(No Model.) 2 Sheets—Sheet 1.

W. E. KARNS.

OIL WELL PUMPING APPARATUS.

No. 595,914. Patented Dec. 21, 1897.

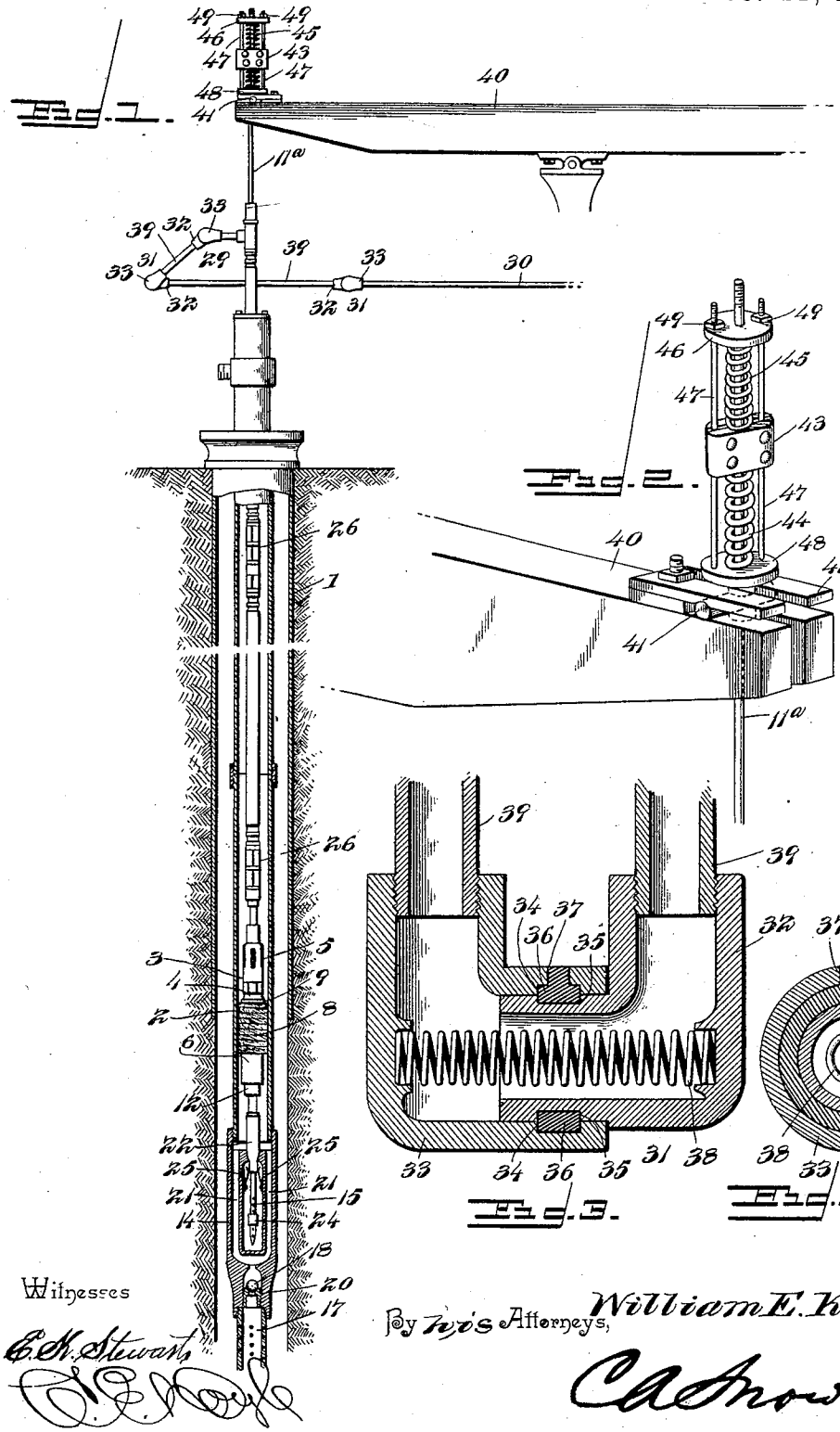


Fig. 1.

Fig. 2.

Fig. 3.

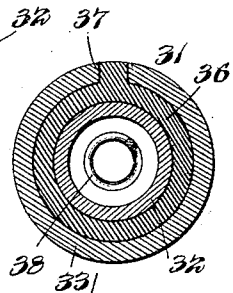


Fig. 4.

Witnesses

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 5.

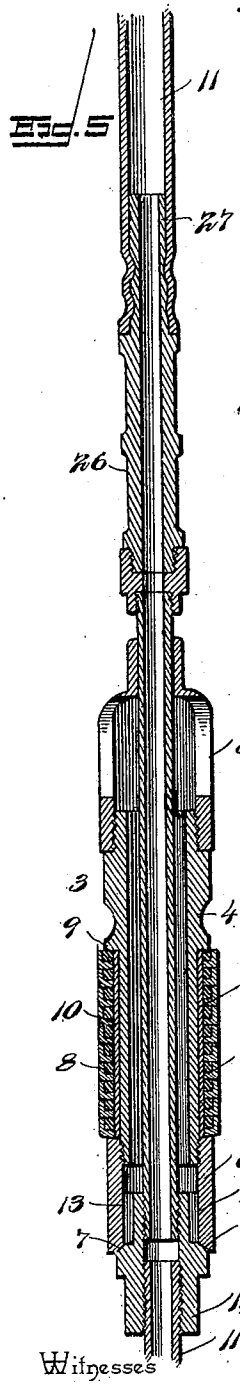


Fig. 8.

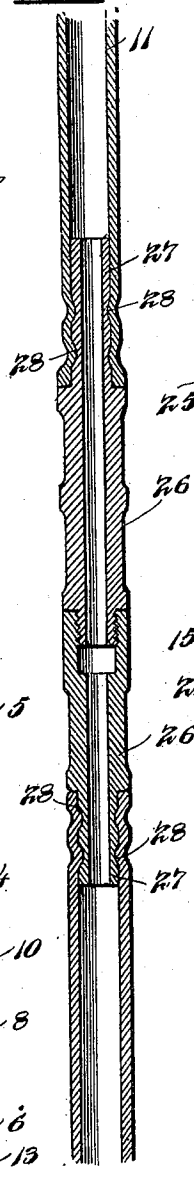


Fig. 6.

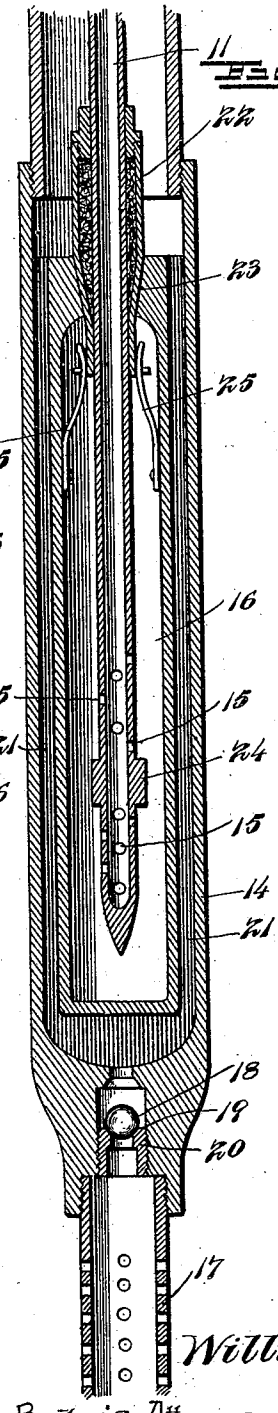
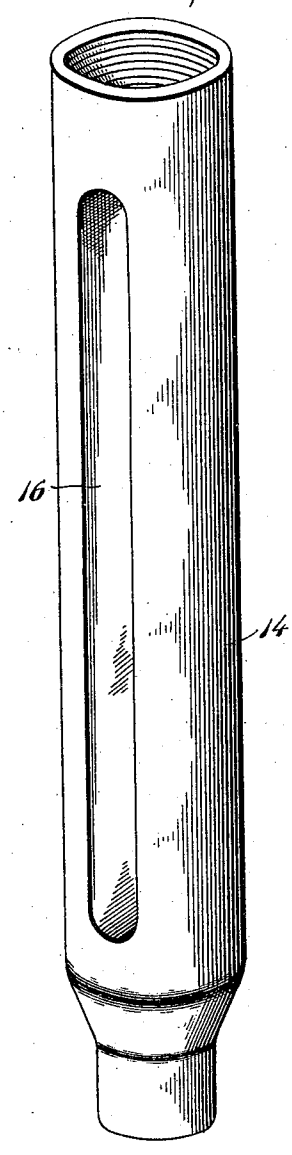


Fig. 7.



Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM E. KARNS, OF PARKER'S LANDING, PENNSYLVANIA.

OIL-WELL PUMPING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 595,914, dated December 21, 1897.

Application filed May 15, 1896. Serial No. 591,689. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. KARNS, a citizen of the United States, residing at Parker's Landing, in the county of Armstrong and State of Pennsylvania, have invented a new and useful Oil-Well Pumping Apparatus, of which the following is a specification.

My invention relates to oil-well pumping apparatus, and has for its object to provide a simple and efficient construction and arrangement of parts whereby steam or other fluid may be supplied to a well at a point contiguous to the lead or inlet valve through a passage concentric with the pump-rod to avoid unnecessarily cooling the conductor, and hence reduce the condensation to the minimum; to provide means for admitting steam or its equivalent to the said passage while the pump is in operation; to provide a cushioning device through which motion is communicated from the pump-lever or walking-beam to the pump-rod; to provide packing devices for the lower end of the pump-rod, said devices being removable from the tube with said rod, and to provide a suction-pipe so constructed as to adapt it for the lateral discharge of steam conveyed through the axial passage.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a central section of a pumping apparatus constructed in accordance with my invention. Fig. 2 is a detail view of the cushioning device whereby motion is communicated from the operating-lever or walking-beam to the pump-rod. Fig. 3 is a detail longitudinal sectional view of one of the universal-coupling joints. Fig. 4 is a transverse section of the same. Fig. 5 is a detail central section of the working valve and contiguous parts. Fig. 6 is a detail central section of the suction-pipe and contiguous parts, including a stuffing-box for the pump-rod. Fig. 7 is a detail view of the suction-pipe detached. Fig. 8 is a detail sectional view of one of the pump-rod couplings.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

1 designates the tubing, including a working barrel or pump-cylinder 2, in which operates a working valve 3, said valve consisting of a hollow shell 4, terminating at its upper end in a cage 5 and at its lower end in a thimble 6, which is constructed to fit a seat 7. The thimble is threaded upon the lower extremity of the shell of the valve and bears against the lower extremity of a packing-cylinder 8, which is fitted upon a cylindrical portion of the shell, with its upper end in contact with a shoulder 9. The packing-cylinder consists of alternate rings or layers of canvas and dental rubber encircling a sleeve 10 and vulcanized thereto, this construction of packing being such as to resist the heat of the steam supplied to the bottom of the well.

The working valve is mounted to slide upon the pump-rod 11, which passes axially therethrough, and the valve-seat is formed, in the construction illustrated, upon a coupling 12 between two contiguous sections of the pump-rods, guide-ribs 13 being formed upon a portion of the coupling above the plane of the valve-seat to fit in a bore of the thimble and prevent lateral vibration thereof.

The pump-rod is hollow or tubular throughout and thus extends axially through the working valve and below the lower extremity of the working barrel or cylinder of the tubing, the same terminating in the interior of a suction-pipe 14, which is fitted upon the lower extremity of the working barrel, the lower extremity of said pump-rod being laterally perforated, as shown at 15, to provide for the discharge of steam or other fluid for liquefying the paraffin lining of the walls of the well. This suction-pipe, which forms the foot of the tubing, is provided with lateral axially-elongated openings 16, through which the steam or other fluid is discharged, the length of said lateral openings or slots being equal to or greater than the length of stroke of the pump-rod.

Threaded into the inlet end of the suction-pipe is an anchor or strainer 17, which is of perforated or reticulated construction, and in

the neck of the inlet-opening is arranged a lead-valve 18 for preventing discharge from the suction-pipe. The seat 19 of said valve, which preferably consists of a ball, as shown in the drawings, is held in place by means of a removable ring 20, threaded into the bore of said inlet-opening, and in communication with the inlet-opening above the plane of the valve are the suction channels or passages 21, arranged, respectively, between the elongated openings in the sides of the suction-pipe, through which liquid is pumped into the working barrel or cylinder, said working barrel or cylinder being in communication with the upper ends of the channels.

The pump-rod operates at a point contiguous to its lower or outlet extremity through a stuffing-box 22 to prevent liquid from entering or leaving the pump-barrel at this point, and in order to secure the advantages incident to the use of a stuffing-box at this point without preventing the removal of the pump-rod from the tubing the shell of the stuffing-box is constructed to form an air-tight joint, with a seat 23 in the suction-pipe, when the pump-rod is lowered into the tubing, whereas when required said stuffing-box may be unseated and withdrawn with the pump-rod.

In the construction illustrated the shell of the stuffing-box is tapered at its lower extremity to fit in the correspondingly-shaped seat 23, and by depressing the pump-rod sufficiently to bring the lower end of the coupling 12 in contact with the upper end of the shell of the stuffing-box the latter may be driven firmly into its seat to prevent leakage. On the other hand, when it is desired to detach the stuffing-box it may be loosened by striking the lower extremity thereof with a head or knocker 24 on the portion of the pump-rod below the plane of the stuffing-box.

In the construction illustrated I also employ auxiliary means for securing the stuffing-box in place in its seat, including spring-latches 25, secured to the walls of the cavity in the suction-pipe and engaging projections on the lower extremity of the suction-box. These latches engage the projections automatically when the suction-box is lowered to its seat, and when the pump-rod is elevated the shoulder at the upper end of the head or knocker 24 comes in contact with the latches and disengages them from the stuffing-box.

In order to avoid weakening the portions of the hollow pump-rod contiguous to its joints, as by threading the members of the coupling upon the contiguous extremities of the pump-rod sections, I employ coupling members 26, constructed with engaging extremities and provided at their outer ends with reduced thimbles 27, having circumferential grooves 28, the extremities of the pump-rod sections being fitted upon the reduced thimbles and crimped or compressed into the grooves thereof. No portion of the material of the pump-rod is removed, and hence the strength is the same as at any other part of the rod. This joint I have found to be superior to either threading or welding, and it is particularly desirable when the pump-rod is employed as a conveyer for steam to be applied to the walls of the well.

The reduced outer extremities of the coupling members form mandrels upon which the receiving extremities of the pipe-sections may be compressed to force the stocks of said pipe-sections into the circumferential grooves of the coupling members, thus forming a joint adapted to resist the axial strain incident to the operation of an oil-well pump-rod.

In order to provide for supplying steam or similar fluid continuously during the operation of the pump mechanism, I employ a universal coupling 29 between the steam-supply pipe 30 and the upper end of the pump-rod, said coupling consisting of a series of swivel-joints 31, of which three are illustrated in the drawings. Each joint consists of male and female members 32 and 33, provided in their contiguous surfaces with registering circumferential grooves 34 and 35, in which is arranged a connecting ring or key 36 of Babbitt metal or its equivalent, said ring being introduced in a molten state through a gate 37, formed in the female member in communication with the groove therein. A compensating spring 38 is arranged axially in the members of the joint to hold them extended and thus maintain a steam-tight contact between the ring and the surfaces of the grooves. The joint members are connected by suitable pipes 39.

The means which I have illustrated in the drawings for reciprocating the pump-rod include an operating-lever or walking-beam 40, upon which is mounted a rocking adjuster 41, held in place by a cap-plate 42, which is vertically perforated to receive a solid extension 11^a of the pump-rod. Secured to said pump-rod extension above the plane of the adjuster is a clamp 43, and between this clamp and the cap-plate 42 is a cushion-spring 44, whereby the jar at the beginning of a stroke is relieved. Above said clamp, which is adjustable to vary the tension of the main or heavy cushion-spring, is arranged an auxiliary or light cushion-spring 45 of less tension than the spring 44, held in place by a cap 46, which is supported by parallel guide-rods 47, extending from a seat 48 on the adjuster. Adjusting-nuts 49 are threaded upon the upper extremities of said guide-rods above the plane of the cap to adjust the tension of the spring 45.

The construction of the packing-ring which is used in connection with the working valve shown and described herein is claimed in my copending application, Serial No. 592,340, filed May 20, 1896.

Various changes in the form, proportion, and the minor details of construction may be

resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

Having described my invention, what I claim is—

1. Oil-well pumping apparatus, having a tubular pump-rod and means for supplying steam thereto, a pump-barrel, a working valve carried by the pump-rod and operating in said barrel, and a suction-pipe having a valved inlet-opening connected by channels with the pump-barrel and provided with a central cavity having lateral outlet-openings, the pump-rod extending into said cavity and having lateral outlet-openings, substantially as specified.

2. Oil-well pumping apparatus, having a tubular pump-rod and means for supplying steam thereto, a pump-barrel, a working valve carried by the pump-rod and operating in the pump-barrel, and a suction-pipe having a valved inlet-opening communicating with opposite cored channels connected with the pump-barrel, and opposite elongated lateral openings equal in length with the stroke of the pump-rod, the pump-rod being extended into the bore of the suction-pipe between and having lateral perforations to discharge through said elongated openings, substantially as specified.

3. Oil-well pumping apparatus, having a tubular pump-rod and means for supplying steam thereto, a pump-barrel, a working valve, a laterally-slotted suction-pipe having a valved inlet-opening connected by channels with the pump-barrel, said pump-rod extending into the bore of the suction-pipe and having outlet-perforations, and a stuffing-box through which the pump-rod extends removably seated in the upper end of the suction-pipe, substantially as specified.

4. Oil-well pumping apparatus, having a tubular pump-rod and means for supplying steam thereto, a pump-barrel, a working valve, a laterally-slotted suction-pipe having a valved inlet-opening connected by channels with the pump-barrel, said pump-rod extending into the bore of the suction-pipe and having outlet-perforations, and a stuffing-box through which the pump-rod extends provided with a tapered extremity removably fitted in a tapered seat in the upper end of the suction-pipe, substantially as specified.

5. Oil-well pumping apparatus, having a tubular pump-rod and means for supplying steam thereto, a pump-barrel, a working valve, a laterally-slotted suction-pipe having a valved inlet-opening connected by channels with the pump-barrel, said pump-rod extending into the bore of the suction-pipe and having outlet-perforations, a stuffing-box removably seated in the upper end of the suction-pipe, and projections on the pump-rod above and below the stuffing-box to jar the latter in seating and unseating the same, substantially as specified.

6. Oil-well pumping apparatus, having a tubular pump-rod and means for supplying steam thereto, a pump-barrel, a working valve arranged in operative relation with a valve-seat, said valve-seat being formed upon a coupling connecting contiguous pump-rod sections, a laterally-slotted suction-pipe having a valved inlet-opening connected by channels with the pump-barrel, said pump-rod extending into the bore of the suction-pipe and having lateral outlet-perforations and a projecting head or knocker, and a stuffing-box through which the pump-rod extends removably seated in the upper end of the suction-pipe, whereby said coupling and the head or knocker are arranged respectively above and below the stuffing-box to provide for jarring the stuffing-box in seating and unseating the same, substantially as specified.

7. Oil-well pumping apparatus, having a tubular pump-rod and means for supplying steam thereto, a pump-barrel, a working valve, a laterally-slotted suction-pipe having a valved inlet-opening connected by channels with the pump-barrel, said pump-rod extending into the bore of the suction-pipe and having outlet-perforations, a stuffing-box through which the pump-rod extends removably seated in the upper end of the suction-pipe, yielding catches for engaging and securing the stuffing-box in its seat, and means carried by the pump-rod for disengaging the catches, substantially as specified.

8. Oil-well pumping apparatus, having a tubular pump-rod and means for supplying steam thereto, a pump-barrel, a working valve, a laterally-slotted suction-pipe having a valved inlet-opening connected by channels with the pump-barrel, said pump-rod extending into the bore of the suction-pipe and having outlet-perforations, a stuffing-box through which the pump-rod extends removably seated in the upper end of the suction-pipe, upwardly-convergent spring-catches on the suction-pipe engaging the stuffing-box, and a head on the portion of the pump-rod below the plane of the stuffing-box for engaging and repressing said catches to release the stuffing-box, substantially as specified.

9. Oil-well pumping apparatus, having a tubular reciprocatory pump-rod extending below the plane of the working valve, and a pump-barrel connected by suction-channels with a valved inlet arranged below the lower extremity of the pump-rod, of a supply-pipe for a fluid agent adapted to be conveyed by the pump-rod to the bottom of the well, and a flexible coupling between said supply-pipe and the pump-rod whereby the fluid agent may be supplied during the reciprocation of the pump-rod, substantially as specified.

10. Oil-well pumping apparatus, having a reciprocatory pump-rod, an operating-lever or walking-beam, a rocking adjuster mounted upon the operating-lever and perforated to receive the pump-rod, a seat carried by the

adjuster, a clamp adjustably secured to the pump-rod above said seat, a cushion-spring interposed between the seat and the clamp, lateral guide-rods connected at their upper extremities by a cap, means for adjusting the cap toward and from the clamp, and an auxiliary spring interposed between the cap and the clamp, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

W. E. KARNS.

Witnesses:
E. G. SIGGERS,
J. H. SIGGERS.