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(54) SUBSURFACE TAGGING SYSTEM WITH WIRED TUBULARS

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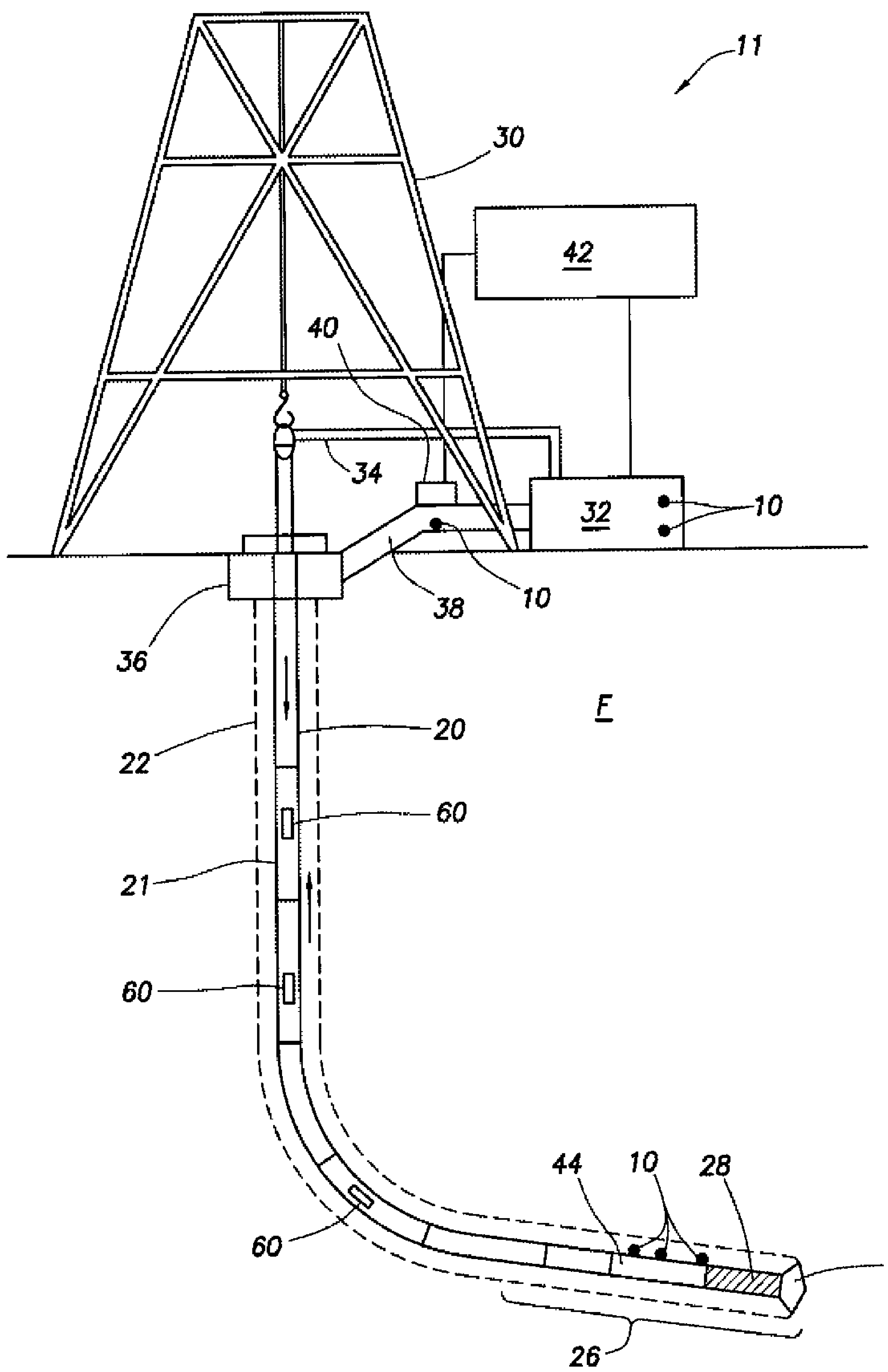
(57) **ABSTRACT**

Downhole systems and methods including tags configured to provide distinguishable identifiers are set for selective release to a subsurface location. Sources/sensors in the wellbore are activated to detect the tags at a subsurface location, and signal data associated with the detected tags is conveyed to the surface.



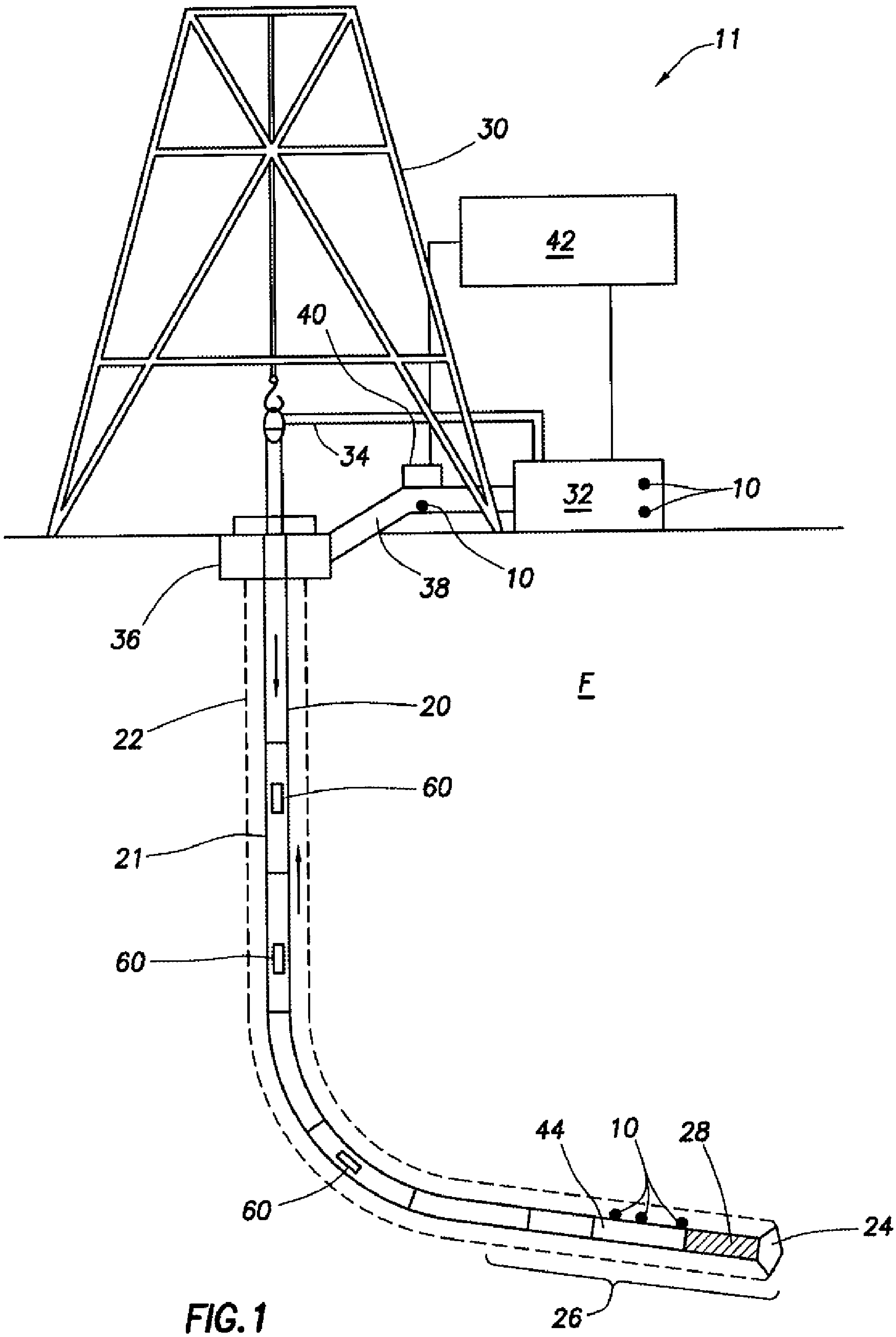


FIG. 1

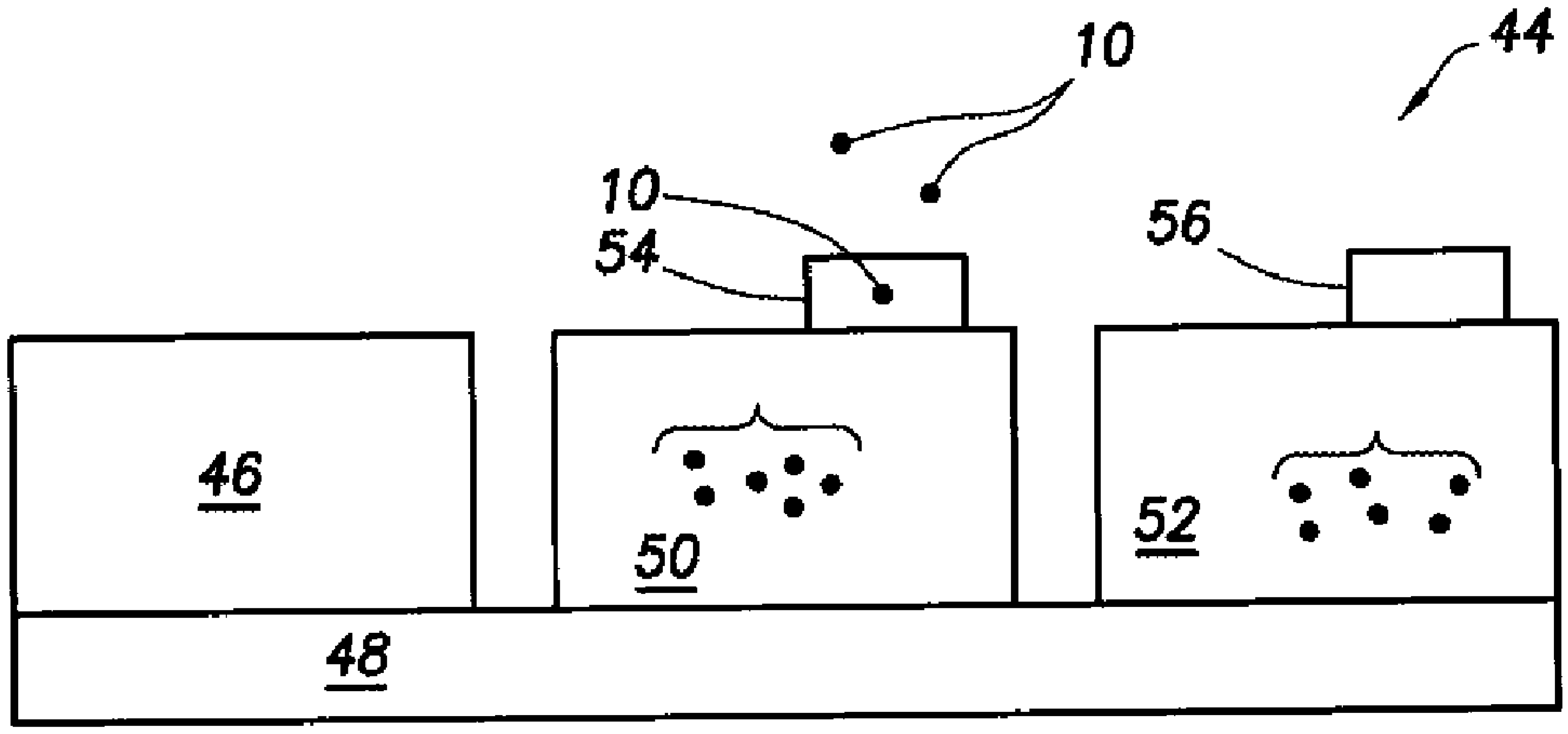


FIG.2

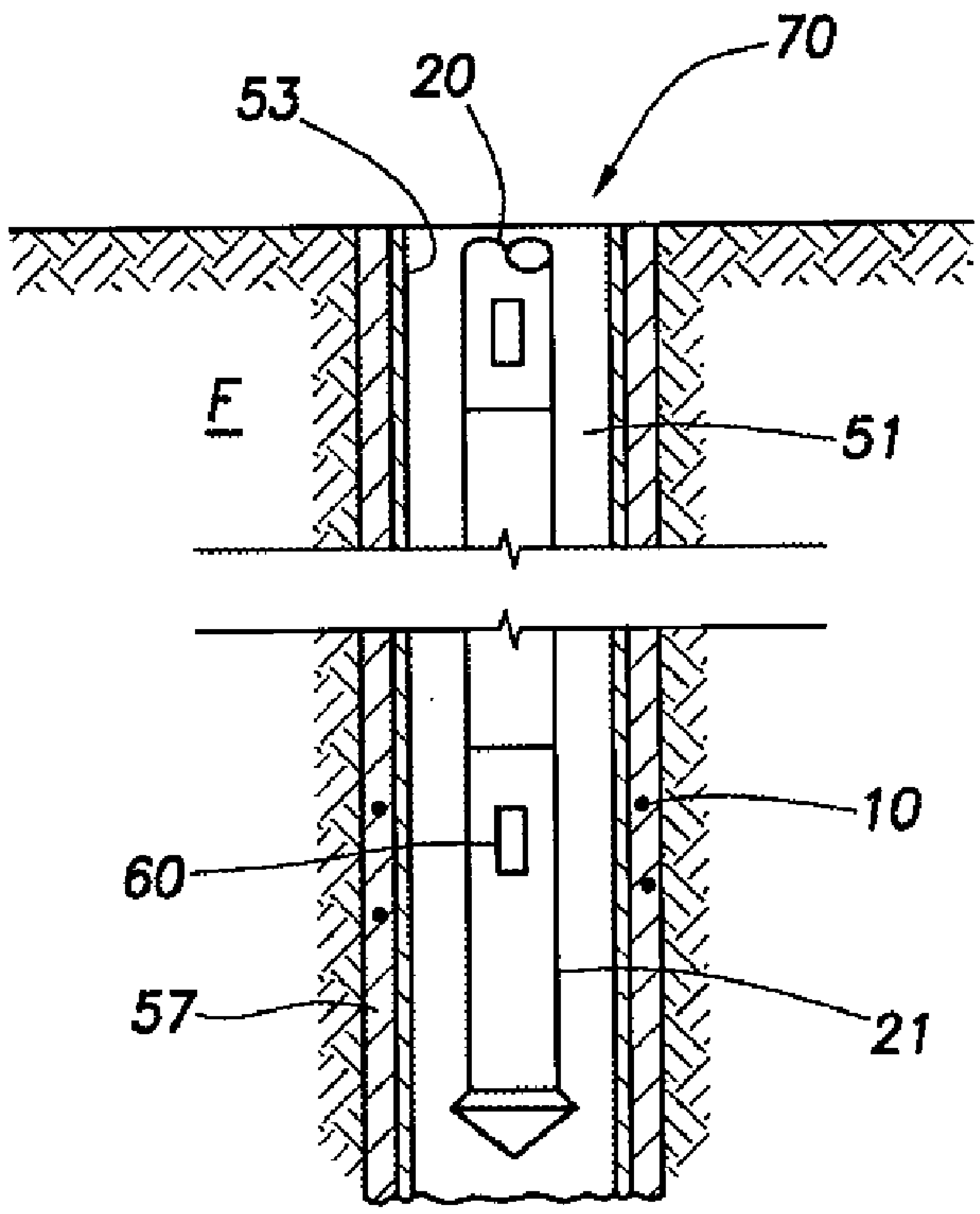


FIG.3

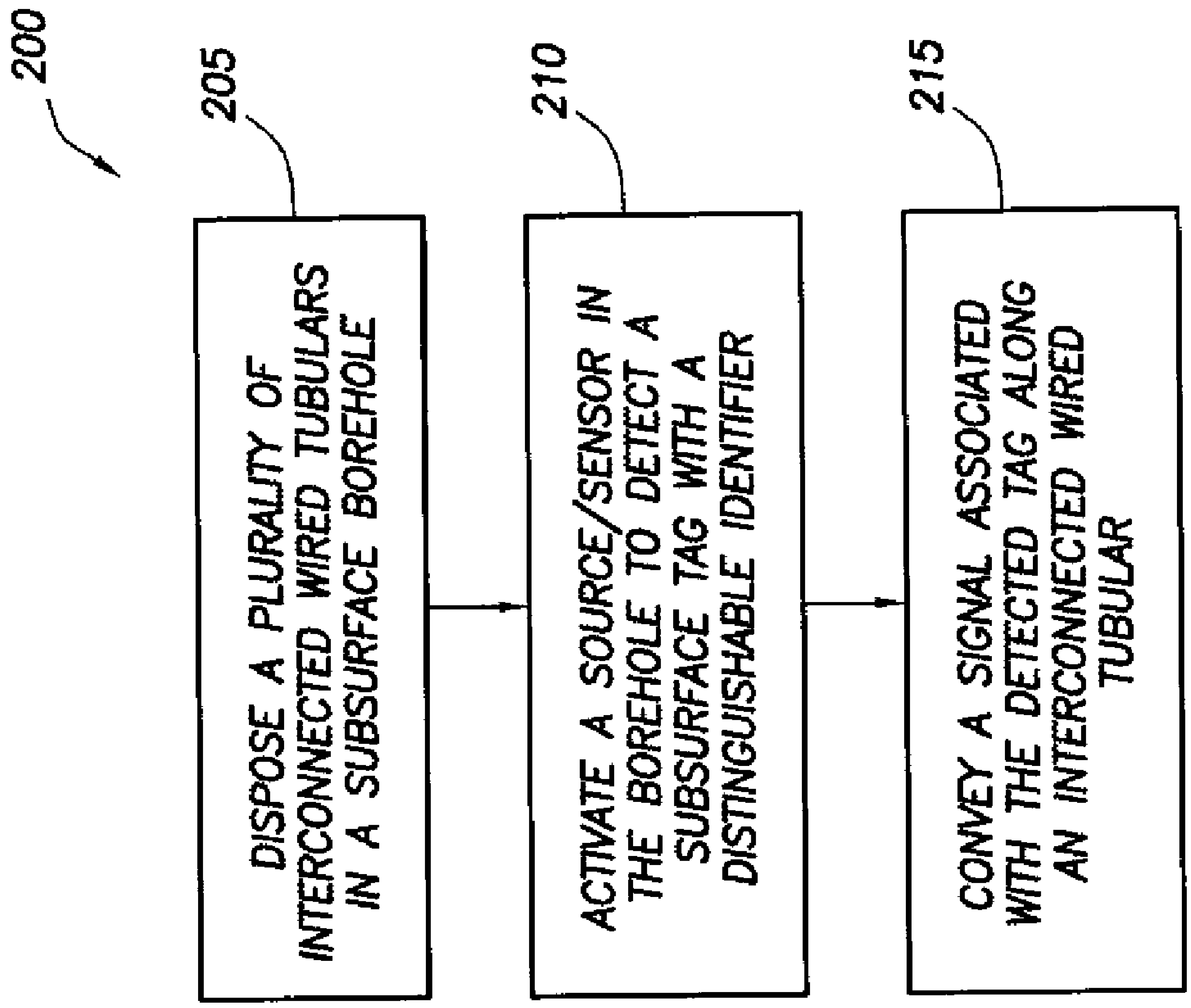

200
205
DISPOSE A PLURALITY OF INTERCONNECTED WIRED TUBULARS IN A SUBSURFACE BOREHOLE
210
ACTIVATE A SOURCE/SENSOR IN THE BOREHOLE TO DETECT A SUBSURFACE TAG WITH A DISTINGUISHABLE IDENTIFIER
215
CONVEY A SIGNAL ASSOCIATED WITH THE DETECTED TAG ALONG AN INTERCONNECTED WIRED TUBULAR

FIG.5

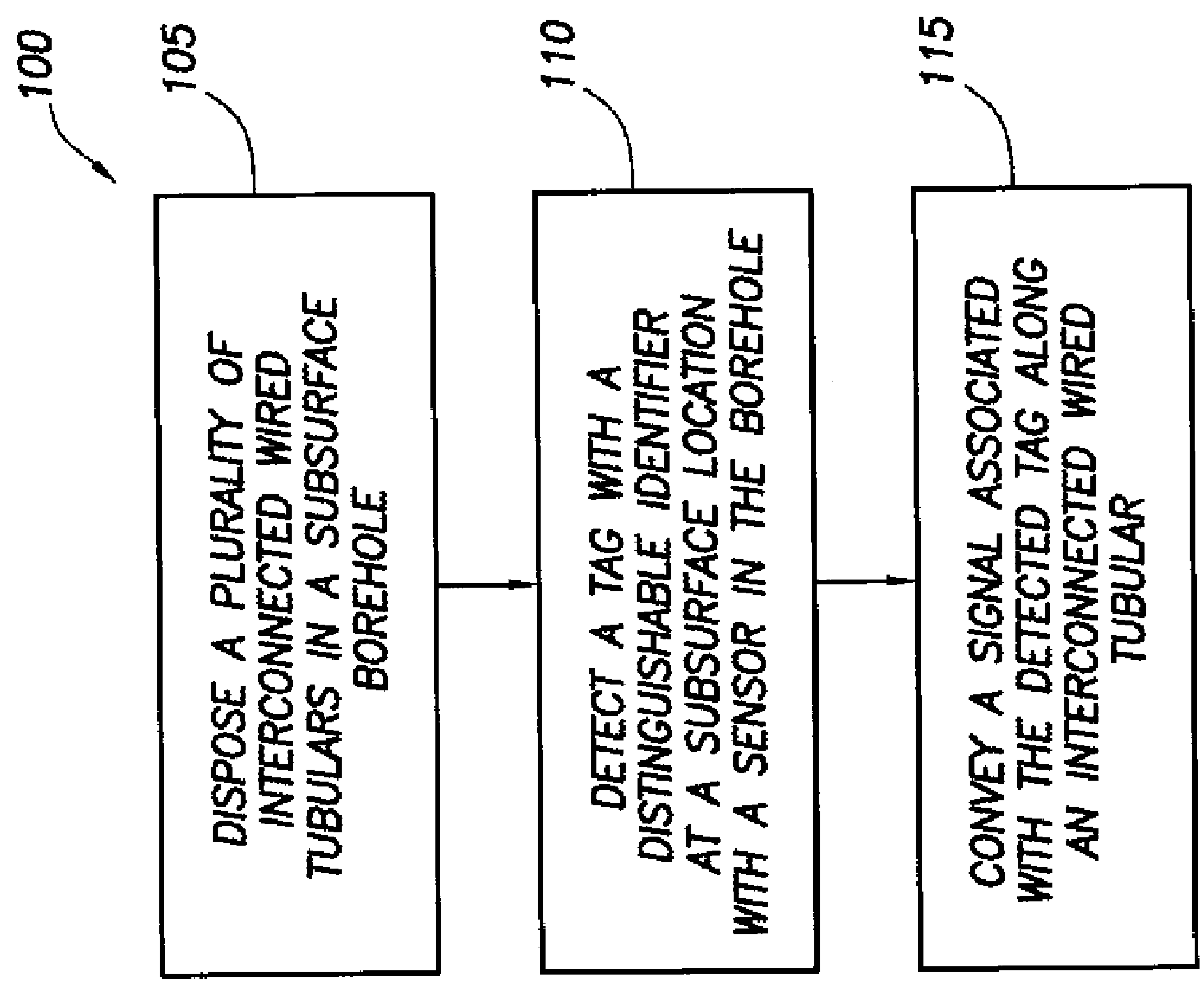

100
105
DISPOSE A PLURALITY OF INTERCONNECTED WIRED TUBULARS IN A SUBSURFACE BOREHOLE
110
DETECT A TAG WITH A DISTINGUISHABLE IDENTIFIER AT A SUBSURFACE LOCATION WITH A SENSOR IN THE BOREHOLE
115
CONVEY A SIGNAL ASSOCIATED WITH THE DETECTED TAG ALONG AN INTERCONNECTED WIRED TUBULAR

FIG.4

SUBSURFACE TAGGING SYSTEM WITH WIRED TUBULARS

RELATED APPLICATION

[0001] The present application is a continuation application and claims priority from U.S. patent application Ser. No. 11/955,518 filed on Dec. 13, 2007.

BACKGROUND

[0002] The present invention relates generally to the field of subsurface monitoring and communication techniques. More specifically, the invention relates to the use of tracers or marker materials in combination with wired tubulars for subsurface measurements.

DESCRIPTION OF RELATED ART

[0003] Drilling operations in the oil and gas industry typically entail the circulation of a drilling fluid ("mud") down the drill string, through the drill bit and up along the annulus to surface. The drilling mud has various functions including cooling, cleaning and lubricating the drill bit and bottom-hole assembly, controlling subsurface pressures to give wellbore stability and prevent fluid influxes, and transporting drill cuttings to the surface where they can be separated and disposed of.

[0004] Downhole pressure control is a primary function of the drilling mud. Maintaining hydrostatic pressure to prevent fluid influxes which may lead to kicks and a well control situation is crucial. However, the circulating pressure must be controlled to be below the fracture pressure for the formation otherwise fractures can propagate causing loss of drilling fluid from the wellbore. In extreme cases this could cause loss of hydrostatic pressure in part of the annulus where a fluid influx could occur. Various techniques have been considered to monitor flow rates.

[0005] Efficient cuttings transport is another key function of the drilling mud. The rheological properties of the mud are engineered to suspend and lift the cuttings in the circulating fluid. However, the conditions in the annulus, particularly diameter and inclination, can affect flow rates, and lessen transport efficiency. In horizontal and deviated wells, where flow rates may be insufficient to keep cuttings in suspension, cuttings beds can build up on the bottom side of the hole. This is a particular problem in high angle holes where the cuttings bed may slump down the annulus and packoff the drill string causing pipe sticking, twist offs and potentially lost circulation if a weak formation lies below the obstruction in the annulus. Wellbore washouts can lead to areas of significantly enlarged wellbore diameter, dramatically lowering flow rates which can drop cuttings out of suspension in the fluid. Washout zones are zones of high formation erosion which can be indicative of, or cause wellbore stability problems and can lead to further problems in efficiently cementing the well. Early detection of trouble zones and timely intervention could prevent costly operational problems.

[0006] Conventional "mud-logging" techniques include monitoring the mud weight at surface as it enters and exits the well and computation of the cuttings load versus the expected load from the rate of cuttings generation. A drawback of these techniques is the inaccuracy due to the methods of mud weight measurement. The wellbore, as drilling continues, is a very dynamic environment and through different processes the fluid flow can often be disrupted, making mudlog determinations subject to inaccuracies. Attempts to evaluate changes in the time it takes cuttings to reach surface ("lag time") have been crude and basic.

[0007] Tracers have been used in the oil and gas industry for many years. One conventional technique has been to use radioactive substances as tracers. U.S. Pat. No. 5,243,190 describes the use of radioactive particles for subsurface tracers. A conventional technique for determining lag time entails the injection of Calcium Carbide pellets, enclosed in a waterproof container, at the surface of the well being drilled for transit down the borehole by the mud stream. When passing through the drill bit, the container is smashed releasing the calcium carbide that reacts with water in the mud to form a gas, Acetylene, which is detected at the surface with a gas analyzer. The lag time can therefore be determined from the time difference between the injection of the Calcium Carbide in the well and the detection of gas at the surface in the return mud. The addition of rice to the mud stream has also been used as a tracking technique to determine lag time.

[0008] Various chemicals have been used as tracers in subsurface applications. For example, U.S. Pat. No. 4,447,340 describes a method of tracing drilling mud by determining the concentration of Acetate tracer ion in the penetrated strata (by core analysis). The use as tracers of Dichromate, Chromate, Nitrate, Ammonium, Cobalt, Nickel, Manganese, Vanadium and Lithium is also mentioned. Some tracer techniques have also been proposed using spectroscopic techniques, including atomic absorption spectroscopy, X-ray fluorescence spectroscopy, or neutron activation analysis, to identify certain materials as tagging agents. U.S. Pat. No. 6,725,926 proposes the use of a proppant coated with phosphorescent, fluorescent, or photoluminescent pigments that glow in the dark upon exposure to certain lighting. Fluorescence spectrometry techniques entailing the illumination of fluids with a light source have also been proposed (See U.S. Pat. Nos. 7,084,392, 6,707,556, 6,564,866, 6,955,217).

[0009] A need remains for improved techniques to determine dynamic subsurface conditions, particularly in the field of oil, gas, or water exploration and production.

SUMMARY

[0010] One aspect of the invention relates to a downhole system that includes at least one tag configured to provide a distinguishable identifier and set for selective release to a subsurface location and at least one sensor disposed in the borehole to detect the at least one tag at a subsurface location. The at least one sensor may be configured to transmit a signal associated with the at least one detected tag a surface.

[0011] Another aspect of the invention relates to a method that includes detecting at least one tag at a subsurface location with a sensor disposed in the borehole, the tag configured to provide a distinguishable identifier and conveying a signal associated with the at least one detected tag to a surface location.

[0012] Another aspect of the invention relates to a downhole method that includes activating at least one source or sensor disposed in the borehole to detect a tag at a subsurface location, the tag configured to provide a distinguishable identifier and conveying a signal associated with the detected tag along an interconnected wired tubular.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] Other aspects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings in which like elements have been given like numerals and wherein:

[0014] FIG. **1** is a schematic of an example downhole system including tag release units and a tag detection unit.

[0015] FIG. **2** is a schematic of an example tag release unit.

[0016] FIG. **3** is a schematic of an example downhole system including tag activation/detection units.

[0017] FIG. **4** is a flow chart of an example downhole method for detecting one or more tags.

[0018] FIG. **5** is a flow chart of an example downhole method for activating one or more tags.

DETAILED DESCRIPTION

[0019] Disclosed examples entail the use of wired tubulars configured for downhole applications. Such tubulars are configured with one or more conductors running through the bore, or disposed within/against/outside the wall, of the tubular. Couplers mounted on the ends of the tubulars allow for conveyance of a signal/power along a string of interconnected tubulars. Wired drill pipe is one such type of tubular. Conventional wired drill pipe configurations that may be used to implement aspects of the invention are described in U.S. Pat. Nos. 7,168,510, 6,950,034, 6,641,434, 6,866,306, 7,040,415, 7,096,961, U.S. Patent Publication Nos. 20070063865, 20070159351, 20070188344, and 20060225926 (all documents incorporated herein by reference in their entirety).

[0020] FIG. **1** shows an aspect of the invention. A system **11** includes a drill string **20** comprising a plurality of interconnected wired drill pipes **21**, shown disposed within a borehole **22** traversing a subsurface formation F as the hole is cut by the action of the drill bit **24** mounted at the far end of a bottom-hole assembly (BHA) **26**. BHA **26** contains a number of devices including various subassemblies **28**, including those used for measurement-while-drilling (MWD) and/or logging-while-drilling (LWD). Signal data between the subassemblies **28** and the surface is communicated via the interconnected wired drill pipes **21** as known in the art. In some aspects of the invention, the signal data may be conveyed via a series of wired drill pipes **21** in combination with another telemetry assembly (e.g., via pressure pulses through the drilling mud, via a wireline cable in the drill string) (not shown) as known in the art.

[0021] At the surface, the system **11** includes a derrick **30** and hoisting system, a rotating system, and a mud circulation system. Although this aspect of the invention is shown in FIG. **1** as being on land, those skilled in the art will recognize that the present invention is equally applicable to marine or offshore environments. A mud circulation system pumps drilling fluid down the central opening in the drill string **20**. The mud is stored in a mud pit which is part of a mud separation and storing system **32**. The mud is drawn in to mud pumps (not shown) which pump the mud through stand pipe **34** and into the Kelly and through the swivel.

[0022] The mud passes through drill string **20** and through drill bit **24**. As the drill bit grinds the formation into cuttings, the mud is ejected out of openings or nozzles in the bit. These jets of mud lift the cuttings off the bottom of the hole and away from the bit, and up towards the surface in the annular space between drill string **20** and the wall of the borehole **22**, as represented by arrows in FIG. **1**. At the surface the mud and cuttings leave the well through a side outlet in a blowout preventer **36** and through a mud return line **38**. The mud return line **38** feeds the mud into the separation and storing system **32**, which separates the mud from the cuttings. From the separator, the mud is returned to a mud pit (not shown) for storage and re-use.

[0023] As shown in FIG. **1**, some examples entail the use of tags **10** to trace fluids and solids in a subsurface environment and to provide means of communication and monitoring. For purposes of this disclosure, the term "tag" is understood to comprise any conventional tracer/marker element or composition configured to provide a distinguishable identifier as known in the art. Such tags **10** are generally miniature in size and configured in various shapes and dimensions (e.g., a ball, bead, rod, ribbon, sphere, globule, droplet, tube). Similarly, the term "subsurface" is herein understood as, relating to, or situated in an area beneath a surface, especially the surface of the earth or of a body of water. For example, a subsurface component is understood to comprise a buried, submerged, or partially buried/submerged component. According to some aspects of the invention, tags **10** are disposed in the mud separation and storing system **32**, such that they are set for selective release to a subsurface location via the mud flow.

[0024] A tag **10** detection unit **40** is shown coupled into the mud return line **38** and linked to surface equipment **42** comprising computer, display, recording, and user interface means as known in the art. In some aspects of the invention, the detection unit **40** includes appropriate components to activate/detect the passing tags **10** in order to resolvable/identify the individual tags. For example, when fluorescence emitting tags **10** are used, a radiation source (e.g., UV lamp) and optics to provide appropriate wavelength illumination may be included in the detection unit **40**. An aspect can be implemented wherein the detection unit **40** is incorporated with a filtering or separating device, such as a centrifuge, to collect the tags **10** for analysis. In aspects wherein the tags **10** comprise a ferromagnetic material, the detection unit **40** can be implemented with magnetic means (e.g., permanent magnet or electromagnet) to collect the particles for processing (not shown).

[0025] In other examples, a system can be implemented wherein the tags **10** are set in a release mechanism disposed on the BHA **26**, or anywhere along the drill string **20**, such that they are selectively or automatically released subsurface at a desired depth or when a predetermined event occurs, or at specified times. Tagging of solids and fluids downhole gives a more precise to time event for both. FIG. **1** illustrates such an aspect of the invention. The BHA **26** may be implemented with a tool comprising a tag **10** release unit **44**.

[0026] Turning to FIG. **2**, an example of a tag **10** release unit **44** is shown. In one example, a tag release unit **44** may be implemented with a sensor **46** adapted to sense a subsurface characteristic or condition (e.g., pressure, temperature, fluid composition, flow rates, etc.). Sensors of these types are well known technology, as are the means to power the sensors. Sensor **46** is in communication with a processor **48** which may comprise a number of microprocessors. One or more chambers **50**, **52** contain the tags **10**. Aspects can be implemented with different types of tags **10** (e.g., various sizes, activation modes, liquid type, solid type, etc.) disposed in each chamber **50**, **52** for selective release of the desired tag(s) at the desired times.

[0027] Associated with the chambers **50**, **52** are release mechanisms **54**, **56**. Under control of processor **48**, the release mechanisms **54**, **56** can be activated to selectively release the respective tag(s) **10**. The release mechanisms **54**, **56** may be configured to release the tag(s) **10** via a forced or pressurized ejection (e.g., pneumatic, hydraulic, electronic, mechanical means), via direct exposure of the tags to the mud flow, or some combination of these methods as known in the art. In some aspects, the release mechanisms **54**, **56** may be instructed to release the tags **10** in accordance with a program in the processor **48**. In this manner, the release mechanisms **54**, **56** can be instructed to selectively release their tags **10** when different predetermined thresholds or conditions are determined by the sensor **46**, based on input from other sensors in the system, or via direct control from a surface operator/computer with signaling conveyed along the wired drill pipes **21**. The use of interconnected wired tubulars in aspects of the invention allows for real-time signal/data transfer and correlation to depth/rime of subsurface tag **10** release and/or detection.

[0028] The wired drill pipes **21** are also equipped with conventional sources/sensors **60** configured to activate and/or detect tags **10** in their vicinity as known in the art and disclosed herein. For example, U.S. Patent Publication No. 20060260801 to Hall describes wired drill pipes equipped with sensors and power sources to obtain subsurface measurements. In aspects wherein electromagnetic (EM) energy is the desired mode to activate/detect the tags **10**, conventional LWD antenna configurations may be used. U.S. Pat. No. 6,577,244 (assigned to the present assignee and entirely incorporated herein by reference) describes a drill pipe system providing various types of sources/sensors for subsurface measurements. As discussed above, aspects of the invention may be configured with "hybrid" telemetry systems incorporating the wired drill pipes **21** in combination with drill pipe systems such as described in U.S. Pat. No. 6,577,244.

[0029] FIG. **3** shows another example of a tagging system. A system **70** is shown disposed within a cased well **51**. The well **51** is configured with conventional tubing/liners/casing **53** as known in the art. A drill string **20** comprising a plurality of interconnected wired drill pipes **21** is disposed within the well **51**. The wired drill pipes **21** are equipped with conventional sources/sensors **60** configured to activate and/or detect tags **10** in their vicinity as known in the art. In this example, one can perform status/performance checks such as identifying the position of cement **57** behind casing by detection of tags **10** that have been added to the cement. The system **70** may also be used to provide positive communication to the surface regarding a specific subsurface condition, such as confirmation that gravel packing (incorporating tags **10**) was properly placed or distributed in the well (not shown). Such functions can be performed while tripping the drill string **20** in or out of the well **51**. As with the other aspects of the invention, this system may also be configured for selective release of the particles **10** from the surface and/or the BHA as disclosed herein.

[0030] As previously discussed, example systems may be implemented with tags **10** comprising any conventional tracer/marker material or composition configured to provide a distinguishable identifier as known in the art. For example, aspects of the invention can be configured to detect tags **10** exhibiting fluorescence emission. Instruments configured to detect fluorescence emission downhole are known in the art. U.S. Pat. No. 6,704,109 (incorporated herein by reference in its entirety) describes a tool equipped with a probe system to illuminate crude oil in the well and detect the emitted fluorescence. Examples may be implemented with similar optical systems such that the tags **10** can be released, irradiated, and observed subsurface. In one example, the sources/sensors **60** on the drill string **20** of FIG. **1** can comprise fluorescence detector units mounted at longitudinally-spaced intervals. Such embodiments can be used to detect the tags **10** subsurface and provide the data to surface instrumentation **42** whenever there is tag movement near a detector. Alternatively, one or more drill pipes **21** may be equipped with a source/sensor **60** comprising a fluorescence detector unit configured to illuminate and detect tags **10** previously released or affixed to the borehole/casing wall, such as tags disposed in proppant/fracturing compounds and stuck in fissures or mudcake.

[0031] The distribution of sources/sensors **60** along the drill string **20** permits spatial resolution to obtain measurements and track fluid/cuttings flow while drilling. In some examples, the surface equipment **42**, alone or in combination with processors in the downhole tool(s), can be programmed to automatically alter operation of surface and subsurface components based on the tag-related measurements obtained subsurface and/or at surface. Such a feedback/control loop can be configured to affect operations to alter pump rates, torque, ROP, pipe rotation, tripping rates, activate/deactivate instruments, etc. For example, on detection of a cuttings bed a command could be sent to increase rotation rate and activate the sensors to monitor the cuttings bed pickup. Such controls can be maintained to correct or stabilize downhole conditions.

[0032] Selective release of the tags **10** and controlled activation of the sources/sensors **60** provides a means to track and monitor transit. Detection of cuttings hold-ups in washouts and beds along the annulus can be achieved by measuring the time of flight and comparing the transit of the cuttings with that of the drilling mud. In one aspect, the tags **10** can be activated/released to tag the drilling mud and cuttings at the BHA **26**. These tags **10** travel up the annulus and experience hydrodynamical dispersion and convectional and diffusional mixing effects. On detection of the tags **10** at the sensors **60** along the wellbore and/or at surface **40**, the difference in time of flight can be calculated. Where the two deviated significantly, a zone of cuttings hold-up can be identified.

[0033] The tag(s) **10** can be automatically or manually released into the annulus from the surface, at the bit **24**, or near the bit at the BHA **26**, with data transmitted near instantly along the wired drill pipe **21** system. In another aspect, measurement of dispersion and transit of the drilling mud can be done through soluble ions, as described in U.S. Pat. No. 4,807,469 (assigned to the present assignee and entirely incorporated herein by reference). Sensors **60** comprising conductivity or ion-specific sensors on the drill string **20** are used to detect the passage of ions. Other examples use tags **10** comprising dyes which are detectable at specific wavelengths or fluorescence used in conjunction with sensors **60** comprising optical sensors. Tags **10** exhibiting other spikes in chemical composition such as pH may also be used provided that the other properties of the fluid remain unaffected. Solid transit could be done by dosing the mud with a tag **10** comprising a weighting agent (e.g., NORM Barite or other detectable solids added at the surface or the BHA). Brazil nut shells, for example, provide significant natural radiation and are available as loss prevention materials.

[0034] Electronic tags **10** such as encapsulated radio-frequency identification (RFID) tags may also be used. RFID tags are configured for activation/interrogation by EM energy and have been proposed for use in subsurface applications. U.S. Pat. No. 6,993,432 (incorporated herein by reference in its entirety) describes the use of RFID tags for communication means in a wellbore. Examples may be implemented with conventional EM sources/sensors **60** (e.g., as described in U.S. Pat. No. 6,577,244) configured to detect/interrogate such tags **10** subsurface. In some examples, the tags **10** can be used in a circulating sweep. Pills of more viscous fluid are often deployed to displace cutting which have become help-up. The arrival of the sweep and its effectiveness could be monitored. The feedback/control loop of the disclosed systems can be used to alter components and parameters timed to the arrival of the sweep.

[0035] Processing of detected tags **10** can be carried out using conventional techniques. For example, upon identification of a tag **10**, the distinguishable tag identifier can be matched against a reference database or "code chart." It will be appreciated by those skilled in the art that any suitable tags **10** and corresponding sources/sensors **46** may be used to implement embodiments of the invention. The detection and identification of the tags **10** can be assisted by the use of a camera that can be used to record images or display on a screen. An aspect of the detection unit **40** of FIG. **1** may comprise a conventional camera configured to record and display images on a screen. The surface equipment **42** may also be configured with a program to identify the tags, establish tag identifier matching, process the resolved/identified tag data, track tag travel times, automatically trigger selected tag release, and respectively transmit/receive data/commands to/from remote locations. In aspects comprising tag imaging, the surface equipment **42** may be configured with programming to perform image analysis for tag identification. In some aspects, a simplistic system can be implemented wherein the tags **10** are initially disposed in the mud manually and captured in the return line **38** (e.g., using a screening filter, magnet means, centrifuge or separator) for processing by rig personnel.

[0036] The disclosed aspects of the invention offer a variety of applications for the wired tubular and tag systems. In addition to, and/or further elaborating on, the previously disclosed applications, uses of the disclosed embodiments for subsurface applications include, but are not limited to:

[0037] Mud logging—The use of uniquely identifiable tags added to the drilling mud at different times provides different types of information:

- **[0038]** Circulation time at specific time slots. The travel time of different tags can be logged. The time between the release and the detection of the tags can be measured, as well as the travel time between two or more established locations.
- **[0039]** Cuttings monitoring—Timed tag release allows for direct cuttings transport rate measurements for hole-cleaning calculations, deduction of hole volume/gauge via annular velocity measurement with a known flow rate, identification of "thief zones" at times of lost circulation/signal.
- **[0040]** Mud loss detection. A dip of the concentration of a given tag in the mud to indicate greater loss of drilling fluid at a particular depth.
- **[0041]** Kick location. A surge of the concentration of a given tag in the mud to indicate that that zone is starting to produce.
- **[0042]** Mud cake formation estimation.
- **[0043]** Rheological modeling.

[0044] Mud cake tagging—The use of uniquely identifiable tags added to the drilling mud at different times can tag the mud cake as a function of depth that is correlated with the drilling depth. This provides for:

- **[0045]** Correlating drilling depth and wireline depth. This may be done by sampling the mud cake at certain depths.
- **[0046]** Cement placement identification. Via analysis of the displaced mud or tag location detection.
- **[0047]** Clean up treatment monitoring. The amount and type of debris may be estimated using the tags.

[0048] Cement analysis—Addition of tags to cement allows the position of cement behind casing to be identified while tripping past with the wired drill pipe, or recordation in combination with sensors disposed in the casing, liner or any other tubular in or outside of the borehole.

[0049] Drill bit communication—In cases where mud pulse telemetry cannot be used, a tag release unit can selectively release a combination of tags into the mud to convey information from the drill bit to surface.

[0050] Gravel pack monitoring—Different types of tags can be added to the gravel at different times during the gravel packing operation. The effectiveness of the placement at different stages of the operation can be monitored by analyzing the concentration of the different tags detected by the passing wired tubulars. This can be used to identify which region of a gravel pack has failed, for example.

[0051] Flow measurement—The release of tags into the mud flow can be used to obtain flow velocity. In such aspects, the tags' surface can be treated as known in the art to increase their affinity to a given fluid when multi-phase flows are measured. Monitoring of circulated "pills" and "sweeps" or other wellbore treatments.

[0052] General testing—Tags can be sent from the surface or selectively released subsurface to test the operation of downhole instruments or to determine/monitor downhole conditions. Tags can be added to the mud, cement, acid, injection fluid, produced fluid, fracturing fluid, proppant, treatment fluid, gravel, etc. The location of an event can be determined by the type and concentration of tags detected. Different tag sizes can be used in combination to perform any of the operations disclosed herein. For example, the use of different sized tags allows for determination of the size of a fracture, fault, porous medium, etc., that serves as a conduit to the fluids or tags. The tags can also be mixed with solid acids or other compounds to track/monitor completion operations.

[0053] FIG. **4** shows a flow chart of an example downhole method **100** that includes, at step **105** disposing a plurality of interconnected wired tubulars **21** within a borehole traversing a subsurface formation. At step **110**, at least one tag **10** is detected at a subsurface location with a sensor **60** disposed in the borehole. The tag **10** may be configured to provide a distinguishable identifier via any conventional means as known in the art and disclosed herein. At step **115**, a signal associated with the at least one detected tag **10** is conveyed along an interconnected wired tubular **21**. The signal may be conveyed solely along the wired tubulars **21** or in combination with other telemetry assemblies as known in the art and disclosed herein.

[0054] FIG. **5** shows a flow chart of another example downhole method **200** that includes, at step **205**, disposing a plurality of interconnected wired tubulars **21** within a borehole traversing a subsurface formation. At step **210**, at least one source/sensor **60** disposed in the borehole is activated to detect a tag **10** at a subsurface location. The source/sensor **60** may comprise any conventional sources or sensors as known in the art and disclosed herein. The tag **10** may be configured to provide a distinguishable identifier via any conventional means as known in the art and disclosed herein. At step **215**, a signal associated with the at least one detected tag **10** is conveyed along an interconnected wired tubular **21**. The signal may be conveyed solely along the wired tubulars **21** or in combination with other telemetry assemblies as known in the art and disclosed herein.

[0055] It will be apparent to those skilled in the art that aspects of the invention may be implemented using one or more suitable general-purpose computers having appropriate hardware and programmed to perform the techniques disclosed herein. The programming may be accomplished through the use of one or more program storage devices readable by the computer processor and encoding one or more programs of instructions executable by the computer for performing the operations described above. The program storage device may take the form of, e.g., one or more floppy disks; a CD ROM or other optical disk; a magnetic tape; a read-only memory chip (ROM); and other forms of the kind well known in the art or subsequently developed. The program of instructions may be "object code," i.e., in binary form that is executable more-or-less directly by the computer; in "source code" that requires compilation or interpretation before execution; or in some intermediate form such as partially compiled code. The precise forms of the program storage device and of the encoding of instructions are immaterial here. Thus these processing means may be implemented in the surface equipment, in the system tools, in a location remote from the well site (not shown), or shared by these means as known in the art. Aspects of the invention may also be implemented using conventional display means situated as desired to display processed or raw data/images as known in the art.

[0056] The above disclosed examples include interconnected wired tubulars, or wired drill pipe, as a telemetry method. This is only provided as an example. Those having ordinary skill in the art will realize that one or more of the advantages of the disclosed examples may be achieved through the use of other telemetry methods known in the art. Such other telemetry methods include mud-pulse telemetry, electromagnetic telemetry, and acoustic telemetry, among others.

[0057] While the present disclosure describes specific aspects of the invention, numerous modifications and variations will become apparent to those skilled in the art after studying the disclosure, including use of equivalent functional and/or structural substitutes for elements described herein. For example, it will be appreciated that the tools and systems comprising the disclosed aspects of the invention may be implemented for use in various subsurface operations (e.g., while tripping, while casing, etc.). All such similar variations apparent to those skilled in the art are deemed to be within the scope of the invention as defined by the appended claims.

What is claimed is:

1. A downhole system comprising:

at least one tag configured to provide a distinguishable identifier and set for selective release at a subsurface location;

a tag release unit positioned on a drill string adapted for releasing the at least one tag at the subsurface location for travel toward a surface location;

at least one sensor disposed on a the drill string comprising a plurality of interconnected drill pipes, at least a portion of the drill string comprises wired tubulars, the at least one sensor in communication with the wired tubulars and adapted to detect the at least one tag at a subsurface location,

wherein the at least one sensor is configured to transmit a signal associated with the at least one tag to a surface location, and further wherein a surface or subsurface component alters operation based on the signal.

2. The system of claim **1**, wherein the at least one tag is set for selective release from a subsurface location for transit to the surface location.

3. The system of claim **1**, wherein the at least one tag is set for selective release from a tool disposed subsurface.

4. The downhole system of claim **1** wherein the surface or subsurface component automatically alters a pump rate, a torque, a rate of penetration, or tripping rate based on the signal.

5. The system of claim **1**, comprising a plurality of sensors disposed on the drill string and configured to detect the at least one tag.

6. The system of claim **1**, further comprising a processor configured to activate release of the at least one tag at the subsurface location.

7. The system of claim **1**, further comprising a detection unit to detect the at least one tag at the surface location.

8. A method comprising:

providing a plurality of wired drill pipes equipped with a plurality of sensors;

positioning a plurality of tags within cement positioned adjacent to casing of a wellbore;

detecting at least one tag at a subsurface location with the plurality of sensors disposed on a drill string, the tag configured to provide a distinguishable identifier; and

conveying a signal associated with the at least one tag and cement from the sensor to a surface location.

9. The method of claim **8**, further comprising using the at least one tag to do at least one of monitor cement placement, monitor gravel packing, and convey information.

10. The method of claim **8**, further comprising activating a plurality of sensors disposed in the borehole to detect the at least one tag.

11. The method of claim **8**, further comprising altering operation of a surface or subsurface component based on detection of the at least one tag at a surface or subsurface location.

12. A method, comprising:

releasing a plurality of tags from a subsurface location within a wellbore for travel to a surface location;

positioning a plurality of sensors on an interconnected wired tubular to detect a location of a tag, wherein the tag has a distinguishable identifier;

detecting the distinguishable identifier of each of the plurality of tags with the plurality of sensors; and

conveying a signal associated with the plurality of tags from the plurality of sensors along the interconnected wired tubular to a processor at a surface location, the signal including information related to a time at which one of the plurality of sensors detects at least one of the plurality of tags.

13. The method of claim **12**, further comprising using the tag to do at least one of determine a fluid flow property, determine a kick location, determine an event location, determine a depth location, determine a transit time, monitor cement placement, monitor gravel packing, convey information, and determine a cuttings flow.

14. The method of claim **12**, further comprising altering operation of a surface or subsurface component based on detection of the tag.

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