

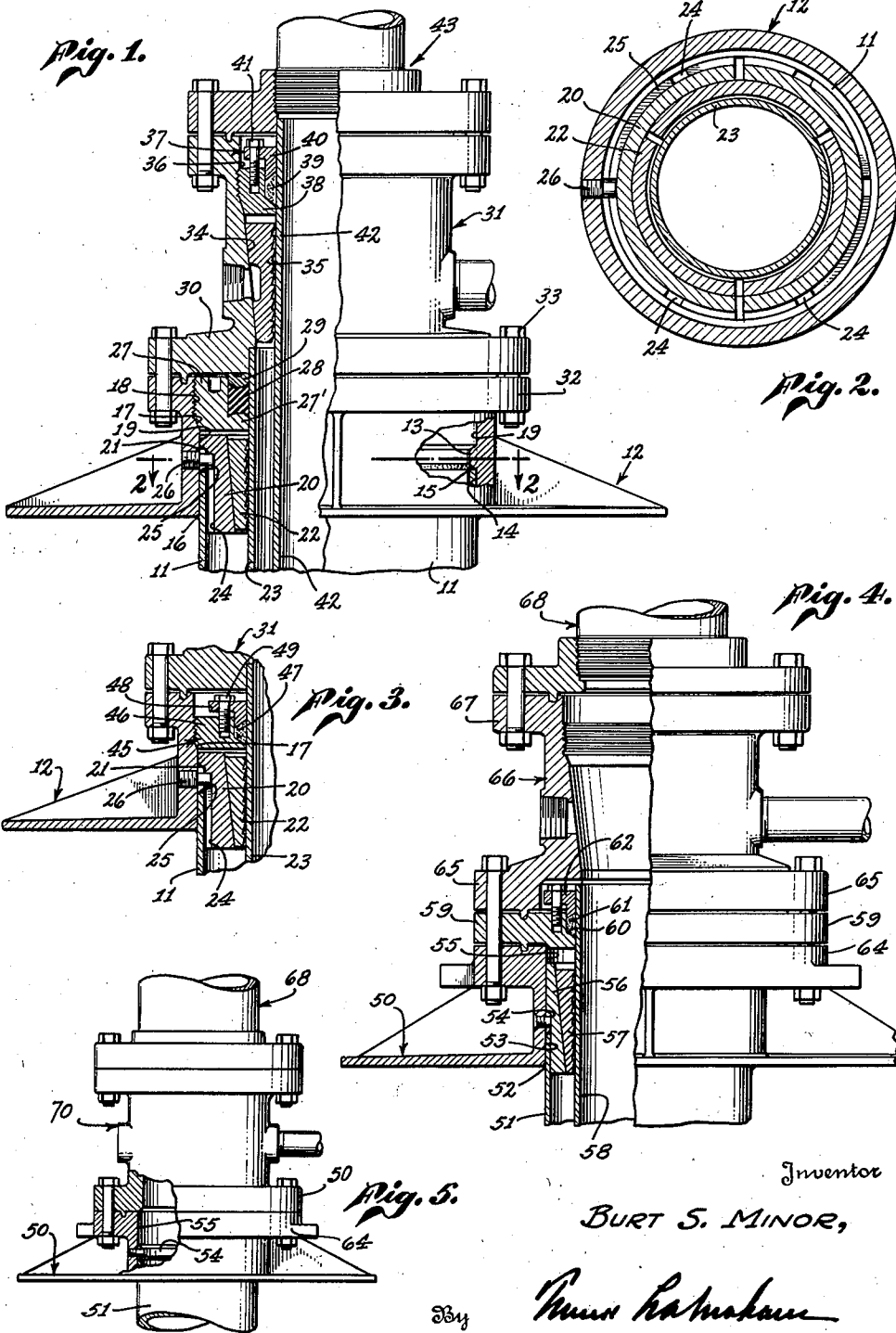
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CASING HEAD CONSTRUCTION

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CASING HEAD CONSTRUCTION

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The invention relates generally to cased wells and particularly to casing heads for suspending successive strings of casing such as is common practice in oil wells.

The present casing suspension practice is to employ a member attached to the outermost string of casing, the member extending considerably above the upper end of the casing and designed so as to receive a gripping means for suspending an inner casing. This suspension means is located at some distance above the outer casing. Other casing head members are mounted above the first member for suspending additional strings of casing as the drilling of the well progresses. The result is a casing head construction of considerable height which requires the building of a cellar of ample depth to accommodate the structure and the drilling tree used during the drilling of the well. In swamp territory where conditions are such that cellars of adequate depth cannot be constructed it is the usual practice to erect the derrick on pillars of increased height to allow sufficient space between the cellar floor and the derrick floor for the casing head structures and drilling tree which in addition to being very costly require the elevating of roadways for the transportation of equipment. Therefore, it is a primary object of this invention to provide a casing head apparatus so constructed as to reduce the overall height of the apparatus and thereby reduce the necessary depth of cellar required or the elevation of the derrick floor in order to accommodate the drilling tree and casing head apparatus. In this connection the cost of drilling is reduced.

It is also an object of this invention to provide a simple casing head structure of relatively few parts and thereby reduce the cost of such structures and the cost of drilling.

It is a particular object of this invention to provide a landing base adapted to be attached to the upper end of an outer string of casing having means for suspending therein an inner string of casing from a point in the region of the upper end of the outer string of casing having means for suspending therein an inner string of casing from a point in the region of the upper end of the outer string of casing and therebelow. In this connection it is a particular object of this invention to provide casing suspension means supported in said base and extending downwardly into the outer casing.

It is also an object of this invention to provide a method and apparatus whereby a drilling tree

may be maintained at the same height during two successive drilling operations. This may be accomplished by using a mud cross having a bore equal to the bore of the outer casing and later using the same to suspend an inner string of casing or exchanging members as here shown and described. In this connection it is an object to provide a method and apparatus whereby a landing base may be provided on the upper end of an outer string of casing and drilling may be carried on through a drilling tree having a mud cross element at the lower end of the drilling tree and mounted on the landing base. Subsequently the mud cross may be removed, after an inner string of casing has been run through the tree and suspended within the landing base, and replaced by a packing plate and a slip bowl, the packing plate and slip bowl being of the same overall height as the mud cross and being adapted to perform the function of a mud cross during subsequent drilling and later to act as a casing suspension member. These and other objects will be apparent from the drawing and following description. Referring to the drawing, which is for illustrative purposes only—

Fig. 1 is an elevation partly in section of a casing head construction of this invention;

Fig. 2 is a sectional plan view on line 2—2 of Fig. 1;

Fig. 3 is a fragmentary sectional elevation of a casing head structure having another form of packing means;

Fig. 4 is an elevation partly in section showing a casing head construction embodying a particular form of packing means; and

Fig. 5 is an elevation partly in section of the landing base of Fig. 4 and a mud cross element associated therewith.

More particularly describing the invention, reference numeral 11 indicates an outer casing which may be considered as extending into a well. Mounted on the upper end of this casing is a landing base 12. This base has an internal annular flange 13 and a lower bore 14 to accommodate the casing 11. Preferably the lower edge of flange 13 is tapered to provide space for weld 15 for securing the base and casing together. The base is also welded to the casing at 16.

The base 12 is provided with a tapered shoulder 17 between an upper bore 18 and an intermediate bore 19. The landing base 12 is adapted to accommodate a split spider 20 which is provided with the external shoulder 21 adapted to seat on flange 13 of the landing base, the upper surface of the flange constituting a ledge or sup-

porting shoulder for the spider. This split spider extends into the upper end of the casing 11 to a point below the lowermost portion of the landing base 12. The split spider accommodates slip members 22 for the suspension of an inner casing 23.

The split spider is provided with longitudinal grooves 24 which terminate at their upper ends in a circumferential channel 25. With this construction pressure fluid may be released through port 26 in the base.

The bore 18 and shoulder 17 of the landing base is adapted to receive a packing ring 27 in threaded engagement with the bore 18. This ring is provided with an inner flange 27' upon which is seated a packing 28. This packing is compressed by means of a packing compression ring 29 which is forced downwardly by engagement with the flange 30 of a slip bowl generally indicated by reference numeral 31.

The landing base 12 is provided with the ordinary flange 32 to accommodate other elements such as the slip bowl 31, the bowl being attached to the landing base by means of the bolt assembly 33. The slip bowl is provided with an inwardly converging bore 34 to accommodate slips 35. At its upper end the bowl is provided with a regular bore 36 and mounted in this bore is the packing means 37 comprising a packing ring 38 in threaded engagement with the bowl 31, packing 39 and compression ring 40 which is secured to member 38 by means of bolts 41. Shown mounted on the bowl is a drilling nipple 43 which may be considered as mounted on the lower end of a drilling tree.

From the above description it is apparent that a considerable saving in overall height of this construction over the ordinary construction is achieved, the saving approximating the height of the slip bowl. In this connection with the ordinary construction the inner casing 23 would be suspended from the point at which the casing member 42 is suspended.

Referring to Fig. 3, there is shown the landing base 12 of Fig. 1 in which there is mounted a different form of packing means which has been generally indicated by reference numeral 45. This packing means comprises a packing ring 46 in threaded engagement with the landing base 12 and seated on shoulder 17, a packing 47, a packing compression ring 48 and suitable bolts 49 for securing the members 46 and 48 together.

Referring to Figs. 4 and 5, another form of casing head construction has been illustrated. In Fig. 4 the casing head construction has been shown after a second string of casing has been landed while in Fig. 5 the landing base has been shown in connection with a mud cross member mounted on the lower end of a drilling tree in the manner that it would be used during drilling and deepening of the hole prior to setting a second string of casing.

Reference numeral 50 generally indicates a landing base which is mounted on an outer string of casing 51 by means of the welding 52. This landing base has a lower bore 53 adapted to accommodate the casing 51, an inwardly extending annular flange 54 and an upper bore 55 which is of substantially the same diameter as the lower bore 53. A split spider 56 is mounted in the landing base and supported on the flange 54. Slips 57 are supported by the split spider 56 and in it is supported an inner or second casing 58.

The space between the inner and outer casing 75

is sealed off or packed by means of a packing plate 59 which is provided with an annular groove 60 to accommodate packing 61. Bolted to the packing plate 59 is a packing compression ring 62. Packing plate 59 is interposed between flange 64 at the upper end of the landing base 50 and flange 65 at the lower end of a slip bowl 66. The slip bowl 66 may be of any suitable construction and is provided with a flange 67 to accommodate other slip bowls or a drilling nipple 68 such as shown thereon.

In this form of the invention, it is desirable after landing the outer string of casing 51 to mount the landing base 50 thereon to utilize above the landing base 50 a drilling tree which is provided with a mud cross element 70 such as is shown in Fig. 5. This mud cross element is of the same overall height as the members 59 and 66 shown in Fig. 4. With the apparatus so constructed a method of drilling and landing casing may be employed which comprises drilling through casing 51 with the landing base 50 mounted thereon utilizing the mud cross 70 as the lowermost element of a drilling tree. When drilling is completed the casing 58 may be run through the tree, the drilling tree parted from the landing base and the casing 58 suspended in the base by insertion of the split spider 56 and slips 57. After the casing has been landed it is cut off at the proper height and the packing plate 59, with its associated packing means and slip bowl 66 mounted on the landing base 50. At this time or previously if desirable the mud cross 70 is removed from the drilling nipple 68 and that member mounted on the upper end of slip bowl 66. With this method the drilling tree is maintained at the same height for the two drilling operations and the slip bowl 66 serves as a mud cross and later as a casing suspension member.

Although the invention has been particularly shown and described it is contemplated that certain changes might be made without departing from the invention and it is intended to cover such changes as come within the scope of the claims.

I claim as my invention:

1. In a casing head structure, an outer casing, a casing head member having an internal flange, a weld between the upper end of said outer casing and said flange, a split spider in said casing head member supported on said flange, said spider extending downwardly into said outer casing, an inner casing, slip members mounted in said spider in engagement with said inner casing, and packing means between said casing head member and said inner casing.

2. In a casing head structure, an outer casing, a landing base having an internal flange, a weld between the upper end of said outer casing and said flange, a split spider in said landing base supported on said flange, said spider extending downwardly into said outer casing, an inner casing, slip members mounted in said spider in engagement with said inner casing, a packing ring mounted in said landing base, said ring having an internal annular flange, a compressible packing on said flange, a packing compression ring in engagement with the upper end of said packing and extending above said landing base, and a slip bowl mounted on said landing base engaging said packing compression ring whereby said packing is compressed between said compression ring and said flange on said packing ring.

3. In a casing head structure, an outer casing,

a landing base mounted on said casing, said landing base having an internal flange, a split spider mounted in said landing base and supported on said flange, said spider extending into said outer casing below the upper end thereof, an inner casing, and slip members in said spider engaging said inner casing, a packing plate mounted on said base having packing means engaging said second casing, and a slip bowl mounted on said packing plate and adapted to accommodate slip members for supporting a third casing in said second casing.

4. In a casing head structure, an outer casing, a landing base mounted on said casing, said

5 landing base having an internal ledge and being provided with an external flange at its upper end, a split spider mounted in said landing base and supported on said ledge, said spider extending into said outer casing below the upper end thereof, a second casing within said outer casing, slip members in said spider engaging said second casing, a packing plate mounted on the flange of said base and having packing means engaging said second casing, and a slip bowl mounted on said packing plate and adapted to accommodate slip members for supporting a third casing inside of said second casing.

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