IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Bobby J. Bowden	§	
	§	
Patent Owner: Wildcat Services L.P.	§	Group Art Unit: 3993
	§	
Control No.: 90/010,615	§	Examiner: Peter C. English
	§	
Reexamination of Patent No. 5,474,142	§	Atty Docket: NOV-2RE:142
	§	
For: Automatic Drilling System	§	Customer No.: 21897

RESPONSE TO OFFICE ACTION MAILED DECEMBER 14, 2009

Mail Stop *Ex Parte* Reexam
Attn: Central Reexamination Unit
Commissioner for Patents
United States Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Commissioner:

This paper is presented in response to the Office Action dated December 14, 2009. Patentee respectfully submits the following grounds in support of this Response.

The **Listing of Claims** is attached as Appendix A to this Response.

A **History** of the Examination of the claims of the '142 Patent; the litigation with Requestor and other litigation and events related to the '142 Patent is attached as Appendix B to this Response.

The **Remarks** begin on page 2 of this response.

REMARKS

Patentee and the undersigned appreciate the careful review of Examiner English in this reexamination proceeding. Consideration of the present application in view of the following remarks is respectfully requested.

Claims 1-8 and 11-15 are subject to reexamination.

Claims 9-10 are not subject to reexamination.

Claims 2-4 and 6-8 were deemed patentable and/or confirmed.

Claims 1, 5 and 11-15 are rejected.

I. The Invention of the '142 Patent

The invention of the '142 Patent was a monumental breakthrough in the automatic driller arts. The prior art automatic drilling systems were designed to drill vertical wells where only weight on bit (WOB) was an important variable in drilling. In vertical drilling, it was safely assumed that whatever weight was indicated or derived by the tension in the rig's hoisting system cables was also indicative of the weight sensed by the drill bit at the bottom of the well. The *Description of the Related Art* section of the '142 Patent describes the prior art *Weight-on-Bit* type automatic driller as follows:

> "Typical automatic drillers presently control the drill string using only bit weight. Such drillers throttle the brake handle of the cable drum brake in response to decreases in bit weight to release the drill string support cable and, thus, lower the drill string. The lowering of the drill string places additional weight of the drill string on top of the drill bit in order to increase bit weight back to its desired value. A driller operator enters a desired bit weight value into the automatic driller which then compares the desired value to the actual bit weight measured by a weight indicator. As long as the actual bit weight remains within the tolerance of the desired bit weight, the cable drum brake remains engaged, and the drill string support cable supports the drill string at its present level. However, once the weight indicator measures a bit weight that falls outside the desired bit weight entered into the automatic driller by the drilling rig operator, the automatic driller

> manipulates the brake handle to release the cable drum brake which lowers the drill string cable, thereby placing more weight of the drill string upon the drill bit. The cable drum brake remains released until the weight indicator provides a signal to the automatic driller which substantially equals the desired bit weight."
>
> (*See* '142 Patent, Col. 1, ll. 14-35)

Such prior art WOB automatic drillers were sufficient for vertical drilling. However, when directional and horizontal drilling became commonplace, the prior art WOB automatic drilling systems were no longer adequate. This was because once the wellbore was deviated from the vertical at least a portion of the drill string would often rest on the slope of the directional well. Thus, surface indicia of weight as proxies of the tension of the hoisting system were no longer accurate.

II. The Le Compte *et al.* Patent (U.S. Patent No. 1,891,329 (1932))

Claims 1 and 11 of the Bowden '142 Patent have been rejected as anticipated (35 U.S.C. § 102) by Le Compte *et al.* (U.S. Patent No. 1,891,329) (hereinafter "Le Compte"). Patentee respectfully traverses.

A. Le Compte Only Releases The Upper Drill String, It Does Not Release The Entire Drill String As Claimed By The '142 Patent

As recognized by the Examiner, Le Compte discloses a telescoping joint type drill string for drilling a vertical well, i.e., not a directional or horizontal well, "wherein telescopic means is employed that will permit of a predetermined pressure being applied to the drilling bit, or cones, throughout the drilling operation." *See* Le Compte, Page 6, ll. 54-58. Le Compte will only work with a sectioned drill string comprising an upper drill string suspended within the drilling rig derrick and a lower drill string having a drilling bit connected at its lower end. The upper and lower drill strings are separated by a telescoping joint or sliding sleeve that is operated to be neither fully

extended nor fully collapsed. With Le Compte's telescopic joint, the "bit is intended to be entirely safe from the weight of the upper drill stem at all times so that a predetermined weight can always be applied to the bit as recommended by the manufacturers of the bit for the various earth formations." *See* Le Compte, Page 6, ll. 43-48. The drawworks of Le Compte can only control the release of the upper drill string from the rig's mast. *See* Page 6, ll. 29-30 ("sliding valve 84 will be further closed to allow normal lowering of the upper drill stem section H"); Page 5, ll. 23-36 ("permit the cable drum to revolve at such speed as to lower upper drill stem into the hole"); Page 5, ll. 110-112 ("further set the brake and slow up feeding of upper drill stem into the hole").

Le Compte never describes controlling the release of "the drill string" as claimed, but only the release of the "upper drill stem." Because the lower drill string or stem is connected to a telescoping joint, the drawworks does not regulate the release of the lower drill stem. The rate of release of the lower drill stem is controlled by the rate of penetration of the bit as it cuts through the earth, not the braking mechanism on the rig floor. Instead, the braking mechanism on the rig floor is used to control the rate of release of only the upper drill stem in a way that attempts to keep pace with the rate of release of the lower drill stem. This is not controlling the rate of release of the entire drill string in response to changes in drilling fluid pressure as claimed in the '142 Patent.

Claims 1 and 11 of the '142 Patent each refers to both an increase and decrease in the rate of release of "the drill string." The drill string of the '142 Patent, identified by numeral "21," is described as containing a mud motor 85 and drill bit 23, and is not

comprised of an upper drill stem with a lower drill stem telescopically suspended therebelow. *See* '142 Patent, Col. 3, Line 52 – Col. 4, ll. 15.

As described in the '142 Patent, the purpose of the invention is to adjust the drawworks 22 "in order to retain drill bit 23 'on bottom' (i.e., on the bottom of the borehole 86) and maintain the progression of borehole 86 through formation 87." *See* '142 Patent, Col. 4, ll. 15-18. As further explained by the '142 Patent, "[t]o maintain drill bit 23 'on bottom' and, thus, the optimal rate of penetration, automatic driller 33 connects to brake handle 208 via cable 207 to regulate the release of cable 28 from drum 26. Automatic driller 33 senses when drill bit 23 is 'off bottom' and manipulates brake 32 to release cable 28 and lower drill string 21 until drill bit 33 is again 'on bottom'. Automatic driller 33 determines when drill bit 23 is 'off bottom' by measuring drilling fluid pressure, bit weight, drill string torque, and drill string revolutions per minute (RPM)." *See* '142 Patent, Col. 4, ll. 33-42.

While the Office Action states that "Le Compte measures the weight using a telescopic device that reflects the bit weight in the pressure of the drilling fluid" (Office Action Page 6), Patentee would point out that Le Compte only generates a control signal indicating the relative position of the telescopic joint via a choke manifold. As explained by Le Compte the "primary aim, at all times, [is] to maintain a predetermined pressure, by weight of a lower section of drill stem on the bit, and no more." *See* Page 2, ll. 92-94. Additionally, Le Compte explicitly specifies "at no time can upper drill stem section come into contact and rest upon the lower drill stem section to add all of its weight to the drilling bit." *See* Page 6, ll. 31-33. That is, so long as the telescopic joint is not fully collapsed (compressed) or fully extended (tensioned), the weight on

the drill bit will remain constant in a vertical well because the preloaded weight of the lower drill stem will always rest on the drill bit. Thus, a change in drilling fluid pressure caused by the relative position of the choke manifold in the telescopic joint only represents the position of the telescopic joint. It does not, in fact, indicate weight or the interaction of the drill bit with the formation and is not used to control the rate of release of the drill string in the manner of the '142 Patent.

For these reasons, Le Compte cannot anticipate claims 1 and 11 of the '142 Patent. Patentee respectfully requests withdrawal of the rejection based upon 35 U.S.C. §102(b) and allowance of Claims 1 and 11.

B. Le Compte Fails To Teach A System For Increasing AND Decreasing The Rate of Release As Required By Claims 1 & 11 of the '142 Patent

The December 14, 2009 Office Action recites that Le Compte "teaches the concept of increasing or decreasing the rate of release (setting or releasing of the brake) of the drill string." *See* Page 5. Le Compte itself purports to describe a mechanism for *decreasing the rate of release* (Page 5, ll. 110-112 ("...to further set the brake and slow up feeding of upper drill stem into the hole") and, allegedly, *increasing the rate of release* (Page 6, ll. 14-15 ("admitting less steam to cylinder and causing a slight let up on the braking action") & ll. 28-30 ("the sliding valve 84 will be further closed to allow normal lowering of the upper drill stem section H").

The Le Compte Patent discloses a "brake actuating mechanism" for activating a drawworks brake reproduced below. The drawworks brake is similar to band brake systems still utilized today. As described by Le Compte with reference to Figure 15, reproduced below,

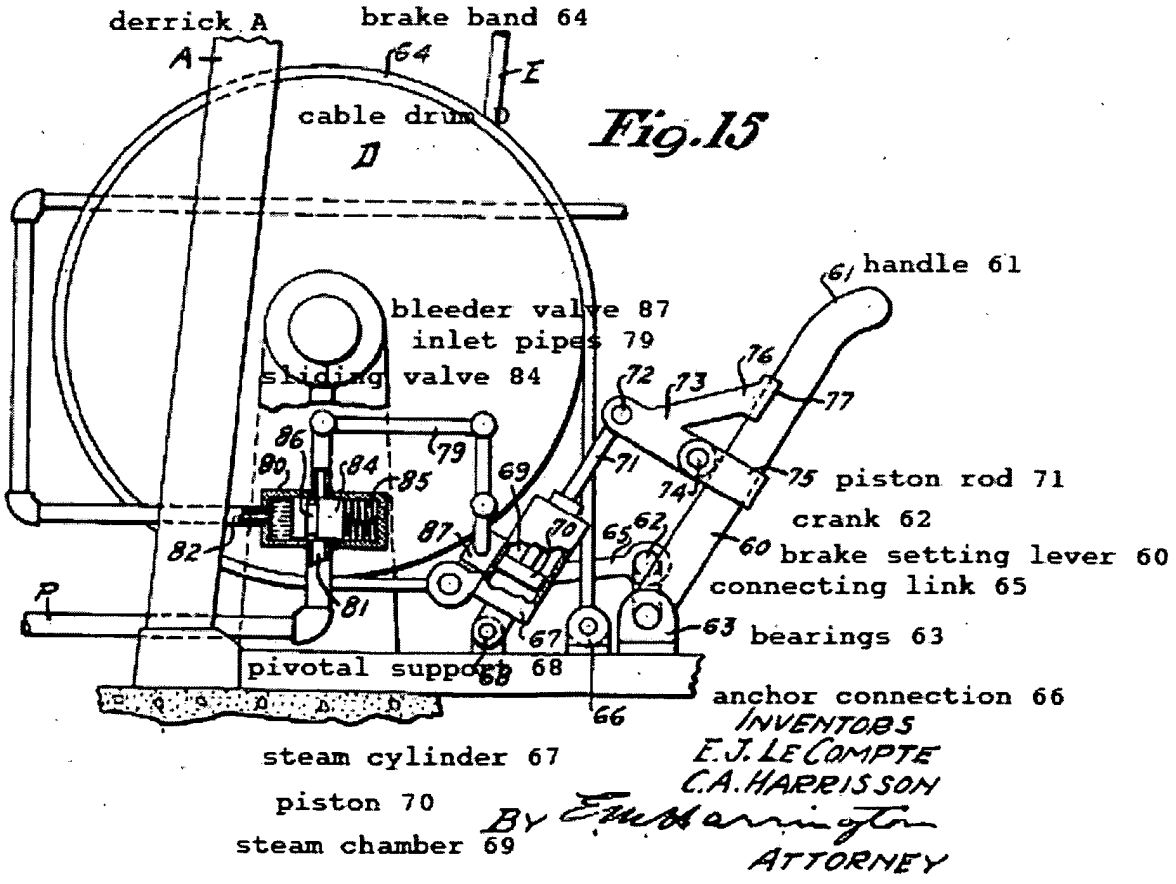
> "the cable drum brake actuating mechanism embodies a brake setting lever 60, which can be manually actuated through the handle 61 ... [t]he brake lever 60 is fixed at its lower end to a rock shaft having a crank 62, which rock shaft is journaled in suitable bearings 63 fixed to the floor of the derrick A. The crank 60 [sic] is connected with the free end of a brake band 64 riding over the cable drum D by means of a connecting link 65. The brake band 64 is fixed at its opposite or forward end to the floor of the derrick A, by means of a suitable anchor connection 66. By this arrangement, the brake band can be brought into braking contact with the cable drum D when so desired with any degree of frictional contact when manually operating the brake lever by manipulating the handle thereof for leading off cable from the cable drum, at any desired speed for lowering upper drill stem section into the well hole bored by the drilling bit." *See* Le Compte, Page 4, Line 128 – Page 5, Line 23.

By this arrangement, when brake handle 61 is lowered vertically towards the rig floor, the crank 62 tightens brake band 64 against drum D (increasing the friction and braking force), which slows down and ultimately stops the rotation of the drum D, decreasing the rate of the letting off of cable E from drum D and, therefore, decreasing the rate of release of the upper drill string or stem.

Conversely, when brake handle 61 is raised vertically away from the rig floor, the crank 62 loosens (slacks off) the brake band 64 around drum D (decreasing the friction and braking force), which starts or speeds up the rotation of the drum D, increasing the rate of the letting off of cable E from drum D and, therefore, increasing the rate of release of the upper drill string or stem.

As described by Le Compte, "if for any reason the mud laden fluid pressure increases from normal, due to the collapsible telescopic action of the drill stem length compensator U, the valve [84] will be opened sufficiently to admit more steam into the steam cylinder [67] for quickly raising the piston [70] therein to move the brake lever 60 to quickly set the brake against the cable drum [D]." *See* Page 5, ll. 64-72. While the written description of Le Compte describes the steam entering the "steam chamber

69" of the "steam cylinder 67," indicated in Figure 15 as the annular space between "piston rod 71" and "steam cylinder 67" above the "piston 70," such a description is illogical and inconsistent with the description of the operation. According to this description of the structure, more steam (i.e., pressure) would enter the "steam chamber 69" through "inlet pipes 79" and "bleeder valve 87" to force "piston 70" and "piston rod 71" to move down towards "pivotal support 68" relative to the "steam cylinder 67" which would, in turn, tend to cause the "brake lever 60" to lift and rotate counter-clockwise and hence slack off on the "brake band 64" with respect to the "drum D." This, however, would actually decrease the frictional force and hence the braking force applied, and increase the rate of release of the upper drill string or stem, which is the opposite of the intended result described by Le Compte. *See* Figure 15 below.



Even if it were assumed that the control system of Figure 15 of Le Compte, can properly be re-drawn to reflect what is described within the written description, the system would still be inoperable. In that event, steam from "inlet pipes 79" and "bleeder valve 87" would not enter "steam chamber 69" above the "piston 70," but instead would enter the "steam cylinder 67" below the "piston 70." Under this assumption, the more steam that entered the cylinder would drive "piston 70" and "piston rod 71" upwardly and to the right to move the "brake lever 60" down and clockwise toward the rig floor to tighten the "brake band 64" around the "drum D" and slow down and stop the release of the upper drill string or stem. The more steam that enters "steam cylinder 67" under "piston 70," the more braking force that is applied, i.e., the "brake lever 60" is moved clockwise to tighten "brake band 64" against drum D. However, while this arrangement might allow for a possible reduction in the rate of release of the upper drill stem, no mechanism is provided for increasing the rate of release.

Nowhere within the Le Compte disclosure is there a structure for admitting steam to either or both sides of the "piston 70" for moving the "piston 70" in opposite directions. Instead, Le Compte's only means of allegedly varying braking action is to allow more or less steam to enter the "steam cylinder 67." *See, e.g.*, Le Compte, p.6 ll. 24-30 ("sliding valve 84 will be further closed to *allow* normal lowering of the upper drill stem section"). Allowing more or less steam to enter "steam cylinder 67," however, cannot actually allow for varying braking action as Le Compte does not disclose, describe or provide any means for removing pressure from the steam cylinder. In other words, once "steam cylinder 67" is filled, Le Compte provides no structure for

further varying the braking action in the direction intended to correspond with admitting more steam to the cylinder, or in the opposite direction intended to correspond with admitting less steam to the same cylinder. Additionally, no structure is disclosed for urging the brake lever 60 in an opposite direction upon the elimination by undisclosed means of steam from either one or both of the two sides of piston 70.

Use of prior art in rejections where operability is a question is typically not appropriate. See, MPEP, §2121.01. The MPEP states, "The disclosure in an assertedly anticipating reference must provide an enabling disclosure of the desired subject matter..." The Le Compte patent is not operable for the purpose it was cited and therefore should not be used.

Moreover, Requester's expert conformed under oath that the Le Compte Patent is different from the '142 Patent. During the jury trial between Patentee NOV and Requester Pason over the '142 Patent, Requester Pason's technical expert was designated as a person having skill in the art of the '142 Patent testified under oath on direct examination (by Pason's counsel) that the Le Compte patent discloses a binary "on/off" type release system substantially similar to the previously considered Varney patent of the 1st Reexamination as follows:

> "Q: You know, we've -- we've heard some reference to another patent we're going to talk about called Varney having sort of an on/off switch.
>
> A: Right.
>
> Q: Is that -- once you move outside the dead band is that --
>
> A: Yeah, what will happen in Le Compte and many of these other older patents is they have kind of an on/off switch nature to them. And so what will happen with Le Compte is when it says, Oh, pressure is too high -- it says, okay, release the drill string, not

release it a little bit, release it a lot, you know, be real careful how you release it, anything like -- it just says release the drill string. And it says, oh, pressure is too high, release the drill string. Oh, pressure is -- pressure is too high hold back on the string; pressure is too low release the string and so it's just an on/off kind of switch.

(*See* Trial Transcript of J. Ford Brett at **Appendix D**, Day 6 p. 1292, ll. 7-22, November 3, 2008).

Moreover, on cross-examination, Requester's designated expert further testified:

Q: You mentioned the Varney patent and you said it was an on/off switch, and you said Le Compte and some of these other ones were on/off switches, correct?

A: Right.

Q: They don't release a little; they either stop the release or start the release.

A: That's right.

Q: It's your understanding that the 142 patent is different from that. It's not a stop or start.

A: I agree, this is different.

(*See* Trial Transcript of J. Ford Brett at **Appendix D**, Day 7, p. 1391, ll. 4-13, November 4, 2008);

Q: Mr. Brett, you lump Le Compte, Dillon, Miller, Garrett, and Varney all together.

A: They all -- I lump them together because they have that similar on/off type nature to them.

Q: They all have the on/off nature, which you just testified is different that the Bowden 142.

A: I agree.

(*See* Trial Transcript of J. Ford Brett at **Appendic D**, Day 7, p. 1392, ll. 8-14, November 4, 2008.

Thus, Le Compte cannot anticipate any claim of the '142 Patent where Pason's representative and designated expert witness admitted under oath that the Le Compte

Patent fails to regulate the release of the drill string, i.e., increase and decrease the rate of release.

For the reasons given above, Patentee respectfully requests withdrawal of the rejection based upon 35 U.S.C. §102(b) and allowance of Claims 1 and 11.

III. The Obviousness Rejection (35 U.S.C. § 103(a))

Claims 1, 5 and 11-15 of the Bowden '142 Patent were rejected as obvious (35 U.S.C. § 103) over Bowden '359 (U.S. Patent No. 3,265,359) in view of Dillon *et al.* (U.S. Patent No. 2,005,889) and Hobhouse (U.S. Patent No. 3,550,697). Patentee NOV respectfully traverses.

A. BOWDEN '359

The Bowden '359 patent was filed in 1957, before directional or horizontal drilling had been commercially developed. The Bowden '359 patent was designed to drill substantially vertical wells based upon changes in WOB alone and nothing more.

The Bowden '359 Patent was issued to J.E. Bowden, the late father of the inventor of Patentee's '142 Patent, Mr. Bobbie Joe Bowden. The Bowden '359 patent teaches a weight-on-bit (WOB) automatic drilling system that controlled the rate-of-release (ROR) in response to changes in changes in WOB. The WOB was measured from the tension in the drilling line or cable via a "diaphragm tension sensor 16 [and 116]" illustrated in Figures 1, 2, 3, 4, 7 and 11. The only other parameter being measured by Bowden '359 is the rate of rotation of the drawworks cable drum which indicates the rate of release of the drill string for feedback of the control system. This feedback is measured by "friction wheel 44" or "pulley 133" and is sometimes referred

to in the art as a drum crawler that is substantially similar to the feedback provided by the "wheel drum rotation sensor 90" of the preferred embodiment of the '142 Patent.

The Patentee's '142 Patent described the Bowden '359 patent in the *Description of the Related Art* section. Additionally, the Ball patent similarly describes the *Weight-on-Bit* type automatic drilling system of the Bowden '359 patent.

B. DILLON

The Patentee's '142 Patent's European Counterpart Application was challenged in view of the Dillon patent (D1) alone and in combination with other previously cited references in the *References Cited* section of the '142 Patent, including Ball, Rogers and Jasinski, in a EPO Opposition proceeding that was filed on July 1, 2003 by Bentec GmbH Drilling Oilfield Systems. *See* EPO Opposition history Attached as **Appendix C**. Like the USPTO concluded with respect to the Varney patent in the 1st Reexamination, the EPO concluded that the Dillon patent similarly failed to disclose an automatic drilling system that can increase or decrease the rate of release. The EPO made the following findings with respect to Dillon in allowing the substantially similar claims in the '142 Patent's European counterpart application:

> "D1 [Dillon] discloses an automatic drilling system responsive to parameters as drilling fluid pressure, weight on bit, drill string torque and drill string rpms. Considering in particular drilling fluid pressure, in the system according to D1 [Dillon] drilling is started with weight on bit, a rate of release of zero (page 3, right column, lines 30-37) and drilling fluid circulated at a given target pressure. A drop in fluid pressure exceeding a given amount causes the drill string to be lowered at a **constant rate** until the target fluid pressure is reestablished, at which moment the rate of release is set again to zero. [emphasis supplied]
>
> The controller of D1 [Dillon] reacts therefore to a drop in fluid pressure by:

- maintaining the drill string vertically stationary if the drop is lower than a given amount, or

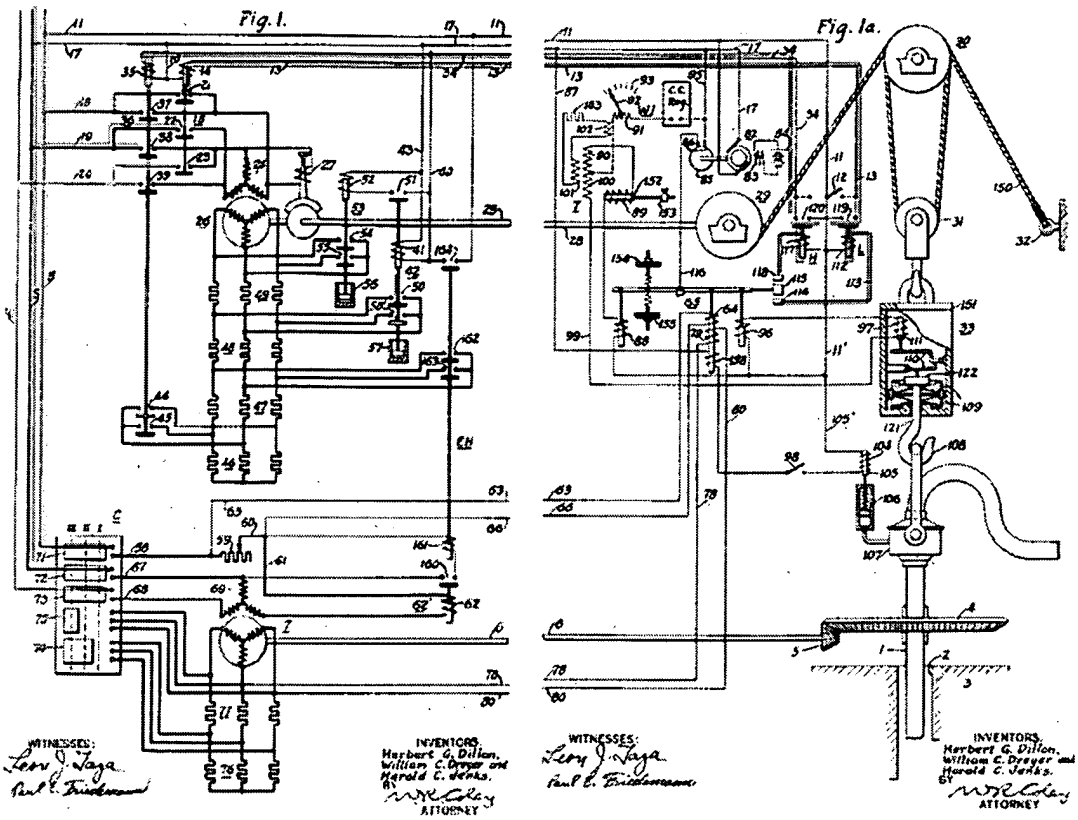
- lowering the drill string at a **given, predetermined** rate if the drop is lower than that amount." (emphasis by EPO Examiner)

(*See* **Appendix C**, p. "NOV 758." See also "NOV387.").

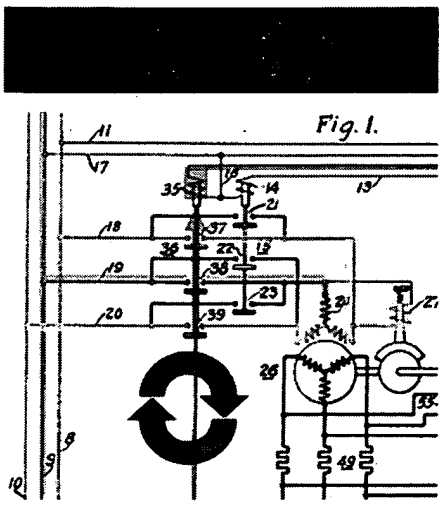
The Dillon patent cannot provide for the increase or decrease of the rate of release of the drill string as explained therein:

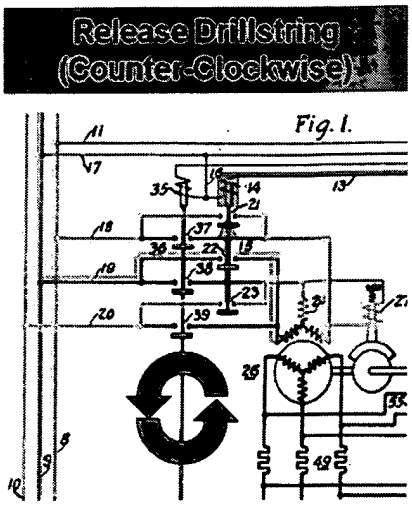
> "To release the hoisting drum 29 for the lowering operation, the brake coil 27 is connected directly across the leads of the primary winding 24 and is thus energized whenever either one of the directional contactors 15 or 36 have operated. With the motor energized, the hoist drum, by virtue of the operation of the brake 27 is released, the operation being effected through the shaft 28. The drill stem 1 is thus lowered as the cable is paid out by the drum 29 and traverses the crown block 30 and the traveling block 31."
>
> (*See* Dillon patent at Requestor's Ex. D, p. 2, Right Column, ll. 49-59)

The manner in which the "directional contactor 15" changes the poles of the "primary winding 24" and hence the direction of "motor 26" is illustrated below:



As shown, the "balancing mechanism 65" is either (1) balanced as shown in Fig. 1a and thus no current is provided to the "winding 24" or "brake 27" thereby holding the drill string static; or (2) unbalanced whereby "directional contactor 15" either completes the circuit with "contact members 114 or 118." If the circuit is completed with "contact member 114" actuating coil 112 of the "lowering relay L" is actuates "coil 14" and hence "contact members 21, 22 and 23" cause "directional contactor 15" to energize "winding 24" to rotate counter-clockwise to release the drill string. Conversely, if the circuit is completed with "contact member 118" actuating coil 117" of the "hoisting relay H" is actuates "coil 35" and hence "contact members 37, 38 and 39" cause "directional contactor 36" to energize "winding 24" to rotate clockwise to release the drill string. The manner in which "directional contactors 15 and 36" changes the poles of the "primary winding 24" and hence the direction of "motor 26" is illustrated below:





Thus, as confirmed by the EPO, the Dillon patent does not regulate the rate of release of the drill string and therefore cannot raise a substantial new question of patentability.

Dillon teaches away from the present invention. Dillon does not consider the pressure to be an "appreciable factor." Particularly, Dillon states:

> Since **the pressure of the fluid in the pumping system is usually not a very appreciable factor**, the operation of this system would more often proceed with the switch **98** in the position shown. In some instances it may even be desirable not to utilize coils **64** and **79,** in which case these coils may be disconnected by switching mechanism not herein shown.

Dillon patent, p.4, Col. 1, ll. 33-40, emphasis added. In 1932, when the Dillon patent was filed, the only technology that existed was vertical drilling technology without mud motors. Thus, any change in pressure was a result of a wash out, a clogged jet nozzle or a ruptured pipe. Therefore, Dillon supports that the presently claimed invention is not obvious and Dillon teaches away from the present claimed invention.

Moreover, during the jury trial between the Patentee and the Requester over the '142 Patent, Requester's designated a person having skill in the art of the '142 Patent as Requester's expert on patent invalidity. This expert was J. Ford Brett, who is also the

co-author of the Brett et al. publication described above, who testified under oath on direct examination (by Requester's counsel) that Dillon discloses a binary "on/off" type release system substantially similar to Varney. Requester's expert testified as follows:

> Q: Mr. Brett, you lump Le Compte, **Dillon**, Miller, Garrett, and **Varney** all together.
>
> A: They all -- I lump them together because **they have that similar on/off type nature to them.**
>
> Q: **They all have the on/off nature**, which you just testified is different that the Bowden 142.
>
> A: I agree.
>
> (*See* Trial Transcript of J. Ford Brett at Appendix D, p. 1392, ll. 8-14, November 4, 2008)(emphasis supplied).

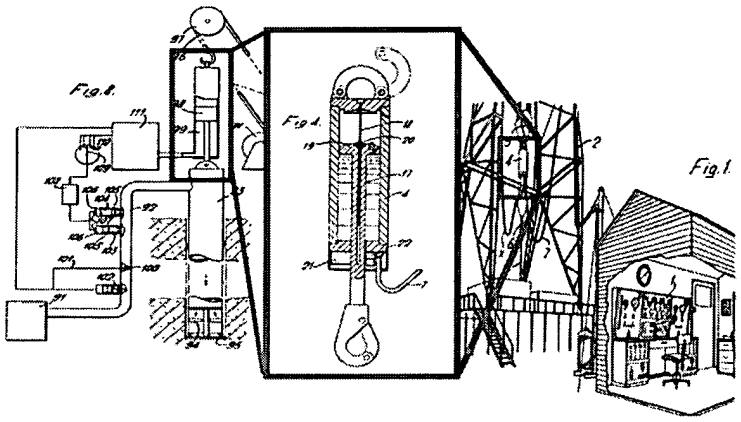
Thus, Dillon cannot raise a substantial new question of patentability. Requester's own expert admitted under oath that the Dillon patent is no more relevant than the Varney patent which the PTO has already confirmed fails to teach the regulation of the release of the drillstring. Further, Dillon is merely cumulative to the prior art previously considered.

C. Hobhouse

The Hobhouse patent was previously considered by the EPO during the examination of the '142 Patent's European counterpart application. *See* EPO File History of Patentee's '142 Patent's counterpart, 2005 Search Report identifying G.B. Patent No. 1,189,644 to Hobhouse whereby the U.S. Patent No. 3,550,697 to Hobhouse claims priority. *See* **Appendix F**.

The Hobhouse patent discloses a hydraulic hoisting system, similar to a conventional snubbing unit that is substantially similar to the previously considered

Rogers patent (U.S. Patent No. 4,165,789), which controls the hoisting and releasing of the drill string as shown in its Figures below:



Further, the specification of Hobhouse specifies the following method or steps be performed by the system when an increase in drilling fluid pressure is detected:

> "The following sequence of control is advantageous upon torque rise in the bit causing an increase in mud-flush pressure in pipe 92 detected by the control device 104, for example due to the drill bit striking a harder strata than previously being drilled:
>
> 1. increase mud-flush flow by opening valve 102;
>
> 2. **stop sinkage** by pressurizing underside of piston 98;
>
> 3. lift weight off bit 95;
>
> 4. stop drilling."
>
> *See* Hobhouse at Requestor's Exhibit E, Col. 8, ll. 37-45 (emphasis supplied).

Conversely, Hobhouse specifies that when the system disclosed detects a decrease in drilling fluid pressure, the following method or steps be performed:

> "The following sequence upon torque fall at the drill bit 95 sensed by a pressure drop detected at control device 103 for example due to the drill breaking through into a softer strata:
>
> 1. **increase sinkage** by releasing pressure beneath piston 98;

2. increase volume of mud-flush flow by opening valve 102;

3. stop drilling."

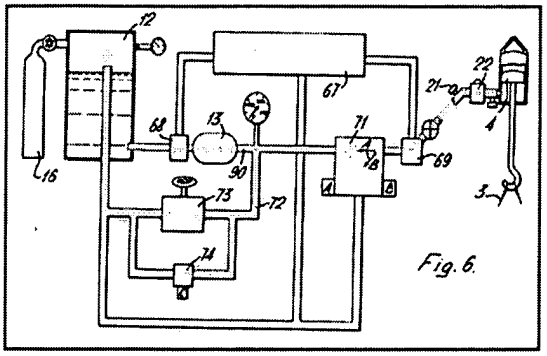
See Hobhouse at Requestor's Exhibit E, Col. 8, ll. 46-51 (emphasis supplied).

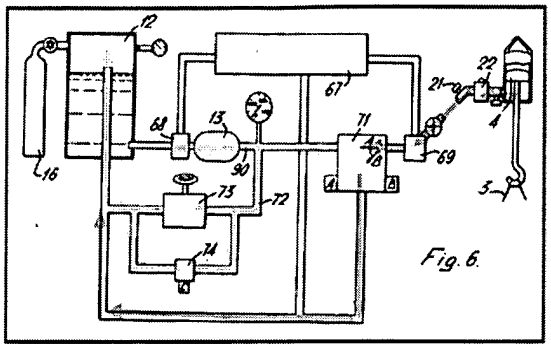
Hobhouse discloses only a single control structure for hoisting and lowering the drill string, which is depicted in Figure 6, reproduced below, and described as follows:

> "As shown in FIG. 6, the hydraulic control circuit is duplicated by a circuit indicated at 67 and two position changeover valves 68 and 69 select whichever is to be used.
>
> "The drive motors for the pumps 13 are also controlled by the changeover valves 68 and 69. The pump 13 of the selected circuit is continually running, at its nominal speed and its outlet 90 connected to a two-way solenoid valve 71, which, in turn, connects it to the hydraulic cylinder 4, when solenoid 71A is energized.
>
> The outlet 90 is also connected to a bypass circuit 72 consisting of a manually adjustable valve 73 to set maximum system pressure, and a normally open solenoid valve 74C which is energized closed at the same time as solenoid valve 71A is energized open.
>
> Therefore, when it is required to raise the piston in the cylinder 4, solenoid 71A and 74C are energized, opening the two-way valve 71 and closing the bypass 72 allowing oil to be pumped into the cylinder 4.
>
> To lower the piston in the cylinder 4, solenoid 71B is operated, and the load on the piston pumps oil through the return ports of the two-way valve 71 and back to the tank 12."
>
> (*See* Hobhouse at Requestor's Exhibit E, Col. 6, l. 66- Col. 7, l. 19).

Thus, in the Hobhouse invention, fluid is pumped under piston of "cylinder 4", via a "continually running" "pump 13" which pumps fluid at a constant system pressure that is set by "valve 73." To lift the cylinder and thus reverse the release of the drill string, "solenoid valve 71" is open to the "A" position to permit the pumping of fluid into "cylinder 4" at a constant pressure and a constant rate.

Hobhouse's description is coded below to show how "two-way valve 71" is controlled by "solenoid 71A" to open "valve 71" between the "pump 13" and "cylinder 4" to hoist the drill string as shown left. Conversely, the "two-way valve 71" is controlled by "solenoid 71B" to open "valve 71" between the "cylinder 4" and "tank 12" to lower the drill string as shown right.





Thus, as shown and described, the system taught by Hobhouse, like that of Varney and Dillon, cannot increase or decrease the rate of release of the drill string. Additionally, while Hobhouse discloses an alternative system for multi-parameter control based upon WOB and/or torque, there is nothing within Hobhouse that suggests the combination of drilling fluid pressure with any other parameter.

More particularly, Hobhouse describes using a WOB technique, or a torque technique, or a combination of WOB and torque technique. However, Hobhouse does not teach combining pressure. Hobhouse does not make the link to use pressure in such a combination. Hobhouse discussing the various techniques without the critical combination is significant evidence of non-obviousness.

D. Secondary Indications of Non-Obviousness

The Federal Circuit has established a number of factors to be considered as a necessary part of a determination of obviousness under 35 U.S.C. § 103. These factors, also known as secondary indications of non-obviousness, include (1) commercial success of products covered by the patent claims; (2) a long-felt, but unresolved need for the solution provided by the claimed invention; (3) unsuccessful attempts by others to find the solution provided by the claimed invention; (4) copying of the claimed invention by others; (5) unexpected and superior results from the claimed invention; (6) acceptance by others of the claimed invention as shown by praise from others in the field of the invention or from the licensing of the claimed invention; (7) disclosures in the prior art that criticize, discredit, or otherwise discourage the claimed invention and would therefore tend to show that the invention was not obvious; and (8) other evidence tending to show non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1(1966); *KSR Int'l Co. v. Teletlex Inc.*, 127 S.Ct. 1727 (2007); *Ruiz v. A B. Chance Co.*, 234 F.3d 654 (Fed. Cit 2000); *Arkie Lures Inc. v. Gene Larew Tackle Inc.*, 119 F.3d 953, 957 (Fed. Cir. 1997); *Specialty Composites v. Cabot Corp.*, 845 F.2d 981, 991 (Fed. Cir. 1988); *Windsurfing Int'l Inc. v. AMF Inc.*, 782 F.2d 995, 1000 (Fed. Cir. 1986); *Pentec. Inc.v. Graphic Controls Corp.*, 776 F.2d 309, 313 (Fed. Cir. 1985).

1. Products Covered by the Claims

The automatic drilling system developed by inventor, Bobbie J. Bowden, is known as the Wildcat drilling system. The Wildcat drilling system is covered by the claims of United States Patent 5,474,142 ('142 Patent). The patent covers an automatic

drilling system that regulates the rate of release of a drill string in response to changes in drilling fluid pressure alone or in combination with changes in weight on bit, drill string torque and/or drill string revolutions per minute. Appendix E-1, 389:9 – 389:13. The invention of Claim 1 contains a pressure sensor, a regulator measuring changes in drilling fluid pressure and outputting a signal, a relay responsive to the output signal of the drilling fluid pressure regulator, and a controller that increases or decreases the rate of release of the drill string in response to the aforementioned signal. All of these features are contained in the Wildcat drilling system. Appendix E-1, 384:8 – 384:23; Appendix E-12, Wildcat services brochure ("Proper use of pump pressure controls (Delta P) has proven to be the superior method of drilling with mud motors."); Appendix E-13, Wildcat services Technical Manual ("Proper use of pump pressure controls (Delta P) has proven to be the superior method of drilling with mud motors.").

The Wildcat drilling system also represents a system that is used to perform all the steps of method claim 11 of the '142 Patent, including measuring drilling fluid pressure, producing a signal in response to changes in drilling fluid pressure, relaying the signal to a drilling string controller and controls the drill string controller to increase or decrease the rate of release of the drill string when the pressure signal represents a decrease or increase in drilling fluid pressure. Appendix E-1, 384:25 – 385:12. Additionally, the Wildcat drilling system may also be used to perform the method of Claim 14, including producing a second signal representing changes in bit weight. Appendix E-1 385:16 – 385:13; also Appendix E-12 and Appendix E-13.

The automatic drilling system produced by Pason Corporation, the Pason AutoDriller, is also covered by the claims of the '142 Patent. Indeed, after a nine-day

jury trial in the United States District Court for the District of Colorado, the Pason AutoDriller was found to infringe claim 1 and to have been used to infringe method claims 11 and 14.

2. Commercial Success of Products Covered by the Patent Claims

Both the Wildcat drilling system and the Pason AutoDriller have been enormously successful and revolutionized the horizontal drilling industry. As described by NOV's expert, who performed a multifaceted analysis of the industry, the increase in the use of the equipment can be characterized as nothing short of "dramatic," since the advent of the Wildcat drilling system and Pason AutoDriller. Appendix E-2, 629:6 – 629:9.

The evidence presented in NOV v. Pason of these products' commercial success was overwhelming. It was determined that the Wildcat drilling system could save anywhere from $20,000 - $100,000 in the cost of drilling a well. Appendix E-3, 204:23 – 205:16. The first distributor of the Wildcat, Drillex, system had a simple sales pitch, "try it... if you like it you keep it." Once the automatic drilling system was used, it was almost never taken down, boasting a 99% success rate. Appendix E-4, 212:21 – 213:17. The growth of the Wildcat drilling system went from a total of 110 units built over a five-year span from 1994 - 1999 to building over a hundred units a year starting in 2000. Appendix E-5, 221:4 – 222:1.

As for the Pason Auto-Driller, it grew from being installed on 35% of Canadian and 6% U.S. land rigs operating with a Pason EDR system in 2004 to being installed on 55% of Canadian and 50% U.S. land rigs operating with a Pason EDR system in 2005.

Additionally, Pason's 2007 annual report boasted "A significant increase in automatic driller revenue of 47%." Appendix E-6, 259:19 – 262:20.

3. Long Felt, but Unresolved Need

The most popular drilling technique in the industry is directional drilling. This is primarily because this technique can be used to drill in the producing zone where the oil and gas is contained, which can result in increased production per well and reduce the number of wells drilled. The ability to drill multiple wells from a single location also reduces the environmental impact caused by the drilling of multiple wells. The downside to horizontal drilling is that it is relatively more complicated and expensive than other drilling techniques. Appendix E-7, 191:2 – 192:10.

Before the invention of the Bowden '142 Patent, there were no effective automatic drilling systems for controlling the rate of release of the drill string during the drilling of a directional or deviated well. In particular, before the '142 invention, there were no automatic drilling systems in the marketplace that controlled the rate of release of a drill string based upon changes in drilling fluid pressure. Appendix E-8, 351:15 – 353:1. The long-felt and increasing need for an effective automatic drilling system in directional wells was evident by the many problems caused by an operator having to attempt to control the rate of release through manual manipulation of a brake handle. As opposed to simply monitoring a machine, a driller would have to stand at a huge lever approximately three to five feet long and physically lift it with his hand and compress it with his body weight to control the brake. If the operator did not perform his job properly, and for example, allowed too much weight on the bit, the well bore

would deviate from its intended path. Additionally, if the brake was not handled correctly the bit could be damaged. If the bit was damaged then the operators would have to make a "trip" to remove all of the pipe down-hole, stick by stick, and then replace the bit and put the pipe all the way back down into the hole. The process of making a trip could take anywhere from a half a day to two days and was very expensive. Appendix E-9, 197:15 – 204:5.

The long-felt need for an automatic drilling system useful for directional drilling was not resolved by the use of weight on bit automatic drillers that at the time were being used successfully in vertical wells. Unlike vertical wells, if weight on bit automatic drillers were used in horizontal wells then at the point the well turned (dog-legged) pipes would start dragging throughout the wall of the hole creating side forces or drag. After this dog-leg, the operator is no longer directly transferring weight on bit. The indirect transfer and drag created by the pipe contacting the walls of the hole made it harder and harder to measure the weight on bit. *Id.*

The Wildcat drilling system provided the solution that the industry had been looking for. It could drill with pump pressure and pump pressure/weight on bit in combination. The problems associated with standard weight on bit operations caused by manual operation and pipe drag were eliminated. Additionally, the Wildcat drilling system allowed operators for the first time in horizontal drilling to be able to drill automatically, ultimately saving the operators a lot of money and time by getting down-hole faster and more efficiently. *Id.*

4. Unsuccessful Attempts by Others to Find the Solution Provided by the Claimed Invention.

Before the invention of the Bowden '142 Patent, there were no effective automatic drilling systems for controlling the rate of release of the drill string during the drilling of a directional or deviated well. In particular, before the '142 Patent, there were no automatic drilling systems in the marketplace that controlled drilling based upon changes in drilling fluid pressure. Appendix E-8, 351:15 – 353:1. The Wildcat Driller was the first to find the solution to the problems associated with traditional weight on bit measuring automatic drillers that could not be used in horizontal wells. The Wildcat eliminated the need for manual operation, as well as the associated problems that came with it, allowing operators to rely on automatic drillers in horizontal wells. Appendix E-9, 203:8 – 203:22.

5. Copying of the Claimed Invention by Others

The Wildcat drilling system was copied by several different companies in the oilfield industry. First, there was a division of what was then known as Varco Company, MD Totco, which developed an automatic driller that was integrated into the rig at the time the rig was built. MD Totco subsequently honored the '142 Patent, without litigation, by paying damages associated with the sale or use of its infringing products. Appendix E-10, 250:16 – 252:18. The invention of the '142 Patent was also copied by a company called Tech Power Controls Company. Tech Power Controls Company entered into an agreed judgment dated September 12, 2001, which stated that Tech Power would pay damages for past products produced and would no longer

manufacture or sell their version of an automatic driller. Appendix E-10, 252:25 – 255:8.

A third company that copied the '142 Patent was IDM Equipment. IDM Equipment entered into a confidential settlement agreement in 2005 admitting that IDM's automatic drilling systems with automatic differential pump pressure control systems infringed one or more claims of the '142 Patent. IDM also agreed to pay a royalty for all infringing products that had been previously produced. Appendix E-10, 255:17 – 258:21. A fourth company was Dick's Oilfield, which also consented to a judgment that it had infringed the claims of the '142 Patent by offering for sale in commerce an automatic drilling system. Appendix E-11, 323:12 – 323:18. Lastly, the fifth company to copy the claimed invention was Pason, through its production of the Pason AutoDriller as found by a jury in NOV v. Pason.

6. Unexpected and Superior Results from the Claimed Invention

The use of the Wildcat drilling system resulted in unexpected and superior results as evidenced by the costs saved from the use of the automatic drilling system and further confirmed by its widespread demand in the industry. Cost savings studies were conducted to determine the extent of the Wildcat drilling system's benefit in actual drilling operations. As noted above, from the monitoring of the performance of the drill and customer input, it was determined that the Wildcat drilling system could save anywhere from $20,000 - $100,000 in cost of drilling a well. Appendix E-3, 204:23 – 205:16.

7. Acceptance by Others of the Claimed Invention as Shown by Praise from Others in the Field of the Invention or From Licensing of the Claimed Invention

Acceptance by others of the claimed invention is shown by the growth in production of the Wildcat drilling system or Pason AutoDriller, or by the licensed use of the product by prominent companies in the industry. The huge growth in production, as well as the fact that after people would rent and use the Wildcat drilling system they were "clambering" to use it again, affirms its widespread acceptance by others. Appendix E-3, 204:17 – 204:22. In fact, once the drill was used it was almost never taken down, boasting a 99% success rate. Appendix E-4, 212:21 – 213:17.

Secondly, the licensing of the invention to several different operators can show acceptance by others. The first of these was a company named Drillex, which was licensed to distribute the product. In exchange, Mr. Bowden the owner of the '142 Patent received a 50% royalty. Appendix E-11, 205:20 – 205:22. In 1998, Baker Hughes, Incorporated bought Drillex and continued to honor the agreement paying Mr. Bowden a 50% royalty per unit sold. Id, 206:17 – 207:7. The invention was later licensed to MD Totco, a Varco company, on September 1, 1999 agreeing to pay a fee of $6,000 per licensed product. After Varco acquired the rights to the '142 Patent in December 2005, Varco entered into a licensing agreement with IDM Equipment stipulating that IDM would pay Varco a royalty of $10,000 per unit. Appendix E-10, 255:17 – 258:12.

8. Conclusion

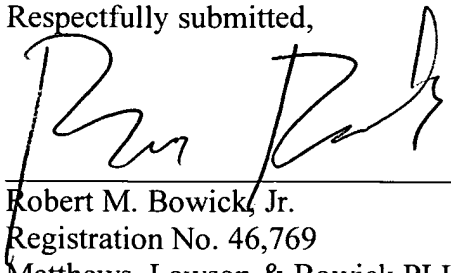
In sum, the '142 Patent is not anticipated and not obvious. The undisputed evidence overwhelmingly establishes the commercial success of the product, the long-felt but unsolved need for a solution provided by the claimed invention, a persistent track record of copying of the invention by others, the unexpected and superior results generated by the invention, and the acceptance by others of the claimed invention by both praise from others in the field and the licensing of the invention. Because these objective factors weigh heavily in favor of non-obviousness, the '142 Patent is patentable and valid in accordance with 35 U.S.C. § 103.

For the reasons given above, Applicant respectfully requests withdrawal of the rejection based upon 35 U.S.C. §103 and allowance of the claims.

IV. SUMMARY

In view of the foregoing, it is respectfully submitted that the claims in the present reexamination are allowable, particularly claims 1, 5 and 11-15. It is believed that this case is now in condition for allowance and such action is respectfully requested.

Respectfully submitted,



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APPENDIX A

Listing of Claims:

Claims 1-15 of U.S. Patent No. 5,474,142 (hereinafter the "'142 Patent") are listed below:

1. (Original) An automatic drilling system for automatically regulating the release of the drill string of a drilling rig during the drilling of a borehole, comprising:

a drilling fluid pressure sensor;

a drilling fluid pressure regulator coupled to said drilling fluid pressure sensor, said drilling fluid pressure regulator measuring changes in drilling fluid pressure and outputting a signal representing those changes;

a relay coupled to said drilling fluid pressure regulator, said relay responsive to the output signal of said drilling fluid pressure regulator to supply a drill string control signal at an output thereof; and

a drill string controller coupled to said relay wherein a decrease in drilling fluid pressure results in said relay supplying a drill string control signal that operates said drill string controller to effect an increase in the rate of release of said drill string and an increase in drilling fluid pressure results in said relay supplying a drill string control signal that operates said drill string controller to effect a decrease in the rate of release of said drill string.

2. (Original) The automatic drilling system according to claim 1, further comprising:

a bit weight sensor;

a bit weight regulator coupled to said bit weight sensor, said bit weight regulator measuring changes in bit weight and outputting a signal representing those changes;

a relay coupled to said bit weight regulator, said relay responsive to the output signal of said bit weight regulator to supply a drill string control signal at an output thereof; and

said drill string controller coupled to said relay wherein a decrease in bit weight results in said relay supplying a drill string control signal that operates said drill string controller to effect an increase in the rate of release of said drill string and an increase in bit weight results in said relay supplying a drill string control signal that operates said drill string controller to effect a decrease in the rate of release of said drill string.

3. (Original) The automatic drilling system according to claim 1 further comprising:

a drill string torque sensor;

a drill string torque regulator coupled to said drill string torque sensor, said drill string torque regulator measuring changes in drill string torque and outputting a signal representing those changes;

a relay coupled to said drill string torque regulator, said relay responsive to the output signal of said drill string torque regulator to supply a drill string control signal at an output thereof; and

a drill strings controller coupled to said relay wherein a decrease in drill string torque results in said relay supplying a drill strings control signal that operates said drill strings controller to effect an increase in the rate of release of said drill string and an increase in drill string torque results in said relay supplying a drill strings control signal that operates said drill strings controller to effect a decrease in the rate of release of said drill string.

4. (Original) The automatic drilling system according to claim 1 further comprising:

a drill string RPM sensor;

a drill string RPM regulator coupled to said drill string RPM sensor, said drill string RPM regulator measuring changes in drill string RPM and outputting a signal representing those changes;

a relay coupled to said drill string RPM regulator, said relay responsive to the output signal of said drill string RPM regulator to supply a drill strings control signal at an output thereof; and

a drill strings controller coupled to said relay wherein an increase in drill string RPM results in said relay supplying a drill strings control signal that operates said drill strings controller to effect an increase in the rate of release of said drill string and a decrease in drill string RPM results in said relay supplying a drill strings control signal that operates said drill strings controller to effect a decrease in the rate of release of said drill string.

5. (Original) The automatic drilling system according to claim 1 wherein said drilling fluid pressure regulator, comprises:

a Bourdon tube coupled to said drilling fluid pressure sensor to measure changes in drilling fluid pressure;

a flapper coupled at one end to said Bourdon tube wherein said flapper pivots about a pivot point in response to changes in drilling fluid pressure measured by said Bourdon tube; and

means responsive to the pivoting of said flapper for outputting to said relay a signal representative of changes in drilling fluid pressure.

6. (Original) The automatic drilling system according to claim 2 wherein said bit weight regulator, comprises:

a Bourdon tube coupled to said bit weight sensor to measure changes in bit weight;

a flapper coupled at one end to said Bourdon tube wherein said flapper pivots about a pivot point in response to changes in bit weight measured by said Bourdon tube; and

means responsive to the pivoting of said flapper for outputting a signal to said relay representative of changes in bit weight.

7. (Original) The automatic drilling system according to claim 3 wherein said drill string torque regulator, comprises:

a Bourdon tube coupled to said drill string torque sensor to measure changes in drill string torque;

a flapper coupled at one end to said Bourdon tube wherein said flapper pivots about a pivot point in response to changes in drill string torque measured by said Bourdon tube; and

means responsive to the pivoting of said flapper for outputting a signal to said relay representative of changes in drill string torque.

8. (Original) The automatic drilling system according to claim 4 wherein said drill string RPM regulator, comprises:

a Bourdon tube coupled to said drill string RPM sensor to measure changes in drill string RPM;

a flapper coupled at one end to said Bourdon tube wherein said flapper pivots about a pivot point in response to changes in drill string RPM measured by said Bourdon tube; and

means responsive to the pivoting of said flapper for outputting a signal to said relay representative of changes in drill string RPM.

9. (Original) An automatic drilling system for automatically regulating the releasing of the drill string of a drilling rig during the drilling of a borehole, comprising:

a drilling fluid pressure sensor;

a bit weight sensor;

a drilling fluid pressure regulator responsive to changes in drilling fluid pressure for outputting a signal representative of those changes;

a bit weight regulator responsive to changes in bit weight for outputting a signal representative of those changes;

a first relay connected to said drilling fluid pressure regulator, said first relay responsive to the output signal of said drilling fluid pressure regulator to supply a first drill string control signal at an output thereof;

a second relay connected to said bit weight regulator, said first relay responsive to the output signal of said bit weight regulator to supply a second drill string control signal at an output thereof;

a relay selector connected to said first and second relay to select any one of said first drill string control signal, said second drill string control signal, and both of said first and second drill string control signals to control the release of said drill string; and

a drill string controller coupled to said first and second relays wherein when said first drill string control signal represents a decrease in drilling fluid pressure, said drill string controller increases the rate of release of said drill string and when said first drill string control signal represents an increase in drilling fluid pressure, said drill string controller increases the rate of release of said drill string, and further wherein when said second drill string control signal represents a decrease in bit weight, said drill string controller decreases the rate of release of said drill string and when said second drill string control signal represents an increase in bit weight, said drill string controller decreases the rate of release of said drill string.

10. (Original) The automatic drilling system according to claim 9, further comprising:

a drill string torque sensor;

a drill string RPM sensor;

a drill string torque regulator responsive to changes in drill string torque for outputting a signal representative of those changes;

a drill string RPM regulator responsive to changes in drill string RPM for outputting a signal representative of those changes;

a third relay connected to said drill string torque regulator, said third relay responsive to the output signal of said drill string torque regulator to supply a third drill string control signal at an output thereof;

a fourth relay connected to said drill string RPM regulator, said fourth relay responsive to the output signal of said drill string RPM regulator to supply a fourth drill string control signal at an output thereof;

said relay selector further connected to said third and fourth relays to select any one of said first, second, third, and fourth drill string control signals, a combination of said first, second, third, and fourth drill string control signals, and all of said first, second, third, and fourth drill string control signals to control the release of said drill string; and

said drill string controller coupled to said third and fourth relays wherein when said third drill string control signal represents a decrease in drill string torque, said drill string controller increases the rate of release of said drill string and when said third drill string control signal represents an increase in drill string torque, said drill string controller decreases the rate of release of said drill string, and further wherein when said fourth drill string control signal represents a increase in drill string RPM, said drill string controller increases the rate of release of said drill string and when said fourth drill string control signal represents a decrease in drill string RPM, said drill string controller decreases the rate of release of said drill string.

11. (Original) A method for automatically regulating the release of the drill string of a drilling rig drill, comprising the steps of:

measuring drilling fluid pressure;

producing a signal in response to changes in drilling fluid pressure, said signal representing the changes in drilling fluid pressure;

relaying said signal to a drill string controller; and

controlling said drill string controller to increase the rate of release of said drill string when said signal represents a decrease in drilling fluid pressure and to decrease the rate of release of said drill string when said signal represents an increase in drilling fluid pressure.

12. (Original) The method according to claim 11 further comprising the steps of:

measuring drill string torque;

producing a signal in response to changes in drill string torque, said signal representing the changes in drill string torque; and

relaying said signal to a drill string controller;

controlling said drill string controller to increase the rate of release of said drill string when said signal represents a decrease in drill string torque and to decrease the rate of release of said drill string when said signal represents an increase in drill string torque.

13. (Original) The method according to claim 11 further comprising the steps of:

measuring drill string RPM;

producing a signal in response to changes in drill string RPM, said signal representing the changes in drill string RPM;

relaying said signal to a drill string controller; and

controlling said drill string controller to increase the rate of release of said drill string when said signal represents a increase in drill string RPM and to decrease the rate of release of said drill string when said signal represents an decrease in drill string RPM.

14. (Original) A method for automatically regulating the release of the drill string of a drilling rig drill, comprising the steps of:

measuring drilling fluid pressure and bit weight;

producing a first signal in response to changes in drilling fluid pressure, said first signal representing the changes in drilling fluid pressure;

producing a second signal in response to changes in bit weight, said second signal representing the changes in bit weight;

selecting any one of said first signal, said second signal, and both said first and said second signals to control the release of said drill string; and

relaying said selected signal or signals to a drill string controller which regulates the release said drill string in response to said selected signal or signals.

15. (Original) The method according to claim 14, further comprising the steps of:

measuring drill string torque and drill string RPM

producing a third signal in response to changes in drill string torque, wherein said third signal represents the changes in drill string torque;

producing a fourth signal in response to changes in drill string RPM, wherein said fourth signal represents the changes in drill string RPM;

selecting any one of said first, second, third, and fourth signals, a combination of said first, second, third, and fourth signals, and all of said first, second, third, and fourth signals to regulate the release of said drill string; and

relaying said selected signal or signals to a drill string controller which regulates the release said drill string in response to said selected signal or signals.

APPENDIX B

I. EXAMINATION HISTORY

As the Examiner is well aware, this is at least the fourth time that the claims of the '142 patent have been examined for conditions for patentability, but in all cases the claims have been found valid over virtually the identical prior art.

1st Examination: The original prosecution (April 19, 1993 - December 12, 1995) whereby the USPTO Examiner allowed the claims as satisfying all conditions for patentability, i.e., valid.

2ndExamination: The 1st Ex Parte Reexamination proceeding initiated by Requestor Pason (January 26, 2004 – July 4, 2006) whereby the USPTO special examining unit found the claims valid.

3rd Examination: The patent infringement litigation and trial between the Applicant NOV and Requestor Pason (December 22, 2003 – April 30, 2009). The Applicant, National Oilwell Varco, L.P. and the Requestor Pason Systems USA Corp. have been involved in a heated patent infringement lawsuit since December 2003, whereby Requestor was found to have willfully infringed claims 1, 11 and 14 of Patentee's U.S. Patent No. 5,474,142 (the '142 patent) and that these claims were valid.

During the litigation between NOV and Pason the District Court interpreted the terms of claims 1, 11 and 14 as contained in the jury instructions attached as Appendix C.

In Addition, the claims have also been examined in the other litigation involving the '142 Patent as set out below.

(1) Cause No. 5:98-cv-01174

Bowden v. Dick's Oilfield
In the U.S. District Court for the Western District of Texas, San Antonio Division.
Filed: December 22, 1998
Settled: April 22, 1999

(2) **Cause No. 5:99-cv-00607**
Bowden v. Martin-Decker Totco, et al.
In the U.S. District Court for the Western District of Texas, San Antonio Division.
Filed: June 10, 1999
Settled: September 24, 1999

(3) **Cause No. 99-cv-1336** ***Bowden v. Tech Power Controls, et al.***
In the U.S. District Court for the Western District of Texas, San Antonio Division.
Filed: November 18, 1999
Transferred: January 19, 2000 to

Cause No. H-00-0271
Bowden v. Tech Power Controls, et al.
In the U.S. District Court for the Southern District of Texas, Houston Division.
Settled: September 24, 2001

(4) **Cause No. 1:03-cv-02579**
National Oilwell Varco, L.P. v. Pason Systems USA Corp.
In the U.S. District Court for the District of Colorado
Filed: December 22, 2003
Verdict: November 6, 2008
Judgment: April 30, 2009, vacated on other grounds
Appeal: May 22, 2009, dismissed as improper Rule 54 Final Judgment
Status: District Court stayed further proceedings pending this Reexamination

(5) **Cause No. 05-0767**
Varco, L.P. v. IDM Equipment Co.,
In the U.S. District Court for the Southern District of Texas, Houston Division.
Filed: March 9, 2005
Settled: December 3, 2005

Furthermore, the '142 Patent is currently been asserted against another infringer in the following case:

(6) **Cause No. 09-00085**
National Oilwell Varco, L.P. v. Auto-Dril, Inc.,
In the U.S. District Court for the Eastern District of Texas, Texarkana Division.

Filed: June 12, 2009

Status: Defendant's Motion to Stay for Reexamination filed on November 20, 2009 was denied on January 6, 2010.

Moreover, the counterpart Canadian Patent to the '142 Patent is presently being asserted against Requestor's parent company, Pason Systems Corp. for infringement in Canada.

Further, the counterpart European Patent to the '142 Patent was challenged in an EPO Opposition proceeding by Bentec GhMB. *See* EPO Opposition Proceeding history attached hereto as Appendix D.

II. LITIGATION BETWEEN THE APPLICANT AND REQUESTOR

The following timeline of events highlight the events leading up to this 2nd Reexamination Request by Requestor:

October 2003	Pason begins importing its infringing AutoDriller product into the United States.
December 22, 2003	Suit was filed in the United States District Court for the District of Colorado as Civil Action No. 03-M-2579 along with a motion for preliminary injunction. In these initial pleadings, the NOV disclosed the following prior art which it had discovered as part of its pre-filing investigation: (1) U.S. Patent No. 2,005,889 to Dillon; (2) U.S. Publication SPE Article to Brett; (3) G.B. Patent No. 1,189,644 to Hobhouse;
January 26, 2004	Pason applied for a 1st Reexamination of the '142 patent as anticipated (35 U.S.C. § 102) in view U.S. Patent No. 3,223,183 to Varney, and obvious (35 U.S.C. § 103) in view of "Varney and further with the teachings of Varney in view of the prior art cited during prosecution of the Bowden patent."
April 15, 2004	USPTO Grant's Pason's request, agreeing that "consideration of Varney raises a substantial new question of patentability as to claims 1 and 11 of the Bowden patent."

April 30, 2004	Pason requested the District Court to stay litigation pending the outcome of the 1st Reexamination. Litigation is stayed in part due to reexamination.
June 2004	Pason was aware of all of the prior art included in this 2nd Request for Reexamination based upon the discovery conducted in the litigation prior to June 2004.
August 20, 2004	Pason files 1st Reexamination Reply under 37 CFR § 1.535, requesting reexamination of Claim 14 in addition to claims 1 and 11.
November 23, 2005	USPTO Confirms Patentability of all claims of the '142 Patent and Issues Notice of Intent to Issue Ex Parte Reexamination Certificate
February 1, 2006	The Court of Appeals for the Federal Circuit reverses the District Court's overly narrow claim construction and remands the case for further proceedings. *See Varco, L.P. v. Pason Sys. USA Corp.*, 436 F.3d 1368 (Fed.Cir. 2006)
July 4, 2006	USPTO Issues 1st Ex Parte Reexamination Certificate
Oct. 27, 2008	Commencement of a Jury Trial before Judge Richard P. Matsch in the United States District Court for the District of Colorado. Pason asserted and provided expert testimony that the claims of the '142 Patent were anticipated or otherwise obvious in view of all of the prior art cited in Pason's 2nd Request for Ex Parte Reexamination
November 6, 2008	A unanimous 12 person jury entered a verdict in favor of NOV finding that: (1) Pason infringed claims 1, 11 and 14 of the '142 Patent (35 U.S.C. § 271); (2) Pason's infringement was willful (35 U.S.C. § 284);

(3) Awarded NOV damages in the form of lost profits of $14,320,283 "to end of today.";

(4) Requestor failed to prove by clear and convincing evidence that the claims of the '142 Patent were invalid.

April 30, 2009 — District Court enters the jury's November 6, 2008 verdict as a Final Judgment. The Court further denied Pason's Motions for New Trial, Pason's Motion for Judgment Not Withstand the Verdict (JNOV), and NOV's Motion for Enhanced Damages. The District Court reserved judgment on Pason's bifurcated, equitable Defense of Inequitable Conduct and the NOV's Motion for Permanent Injunction (35 U.S.C. § 283)

See National Oilwell Varco, L.P. v. Pason Sys USA Corp., 2009 WL 1193263 (Fed.Cir. Apr. 30, 2009)

May 22, 2009 — Pason files its Notice of Appeal with the Court of Appeals for the Federal Circuit appealing the District Court's Final Judgment.

July 24, 2009 — Pason files its 2nd Ex Parte Reexamination Request

August 21, 2009 — USPTO grant's Pason's 2nd Ex Parte Reexamination Request

September 1, 2009 — Court of Appeals for the Federal Circuit dismisses the Appeal because the District Court's Final Judgment was an improper F.R.C.P. 54 Final Judgment because unresolved issues remained including inequitable conduct and permanent injunction. The District Court therefore vacated its Final Judgment.

See National Oilwell Varco, L.P. v. Pason Sys. USA Corp., 2009 WL 2903595 (Fed.Cir. Sept. 1, 2009)

November 12, 2009 — The District Court stays all further proceedings pending the outcome of the 2nd Ex Parte Reexamination

III. Summary of the Prior Examination of the '142 Patent

A. The Prior Art Considered During the Original Prosecution and 1st Reexamination

The Applicant incorporates the above description of the prior art described in the *Description of the Related Art* of the '142 Patent, Col. 1, ll. 14-55.

These described *Weight-on-Bit* type automatic drilling systems include the systems disclosed in the Bowden '359 patent cited in the Requestor's 2nd Ex Parte Reexamination Request. Similar *Weight-on-Bit* automatic drillers were also cited and considered by the PTO Examiner during the original prosecution of the '142 Patent including U.S. Patent 4,662,608 to Ball; and U.S. Patent 4,793,421 to Jasinski. Additionally, the previously considered Publication to Gatlin describes how multiple drilling parameters, i.e., WOB, drilling fluid pressure, RPM and torque, are interrelated and how drilling conditions affect one or more of these parameters.

The invention of the '142 Patent was distinguished from these *Weight-on-Bit* automatic drillers in numerous ways including the advantages over this prior art as best explained in the written description of the '142 Patent:

> "Although bit weight automatic drillers function adequately for completely vertical boreholes, they cease to operate properly for any type of directional or horizontal drilling operations. Specifically, once the borehole deviates from vertical, the weight indicator, which typically mounts to the drill string cable, no longer measures direct drill string weight but, instead, measures the drill string weight at an angle. As a result, the weight indicator supplies to the automatic driller an erroneous reading of the actual drill string weight on the drill bit. Consequently, the automatic driller will fail to properly control the cable drum brake to release the drill string cable. The drilling operation, therefore, does not operate at an optimal efficiency which reduces the likelihood of successfully completing the borehole as well as increasing the cost of the

entire operation.

Accordingly, a need exists for an automatic driller that not only operates through bit weight measurements but also operates in response to other measurements so that directional or horizontal boreholes may be drilled."

(*See* '142 Patent, Col. 1, ll. 36-55)

Also, during the original prosecution, the PTO Examiner combined the teachings of many *Weight-on-Bit* automatic drilling systems as well as multi-parameter systems and initially rejected then claims 1-11 as obvious:

> "under 35 U.S.C. § 103 as being unpatentable over Ball in view of Rogers and Gatlin publication. Ball discloses an automatic drilling control system which comprises an electronic drum brake control system in response to the bit weight variations (Fig. 3). Ball basically teaches the same principle of controlling the rate of drill string release as being recited in applicant's respective claims with the exception of the drilling fluid pressure sensor, the torque sensor and the rpm sensor. Inclusions of such sensors, in the examiner's opinion, is well within the scope of general engineering design considerations, in that it is well known to one of the ordinary skill in the art of drilling, the drilling fluid pressure, the drilling rpm and the drilling torque are among the important factor which affect the penetration rate and such has long been taught in the general publication such as Gatlin's Petroleum Engineering. To illustrate such inclusion, Rogers discloses a drilling optimization control system (Figs 1-3) which comprises a computer control system for optimizing the penetration rate. In which the drilling rpm and the thrust (or bit weight) are monitored and manipulated by the computer to achieve the optimal penetration conditions (Col. 4, lines 16+). It is therefore obvious to one of the ordinary skill in the art to have modified Ball's automatic drilling control system by including rpm sensor as been taught by Rogers and further including the pumping pressure and the drilling torque sensors into the control system so that more drilling parameters can be monitored and the penetration rate can be more effective controlled as such has been clearly taught in Gatlin publication."
>
> *See* March 11, 1994 Non-Final Office Action, NOV Trial Exhibit 2, pp. "WS 126-27", ¶5.

In its Final Office Action during the original prosecution, the PTO Examiner concluded:

> "Regarding the base of claim rejections based on the combination of Ball, Rogers and Gatlin; examiner believes that he has established sufficient grounds supporting a prima facie case of obviousness, specifically Ball and Rogers disclose the techniques of automatic drilling control based limited parameters while Gatlin teaches the importance of a more comprehensive drilling optimization approach which basically provides the theoretical background and the motivation of including a broader drilling factors into the automatic drilling system taught in Ball and Rogers."
>
> *See* Original Prosecution History at Appendix F, August 8, 1994 Final Office Action, NOV Trial Ex. 2, p. "WS 141-42"

Additionally, during the original prosecution, the PTO Examiner considered prior art utilizing mud pulse telemetry for transmitting a signal representing a downhole parameter (e.g., RMP) to the surface for controlling the release of the drill string including as U.S. Patent No. 4,491,186 to Alder. *See* '142 Patent, *References Cited* section.

Thus, during the original prosecution, the PTO Examiner previously considered prior art including weight-in-bit automatic drillers (i.e., Ball); multi-parameter automatic drillers (i.e., Rogers; Jasinski; and Frink et al.); the importance of measuring drilling fluid pressure and what it represents (i.e., Gatlin; Gray, Jr. et al.); and mud-pulse telemetry automatic drillers (i.e., Alder).

The Applicant successfully traversed the Examiner's rejections by pointing out that the claims of the '142 Patent were novel and that the Examiner's combination of prior art teachings was in fact non-obvious. The '142 Patent issued on December 12, 1995.

B. The Prior Art Considered During the 1st Reexamination

On January 26, 2004, Requestor filed a first reexamination asserting that claims 1 and 11 of the '142 Patent were anticipated under 35 U.S.C. § 102 by Varney and obvious under 35 U.S.C. § 103 by Varney alone or in combination with the prior art of record during the original prosecution as set out above. *See* 1st Reexamination ("Claims 1 and 11 of the Bowden patent are considered to be unpatentable under 35 U.S.C. § 103 in view of the prior art patent document to Varney and further with the teachings of Varney in view of the prior art cited during prosecution of the Bowden patent [i.e., Ball].") Claim 14 was later added to this request via Requestor's Reply pursuant to 37 C.F.R. § 1.535 filed on August 9, 2004.

It the PTO's April 15, 2004 Order Granting Request for Ex Parte Reexamination, the PTO Examiner "agreed that consideration of Varney raises a substantial new question of patentability as to claims 1 and 11 of the Bowden patent" because "[t]he use of drilling fluid pressure to control the release of the drill string was not present in the examination of the original patent" and "Varney teaches the use of drilling fluid pressure to control the release of the drill string." *See* PTO 4-15-04 Order.

In Patentee's Statement under 37 CFR § 1.530(B) filed on June 8, 2004, the Patentee pointed out that Varney failed to disclose the regulation of the release of the drill string--that is affecting an increase or decrease in the rate of release of the drill string.

The PTO agreed with the Patentee and provided the following *Statement for Reasons for Patentability and/or Confirmation*:

> "the prior art of record, including Varney, US Patent 3,223,183, fail to show or suggest an automatic drilling system having drill string wherein a decrease in drilling fluid pressure results in a relay supplying a drill string control signal that operates a drill string controller to effect an **'increase in the rate of release'** or said drill string and an increase in drilling fluid pressure results in said relay supplying a drill string control signal that operates said drill string controller to effect a **'decrease in the rate of release'** of said drill string. While Varney shows drill string control based upon drilling fluid pressure that relaxes and tightens the drill string. Varney does not teach or suggest effecting an **'increase in the rate of release' and a 'decrease in the rate of release'** ..." (emphasis supplied)
>
> *See* PTO's November 23, 2005 Notice of Intent to Issue Ex Parte Reexamination Certificate.

Thus, the PTO has determined that the claims of the '142 Patent were distinguishable over Varney alone and in combination of the prior art of record during the original prosecution based upon the fact that Varney failed to teach or disclose affecting an increase or decrease in the rate of release, i.e., regulating the release of the drill string.

C. The PTO Has Previously Considered And Discussed The Most Relevant Prior Art

As explained above, the PTO has already considered and examined the patentability of the claims of the '142 Patent in view of the proposed combination of Weight-on-Bit automatic drillers as well as drilling fluid pressure activated automatic drillers as set forth in the chart below:

CATEGORY	PRIOR ART	Control the Rate of Release?	Parameter(s) Measure
Weight-On-Bit Automatic Drilling Systems	Bowden '359	Yes	WOB
	Ball	Yes	WOB
Hydraulic Hoisting Automatic Drilling Systems	Rogers	No	WOB & RPM
Telescoping Joint Automatic Drilling Systems	Varney	No	Drilling Fluid Pressure
WOB, RPM, Torque & Drilling Fluid Pressure All Important Factors in Drilling	Gatlin	No	WOB, RPM, Torque & Drilling Fluid Pressure

Additionally during the litigation with Requestor, Requestor's patent counsel testified that the previously considered Varney patent was the most relevant prior art to the '142 Patent, more significant than the prior art now presented. *See* September 8, 2006 Deposition Testimony of Requestor's Patent Counsel Terry Leier, who acted as Requestor's Agent during the 1st Reexamination:

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Q. (BY MR. BOWICK) So why were you so concerned with Varney?
A. Because it anticipates claims 1 and 11.
Q. More so than any other reference?

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A. Very clearly.

Q. Is Varney more relevant than the art listed in any of your prior opinions?
A. To claims 1 and 11, I think that Varney is the most relevant.

See Testimony, Sept. 8, 2006, pages 46 & 47, Attached as Appendix E.

Also, as set out below in the *Newly Cited Prior Art* section, the prior art relied upon by the Examiner in granting the Ex Parte Reexamination can be generally broken down into the following categories and whether the reference controls the *rate of release* and what parameters are measured.

CATEGORY	PRIOR ART	Control the Rate of Release?	Parameter(s) Measured
Weight-On-Bit Automatic Drilling Systems	**Bowden '359**	**Yes**	WOB
	Ball	**Yes**	WOB
Telescoping Joint Automatic Drilling Systems	**Varney**	**No**	Drilling Fluid Pressure
	Le Compte, et al.	**No**	Drilling Fluid Pressure
Hydraulic Hoisting Automatic Drilling Systems	**Rogers**	**No**	WOB & RPM
	Brett et al.	**No**	WOB, RPM, Torque **OR** Pressure
	Hobhouse	**No**	Drilling Fluid Pressure
Motorized Hoisting and Lowering System	Dillon	**No**	WOB, RPM, Torque & Pressure
WOB, RPM, Torque & Drilling Fluid Pressure All Important Factors in Drilling	**Gatlin**	**No**	WOB, RPM, Torque & Drilling Fluid Pressure

The previously considered references are highlighted above to show the teachings already considered and discussed during the prior prosecution of Patentee's '142 Patent. Comparing the previously considered references to the newly cited prior art clearly shows that the newly cited prior art is merely cumulative to the prior art previously considered and discussed on the record during the prosecution of the '142 Patent. Therefore, the newly cited prior art cannot raise a substantial new question of patentability.

Each of the newly cited prior art references is analyzed and discussed below in detail in explaining how they are cumulative to the art previously considered.