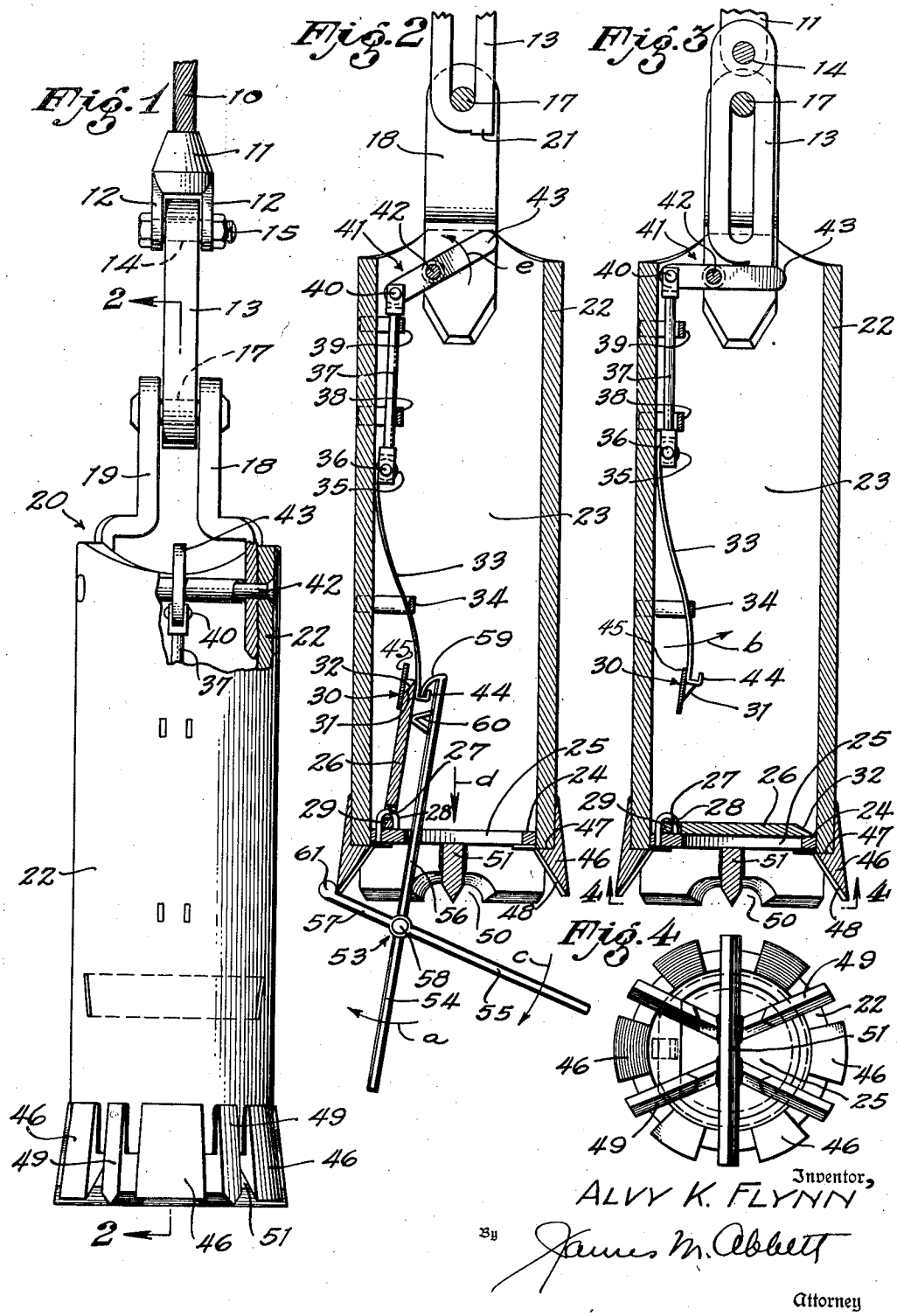
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MUD TRAP DRILLING BIT

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MUD TRAP DRILLING BIT

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3 Claims. (Cl. 255—64)

This invention relates to well drilling tools of the cable type and particularly pertains to a mud trap drilling bit.

In the drilling of wells by the use of cable tools it is of course common practice to suspend a drilling bit upon a cable and to lower it into the well bore, after which the bit is raised and dropped to penetrate the earth formation and to form a drilled hole. In such tools it is desirable to provide means within which the cuttings may be entrapped and thereafter withdrawn from the well bore in the manner accomplished by a well bailer. It is the principal object of the present invention, therefore, to provide a drilling bit structure associated with a bailing chamber, which chamber is fitted with a normally open closure adapted to be manipulated from the top of the well to close the bottom of the chamber, and to entrap the cuttings and other material which may accumulate within the chamber, the structure being simple in construction and easy to operate.

The present invention contemplates the provision of a cylindrical bailing chamber or housing having a hinged trap closure at the bottom thereof normally held open and released by manipulation of the cable, the lower end of said bailer housing carrying digging and cutting bits by which a drilling operation is performed.

The invention is illustrated by way of example in the accompanying drawing, in which:

Figure 1 is a view in elevation showing the structure in position for drilling operations.

Fig. 2 is a view through the drilling bit as seen on the line 2—2 of Fig. 1 and shows the operation of the bailer drilling tool in latching the bailer in its open position.

Fig. 3 is a view in central vertical section similar to that of Fig. 2 showing the manner in which the closure for the bailer is released by manipulation of a cable and material is entrapped within the bailer.

Fig. 4 is a view in end elevation showing the cutting bits as viewed in the direction of the arrows 4—4 in Fig. 3.

Referring more particularly to the drawing, 10 indicates the cable of a drilling structure. The lower end of the cable is fitted within a thimble 11 carrying spaced arms 12. Disposed between these arms is a link 13. The link 13 is formed at its upper end with a bore 14 which receives a horizontally disposed connecting pin 15. The link is elongated and is formed with an elongated slot 16 which receives a pin 17. The pin 17 is secured between the vertical arms 18 and 19 of the bailer structure 20. These arms extend parallel to each other and are spaced apart so that the pin 17 may move freely along the slot 16 for a purpose to be hereinafter explained. Formed on the lower end of the link 13 is a hammer 21 for a purpose to be hereinafter described.

The bailer structure 20 includes an outer cylindrical body 22 formed with a central bailer chamber 23. The upper end of the bailer chamber 23 is open. The lower end of the bailer chamber is normally open and is formed with a substantially annular seat 24 which is secured in position and has a central opening 25 through it. The opening 25 is of relatively large diameter. This opening may be closed by a closure plate 26. The plate 26 is formed near one of its marginal edges with a slotted opening 27 through which a hinge hook 28 extends. This hook, as shown in Fig. 2 of the drawing, is secured to the ring 24 and extends upwardly thereabove. The portion of the hook which engages the closure 26 is rounded and thus forms a hinge pin 29 for the closure 26. When the closure plate 26 is released it is free to swing downwardly and to cover the opening 25. It is intended, however, that during normal drilling operations the closure 26 shall be latched in its open position. This is accomplished by providing a stop bar 30 which extends transversely of the chamber 23 and is positioned so that the free end of the closure 26 may swing against it. This stop bar is also positioned in a manner to offset it from the center of the hinge pin 29 so that when the closure 26 is released it will be overbalanced and will tend to swing by gravity to its closed position. The stop bar 30 is provided with a tapered face 31 against which a similarly tapered face 32 on the closure 26 rests when the closure is latched. The latch means for the closure comprises a flat spring arm 33 which passes beneath a stirrup 34 secured to the side wall of the housing 22. The upper end of the latch spring 33 is formed with an eye 35 which receives a pin 36. The pin 36 is carried by a trip rod 37. This rod lies parallel to the side wall of the housing or barrel 22 and reciprocates through bearing elements 38 and 39. The upper end of the rod 37 is pivoted at 40 to a trip lever 41. The trip lever 41 is mounted on a pivot pin 42 extending transversely of the barrel 22 and secured thereby. The free end 43 of the trip lever stands in the vertical path of travel of the hammer 21 carried by the link 13. Thus, when the hammer 21 delivers a downward blow to the free end 43 of the trip lever 41 the trip rod 37 will be drawn upwardly.

The lower end of the latch spring **33** is fitted with a hook **44**. The stirrup **34** and the stop bar **30** are so positioned with relation to each other that when the spring **33** is moved to its lowermost position it will overhang the free end of the closure **26** and hold it against the stop bar. The spring is given tension by the stirrup **34** under which it passes. Formed as a part of the stop bar is an upper extension **45** against which the free end of the latch spring **33** bears when the spring **33** is moved to its unlatched position.

The lower end of the barrel **22** may be fitted with any desired type of drill bit or cutter. As here shown, a plurality of wedge-shaped bits **46** are secured around the outer circumference of the barrel **22** at the lower end thereof. These bits have an upwardly extending portion lying against the outer face of the barrel **22** and a square shoulder **47** which rests against the end of the barrel. The bits may be secured in position in any manner, although in the present instance they are indicated as being welded. The outer faces of the bits taper outwardly, and their inner faces, as indicated at **48**, also taper outwardly but converge with the outer faces to form V-shaped cutting edges. The cutting edges will lie along a circle concentric with the longitudinal axis of the barrel but of a larger diameter.

Disposed radially at the end of the barrel **22** are cutter blades **49**, the inner ends of which terminate short of the center of the barrel, thus providing a clearance space **50**. Extending diametrically across the center of the barrel **22** and associated with the radial cutter blades **49** is a continuous cutter blade **51**. The cutter blades **49** and **51** all have tapered cutting edges terminating in a common plane lying transversely of the end of the barrel **22**. The blades **49** and **51** occur between contiguous bits **46**, as particularly shown in Fig. 4 of the drawing. These various elements may be welded together, as indicated at **52**, and are all welded to the end of the barrel. It is to be understood that other means of securing the bits and blades in position may be employed if desired.

Referring to Fig. 2 of the drawing, it will be seen that a tool **53** is provided for the purpose of latching the closure **26**. This tool is a tong-like structure having handles **54** and **55**. The handle **54** carries a latch arm **56** and the handle **55** carries a fulcrum arm **57**. These two structures are pivoted together at **58**. The latch arm **56** is formed with a hook **59** at its free end and carries a fulcrum lug **60** adjacent thereto. The fulcrum arm **57** is fitted at its free end with an enlarged member **61** which acts to engage the edge of one of the bits **46** for a purpose to be hereinafter described.

In operation of the present invention the structure is assembled as shown in Fig. 1 of the drawing and is secured to a cable **10**. Before the device is lowered into the well bore the closure **26** is in the position shown in Fig. 3 and the latch spring **33** is in the position shown in that figure with the free end of the spring seated against the member **45** of the stop bar **30**. When in this position it will be recognized that the trip rod **37** is in its uppermost position and that the end **43** of the lever **41** is in its downwardly swung position. In order to latch the closure **26** the tool **53** is positioned with the latch arm **56** extending upwardly through the opening **25** in the seat **24**. As it is moved upwardly it will be recognized that the closure **26** will swing to the position shown in Fig. 2 of the drawing. The hook **59** then extends upwardly to engage the hooked end **44** of the latch spring **33** which is resting against the stop **45** of the lock bar. The enlarged end **61** of the fulcrum lever **57** of the tool is then positioned over the end of a bit **46**, and while the handle **55** is held firmly the handle **54** is swung in the direction of the arrow *a*, as shown in Fig. 2, with the result that the hooked end portion **59** of the latch lever **56** will engage the hooked end **44** of the latch spring **33** and flex the latch spring outwardly in the direction of the arrow *b* in Fig. 3 of the drawing. This motion is continued until the latch spring clears the stop bar **30** and the end of the closure **26**. During this time the fulcrum lug **60** will bear against the under face of the closure **26** and hold the closure **26** firmly against the stop bar **30**. While the spring is in this outwardly flexed position the handle **55** is swung in the direction of the arrow *c*. This will pull the fulcrum arm **56** downwardly in the direction of the arrow *d*, as shown in Fig. 2 of the drawing, and will dispose the end of the latch spring **33** over the edge of the closure **26**. It will be seen that the stirrup **34** will restrain outward movement of the flexed spring **33** and cause it to yieldably hold the closure **26** against the stop bar **30**. It will be also evident that as the latch spring **33** is drawn downwardly from its seated position against the stop bar **30**, as shown in Fig. 3, to its latched position as shown in Fig. 2, the trip rod **37** will be drawn downwardly through the guide bearings **38** and **39** and the end **43** of the trip lever will be swung upwardly in the direction of the arrow *e*, as shown in Fig. 2. The tool **53** may then be removed and the mud trap drilling bit may then be lowered into the well for drilling operations.

When it is desired to entrap material within the chamber **23** of the barrel **22** slack is suddenly let in the cable **10** after the barrel has been allowed to rest on the bottom of the drilled hole. When this takes place the link **13** will fall forcibly so that its hammer **21** will strike the end **43** of the lever **41**, swinging the free end of the lever in a counter direction to that indicated by the arrow *e* and at this time drawing the trip rod **37** and the latch spring **33** upwardly from the position shown in Fig. 2 to that indicated in Fig. 3. In view of the fact that the closure **26** is hinged off-center, the closure will swing by gravity from the position shown in Fig. 2 to the position shown in Fig. 3 and the material present in the chamber **23** of the barrel **22** will be entrapped so that the structure may be drawn from the well bore and emptied. The device may then be re-set and ready for further use. It will be evident that in the event the material within the chamber **23** of the barrel tends to prevent the closure **26** from swinging to its closed position by gravity that when the bailer is lifted the weight of the material will force the closure onto its seat.

It will be seen that by the structure here disclosed simple and effective means are provided for drilling a well bore by the use of cable tools, and that in addition the movement and position of a closure for a bailer barrel may be easily and positively controlled from the top of the well.

While I have shown the preferred form of my invention as now known to me, it will be understood that various changes may be made in combination, construction and arrangement of parts by those skilled in the art, without departing from the spirit of my invention as claimed.

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

1. A bailer, comprising a tubular body, a link connection between said body and a supporting cable, an opening through the bottom of the body, a freely hinged closure trap within the body adapted to swing down over said opening to close the same, latch means for temporarily holding said closure in an open position, and means actuated by said linkage as manipulated by the cable to operate the latch and release the closure.

2. A mud trap drilling bit, comprising a tubular body, a link connection between said body and a supporting cable, an opening through the bottom of the body, a freely hinged closure trap within the body adapted to swing down over said opening to close the same, latch means for temporarily holding said closure in an open position, means actuated by said linkage as manipulated by the cable to operate the latch and release the closure, and earth digging means carried at the lower end of said body.

3. A mud trap drilling bit, comprising a tubular body, a link connection between said body and a supporting cable, an opening through the bottom of the body, a freely hinged closure trap within the body adapted to swing down over said opening to close the same, latch means for temporarily holding said closure in an open position, means actuated by said linkage as manipulated by the cable to operate the latch and release the closure, and earth digging means carried at the lower end of said body, said digging means including a plurality of downwardly projecting wedge-like bits disposed around the circumference of the body at the lower end thereof and radially extending cutting blades positioned transversely of the lower end of said body.

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