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LeRouax

[11] **3,915,426**

[45] ***Oct. 28, 1975**

[54] **BLOWOUT PREVENTER WITH VARIABLE INSIDE DIAMETER**

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[73] Assignee: **Hydril Company**

[*] Notice: The portion of the term of this patent subsequent to July 29, 1992, has been disclaimed.

[22] Filed: **Nov. 5, 1973**

[21] Appl. No.: **412,771**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 326,965, Jan. 26, 1973, abandoned.

[52] **U.S. Cl.** **251/1;** 277/127

[51] **Int. Cl.²** **E21B 33/06**

[58] **Field of Search** 251/1; 277/73, 126, 127, 277/129, 181, 185, 188, 235; 166/81, 82, 84, 86, 88

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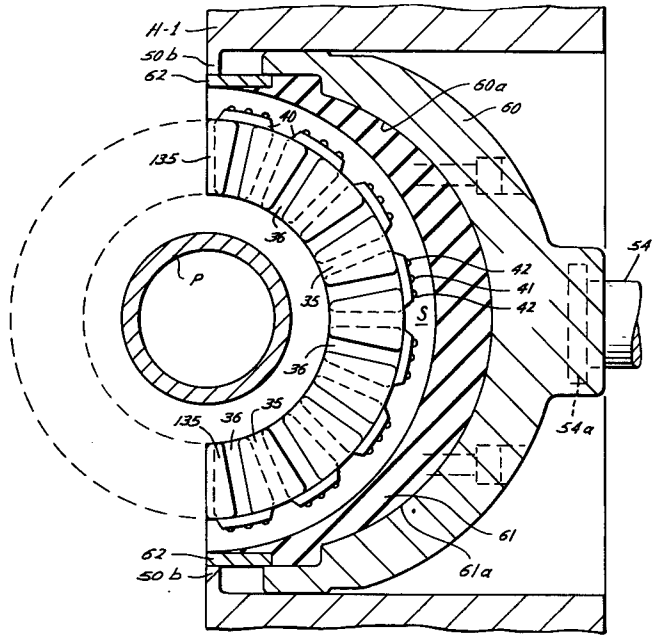
Assistant Examiner—Richard Gerard
Attorney, Agent, or Firm—Pravel & Wilson

[57] **ABSTRACT**

A variable inside diameter blowout preventer capable of sealing off a bore or around an object against high well pressures, and which may be either a ram-type preventer or an annular preventer, and wherein a plurality of upper and lower anti-extrusion members are each disposed in two overlapping layers and are mounted for radial movement to and from a sealing position and an open position, with the anti-extrusion members inhibiting extrusion of a resilient sealing member therewith throughout a predetermined range of variable inside diameters of the sealing member and anti-extrusion members.

11 Claims, 10 Drawing Figures



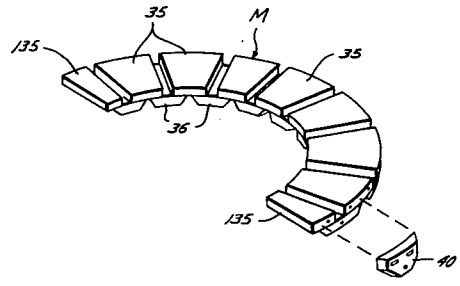


Fig. 1

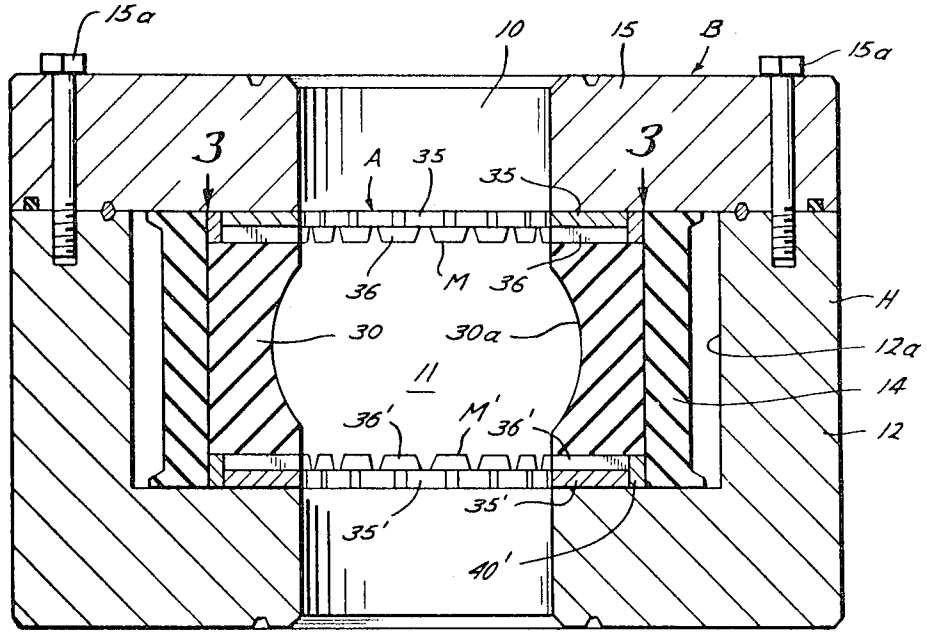

15a
10
15
B
15a
3
3
A
35
35
36
M
36
H
30
30a
12a
11
14
36'
M'
36'
12
35'
35'
40'

Fig. 2

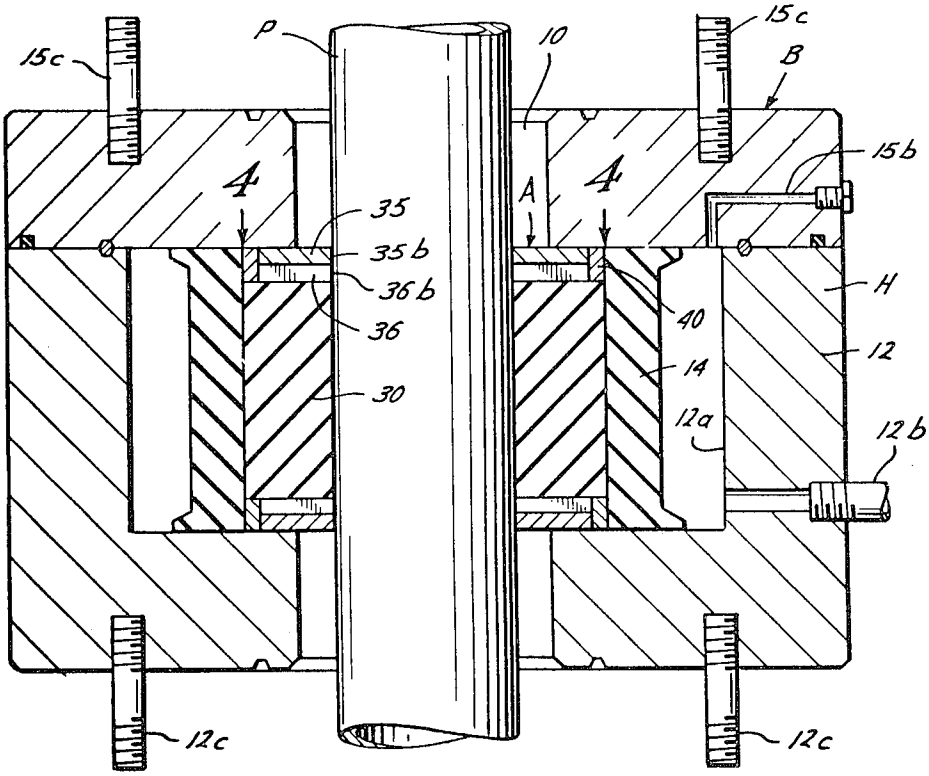

15c
P
10
15c
B
15b
4
4
A
35
35b
36b
36
30
40
H
12
14
12a
12b
12c
12c

Fig. 3

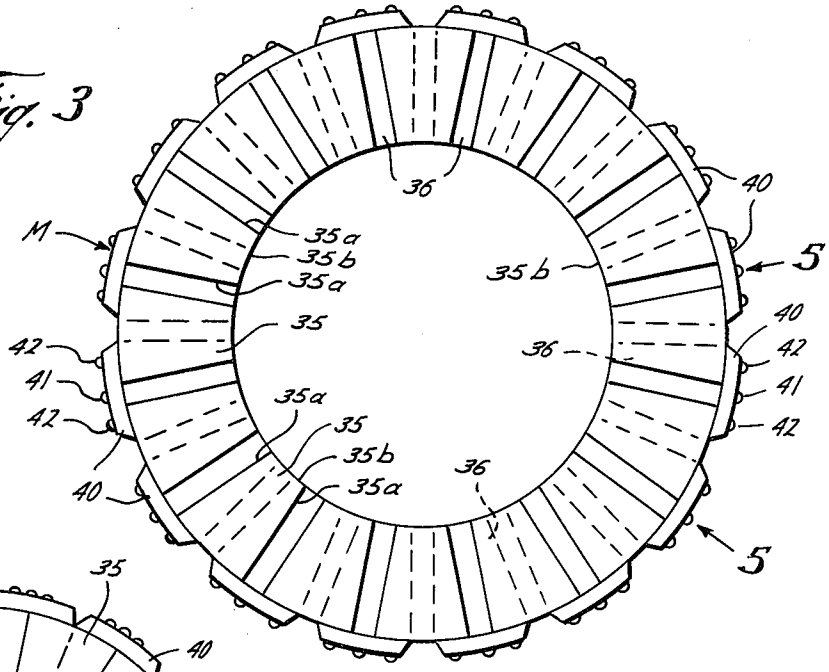


Fig. 4

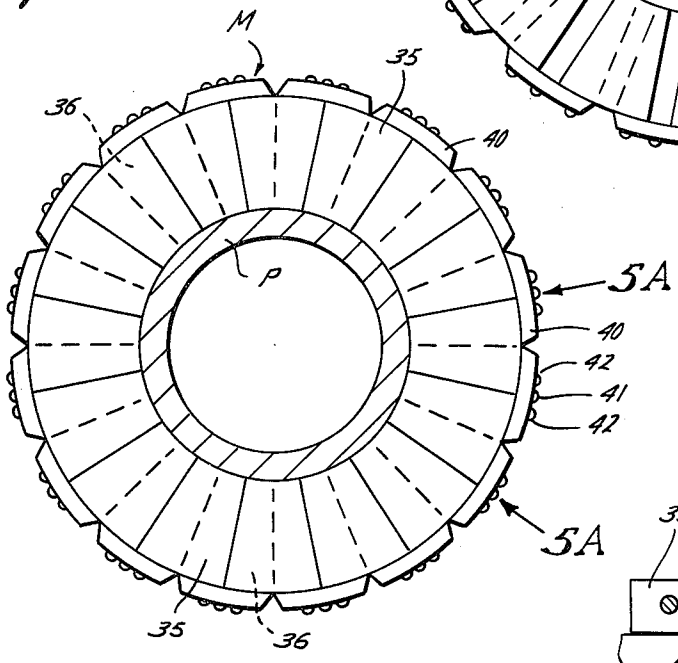


Fig. 5

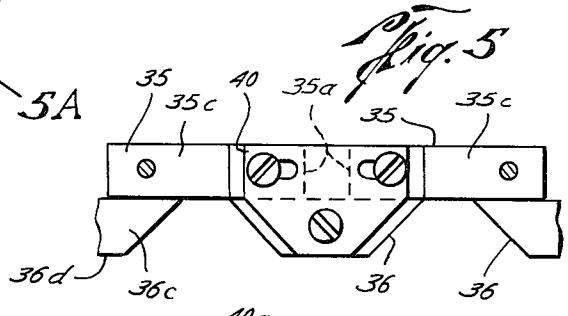
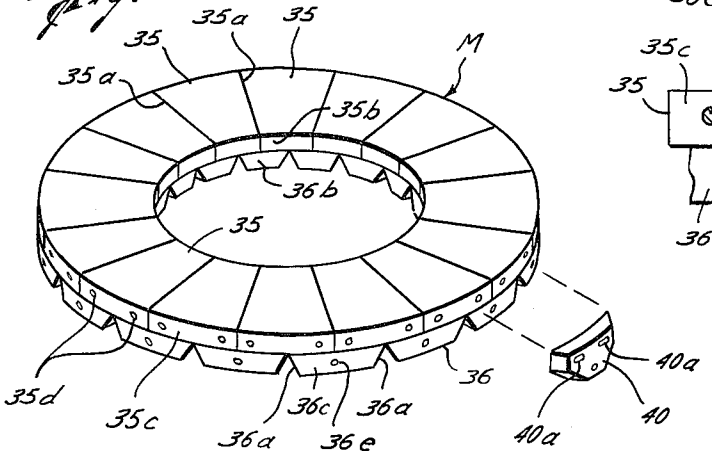


Fig. 6



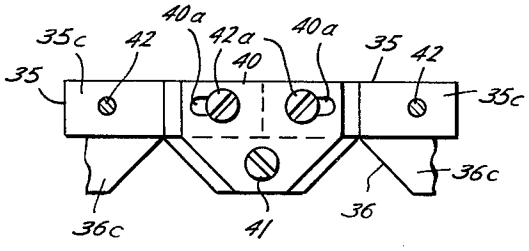


Fig. 5A

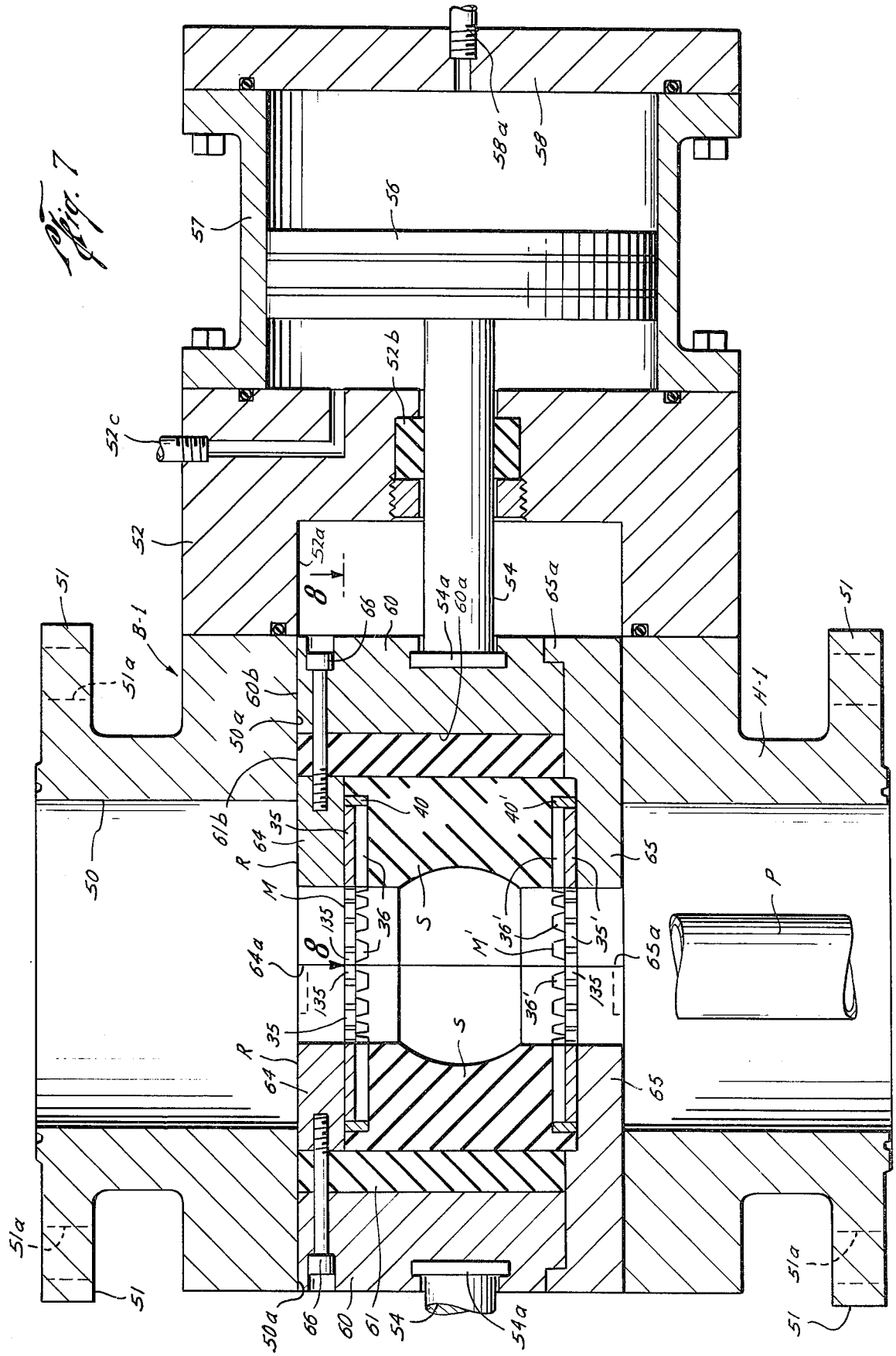
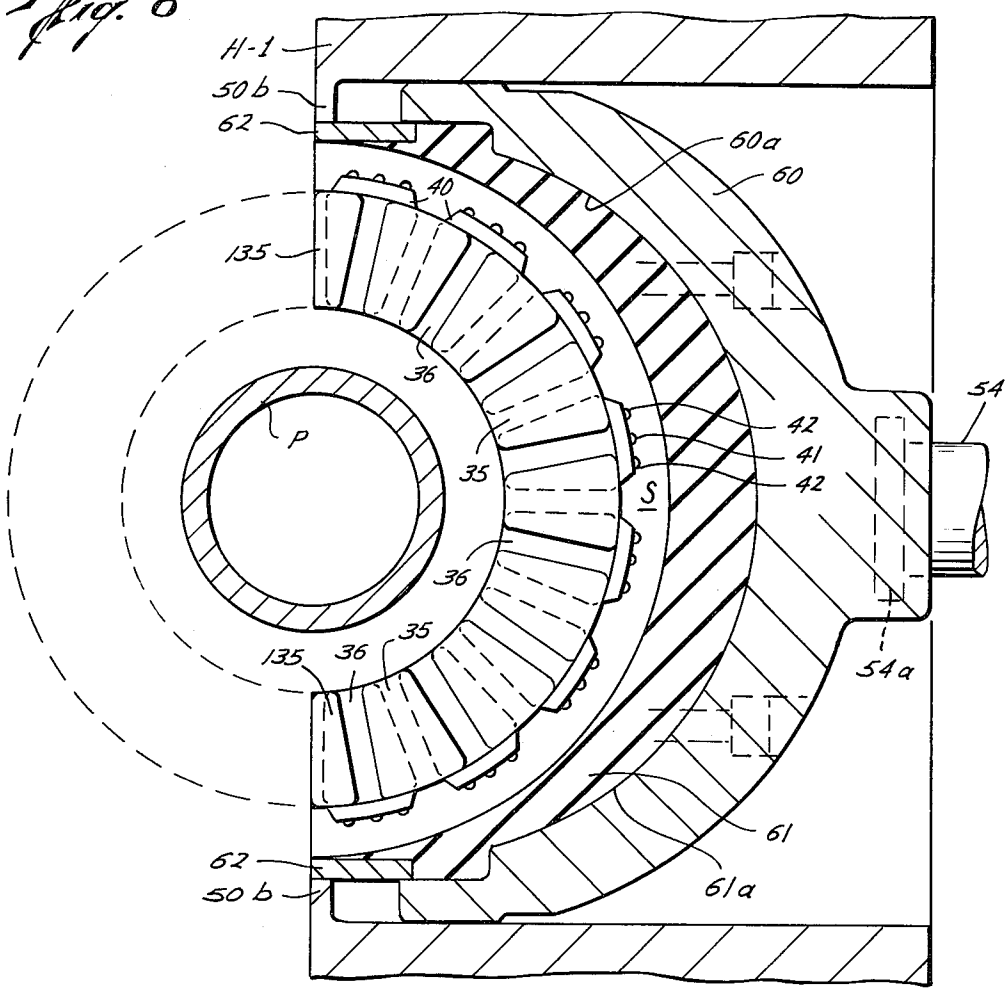


Fig. 7
58a
58
56
57
52b
52c
52
52a
8
66
60
54a
60a
54
65a
51
B-1
51a
60b
50a
61b
50
40
40'
R
64
35
M
36
S
M'
36'
35'
135
135'
64a
65
65a
P
H-1
61
54
54a
66
60

Fig. 8


H-1
50b
62
60a
60
40
135
36
54
42
41
42
P
35
S
36
35
135
36
54a
61
62
50b
61a

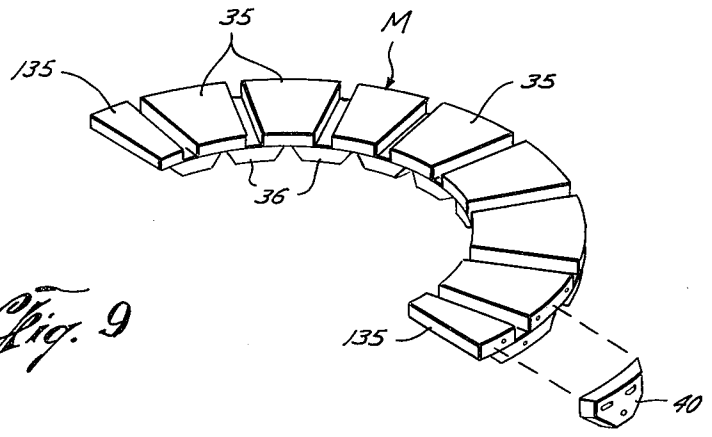

35
M
135
35
36
135
40

Fig. 9

BLOWOUT PREVENTER WITH VARIABLE INSIDE DIAMETER

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of U.S. patent application Ser. No. 326,965 filed Jan. 26, 1973, copending herewith, and now abandoned.

BACKGROUND OF THE INVENTION

The field of this invention is blowout preventers for oil wells and the like.

Annular blowout preventers made by the Hydril Company, an example of which is shown on page 2742 of the "Composite Catalog" for 1970–71, have been in extensive commercial use for a number of years. Such blowout preventers provide a fully-open bore therethrough so that drill bits, reamers, casing hangers and other large diameter tools can freely pass therethrough, but when actuated to the closed position, the packing of each such preventer is forced inwardly to reduce its bore and automatically adjust its size and shape in sealing contact with whatever object happens to then be in the bore of the preventer, thereby closing off the annular space around such object to prevent a blowout of well pressure from below. If no tool is in the well, the bore of the preventer can be fully closed to prevent a blowout.

Although such Hydril blowout preventers are very satisfactory for relatively low well pressures in the range of from about 2,000 p.s.i. to 5,000 p.s.i., it is generally desirable to use a ram type blowout preventer above such pressures, and above 10,000 p.s.i. well pressure, it has heretofore been considered essential to use a ram type blowout preventer of a predetermined opening size because of the inability to satisfactorily prevent extrusion of the rubber of the preventers at such higher pressures.

SUMMARY OF THE INVENTION

The present invention relates to blowout preventers wherein a resilient sealing member or members are provided for closing a well bore or sealing with a pipe or other object disposed in the bore and wherein anti-extrusion means are mounted with the sealing member or members to prevent extrusion thereof over a relatively large variable range of bore diamters for the preventer, and wherein the blowout preventers of this invention may be of the ram type or the annular type, and are yet capable of sealing off much higher well pressures than with prior known annular blowout preventers.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a vertical sectional view illustrating one embodiment of the blowout preventer of this invention in the retracted or opened position;

FIG. **2** is a view similar to that of FIG. **1** illustrating the blowout preventer in the closed or sealing position with a pipe in the well bore;

FIG. **3** is a view taken on line **3—3** of FIG. **1** to illustrate in particular the anti-extrusion means of the blowout preventer of this invention;

FIG. **4** is a view taken on line **4—4** to further illustrate the anti-extrusion means of FIG. **3** when in the contracted position with the sealing means in sealing contact with the well pipe;

FIG. **5** is a view taken on line **5—5** of FIG. **3**;

FIG. **5A** is a view taken on line **5A—5A** of FIG. **4**;

FIG. **6** is an isometric view of the upper anti-extrusion means used with the blowout preventer of this invention in the annular or cylindrical form thereof;

FIG. **7** is a vertical sectional view of the blowout preventer of this invention in the ram type preventer;

FIG. **8** is a view taken on line **8—8** and illustrating a portion of the blowout preventer of this invention in the ram type; and

FIG. **9** is an isometric view, partly exploded, illustrating the upper anti-extrusion means used with the ram type blowout preventer of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the drawings, the letter B refers generally to the form of the blowout preventer of this invention shown in FIGS. **1–6.**

Briefly, the preventer B includes a housing H which has a central longitudinal bore **10** through which a pipe P or other object is adapted to extend in the known manner for well operations. The housing H is constructed so that it is positioned in a stack of blowout preventers or in a string of well casing or pipe in any suitable manner, as will be understood by those skilled in the art. The blowout preventer B has a replaceable assembly A, the details of which will be described hereinafter, which has a central bore **11** which is preferably at least as large as the central opening or bore **10** and which is likewise substantially the same size or at least as large as the bore of the casing or pipe above and below the preventer B so that a full opening bore **11** is available for the passage of the pipe P and other well tools during normal operations.

Considering the details of the blowout preventer B, the housing H may take numerous forms, but as illustrated in the drawings, it includes a lower housing section **12** having a housing recess **12*a*** for receiving the blowout preventer assembly A and an annular piston **14** formed of rubber or similar material, as will be further explained. The recess **12*a*** is further defined by a housing section or cover **15** which is secured to the housing section **12** by bolts **15*a*** (FIG. **1**) or other suitable securing means. A fluid line **12*b*** and a fluid relief line **15*b*** communicates through the housing H with the recess **12*a*** for the inlet and relief of hydraulic or other fluid pressure with respect to the resilient piston **14** to control the opening and closing of the blowout preventer B, as will be more evident hereinafter. For connecting the housing H in a stack of blowout preventers, or to suitable flanges of the well pipe or casing above and below the blowout preventer B, connecting threaded studs **12*c*** and **15*c*** are preferably provided, although any other suitable connecting means may be employed. Connecting studs **15*c*** are preferably disposed longitudinally in alignment with the connecting studs **12*c***, although this is not essential.

The replaceable assembly A includes an annular resilient yieldable sealing element or member **30** formed of rubber or other similar yieldable material and preferably having a dished out or concave inner annular surface **30*a***. An upper anti-extrusion means M is provided with the seal member **30**, and a lower anti-extrusion

means M' is also provided with the seal member **30**, as will be more fully explained. The upper anti-extrusion means M is preferably identical to the lower anti-extrusion means M' in the preferred form of the invention, except that they are upside down with respect to each other. Therefore, the details of the anti-extrusion means M will be hereinafter explained and the same parts will be identified with the same numerals and/or letters followed by a prime mark for the lower anti-extrusion means M'.

The upper anti-extrusion means M is illustrated in detail in FIGS. **3–6.** Such anti-extrusion means M includes an upper or first set of anti-extrusion members **35** which together form an annular or cylindrical assembly (FIG. **6**). In fact, the members **35** may be cut or otherwise formed from a single solid cylindrical member or ring. The radial edges or sides **35***a* of each of the members or segments **35** are disposed radially and if extended would all converge at a single point in the center of the bore or opening defined by such segments **35.** The inner surfaces **35***b* of the segments or members **35** form the inner bore of the upper or first set of the anti-extrusion members **35,** which bore may vary from its smallest diameter (FIG. **6**) to a larger retracted diameter (FIGS. **1** and **3**).

The outer surface **35***c* of each of the members or segments **35** is likewise formed in a cylindrical surface with the other surfaces **35***c* and in the preferred form of the invention, a pair of threaded openings **35***d* are provided in such surface **35***c* of each segment **35** for a purpose to be hereinafter explained.

The upper anti-extrusion means M also includes a second or lower set of anti-extrusion members or segments **36** which are likewise formed in a substantially cylindrical or annular shape as a ring when assembled in their innermost contracted position (FIG. **6**) and which are adapted to move outwardly to a larger inner bore diameter as shown in FIGS. **1** and **3.** The members **36** are staggered or are spaced alternately with respect to the members **35** so that the radial edges **35***a* of the segments **35** are disposed substantially midway of the segments or members **36** when the segments **35** are in their retracted position of FIG. **6.** The sides or edges **36***a* of the segments **36** extend substantially radially although they are also preferably inclined as shown in the drawings since the lowermost surface **36***d* of each segment **36** is bonded or is otherwise secured to the rubber or other material of the sealing element **30,** and such inclined surfaces **36***a* provides room for some distortion of the rubber of the sealing element **30** without binding the movements of the members **36.** The inner surfaces **36***b* of the segments **36** are preferably disposed coextensively with the surfaces **35***b* so as to form a bore which is of the same diameter as the bore formed by the surfaces **35***b*. Also, as will be explained, the surfaces **35***b* and **36***b* remain vertically aligned during the radial movement of the segments **35** and **36** from the open position to the closed position of the blowout preventer B and vice versa. Each of the segments **36** has an outer surface **36***c* which is formed with one or more openings **36***e*, the purpose of which will be hereinafter explained.

The segments **35** and **36** are connected together so that they may move radially from the enlarged or retracted position of FIGS. **1** and **3** to the maximum closed position of FIGS. **4** and **6** by connectors **40.** Each connector **40** also serves to prevent extrusion of the ring **14** and/or the sealing member **30** radially and horizontally between the edges **35***a* of adjacent segments **35.** Each connector **40** is secured to one of the segments **36** by a screw or other fastener **41** which extends into the threaded opening **36***e*. Each connector **40** is connected to a pair of segments or anti-extrusion members **35** disposed above the segment **36** with which the connector **40** is secured, by a slidable connection which includes lateral or circumferential slots **40***a* in the connector **40** through which connector screws or pins **42** are disposed. Each connector pin **42** extends into one of the openings **35***d* on the outer surface of one of the segments **35,** and each pin **42** has a head **42***a* which is larger than the slot **40***a* so that the segments **35** are forced to move radially with the segments **36** while permitting relative circumferential movements of the members **35** with respect to the member **36** with which it is connected, within the limits provided by the length of the slots **40***a*.

In the operation or use of the blowout preventer B of FIGS. **1–6** of this invention, the normal undistorted shape of the sealing member **30** is illustrated in FIG. **1** and in that position, the segments **35** are circumferentially spaced from each other so that there is a space between the sides **35***a* of the adjacent segments **35.** The segments **36** below the segments **35** cover the gap thus present between the edges **35***a* of the segments **35** and prevent extrusion of rubber upwardly into the spaces between the segments **35.** When it is desired to seal with the pipe P or other object in the well bore, hydraulic pressure or the like is introduced through the line **12***b* to urge the annular piston **14** inwardly to thus force the sealing element **30** into a smaller diameter and finally into sealing contact with the external surface of the pipe P. During such inward distortion of the sealing element **30** to its sealing position with the pipe P, the segments **36** are carried with the rubber or other material of the sealing element **30** and they thus move radially inwardly to reduce the inner bore diameter of the inner surfaces **36***b* until they engage the pipe P. The connectors **40** urge the segments **35** radially inwardly with the segments **36** and permit them to move closer to each other to close the gap between their side edges **35***a* until the surfaces **35***b* engage the pipe P also. It will be understood that the surfaces **35***b* and **36***b* remain substantially vertically aligned at all times and normally are also substantially vertically aligned with the inner bore **30***a* of the sealing member or element **30** so that extrustion of the sealing element **30** longitudinally of the pipe P is prevented by the overlapping segments **35** and **36** at all times.

The lower anti-extension means M' has segments **35'** and **36'** which correspond with the segments **35** and **36** and they are connected together by connectors **40'** in the same manner as the connectors **40** serve to connect the segments **35** and **36** as previously explained. The lower anti-extrusion means M' functions in the same manner as the upper anti-extrusion means M and both work simultaneously above and below the sealing element **30** to thus confine the sealing element **30** against extrusion in either longitudinal direction with respect to the pipe P.

When it is desired to retract the blowout preventer B from its sealing position (FIG. **2**) to its open or retracted position (FIG. **1**) the pressure in the recess **12***a* is relieved through the relief line **15***b* or other suitable means so that the annular piston **14** returns to its normal undistorted condition by its own inherent resil-

iency or other suitable means. Likewise, the sealing element **30** returns to its normal undistorted position of FIG. **1**, carrying with it the segments **36** and **36'**, which through connectors **40** and pins **42** carry with them the segments **35** and **35'**, respectively, so that they move to their fully open position (FIGS. **1** and **3**).

In the modified form of this invention illustrated in FIGS. **7–9**, a blowout preventer B-**1** of the ram type is illustrated, utilizing the same anti-extrusion means M and M' and modified only to accommodate the semi-cylindrical configuration of the rams R of the blowout preventer B-**1** rather than annular shape of the preventer B.

The blowout preventer B-**1** has a housing H-**1** of any suitable construction which is adapted to be connected in a stack of blowout preventers or in a string of well casing or pipe in the conventional manner. Thus, the housing H-**1** has a longitudinal central bore **50** therethrough for the passage of the pipe P or other well tools in the known manner. The housing H-**1** also has upper and lower flanges **51** with bolt openings **51**a or other suitable means for connecting the preventer B-**1** in the stack of the preventers or in the well casing. The rams R are adapted to fit within lateral recesses **50***a* in the housing H which communicate with the longitudinal bore **50** in the known manner.

A conventional head or bonnet **52** is connected to each side of the housing H, and each of such heads or bonnets **52** has a recess **52**a (one of which is shown in FIG. **7**) and each of which is aligned with the lateral openings **50***a* in the housing H-**1**, so as to form a continuation thereof. The rams R are received in their respective recesses **52***a* when they are in the retracted position (FIG. **8**). A piston rod **54** extends through a suitable seal **52***b* in the bonnet **52** and is connected to a piston **56** disposed in the cylinder **57** in the known manner. The cylinder **57** is closed by a cap **58** having a fluid inlet line **58***a* therewith for the introduction of hydraulic fluid or other fluid for operating the piston **56.** Another fluid line **52***c* is provided for communicating with the opposite side of the piston **56** for introducing hydraulic fluid or other fluid to move the piston **56** to the right or outwardly from the position shown in FIG. **7.** It will be understood that the piston **56** is merely exemplary of any suitable power means for moving the rams R, and a similar power means is provided for each of the rams R, although only the piston **56** is illustrated for the right-hand ram R in FIG. **7.**

To facilitate the description, the details of only one of the rams R will be described hereinafter, and only wnen it is necessary to show the interaction of the two rams will the other ram be specifically identified. However, it will be understood that the two rams R are preferably made in the same manner and bear like numerals and/or letters for identification purposes.

Thus, each ram R has a ram carrier **60** which is connected to the piston rod or stem **54** preferably in the conventional releasable manner, utilizing a button **54***a* on the rod **54** fitting into a suitable slot in the ram carrier **60.** The ram carrier **60** is preferably formed of steel or other relatively rigid material and is substantially semi-cylindrical in cross-sectional shape (FIG. **8**). The ram carrier **60** is provided with an internal recess or surface **60***a* which is likewise substantially semi-cylindrical in cross-sectional shape and which is adapted to receive a seal element **61** formed or rubber or other suitable resilient material and preferably having an external convex surface **61**a which substantially conforms with the internal surface of the recess **60**a (FIG. **8**). Side anti-extrusion plates **62** formed of steel or other metal are disposed so as to engage the inside surface of an inwardly extending lip **50***b* on the housing H-**1.** During movement of the carrier **60** from the position of FIG. **8** to the stop position of FIG. **7,** there is a sliding movement between the carrier **60** and the side plates **62** as the seal element **61** deforms and urges the semi-cylindrical sealing member S into sealing contact with the pipe P.

The seal member **61** is confined at its upper end between the ram carrier **60** and an upper ram confining and alignment plate **64** which is also preferably semi-cylindrical (FIG. **1**) which plate **64** is secured to the carrier **60** by one or more cap screws **66** or other suitable securing means. It is to be noted that the upper surface **60***b* of the ram carrier **60** engages and slides relative to the upper surface of the recess **50***a* and the recess **52***a*. The upper surface **61***b* of the seal member **61** engages and seals with the upper surface of the recess **50***a*.

Each ram R also has a lower ram confining and alignment plate **65** which preferably extends for the full depth of the ram and which is provided with a shoulder **65***a* or other suitable engaging means for enabling the carrier **60** to retract the plate **65** outwardly therewith but permitting inward movement of the carrier **60** relative to the plate **65** after inward movement of the plate **65** is stopped by engagement with the opposite plate **65** on the other ram R.

It is to be noted that the vertical or longitudinal area between the upper alignment plate **64** and the lower alignment plate **65,** and inwardly of the seal member **61,** forms a pocket or recess which is generally semi-cylindrical for receiving the parts of the ram R which are normally the primary replaceable parts. Such parts may be preassembled and inserted initially into position as will be more evident hereinafter.

Also, replacement assemblies including such parts may be used when necessary.

Such replaceable assembly of the ram R includes the yieldable sealing element or member S formed of rubber or other similar resilient yieldable material. The upper anti-extrusion means M shown in FIGS. **7–9** is provided above the sealing element S for each of the rams R and likewise, the lower anti-extrusion means M' is provided below the sealing element S for each of the rams R.

As best seen in FIG. **9,** the anti-extrusion means M for each ram R includes the segments or anti-extrusion members **35** and **36** which are disposed in the two layers in the same manner as described heretofore in connection with FIGS. **1–6,** the only difference being that the segments **35** are arranged in a semi-circular or semi-cylindrical form when used with the rams R of FIGS. **7** and **8.** It should also be noted that the end segments **135** in the upper anti-extrusion means M for each ram R are modified so as to be only partial segments as compared to the other segments **35** so that the semi-cylindrical configuration is obtained for the entire assembly of the segments **35** (FIG. **9**). The segments **35** and **36** as well as the special segments **135** are connected together by the same connectors **40** and the connector screws **41** and pins **42** as heretofore described in connection with FIGS. **1–6.** The construction of the lower anti-extrusion means M' for each ram R is

identical to that heretofore described for the anti-extrusion means M, except that they are upside down with respect to each other as is evident from FIG. 7.

In the operation or use of the form of the invention shown in FIGS. 7–9, the rams R are operated in the conventional manner, utilizing hydraulic pressure supplied to the line 58*a* for moving the piston 56 for each ram R inwardly from the open or retracted position (FIG. 8) to the inner or sealing position (FIG. 7). When the rams contact each other at the radial surfaces 64*a* and 65*a*, the inward momvement of the confining plates 64 and 65 is prevented, but the carrier can still exert an inward radial force on the seal member 61 and the sealing element S for each of the rams R. Such distortion of the sealing member S continues until it is in full sealing contact with the external surface of the pipe P.

During the inward radial movement or distortion of the sealing element S, the segments 36 and 36′ are moved with the material of the sealing element S radially inwardly so as to constantly maintain a metallic barrier to prevent longitudinal extrusion of the flexible material of the sealing element S. The extrusion members 35 move with the elements S by reason of the connectors 40 and likewise the segments 35′ move with the segments 36′ by reason of the connectors 40′ so as to avoid any extrusion of the rubber or other material of the sealing element S between the segments 36 and 36′, respectively. Ultimately, the segments of the extrusion means M and M′ also contact the external surface of the pipe P and thus block longitudinal extrusion of the sealing element S in either longitudinal direction relative to the pipe P. Upon a release of the pressure acting on the piston 56 and the application of pressure to move same outwardly for each of the rams R, the rams R are retracted and are moved to the position of FIG. 8 so as to provide the full open bore corresponding to the bore 50 of the housing H-1 in the known manner.

Instead of the dished out or concave surface 30*a*, the shape of the surface 30*a* or other portions of the sealing member 30 may be modified, or recesses or the like in the member 30 may be provided, the purpose of which is to compensate, or partially compensate, for the smaller volume of the space available for the rubber of the member 30 when it is in its sealing position (FIG. 2) as compared to the volume of the space available for such member 30 in its retracted position (FIG. 1).

The foregoing disclosure and description of the invention are illustrative and explanatory thereof, and various changes in the size, shape, and materials as well as in the details of the illustrated construction may be made without departing from the spirit of the invention.

I claim:

1. A blowout preventer adapted to seal with a pipe or other object in a well bore or to close same in the absence of any object in the well bore, comprising:

a resilient sealing member having an inner curved surface adapted to engage a pipe or the like in a well bore;

means for urging said sealing member radially inwardly for effecting a seal with a pipe or the like in a well bore or with itself for closing a well bore; and

first anti-extrusion means mounted with said sealing member and movable radially therewith in response to radial inward movement of said sealing member for preventing extrustion of the sealing member longitudinally when fluid pressure acts on said sealing member, said first anti-extrusion means comprising:

a first set of anti-extrusion members circumferentially disposed with respect to each other and mounted for radial movement;

a second set of anti-extrusion members, mounted below said first set and staggered circumferentially with respect to said anti-extrusion members in said first set to close radial spaces therebetween; and

separate connector means connecting said first set of anti-extrusion members to said second set for effecting radial movement thereof together.

2. The blowout preventer set forth in claim 1, wherein:

said sealing member is substantially semi-cylindrical and is adapted to be mounted as a part of a blowout preventer ram.

3. The blowout preventer set forth in claim 1, wherein said sealing member is annular.

4. The blowout preventer set forth in claim 1, including:

second anti-extrusion means mounted with said sealing member on the opposite side longitudinally of said sealing member from said first anti-extrusion means and movable radially relative to said sealing member in response to radial inward movement of said sealing member for inhibiting extrusion of the sealing member longitudinally when fluid pressure acts on said sealing member from either longitudinal direction.

5. The structure set forth in claim 4, wherein said second anti-extrusion means includes:

a first set of anti-extrusion members circumferentially disposed with respect to each other and mounted for radial movement;

a second set of anti-extrusion members mounted below said first set and staggered circumferentially with respect to said anti-extrusion members in said first set to close radial spaces therebetween; and

said anti-extrusion members in such first and second sets having overlapping surfaces, the extent of overlap of which increases as the anti-extrusion members move radially inwardly.

6. The structure set forth in claim 5, wherein:

each of said anti-extrusion members in said second set of anti-extrusion members of said second anti-extrusion means is bonded to said sealing member and is movable therewith; and

connector means connecting said first set of anti-extrusion members in said second anti-extrusion means to said second set for effecting radial movement thereof together.

7. The structure set forth in claim 6, wherein said connector means includes:

a connector plate secured to each of said anti-extrusion members in said second set for movement therewith; and

circumferential slide connection means connecting said connector plate to each of two of the anti-extrusion members in said first set above the anti-extrusion member in said second set to which said plate is secured for thereby providing limited circumferential movement of said connected members relative to each other as they move together radially.

8. The structure set forth in claim 1, wherein:

said anti-extrusion members in said first and second sets having overlapping surfaces, the extent of overlap of which increases as the anti-extrusion members move radially inwardly.

9. The structure set forth in claim **8,** wherein:

each of said anti-extrusion members in said second set of anti-extrusion members of said first anti-extrusion means is bonded to said sealing member and is movable therewith.

10. The structure set forth in claim **1** wherein said separate connector means includes:

a connector plate secured to each of said anti-extrusion members in said second set for movement therewith; and

circumferential slide connection means connecting said connector plate to each of two of the anti-extrusion members in said first set above the anti-extrusion member in said second set to which said plate is secured for thereby providing limited circumferential movement of said connected members relative to each other as they move together radially.

11. The structure set forth in claim **10,** wherein said circumferential slide connection means includes:

a circumferential slot in each said connector plate for each of said two anti-extrusion members in said first set; and

a pin with each of said two anti-extrusion members in said first set extending through said slot and having a head thereon to force the anti-extrusion members in said first set to move radially with the anti-extrusion members in said second set while permitting relative circumferential movement during such radial movement.

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