Sept. 12, 1944. J. R. YANCEY 2,358,122

WELL HEAD EQUIPMENT

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Fig. 1.

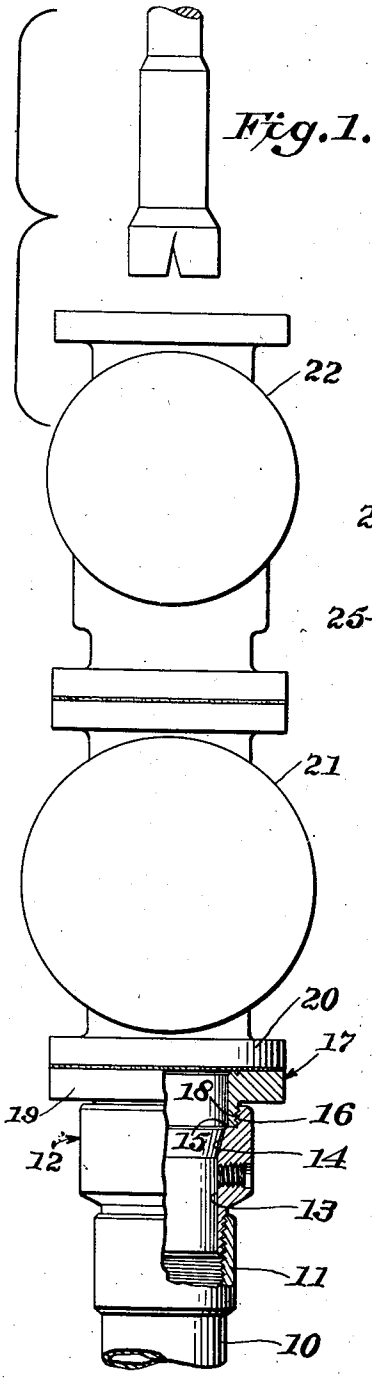


Fig. 3.

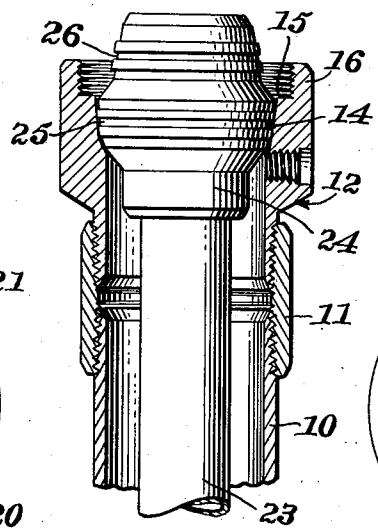
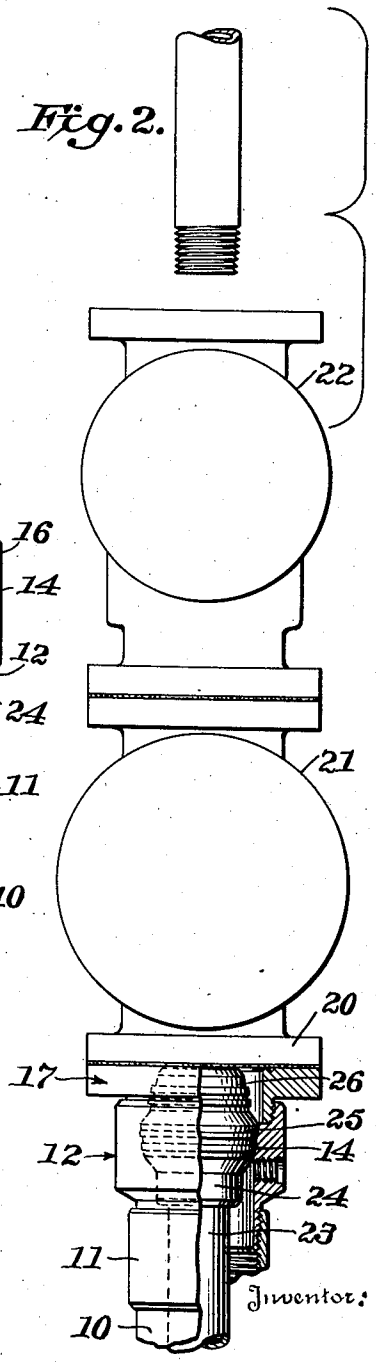


Fig. 2.



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Fig. 4.

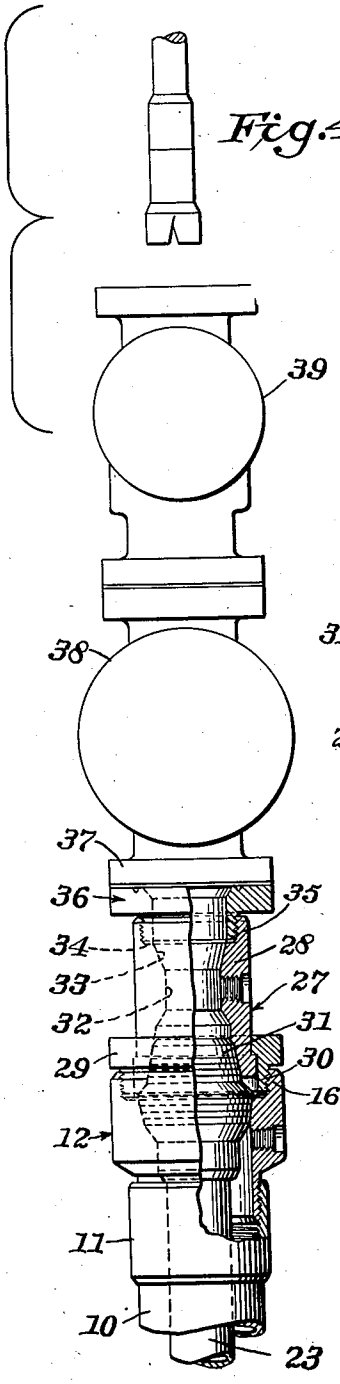


Fig. 6.

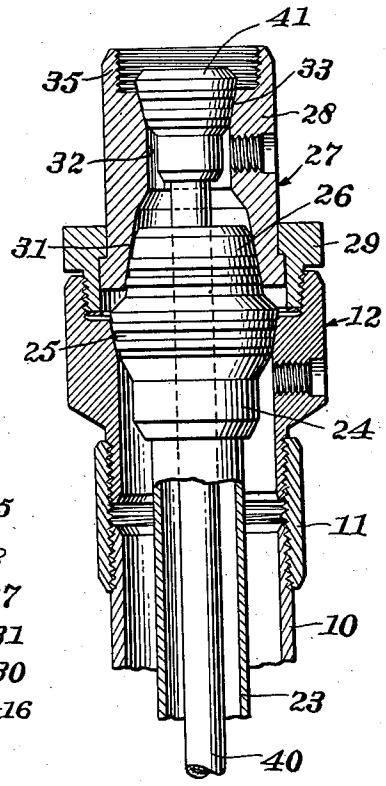
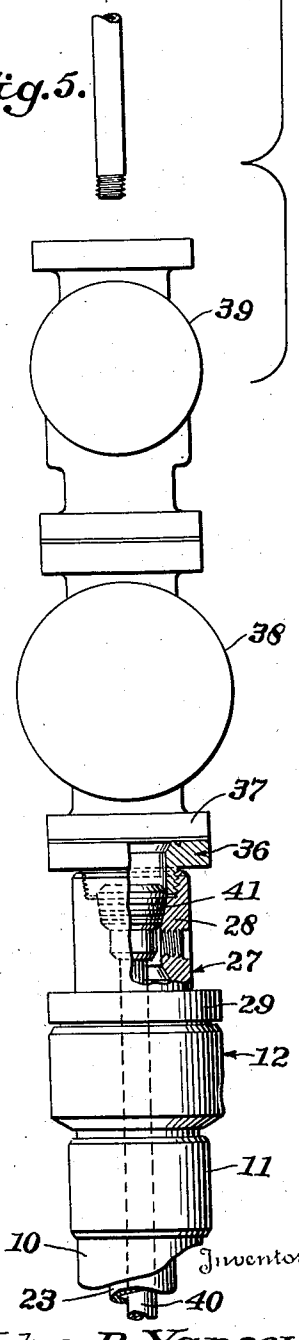


Fig. 5.



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Fig. 7.

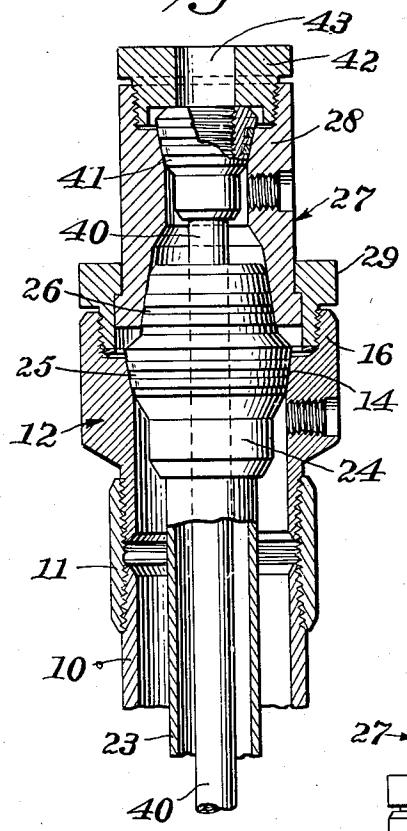
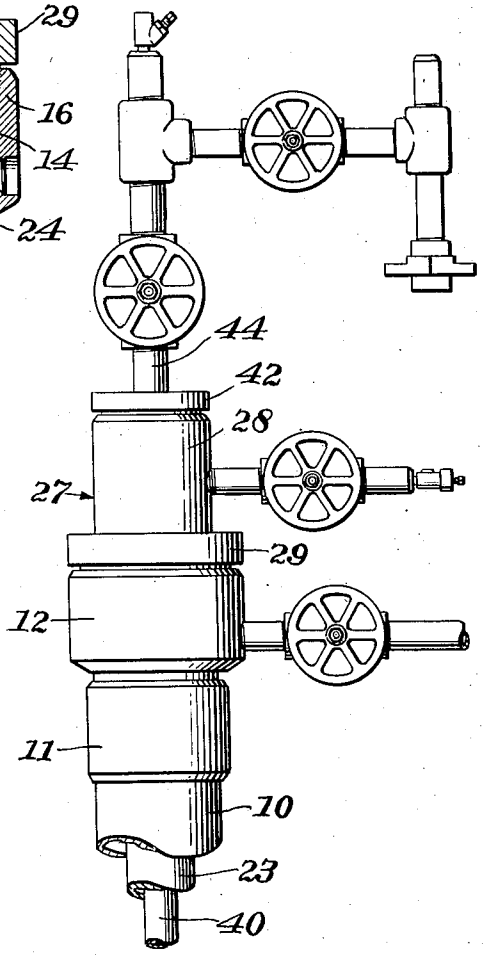


Fig. 8.



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UNITED STATES PATENT OFFICE

2,358,122

WELLHEAD EQUIPMENT

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Application June 11, 1941, Serial No. 397,617

2 Claims. (Cl. 166—14)

This invention relates to well head equipment and has as its purpose the effecting of certain economies therein.

Usual well head installations include one or more casing heads and a tubing head, each of the heads being provided with a heavy top flange designed for engagement, during the drilling operation, with control equipment. In the completed well the superposed heads have to be provided with expanded bottom flanges on the order of the top flanges of underlying heads. According to the present invention, I equip the heads with removable top flanges or adapters for engagement in the usual manner with standard control equipment, and I provide a relatively less expensive means substitutable upon the removal of the control equipment and the said removable flanges. The said substitutable means are ordinarily in the form of lock-down means of suitable design, for the casing and tubing hangers. The invention is applicable, for example, to systems such as are disclosed in patents, Nos. 2,082,413, granted June 1, 1937, and 2,117,444, granted May 17, 1938, to Robert A. Mueller and myself. The manner of practice of the invention and the novel means provided are shown exemplarily in the accompanying drawings, with reference to which the description will proceed.

In the drawings:

Figure 1 shows in elevation, partly in section, a lower casing head equipped with an adapter in accordance with the invention, with superposed control equipment ready for drilling in.

Figure 2 shows the same equipment after the drilling operation and with an inner string of casing run in.

Figure 3 is a section of the casing head after the hanging of the inner string and with its adapter removed.

Figure 4 is an elevation partly in section of a succeeding stage wherein locking means, in this case a tubing head, is substituted for the adapter and is engaged with the inner casing hanger, the tubing head being provided with an adapter supporting control equipment ready for drilling in through the inner casing.

Figure 5 shows the equipment of Figure 4 with the tubing landed.

Figure 6 is a section of the casing and tubing heads with the tubing head adapter removed.

Figure 7 is a section showing the tubing head equipped with a lock-down ring for the tubing hanger, and

Figure 8 is an elevation of the final equipment.

Referring to the drawings, and first to Figure 1, reference numeral **10** designates an outer casing cemented in and equipped at its upper end, by means of a coupling **11**, with a casing head **12** according to the present invention. The casing head has a lower passage portion **13** preferably at least as large as the inner diameter of the casing **10**, this passage portion being surmounted by an upwardly flared portion **14** constituting a hanger seat. The seat **14** terminates upwardly in an annular shoulder **15** outwardly of which rises an integral internally threaded upper portion **16**.

The adapter member **17** is in the form of a ring having an internal diameter at least as great as the maximum diameter of the seat **14**, the ring including an externally threaded bottom neck **18** threaded in the portion **16** and against the shoulder **15**, or a packing ring on the latter. Also, member **17** includes a heavy radial flange **19** which corresponds in size with the flange **20** of a drilling master valve **21**, the two flanges being bolted together, with interposed packing means, in the usual manner. The drilling master valve **21** is surmounted, as here shown, by a blow-out preventer **22** and these pieces of control equipment have an available through passageway of a diameter as large as that of the opening of member **17**.

In Figure 2 the drill has been withdrawn and an inner string of casing **23** run in, this string being equipped with a hanger **24** having a lower tapered portion **25** mating and engaged with seat **14**, and a top upwardly tapered portion **26**, the illustrated hanger being of a type shown in the patents above mentioned.

With the hanger **24** landed, the control equipment and adapter **17** are removed, bringing the procedure to the stage shown in Figure 3.

Referring now to Figure 4, reference numeral **27** designates locking means, here shown as a tubing head including a body **28** and a ring **29** swivelled to its lower end, the ring **29** having a lower neck **30** threaded into portion **16** in place of the removed adapter **17**. The body **28** has a lower tapered surface **31** seating against the upper taper **26** of hanger **24** so that a seal is provided between the hanger and both heads. Body **28** has an intermediate cylindrical passage portion **32** which has a diameter at least as large as the inner diameter of casing **23**. Passage **32** is surmounted by an upwardly and outwardly flared conical seat **33** which in turn is surmounted by an annular shoulder **34** bounded outwardly by an internally threaded upper portion **35**. An adapter member **36**, identical with member **17**

except that it is smaller, is engaged with the upper end of body 28 with its flange portion of a size for bolting to a flange 37 of a drilling master valve 38 which in turn supports a blow-out preventer 39, the two having an available through passageway of a diameter as great as that of adapter 36 and greater than that of passage portion 32 of body 28. The drilling-in operation through the inner casing is now carried out. Each head has a bore, as here shown, as large as the casing to which it connects, in order to allow the passage of tools whose outside diameter is substantially as great as the inside diameter of the casing.

In Figure 5 the drill has been removed and tubing 40 has been run in, the tubing being equipped at its upper end with a hanger 41 tapered and equipped for sealing engagement with the seat 33.

With the tubing thus hung the control equipment and adapter 36 are removed, bringing the procedure to the stage shown in Figure 6.

In the next stage, shown in Figure 7, a locking ring 42 is threaded into the upper end of body 28 into engagement with the top margins of hanger 41. The upper end of the latter is internally threaded on a root diameter somewhat less than the diameter of the opening 43 of ring 42 so as to be readily engageable by the threaded end of the flow pipe 44 shown in the completed installation, Figure 8.

It will be evident that regardless of the number of casing strings, the adapter portion of each head, with its heavy expensive flange, may be salvaged, and the same applies to the expensive flange studs. Each adapter is designed for connection with the standard flange of the associated control equipment assembly, but can be readily removed for replacement by a considerably less expensive member, which member may be a portion, as at 29, of a head, or may be an entity in itself, as at 42, the members, in any case, being engageable with the same internal threads of the head with which the adapter was previously engaged. The saving in metal and consequent cost is substantial in all cases.

It will be understood that while I have illustrated the invention in at present preferred embodiment and procedure, variations are possible and consequently I do not limit myself to the disclosed form and relationship of parts except as in the following claims.

I claim:

1. Well head equipment comprising a casing or tubing head having an integral tapered seat therein spaced below its upper end, said head being internally enlarged above said seat and provided with threads, and a coupling member including a flange for connection with and the support of control equipment above said head, said member including an externally threaded neck portion engageable with the threads of said head, said member having an opening permitting the passage therethrough of a hanger to said seat.

2. Well head equipment comprising a member associable with a casing or tubing head for locking down a hanger supported by the head, said member comprising a body and a ring swiveled on said body and threadedly engageable with the head, said body having a tapered hanger seat spaced from its upper end and being internally enlarged above its said seat and provided with threads, and a coupling member including a portion engageable with said threads and a flange securable to the flange of control equipment above said head, said coupling member having an opening adapted to pass therethrough a hanger to said body seat.

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