

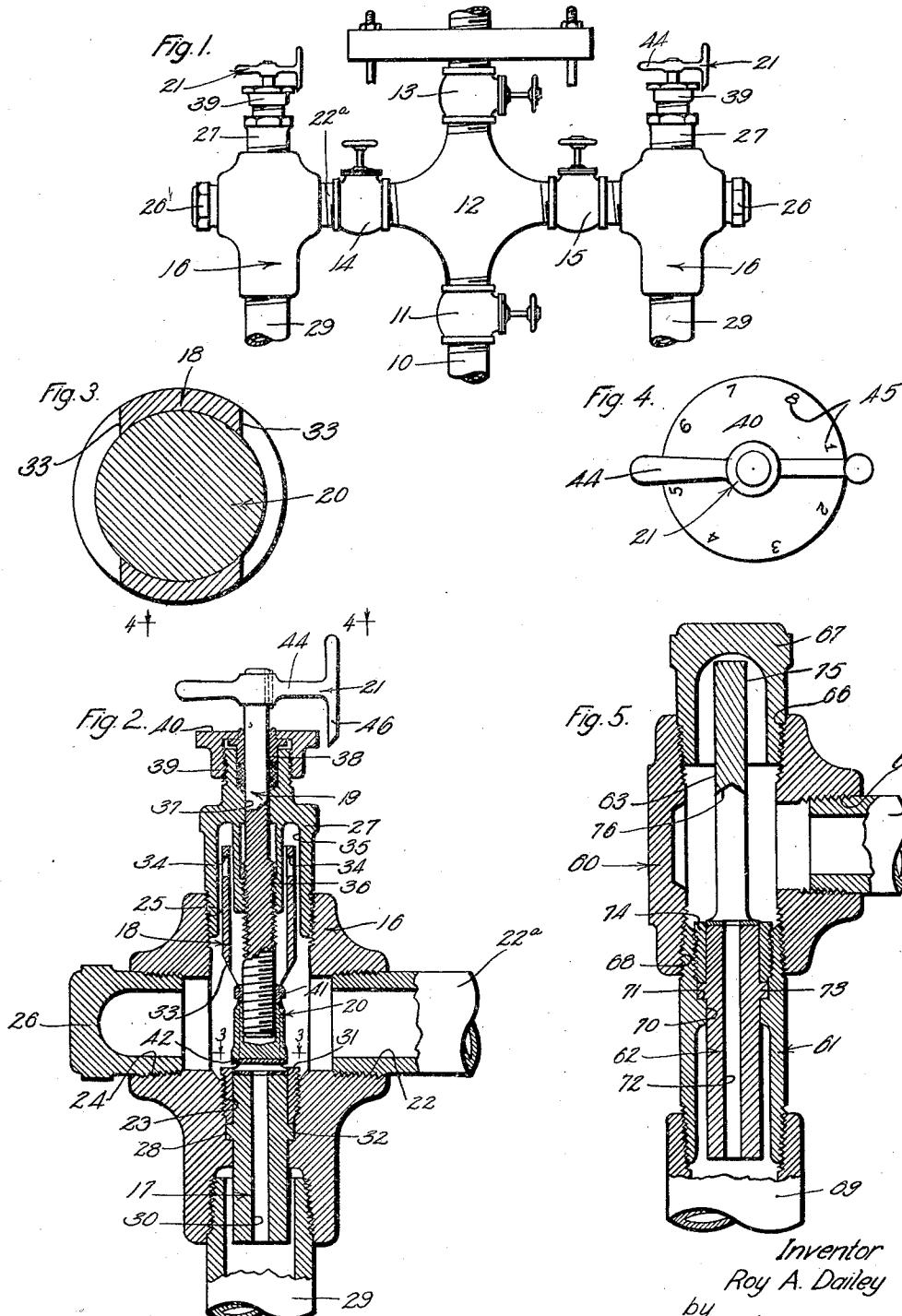
April 5, 1932.

R. A. DAILEY

1,852,233

DEVICE FOR CONTROLLING THE FLOW OF FLUID

Filed Feb. 3, 1930



Inventor  
Roy A. Dailey  
by  
W. H. Campbell  
his Attorney

## UNITED STATES PATENT OFFICE

ROY A. DAILEY, OF TAFT, CALIFORNIA

## DEVICE FOR CONTROLLING THE FLOW OF FLUID

Application filed February 3, 1930. Serial No. 425,584.

This invention relates to a device for controlling the flow of fluid and relates more particularly to a device for controlling the flow of an oil well.

5 Frequently oil flows from a well under very high pressures making it necessary to control or regulate the flow. Devices commonly known as flow nipples or flow beans are used to reduce or control the rate of flow 10 from wells flowing or producing from natural causes where the pressures are high. The oil flowing from wells under high pressure usually carries with it some sand which quickly cuts out and enlarges the bores or passages of 15 the usual types of flow nipples and necessitates their early replacement. The common forms of valves cannot be employed in such instances as their gates or flow-controlling parts are quickly worn or cut out through the 20 action of the fluid and the sand carried by the oil and are made inoperative.

It is a general object of the present invention to provide a practical and effective mechanism for controlling and regulating the flow 25 of oil from an oil well, or the like.

It is an object of this invention to provide a flow controlling device including a nipple mounted so that it can be easily and quickly removed for replacement.

30 A further object of the invention is to provide a simple effective and improved form of nipple, for a flow controlling device.

Another object of the invention is to provide a valve mechanism or flow nipple that is 35 operable to vary the flow from a well and which may be operated to compensate for partially worn or cut out flow controlling parts without removing such parts from the device and without stopping the flow.

40 Another object of the invention is to provide a device of the character mentioned in which the flow controlling parts present relatively small surfaces to the abrasive action of the sand or solid matter carried by 45 the flowing fluid.

It is another object of the invention to provide a device of the character mentioned in which the parts subjected to the abrasive action of the sand may be quickly and easily 50 replaced.

Another object of the invention is to provide a flow controlling device of the character mentioned which embodies means for indicating the position or setting of the flow controlling element.

55 A further object of the invention is to provide a device of the character mentioned in which the flow controlling parts which directly control or restrict the flow of fluid are of simple formation and are faced with hard 60 wear-resisting material.

65 Other objects and features of the invention will be best and more fully understood from the following detailed description of typical forms and applications of the invention, throughout which description reference is had to the accompanying drawings, in which:

70 Fig. 1 is a side elevation of a typical arrangement of control devices and fittings at the upper end of a well casing. Fig. 2 is an enlarged longitudinal detailed sectional view of a device provided by this invention. Fig. 3 is an enlarged transverse detailed sectional view taken as indicated by line 3—3 75 on Fig. 2. Fig. 4 is an enlarged top or plan view taken as indicated by line 4—4 on Fig. 2, and Fig. 5 is a longitudinal detailed sectional view of another form of the invention.

80 In Fig. 1 of the drawings I have shown an arrangement of conduits, control devices and fittings at the top of a well casing which arrangement may be considered typical of constructions found on producing oil wells 85 and which is commonly termed a "Christmas tree". The arrangement shown in the drawings includes the upper end of a well cap or head 10, a gate valve 11, immediately above the head 10, a cross fitting 12 above the valve, a gate valve 13 connected with the upper arm of the cross 12, valves 14 and 15 connected with the two opposite horizontal outlets or side arms of the cross 12, flow controlling devices connected beyond the valves 90 14 and 15, and other parts common to arrangement of this class.

95 The device provided by this invention is primarily intended to be mounted in a conduit connected with a producing oil well, 100

and throughout the following detailed description I will consider a device provided by this invention in an arrangement of parts such as I have described above. It is to be understood that the flow controlling device provided by this invention may be employed wherever it is desirable to control the flow of fluid under high pressures and that it can be arranged in various combinations and manners other than I have shown for purpose of illustration.

The form of the invention illustrated in Figs. 1, 2, 3 and 4 of the drawings includes, generally, a body 16 adapted to be connected with a supply conduit, as through a control valve 14 or 15, a flow bean or nipple 17 removably mounted in a passage in the body to restrict the passage to reduce the flow of fluid through the body, a tubular guide or member 18 detachably clamping the nipple 17 in the passage of the body, a valve stem 19 extending through the member 18, a valve head 20 carried by the stem 19 adapted to cooperate with the nipple 17 to control the flow of fluid through the nipple, and means 21 for indicating or determining the rate of flow through the body.

The body 16 may be in the general form of a high-pressure cross or T. In the case shown in the drawings the body is in the form of a high-pressure cross having four communicating outlets or passages 22, 23, 24 and 25. I have shown a nipple or conduit 22<sup>a</sup> connecting the valve 14 and the body. The outlet or passage 24 which is opposite the passage 22 may be closed by a suitable bullet plug 26. The passage 25 of the body is closed by a valve fitting or cap 27 which carries the valve stem 19, as will be herein-after described. The passage 23 of the body opposite the passage 25 is provided with a reduced portion which provides an inwardly facing shoulder 28. An outlet conduit 29 may be connected with the passage 23.

The nipple 17 is in the nature of a flow bean or flow nipple and is mounted in the passage 23 of the body to reduce the rate of flow of fluid through the passage. The nipple 17 is an elongated tubular part arranged longitudinally in the passage 23 and having a central longitudinal passage or opening 30. The diameter of the passage 30 is preferably comparatively small, its size depending upon the conditions under which the device is to operate. The nipple 17 is preferably comparatively long, and in the form of the invention illustrated in the drawings the inner end 31 of the nipple is adjacent the inner end of the passage 23. The inner end 31 of the nipple 17 is made flat, and is faced with abrasion-resisting material. The nipple 17 slidably fits the reduced portion of the passage 23 and is provided with a radially projecting flange 32. The outer side of the flange 32 seats against the shoulder 28 of the passage

23 and is retained or clamped against the shoulder 28 by the member 18.

The member 18 is provided to removably clamp the nipple 17 in position in the passage 23 and to guide the valve head 20. The member 18 is an elongated tubular part having one end screw threaded into the inner end of the passage 23. The member 28 slidably receives the inner end portion of the nipple 17 and the end of the member 18 clamps against the flange 32. In accordance with the invention the member 18 extends completely through the passage 25 of the body and extends into the cap 27. The walls of the member 18 are cut away adjacent the inner end of the nipple 17 to provide two diametrically opposite openings 33. The openings 33 may be comparatively long and are arranged or positioned opposite the passages 22 and 24 of the body. The openings 33 terminate adjacent the inner end of the nipple 17. Two diametrically opposite openings 34 are provided through the walls of the member 18 adjacent its outer end. The openings 34 are provided to receive a suitable tool or wrench for turning the member.

The cap 27 may be screw threaded into the passage 25 of the body and is provided to carry the valve stem 19. The cap 27 projects outwardly from the body 16 and is provided in its inner end or interior with a socket or opening 35. An inwardly projecting part 36 is provided on the cap 27. The part 36 extends into the member 18 which projects into the opening 35 of the cap 27.

The valve stem 19 extends through an opening 37 in the cap 27 and projects into the interior of the body. The stem 19 is screw threaded through the part 36 and projects outwardly from the outer end of the cap 27. A suitable operating handle 44 may be attached to the stem 19. A packing gland 38 is provided in the opening 37 to seal around the valve stem 19. A nut 39 is screw threaded on the cap 27 to compress the packing of the gland 38. The nut 39 is provided with a flat upper or outer face 40.

The valve head 20 is carried at the inner end of the stem 19 and is provided to cooperate with the inner end of the nipple 17 to control the flow of fluid through the passage 30 of the nipple 17. The valve head 20 may be removably secured to the stem 19 in any suitable manner. In the preferred form of the invention the head 20 is screw threaded onto the inner end of the valve stem 19 and a lock nut 41 is provided to lock the valve head 20 in position. The head 20 is preferably of round cross sectional configuration and is slidably guided by the inner walls of the member 18. The end 42 of the head 20 is made flat and is faced with hard wear-resisting material. The face or end 42 of the head 20 is normally spaced from the face or inner end 31 of the nipple 17 and may be operated

relative to the end of the nipple to regulate the flow of fluid through the passage 30.

The means 21, for indicating the position of the head 20 relative to the inner end or face 31 of the nipple 17, may include indicating markings 45 on the end 40 of the nut 39, and a hand or finger 46 on the handle 44. The finger 46 may be arranged to operate around the edge of the nut 39 to be movable between the various markings 45 on the nut.

In the form of the invention illustrated in Fig. 5 of the drawings the invention embodies a body 60 in the form of a cross or T, a nipple 61 carried in one of the ports or passages 15 of the body, a flow bean or flow nipple 62 arranged in the nipple 61, and a stem or clamping member 63 for clamping the flow nipple 62 in position. In this form of the invention the body 60 may be a common form 20 of high-pressure T having a passage or port 64 to receive a conduit 65 from a well, a passage 66 closed by a cap or bull plug 67, and a passage 68. The nipple 61 is arranged between an outlet pipe 69 and the body 60 and is screw threaded into the passage 68 of the body so that it becomes in effect a part of the body. In accordance with this form of the invention the passage of the nipple 61 is provided with a reduced portion 70 which provides an inwardly-facing shoulder 71. The flow bean or nipple 62 embodied in this form 30 of the invention may be of the same character as the nipple 17 described above. The nipple 62 may have a central passage 72 of reduced diameter to limit or reduce the flow of fluid through the nipple 61. A flange 35 73 is provided on the nipple 62 and is seated against the shoulder 71.

The stem 63 is provided at its inner end 40 with an enlarged tubular part 74 which is screw threaded into the inner end of the nipple 61 and clamps the flange 73 against the shoulder 71. The stem 63 has an elongated part 75 which projects outwardly from the part 74 into the bull plug 67. A transverse opening 76 is provided through the part 75 opposite the passage 64 of the body and extends into or communicates with the opening of the tubular part 74. The part 75 of the stem 63 is made polygonal so that it is adapted to be engaged by a wrench or tool for turning the stem when the bull plug 67 is removed.

It is believed that the operation of the two forms of the invention described above will be fully understood from the foregoing detailed description. In the form of the invention illustrated in Figs. 1, 2, 3 and 4 of the drawings, flow from a well or from the cross 12 passes through the valve 14 and into the body through the passage 22. The valve head 20 may be positioned to permit the desired flow of fluid into the passage 30 of the nipple 17. The velocity of the fluid entering the passage 30 may be effectively controlled

by means of the valve head 20. The passage 30 of the flow nipple 17, being of reduced diameter, limits or reduces the flow of the fluid into the outlet conduit 29. The hard abrasion-resisting material facing the nipple 17 and the valve head 20 prevents these parts from becoming excessively worn under the usual conditions of use. As the passage 30 of the flow nipple 17 becomes enlarged through use of the device and the flow of fluid through the passage is not properly controlled or reduced, the valve head 20 may be operated toward the end 31 of the nipple to control the rate of flow into the passage 30. The bull plug 26 may be removed so that the valve head 20 and the inner end of the nipple 17 may be examined to determine their condition. The nipple 17 may be removed from the body by removing the cap 27 and loosening or removing the member 18. The valve 35 head 20 and the nipple 17 are of simple construction and are easily replaced. The co-operating faces 31 and 42 of the nipple 17 and the valve head 20 present comparatively small wearing surfaces and, being faced with 40 hard material, are not quickly cut out.

In the form of the invention illustrated in Fig. 5 of the drawings the flow nipple 62 is similar to the nipple 17 and is quickly and easily removed by removing the bull plug 67 and unscrewing the stem 63.

Having described only typical preferred forms of my invention, I do not wish to limit myself to the specific details set forth, but wish to reserve to myself any changes or variations that may appear to those skilled in the art or fall within the scope of the following claims.

Having described my invention, I claim:

1. A device of the character described including, a body having a fluid passage, a removable flow nipple in the passage, a removable cap on the body, a stem threaded through the cap, a valve head on the stem opposing an end of the nipple, and a guide for the head screw threaded into the passage to hold the nipple in the passage.

2. A device of the character described including, a body having a fluid passage with a shoulder, a flow nipple in the passage, a flange on the nipple, a detachable cap on the body, a stem threaded through the cap, a valve head on the stem having a side opposing an end of the nipple, and a member guiding the valve head and screw threaded into the passage to hold the flange against the shoulder.

3. A device of the character described including, a body having a fluid passage with a shoulder, a flow nipple in the passage, a flange on the nipple, a detachable cap on the body, a stem threaded through the cap, a valve head on the stem having a side opposing an end of the nipple, and a member guiding the valve head and screw threaded into the

passage to hold the flange against the shoulder, the member extending into the cap.

4. A device of the character described including, a body having a fluid passage, an inwardly facing shoulder in the passage, a nipple in the passage, a projecting part on the nipple, a member threaded into the inner end of the passage and retaining the projecting part against the shoulder, the member 10 having an opening beyond the inner end of the nipple, and an extension extending to a point accessible from the exterior of the body.

5. A device of the character described including, a body with opposite openings, one 15 carrying a nipple, the other carrying a removable cap, and a member screw threaded into the body for retaining the nipple in the opening, the member having an extension covered by the cap.

20 6. A device of the character described including, a body having a fluid passage, a removable nipple in the passage, a movable valve head in the body opposing an end of the nipple, and a member screw threaded into the body for guiding the valve head and for retaining the nipple in the passage.

7. A device of the character described including, a body having a passage extending completely through it and a lateral passage 30 connecting with the said passage intermediate its ends, there being a shoulder in one end part of the said passage, a removable nipple in the said end part of the passage, and a member screw threaded into the said end 35 part of the passage to retain the nipple against said shoulder, the member projecting through the other end part of the said passage to be accessible from the exterior of the body.

40 8. A device of the character described including, a body in the form of a cross fitting having two intersecting passages, there being a shoulder in one end part of one of the passages, a removable nipple in the said end part 45 of the said passage, a valve head opposing an end of the nipple and adjustable toward and away from the end of the nipple, a member guiding the valve head and retaining the nipple against the shoulder, the member extending through the other end part of the said passage to be accessible from the exterior of the body, the said end of the nipple and the valve head being accessible through one end 50 part of the other passage, and a removable plug normally closing the said end part of the said other passage.

9. A device of the character described including, a body having two communicating fluid passages, a shoulder in one of the 60 passages, a nipple in the said passage, a projecting part on the nipple, a member threaded into the inner end of the said passage and retaining the projecting part against the shoulder, the member having an opening communicating with the inner end of the nipple 65

for passing fluid, and an extension on the member extending into an opening in the body to be accessible from the exterior of the body, and a removable cap closing the opening in the body and covering the extension.

In witness that I claim the foregoing I have hereunto subscribed my name this 20th day of January, 1930.

ROY A. DAILEY.

70

75

80

85

90

95

100

105

110

115

120

125

130