June 4, 1929. E. SMITH 1,716,092

CORE DRILLING AND EXTRACTING DEVICE

Filed Oct. 9, 1924 2 Sheets-Sheet 1

Fig. 1

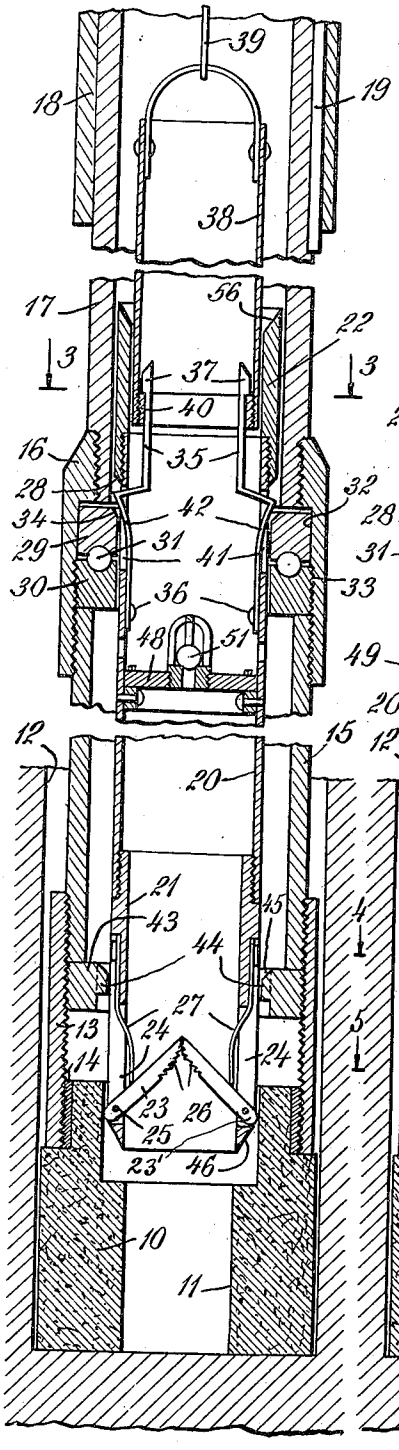


Fig. 2

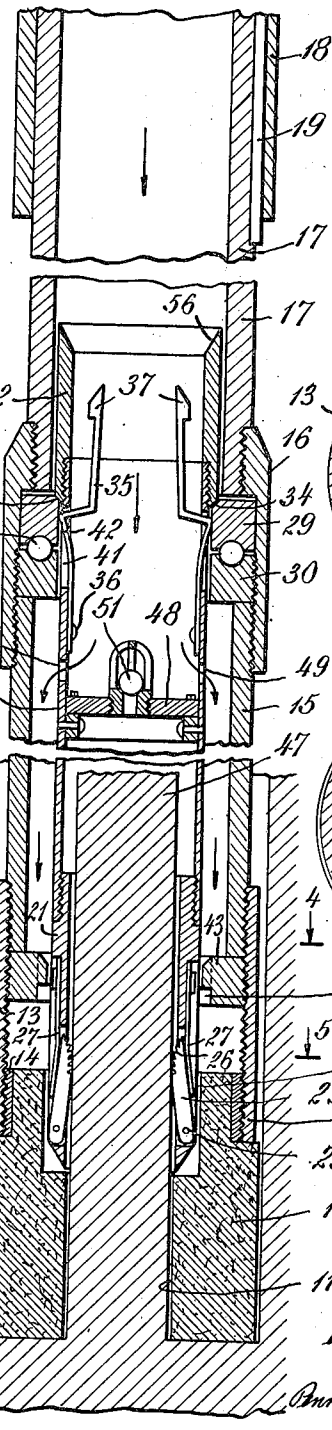


Fig. 3

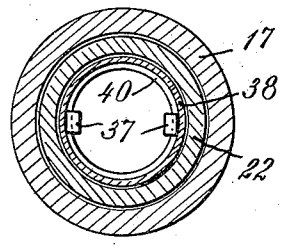


Fig. 4

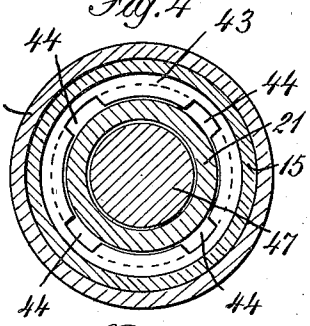
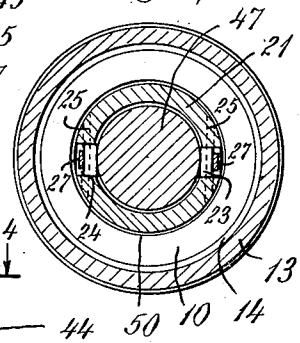


Fig. 5



INVENTOR
Eggleston Smith
BY
Bonnie Davis Marvin & Edmonds
ATTORNEYS

June 4, 1929. E. SMITH 1,716,092

CORE DRILLING AND EXTRACTING DEVICE

Filed Oct. 9, 1924 2 Sheets-Sheet 2

Fig. 6,

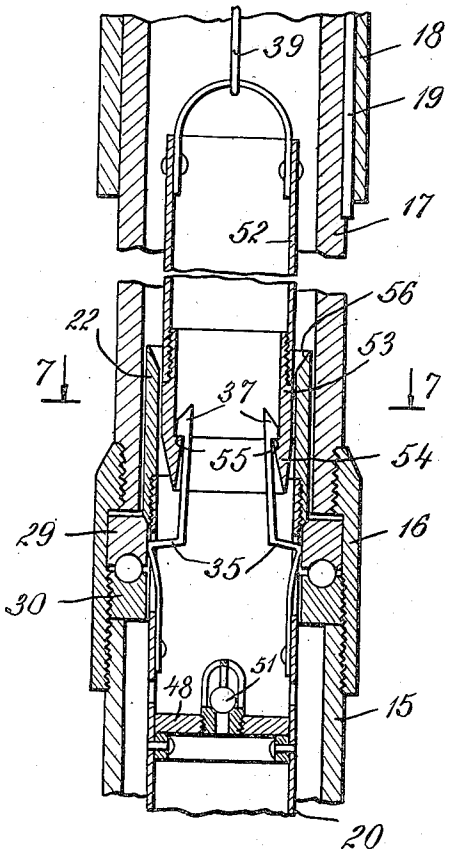


Fig. 8,

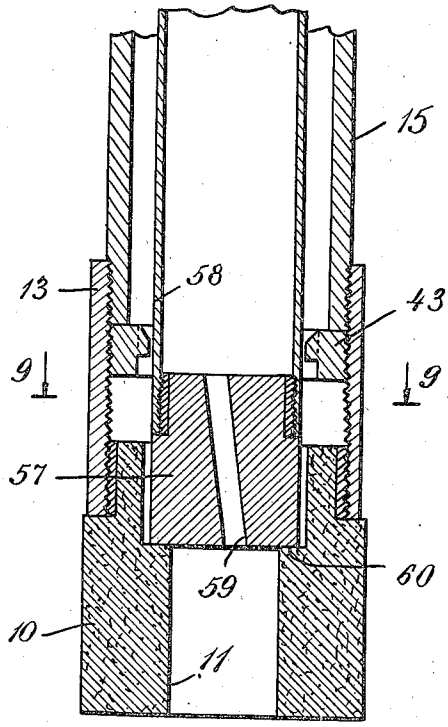


Fig. 7,

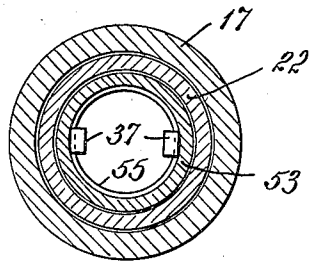
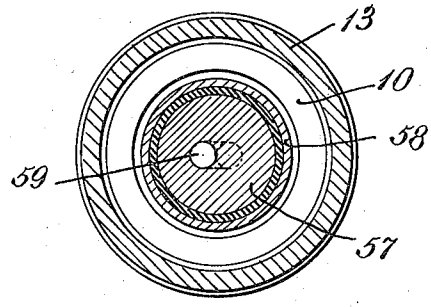


Fig. 9,



INVENTOR
Eggleston Smith
BY
Pennie Davis Marvin & Edmonds
ATTORNEYS

Patented June 4, 1929. 1,716,092

UNITED STATES PATENT OFFICE.

EGGLESTON SMITH, OF MAMARONECK, NEW YORK, ASSIGNOR TO EGGLESTON DRILLING CORPORATION, OF DOVER, DELAWARE, A CORPORATION OF DELAWARE.

CORE DRILLING AND EXTRACTING DEVICE.

Application filed October 9, 1924. Serial No. 742,521.

This invention relates to the drilling of wells for oil, gas, water, minerals, and the like, and more particularly to devices for drilling and extracting cores so as to obtain with facility samples of the rock or other material being drilled through. The object of the invention is the provision of an improved core drilling and extracting device.

In obtaining cores during well drilling of this character a drilling bit which cuts its way through the rock by a motion of rotation is employed, the drilling bit being annular in form so that the rock opposite the central opening in the bit is left uncut. After the drilling has progressed a short distance, the uncut portion of the rock projects upwardly through the annular bit in the form of a core. When an annular hole has been drilled in this manner to a depth sufficient to produce a core varying from a few inches to several feet in length, the core is broken off and removed from the hole by an appropriate core-taking device.

The core-taking or extracting device is lowered on a cable into the drill stem which drives the rotating bit, and it is sometimes difficult properly to manipulate the core-catcher when it is run into the hole after the core has been cut and break off and recover the core. In the utilization of the automatic bit feed of my invention disclosed and claimed in my application Serial No. 712,197, filed May 10, 1924, it might be difficult in some cases to recover cores in this manner.

Hence, it is desirable to have the core-extracting device in position within the drill stem during the drilling of the core so that the core will enter the removing device after it is cut. In order to operate the drilling apparatus in this manner with the core-taking device in position during the drilling operation, it is desirable, if not necessary, to provide automatic means for detaching the cable after the core-taking device has been placed in operating position so as to permit the cable to be hoisted out of the drive pipe and the surface end of this pipe to be connected to a source of water pressure for supplying water to the cutting surfaces of the drilling bit. Likewise, automatic means must be provided for reattaching the cable to the core-taking device after the core has been cut.

In constructing a core drilling and extracting device of this type, it is important that the latching and tripping mechanism for detaching and attaching the cable be arranged to operate with an extremely high degree of safety, for if the core-taking device were allowed to fall a distance of several hundred or several thousand feet, great damage would be done to the hole. In fact, such an accident is capable of damaging the hole to such an extent that it is necessary to side-cut around the damaged portion, or even abandon the hole altogether.

The core barrel should remain stationary with the core, and hence the drill stem must rotate with respect to the core barrel. The friction between these parts should be reduced as much as possible, and adequate means for accomplishing this result, and at the same time supporting the core barrel by the drill stem, should be provided.

It is also important that the core barrel be furnished with effective core engaging devices by which the core may be readily broken off and withdrawn from the hole. These devices must, therefore, positively engage the core so as to prevent any possibility of the core itself being allowed to fall. Moreover, I have found that a drilling bit constructed of abrasive material, such, for example, as carborundum, is particularly effective in drilling wells when appropriate means is provided for regulating the pressure of the bit against the bottom of the hole. When such a bit is used it is important that the lower end of the core barrel be prevented from coming in contact with the bit, as this would cause rapid wear of the core barrel and might also damage the bit itself.

During the usual operation of drilling a well it is frequently desirable to drill considerable lengths of the hole without taking

the cores. In order to change from an annular bit to a solid bit it is customary to remove the entire drive pipe from the hole. This necessitates taking apart the drive pipe section by section and then replacing it in a similar manner, which requires an unreasonable amount of time.

In accordance with my present invention I provide the core barrel, that is, the core extracting device, with a releasable bail for lowering it into operative position within the drill stem, and I also provide means operable upon the core barrel reaching the operative position for releasing the bail. That is, the bail-releasing means is actuated only by the final movement of the core barrel to its final operative position. There is, therefore, no possibility of the bail-releasing means being tripped as the core barrel is being lowered into the hole. Thus the danger of the core barrel being tripped while near the surface, which would result in the wrecking of the bottom of the hole, is eliminated. A lifting bail is also provided which, when lowered into the drill stem after the core has been cut, positively engages the core barrel in such a manner that it is impossible to disengage these parts automatically, but to do this the core barrel must be hoisted to the surface and the lifting bail disengaged by hand.

The mechanism which I employ for accomplishing these results comprises a latch member which is secured to the core barrel and which is biased to a given position. In its normal position this latch member is adapted to engage the lowering bail, but when the core barrel moves into its final operative position within the drill stem, the latch member is moved by means disposed at this operative position and preferably upon the drill stem into a position of disengagement with the lowering bail which may then be hoisted out of the hole. The latch member is held in the disengaged position as long as the core barrel is in its operative position, and when it is desired to remove the core barrel a lifting bail is lowered into the hole which engages the latch member in the position in which it is held, and when once the lifting bail has been thus interlocked with the core barrel, it is impossible to detach it until the core barrel has been hoisted to the surface.

The invention also involves the provision of a friction reducing bearing for supporting the core barrel within the drill stem, and core engaging devices hinged at their lower ends to the core barrel so that they fall by gravity against the core, each of these devices having a plurality of teeth which are disposed along a curve so that one or more of the teeth are presented to the core at every possible angular position of these devices. In addition, means is provided for guiding the lower end of the core barrel into alignment with the annular hole in the drilling bit so as to prevent damage to the bit or to the core barrel during the drilling operation.

Furthermore, in order to provide for the drilling of complete holes without leaving a core, an inner cutting member of abrasive material is secured to a mounting which is provided with the latch mechanism of my invention and lowered into the drill stem in place of the core barrel. This inner cutting member rests upon an annular shoulder on the annular abrasive bit and is driven by the friction between these engaging surfaces. It has a passage for drilling water extending through it longitudinally and this passage is eccentrically arranged so that a complete hole will be cut.

A better understanding of the invention will be had by referring to the accompanying drawings which illustrate, by way of example, a mechanical embodiment of the invention. In these drawings:

Fig. 1 is a longitudinal section of the core drilling and extracting device showing the core barrel supported by the lowering bail just above the operative position;

Fig. 2 is a similar view showing the core barrel in operative position, the latch members being forced inwardly and having released the bail, which has been hoisted out;

Fig. 3 is a transverse section on line 3—3 of Fig. 1, showing the latch members in engagement with the lowering bail;

Fig. 4 is a transverse section on line 4—4 of Fig. 2, showing the water passages or channels through the guide collar for the lower end of the core barrel;

Fig. 5 is a similar view on line 5—5 of Fig. 2, showing the mounting of the core engaging devices;

Fig. 6 is a longitudinal section similar to Figs. 1 and 2 showing the lifting bail lowered into engagement with the latch members and locked therewith ready to hoist the core barrel to the surface;

Fig. 7 is a transverse section on line 7—7 of Fig. 6;

Fig. 8 is a longitudinal section of the lower portion of the drilling apparatus showing the inner cutting member and its mounting in position within the drill stem and resting upon the annular abrasive bit; and

Fig. 9 is a transverse section taken on the line 9—9 of Fig. 8.

Referring to these drawings, an annular bit 10 of abrasive material having a central longitudinal opening 11 is rotated to drill the hole 12. The bit 10 is secured to the bit mounting 13 by means of babbitt 14, and the bit mounting is threaded onto the lower end of the drill stem 15. A coupling 16 of special form is screwed onto the upper end of the drill stem and serves to secure the

same to the drive pipe by which the drilling apparatus is rotated.

As is illustrated in the drawings, however, the drilling apparatus is driven by the drive pipe through a slidable joint or automatic bit feed such, for example, as is shown in my prior application above mentioned. Therefore, the coupling 16 is threaded onto the lower end of the driven member 17 of such a slidable joint. The driving member of this mechanism is indicated at 18, only the lower end being shown and its upper end being mounted upon the drive pipe. Members 18 and 17 are connected together by means of a longitudinal key 19, and by virtue of this connection rotary motion is transmitted from member 18 to the driven member 17 while the member 17 is at the same time allowed to slide freely in the vertical direction within the member 18. By means of this connection the weight of the drive pipe is removed from the cutting bit 10 and the appropriate feeding pressure for enabling the abrasive bit to operate at maximum cutting speed can be readily applied.

The core barrel—and in this application this term is intended to include any form of core extracting device—consists of three parts, a central barrel portion 20 of relatively thin metal, a dog holder 21, and a guard ring 22. The central portion 20 may be as long as necessary to form a chamber of the required size to accommodate the desired length of core. The dog holder 21 is screwed onto the lower end of the barrel portion 20 and consists of a hollow cylinder the interior diameter of which is slightly greater than that of the opening 11 of the abrasive bit and the walls of which are relatively thick.

The core engaging devices are mounted in the dog holder 21 and, in the preferred form, these devices comprise two or more dogs 23 which are mounted in recesses 24 in the walls of the dog holder 21, the dogs being of substantially the same thickness as these walls. Dogs 23 are hinged at their lower ends by pins 25 which are driven into the walls of dog holder 21, as is clearly shown in Fig. 5. Each of the dogs 23 is provided near its upstanding end with a series of relatively sharp tranverse teeth 26 which are cut upon a curve as indicated so that one or more of these teeth are presented to the core in any angular position which the dogs may assume. The dogs are urged inwardly away from their dead center position and against the core by means of flat springs 27 which are riveted within recesses 24. These springs prevent the dogs from protruding beyond the outer surface of the dog holder and insure that the dogs will always fall against the core.

The upper surfaces of the teeth 26 are preferably somewhat undercut so that they tend to dig into the surface of the core, and by employing this form of teeth, in combination with the hinging of the dogs at their lower ends so that they are always urged by gravity against the core, any lifting movement of the core barrel will tend to force the dogs with increasing pressure into the core.

It is important that the dogs 23 be kept from falling below the horizontal position because if they should be turned downwardly while the core barrel is in position to receive a core, the dogs might become engaged with one another so as to prevent them from reassuming their upward positions and the upward pressure of the core being cut would then seriously damage the dogs. In order to obviate this, the dogs 23 are provided with portions 23′ which extend a short distance beyond the pins 25. The dogs may engage one another as shown in Fig. 1 and prevent their falling into the downward position, but in the event that they do not so engage one another, these projections 23′ will come in contact with the inner surface of the annular bit 10, as shown in Fig. 1, and the dogs will thus be maintained in their proper positions. In order to be sure that the dogs project upwardly while the core barrel 20 is being lowered into the well, a small block of wood (not shown) may be inserted between the teeth of the dogs. This block will hold the dogs in position until the core pushes it upwardly and is engaged by the teeth of the dogs.

The guard ring 22 is threaded upon the outside of the upper end of the central portion 20 of the core barrel and has around its lower end a shoulder 28 by which the core barrel is supported within the drill stem 15. For this purpose a friction reducing bearing is employed which comprises a pair of collars 29 and 30 which have ball races along their opposing surfaces in which the balls 31 roll. These collars are held in position by means of the specially constructed coupling 16 which is provided with a chamber 32 above the end of the lower threads 33, this chamber being slightly larger than collar 29.

In assembling these parts collar 29 is placed within the chamber 32 and collar 30 is turned tightly against the end of threads 33, the balls 31 being between the collars. Coupling 16 is then screwed onto the drill stem 15 and thus clamps collar 30 solidly against the upper end of the drill stem, allowing collar 29, however, to rotate freely within chamber 32 upon the balls 31. The inner upper corner of movable collar 29 is slightly rounded or beveled, as shown at 34, for a purpose which will appear later on, and also for engagement with the shoulder 28 so as to support the core barrel in operative position.

The latch members by which the core barrel is lowered into and lifted from the operative position comprise one or more resilient or yieldably mounted arms 35 which are riveted at 36 to the inside of the central portion 20 of the core barrel. Two oppositely arranged latch members are preferably used. They are provided at their upper ends with hooks 37 for engaging the lowering and lifting bails. A lowering bail 38 is shown in Fig. 1, and comprises a metal cylinder having a loop at the top by which it is suspended from the cable 39 and an annular ring 40 interiorly fixed adjacent the bottom. Ring 40 may be welded to the cylinder and its upper surface is adapted to engage the hooks 37 when the bail cylinder is telescoped into the guard ring 22.

The latch members 35 are bent outwardly through slots 41 in the walls of the central portion 20 and have curved cam surfaces 42 for the purpose of extending through the slots 41 into the path of the collar 29 when the hooks 37 are in their normal outermost position, to which they are biased by the resiliency of the latch members 35. The latch members, however, are bent inwardly just above the ends of the cam portions 42 so as to re-enter the core barrel, and the outermost parts of the cam surfaces 42 always remain within the diameter of the guard ring 22 so as to be protected thereby against accidental tripping.

When a core barrel is to be lowered into operative position within the drill stem, the bail 38 is inserted in guard ring 22 and snapped onto the latch members 35 and lowered down the drill pipe by means of cable 39. In Fig. 1 the core barrel has reached the bottom of the hole and is about to move into operative position. The hooks 37, however, still engage the annular ring 40. When the core barrel is lowered a slight distance further, and thus passes into its final operative position, the cam surfaces 42 are engaged by the rounded shoulder 34 of collar 29 so that the latch members 35 are forced inwardly thereby and the hooks 37 are released from engagement with annular ring 40 of the bail 38.

In Fig. 2 the core barrel has settled to its final position and bail 38 has been hoisted out of the well so that the drive pipe may be connected with an appropriate drilling water supply and the drilling operation resumed. It will be noticed that in this position the outwardly projecting points of the latch members 35 lie against the interior surface of collar 29, thus holding the hooks 37 in restricted position as long as the core barrel remains in its operative position.

In lowering the core barrel into position, it is important that the barrel be suitably guided and held with its axis substantially in alignment with the axis of the drilling bit 10, and for this purpose an annular guide ring or collar 43 is mounted toward the lower end of drill stem 15, this ring being channeled, as indicated at 44, to allow for the passage of drilling water. The upper corner of the guide ring is chamfered at 45 so as to assist in guiding the beveled end 46 of the core barrel therethrough.

The hooks 37 of the latch members extend into relatively close proximity to the internal walls of the guard ring 22 when the latch members are in normal position. Furthermore, the guard ring extends a substantial distance above the hooks 37 and forms a lateral support for the bail cylinder which is telescoped into it, thus tending to keep the bail in longitudinal alignment with the core barrel and assist in preventing the accidental releasing of the core barrel from the bail.

In Fig. 2 drilling has progressed to a point where a core 47 projects a considerable distance into the core barrel, and drilling may be continued in this way until the core reaches a head 48 which forms the roof of the core chamber, and for this purpose is fitted tightly and solidly to the inner walls of the central barrel portion 20. During the drilling of the hole water is forced downwardly through the drive pipe, through the sliding joint, and guard ring 22, into the chamber of the core barrel above head 48.

From this chamber it passes radially outwardly through openings 49 in the central portion 20 into the annular space between the core barrel and drill stem 15, indicated by the arrows. The water flowing thence downwardly goes through channels 44 in guide ring 43 and then passes into the narrow annular space 50 between the lower end of the core barrel and the abrasive bit. From here the drilling water flows between the core and the wall of the opening 11 of the abrasive bit to the cutting surfaces. After passing between the cutting surfaces the drilling water flows upwardly between the outside of drill stem 15 and the walls of the hole 12.

It is preferable to have the lower end of the core barrel extend into close proximity to the upper surface of the abrasive bit 10 and even enter a recess in the upper part of the bit, as shown in Figs. 1 and 2. Guide ring 43, however, coacts with the exterior of the core barrel in such a manner as to prevent the core barrel from coming into contact with the abrasive bit, inasmuch as the rotation of the bit would rapidly wear away the core barrel, and also because, if the bottom of the core barrel should strike the abrasive bit as it is being lowered into position, it might crack the bit or loosen it from its mounting.

While the annular hole shown in Fig. 2

is being drilled, which results in the formation of core 47, the core barrel is held stationary by frictional engagement with the core, and particularly by engagement of dogs 23 with the core. The drill stem and bit, therefore, rotate, and the core barrel is supported upon collar 29 which remains stationary with the core barrel. By means of the ball bearing comprising collars 29 and 30, this relative movement between the drill stem and the core barrel takes place with a minimum of friction. Hence, the drag upon the core is relatively small, and cores may be cut in relatively soft formations and taken out without injury or breaking up. As the core 47 increases in length, the water which fills the core chamber must be displaced and is expelled through the bell valve 51 in head 48.

When it is desired to remove the core, the supply of drilling water is cut off and the lifting bail 52 shown in Fig. 6 is lowered down the drive pipe by means of cable 39. This bail is similar to the lowering bail 38, but the bail cylinder has secured to its lower end a hollow cylinder 53 having relatively thick walls and terminating at the bottom in an annular wedge-shaped head 54 having shoulders 55 for engaging hooks 37 of the latch members 35.

The upper end of guard ring 22 is flared as shown at 56 so as to facilitate the manual insertion of the lowering bail 38, and particularly to coact with the wedge-shaped head of the lifting bail 52 to facilitate its entrance into the guard ring when this bail is lowered into the well. After the head 54 slides into and telescopes with guard ring 22, its wedge-shaped surfaces also force the hooks 37 further inwardly into a third position from which they snap outwardly into engagement with the shoulders 55.

The bail 52 may thus be automatically interlocked with the core barrel, and inasmuch as the outermost points of the latch members 35 are held within the diameter of the guard ring 22, there is no possibility of their becoming engaged with any object so that the core barrel will be accidentally released from the bail. The core barrel and core may thus be safely hauled to the surface by cable 39. As tension is applied to the cable, the teeth 26 of dogs 23 are forced against the core 47 with considerable pressure, this pressure increasing as the pull on the cable is increased, until the core breaks off.

When the core barrel is brought to the surface the core is taken out and bail 52 is manually released from engagement with the latch members 35. If it is desired to cut another core immediately, lowering bail 39 is then attached to the core barrel and it is lowered back into position in the drill stem. If, however, it is not necessary to take another core until the hole has been drilled to some further depth, the device illustrated in Fig. 8 for drilling a complete hole instead of an annular hole is utilized.

This device comprises an inner cutting bit 57 also of abrasive material and of substantially the same external diameter as the core barrel previously taken out. The inner cutting bit 57 is mounted by means of babbitt in the end of a tubular member 58 which may not necessarily be as long as the core barrel, inasmuch as it is not supported upon the ball bearing collar 29. The tubular member 58, however, is provided at its upper end with the latch members 35 and the guard ring 22.

The member 58 and the inner cutting bit 57 may therefore be lowered into the drill stem 15 by means of lowering bail 38 and removed by means of the lifting bail 52 in exactly the same manner as the core barrel was inserted and removed.

Tubular member 58 is open at its upper end so that the drilling water passes down through the cylinder and through a passageway 59 in the inner cutting bit 57 into the central opening 11 of the bit 10, and thus to the cutting surface. Passageway 59 is preferably eccentrically disposed so that a complete hole will be cut without leaving a core.

The inner cutting bit 57 is rotated by its frictional contact with the shoulder 60 on the main annular bit 10. If it is necessary, the friction of these surfaces may be increased by adding weight to the inner cutting bit 57, say, for example, in the form of shot within the tubular member 58, the shot not interfering with the flow of drilling water to the cutting surfaces of the bit.

By the use of the core cutting and extracting device described above, cores may be taken with comparative ease and safety, and when the inner cutting bit 57 is employed in conjunction with the core-taking device, it is possible to change over from a core drilling operation to the drilling of a complete hole in an extremely short time. It is not necessary to remove the drive pipe from the hole, but merely to hoist out the core barrel by means of a cable and in place of this core barrel lower into the drill stem on the same cable the inner cutting bit member. This member takes the place of the core barrel and because of its construction drills away the core at the same time that the annular bit is drilling the annular hole.

I claim:

1. In a well drilling device the combination of, a core cutting bit, a tubular drill stem therefor, a core barrel insertable within the drill stem, a latch member yieldably mounted on the core barrel and biased in one direction, a bail having means engaging the latch member in the normal position of said

member so as to lower the core barrel into operative position within the drill stem, and means disposed at the operative position for forcing the latch member out of engagement with the bail when the core barrel reaches said position.

2. In a well drilling device the combination of, a core cutting bit, a tubular drill stem therefor, a core barrel insertable within the drill stem, a latch member yieldably mounted on the core barrel and normally biased to a given position, a bail having means engaging the latch member in the normal position of said member so as to lower the core barrel into operative position within the drill stem, means disposed in the operative position for forcing the latch member to a second position out of engagement with the bail when the core barrel reaches said position so that the bail may be removed from the drill stem, and a lifting bail, adapted to be lowered into the drill stem, having means for forcing the latch member into a third position thereby interlocking itself therewith and affording means for withdrawing the core barrel.

3. In a well drilling device the combination of, a core cutting bit, a tubular drill stem therefor, a core barrel insertable within the drill stem and provided near its upper end with a yieldably mounted latch member, shoulders on the drill stem and core barrel respectively adapted to coact to support the latter in operative position, a bail for lowering the core barrel to operative position having a shouldered ring engaging a hook on the latch member, the latch member having a cam portion extending outwardly through the wall of the core barrel which is engaged by the shoulder on the drill stem when the core barrel reaches the operative position and forces the latch member inwardly to release the bail so that it may be removed from the drill stem, and a lifting bail, adapted to be lowered into the drill stem, having a wedge-shaped annular head for forcing the latch member further inward and engaging the hook thereof so as to withdraw the core barrel.

4. In a well drilling device the combination of, a core cutting bit, a tubular drill stem therefor, a core barrel insertable within the drill stem, a latch member on the core barrel near the upper end thereof, a bail having means for engaging the latch member so as to lower the core barrel into operative position within the drill stem, and means disposed at the operative position for coacting with the latch member when the core barrel reaches said position so as to release the bail therefrom, said core barrel having a guard portion extending above the latch member to protect said member.

5. In a well drilling device the combination of, a core cutting bit, a tubular drill stem therefor, a core barrel insertable within the drill stem, a latch member on the core barrel near the upper end thereof, a bail having means for engaging the latch member so as to lower the core barrel into operative position within the drill stem, and means disposed at the operative position for coacting with the latch member when the core barrel reaches said position so as to release the bail therefrom, said core barrel having a guard portion extending above the latch member and having a flaring mouth for guiding the bail into engagement with the latch member.

6. In a well drilling device the combination of, a core cutting bit, a tubular drill stem therefor, a core barrel insertable within the drill stem, a latch member on the core barrel near the upper end thereof, a bail having means for engaging the latch member so as to lower the core barrel into operative position within the drill stem, and means disposed at the operative position for coacting with the latch member when the core barrel reaches said position so as to release the bail therefrom, and a guard ring secured to the upper end of the core barrel and extending above the latch member having a flaring mouth for guiding the bail into engagement with the latch member.

7. In a well drilling device the combination of a core barrel having a latch member resiliently secured interiorly of the barrel below the upper end thereof, and an annular bail member adapted to telescope within the end of the barrel having means to engage the latch member in this position.

8. In a well drilling device the combination of a core barrel having a latch member resiliently mounted interiorly of the barrel below the upper end thereof, and a bail member having an annular pick-up portion for telescoping within the end of the barrel, said pick-up portion being wedge shaped at its lower end for springing said latch member into engagement therewith.

9. In a well drilling device, the combination of a core cutting bit, insertable within the drill stem, a prong-shaped latch member resiliently mounted on the core barrel, a bail having an annular ledge for engaging said latch member for lowering the core barrel into operative position within the drill stem, and an annular ring carried by a friction reducing bearing upon the interior wall of the drill stem and projecting inwardly therefrom a sufficient distance to force said latch members out of contact with said annular ledge when the core barrel reaches the operative position so as to release the bail therefrom.

10. In a well drilling device, the combination of a core cutting bit, a tubular drill stem therefor, a core barrel insertable within the drill stem, a prong-shaped latch member

resiliently mounted on the core barrel, a bail having an annular ledge for engaging said latch member for lowering the core barrel into operative position within the drill stem, an annular ring mounted upon a friction reducing bearing within the drill stem and projecting inwardly a sufficient distance to force said latch member out of contact with said annular ledge when the core barrel reaches the operative position so as to release the bail therefrom, and a second bail having an annular wedge shaped lower end and an annular ledge thereabove by which said latch member is forced inwardly and engaged when this second bail is lowered into the drill stem to pick up and withdraw the core barrel.

In testimony whereof I affix my signature.

EGGLESTON SMITH.