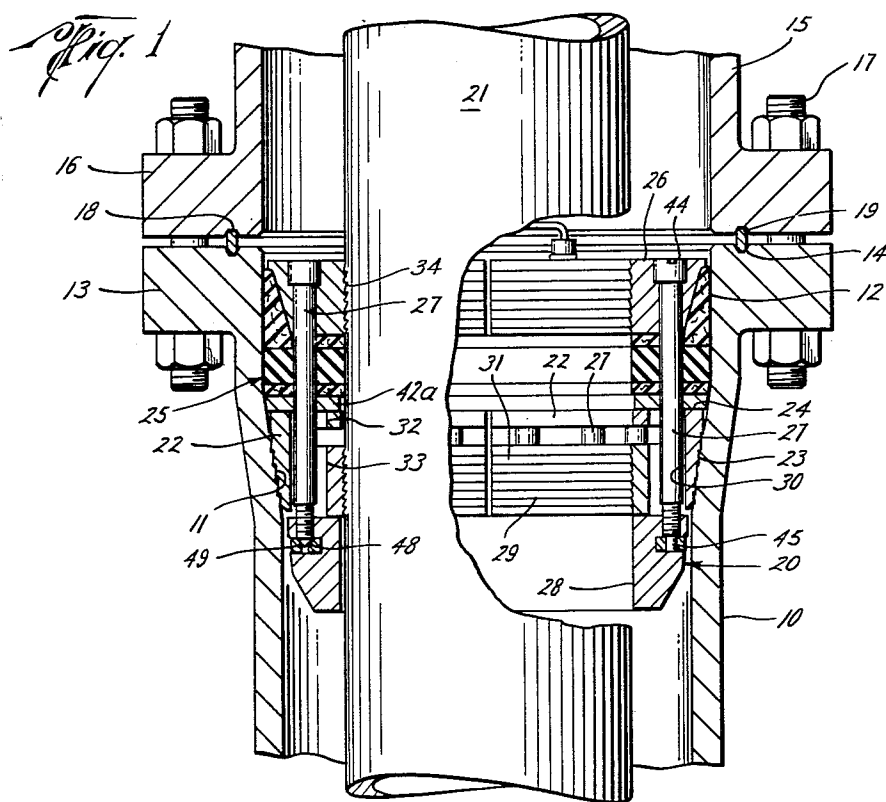
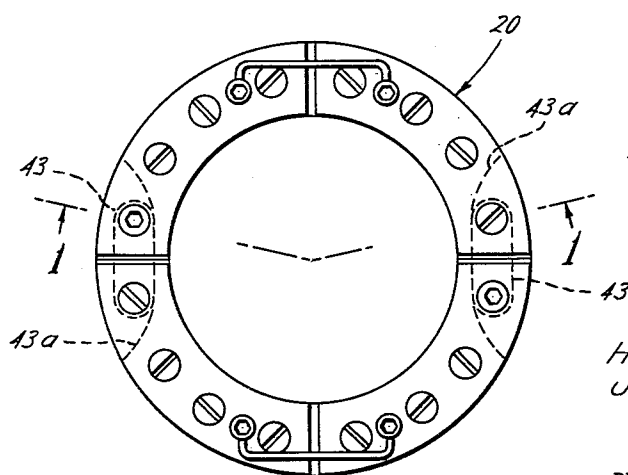
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H. ALLEN ET AL
HANGING APPARATUS

3,011,806

Filed April 18, 1956

4 Sheets-Sheet 1



Herbert Allen
John P. Oliver
INVENTORS

BY

Browning, Simms & Hager

ATTORNEYS

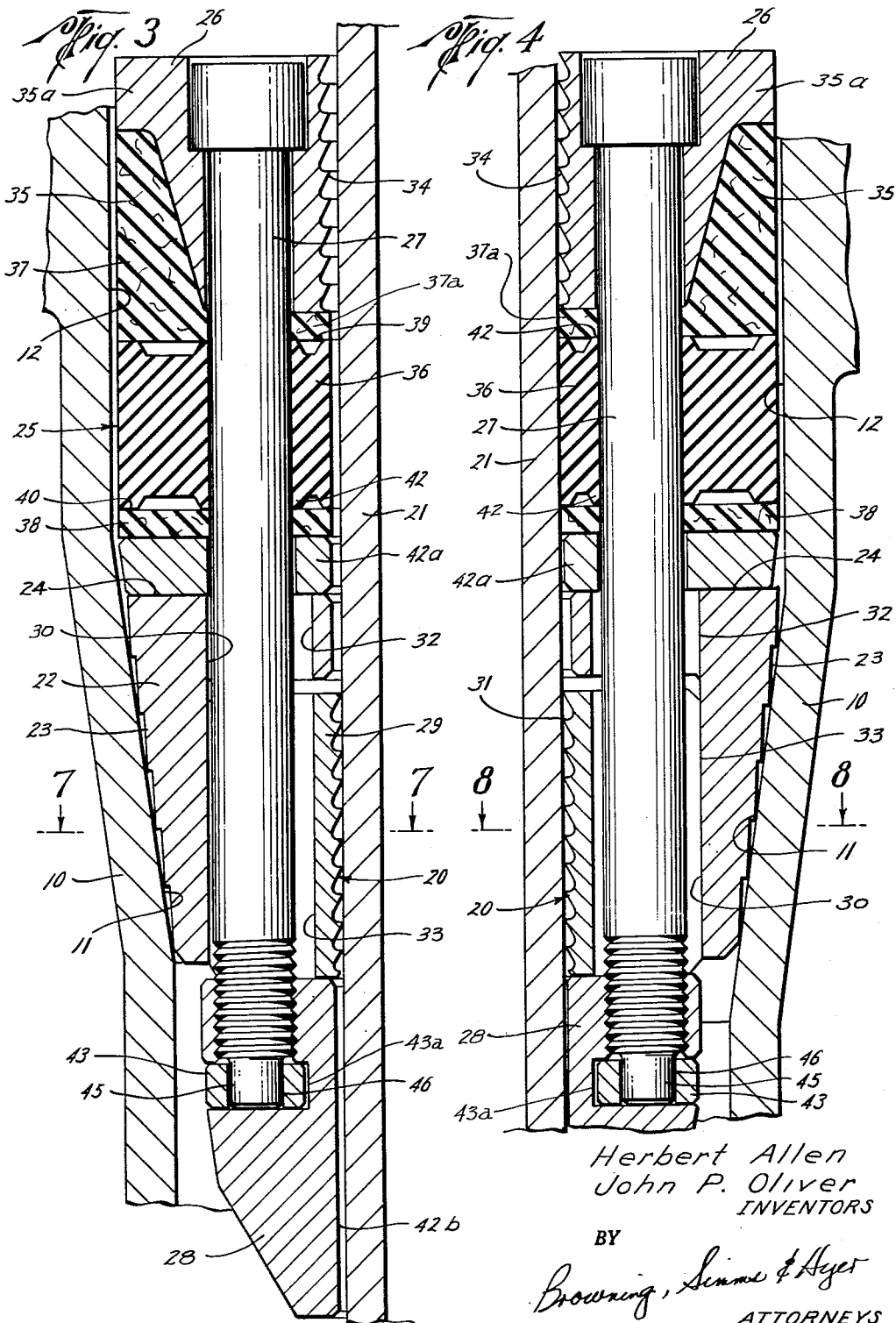
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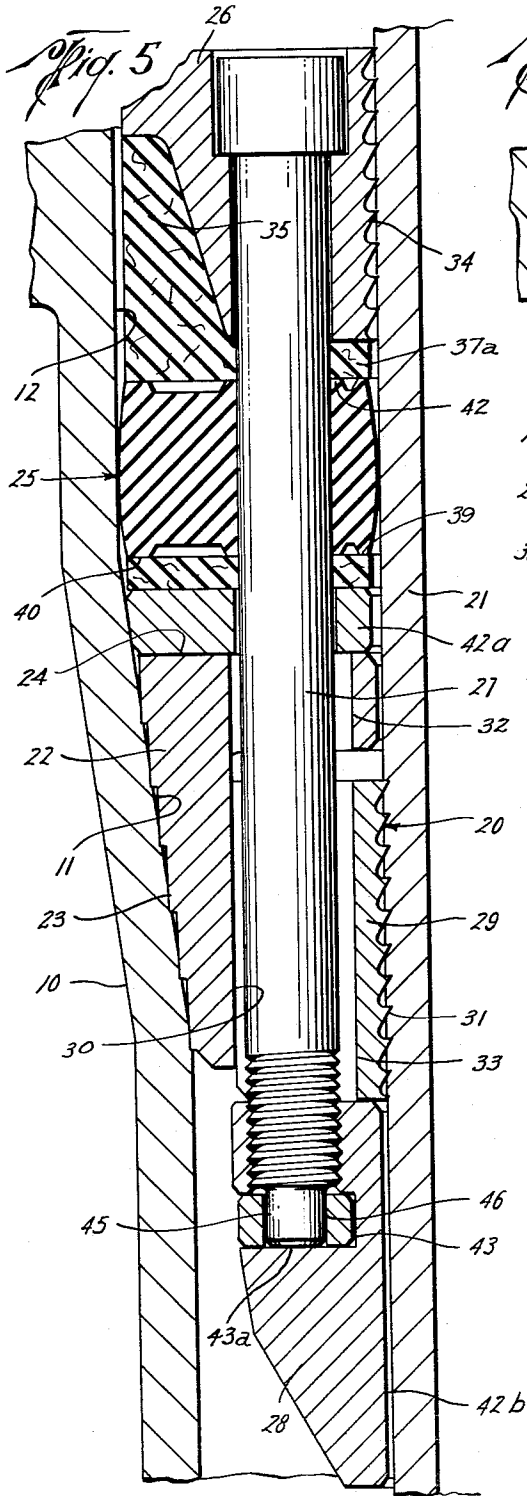
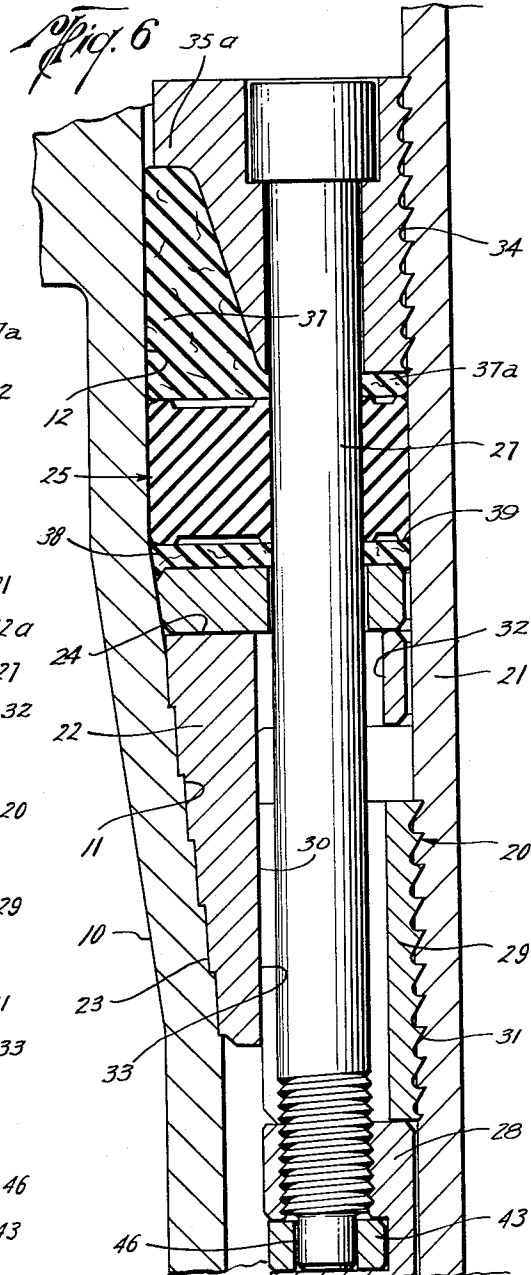
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Herbert Allen
John P. Oliver
INVENTORS

BY

Browning, Simms & Hyer
ATTORNEYS

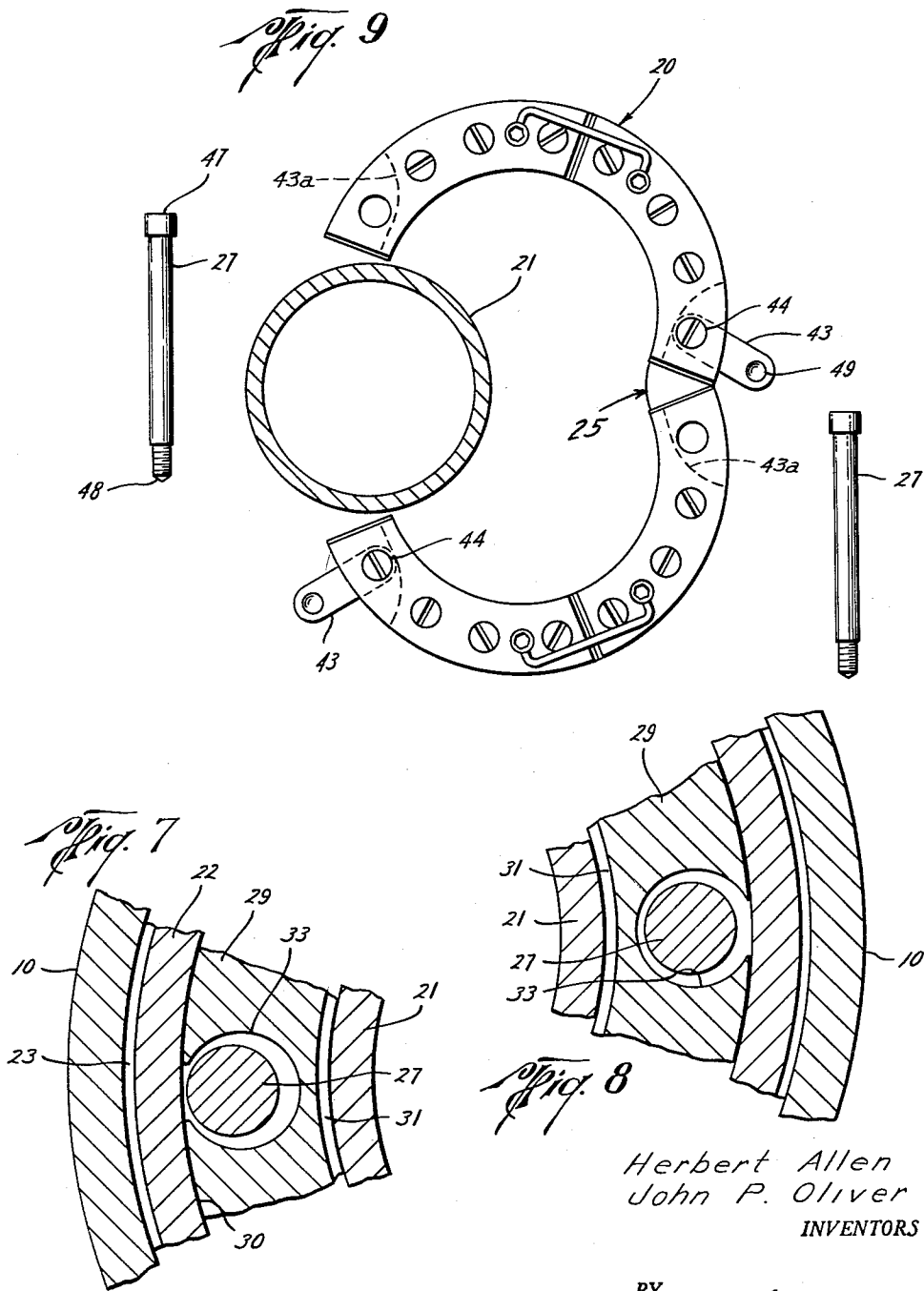
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Herbert Allen
John P. Oliver
INVENTORS

BY
Browning, Simms & Hoyer
ATTORNEYS

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HANGING APPARATUS

Herbert Allen and John P. Oliver, Houston, Tex., assignors to Cameron Iron Works, Inc., Houston, Tex., a corporation of Texas

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5 Claims. (Cl. 285-147)

This invention relates generally to apparatus of the type employing toothed slips seatable on a surface of one member so as to grip and fixedly locate another member against longitudinal movement with respect to said surface as the slips are wedged between the members. More particularly, this invention relates to an assembly for use in hanging and sealing pipe within a wellhead fitting.

This invention constitutes an improvement over that disclosed and claimed in a copending application, Serial No. 543,215, filed October 27, 1955, now abandoned, and assigned to the assignee of the present application. As pointed out in the aforesaid copending application, there had long been the problem in the well art of deflecting the pipe during hanging to such an extent that its inner diameter would not accommodate various well tools designed for passage therethrough. Although many and varied attempts had been made at solving the problem, none had proven satisfactory.

The solution proposed by the invention of this earlier application was to provide one set of slips adapted to exert a large deflecting influence on the pipe during the initial stage of the hanging operation when the load on the slips was low, together with another set of slips to exert a gradually decreasing and eventually minimum deflecting influence on the pipe toward the end of the hanging operation when the load was high. For this purpose, both sets of slips were supported one above the other on a bowl seatable in the wellhead fitting, with the upper slips connected to the lower slips for movement downwardly therewith. More particularly, the lower set of slips were supported for gripping and moving inwardly of the pipe, as the weight of the pipe was placed thereon, at a relatively constant rate. On the other hand, the upper set slips were supported for gripping and moving inwardly of the pipe at a rate which increased per unit of downward movement, as the load was increased and the weight of the pipe was placed thereon.

The assembly of this earlier invention was also "automatic" in that it was operative to establish a seal between the pipe and wellhead fitting responsive to hanging of the pipe. Thus, a seal ring of the assembly was so supported by the bowl and beneath the upper slips as to be compressed by said slips into such sealing relation during downward movement thereof under the weight of the pipe. More particularly, the seal ring was so constructed and arranged as to cause, during compression thereof, the upper slips to move inwardly at the rate above described.

Despite the fact that it has greatly reduced pipe deflection, difficulty has been encountered in securely hanging the pipe and providing an effective seal thereabout with this earlier assembly, especially with relatively low casing loads. Such difficulty is due to the fact that the upper slips are movable downwardly with the lower slips, as previously mentioned, by means of direct rigid connection therebetween. During accommodation of the lower slips to pipe tolerances, as well as during inward movement of the lower slips at a faster rate than the upper slips upon initial loading, there is no free relative radial movement between the lower slips and rigid connectors. As a result, considerable friction is developed between such connectors and the upper slip and its support, which friction, together with the strain caused by

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distortion of the assembly, may restrain the downward movement of the slips to such an extent that the pipe is insecurely hung and the seal ring insufficiently compressed. Consequently, heavy loads must be placed on the slips to insure a proper hanging and sealing of the pipe.

An object of this invention is to provide an assembly of the general type described which will, even under light loads, securely hang the pipe and provide an effective seal thereabout.

A more particularly object is to provide an assembly having the advantages of the earlier invention, but in which the lower slips are movable, without frictional or other restraint, radially with respect to the pipe both during accommodation to pipe tolerances as well as during initial loading of the slips.

It was also found that in the assembly of the copending application, the lower slips were so supported upon a tapered surface of the bowl that there was a tendency for the slips and bowl to converge inwardly about their upper ends, due to the pipe load induced moment thereon. Obviously, such an arrangement was also productive of excessive pipe deflection.

Another object of the present invention is to provide an assembly of the general character described in which the lower slips and bowl are held both above and below in a manner to limit such convergence of their upper ends.

A further object is to provide an assembly having a longer vertical guide surface adjacent the pipe than prior assemblies of this general type, whereby it is maintained in substantial vertical alignment with the pipe.

A still further object is to provide a pipe hanging and sealing assembly of this general type which is adapted to be hinged about the seal ring thereof for wrapping around the pipe, and which is provided with a novel latching means for securing the hinged parts about the pipe.

Other objects, advantages and features of this invention will be apparent to one skilled in the art upon a consideration of the written specification, the attached claims and the annexed drawings.

In the drawings, wherein like reference characters are used throughout to designate like parts:

FIG. 1 is a sectional view taken substantially along broken line 1-1 of FIG. 2 of a wellhead fitting in which a pipe is supported and sealed with respect to the fitting by means of an assembly constructed in accordance with the present invention;

FIG. 2 is a top plan view of the assembly of FIG. 1 removed from the pipe and wellhead fitting;

FIG. 3 is an enlarged sectional view of a part of the assembly of the present invention, and illustrating the manner in which the lower slips of such assembly accommodate themselves to a pipe diameter of minimum tolerance;

FIG. 4 is a view similar to FIG. 3, but illustrating the manner in which the lower slips accommodate themselves to a pipe diameter of maximum tolerance;

FIGS. 5 and 6 are views similar to FIGS. 3 and 4, and illustrating sequentially the manner in which the slip teeth grip and move inwardly with respect to the pipe, as the weight of the pipe is placed on the slips, so as to hang the pipe and compress the seal ring into sealed relation between the pipe and wellhead fitting;

FIGS. 7 and 8 are cross-sectional views of the assembly taken, respectively, along broken lines 7-7 and 8-8 of FIGS. 3 and 4; and

FIG. 9 is a top plan view of the assembly, similar to FIG. 2, but in which hinged connected parts of the assembly have been unlatched and swung open so as to permit it to be wrapped around a pipe.

In accordance with one novel aspect of the present

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invention, there is provided apparatus which comprises a body seatable upon a tapered seating surface of one member and movable, upon seating, a limited extent downwardly with respect to said seating surface and inwardly with respect to another member spaced therefrom. A seal element of deformable material is disposed above the body, and a compression part is disposed above the seal element in position to deform it into sealing engagement between the members upon movement of said part downwardly with respect to the body. A slip, having teeth for gripping the other member so as to fixedly locate it against downward movement relative to the seating surface of the one member, is carried upon a support in a position to be engaged by the body and forced into gripping relation with the other member during said inward and downward movement of the body. This slip support is movable downwardly relative to the body and is suspended from the compression part by a rigid connector so as to move said part downwardly as the weight of the pipe is placed on the slip. Thus, as the body reaches the limit of its inward and downward movement and the slip and its support continue to move downwardly, the seal element will be deformed into sealing engagement between the members.

The slip and body are so constructed as to be freely movable inwardly and outwardly with respect to the rigid connector for suspending the slip support. In this manner, as the body and slip move inwardly with respect to the other member at a faster rate than the compression part and seal element, both during accommodation to pipe tolerances and initial loading of the slip, there will be no frictional or other restraint thereto. Thus, this novel arrangement enables the pipe to be hung securely and the seal effectively established even under low loads.

In accordance with another novel aspect of the invention, there is provided apparatus which also comprises a body seatable upon a tapered seating surface of one member, together with upper and lower slips having teeth for gripping another member spaced from the one member so as to fixedly locate the other member against downward movement relative to said seating surface. The upper slip is supported above the body for movement inwardly toward the one member and downwardly relative to the other member, as the weight of the one member is placed thereon. The lower slip is carried from the upper slip for movement inwardly toward the one member at a rate per unit of movement downwardly relative to the other member, as the weight of the one member is placed on the lower slip, which is initially greater than that of the upper slip.

The means for so carrying the lower slip includes a support for the slip movable downwardly relative to the body, and a rigid connector suspending the support from the upper slip. As in the case of the novel "automatic" sealing assembly above-described, each of the lower slip and connector are movable inwardly independently of one another. Thus, the lower slip is movable without restraint into a sufficiently intimate gripping relation with the other member so that the load of such member may be relatively low.

It is contemplated that an element of deformable material disposed above the body and below the upper slip may include a part inwardly expandable, upon deformation of the element due to downward movement of the upper slip, to move said upper slip inwardly toward the other member at a rate which increases per unit of downward movement, as the weight of the other member is placed thereon. Still further, such a seal element may be disposed across the body for deformation into sealing engagement between said members, as in the case of the "automatic" assembly. Obviously, in this latter instance, the upper slip acts as a compressing part for the seal element.

Referring now particularly to the illustrated embodiment of the invention, there is shown a wellhead fitting 10 which may comprise a standard casing or tubing head

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having on its interior an inwardly and downwardly tapered seat 11 and a substantially cylindrical portion 12 above the seat. The upper end of the head 10 above cylindrical portion 12 is provided with an outwardly projecting flange 13 having an annular groove 14 about its upper surface. A fitting 15, which may be a blowout preventer or the like, is disposed above the head 10 and provided with a flange 16 at its lower end for connection to the head by means of bolts 17 and extending through the flanges 13 to 16. The flange 16 of the fitting 15 is also provided with an annular groove 18 adapted to be disposed opposite groove 14 of the head 10 so that a conventional type seal ring 19 may be received within and compressed between the grooves for sealing the fittings with respect to one another as they are drawn together and made up by the bolts 17.

The assembly of the present invention, which is designated in its entirety by reference character 20, is seated upon the seat 11 of head 10 for the purpose of hanging and sealing the pipe 21, which may be a well casing or tubing, with respect to the head. As well known in the art, it is often desirable in the completion of a well to hang and provide such a seal about the outside of an inner string of pipe prior to removal of the control equipment, such as the blowout preventer 15, which is customarily employed on a well. Thus, in this completion operation, the pipe 21 will have been run into the well through the head 10 and blowout preventer 15 to the position at which it is desired to hang and seal same.

With the pipe held suspended by suitable hoisting apparatus used in running the pipe, the assembly 20 is swung open, as indicated in FIG. 9 and as will be explained more fully hereinafter, so as to permit it to be wrapped around and secured in place about the pipe 21 at a location above the blowout preventer. Upon opening of the preventer, the assembly is permitted to pass downwardly along the pipe and to land in the head by seating upon seat 11, at which time the weight of the pipe is eased off of the hoisting apparatus and placed upon the slips of the assembly. As will be described more fully hereinafter, the assembly is automatically operable in response to the weight of the pipe being placed thereon to hang and seal same with respect to the head 10.

Although the assembly of this invention is especially well suited for the above described use, and thus is particularly described in connection therewith, it is understood that its novel concepts are not limited to such use.

The assembly 20 includes a bowl made up of a plurality of circumferentially separated segments 22, each having an outer surface 23 tapered correspondingly to the seat 11 of the head 10 for movement, upon seating of the bowl, inwardly of the pipe and downwardly of the fitting. An upper surface 24 on each of the bowl segments extends inwardly from the fitting to a point substantially adjacent the pipe 21 for supporting a seal ring 25 of deformable material disposed thereacross. The bowl is formed of four segments, while the ring is split at one location circumferentially, as indicated by FIG. 9, in alignment with one of the bowl segment separations.

Disposed above seal ring 25 is a compression part comprising a plurality of circumferentially separated segments 26, the separations between said segments being aligned with those between the bowl segments, as can be seen from FIG. 1. Suspended by bolts 27 from the compression part segments 26 is a slip support ring which is formed in two segments 28 separated in alignment with the split in the seal ring and two of the bowl and compression part segments. Supported on ring segments 28 in a position between the bowl segments and the pipe are a plurality of lower slip segments 29 which are circumferentially separated in alignment with the bowl and compression part segments. Thus, as the bowl seats in the head and the bowl segments 22 move inwardly and downwardly, the inner surfaces 30 of the bowl segments will engage the outer surfaces of slip segments 29 so as to force them inwardly toward the pipe. Teeth 31 on the

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inner surfaces of the slip segments 29 will grip and move downwardly with the pipe as the weight of the pipe is placed thereon. It will be understood that since, during this initial loading of the slips, there will be substantially no radial force upon the seal ring and compression part segments, the bowl and slip will move radially inwardly of the pipe at a greater rate than the ring and compression part segments.

The outer surfaces 23 of the bowl segments are stepped and the support ring segments 28 are movable downwardly relative thereto in such a manner that loading of the lower slips not only causes the slip teeth 31 to bite into the pipe, but also serves to automatically deform the seal ring into sealing engagement between the pipe and fitting. That is, the steps on surface 23 of bowl segments 22 offer less frictional resistance than slip teeth 31 so that the pipe 21 will first be gripped by the pipe as the bowl segments move inwardly and downwardly. However, such movement will be gradually retarded by the steps as the load increases and, as it is stopped altogether, the slip segments and support ring will continue to move downwardly so as to deform the seal ring 25 above the upper surface 24 of bowl segments 22.

It will be noted from each of FIGS. 3 to 6, inclusive, that the slip segments 29 are movable radially independently of the rigid connection provided by bolts 27. In this manner, as the weight of the pipe is placed upon the lower slip segments 29, and during such time that the slip segments move inwardly with respect to the pipe at a greater rate than the compression part segments 26 and seal ring 25, they are permitted to so move freely and without restraint by the bolts 27.

Thus, in addition to extending downwardly through relatively tight-fitting openings in compression part segments 26 and seal ring 25, the bolts 27 extend through enlarged openings 32 and 33, respectively, in bowl segments 22 and slip segments 29 for threaded connection at their lower ends with support ring 28. As shown in FIGS. 7 and 8, the openings 33 through slip segments 29 intersect with the outer surface of the slip segments engaged by inner surface 30 of bowl segments 22. In fact, it is contemplated that the circle described by the opening 33 will be tangential to the outer surface of slip segments 29. However, as long as the slot formed at the intersection is sufficiently small to retain the bolts, the width of the assembly may thusly be kept to a minimum.

As illustrated in FIGS. 3 and 7, the slip segments 29 will readily accommodate themselves to a pipe of minimum tolerance. In this case, upon seating, the bowl segments 22 move freely inwardly and downwardly a slight amount to force the lower slip segments 29 radially inwardly with respect to compression part segments 26 and seal ring 25 so as to grip the pipe 21. On the other hand, the lower slip segments 29 of this assembly will also readily accommodate themselves to a pipe of maximum tolerance, as illustrated in FIGS. 4 and 8. In this instance, it is contemplated that there will be little or no inward and downward movement of the bowl segments 22, so that the teeth 31 of the lower slip segments will be in substantial axial alignment with the inner surface of compression part segments 26. It will thus be seen from a comparison of FIGS. 3 and 7 with FIGS. 4 and 8, that in the case of minimum pipe tolerance, the bolt 27 will be disposed toward the outer surface of slip segments 29 at the time the weight of the pipe is first placed on the lower slip segments, while in the case of maximum pipe tolerance, the bolts 27 will be disposed more nearly adjacent the teeth 31 of the slip segments. Thus, it will be understood that the openings through the bowl segments and slip segments are of such size as to not only permit free movement thereof inwardly and downwardly during initial loading, but also to permit free movement in accommodating themselves to minimum and maximum pipe tolerances.

The compression part segments 26 comprise slips having teeth 34 on their inner surfaces for gripping the pipe

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and supported above the seal ring 25 for movement inwardly toward the pipe at a rate which increases per unit of slip movement downwardly relative to the head 10, as the weight of the pipe is placed on the slips. For this purpose, seal ring 25 not only includes a part deformable into sealing engagement with the pipe and fitting upon downward movement of compression parts 26 relative to bowl segments 22, but also a part which will, during such deformation, cause the segments 26 to move inwardly or radially of the pipe in the manner described. More particularly, as the downward movement of the segments 26 compresses the ring 25 so as to increase the resistance of the ring to downward movement of the segments 26, said part of the seal ring will expand radially so as to move the slip segments 26 inwardly of the pipe at an increasing rate per unit of downward movement thereof.

The seal ring 25 is made up of a central sealing portion 36 of rubber or other material having a rather high degree of flowability, and upper and lower portions 37 and 38 of a deformable material having a somewhat lesser degree of flowability so as to prevent the extrusion of portion 36 therepast as the ring is deformed. The upper portion 37 includes a radially extending part 37a directly beneath the slip segments 26 at the inner periphery thereof, and another part 35 extending upwardly from part 37a adjacent the outer periphery of the slip segments. More particularly, the part 35 extends upwardly to a point beneath an annular shoulder 35a beneath the upper end of the slip segments so that said part is substantially confined, upon deformation of the ring, for expansion radially inwardly against the slip segments. Obviously, the rate of such expansion will increase per unit of deformation of the ring so as to move the slip segments in the manner previously described.

Reviewing now to the overall operation of the assembly, as the load of the pipe is first placed thereon, the lower slip segments are forced into gripping relation with the pipe. As illustrated by a comparison of FIGS. 3 and 4 with FIG. 5, this loading of the slip segments will cause them to push downwardly on support ring segments 28 which, in turn, will pull downwardly upon bowl segments 22 through the medium of bolts 27, upper slip segments 26 and seal ring 25. Obviously, at this stage, the steps on the surface 23 of bowl segments offer little frictional resistance to downward movement so that there is little downward movement of the support ring relative to the bowl, the seal ring is only slightly deformed, and the teeth of the upper slip segments are moved only slightly toward the pipe.

However, as the load of the pipe is further increased, the steps will be caused to bite into seat 11 a sufficient amount to stop downward movement of the bowl segments as the lower slip segments 29 and support ring 28 move downwardly with respect thereto. In this manner, and as shown in FIG. 6, the seal ring 25 is deformed into sealing engagement between the pipe and bowl and the teeth 34 of upper slip segments 26 are caused to bite firmly into the pipe. More particularly, the upper slip segments are caused to bite into the pipe at an ever increasing rate per unit of downward movement thereof.

Thus, during the initial stages of the hanging and sealing operation and while the load is relatively low, there is first exerted on the pipe a force having relatively large deflecting influences, such force being due to the movement of the lower slip segments inwardly of the pipe at a relatively constant rate corresponding substantially to the steep taper of seat 11. However, as the load is increased, a gradually increasing percentage of the weight of the pipe is accepted by the upper slip segments. Since these latter segments are, in effect, movable inwardly of the pipe in accordance with a gradually reducing taper, a minimum of pipe deflecting influence will be exerted thereby at the time the full load is placed on the assembly.

In addition to providing a seal between the pipe and fitting against pressures from above, this assembly also

provides a very effective seal against pressures from below. That is, the above-described construction of the seal ring will have the effect, in response to pressure from below the assembly, of actually urging the upper slip segments 26 into a tighter gripping relation with the pipe. To be more particular, the seal ring acts as a piston which, upon upward urging, causes the upwardly directed teeth 34 of upper slip segments 26 to bite still deeper into the pipe. It will also be noted that with bolts 27 extending therethrough, the seal ring will be pressure energized from both above and below on an area multiple basis, determined by the ratio of the cross-sectional area of the entire assembly at the ring to the cross-sectional area of the ring itself.

It is contemplated that the upper and lower portions 37 and 38 of the ring may be formed of a rubber compound reinforced with fabric. It is also contemplated that the center portion 36 of the ring may be provided with lips 39 and 40 about its inner and outer diameter for deformation by the upper and lower parts of the ring, as well as annular lips 42 for encircling the openings through the central part 36 for receiving bolts 27. It will be understood to those skilled in the art that the use of such lips will facilitate a low pressure seal in the case of loading of the slips with a relatively small amount of weight.

Supported upon the upper surface 24 of the bowl segments 22 and beneath seal ring 25 is a back-up ring composed of two segments 42a separated in alignment with support ring segments 28 and having openings therethrough to accommodate bolts 27. These segments 42a permit the bowl segments 22 to move radially with respect thereto and are of such width as to provide a full back-up for the seal ring as well as the upper surfaces 24 of the bowl segments. It will be noted in this respect that the support ring segments 28 are of such width as to provide a full back-up for the lower surfaces of lower slip segments 29 supported thereon. In this manner, the lower slip means and bowl therefor are restrained both above and below against tilting, so that there is no tendency for them to converge toward the pipe at their upper ends due to moments induced by the weight of the pipe.

The inner surface 42b of the support ring segments 28 extends for a substantial distance axially of the pipe and is disposable substantially adjacent thereto so as to provide a guide against tilting of the assembly relative to the pipe.

As previously mentioned, the seal ring 25 is split at one circumferential location to permit the assembly to be swung open for wrapping around the pipe. More particularly, this split in the ring is located in alignment with one of the separations between the segments of the upper and lower slips, bowl, and support ring so that the assembly may be swung open about the diametrically opposed portion of the seal ring which acts as a hinge, as shown in FIG. 9. In this open position of the assembly, certain of the bolts 27 provide a means of connecting the various elements of the assembly together both vertically as well as radially.

As best shown in FIG. 9, the two swingable parts of the assembly are adapted to be secured together by means of latches 43 which are removably disposable within recesses 43a of the support ring segments 28. When so disposed, the latches 43 span the separations between the adjacent parts and are in position to be retained therein by the lower end of certain others of the bolts 27. Thus, one latch bolt 27 is removed from each of the parts of the assembly, as indicated by FIG. 9, so as to permit the latches to be swung open. More particularly, and as illustrated in FIG. 1, two of the latching bolts are provided with screw heads 44 at their upper end and a retaining pin 45 at their lower end for reception within openings 46 (see FIGS. 3 to 6) in one end of each latch 43. The other latch bolts are provided with Allen heads 47 at their upper ends and conical surfaces 49 at their

lower ends for cooperation with conical depressions 48 (see FIG. 1) in the other ends of the latches 43.

Upon removal of the latching bolts 27 having Allen heads on their upper ends, the pins 45 on the lower ends of the other bolts provide pivots about which the latches may be swung to an open position, as shown in FIG. 9. After the assembly has been wrapped around the pipe, and its open ends adjacent the circumferential split in the seal ring 25 are brought together, the latches 43 may be swung back into the recesses 43a within support ring 28 so as to substantially align their conical surfaces 49 with the openings in the elements of the assembly for receiving latch bolts 27. At this time, the removable latch bolts 27 are inserted within the bolt holes of the assembly and initially threaded to the support ring segments, so that the conical ends 48 thereof engage surfaces 49 of the latch 43. This construction enables the parts of the assembly to be brought tightly together as the bolts are further forced into threaded engagement with the threaded openings in support ring segments 28.

From the foregoing it will be seen that this invention is one well adapted to attain all of the ends and objects hereinabove set forth, together with other advantages which are obvious and which are inherent to the apparatus.

It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the claims.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

The invention having been described, what is claimed is:

1. An assembly for hanging and sealing a pipe within a wellhead fitting or the like, comprising a bowl seatable in the fitting, a seal ring of deformable material above the bowl, a compression ring above the seal ring, slip means having teeth thereon for gripping the pipe, a support ring carrying the slip means between the bowl and pipe and movable downwardly relative to the bowl, said bowl including a plurality of circumferentially separated segments adapted, upon seating of the bowl, to move inwardly and downwardly in engagement with the slip means, each of the slip means and compression and support rings comprising segments having diametrically disposed separations therebetween in substantial alignment with separations between the bowl segments, and the seal ring being split circumferentially to permit opening of the assembly into at least two parts for wrapping around the pipe, openings through the seal ring as well as each of the segments of the bowl, compression ring and slip means, a bolt suspended from each of the compression ring segments and received through said openings for connection with each support ring segment, and means for securing the parts of said assembly together when wrapped about the pipe, said securing means comprising latches for spanning the separations between adjacent parts and removably disposable within recesses of the support ring segments in position to be retained by the lower end of the bolts connected thereto.

2. An assembly for hanging and sealing a pipe within and from a downwardly and inwardly tapered seat of a wellhead fitting or the like, comprising an annular bowl including a plurality of segments disposable between the fitting and pipe, said segments being circumferentially spaced apart and having outer surfaces tapered correspondingly to the seat for seating thereon and sliding downwardly and inwardly therealong when so disposed, a seal ring of deformable material supported by the bowl against movement downwardly with respect thereto and for extension between the pipe and fitting, a compression ring above the seal ring, circumferentially spaced apart slip segments each having teeth thereon, a support carry-

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ing the slip segments radially inwardly of the bowl segments so that the slip segments are forced inwardly into gripping relation with the pipe upon said inward movement of the bowl segments, and rigid connectors extending closely through the seal ring to suspend the support from the bowl segments and the slip segments in downwardly force-transmitting relation to the compression ring, said slip segments being movable downwardly with respect to the bowl segments as the load of the pipe is placed thereon, to thereby deform the seal ring into sealing engagement between the pipe and fitting, and said slip segments and bowl segments being movable radially with respect to said connectors.

3. An assembly of the character set forth in claim 2, including teeth on the outer surfaces of the bowl segments, said teeth offering less frictional resistance than the teeth on the slip segments.

4. An assembly for hanging and sealing a pipe within and from a downwardly and inwardly tapered seat of a wellhead fitting or the like, comprising an annular bowl including a plurality of segments disposable between the fitting and pipe, said segments being circumferentially spaced apart and having outer surfaces tapered correspondingly to the seat for seating thereon and sliding downwardly and inwardly therealong when so disposed, a seal ring supported by the bowl segments against movement downwardly with respect thereto and extending thereacross, a compression ring above the seal ring, circumferentially spaced apart slip segments each having

teeth thereon, a support carrying the slip segments radially inwardly of the bowl segments beneath the seal ring so that the slip segments are forced inwardly into gripping relation with the pipe upon said inward movement of the bowl segments, and rigid connectors extending closely through the seal ring and suspending the support from the compression ring, said slip segments and support being movable downwardly with respect to the bowl segments, as the load of the pipe is placed thereon, to thereby deform the seal ring into sealing engagement between the pipe and fitting, and said slip segments and bowl segments being movable radially with respect to said connectors.

5. An assembly of the character set forth in claim 4, including teeth on the outer surfaces of the bowl segments, said teeth offering less frictional resistance than the teeth on the slip segments.

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