

Aug. 6, 1940.

N. R. KIMMEL

2,210,245

FORMATION TESTER

Filed Sept. 27, 1938

2 Sheets-Sheet 1

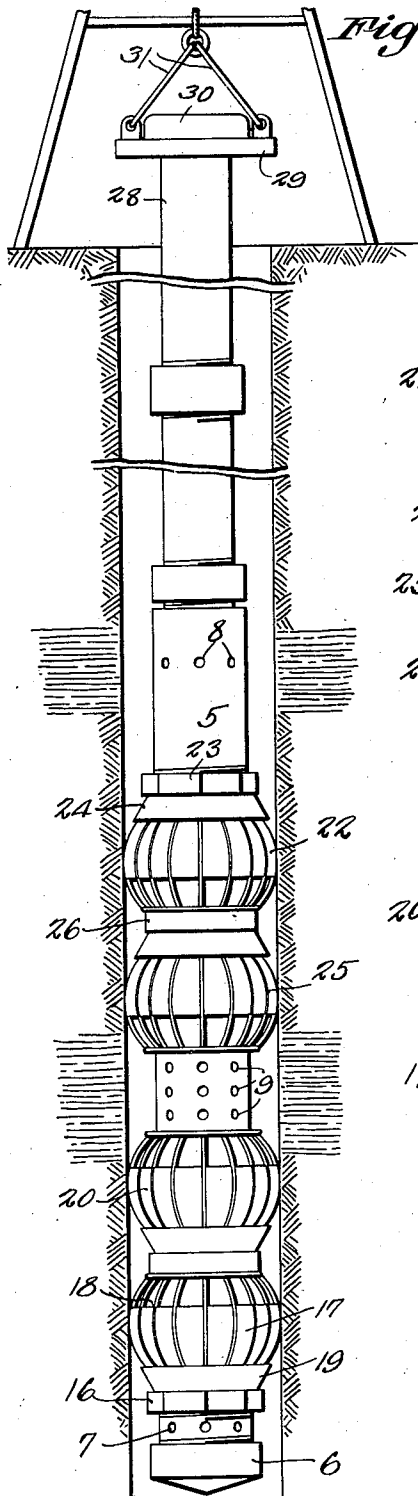


Fig. 1.

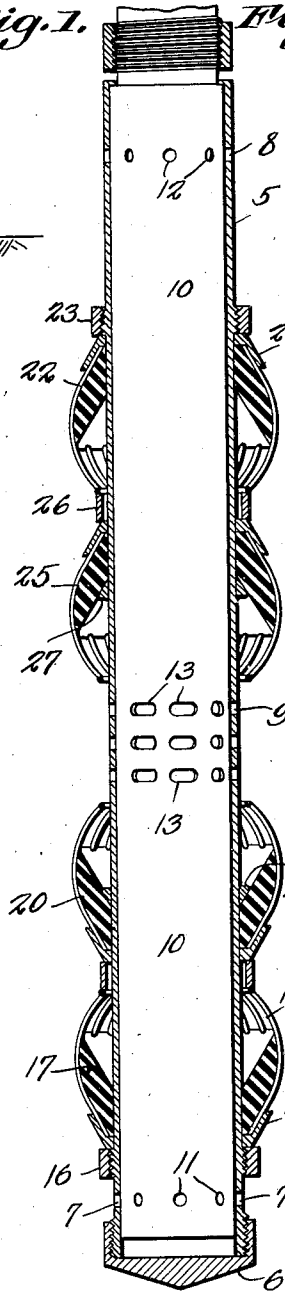
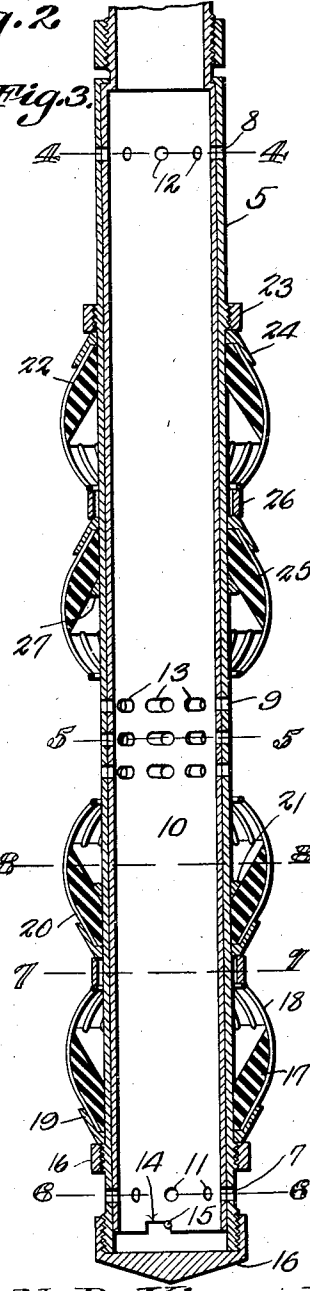


Fig. 2.

Fig. 3.



N. R. Kimmel
INVENTOR.

BY *Chas. Snow*
ATTORNEYS.

Aug. 6, 1940.

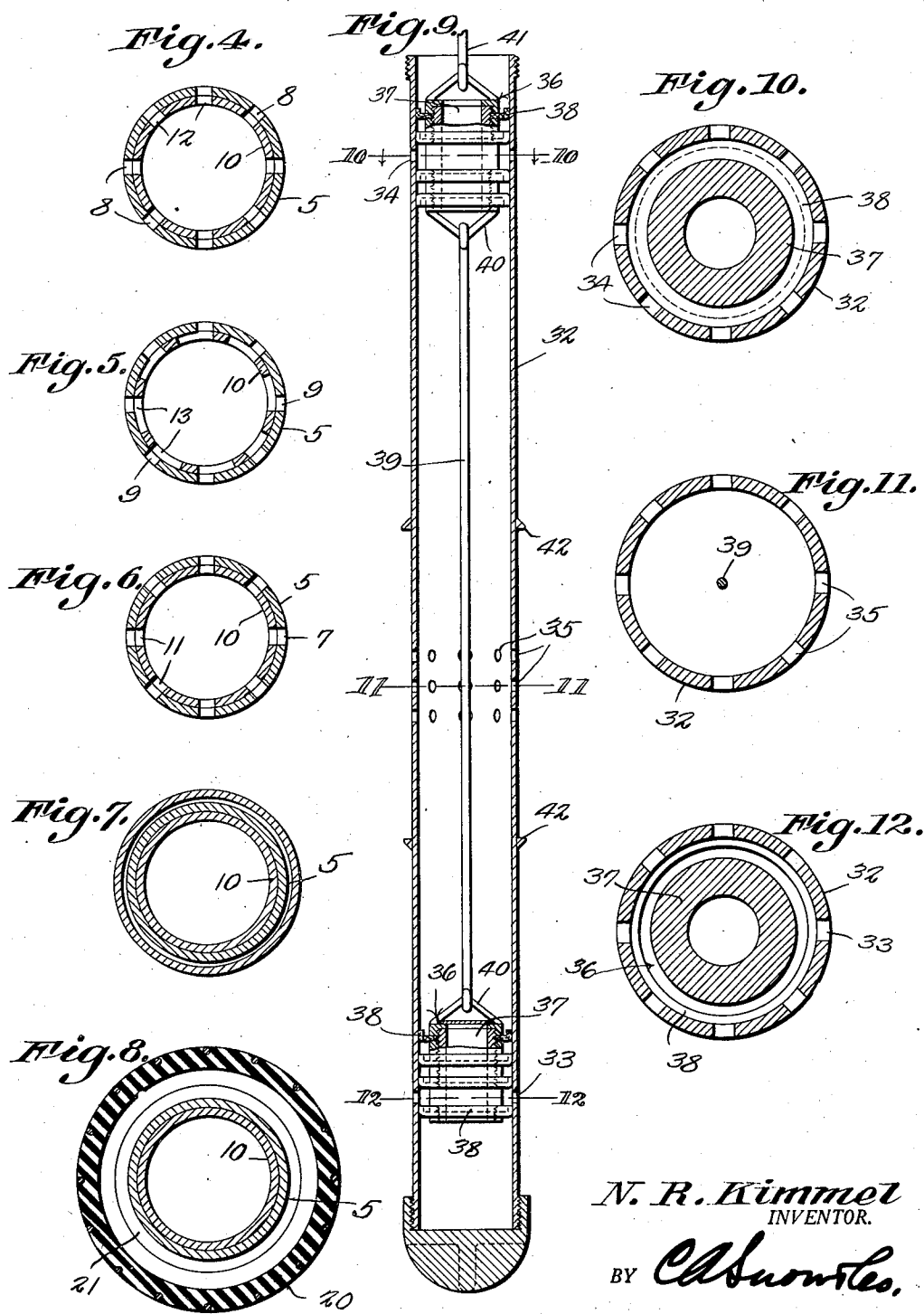
N. R. KIMMEL

2,210,245

FORMATION TESTER

Filed Sept. 27, 1938

2 Sheets-Sheet 2



N. R. Kimmel
INVENTOR.

BY *Edwards*
ATTORNEYS.

UNITED STATES PATENT OFFICE

2,210,245

FORMATION TESTER

Norman R. Kimmel, Gladwin, Mich.

Application September 27, 1938, Serial No. 231,993

1 Claim. (Cl. 166—1)

This invention relates to a device designed for testing formation and supplying acid to oil bearing stratus of oil wells, to increase production by stimulating and inducing the flow of oil in otherwise inactive or slow flowing oil wells.

An important object of the invention is to provide a device of this character which may be adjusted to various positions within a well, eliminating the necessity of removing the device at the time of making an adjustment.

Another important object of the invention is to provide a device which may be used in packing off any particular portion of the well to confine the acid, commonly used in cleaning oil wells, to a particular location, thereby reducing the amount of acid necessary to accomplish a particular result, to the minimum.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein described, may be made within the scope of what is claimed, without departing from the spirit of the invention.

Referring to the drawings:

Figure 1 is an elevational view illustrating a device constructed in accordance with the invention as positioned within a well.

Figure 2 is a longitudinal sectional view through the outer casing of the device, the tubular liner of the device being shown in elevation.

Figure 3 is a longitudinal sectional view through the device, both liner and outer casing being shown in section.

Figure 4 is a sectional view taken on line 4—4 of Figure 3.

Figure 5 is a sectional view taken on line 5—5 of Figure 3.

Figure 6 is a sectional view taken on line 6—6 of Figure 3.

Figure 7 is a sectional view taken on line 7—7 of Figure 3.

Figure 8 is a sectional view taken on line 8—8 of Figure 3.

Figure 9 is a longitudinal sectional view through a modified form of the invention.

Figure 10 is a sectional view taken on line 10—10 of Figure 9.

Figure 11 is a sectional view taken on line 11—11 of Figure 9.

Figure 12 is a sectional view taken on line 12—12 of Figure 9.

Referring to the drawings in detail, the device comprises an outer tubular casing 5 formed with a lower threaded extremity on which the cap 6 is positioned, the cap 6 being formed with a tapered portion adapted to dig into the ground surface when the device has been lowered to the bottom of a well, to prevent rotary movement of the outer casing when the inner tubular member, to be hereinafter more fully described, is rotated.

In the lower end portion of the tubular casing 5, is a circumferential row of openings 7, while in the upper end portion of the tubular casing 5, is another row of openings 8, the openings in each row being spaced apart, as clearly shown by the drawings. Arranged at intermediate the rows of openings 7 and 8 are other spaced circumferential rows of openings 9.

Closely fitted within the outer tubular casing 5, is an inner tubular member 10, which is formed with a circumferential row of openings 11 near the lower end thereof, the openings being arranged to register with the openings 7, so that liquid may be forced from the device. A circumferential row of openings 12 are formed in the inner tubular member 10, and are arranged to align with the openings 8 near the upper end of the outer tubular casing, so that liquid may pass therefrom. Arranged in circumferential rows in the inner tubular member 10, and disposed at points to align with the openings 9, are circumferentially elongated openings 13. At the lower end of the inner tubular member 10 is an elongated cut-out portion or slot 14 that accommodates the pin 15 that extends inwardly from the outer tubular casing 5, the ends of the cut-out portion or slot 14 acting as stops for the pin, to limit the rotary movement of the inner tubular member 10. Thus it will be seen that when the inner tubular member has been moved to the position shown in Figure 3 of the drawings, the openings of the inner tubular member 10 will align or register with the openings of the outer tubular casing 5 to allow liquid to pass there-through. However, when the inner tubular member 10 has been rotated in the opposite direction, the openings at the upper and lower ends of the inner tubular member and outer tubular casing, will be closed, while the openings 13 at the central portion of the inner tubular member will still be aligned with openings 9 in the outer tubular casing. It might be further stated that the device when adjusted as described, will be used for forcing acid through the central open-

ings, and into an oil bearing stratum directly opposite the central openings.

Near the lower end of the outer tubular casing 5 are threads to accommodate the threaded collar 16 that provides a stop against which the cup-shaped washer 17 engages, the cup-shaped washer being held within a wire cage-like member 18. A flared collar 19 is provided at one end of the washer 17, to prevent expansion of the collar at this point.

Directly above the washer 17, is a washer 20, which is identical with the washer 17, the washer 20 being held against upward movement on the outer tubular casing 5, by means of the stationary annular rib 21 formed on the outer casing.

An inverted cup-shaped washer 22 is held on the outer tubular casing 5, by means of the threaded collar 23 that bears against the flared collar 24 in which one end of the washer 22 is disposed. The washer 22 is spaced from the washer 25, by means of the spacing collar 26, the washer 25 resting against the annular rib 27 formed on the outer casing. It might be further stated that the washers 22 and 25 are identical with the washers 17 and 20, with the exception that the washers 22 and 25 are inverted. Due to the arrangement of washers, it will be obvious that acid will be restricted from passing longitudinally of the outer tubular casing, and will be confined therein to the space between the washers 20 and 25, causing the acid or liquid forced through the device, to enter the oil bearing stratum opposite to the central openings of the device.

In order that the device may be conveniently operated, removable pipe sections 28 are connected to the upper end of the outer tubular casing, the pipe sections being supported by means of the collar 29 resting against the head 30 at one end of the uppermost pipe section. Links 31 connect with the collar 29 and afford means for connecting the cable of a suitable derrick to the device, to raise and lower it. In the modified form of the invention as illustrated by Figure 9 of the drawings, the casing is indicated by the reference character 32, the casing being provided with lower openings 33 and upper openings 34. Openings 35 are arranged intermediate the ends of the casing 32. Vertically movable valve members 36 are used in this form of the invention, the valve members 36 including hollow body portions 37 which carry the rubber gaskets 38 which are shown as spaced apart so that when the valve members 36 are positioned as shown by Figure 9 of the drawings, the oil passing through the openings 33 and 34, will be trapped between adjacent gaskets and prevented from flowing into the casing 32.

These upper and lower valve members 36 are connected by means of the rod 39, that has its ends hooked over the balls 40 of the valve members.

An operating rod 41 connects with the uppermost valve member, and is used to move the valve members longitudinally of the casing 32, to position them properly in making tests, or treating the well with acid. Thus it will be seen that due

to this construction, the flow of oil through the openings of the casing is controlled by vertically moving valve members, instead of a rotary movement between a casing and liner, as in the structure illustrated on Sheet 1 of the drawings of this application.

Annular ribs 42 are provided on the casing 32 and afford stops for the rubber gaskets, corresponding to the rubber gaskets or washers 17 illustrated in the apparatus shown by Figure 10 of the drawings.

When using applicant's device, the structure shown by Sheet 1 of the drawings is dropped into a well until the openings thereof are disposed opposite to certain oil bearing strata of the well. The oil will pass into the openings and enter the apparatus. A test may be made of the oil so trapped, thereby to determine the condition of the oil. When it is desired to treat the well with acid, it is only necessary to lower the apparatus to the desired level within the well. The tubular member 10 or liner is now rotated to close the upper and lower openings thereof. The acid is now forced into the apparatus whereupon the acid will flow through the openings which are exposed to the particular oil bearing stratum, the acid acting to loosen and clear the oil bearing stratum of obstructions which tend to retard the flow of oil.

It is obvious that the gaskets above and below the openings will prevent the acid from passing to points above or below the oil bearing stratum under treatment, thereby reducing the quantity of acid necessary in treating a particular stratum, to the minimum.

I claim:

A device for treating and testing oil wells, comprising a casing having an open upper end and a closed lower end, said casing having a circumferential row of circular openings in its upper and another in its lower end portion, and a plurality of intermediately vertically spaced circumferential rows of circular openings, an inner tubular member mounted for limited movement within the casing and having a circumferential row of circular openings in its upper and another in its lower end portion, and a plurality of intermediate circumferential rows of circumferentially elongated openings, the upper and lower rows of openings of the inner tubular member being adapted to register with the corresponding openings of the casing upon rotation of the inner tubular member in one direction to admit liquid into the casing, said inner tubular member being adapted to be rotated in the opposite direction, whereby the openings in the end portions of the casing and tubular member are closed, cooperating means on the casing and inner tubular member for limiting relative rotation therebetween, the intermediate openings of the casing and tubular member being in alignment at all times during relative rotation of the casing and the inner tubular member to discharge liquid from the device, and means for packing-off sections of the casing at points above and below said intermediate openings.

NORMAN R. KIMMEL.