W. E. MURRIN.

COUPLING JAR.

APPLICATION FILED MAR. 16, 1910.

**1,002,601.** Patented Sept. 5, 1911.

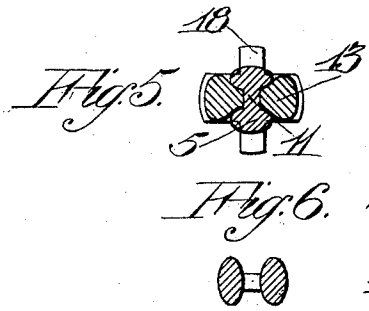


Fig. 5.



Fig. 6.

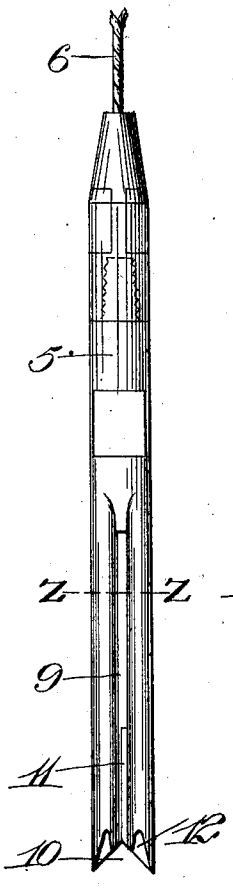


Fig. 2.

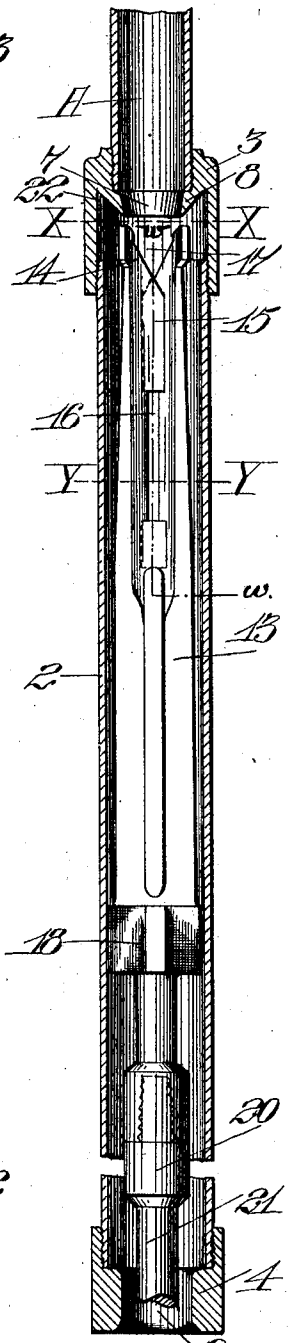


Fig. 1.

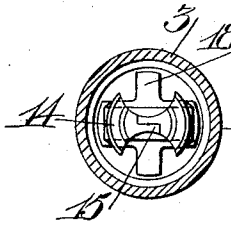


Fig. 4.

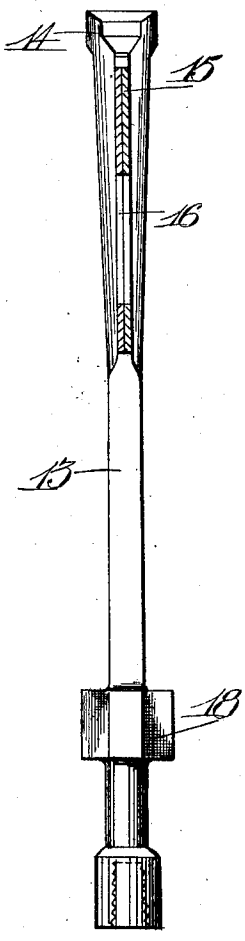


Fig. 3.

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# UNITED STATES PATENT OFFICE.

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## COUPLING-JAR.

1,002,601. Specification of Letters Patent. **Patented Sept. 5, 1911.**

Application filed March 16, 1910. Serial No. 549,749.

*To all whom it may concern:*

Be it known that I, WILLIAM E. MURRIN, citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Coupling-Jars, of which the following is a specification.

My invention relates to the drilling of wells and the like, and pertains especially to an apparatus which will permit of the use of a cable and drop drill interchangeably in the same well with a rotary drilling bit.

There are two methods of drilling oil, gas and Artesian wells. One is to work the drill up and down by means of a walking-beam or other appliance, and the other is to rotate the bit and wash out the borings by hydraulic pressure. The former method is entirely the better in hard rock, and the latter in soft rock, sand and loam. When the rotating bit comes to hard rock it bores very slowly, and no method or device has been found that will bore hard rock one-twentieth as fast as the drop drill or cable tools are capable of cutting. In the eastern oil fields where there is much hard rock and the walls of the hole do not cave or fall in, the drop drill is used exclusively; while in Texas, along the Gulf of Mexico, where the formation is soft, the boring or rotary drill is used almost exclusively. There are some places, like California, where there are both hard and soft formations, sometimes alternating, and it is slow and expensive to drill a well by either method alone.

To blend the two methods is one object of this device, so that it is possible to continue the drilling of a well which has been partly through a soft formation, or in which hard and soft formations alternate, requiring the use of entirely distinct forms of drilling mechanism.

It is desirable in using a rotary drill to bore a hole of good size, say fifteen to sixteen inches, as far as possible, while the most desirable size for rotating pipe is six-inch, with a section or two of ten-inch pipe next the boring bit. The water forced by the pumps goes down through the six-inch and out at the bottom of the ten-inch pipe. As the borings are carried up between the rotating pipe and the walls of the hole, the movement of the pipe plasters up the walls of the well with mud in such a manner that they stand up quite well, and the six-inch rotating pipe, with the larger pipe and still larger bit, can be readily pulled out and put back in without disturbing or destroying the plastered walls. But when a hard formation is run into, the rotary bit must be withdrawn. It has proved impractical to pull out the rotating pipe and bit when hard rock is reached and run in the cable tools, without casing the well, as the cable whips in and destroys the plastered walls. It is also impractical, on account of the expense and risks of losing tools or destroying the well, to put in large casing and drill below and under-ream to the size of the rotating bit.

My invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is an elevation of the lower member of my coupling jars in position in its housing, said housing being shown in section. Fig. 2 is an elevation of the upper member or link of the coupling jars. Fig. 3 is an elevation in partial section on line *w*—*w* of Fig. 1 of the lower coupling taken at right angles to the view of Fig. 1. Fig. 4 is a section on *x*—*x*, Fig. 1. Fig. 5 is a section on *y*—*y*, Fig. 1, showing the two coupling jars interlocked. Fig. 6 is a section on *z*—*z*, Fig. 2.

In drilling with a rotary bit, as where working in a soft formation, I employ a smaller pipe A corresponding to the six-inch pipe previously referred to, which pipe A is made up of a series of sections suitably coupled together and adapted to be lowered into the well as the boring progresses. Suitably connected to the lower end of the pipe A is a section of larger pipe similar to that represented at 2, and which larger section corresponds to the ten-inch pipe previously referred to. To the lower end of the larger section would be attached the rotary bit (not here shown) which would bore and ream out a hole larger than either of the sections 2 or A. The borings are flushed out of the well by injecting water down through the pipes A and 2 and forcing the water and borings up outside of the pipes 2—A against the well wall, plastering the mud against the wall.

When the hard formation is reached, I displace the rotary boring bit and the larger lower section to which it is connected, with the mechanism now described; employing, however, the same string of pipe A and the same means of flushing the borings.

To the lower end of the pipe A I attach a coupling 3 which is adapted to screw on over the pipe A, or be otherwise suitably secured thereto. In the other end of the coupling 3 is screwed the section 2 which is of the same diameter and general character as the large section previously used to carry the rotary bit. Obviously I could use the same section, too, for both the rotary and drop drilling processes, but for convenience I have a separate section 2 carrying its coupling 3 and bottom stop collar 4 for use with the drop drill. The reason for this is readily understood when it is considered that these sections 2 are from sixteen to twenty feet or more in length. Inside this section 2 which is used for the drop drill are arranged what is known as a set of jars, which jars consist of a rod or link 5 secured to the cable 6; the link 5 being of suitable length, and of a size capable of easily passing down through the pipe A and through the slightly contracted throat 7 formed by the convergent walls of the annular flange 8 inside and part of the coupling 3 and in continuation of pipe A. This link 5 has a lengthwise extending slot 9 between its ends, and the lower extremity of the link is formed with a V-notch 10, the walls of which notch are also laterally beveled, as shown at 12, Fig. 2. These bevels 10—12 permit of the ready engagement of the link 5 with the complementary member 13 which is arranged in, and designed to be carried continually by, the section 2. This lower coupling member 13 has its upper end bifurcated to provide two coacting opposed spring arms or jaws 14 which have overlapping interlocking lugs 15 at their upper ends, Figs. 4 and 1, and which lugs and arms inclose a space or slot 16 designed to receive the solid portion 11 at the lower extremity of link 5 and below its slot 9; lugs 15 fitting in slot 9. The upper extremities of the spring arms 14 on link 13 are downwardly converged, as shown at 17, with the mouth of the space inclosed by the walls 17 slightly larger than the throat 7 so as to insure the proper end for end connection of the parts 5—13 when the former is dropped into the well on the end of the cable 6, and also to permit of the proper coaction of the exterior beveled walls 22 of flange 8 when the pipe A is dropped to spread the jaws 14 apart to permit the release of the link 5. The coupling member 13 has a spider or guide portion 18 formed adjacent to its lower end which is freely slidable within the section 2, but which spider or guide 18 is too large to pass through the opening 19 in collar 4, which latter is carried at the lower end of the section 2, but which opening 19 is sufficiently large to pass the shank 20 of the drill 21; the drill shank 20 being suitably secured in, and carried by, the lower coupling link 13.

The operation of the device is as follows: To work with a drop or reciprocating drill, a section 2, with its coupling 3 and collar 4 and inclosed link 13 carrying the externally projecting drill 21, is attached to the pipe A and the latter lowered into the well; successive sections being screwed on the pipe A from time to time. Having reached the point where drilling is to begin, the link 5 is lowered into the well by cable 6, and by its weight and impact when dropped on to the top of the link 13, forces the spring arms 14 apart, so as to allow the solid portion 11 of the link 5 to pass down between the lugs 15 on link 13 and couple the two links 5—13 forming the jars, together. By properly suspending the pipe A and section 2, the cable is worked up and down to reciprocate the drill 21 and bore the hole in the desired manner; the section 2 meanwhile performing the very important function of holding up the soft walls previously formed and plastered by the rotary bit. Thus the section 2 forms both a guard and protector for the walls of the well, and a guide for the drill. To uncouple the jars and remove the apparatus from the well, it is only necessary to let the drill 21 rest on the bottom of the well and then drop the pipe A and section 2 sufficient to cause the outwardly beveled walls 22 of the annular flange 8 inside collar 4 to engage the beveled walls 17 of the spring arms 14, forcing the latter apart and opening up the space between the overlapping lugs 15 sufficient to allow the link 5 to be disconnected and drawn out.

In case the line 6 or the coupling of the jars should break, the tool will not be lost in the well, because the stop 18 will strike against the inwardly projecting shoulders formed by the lower end of the collar 4, so that when pipe A and section 2 are drawn out of the well, the bit 21 and the internal mechanism will all come out together. This is very important, because the loss of a tool or string of tools in a well results in a great loss of time and additional expense, and often necessitates the abandonment of the well. Furthermore, the guides 18 on the jars, and the guide formed by the walls of the reduced portion 19 on collar 4, operate to hold the drill stem and bit in line, so that it is impossible to make a crooked hole.

By this device the drilling tools can be

put down a hole and taken out independent of the cable that works them. This is something that has never before been done in oil-well drilling, and this device is also the first one to drill a hole much larger than the casing.

Instead of coupling the link 5 to the link 13 by impact, as previously described, with the impact forcing the spring jaws apart, manifestly these jaws can be opened to let in the link 5 by means of the conical wedge 22, just as they are opened when it is desired to separate the links.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. In a drilling tool, the combination with a pair of coupling members, one of which is designed to be attached to a cable, and the other of which is designed to carry a drill, of a guide for the drill-carrying member, means operative by the gravity of the cable-carried member to couple the two members together, and means independent of both coupling members and operative by the said guide for effecting the uncoupling of said members.

2. In a drilling tool, the combination with a pair of coupling members, one of which is designed to be attached to a cable, and the other of which is designed to carry a drill, of a guide for the drill-carrying member, means operative by the gravity of the cable-carried member to couple the two members together, and means independent of the coupling members and movable relatively to said members for uncoupling the members.

3. In a drilling tool, a drill-carrying device having a section with jaws inclosing a slot, another section with a slot operative by gravity to open the jaws and interlock therewith, and means independent of the last-named slotted section for opening the jaws to release the sections.

4. In a drilling tool, a coupling device comprising two coacting interlocking sections, a cable connected to one of the sections and a drilling tool carried by the other section, a tubular guide housing the sections, and means carried by the tubular housing and independent of the cable for unlocking the sections.

5. In a drilling tool, a coupling device comprising two coacting interlocking sections, a cable connected to one of the sections and a drilling tool carried by the other section, a tubular guide housing the sections, and means independent of the cable for unlocking the sections, said last-named means including a wedge member on said guide operative lengthwise on one of the sections to spread it.

6. In a drilling tool, a coupling device comprising two coacting interlocking sections, a cable connected to one of the sections and a drilling tool carried by the other section, a tubular guide housing the sections, means independent of the cable for unlocking the sections, said means including a wedge member on said guide operative lengthwise on one of the sections to spread it, and coöperative means on the guide and sections for suspending the drill independent of the cable.

7. In a drilling tool, a coupling device comprising two coacting interlocking sections, one of said sections formed with a pair of jaws, a cable connected to one of the sections and a drilling tool carried by the other section, a tubular guide housing the sections, means independent of the cable for unlocking the sections, said last-named means including a wedge member on said guide operative lengthwise on one of the sections to spread said jaws, and means on the guide engaging stops on one of the sections for suspending the drill independent of the cable.

8. In a drilling tool, the combination of a tubular guide, a coupling member in the guide, stop means at the lower end of the guide for limiting the downward movement of the coupling member, said coupling member having coacting jaws, and a complementary coupling member suspended by a cable engageable with said first-named coupling member, said tubular guide carrying a wedge member adapted to spread the jaws to disengage one coupling member from the other.

9. In a drilling tool, the combination of a tubular guide, a coupling member in the guide, stop means at the lower end of the guide for limiting the downward movement of the coupling member, said coupling member having coacting jaws, a complementary coupling member suspended by a cable engageable with said first-named coupling member, and means operative by the lengthwise movement of the guide for opening said jaws to release said coupling members.

10. In a drilling tool, the combination of a tubular guide, a coupling member in the guide, stop means at the lower end of the guide for limiting the downward movement of the coupling member, said coupling member having coacting jaws, a complementary coupling member suspended by a cable engageable with said first-named coupling member, and means operative by the lengthwise movement of the guide for opening said jaws to release said coupling members, said last-named means including a wedge at the uper end of the guide engageable with said jaws.

11. In a drilling tool, the combination of a tubular guide, a coupling member in the guide, said coupling member designed to carry a drilling tool at its lower end, and the upper end of said coupling member hav-

ing overlapping, spring-actuated jaw members in closing a slot, and a second slotted coupling member engageable in line with the first coupling member, said tubular guide carrying a wedge portion adapted to engage and spread the jaw members to disengage one coupling member from the other.

12. In a drilling tool, the combination of a tubular guide, a coupling member in the guide, said coupling member designed to carry a drilling tool at its lower end, and the upper end of said coupling member having overlapping, spring-actuated jaw members inclosing a slot, a second slotted coupling member engageable in line with the first coupling member, the meeting ends of the coupling members being beveled and guide means on said tubular guide member for alining the two coupling members, said tubular guide carrying a wedge portion adapted to engage and spread the jaw members to disengage one coupling member from the other.

13. In a drilling tool, the combination of a tubular guide, a coupling member in the guide, said coupling member designed to carry a drilling tool at its lower end, and the upper end of said coupling member having overlapping, spring-actuated jaw members inclosing a slot, a second slotted coupling member engageable in line with the first coupling member, the meeting ends of the coupling members being beveled and guide means on said tubular guide member for alining the two coupling members, said guide means on the tubular guide having means to spread said jaws to release the coupling members.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM E. MURRIN.

Witnesses:
RAYMOND A. LEONARD,
CHARLES EDELMAN.