

April 30, 1935.

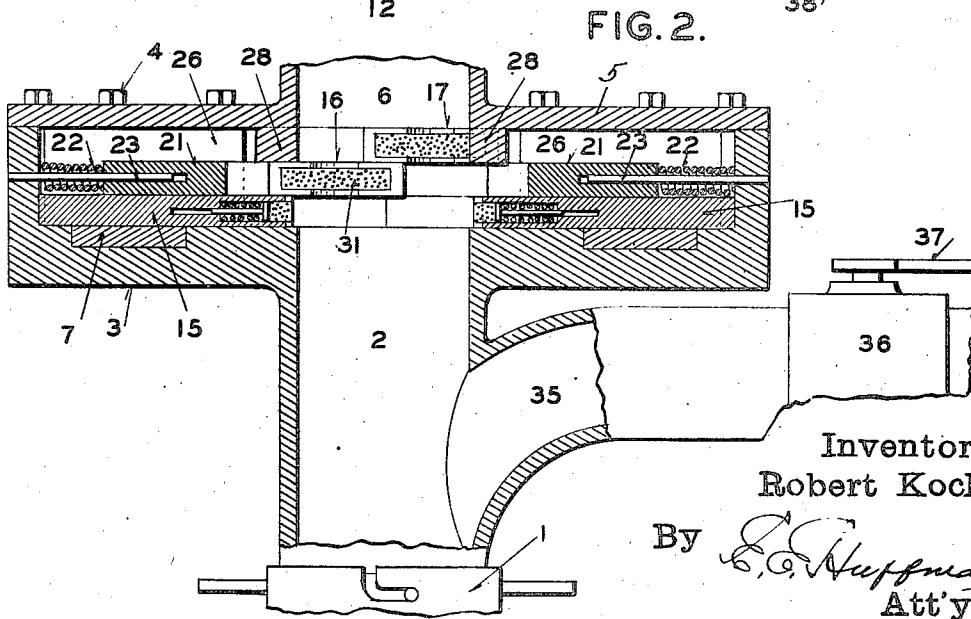
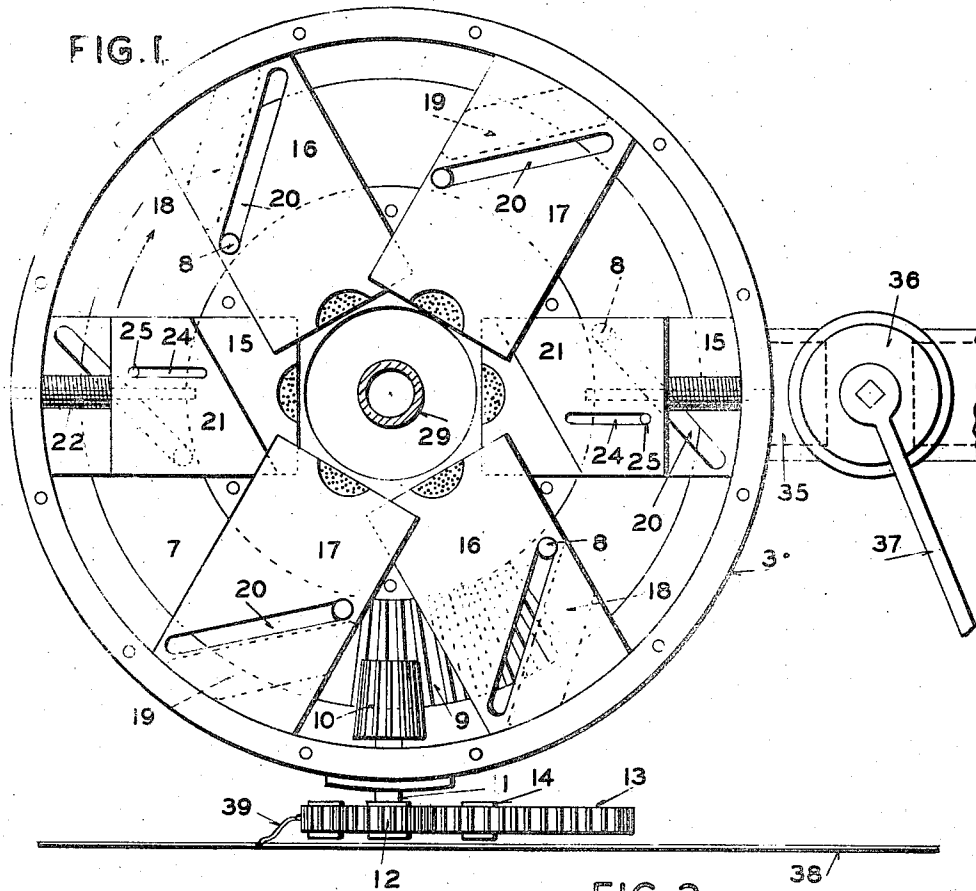
R. KOCH

1,999,699

WELD CAPPING DEVICE

Filed Nov. 22, 1933

2 Sheets-Sheet 1



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FIG. 3.

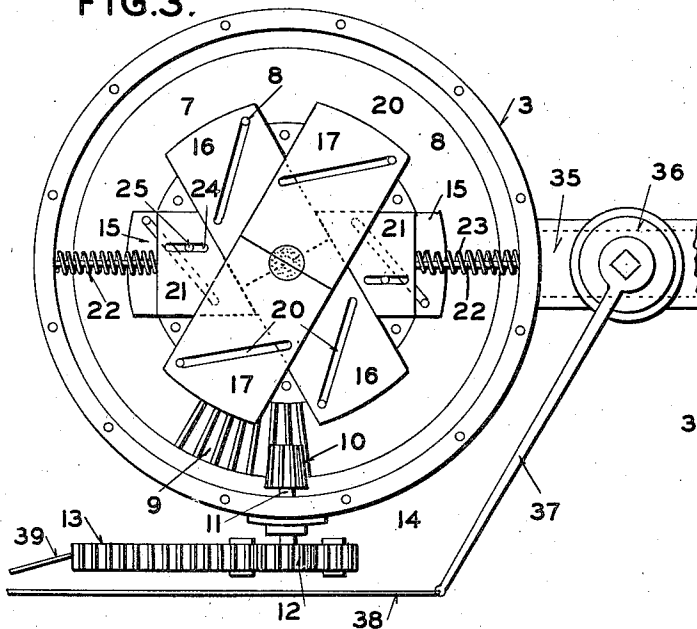


FIG. 4.

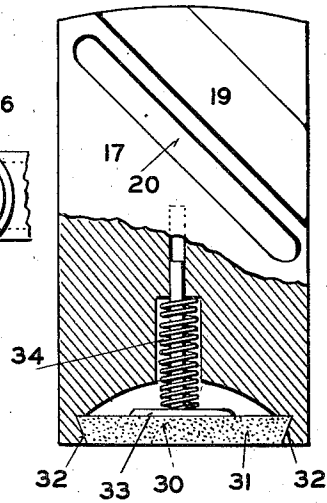


FIG. 5.

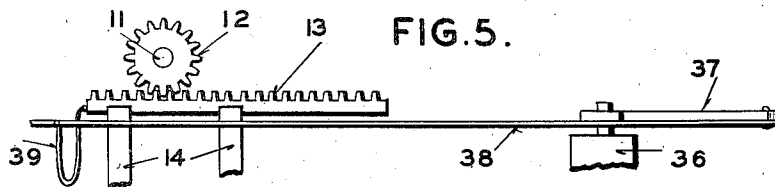


FIG. 6.

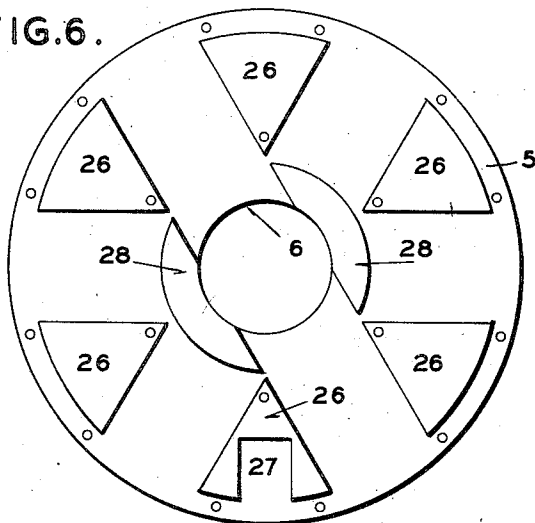
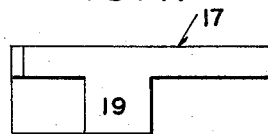


FIG. 7.



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UNITED STATES PATENT OFFICE

1,999,699

WELL CAPPING DEVICE

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6 Claims. (Cl. 251-59)

My invention relates to a well-capping device and particularly to a device adapted to be applied to the upper end of an oil well casing to provide means for closing the outlet either during the boring operation in case a "gusher" is produced, or at any time during or after boring in case of fire.

One object of my invention is to provide a capping device having a relief discharge opening and differential valve operating mechanism, whereby the relief discharge is partially opened before the main valve starts to close, thus minimizing the pressure on the main capping valve.

Another object of my invention is to provide a light, simple, and effective valve mechanism for the main discharge passage and one which will be equally effective when a drill rod or other tool is in the well and when such tool is absent.

In the accompanying drawings, which illustrate one form of well capping device made in accordance with my invention, Figure 1 is a top plan view, the cover plate being removed; Figure 2 is a vertical section; Figure 3 is a view similar to Figure 1 but having the parts in a different position; Figure 4 is an enlarged bottom plan view of one of the slide valve plates, partly in section; Figure 5 is a front elevation showing the differential valve operating mechanism; Figure 6 is a bottom plan view of the cover plate; and Figure 7 is a side view of one of the slide valve plates.

The device is adapted to be secured to the upper end of an oil well casing by means of a union (Figure 2) which may be of the bayonet joint type, as shown, or any other form of connector. The device comprises a hollow stem 2, forming a continuation of the well casing, and a cylindrical head 3. Secured to the head 3 by means of bolts 4, is the cover plate 5 carrying the main discharge pipe 6 which is in alignment with the stem 2.

Formed in the bottom of the head is an annular groove in which is seated a ring 7. This ring carries six valve actuating pins 8 and is provided with an arcuate rack 9. Engaging with the rack 9 is a bevel pinion 10, the shaft 11 of which extends through the wall of the head and is provided on its outer end with a pinion 12 engaging a rack 13 sliding in ways 14 which may be supported in any suitable manner either from the head itself or from the floor of the well structure. The valve consists of three pairs of opposing valve plates arranged in different parallel planes. The bottom plates 15 slide upon the bottom of the head. The intermediate plates 16 have their inner ends resting on the plates 15 and their outer ends raised from the bottom of the

head by spacing blocks 18 equal in thickness to the plates 15 and either formed integral with or secured to the said plates 16. The top plates 17 have their inner ends resting on the plates 16 and their outer ends raised from the bottom of the head by spacing blocks 19 similar to blocks 18 but of a thickness equal to the combined thickness of the plates 15 and 16. Each of the plates 15, 16 and 17 is provided with a cam slot 20 engaging one of the pins 8 so that when the ring 7 is moved in the direction of the arrow (Figure 1), through the necessary arc, the valve plate will be moved from the open position shown in this figure to the closed position shown in Figure 3. When the plates are in their closed position, spaces will be left between plates 15 and 17 through which oil might leak unless these spaces are filled. I accomplish the filling of these spaces by means of auxiliary valve plates 21 slidingly mounted on the plates 15. These auxiliary plates are of a thickness equal to the plates 16 and have their inner ends cut at the proper angle to seat against the edges of said plates 16. Coil springs 22 surrounding rods 23 hold the auxiliary plate against the edges of the plates 16 when the valve is in closed position. In order to retract the auxiliary plate when the valve is in open position, each of said plates is provided with a slot 24 engaged by a pin 25 in the corresponding plate 15.

Guide ways for the plates of the slide valve are provided by triangular guide blocks 26, either formed integral with or secured to the cover plate 5. These blocks are of sufficient depth to extend to the bottom of the head and so engage the edges of all the valve plates. One of the blocks 26 is provided with a recess 27 for the reception of the bevel pinion 10. The cover plate bears against the upper face of the plates 17 but the plates 16 and the auxiliary plates 21 are spaced from the cover. Therefore, to support these latter named plates the cover is provided with spacing blocks 28 of a thickness equal to the plates 17.

To allow the valve plates to be closed when a drill rod 29 or other tool is in the well casing, each valve plate is provided with a curved recess 30, which recess is closed by packing 31 of asbestos or other non-combustible material. This packing is held at the ends by any suitable means, such as the dovetails 32 (Figure 4), and is normally held in position to fill the recess 30 by means of a plate 33 held in place by the tension of a spring 34. When, however, a tool is in the casing when the valve is closed, the spring will

permit the packing to move back so that the recesses may enclose the rod.

Leading from the stem 2 is a relief passage in which is a valve 36. This valve may be of the plug type, as shown, or of any other desired form. It is operated by an arm 37 to the end of which is attached a flexible cable 38 which may lead to any selected distant point for remote control of the device. The cable 38 is connected to one end of the rack 13 by a short flexible cable 39 which, when the main valve is open and the auxiliary valve closed, as shown in Figure 1, hangs in a loop as shown in Figure 5. When the cable 38 is pulled, the first action will be to start opening the relief valve 36 and the main valve will not start to close until all the slack of the cable 39 is taken up, which should occur when the relief valve is about half open. During the remainder of the movement of the cable 38 the relief valve will be completely opened and the main valve closed. In this way I secure a differential operation of the valves, insuring relief of excessive pressure under the main valve.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a well capping device, the combination with a head, of a plurality of pairs of opposing sliding plates, said pairs of plates lying in different parallel planes and forming an interlocking valve, spacing blocks on the faces of some of said plates, a cover plate for holding said valve plates in position, and means for actuating said valve plates.

2. In a well capping device, the combination with a head, of a plurality of pairs of opposing sliding plates, said pairs of plates lying in different parallel planes and forming an interlocking valve, spacing blocks on the under faces of some of said plates, a cover plate having guide blocks forming ways for all of said valve plates and spacing blocks bearing on some of them, and means for actuating said valve plates.

3. In a well capping device, the combination with a head, of a plurality of pairs of opposing sliding plates, said pairs of plates lying in different parallel planes and forming an interlocking valve, spring-actuated auxiliary valve plates carried on one pair of said first named valve plates and seating upon the edges of another pair when the valve is in closed position, and means for actuating the valve plates.

4. In a well capping device, the combination with a head, of a ring in said head provided with an arcuate rack and a plurality of operating pins, a plurality of pairs of opposing sliding plates having cam slots engaging said pins, said plates lying in different parallel planes and forming an interlocking valve, and a gear engaging with said rack to actuate the valve.

5. In a well capping device, the combination with a head, of a ring in said head provided with an arcuate rack and a plurality of operating pins, a plurality of pairs of opposing sliding plates having cam slots engaging said pins, said plates lying in different parallel planes and forming an interlocking valve, a cover plate having guide blocks forming ways for said plates, one of said guide blocks being provided with a recess, and a gear positioned in said recess and engaging said rack to actuate the valve.

6. In a well capping device, the combination with a head, of a ring in said head provided with an arcuate rack and a plurality of operating pins, a plurality of pairs of opposing sliding plates having cam slots engaging said pins, said plates lying in different parallel planes and forming an interlocking valve, auxiliary sliding plates carried upon one pair of said first named plates and seating against the edges of another pair, a cover plate having guide blocks forming guide ways for all of said plates and spacing blocks bearing upon one pair of the main plates and the auxiliary plates, a gear engaging with the rack to actuate the valve.

ROBERT KOCH.