

W. F. MUEHL.
WELL CLEANING DEVICE.
APPLICATION FILED MAY 13, 1918.

1,402,786.

Patented Jan. 10, 1922.

2 SHEETS—SHEET 1.

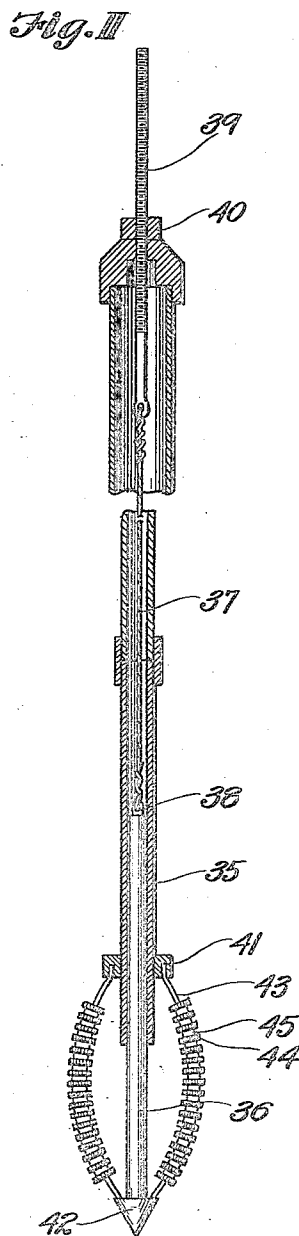
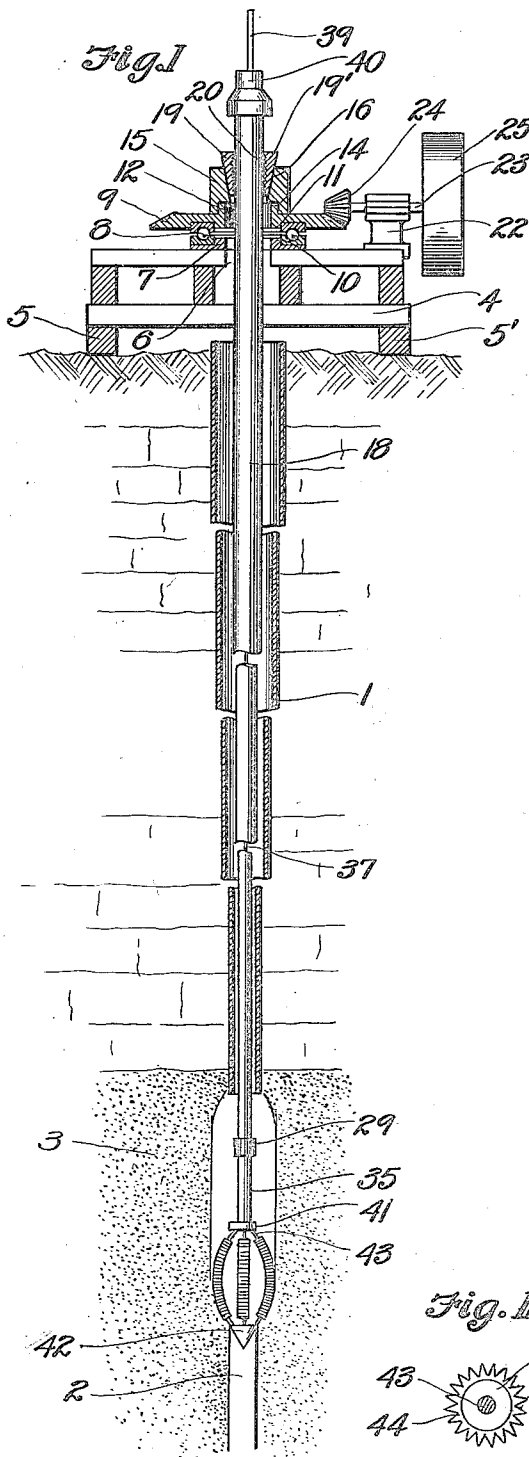
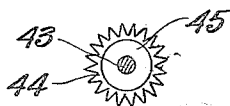


Fig. III



INVENTOR.
William F. Muehl

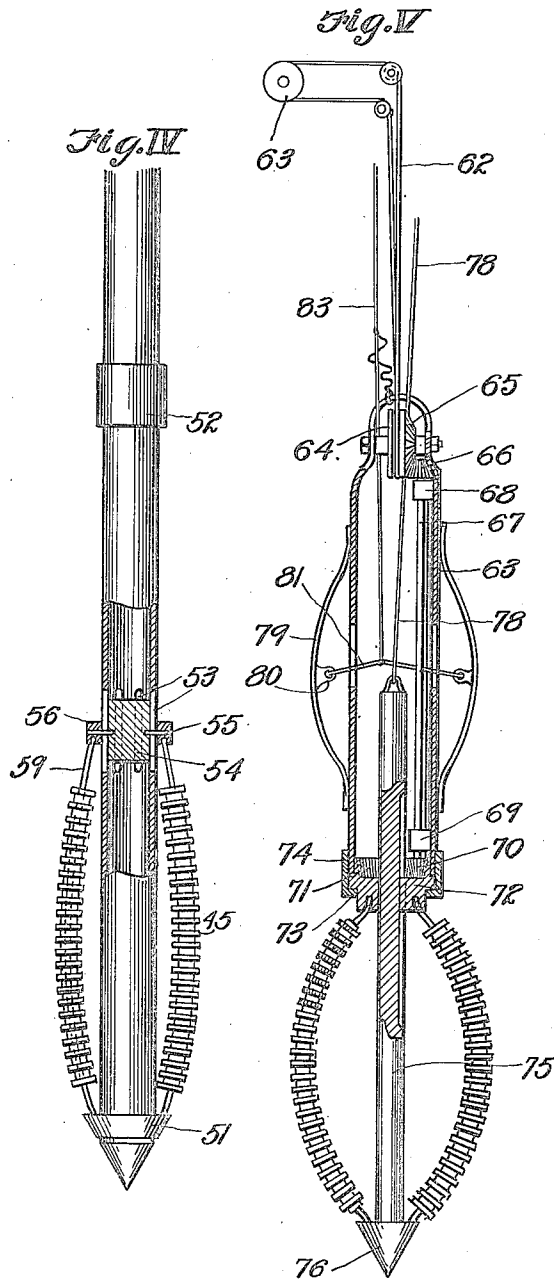
BY *Arthur C. Brown*
ATTORNEY.

W. F. MUEHL.
WELL CLEANING DEVICE.
APPLICATION FILED MAY 13, 1918.

1,402,786.

Patented Jan. 10, 1922.

2 SHEETS—SHEET 2.



INVENTOR.
William F. Muehl

BY
Arthur C. Brown
ATTORNEY.

UNITED STATES PATENT OFFICE.

WILLIAM F. MUEHL, OF KANSAS CITY, MISSOURI.

WELL-CLEANING DEVICE.

1,402,786.

Specification of Letters Patent. Patented Jan. 10, 1922.

Application filed May 13, 1918. Serial No. 234,078.

To all whom it may concern:

Be it known that I, WILLIAM F. MUEHL, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Well-Cleaning Devices; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to a means for cleaning oil or like wells and more particularly to means for straightening and enlarging that part of the well that extends into the oil sand; the principal object of the invention being to provide a means whereby a well hole may first be straightened, and other mechanism comprising an expansible member whereby the straightened hole may be substantially enlarged.

A further object of the invention is to provide means whereby the perforations of a well casing or screened casing may be opened up and the loosened material carried from the well.

In accomplishing these objects I have provided improved details of structure, the preferred forms of which are illustrated in the accompanying drawings, wherein:—

Fig. I is a longitudinal sectional view of a well, showing a well enlarging device in operative position therein.

Fig. II is an enlarged sectional view of the expansible well cleaning and enlarging head.

Fig. III is an enlarged view of one of the pricker wheels used on the expansible head.

Fig. IV is another type of cleaning device wherein the expansible head is operated to expanded position by a fluid pressure.

Fig. V is a side view, partially in section, of a type of cleaning device that may be suspended within a well and operated from a cable belt.

Referring more in detail to the drawings:

1 designates a well casing, such as is commonly used in oil or like wells, and which in the present instance extends within the well hole 2 to such a depth that it terminates at the surface of what is known as

the "sand" indicated at 3; the casing may comprise a plurality of sections, gradually decreasing in diameter toward the bottom of the well and joined together by any suitable means (not shown) so that a liquid tight casing is provided and water, that may be contained in the strata of stone or earth above the sand will be prevented from flowing into the well and destroying the product.

At its upper end the casing is open, and terminates closely beneath a horizontal base, or platform, 4 supported at opposite sides of the casing on beams 5—5'; the base being provided perpendicularly above the well with an opening 6 where-through the cleaning devices may be lowered into or removed from the well.

Fixed on the platform, centrally about the opening 6, is a bearing plate, or ring, 7 whereon an anti-friction race-way 8 is mounted and which supports and retains an upwardly facing, horizontally disposed, bevel gear wheel 9 coaxially thereon. The ring 7 is provided with a peripheral flange 10 on its upper side which extends within the lower member of the race way to retain the latter in position, and the gear wheel 9 has a depending annular flange 11 formed about a central opening 12 therein, which extends downwardly within the upper member of the race way to hold the gear in proper functional position.

Extending from the upper face of the gear wheel is a squared hub 14 which locks within a block 15 seated on the wheel, so that rotation of the wheel rotates the block; the latter being provided with a downwardly tapering opening 16 there-through, located coaxially with respect to the gear wheel and perpendicularly above the well and platform openings, where-through a cleaner shaft 18 is extended into the well.

The cleaner shaft, which may also comprise a plurality of connected tubular sections, is of lesser diameter than the block opening and is supported, with its lower end at a desirable depth within the well, by means of wedge blocks 19—19' which are fitted within the opening 15 to engage opposite sides of the shaft and are provided on their inner faces with teeth 20 which grip the shaft to prevent any possible slippage of the same within the block.

Mounted at one side of the platform is a

bearing 22 wherein a shaft 23 is revolubly contained. At its inner end the shaft has a gear wheel 24 fixed thereon which travels in mesh with the gear wheel 9 and at its outer end has a belt wheel 25 over which a belt may operate to drive the gearing parts in such a manner as to revolve the cleaner shaft 18 suspended thereby.

The preferred form of enlarging tool (Fig. I and Fig. II), comprises a tubular sleeve 35 that may be fixed to the end of the cleaner shaft by threading the upper end of the sleeve into the collar 29 at the end of the said shaft in practically the same manner as the bit was secured.

Slidably contained in the lower end of the sleeve 35 and extending therefrom is a shaft 36 which is suspended by and may be drawn into and lowered from the sleeve by means of a cable 37 that is fixed at its lower end to an eye 38 at the upper end of the shaft and at its upper end to a bolt 39 threaded through a cap 40 mounted on the upper end of the drill shaft.

Fixed about the sleeve 35, adjacent its lower end, is a collar 41 and mounted therein and in the base of a downwardly pointed, cone-shaped head 42 at the lower end of the shaft 36 respectively, are the upper and lower ends of a plurality of spring wire ribs 43 whereon a plurality of closely placed pricker wheels 44, spaced apart by washers 45, are revolubly mounted.

The cleaner head is lowered into and removed from a well when in closed position and to permit the tool parts to move to such position, the cable 37 is sufficiently lowered, by turning the cap nut 40 to lower the bolt 39, that the shaft 36 will move downwardly to its lower limit in the sleeve 35 and the spring wire ribs will extend practically straight. Straightening of the ribs causes the cleaner head to be closed to its smallest diameter, which is sufficiently small to permit the same to be freely lowered into or removed from the well.

To expand the cleaner head after the member has been lowered into a well to a point where enlarging is desired, the shaft 36 is drawn upwardly within the sleeve by threading the cap 40 downwardly on the bolt 38. As the shaft 36 moves upwardly, the spring wire ribs are sprung outwardly along their central portions so that the effective diameter of the head is increased correspondingly as the shaft 36 moves upwardly into the sleeve.

When the head has been adjusted to a desired diameter, the shaft 18, is rotated by the driving mechanism previously described which revolves the expanded head so that the pricker wheels engaging the walls of the well will loosen the sand and enlarge the hole to the diameter of the head.

At the same time that this operation is going on, oil may be flowed into the well casing at the top of the well to facilitate loosening of the sand.

As the well is cleaned and enlarged, the cleaner shaft is lengthened and lowered until the well has a desired depth. The cleaner shaft is then removed and if necessary the loosened sand may be bailed from the well.

When the bit is in operation dilute acid of a cutting quality is first flowed into the shaft and is discharged into the sand to loosen or dissolve the same, and thereby partially clean the openings. This is followed by oil, or other liquid which is also flowed into the upper end of the drill shaft and is discharged from the perforations 32 below the collar. Pressure of this liquid forces the loosened sand or dirt filling the casing perforations and screen outwardly, and carries the same upwardly along the outside of the casing to a point above the bit collar. There being no pressure within the casing above the collar the loosened sand and sediment will then enter the casing through the previously cleaned openings and will be carried upwardly and delivered from the well. It is apparent that operation of the bit while liquid is being discharged therefrom will tend to increase the pressure of the liquid within the casing and effective cleaning may be accomplished.

In Fig. IV, I have illustrated a modified form of cleaner, wherein the expansible members are operated under the influence of liquid pressure. In this device, a tubular bit 50 fixed to the drill shaft 18 by a collar 52 and having a pointed end head 51, is provided. At about its center the bit tube is provided with a plurality of longitudinally extending slots 53 and has a piston 54 slidably mounted therein. Extending from the piston outwardly through two of the slots are pins 55 which support a ring 56 about the tube.

Mounted on the ring and pointed head 51 are the opposite ends of spring wire ribs 59 which carry pricker wheels 44 similarly as in the preferred form of cleaning device.

When the device is in closed position the piston 54 is maintained above the slots 53, but when the device is in use and it is desired to expand the head, liquid is flowed into the upper end of the drill shaft and the weight of such liquid forces the piston downwardly and springs the ribs 59 outwardly to effect expansion of the cleaner. As the piston moves downwardly past the slots the liquid is discharged into the hole and serves to loosen the sand and sediment to facilitate operation of the tool. When the liquid pressure is removed the tool automatically moves back to closed position and may be removed from the well.

Fig. V illustrates a modified form of cleaner or enlarging tool. This type of device may be suspended and operated by means of a continuous belt cable 62 which extends over a drum 63 that may be driven in any suitable means located adjacent the well opening. The device comprises a tubular housing 63 open at the upper end and having a pulley wheel 64 revolvably mounted therein whereover the belt cable 62 is extended. On one face of the pulley is a gear surface 65 and operating in mesh therewith is a bevel gear wheel 66 fixed at the upper end of a shaft 67 mounted revolvably in bearings 64-65 adjacent upper and lower ends of the housing. At the lower end of the shaft is a gear wheel 70 adapted to travel in mesh with a gear surface 71 on a head 72 that is revolvably contained within the lower end of the housing by the inturned rim 73 of a collar 74 threaded onto the housing.

A shaft 75 is extended slidably through the head 72 and at its lower end has a pointed head 76, and extending between the said heads 72 and 76 are spring wire ribs 77 carrying the pricker wheels, similarly as described in the preferred form of cleaner. A cable 78 is attached to the upper end of the shaft 75 and extended to the well opening so that the said shaft may be moved to and from the head to adjust the spread of the cleaner members.

The casing or housing is provided at opposite sides adjacent its lower end with outwardly curved spring members 79 fixed at their lower ends to the casing and having attaching devices 80 on their inner sides where-to a connecting cable 81 is fixed. A cable 83 is fastened to the cable 81 in such a manner that when drawn upwardly, it will draw inwardly on the spring members, which normally engage the sides of the well to hold the housing perfectly solid and prevent any rotation incidental to rotation of the cleaner head, and release the same from engagement with the well casing so that the cleaner may be raised or lowered.

With this construction it is apparent that the operation of the drums will revolve the pulley wheel to actuate the cleaner head to cause enlargement of the well hole as previously described.

In using the preferred means herein described to straighten and clean out a well hole that has been partially or entirely filled, the platform with the driving gearing thereon is properly located above the well and the

cleaner shaft with the cleaner bit thereon is lowered to position.

After properly locating the cleaner shaft, in the driving mechanism, power is applied through the belt wheel 25 to revolve the shaft to operate the bit.

The shaft is lengthened from time to time to advance the bit to straighten the well hole to the desired depth; oil being fed to the bit through the tubular shaft as the operation is in progress to facilitate the operation.

After the well has been cleaned to a desired depth the bit is withdrawn and it is replaced on the shaft by the expansible cleaning device.

Operation of this device is similar to the operation of the bit except that by adjusting the tension of the cable, the head shaft is allowed to move from, or is drawn into the cleaner sleeve to effect a desired expansion of the head to clean out a well hole of desired diameter within the limit of expansion of the head.

After the enlarging device has been lowered to the depth of the well hole, it is withdrawn and the loosened material if necessary is bailed from the well.

It is apparent that by use of an expansible tool of this character, the well may be deepened and enlarged below the casing, and a more ready flow of oil into the well will result.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is:

1. In a well cleaning device, a tubular member, a shaft slidable within the tubular member and having an end projecting there-through, spring members connected to the tubular member and to the shaft and adapted to be bowed outwardly by reciprocation of the shaft within the tubular member so that two diametrically opposite springs will substantially form an ellipse, and rotatable toothed cutter members on the springs.

2. A well cleaning device comprising a tubular member, a reciprocatory shaft in the tubular member, bowed springs having their ends connected respectively to the tubular member and to one end of the shaft to provide arcuate cutter carrying members, rotatable cutters on the members, and means for reciprocating the shaft to vary the degree of curvature of the springs.

In testimony whereof I affix my signature.

WILLIAM F. MUEHL.