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J. H. McEVOY ET AL

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UNIVERSAL CASING HEAD

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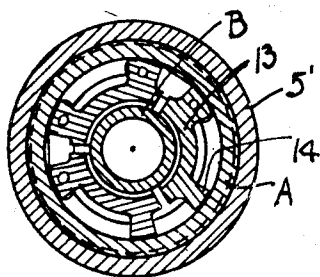


Fig. 3.

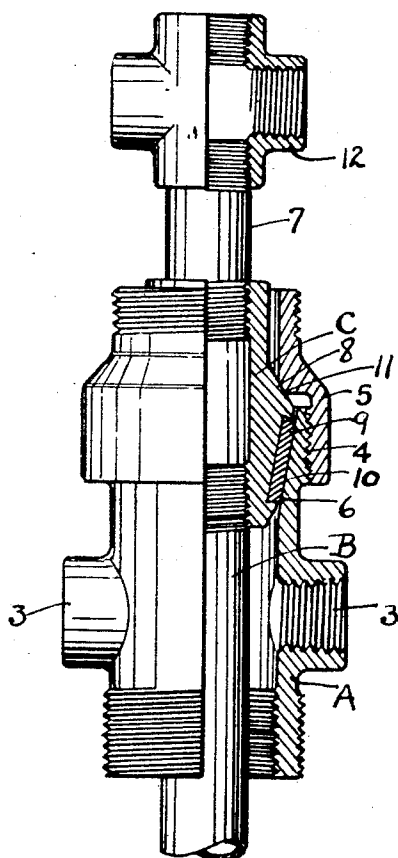


Fig 1

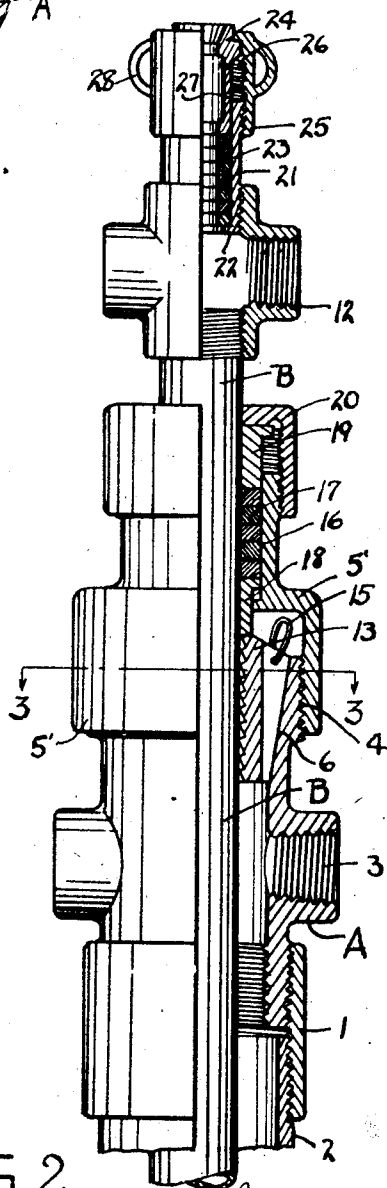


Fig. 2

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## UNITED STATES PATENT OFFICE

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## UNIVERSAL CASING HEAD

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Our invention relates to an improvement in casing heads to be employed in connection with deep well operations, either drilling or pumping operations, and is particularly adapted for use in wells in which a pressure of gas is encountered.

In wells in which gas is present in the producing stratum, care must be taken at all times to guard against a blowout of the well. Gas may accumulate in the body of the well bore, the pressure of which is so great as to blow the tools and contents of the well upwardly, and this may be done with such force as to wreck the drilling equipment and practically destroy the well. Even in wells which are already producing, it is often necessary to provide against gas accumulations which will be sufficient in force to blow the liquid from the well in quantities, and thereby creating a fire hazard.

It is an object of our invention to provide a casing head and attachments therefor adapted to equip the upper end of the casing so as to prevent the escape of gas or the blowing of the tools or well tubing from the well.

It is desired that the parts be capable of quick adjustment so that the upper end of the casing may be closed and controlled so that the fluid coming from the well may be directed to points where it may be stored and injury to the well may be prevented.

In the invention, it is contemplated that the space between the well casing and the drill pipe or tubing may be closed so as to prevent the escape of liquid or gas and to further close the opening from the drill pipe or tubing in case of emergency. Gripping means are provided to anchor the tubing relative to the casing and further means are provided to seal the space between the tubing and casing after the parts have been properly anchored.

It is also an object to provide a means for closing the space about the tubing and within the casing head which may be quickly and accurately adjusted and which will effectively seal off the space between the two pipes.

The invention resides in the particular construction of the casing head and the parts attached thereto so that it may be adjusted

in the manner desired to guard against different emergencies which may arise, due to the pressure of gas. The invention resides in the particular arrangement and construction of the parts whereby interchangeability and quick adjustment is obtained.

Referring to the drawing herewith wherein the invention is illustrated, Fig. 1 is a broken side view, partly in elevation and partly in vertical section, illustrating our casing head with certain attachments thereon. Fig. 2 is a similar view showing our casing head with slightly different attachments thereon. Fig. 3 is a transverse section on the plane 3-3 of Fig. 2.

Our casing head is shown at A. It is threaded at its lower end for attachment by means of a coupling 1 to a casing 2. This casing head has lateral threaded openings 3 therein for connection by means of pipes to places of storage or otherwise, as desired. The upper end of the casing head is threaded on its exterior at 4 to receive a connecting member 5 or 5'. The interior of the upper end of the casing head is provided with a seat 6 which is tapered downwardly and adapted to receive slips or other means for anchoring the tubing B, which is adapted to extend upwardly therethrough.

In Fig. 1 the tubing B has secured at a point adjacent the upper end, a special coupling member C, which connects the tubing B with a short extension thereof indicated at 7. The outer surface of the coupling member C forms a type of bushing to fit within the seat 6 in the casing head. Its outer wall is inclined outwardly and downwardly at 8 for a short distance and is then inclined inwardly and downwardly at 9. The bushing thus provided is adapted to fit the seat 6 and the tapered area 9 is shaped to conform to the curvature of said seat. I may employ one or more rings 10 of compressible packing material on the outer surface of the bushing, said rings being adapted to contact with the seat 6 and be compressed thereby to seal the space between the casing head and the tubing.

The threaded area 4 upon the casing head 2 is connected with a nipple 5, previously

mentioned. This nipple is swedged inwardly towards its upper end, and a shoulder is provided at 11 which contacts with the beveled area 8 upon the bushing, and when the nipple is screwed downwardly upon the casing head, the shoulder thereon will force the bushing tightly into the seat 6 and serve to prevent relative movement of the tubing in the casing head.

The upper end of the extension 7 upon the tubing may be connected with a cross shaped coupling 12 having the openings therein threaded for engagement with pipes or packing means, as may be desired, tending to control the flow of fluid from the tubing.

In this form of the invention, the tubing may be inserted into the well for producing purposes, and if danger of blowout is imminent, the bushing 8 may be threaded upon the upper end of the tubing with the cross shaped connection thereon and the nipple 5 may be then screwed downwardly on the casing head to clamp the bushing firmly into its seat, and it will be obvious that there can be no escape of fluid through the space between the casing head and the tubing, except in such manner as to be easily controlled.

In Fig. 2 embodiment, the construction of the casing head is identical with that shown in Fig. 1. Instead of the bushing 8 being screwed as a coupling into connection with the tubing, no bushing is provided. The upper end of the tubing B is connected directly with the cross 12. Slips 13 are employed to grip the tubing when it is to be supported within the casing head. These slips are shown as being arcuate in shape with teeth presented toward the tubing, said teeth being inclined upwardly so as to hold the weight of the tubing when the slips are in the seat. The outer sides of the slips may be provided with a plurality of ribs contacting with the seat, and handles 15 which may be of flexible material as shown in Fig. 2, and will supply means of moving the said slips to and from the tapered seat 6 in the casing head. The space between the casing head and the tubing is sealed by means of a swaged cap 5', the lower end of which is threaded to engage the threaded area 4 of the casing head. The upper end of the cap is decreased in diameter to form a neck which is provided with a central seat 16 to receive packing rings 17. These rings are adapted to fit upon a lower gland 18 slidable in the nipple and adapted to contact at its lower end with the upper end of the slips 13. The downward movement of this gland 18 is limited by a flange on its upper end which is arranged to contact the seat 16. Above the packing rings 17 is an upper gland 19, which may be forced downwardly to compress the packing by means of a threaded cap 20 secured upon the upper end of the nipple. It will be clear

from this construction that the tightening of the cap will force the gland 19 upon the packing rings 17, tending to expand them laterally and seal the space about the tubing. It will also tend to force the lower gland 18 firmly against the slips 13 and thus hold the tubing from movement in the casing head.

We contemplate also placing above the cross 12 a stuffing box to allow the pumping of the well while the upper end is equipped as described. There is a short tube 21 to house the stuffing box. The lower end of the tube has an inwardly extended threaded end 22 to receive packing rings 23. The gland 24 above the packing rings may be forced downwardly upon the rings by means of a collar 25. This collar has a small chamber 26 between the same and the outer wall of the gland 24, in which shot or lubricant for the polished rod may be placed, and small openings 27 in the wall of the gland allow the lubricant to pass inwardly against the pump rod working through said stuffing box. The upper end of the stuffing box gland is flared slightly to receive lubricant so that the pump rod may be more easily inserted therein and lateral handles 28 are formed on the collar 25 so as to more easily manipulate the gland upon the packing.

In the use of the device, it will be noted that the casing head may be equipped in various ways to meet different emergencies which may arise. By the use of the bushing C, shown in Fig. 1, connected directly to the tubing B, the tubing may be secured quickly in fluid tight relation relative to the casing head and also locked against any danger of blowout.

In the Fig. 2 arrangement a tight grip may be obtained upon the tubing and a seal between the casing head and the tubing is also provided, but separate slips are necessary to grip the tubing and a stuffing box must be provided to seal the space above the casing head. It is to be noted, however, that the gripping means provided by the slips co-operate with the stuffing box so that when the stuffing box is tightened, the slips are also locked in position and the tubing supported at any desired point relative to the casing head. The provision of a second stuffing box at the upper end of the tubing allows for the pumping of the well equipped in this manner. It is to be understood, of course, that this stuffing box may be applied in the Fig. 1 embodiment in an obvious manner, the connection being identical with that shown in Fig. 2.

The principal point of advantage in this construction is its capacity for universal adjustment to meet every different condition arising in the production of oil or gas in deep well operations. The same equipment may be used with different attachments to meet the different emergencies arising during the han-

dling of production. The advantages will be obvious to those skilled in the art.

What we claim as new is:

1. A casing head comprising in combination a tapered seat, a set of pipe engaging slips therein, a nipple having a neck reduced to a diameter less than that of said slips and arranged to be screwed onto said head, a packing chamber in said reduced neck, a pair of gland members in said chamber the lower end of said members having a flange thereon whereby its downward movement is limited and having its lower end arranged to contact the upper end of said slips, packing between said glands, and a cap on said neck whereby said glands, packing and slips may be compressed into pipe engaging position.

2. A casing head comprising in combination a tapered seat, a set of pipe engaging slips therein, a nipple having a neck reduced to a diameter less than that of said slips and arranged to be screwed onto said head, a packing chamber in said reduced neck, a pair of gland members in said chamber, the lower of said members having a flange thereon whereby its downward movement is limited and having its lower end arranged to contact the upper end of said slips, packing between said glands, and a cap on said neck whereby said glands, packing and slips may be compressed into pipe engaging position, said slips being so arranged that the pipe may be moved upwardly upon loosening of said cap.

3. A casing head assembly including in combination a tapered seat, a set of pipe-engaging slips adapted for disposition on said seat and to engage a pipe passing through said casing head, a nipple connected to said casing head, a packing chamber in said nipple, a pair of gland members arranged to extend outwardly from each end of said packing chamber and arranged to confine packing material therebetween and a cap member on said nipple to engage the uppermost of said glands to compress said packing and move the lowermost gland into contact with said slips.

In testimony whereof we hereunto affix our signatures this 26 day of October, A. D. 1927.

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