M5711 2,215,049

Sept. 17, 1940. B. S. MINOR 2,215,049

HOOK FOR ROTARY WELL DRILLING

Filed April 28, 1937 2 Sheets-Sheet 1

Fig-2

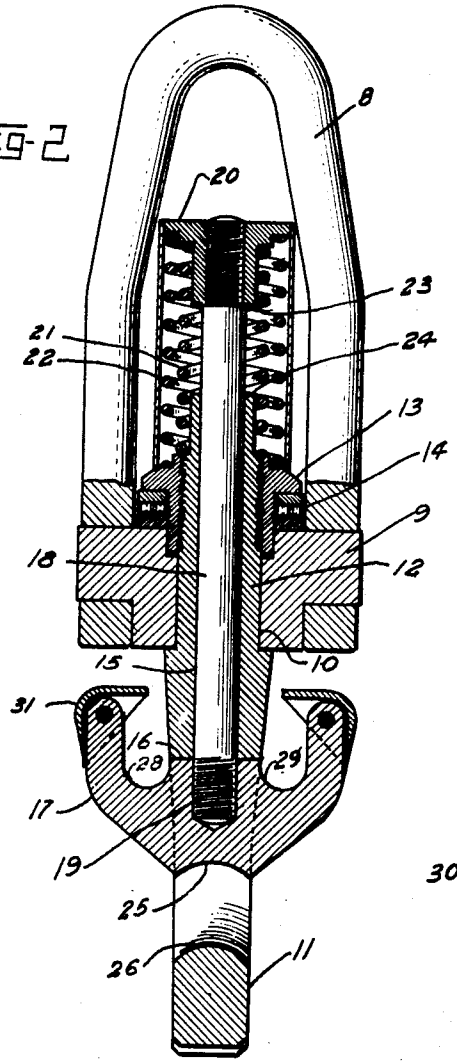
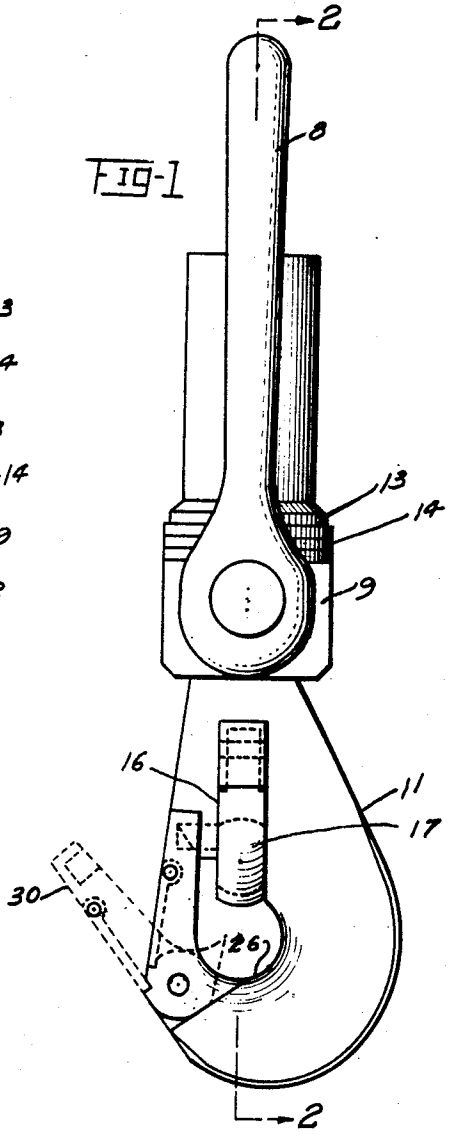


Fig-1



Burt S. Minor INVENTOR.

Sept. 17, 1940. B. S. MINOR 2,215,049

HOOK FOR ROTARY WELL DRILLING

Filed April 28, 1937 2 Sheets-Sheet 2

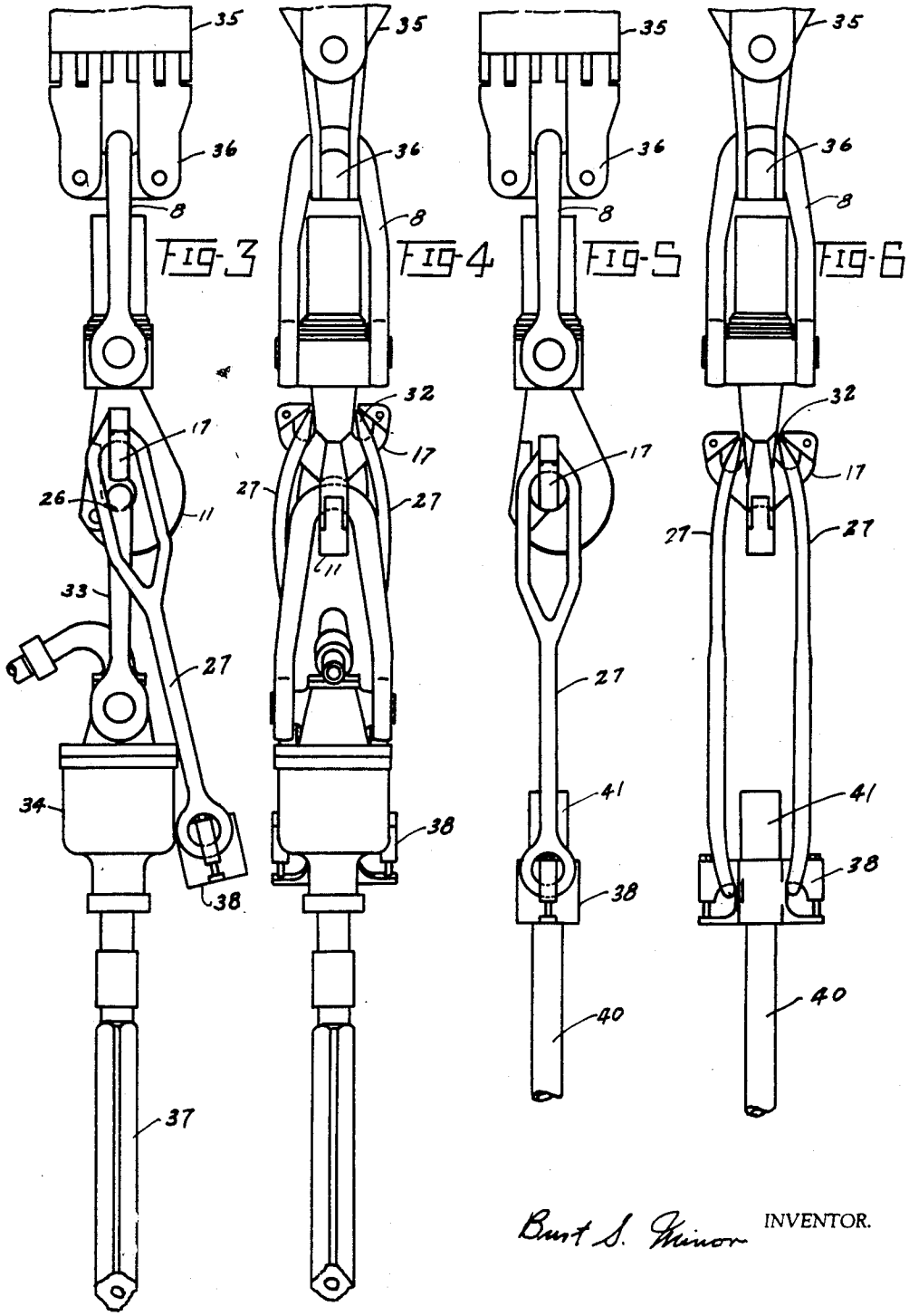


FIG-3 FIG-4 FIG-5 FIG-6

Burt S. Minor INVENTOR.

294. HANDLING- HAND AND
HOIST-LINE IMPLEMENTS.

82 Patented Sept. 17, 1940 2,215,049

UNITED STATES PATENT OFFICE

2,215,049

HOOK FOR ROTARY WELL DRILLING

Burt S. Minor, San Pedro, Calif., assignor to Regan Forge & Engineering Company, a corporation of California

Application April 28, 1937, Serial No. 139,441

8 Claims. (Cl. 294—82)

This invention relates to improvements in hooks used in connection with the rotary method of drilling wells. With this method it is customary to use a hook to which can be attached both the rotary swivel which supports and permits rotation of the drill pipe and bit during the drilling operations, and the elevator which is used when it is necessary to withdraw or run the drill pipe in the well.

In connection with the latter operations when the elevator is employed, it is desired that the hook supporting the elevator be equipped with some form of spring means which will lift the threaded joints clear of each other as the drill pipe is being broken down into stands, usually consisting of four joints of pipe each.

In most cases it is now the practice to use a hook with a bight of sufficient size to accommodate both the bail of the rotary swivel and the links of the elevator, the latter being left hanging from the hook in readiness for emergency use and being pushed to the back side of the bight when the rotary swivel is in use. When it becomes necessary to use the elevator the rotary swivel with the kelly attached is unscrewed from the drill pipe and set to one side of the derrick.

Hooks of such design must necessarily have a very large bight and cross section of metal to accommodate both the rotary swivel bail and links at one time, and, with the continually increasing drilling depths and corresponding loads such design of hooks have become very large and massive in size making them awkward and dangerous for the workmen to use.

The more recently improved hooks have three bights of smaller size, the usual single bight for the rotary swivel bail and two other bights at right angle to the single bight for the elevator links. Such design of hooks while much lighter and more convenient to use, are of such shape that they cannot be readily forged and necessarily are of cast material. This is an undesirable feature as there is always the possibility of hidden casting defects.

There is also another undesirable feature still existing in all of the present types of these hooks, that of the spring coming into use when either the rotary swivel or elevator is being used. The spring serves a useful purpose when the elevator is used but only undergoes useless strain when drilling and as the latter operation consumes the major portion of the time the spring becomes weak and inefficient requiring replacement.

It is therefore an object of this invention to provide a triple-bight hook structure which can be easily forged from mill rolled steel.

It is also an object of this invention to provide a hook structure in which the spring means will be useful when withdrawing or running in the drill pipe but free of undue strains during the drilling operations.

It is a further object of this invention to provide a latch means which cannot accidently open when the elevator links hang near a vertical position and which must be tilted to a horizontal position before the latch can be opened and the links disengaged.

It is an object of this invention to provide a hook structure which will embody all of the present desirable features together with desired improvements.

The accompanying drawings illustrate my invention, in which,

Figure 1 is an elevation looking at the side of the single-bight hook with the latch for the same shown in open position by dotted line.

Figure 2 is a vertical section of the entire hook structure on the line 2—2 of Fig. 1.

Figure 3 is a side elevation to show how the invention is intended to be used during the drilling operation. The hook is shown suspended from a traveling block and carrying the bail of the rotary swivel in the single-bight hook member. The elevator and links are shown hanging loosely from the double-bight hook member.

Figure 4 is a left end elevation of Fig. 3.

Figure 5 is a side elevation to show the intended use of the invention when the rotary swivel has been set aside and the elevators in use to withdraw or run the drill pipe in the well.

Figure 6 is a left end elevation of Fig. 5.

Referring to the drawings and more particularly to Fig. 2, 8 is a bail member pivotally supporting a swivel block 9 provided with a central bore 10. Rotatably suspended from the swivel block is a hook member 11 which has a screw threaded shank 12 passing through the bore 10 and by means of the internally threaded abutment nut 13 rests upon the anti-friction bearing 14.

Hook member 11 has a bore 15 through the shank 12 and a rectangular recess 16 directly above the bight 26 to accommodate and receive a second hook member 17 and a shank member 18 having screw threaded engagement at 19. The second hook member 17 is provided with two bights 28 and 29 and is so arranged that it has a cross-wise and vertical slidable relation with the first hook member 11. To resiliently maintain

the double bight hook member in its uppermost position the shank 18 is provided with a nut 20 which can be adjusted to create the proper tension in the spring members 21 and 22 interposed between the nuts 14 and 20.

Member 26 resting upon the nut 13 and loosely encircling the nut 20 provides a guard or cover for the spring members 21 and 22.

Member 30 is a safety latch for hook member 11 to retain the rotary swivel bail 33 within the bight 26. When in the open position as shown by dotted line it extends the nose of the hook so that when picking up the rotary swivel 34 the bail 33 may be more easily engaged. Likewise, the hook member 17 is provided with latch means 31 to retain the elevator links 27 in the bights 28 and 29. (See Figs. 4 and 6.) When the elevator links 27 hang closely to a vertical position the latches 31 cannot be rotated to an open position because of interfering with the upper projection of the links at 32. When the links are elevated to a nearly horizontal position clearance will be provided so that the latches can be rotated to open position and the links removed.

When the hook member 19 is retained in its upper position by the tension of the spring members 21 and 22 the vertical clearance between the under concave surface 25 and the upper convex surface of the bight 26 is just sufficient to accommodate the bail 33 of the rotary swivel 34. When the rotary swivel has been set to one side and weight in excess of that capable of being supported by the spring members 21 and 22 is hung from the elevator 38 the spring members collapse allowing the hook member 17 to drop and the concave surface to come to rest within the bight 26 of the hook member 11. With this design the shank 18 need be only of sufficient size and strength to withstand the maximum tension of the springs.

In describing the use and operation of my invention, reference is made to Figures 3 to 6 where it is shown the hook assembly, which in this case constitutes my invention, is suspended from a traveling block 35 by means of the lower suspension members 36 which engage and interlock with the bail member 8 of the hook assembly.

During drilling operations a rotary swivel 34 is employed, as shown in Figures 3 and 4 the bail 33 of the rotary swivel engages the bight 26 of the hook member 11 and rotatably supports the kelly 37, drill pipe and bit (not shown) in the well hole.

When it becomes necessary to withdraw the drill pipe 40 from the well hole, as shown in Figures 5 and 6, for changing bits or other purposes the rotary swivel 34 with the kelly 37 is unscrewed from the first joint of the drill pipe and set to one side and the elevator 38 employed. As here shown the elevator links 27 are suspended from the bights 28 and 29 of the resiliently supported hook member 17 and support the elevator 38 which clamps beneath the collars 41 of the drill pipe 40.

In withdrawing the drill pipe from the well it is customary to break the same into stands of four joints each and to stack the stands on end in one corner of the derrick. It is during this operation that the spring members 21 and 22 serve their useful purpose of lifting the stand of drill pipe as the threaded joint is being unscrewed. As the springs are designed with just sufficient strength to support one stand of drill pipe, during the pulling operation when the weight of all the drill pipe remaining in the well is carried by the elevator 38 the spring members compress under the excess weight allowing the hook member to lower and come to rest in the bight 26 of the hook member 11.

As the bight 26 of the hook member 11 need be of a size only sufficient to accommodate the rotary swivel bail 33 the cross section and weight can be less than required for a hook having a larger bight and as now used to accommodate both the rotary swivel bail and elevator links, also, as the hook member 17 rests within the bight 26 of the hook member 11 and is supported thereby when loads in excess of the capacity of the spring members 21 and 22 are imposed upon it, it likewise can be of small size, all resulting in a very compact structure with increased capacity as compared with the weight of the presently used hooks.

The separate hook members 11 and 17 having no awkward projections they can be easily forged from mill bar steel resulting in a more acceptable product for the particular service to which they must be subjected.

As the spring members are only subjected to service when withdrawing or running-in drill pipe they will retain their resilience for a much longer time than they do at the present time where they are compressed to the maximum limit during the entire drilling time.

What I claim is:

1. A hook structure for rotary well drilling comprising: a bail, a swivel block pivotally supported by said bail, a hook member rotatably suspended from said swivel block, said hook member having a hollow shank, and a second hook member arranged for vertical movement within the bight of the said first mentioned hook member, said second hook member having a shank telescoped within the hollow shank of the first mentioned hook member.

2. A hook structure for rotary well drilling comprising: a bail, a swivel block pivotally supported by said bail, a hook member rotatably supported from said swivel block, said member having a hollow shank, a second hook member slidably arranged for vertical movement within the bight of the first mentioned hook member and at right angle thereto, said second hook member having a shank telescoped within the hollow shank of the first mentioned hook member; and spring means interposed between said hook members to urge the second hook member to its uppermost position.

3. A combination hook structure comprising: a bail, a yoke member pivotally mounted in said bail, a single bight hook member rotatably suspended from said yoke; and a double bight hook member yieldably supported by said yoke within the bight of the single hook member and limited in its downward movement by engagement with the bight portion of the single hook member.

4. A combination hook structure comprising, a suspension member, a yoke member pivotally supported from said suspension member, a hook member provided with a hollow shank rotatably supported from said yoke member and having a single bight adapted to receive and support a bail, a second hook member provided with a shank slidably telescoped within the bight and shank of the first mentioned hook member and at a right angle thereto and having two bights adapted to receive and support a pair of links and spring means urging the double bight hook upwards to permit reception of a bail into the bight of the first mentioned hook member.

5. A combination hook structure comprising, a suspension member, a yoke member pivotally supported from said suspension member, a hook

294 HANDLING- HAND AND
HOIST-LINE IMPLEMENTS.

member rotatably suspended from said yoke member and provided with a hollow bore shank and a second hook member suspended through the hollow bore shank of the first mentioned hook member, in axial alignment and within the bight of the first mentioned hook member.

6. A combination hook structure comprising, a suspension member, a yoke member pivotally supported from said suspension member, a hook member rotatably suspended from said yoke member and provided with a hollow shank, a second hook member suspended through the bore of the hollow shank and within the bight of the first mentioned hook member with clearance provided to allow a limited relative vertical movement between the two hook members.

7. A combination hook structure comprising, a single hook member provided with a hollow shank, a double hook member provided with a shank, the shanks of the two members slidably telescoped together with the double hook member free to move with relative vertical movement within the bight of the single hook member and spring means urging the single hook member to its relative highest position.

8. A hook structure for rotary well drilling comprising: a bail, a swivel block pivotally supported by said bail, a hook member rotatably suspended from said swivel block, said hook member having a hollow shank, and a second hook member, said second hook member having a shank slidably extending through the hollow shank of the first hook member, and yieldable means cooperating with the shank of the second hook member to yieldably support such member in the bight of the first hook member.

BURT S. MINOR.