

Jan. 9, 1934.

J. M. HEWGLEY

1,942,598

EXPANSION HEAD

Filed Jan. 22, 1931

2 Sheets-Sheet 1

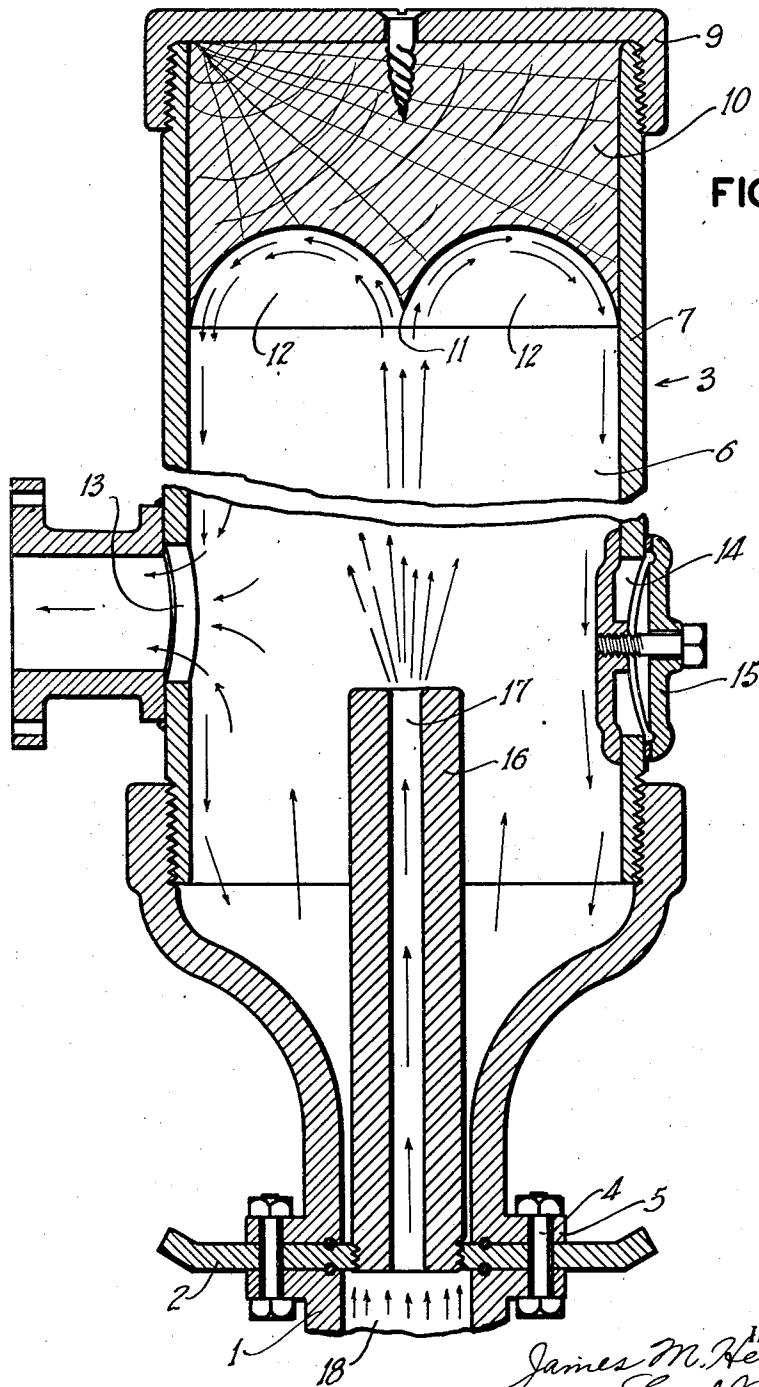


FIG. I.

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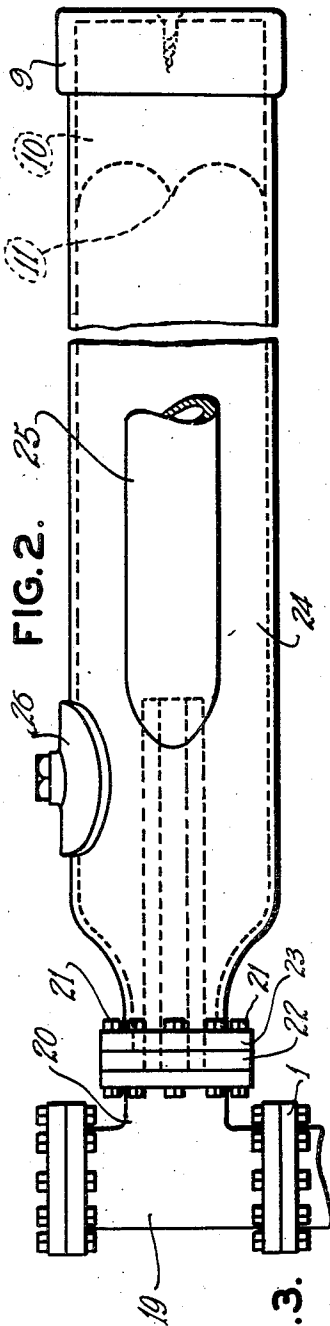


FIG. 3.

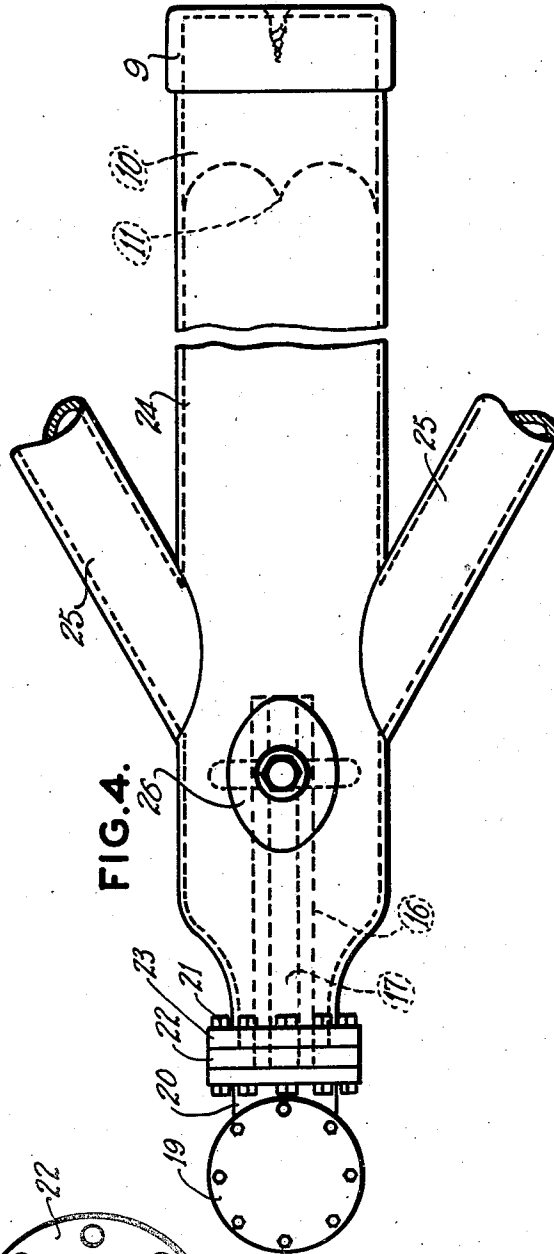
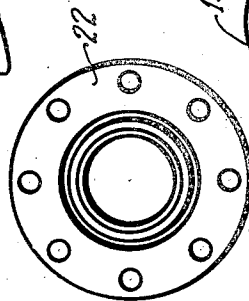


FIG. 4.



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UNITED STATES PATENT OFFICE

1,942,598

EXPANSION HEAD

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Application January 22, 1931. Serial No. 510,499

11 Claims. (Cl. 166—15)

My invention relates to heads for oil and gas wells, and more particularly to a head for confining extremely high pressure.

The objects of my invention are to provide a device of this class which is new, novel, practical and of utility; which may be used on wells having an extremely high pressure, and which will confine a large amount of the gas and oil within the well and will release a given amount without its increased velocity at the releasing point causing the connected fittings or pipes to be cut away by the flowing fluid; which will cause the velocity of the released oil and gas to be checked or stifled by its own pressure, thus making it possible to convey the oil and gas to a separator at a velocity and in a volume at which the separator is capable of separating the oil from the gas; the wearing parts of which are easily replaceable; which will be strong and durable; which will be comparatively cheap in manufacture; and, which will be efficient in accomplishing all the purposes for which it is intended.

At the present time a pipe cross is usually installed directly over the master gate of a well for the purpose of splitting or diverting the flowing oil and gas into three different pipes so that, if necessary, the oil and gas can be conveyed to a plurality of separators. Each of these pipes is provided with a gate valve, and the volume of the oil and gas which is permitted to flow to each separator is governed by the width at which each valve is opened. With this installation much loss is incurred because of the fact that when one of the gate valves is only partially opened it causes an increase in the velocity of the oil and gas, and consequently the gate valves as well as the pipes between the valves and the separators are constantly being cut away by the flowing oil and gas together with the sand and other extraneous particles conveyed in the oil and gas.

In many instances the volume and pressure of a well is too great to be controlled by the three valves upon the outlet pipes leading from the pipe-cross, and consequently the master gate valve is only partially opened. This of course results in the increased velocity of the fluid at the master gate valve cutting away the valve housing and frequently results in the complete loss of the master gate valve. This loss results many times in the well breaking loose and running wild, which of course is extremely expensive, and dangerous.

Applicant's device is designed to confine a desired amount of the volume of the fluid in the well, and to release an amount from the well that can be amply disposed of by the separators. It

is also designed to provide an expansion chamber at the point at which the fluid is released from the well, so that the velocity of the released fluid will be materially cut down, and the usual cutting away of the connections will be eliminated. It is also so arranged that the pressure of the released fluid acts as a force for stifling the velocity of the fluid, thus bringing it under perfect control before it is conveyed to the separators. Applicant's device entirely eliminates the usual pipe-cross and its gate valves, commonly known to those familiar with the art, as a "Christmas tree".

With these and other objects in view as will more fully appear, my invention consists in the construction, novel features, and combination of parts hereinafter more fully described, pointed out in the claims hereto appended, and illustrated in the accompanying two-sheet drawing, of which:

Figure 1 is a vertical sectional view of a device embodying the principles of the invention;

Fig. 2 is a side elevational view of a slightly different embodiment of the device;

Fig. 3 is a detail plan view of one member of the device; and,

Fig. 4 is a plan view of the embodiment illustrated in Fig. 2.

Like characters of reference designate like parts in all the figures.

It is understood that various changes in the form, proportion, size, shape, weight and other details of construction within the scope of my invention may be resorted to without departing from the spirit or broad principle of my invention and without sacrificing any of the advantages thereof; and it is also understood that the drawings are to be interpreted as being illustrative and not restrictive.

One practical embodiment of the invention as illustrated in the drawings follows:

Referring more particularly to Fig. 1, the reference numeral 1 indicates the upper flanged end of a usual master gate valve, and the numeral 2 indicates a usual plate for tying down the valve against the pressure of a well, (not shown). A better understanding of the office of said plate 2 may be had by reference to a United States patent application filed by me on July 7, 1930, under Serial Number 465,870, in which the reference numeral 7 indicates the said plate 2 of this application.

The expansion head, the whole of which is represented by the reference numeral 3, is adapted to be connected to said plate 2 and master gate valve 1 by a plurality of bolts 4 110

through its lower flange 5. Said expansion head consists of an enlarged expansion chamber 6 formed by a housing 7 which is preferably cylindrical in form. Said housing 7 is threadedly attached at its lower end to a reducer 8, the lower end of which bears said flange 5. The upper end of said housing 7 is closed by a cap 9, the inner surface of which is removably provided with a thick block of wood 10 which acts as a buffer for receiving the force of any fluid released into said chamber 6 through the master gate valve 1. It may be found desirable to substitute some other material such as lead in lieu of said block 10. The lower surface of said block 10 is preferably provided with a central down-standing point 11 and with an annular concavity 12 surrounding the same. The reason for this will be more fully described hereinbelow. Said housing 7 is provided with a lateral outlet 13 and oppositely therefrom with a man-hole opening 14 hermetically closed by a closure 15.

As a means of stiffling a portion of the fluid before it enters said chamber 6, I provide a nipple or choke member 16, having a comparatively small axial bore 17. The lower end of said choke member 16 is threadedly received by said plate 2. It may be seen that said member 16 is readily replaceable through said man-hole opening 14, and that the amount of fluid released into said chamber 6 may be governed by providing said member 16 having a desired size of bore 17 therein.

In operation, the master gate valve 1, will be opened to its full extent, thus eliminating the detrimental cutting force of the fluid usually had when the valve is only partially opened. A portion of the flowing fluid will be released through said bore 17 of said member 16, but the majority of the fluid will be held within the bore 18 of said valve 1. The force of that portion of the fluid which is released through the bore 17 of said member 16 will be received by said block 10, and due to the comparatively large size of said chamber 6, ample room will be had for the fluid to expand without exerting its cutting action upon said housing 7. It will be understood that the greatest force of the fluid will be received by said point 11, which is in axial alinement with said bore 17, and that when the fluid strikes said point 11, said point 11 and said concavity 12 will act as a means for diverting the fluid to the walls of said housing 1 as indicated by the arrows in Fig. 1. The fluid is thus forced to back up and lose most of its velocity before it can escape through said outlet 13. The fluid after leaving said block 10, will also act as a means for assisting in stiffling the velocity of the incoming fluid. It is to be understood that the fluid will be conveyed from said outlet 14 by a pipe, not shown, to a usual separator.

In Figs. 2, 3 and 4, is illustrated a slightly different embodiment of the device, but one which well remains within the scope of the invention. This embodiment is designed for use where it is desired to convey the fluid to more than one separator, and when it is desired to use the device upon master gate valves which were not previously provided with said plate 2. This embodiment is illustrated with the device installed in a horizontal position.

In this last mentioned embodiment, the upper end of said master gate valve 1 is provided with a usual pipe T 19, the upper end of which is closed. To the flanged horizontal leg 20 of said T 19 is attached by bolts 21, a plate 22, and the flanged end 23, of a housing 24. Said plate 22

is similar in form and office to that of said plate 2 formerly described, with the exception, that said plate 22 is not provided with the outstanding arms which are provided upon said plate 2 for tying down said master gate valve 1.

Said housing 24 is similar in form and office to said housing 7, with the exception of the location of said outlet 13 and the man-hole. In this embodiment the choke member 16 is threadedly received at one end by said plate 22. The housing 24 is provided with a pair of outlet pipes 25 which extend outwardly from said housing 24 and at an angle toward said cap 9. A man-hole is provided through the top of said housing 24, and its closure is indicated by the reference numeral 26.

The operation of this last described embodiment is similar to that described with reference to the first described embodiment, with the exception that said pipes 25 may each lead to a separator.

It will be obvious that more than two of said outlet pipes 25 may be provided if desired. It is also obvious that when it is desired to install the device, as embodied in Fig. 1, upon a master gate valve which has not previously been provided with said plate 2, that said plate 22 may be utilized.

Obviously, the invention is susceptible of embodiment in forms other than that which is illustrated in the accompanying drawings and described herein, and applicable for uses and purposes other than as detailed, and I therefore consider as my own all such modifications and adaptations and other uses of the form of the device herein described as fairly fall within the scope of my invention.

Having thus described my invention, what is claimed and desired to be secured by Letters Patent, is:

1. An expansion head, having in combination, a housing having an axial inlet in one of its ends and having its other end closed, said housing forming an expansion chamber of considerably greater diameter than the diameter of said inlet, said housing also having a lateral outlet adjacent said inlet, and removable means within said inlet for controlling the ingress of a fluid.

2. Organization as described in claim 1, in which said controlling means comprises a removable nipple extending axially into said chamber to a point adjacent said outlet.

3. Organization as described in claim 1, in which said controlling means comprises a nipple extending axially into said chamber to a point adjacent said outlet, said nipple having an axial bore comparatively small with respect to the size of said outlet.

4. An expansion head, embodying a housing having an axial inlet in one of its ends and having its other end closed, said housing forming an expansion chamber of considerably greater diameter than the diameter of said inlet, said housing also having a lateral outlet adjacent said inlet, removable means within said inlet for controlling the ingress of a fluid, and removable means upon the inner face of the closed end of said housing for receiving the force of a fluid entering said inlet.

5. An expansion head, embodying a housing having an axial inlet in one of its ends and having its other end closed, said housing forming an expansion chamber of considerably greater diameter than the diameter of said inlet, said housing also having a lateral outlet adjacent

said inlet, removable means within said inlet for controlling the ingress of a fluid, removable means upon the inner face of the closed end of said housing for receiving the force of a fluid entering said inlet, and means formed upon the inner face of said force receiving means for directing such fluid to the wall of said housing.

6. In an expansion head for oil and gas wells, the combination with a housing having an axial inlet in one of its ends and having its other end closed, said housing forming an expansion chamber larger than the diameter of said inlet and having a lateral outlet, of removable means within said inlet for controlling the ingress of a fluid.

7. In an expansion head, an expansion chamber, having an axial inlet, a removable nipple extending into the expansion chamber, said nipple having an axial bore smaller than the chamber's outlet and sufficiently small to partially choke or muffle the fluid flow into said chamber.

8. In an expansion head, an expansion chamber having an axial inlet, a removable nipple within the inlet and extending axially into the expansion chamber, said nipple having an axial bore smaller than the chamber's outlet and sufficiently small to partially choke or muffle the fluid flow into said chamber.

ciently small to partially choke or muffle the fluid flow into said chamber.

9. In combination with well tubing for conveying fluid from submerged strata under high pressure, an expansion chamber in communication with the discharge end of the tubing for choking flow therethrough, and a deflector member in the chamber positioned in line with the flow of fluid discharged from the tubing for deflecting the flow in the chamber.

10. In combination with well tubing for conveying fluid from submerged strata under high pressure, an expansion chamber, a removable nipple in the expansion chamber in communication with the discharge end of the tubing for choking flow therethrough, and a deflector member in the chamber positioned in line with the flow of fluid discharged from the tubing for deflecting the flow in the chamber.

11. The combination with a well pipe, of an upright tank mounted directly over the pipe, means for discharging the effluent from the well pipe into the tank, and means for choking said discharge in said tank.

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