

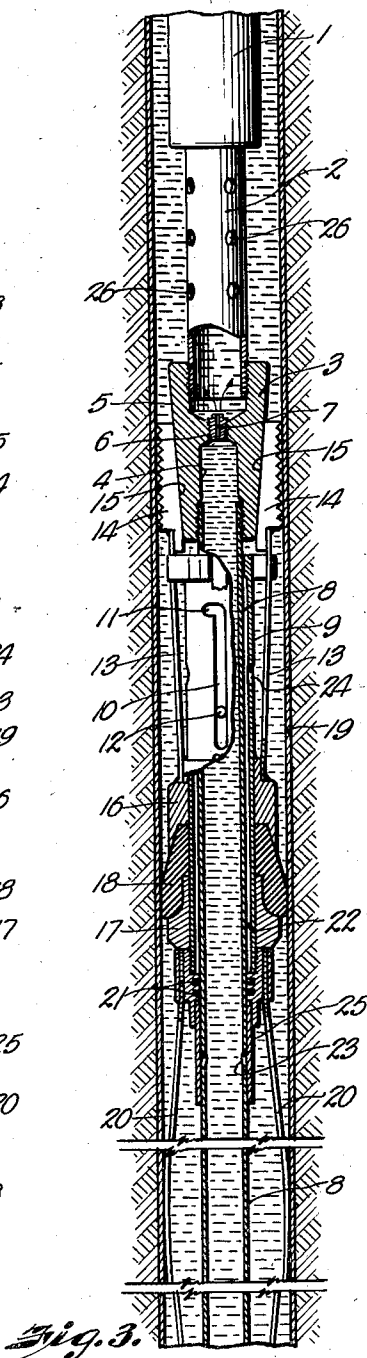
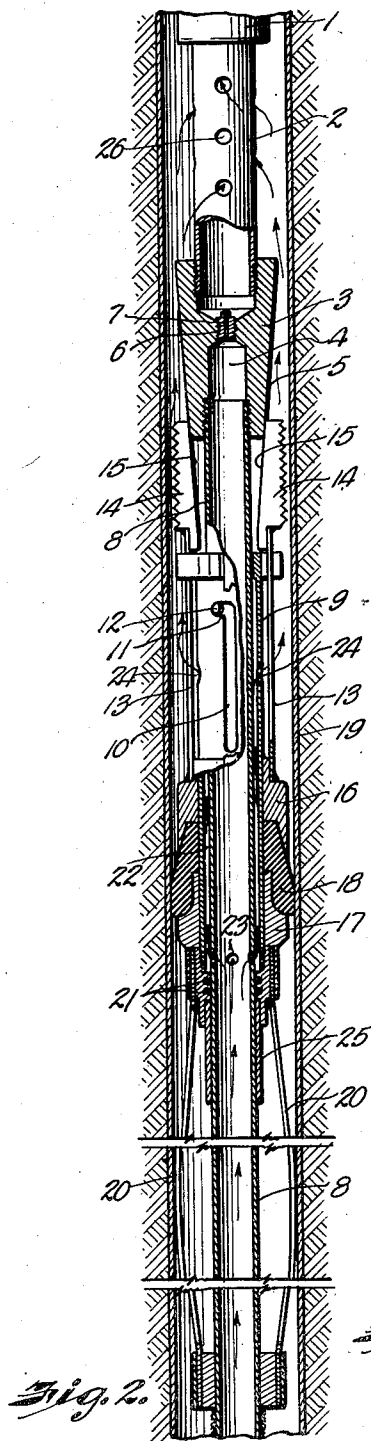
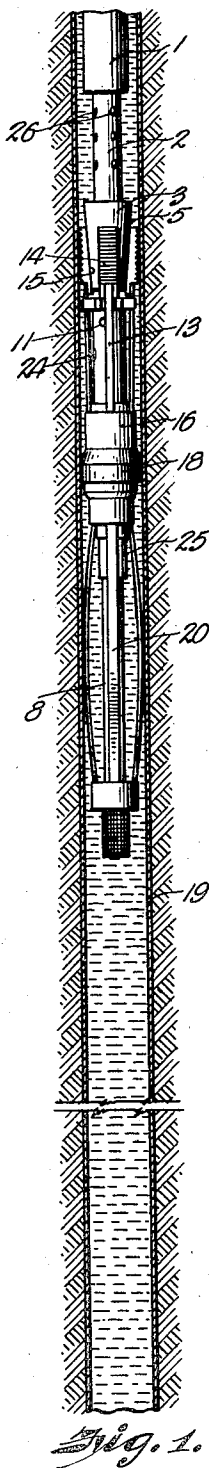
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OIL PRODUCTION CONTROL DEVICE

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OIL PRODUCTION CONTROL DEVICE

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5 Claims. (Cl. 166—12)

My invention relates to an oil production control device.

In many areas, oil production is limited by law to a certain amount. Frequently this amount is so small that it is difficult to find pumping equipment of small enough capacity to produce the wells. If larger size equipment is used, there is great danger that the allowable production will be exceeded, resulting in embarrassment and involving a violation of the law.

One object of my invention is to provide an oil production control device in which standard size pumping equipment may be employed without danger of exceeding the allowable production.

Another object of my invention is to provide an oil production control device in which standard size pumping equipment may be used.

In the accompanying drawing which forms part of the instant specification and is to be read in conjunction therewith and in which like reference numerals are used to indicate like parts in the various views:

Figure 1 is a sectional view of a well showing my oil production control device in place.

Figure 2 is an enlarged sectional view showing my device being lowered into the well.

Figure 3 is an enlarged sectional view showing my device in production controlling position.

Referring now to the drawing, the assembly is attached to the end of any suitable pumping equipment 1 by means of a perforated nipple 2, and comprises a member 3 formed with a bore 4 and tapered outer side walls 5. Supported within the bore 4 is a plug 6 provided with an orifice 7. The plug 6 is removable and a plurality of interchangeable plugs 6 provided, each with an orifice of a size different than that of any of the other plugs, so that the plug with the desired size orifice may be employed, depending upon the particular well for which my device is used. The orifice 7 is calibrated so that, for the pressure in a particular well, the amount of oil flowing through the orifice will be equal to the allowable production. The member 3 carries a tube 8 which supports an anchoring and packing assembly positioned thereabout. A sleeve member 9 surrounding and slidably mounted on tubes 8 is held in its lower position shown in Figure 2 when the assembly is being lowered into the well. Secured to the sleeve 9 are housing members 16 and 17 which house a packing member 18 adapted to pack off the well against the well casing 19. The housing member 16 is formed with a vertically disposed slot 10 hav-

ing a horizontal portion 11. A pin 12 secured to the tube 8 holds the sleeve 9 in the lower position shown in Figure 2. Secured to the sleeve are spring members 13, supporting anchoring members or slips 14. The anchoring members are formed with a tapered inner surface 15, adapted to coact with the tapered surface of the member 3. The spring members 13 normally hold the anchoring members 14 inwardly as shown in Figure 2.

The lower housing member 17 supports spring fingers 20 which are normally bowed outwardly to frictionally contact with the casing 19. The lower portion of member 17 is also provided with packing rings 21 adapted to seal the lower portion of the tube 8.

The packing rings just described seal off an annular space 22 formed between the interior of the sleeve 9 and the exterior of the pipe 8. The lower portion of member 17 containing the packing rings 21 acts as a valve controlling ports 23 formed in the pipe 8. A number of ports 24 are formed in the upper portion of the sleeve 9.

In operation, the assembly is lowered into the well with the parts in the position shown in Figure 2. Oil below the packer 18 is displaced by the packer as the assembly is lowered. This oil passes upwardly through pipe 8, as shown by the arrows, through ports 23 into the annular space 22 and out through the ports 24 in the sleeve 9. When the assembly has reached the desired position in the well casing, it is rotated to move the pin 12 out of the horizontal portion 11 of the slot, permitting it to enter the vertical slot 10. Continued lowering of the assembly will move the member 3 and pipe 8 downwardly relative to the external sleeve 9. Downward motion of the body member 3 will cause the tapered surface 5 therefore to engage the tapered surfaces 15 of the anchoring members 14 to cam the members outwardly to the position engaging the well casing 19, as shown in Figure 3, thereby securing the assembly to the casing 19. The downward movement of the pipe 8 relative to the sleeve 9 also moves the valve at the lower end of the member 17 upwardly relative to the ports 23, closing these ports from access to the annular space 22. The position of the parts can be seen by reference to Figure 3, in which it will be noted that the skirt 25, secured to the member 17, covers the ports 23, while the sealing rings 21 are sealed against the exterior of the pipe 8 above the ports 23. The downward movement of the sleeve 9 relative to the pipe 8 when the pin 12 is positioned in

the vertical portion of slot 10 is prevented by frictional engagement of the spring fingers 20 with the walls of the casing 19. When the parts are in the position shown in Figure 3, oil may flow out of the well only through the orifice 7 of the plug 6. Oil flows outwardly through the openings 26 in the nipple 2 and fills the casing 19 above the packer 18 to the height determined by the pressure in the well. It will be seen, therefore, that the packer 18 forms a reservoir above the packer with the casing, which reservoir is filled only through the orifice 7 of the plug 6. At suitable intervals the pump 1 may be operated to empty the reservoir formed by the packer 18 with the casing. During this pumping operation, the pump may be run at full capacity, taking suction from the oil collected in the reservoir. After the reservoir is emptied, the pump may be stopped and the reservoir again allowed to fill. In this manner, at no time during the pumping operation will the allowable quota of oil for the particular well be exceeded. At the same time, full size pumping equipment can be used and, through this pumping equipment, the well may be operated efficiently over short periods of time, rather than inefficiently over long periods of time.

It will be seen, therefore, that I have accomplished the objects of my invention. I have provided an oil production control device enabling efficient use of standard size pumping equipment to be made without the danger of exceeding the allowable production for the well.

When it is desired to remove the assembly from the well or to change its position, the pumping equipment is lowered until the pin 12 contacts the upper wall of the horizontal slot 11. The pump is then rotated to seat the pin in the slot 11. As the member 3 moves upwardly with respect to the slips 14, the spring fingers 13 will move the slips inwardly to the position shown in Figure 2. With the parts in this position, the assembly may be removed from the well or shifted to any desired position and again located in place.

It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and sub-combinations. This is contemplated by and is within the scope of my claims. It is further obvious that various changes may be made in details within the scope of my claims without departing from the spirit of my invention. It is, therefore, to be understood that my invention is not to be limited to the specific details shown and described.

Having thus described my invention, I claim:

1. An oil production control device including in combination a perforated nipple adapted to be placed in communication with the intake port of a pump, a body member supported by said nipple, an orifice plug within said body member, a tube supported by said body member communicating with said orifice plug, a sleeve slidably mounted around said tube, a packer carried by said sleeve, said sleeve forming an annular passageway with said tube, a port in said sleeve above said packer, a port in said tube below said packer, valve means carried by said sleeve adapted to be moved to positions opening and closing said tube port, anchoring means carried by said assembly and moved to anchoring position by motion of said sleeve with respect to said tube, means normally holding said anchoring means in non-anchoring position, the construction being

such that, when the anchoring means is in non-anchoring position, said valve uncovers said tube port providing communication between the interior of said tube and said annular passageway, means for securing said tube and said sleeve against relative vertical movement in a non-anchoring position, said means rendered inoperative by relative rotation between said tube and said sleeve.

2. An oil production control device including in combination a tube, a sleeve slidably mounted about said tube, said sleeve being formed with a bayonet slot, a pin secured to said tube and positioned in said bayonet slot, an orifice plug carried by said tube, a packer carried by said sleeve, means carried by said sleeve for frictionally engaging the walls of a well, anchoring means carried by said assembly for securing the same in a well, said anchoring means being constructed to move to anchoring position upon relative vertical motion of said tube to said sleeve, said pin and said bayonet slot being constructed normally to prevent relative motion between said tube and said sleeve, said tube and said sleeve forming an annular passageway, said sleeve being formed with a port above said packer providing communication between the well and said annular passageway, said tube being formed with a port below said packer providing communication between said annular passageway and the interior of said tube, a valve carried by said sleeve adapted to cover said tube port when said tube and sleeve move relative to each other in a vertical direction to operate said anchoring means, said bayonet slot and pin being such that upon rotation of said tube and said sleeve relative to each other, said pin is moved to a position permitting vertical relative movement of said tube with respect to said sleeve.

3. An oil production control device including in combination a tube, a sleeve mounted on the tube for movement relative thereto, means for moving the sleeve to different adjusted positions on the tube, a passageway between the tube and the sleeve, a packer carried by the sleeve, means for anchoring the packer in the well, an orifice plug for controlling the flow through the tube, ports in the inner tube below the orifice plug for admitting fluid in the tube into the passageway between the tube and sleeve, ports in the outer sleeve above the packer for discharging fluid in the passageway exteriorly of the sleeve, and a valve carried by the sleeve and movable therewith to open the ports in the tube in one adjusted position of the sleeve whereby to bypass fluid in the tube through the passageway and around the orifice plug and to close the ports in the tube in another adjusted position of the sleeve so that fluid flowing in the tube must pass through the orifice plug.

4. An oil production control device including in combination a tube, a sleeve mounted on the tube for movement relative thereto, means for moving the sleeve to different adjusted positions on the tube, a packer carried by the sleeve, means rendered operative by movement of the sleeve for anchoring the packer within the well, an orifice plug for controlling flow through the tube, a bypass between the tube and sleeve, said bypass opening through the tube below the orifice plug and through the sleeve above the packer, and a valve carried by the sleeve adapted to open and close the bypass in different adjusted positions of the sleeve, the arrangement being such that in one adjusted position of the sleeve the valve will

open the bypass so that fluid in the tube can discharge from the device above the packer without passing through the orifice plug and that in another adjusted position of the sleeve the valve will close the bypass so that fluid in the tube must pass through the orifice plug before discharging from the device.

5. An oil production control device including in combination a tube, a sleeve mounted on the tube for movement relative thereto, means for moving the sleeve to different adjusted positions on the tube, a packer carried by the sleeve, an orifice plug for controlling flow through the tube, a bypass between the tube and sleeve, said by-

pass opening through the tube below the orifice plug and through the sleeve above the packer, and a valve adapted to open and close the bypass in different adjusted positions of the sleeve, the arrangement being such that in one adjusted position of the sleeve the valve will open the bypass so that fluid in the tube can discharge from the device above the packer without passing through the orifice plug and that in another adjusted position of the sleeve the valve will close the bypass so that fluid in the tube must pass through the orifice plug before discharging from the device.

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