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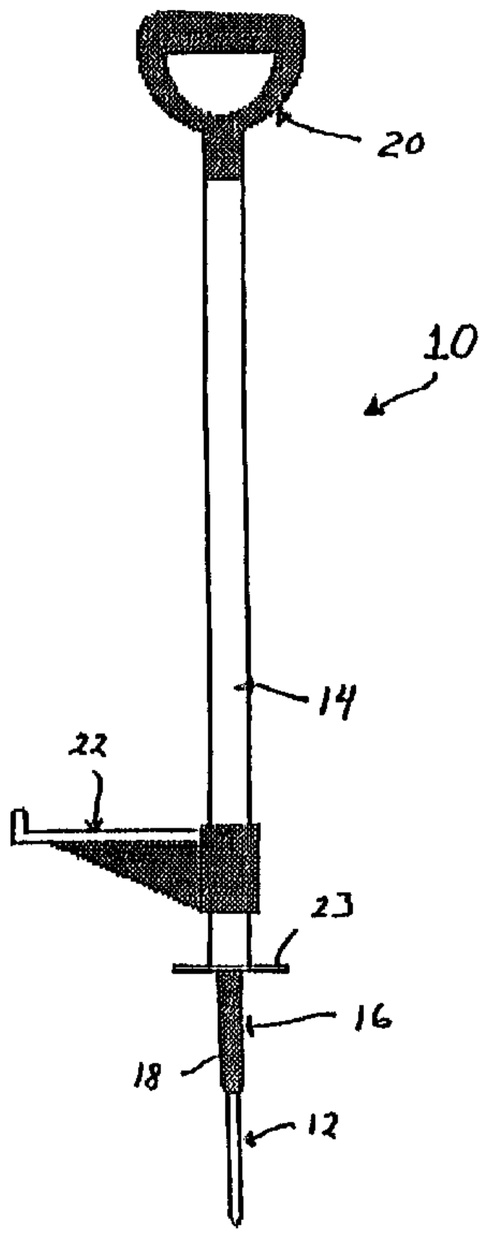
(54) Title: CHIP PLANTER TECHNOLOGY



(57) Abrégé/Abstract:
A system for marking land (figure 5), comprising a tag (24) adapted to store a code, a planter device (10) for planting the tag at a predetermined location, and a scanner (25) for reading the code of the tag to identify the predetermined location. The tag is preferably a radio frequency microchip (24) adapted to store an alphanumeric code. The planter device includes a planter head (16) adapted to hold the microchip and to plant the microchip at the predetermined location. The scanner generates a scanner signal (26) to power the microchip. The powered microchip generates a microchip signal containing the code (28), and the scanner reads the microchip signal to identify the predetermined location.

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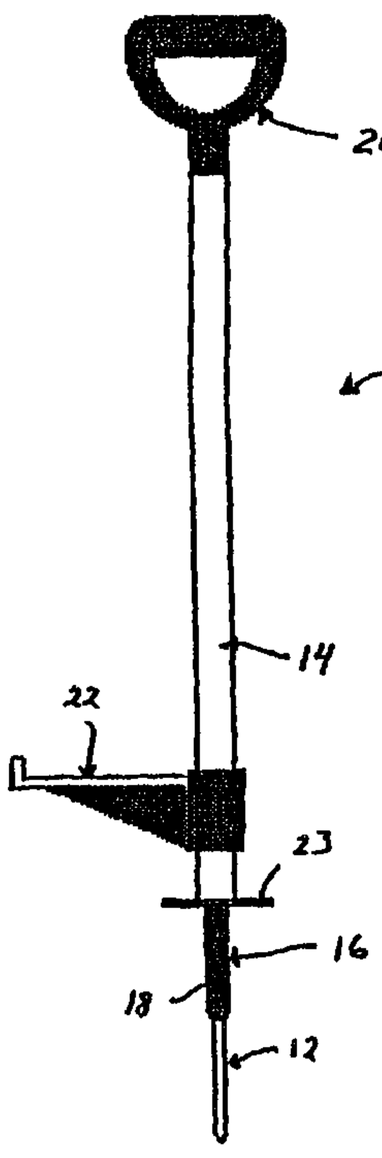
(54) Title: CHIP PLANTER TECHNOLOGY



(57) Abstract: A system for marking land (figure 5), comprising a tag (24) adapted to store a code, a planter device (10) for planting the tag at a predetermined location, and a scanner (25) for reading the code of the tag to identify the predetermined location. The tag is preferably a radio frequency microchip (24) adapted to store an alphanumeric code. The planter device includes a planter head (16) adapted to hold the microchip and to plant the microchip at the predetermined location. The scanner generates a scanner signal (26) to power the microchip. The powered microchip generates a microchip signal containing the code (28), and the scanner reads the microchip signal to identify the predetermined location.

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BACKGROUND OF THE INVENTION

1. Field of the Invention.

The present invention relates, generally, to land marking systems. More particularly, the invention relates to a method and apparatus for marking land with microchip-containing probes planted below the surface of the ground.

2. Background Information.

There is a need to mark and convey information about land, including the underground objects in a parcel of land and the boundaries of the parcel of land. Typical underground objects which need to be located for repair purposes or to be avoided during excavation include water lines, electric lines, gas lines, telephone lines, cable television lines, septic tanks, and storage tanks. Further, real estate, including commercial sites, residential sub-divisions, and cemetery plats, are precisely surveyed to accurately identify the boundaries of the parcel of land. Typically, a surveyor forms a sub-division plat by marking the boundary of the subdivision and each subdivision plat, the rights-of-way for streets and sidewalks, and the easements for utilities or access within the sub-division plat. Then, a civil engineer creates grading plans, storm drainage plans, waterline plans, sanitary sewer plans, and street plans, all of which are properly marked during the construction of the sub-division. A cemetery plat is, in some ways, similar to a sub-division plat in that a larger parcel of land is surveyed and divided into smaller parcels or individual grave sites. Adjacent grave sites are often owned by a single person or family and associated grave sites are often marked with a family headstone. The boundary for each grave site is measured and marked prior to digging.

The known art includes various devices and methods for marking land, including painting lines on the surface, placing stakes or making other visible surface markings. The known art also includes various devices and methods for detecting underground objects or hazards, including using ground penetrating radar, detecting electromagnetic fields generated by an underground source, and burying a device that generates a signature signal near the underground structure. These devices and methods are believed to have significant limitations and shortcomings. Visible surface markings are often temporary and aesthetically displeasing. Ground penetrating radar poses a significant problem in distinguishing unwanted or unnecessary signals from those signals of interest. Detecting electromagnetic fields is limited to detecting underground sources that either generate electromagnetic fields, such as underground electrical power lines, or are a conductor and can be attached to an electrical current, such as water pipes.

Applicants' invention provides a surveying marking system which is believed to constitute an improvement over existing technology.

BRIEF SUMMARY OF THE INVENTION

The present invention provides land marking system which generally comprises a planter device, a tag, and a scanner. The tag is preferably a radio frequency microchip, such as the chips manufactured by Destron Fearing which are adapted for identifying the animals in which they are implanted. The microchip is a tiny, passive electronic device that typically ranges in length from about 11 to 28 millimeters and in diameter from about 2.1 to 3.5 millimeters. The microchip is individually inscribed and programmed to store a unique, permanent 10 to 15 digit alphanumeric identification code, is coupled with an antenna, and is sealed in an inert capsule. The microchip is inserted, molded, or otherwise encapsulated into a rod, probe or spike. The identification code of the microchip is recorded. The probe is loaded into the planter device and planted or inserted below the surface of the ground. The passive microchip remains inactive until it is read by the scanner. The scanner transmits a low radio frequency scanner signal to the chip, which provides the power needed by the microchip to transmit its unique code back to the scanner as part of the microchip signal. The scanner positively identifies the probe by the detected microchip signal. Upon reading the detected microchip signal, the scanner may display the unique code on a display, or it may be interfaced with other equipment for further processing and reporting.

The probe is adapted to be driven into the ground at a desired position in the land. The probe is preferably an elongated rod or spike formed from a material that will not corrode or otherwise degrade in a moist underground environment and that

will not interfere with the transmission of the radio frequency signals between the scanner and the microchip.

The probe is inserted or planted into the ground using a planter device. The planter device has a body connected to a planter head that is adapted to receive the probe. The probe / planter head interface is adapted to cause the probe to remain in the planter head until it is driven into the ground and to remain in the ground after the planter head is lifted. The planter head preferably has a cylindrically shaped portion having an opening sized to provide a friction fit with a preferably cylindrically shaped probe. The friction fit is sufficiently tight so that the probe does not fall out, but not too tight so that the probe remains in the planter head when the probe is driven into the ground. A manual planter embodiment has a step at one end of the body proximate to the planter head, and further has a handle at the other end of the body. A user's weight applied against the step drives the probe into the ground.

The land marking system may be used for a variety of purposes, including to uniquely identify a predetermined location, a boundary, an underground hazard or a buried element, and to provide land use and ownership information for a parcel of land. The features, benefits and objects of this invention will become clear to those skilled in the art by reference to the following description, claims and drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

Figure 1 is a plan view of a planter device used in the land marking system of the present invention.

Figure 2 is a plan view of a probe used in the land marking system of the present invention.

Figure 3 is a top view of the probe of Figure 2.

Figure 4 is an illustration of a land marking system used with respect to a cemetery plat.

Figure 5 is an illustration of a land marking system used with respect to a sub-division plat.

Figure 6 illustrates the planter device planting a microchip-containing probe into the ground.

Figure 7 illustrates a scanner detecting a planted microchip-containing probe.

DETAILED DESCRIPTION

Referring to **Figure 1,** an example of the preferred embodiment of a planter device for the system of the present invention is illustrated and generally indicated by the reference numeral 10. **Figures 2-3** illustrate a molded embodiment of a microchip-containing probe 12 that can be driven into the ground using the manual planter device 10 of **Figure 1**. **Figures 4-5** illustrate the system of marking land of the present invention using the planter device 10 and the probe 12 within a cemetery or residential sub-division environment. **Figures 6-7** illustrate a method of planting and detecting the probe 12.

The present invention provides a land marking system which generally comprises a planter device 10, a radio frequency tag or microchip 24, and a scanner 25. The probe 12 is inserted or planted into the ground using the planter device 10. The planter device 10 has a body 14 connected to a planter head 16 that is adapted to receive the probe 12. The planter head 16 preferably has a cylindrically shaped portion 18, which has an opening sized to provide a friction fit with the generally cylindrically shaped probe 12. The friction fit is sufficiently tight so that the probe 12 does not fall out of the cylindrically-shaped portion 18, but not too tight so that it remains in the planter head 16 after the probe 12 is planted into the ground. The probe 12 remains in the planter head 16 until it is driven into the ground and remains in the ground after the planter head 16 is lifted. Other probe 12 / planter head 96 interfaces are anticipated for a variety of prove shapes and sizes.

The manual planter embodiment shown in **Figure 1** has a handle 20 on one end of the body 14 and a step 22 at the other end of the body proximate to the planter

head 16. The step 22 provides a means to use the weight of a user to drive the probe 12 into the ground. A stop plate 23 limits the depth that the probe is planted. Additionally, a scanner 25 for detecting a microchip-containing probe 12 may be attached to identify the probe and verify that it is operational and correctly placed in the ground.

A tag or microchip 24 is inserted, molded or otherwise encapsulated in the probe 12 which is adapted to be driven into the ground at a desired or predetermined location. The probe 12 is preferably an elongated rod or spike formed from a material that will not corrode or otherwise degrade in a moist underground environment, and that will not interfere with the transmission of radio frequency signals between a scanner and the microchip 24.

The microchip 24, such as the chips manufactured by Destron Fearing for implanting into animals, is a tiny, passive electronic device that typically ranges in length from about 11 to 28 millimeters and in diameter from about 2.1 to 3.5 millimeters. Those microchips 24, for example, are individually inscribed and programmed to store a unique, permanent 10 to 15 digit alphanumeric identification code and is coupled with an antenna and sealed in an inert capsule. The microchip is inserted, molded, or otherwise encapsulated into the probe 12. The identification code of the microchip 24 is recorded. The probe 12 is then loaded into the planter device 10 and driven into and below the surface of the ground G. The microchip 24 is passive and remains inactive until it is read by a scanner, such as the scanner 25 shown in **Figures 6-7**. The scanner transmits a low radio frequency scanner signal 26 to the microchip 24, which provides the power needed by the microchip 24 to transmit its unique code back to the scanner 25 as part of the microchip signal 28. The scanner

25 positively identifies the probe 12 by the detected microchip signal 28. Upon reading the detected microchip signal, the scanner may display the unique code on a display, or it may be interfaced with other equipment for further processing and reporting.

The land marking system may be used to uniquely identify a predetermined location in a parcel of land, a boundary for a parcel of land, or an underground hazard. Additionally, the system may be used to provide land use and ownership information for a parcel of land. The information may be provided in a variety of ways. Each microchip 24 may contain a unique code. This code may be entered into a database and related to information for the predetermined location in which the probe 12 is planted. The identification of the detected microchip 24 is then cross referenced against the database to extract the desired information. This database information is then conveyed or otherwise provided to a user. Alternatively, the microchip 24 may be designed to contain the desired information itself.

For example, **Figure 4** illustrates a cemetery plat containing twenty-four grave sites (A1-2, B1-4, C1-2, D1-6, and E1-10). A probe 12 may be planted in a corner of each grave site. Grave sites A1-A2 represent deceased spouses, grave sites B1-B4 represent a deceased family of four, and grave sites C1-C2 represent spouses who are alive but have marked their graves with a headstone H. Each of the associated or family of grave sites A, B and C are identified by a visible marker, *i.e.* a headstone H. The headstones H typically identify the person and the dates of birth and of death. Grave sites D1-D6 represent grave sites that have been bought but have no visible markers or headstones H, and grave sites E1-E10 represent grave sites that have not been bought. The microchips 24 in the probes 12 uniquely identifies each probe 12

and the location of all of the grave sites. The probes 12 may also convey, either with or without a database, additional information such as identifying the grave sites E have not been bought, the owners of grave sites D that have been bought but are not visibly marked with a headstone H, and the grave sites that are grouped together under a family such as groups A, B, and C, the deceased person's relatives, and other information about the deceased.

Another example is illustrated by the residential sub-division shown in **Figure 5**. Typically, a surveyor forms a sub-division plat by marking the boundary of the entire subdivision S and each subdivision plat or lot L within the sub-divisions, the rights-of-way RW for streets and sidewalks, and the easements E for utilities or access within the sub-division plat. Subsequently, a civil engineer creates grading plans, storm drainage plans, waterline plans, sanitary sewer plans, and street plans which are marked during the construction of the sub-division. The microchip-containing probes 12 may be planted to uniquely identify or locate the boundaries of a lot L and may further identify the location and type of underground hazard such as water lines WL and electrical power lines EPL. Further, the probes 12 may provide ownership and land use information including utility and lot access easements E, rights of way RW for streets and sidewalks, covenants, and association affiliations. The probes 12 can also be used as points of reference based on the civil engineer's plans during, among other activities, the grading of the land and the construction of the storm and sanitary sewers, the water lines, and the streets. This above-listed information is given as an illustration and not an all-inclusive list of the variety of information that can be contained by the microchips in the probes.

The descriptions above and the accompanying drawings should be interpreted in the illustrative and not the limited sense. While the invention has been disclosed in connection with the preferred embodiment or embodiments thereof, it should be understood that there may be other embodiments which fall within the scope of the invention as defined by the following claims. Where a claim, if any, is expressed as a means or step for performing a specified function it is intended that such claim be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof, including both structural equivalents and equivalent structures, material-based equivalents and equivalent materials, and act-based equivalents and equivalent acts.

CLAIMS

What is claimed is:

1. A system for marking land, comprising:

(a) a tag adapted to store a code; and

(b) a planter device for planting said tag at a predetermined location on land.

2. The system of claim 1, wherein said tag is a microchip inscribed and programmed to store said code.

3. The system of claim 2, further comprising a scanner for reading said code to identify said tag and said predetermined location, wherein said scanner generates a scanner signal to power said microchip, said powered microchip generates a microchip signal containing said code, and said scanner reads said microchip signal to identify said predetermined location.

4. The system of claim 2, wherein said microchip is encapsulated in a probe.

5. The system of claim 4, wherein said probe is formed from a material that will not degrade in a moist underground environment.

6. The system of claim 4, wherein said probe is adapted to be driven into the ground.

7. The system of claim 6, wherein said probe has an elongated shape and a pointed end.

8. The system of claim 1, wherein said planter device includes a planter head adapted to hold said tag and to plant said tag at said predetermined location.

9. The system of claim 8, wherein said planter device is a manual planter device.

10. The system of claim 9, wherein said planter device includes a body having a first end and a second end, a handle attached to said first end of said body, and said planter head attached to said second end of said body.

11. The system of claim 10, further including a step attached to said body proximate to said planter head, wherein a user's weight is applied to said step to plant said tag.

12. The system of claim 10, further including a stop plate to limit the depth said tag is planted.

13. The system of claim 1, wherein a scanner is attached to said planter device, said scanner being adapted for reading said code of said tag to identify said tag and said predetermined location.

14. The system of claim 1, wherein said code is an alpha-numeric code.

15. The system of claim 1, wherein said code uniquely identifies said predetermined location.

16. The system of claim 1, wherein said code identifies a boundary for a parcel of land.

17. The system of claim 1, wherein said code identifies an underground hazard.

18. The system of claim 1, wherein said code provides land use information for a parcel of land.

19. The system of claim 1, wherein said code provides ownership information for a parcel of land.

20. A system for marking land, comprising:

(a) a radio frequency microchip adapted to store an alphanumeric code;

(b) a planter device for planting said microchip at a predetermined location, said planter device including a planter head adapted to hold said microchip and to plant said microchip at said predetermined location; and

(c) a scanner for reading said code of said tag to identify said predetermined location.

21. A system for marking land, comprising:

(a) a radio frequency microchip adapted to store an alphanumeric code, said microchip being encapsulated in a probe adapted to be driven into the ground;

(b) a manual planter device for planting said microchip at a predetermined location, said planter device including a body having a first end and a second end, a handle attached to said first end of said body, a planter head attached to said second end of said body and a step attached to said body proximate to said planter head, said planter head being adapted to hold said microchip and to plant said microchip at said predetermined location, wherein a user's weight is applied to said step to plant said microchip; and

(c) a scanner for reading said code of said tag to identify said predetermined location, wherein said scanner generates a scanner signal to power said microchip, said powered microchip generates a microchip signal containing said identification code, and said scanner reads said microchip signal to identify said predetermined location.

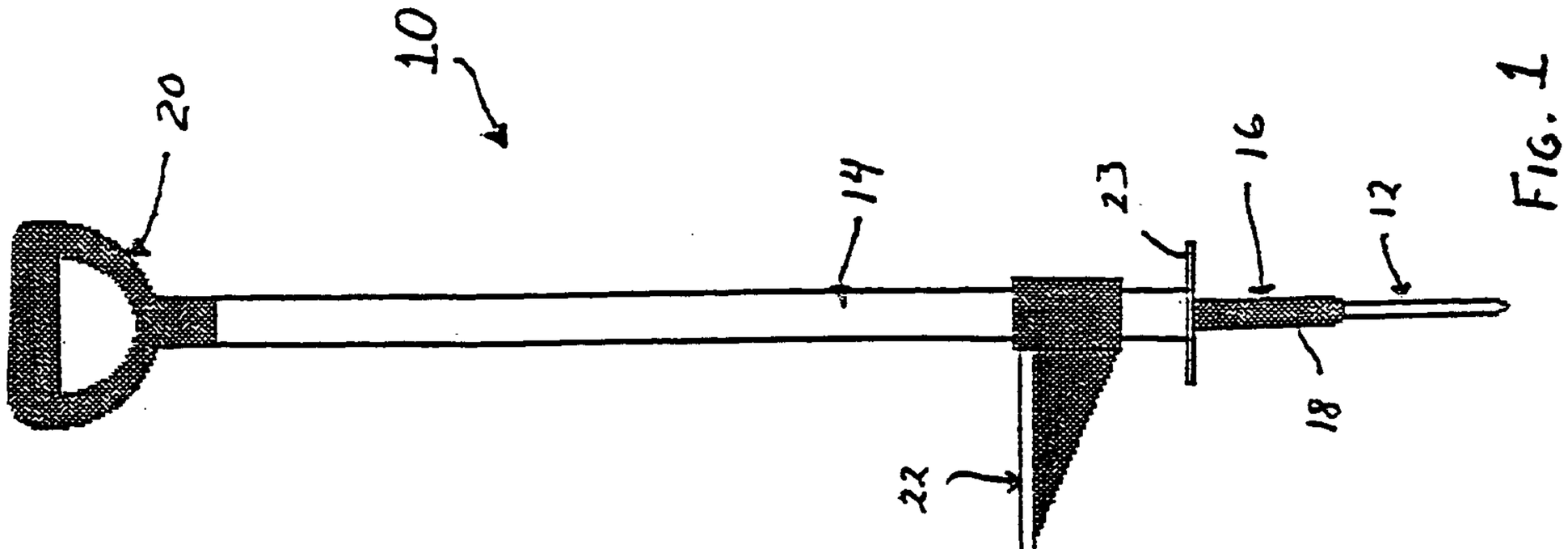


FIG. 1

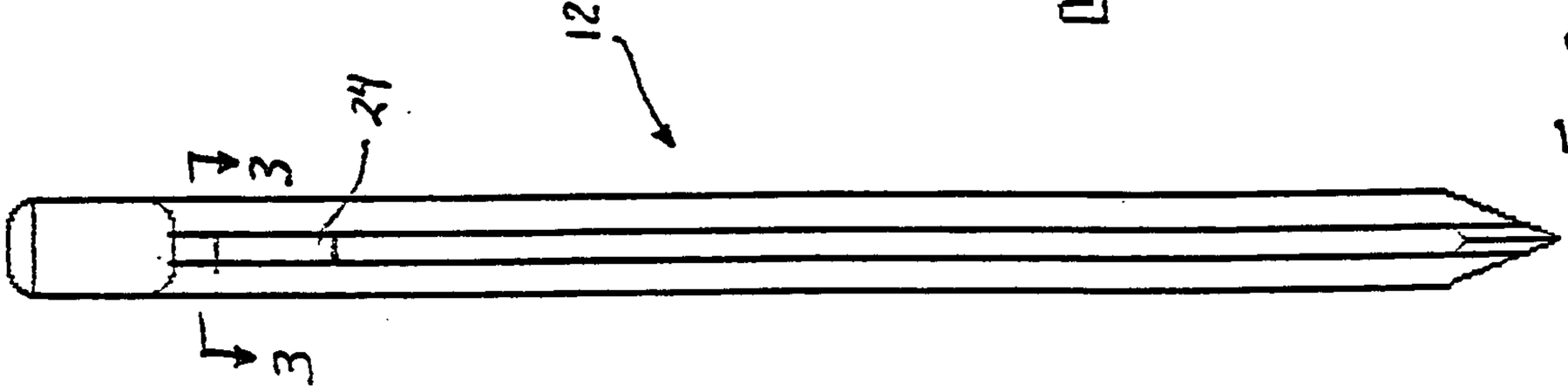


FIG. 2

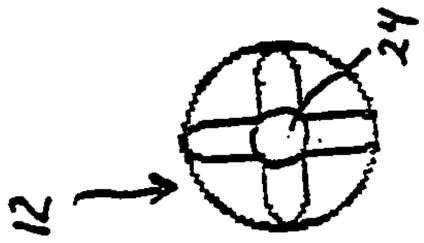


FIG. 3

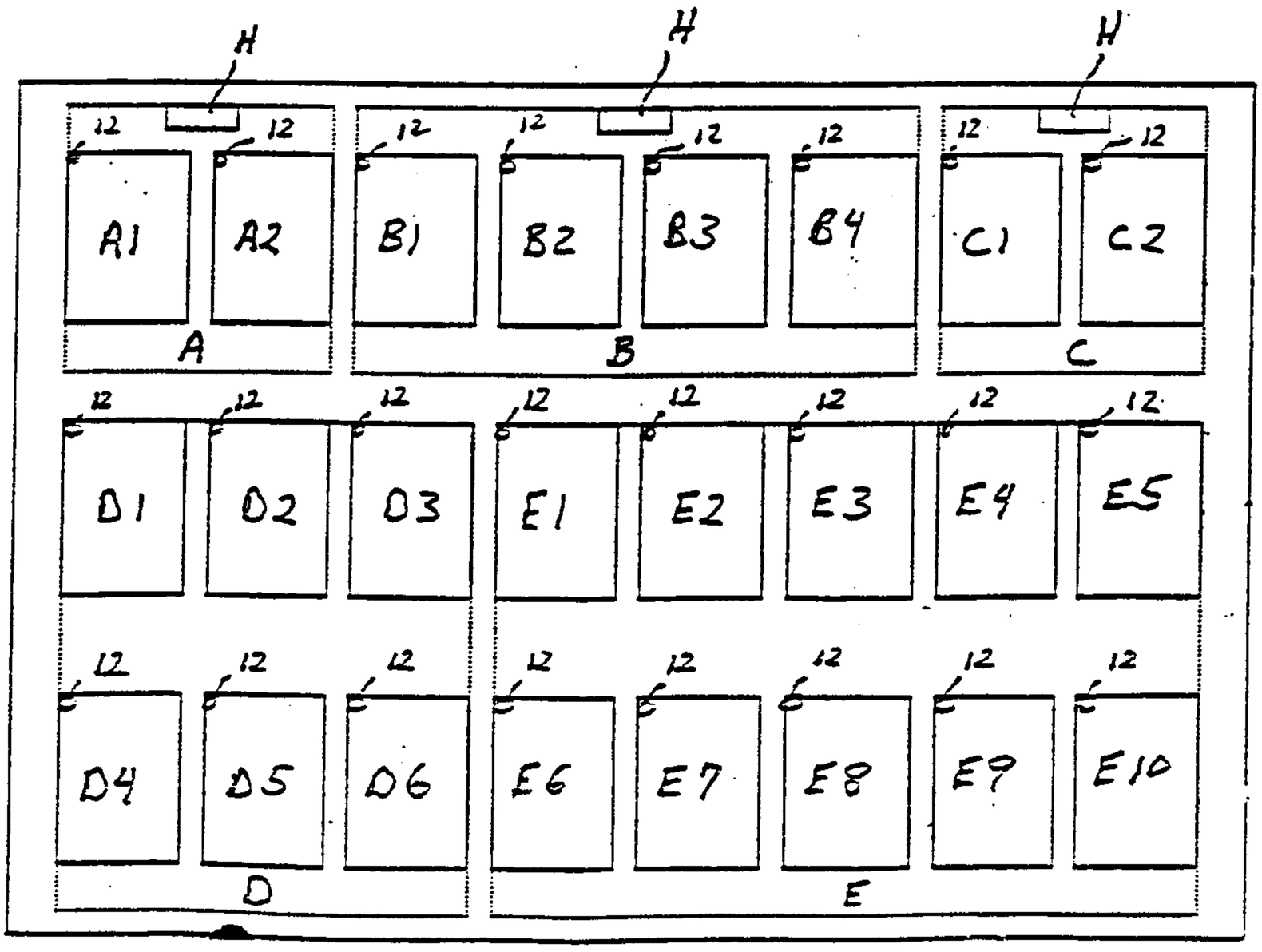


FIG 4

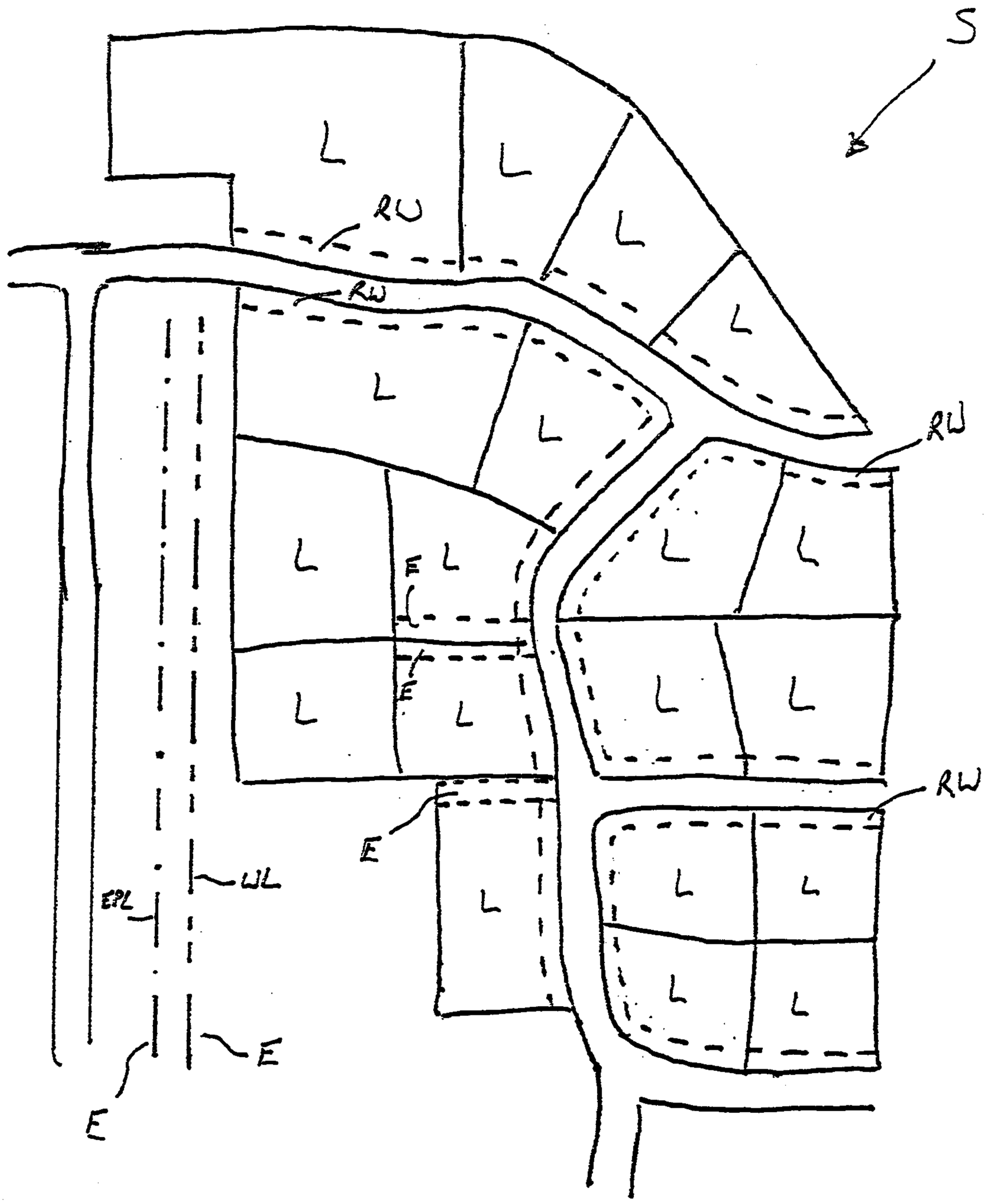


FIG. 5

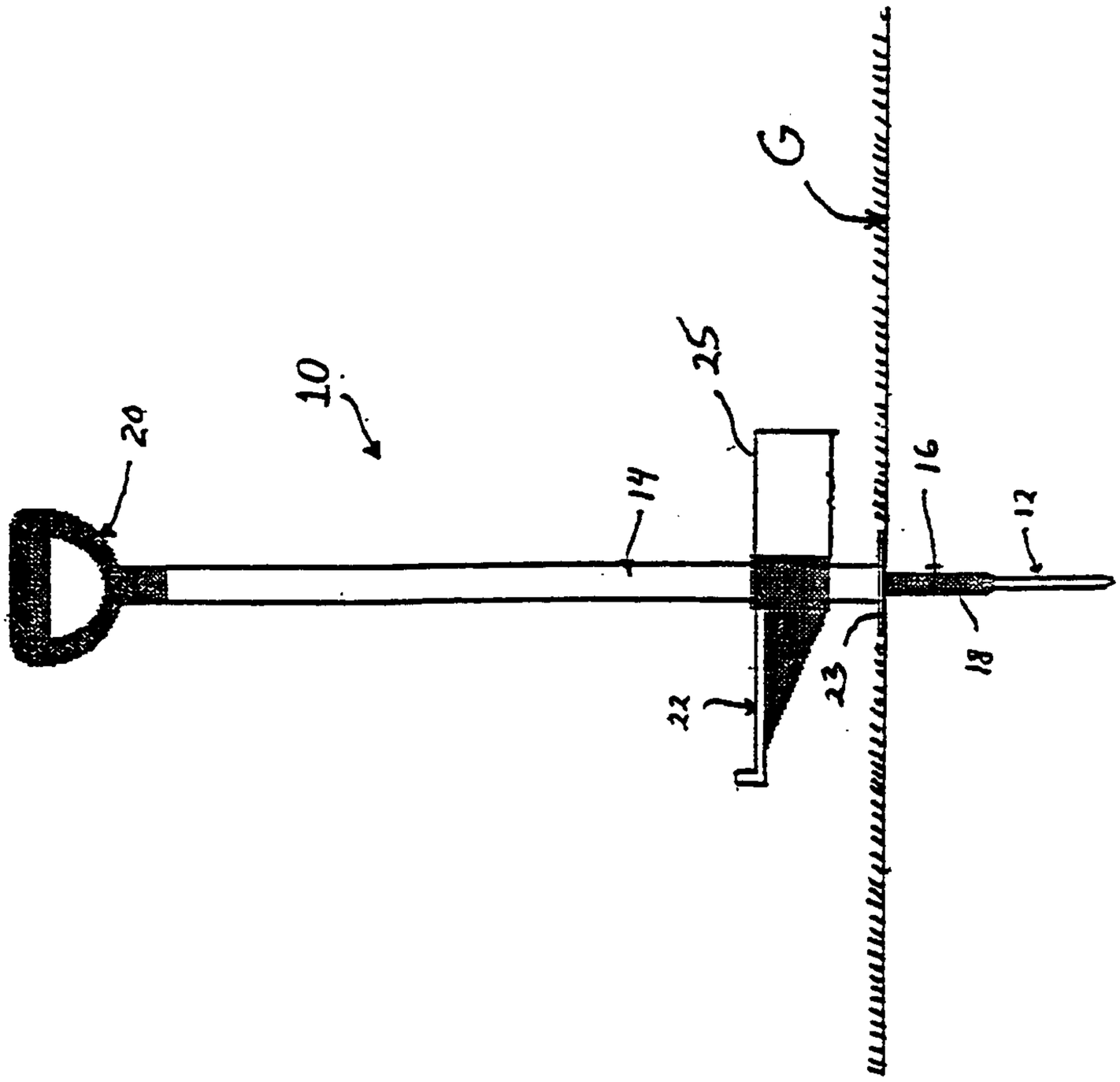


FIG. 6

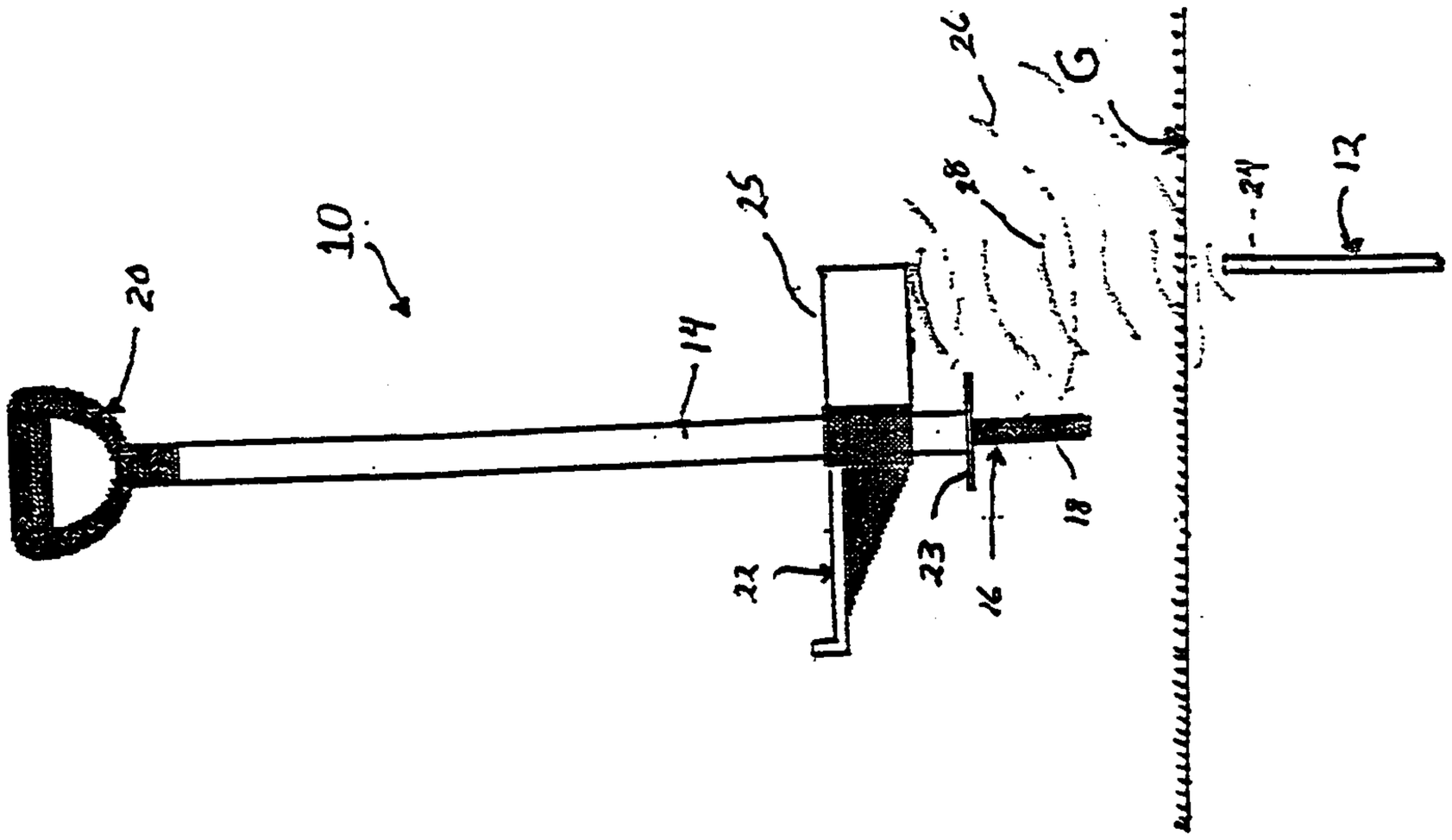
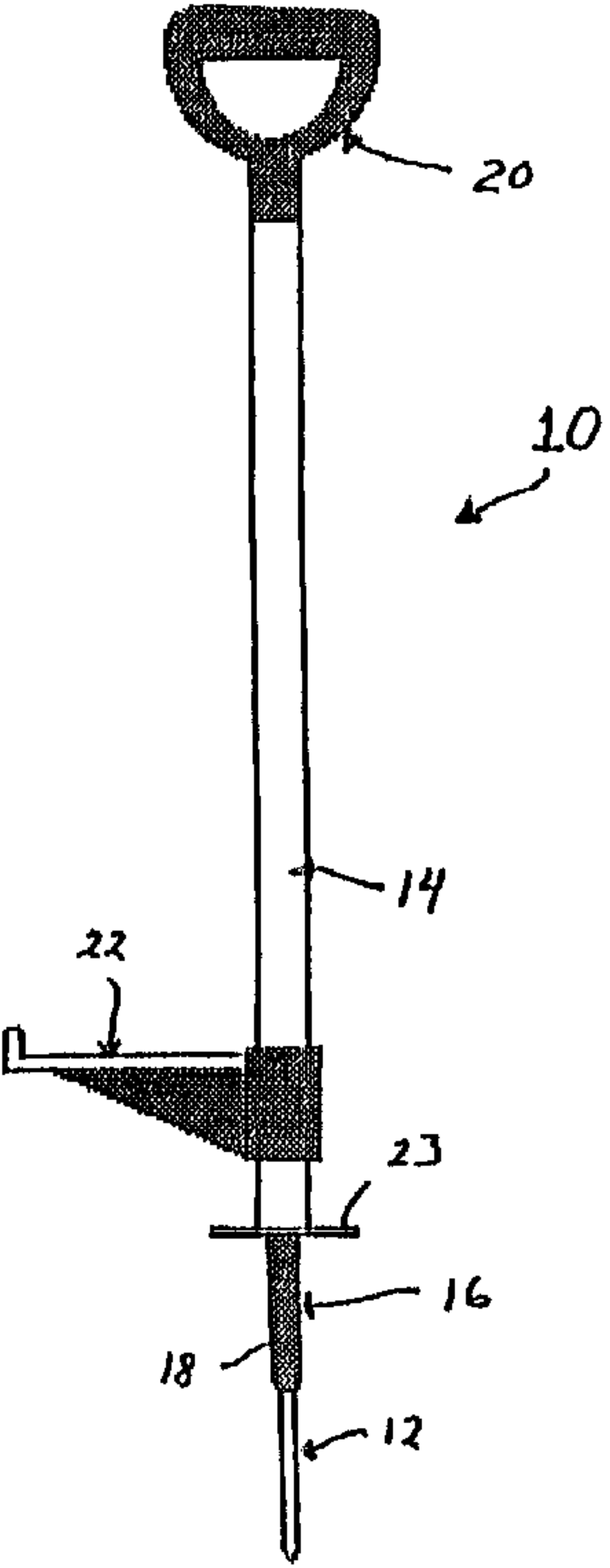


FIG. 7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