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(54) Access chamber cover

(57) A cover (21) for an access chamber (1) such as a manhole, hydrant or the like, where the cover is lockable so as to prevent unauthorised access to the access chamber and to a service or public utility of which the access chamber permits maintenance. In one embodiment the cover (21) comprises a locking mechanism having four bolts (35,37) which are disengaged by way of a corresponding key (53). Monitoring means (45) provide a way of monitoring access, logging statistics regarding access. The cover may also determine whether an access attempt is authorised or unauthorised and react accordingly, activating an alarm or communicating an appropriate signal over a network of such interconnected covers.

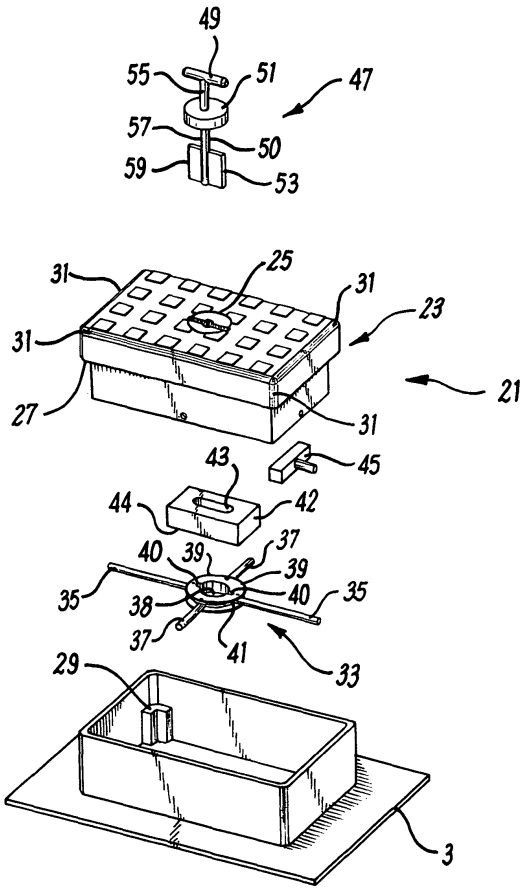

FIG 2

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Description

[0001] The present invention relates to a cover for an access chamber for a utility, and in particular to a lockable cover for an access chamber.

[0002] The term access chamber is used to describe an access that extends from street or ground level to a service duct or conduit, which might be a sewer, other pipe or a conduit through which services are provided. The services in question may be public utilities such as water, electricity, communications, sewerage or any other utility or infrastructure service. Access chambers for such utilities may or may not be sized to allow a person access to services situated below ground level through the hole. Typically, access chambers house access points for making connections to or allowing maintenance of services or utilities located below ground level. For example, a manhole and a utility vault are examples of access chambers, as are water and fire hydrants.

[0003] For the purposes of the present application, a cover for an access chamber refers to any cover suitable for covering or closing an access to such a manhole, hydrant, service duct, conduit or the like. The cover is intended to prevent unauthorised access to components such as valves for water and gas, or switchgear for electrical and telecommunications purposes.

[0004] Figure 1 shows a typical access chamber 1 with a cover 5, which forms part of the state of the art. The access chamber 1 is constructed by digging a large hole in the ground, down to a sewer pipe or other similar conduit 19. The access chamber 1 is reinforced typically by brickwork 13 or other structural material such as concrete or steel extending around the manhole 1 and by a base plate 3. The base plate 3 defines an access hole over which a cover 5 is placed.

[0005] The base plate 3 is supported by the reinforced shaft or brick work 13 and is held in position by filling the area around the base plate with tar or another filler material, which secures it in position with respect to the surrounding ground 11 up to ground level 7. The cover plate 5 typically contains a small hole which can be opened using a crow bar or access key.

[0006] One significant problem with access chambers, for example manholes and hydrants, and their associated covers as they are currently configured is that it is extremely easy to obtain unauthorised access to the access chamber because the covers are easy to remove. There are a number of serious problems associated with persons obtaining unauthorised access to access chambers. In the case of a cover covering a fire hydrant, when unauthorised access to the fire hydrant is obtained, a person can open the hydrant causing large volumes of water to be released onto street or ground level.

[0007] As water is becoming a more scarce resource, it is extremely important to prevent the high level of waste that will arise where the hydrant is opened in this manner. Typically, hundreds of thousands of litres of water can be wasted per day through the unauthorised opening of fire hydrants. In addition, the cost of having an engineer inspect the hydrant and close the hydrant and associated cover after unauthorised opening is high.

[0008] Another problem associated with unauthorised access to access chambers is that of security. Where the access chamber is over and allows access to a gas pipe, perhaps housing valves and the like, there is a risk of explosion caused by accident or sabotage.

[0009] Where the access chamber houses a communications line or the like then there is a risk to the security of data that is transferred down the communications line. In addition, access to an access chamber such as a manhole may provide a person with the means to access a large network of underground pipes in a sewage system. This also presents a significant security and possibly health risk.

[0010] In accordance with an aspect of the present invention there is provided a cover for an access chamber, the cover comprising:

a cover plate comprising an opening means; and
a locking mechanism;

wherein the opening means is adapted to cooperate with the locking mechanism and the locking mechanism is adapted for engagement with the access chamber.

[0011] Preferably, the opening means is operable to disengage the locking mechanism from the access chamber.

[0012] Preferably, the opening means comprises an opening for receiving a key.

[0013] Preferably, the opening extends through the cover plate to the locking mechanism which is positioned for engagement with the key in use.

[0014] Alternatively, the opening means comprises a mechanical means operable to disengage the locking mechanism from the access chamber.

[0015] Alternatively, the opening means comprises an electronic means operable to disengage the locking mechanism from the access chamber.

[0016] Alternatively, the opening means comprises a magnetic means operable to disengage the locking mechanism from the access chamber.

[0017] Optionally, the opening means is remotely operable.

[0018] Preferably, the cover plate is shaped to fit into a base plate situated at the top of the access chamber, below ground level.

[0019] Preferably, the cover plate has radiused edges.

[0020] Preferably, the locking mechanism comprises one or more bolts.

[0021] Preferably, the locking mechanism comprises one or more bolts adapted for engagement with the underside of the base plate.

[0022] Preferably, the locking mechanism comprises a key slot.

[0023] Preferably, the key slot is positioned at a predetermined distance from the top side of the cover plate.

[0024] Preferably, the key slot has an opening to allow debris to pass through the slot.

[0025] Preferably, the opening is annular.

[0026] Preferably, the locking mechanism is rotatably connected to the cover plate.

[0027] Preferably, the one or more bolts extend from the key slot.

[0028] Preferably, the one or more bolts are mounted to the rotatable locking mechanism.

[0029] Preferably, the one or more bolts are pivotally mounted to the rotatable locking mechanism.

[0030] Preferably, the one or more bolts pivot by a predetermined maximum amount to move the bolts from engagement with the underside of the base plate.

[0031] Preferably, one or more bolts are pivotable in both directions, forward and back.

[0032] Optionally, one or more bolts are pivotable only in one direction.

[0033] Preferably, the locking mechanism is provided with four bolts.

[0034] Preferably, the four bolts are adapted to extend across the underside of the cover plate.

[0035] Preferably, the four bolts are further adapted to bear the weight of the cover plate when the cover plate is being removed.

[0036] Preferably, the four bolts are arranged in a substantially cruciform shape.

[0037] Preferably, the present invention further comprises a key.

[0038] Preferably, the key is provided with a spacer situated below the key handle to set the distance that the key may be extended into the opening.

[0039] Preferably, the invention further comprises an access slot positioned in the opening between the underside of the cover plate and the locking mechanism.

[0040] Preferably, the access slot is mounted in a block which provides an abutment for the key when the key is used to lift the cover plate out of the access chamber.

[0041] Alternatively, the present invention further comprises a remote control adapted to control the opening means.

[0042] Alternatively, the present invention further comprises, a user interface adapted to control the opening means.

[0043] Preferably, the cover further comprises an alarm, for detecting attempts to gain unauthorised access to the access chamber.

[0044] Preferably, the alarm is positioned at or near the underside of the cover plate.

[0045] Preferably, the cover further comprises a monitoring means adapted to monitor access to the access chamber.

[0046] Optionally, the monitoring means is adapted to detect disengagement of the locking mechanism.

[0047] Preferably, the monitoring means is adapted to store data in connection with access to the access chamber.

[0048] Optionally, the data comprises information regarding whether access was authorised or unauthorised.

[0049] Preferably, the monitoring means comprises an interface for communicating the data over a communications link.

[0050] Optionally, the monitoring means is capable of receiving a signal over a communications link and controlling the opening means in accordance with the signal.

[0051] The present invention will now be described by way of example only with reference to the accompanying drawings in which;

Figure 1 illustrates the typical state of art access chamber and associated cover;

Figure 2 is an exploded perspective view of a cover for an access chamber in accordance with the present invention;

Figure 3 is a perspective view of the cover and a key in accordance with the present invention;

Figure 4 is a perspective view of the key and locking mechanism in use;

Figure 5 is a perspective view of the locking mechanism with the key removed from the access chamber cover of the present invention;

Figure 6 (a) is a schematic view of a number of access chamber covers connected to a network; and

Figure 6(b) is a schematic view of an alternative network of connected access chamber covers.

[0052] Figure 2 shows a lockable access chamber cover 21, comprising a cover plate 23, a key hole or opening 25, supported surface 27, support 29 which is formed at a base plate 3, radiused edges 31 of the cover plate designed to prevent or make more difficult the use of a crow bar or the like to lever open the access chamber cover and locking mechanism 33.

[0053] The locking mechanism comprises bolts 35 and 37. Bolts 35 are substantially equal in length and extend along the length of the access chamber cover 21 and bolts 37 are substantially equal in length but shorter than bolts 35 and extend across the cover 21. The arrangement of bolts 37 in this example is substantially cruciform.

[0054] The bolts are mounted on an annulus 39, which includes a central space 38 which is provided to allow debris such as earth, stones or the like to fall through the locking mechanism into the access chamber beneath. Access slot 43 is mounted in a block 42 and has a bottom surface 44. The bottom surface of the block 44 provides an abutment against which the paddle of key 53 contacts when the key has been rotated by the handle 49. The bolts 35 are connected to the annulus by a pivot point 41.

[0055] Key 47 comprises a handle 49, spacer 51 and key paddle 53. In addition, distances D1 55, D2 57 and

D3 59 are predetermined so that only a correctly sized key will form part of the keying mechanism.

[0056] The access chamber cover 21 is further provided with an alarm 21 which can be activated if attempts to tamper with the cover 21 are detected. The alarm may detect excessive vibrations, a change in the level of light or may rely on other suitable detection means.

[0057] Also incorporated into the access chamber cover 21 is a monitoring device, indicated by reference numeral 45. The monitoring device 45 is capable of detecting a number of different parameters in connection with the cover 21 and/or the access chamber.

[0058] The monitoring means 45 may comprise a solenoid or other device capable of registering a signal when the opening means is actuated, when the locking mechanism is disengaged or when an attempt is made to tamper with the cover. This information may be stored locally, and used to determine statistics related to use of the access chamber, e.g. when and how often the cover has been removed for maintenance. It may also be capable of determining whether such access is or was authorised and store data relevant to that condition.

[0059] In addition to storing such data locally, it is envisaged that by incorporation of a communication device, e.g. a wired or a wireless communications link, this data could be shared across a network of such covers as exemplified in Figure 6(a).

[0060] Figure 6(a) illustrates a network of interconnected covers 21A-21D, each in accordance with the present invention and comprising a monitoring means adapted to communicate data over the network. The network comprises four covers 21A-21D connected in a series link to a central server 61. This central server collects and aggregates the data communicated across the network by each of the covers 21A-21D. In this way, statistics for each or all of the covers 21A-21D may be accessed, viewed and processed at a central location.

[0061] Figure 6(b) illustrates an alternative network configuration in which each of the covers 21A-21D are connected in parallel to a central server 61A which aggregates the relevant data collected from each of the covers 21A-21D. This server may subsequently act as a node on a larger network 63 comprising a further server 61B connected to a further separate network of covers 21E-21H.

[0062] The communication method by which the covers transfer such data may be any of a variety of methods - wired (by means of conduits which may be integrated with the utility for which the access chamber permits maintenance) or wireless (by means of radio communication such as Bluetooth, Wi-Fi or the like). Furthermore, the monitoring device 45 may also log such information as temperature, humidity, and also feed this information back into the network to which it is attached.

[0063] It is also envisaged that one or more of the covers may be controlled remotely over such networks. This may include remotely opening one or more covers in accordance with a maintenance schedule or alternatively preventing the opening means from being able to disengage the locking mechanism on a particular cover if a tamper attempt is detected.

[0064] Figure 3 is a perspective view of a lockable access chamber cover in accordance with the present invention. This figure shows the key 49 in position in the cover plate 23 of the access chamber cover. In normal use, the base plate 3 is below ground level and the cover plate 23 is at ground level but supported by the collar section 4 of the base plate.

[0065] Figure 4 shows detailed perspective view of the apparatus of the present invention, as shown in figures 2 and 3. In this figure, the locking mechanism is clearly shown below the base plate 3. The locking mechanism 33 comprises four bolts 35 and 37, pivotably attached to an annulus 39 at pivot point 41. Key holes 40 are present in the circumference of the annulus and are adapted to fit with the key paddle 53, wholly shown in figure 2.

[0066] In use, the cover 21 of the present invention is placed inside the collar 4 of the base plate 3 and is locked in position by turning the handle 49. This action causes bolts 35 and 37 to move from an angled or pivoted position where the longitudinal axis of each bolt is at an angle to the side of the cover plate to a position change in the angle causes an effective lengthening of the bolts and causes the bolts 35, 37 to move to a position underneath the base plate 3 such that, the bolts are positioned below the base plate 3 in the gap between the plate and the wall 13 of the manhole.

[0067] Clearly, therefore once the bolts are in such a position they will abut against the lower surface of the base plate 3, preventing the removal of the manhole cover.

[0068] In order to remove the cover 21 from the access chamber, the key 47 is inserted into the keyhole 25 and is positioned where the spacer 51 is in contact with the cover plate 23. As previously described, the spacer position sets the distance between the key paddle 53 and the key handle 49 to allow the key paddle to be in operative contact with the locking mechanism 33.

[0069] Upon insertion, the key paddle 53 passes through the access slot 43 before contacting the key holes 40 of the annulus 39. Rotation of the handle 49 causes the bolts 35 and 37 to pivot about the pivot points 41 thereby removing the bolts from abutment with the lower surface of the base plate.

[0070] Once the bolts have been so removed, the handle 49 can be used to lift the cover plate 23 out of the access chamber. Removal is made easier because the key paddle 53 abuts against the surface 44 of the access slot block 42. This occurs because the key paddle is now, by virtue of its rotation, at an angle with respect to access slot 43 and therefore cannot move up through the access slot.

[0071] In addition, the presence of the bolts 35 and 37 extending across the bottom most surface of the cover plate provides additional support and spreads the weight of the cover plate across the bolts and makes the cover

plate easier to lift using handle 49.

[0072] Annulus 39 is rotatably mounted on the cover plate. This may be achieved by having pivotable arms extending down from the cover plate to the annulus 39, or by attaching the annulus 39 to the cover plate in a collar that provides a degree of rotational freedom to the annulus.

[0073] The present invention may be used as a cover for access chambers over water, electricity, gas, communications, sewerage or any other services. In all of these cases, unauthorised access can result damage and/or waste of the service in question. The present invention provides a solution to this problem by providing a lockable access chamber cover that prevents unauthorised access to all but the most determined person. Even in cases where a person is determined to breach the access chamber cover, the present invention will make this task much more difficult and time consuming. As most cases of break-in to access chambers are as a result of casual or opportunistic vandalism, it is anticipated that the present invention will greatly reduce the number of times that the access chamber cover might be breached. Furthermore, information about when access has been gained and for how long may be collected for local use or for distribution across a network of other connected covers.

[0074] A number of alternative methods of opening a cover are envisaged, each within the scope of the present invention. For example, rather than a key and a corresponding mechanical interface; it is envisaged that control over the opening means may be exercised remotely (e.g. by a remote control, a keyfob or the like) or by a user interface comprising such security means as a magnetic card reader, chip and PIN reader, or a keypad input.

[0075] Monitoring and recording when and how access occurs, as well as environmental data, and feeding this information back into a network of such interconnected covers allows a wide variety of diagnostic information to be collected. Furthermore, it will allow for warnings to be triggered if unauthorised access is gained or attempted, and maintenance schedules to be planned and coordinated.

[0076] Improvements and modifications may be incorporated herein without deviating from the scope of the invention as defined by the appended claims. For example, it will be understood that access chambers comprise manholes, utility vaults, utility access points, hydrants and the like, and that the present invention relates to a cover suitable for any of the above where unauthorised access is undesirable.

Claims

1. A cover for an access chamber, the cover comprising:

   a cover plate having an opening means; and

   a locking mechanism;

   wherein the opening means is adapted to cooperate with the locking mechanism and the locking mechanism is adapted for engagement with the access chamber.

2. A cover as claimed in claim 1 wherein, the opening means is operable to disengage the locking mechanism from the access chamber.

3. A cover as claimed in claim 1 or claim 2 wherein, the opening means comprises an opening for receiving a key.

4. A cover as claimed in claim 3 wherein, the opening extends through the cover plate to the locking mechanism which is positioned for engagement with the key in use.

5. A cover as claimed in claim 1 wherein, the opening means comprises a mechanical means operable to disengage the locking mechanism from the access chamber.

6. A cover as claimed in claim 1 wherein, the opening means comprises an electronic means operable to disengage the locking mechanism from the access chamber.

7. A cover as claimed in claim 1 wherein, the opening means comprises a magnetic means operable to disengage the locking mechanism from the access chamber.

8. A cover as claimed in any preceding claim wherein, the opening means is remotely operable.

9. A cover as claimed in any preceding claim wherein, the cover plate is shaped to fit into a base plate situated at the top of the access chamber, below ground level.

10. A cover as claimed in any preceding claim wherein, the cover plate has radiused edges.

11. A cover as claimed in any preceding claim wherein, the locking mechanism comprises one or more bolts.

12. A cover as claimed in claim 11 wherein, the one or more bolts are adapted for engagement with the underside of the base plate.

13. A cover as claimed in any preceding claim wherein, the locking mechanism comprises a key slot.

14. A cover as claimed in claim 13 wherein, the key slot is positioned at a predetermined distance from the

top side of the cover plate.

15. A cover as claimed in claim 13 or claim 14 wherein, the key slot has an opening to allow debris to pass through the slot.

16. A cover as claimed in claim 15 wherein, the opening is annular.

17. A cover as claimed in any preceding claim wherein, the locking mechanism is rotatably connected to the cover plate.

18. A cover as claimed in any of claims 13 to 16 wherein, the one or more bolts extend from the key slot.

19. A cover as claimed in claim 17 wherein, the one or more bolts are mounted to the rotatable locking mechanism.

20. A cover as claimed in claim 19 wherein, the one or more bolts are pivotally mounted to the rotatable locking mechanism.

21. A cover as claimed in claim 20 wherein, the one or more bolts pivot by a predetermined maximum amount to disengage the bolts from the underside of the base plate.

22. A cover as claimed in claim 20 or claim 21 wherein, one or more bolts are pivotable in both directions, forward and back.

23. A cover as claimed in claim 20 or claim 21 wherein, one or more bolts are pivotable only in one direction.

24. A cover as claimed in any preceding claim wherein, the locking mechanism is provided with four bolts.

25. A cover as claimed in claim 24 wherein, the four bolts are adapted to extend across the underside of the cover plate.

26. A cover as claimed in claim 24 or claim 25 wherein, the four bolts are further adapted to bear the weight of the cover plate when the cover plate is being removed.

27. A cover as claimed in any of claims 24 to 26 wherein, the four bolts are arranged in a substantially cruciform shape.

28. A cover as claimed in any preceding claim wherein, the cover further comprises a key.

29. A cover as claimed in claim 28 wherein, the key is provided with a spacer situated below a key handle to set the distance that the key may be extended into an opening.

30. A cover as claimed in claim 29 wherein, the cover further comprises an access slot positioned in the opening between the underside of the cover plate and the locking mechanism.

31. A cover as claimed in claim 30 wherein, the access slot is mounted in a block which provides an abutment for the key when the key is used to lift the cover plate out of the access chamber.

32. A cover as claimed in any of claims 1 to 27 wherein, the cover further comprises a remote control adapted to control the opening means.

33. A cover as claimed in any of claims 1 to 27 wherein, the cover further comprises a user interface adapted to control the opening means.

34. A cover as claimed in any preceding claim wherein, the cover further comprises an alarm for detecting attempts to gain unauthorised access to the access chamber.

35. A cover as claimed in claim 34 wherein, the alarm is positioned at or near the underside of the cover plate.

36. A cover as claimed in any preceding claim wherein, the cover further comprises a monitoring means adapted to monitor access to the access chamber.

37. A cover as claimed in claim 36 wherein, the monitoring means is adapted to detect disengagement of the locking mechanism.

38. A cover as claimed in claim 35 or claim 36 wherein, the monitoring means is adapted to store data in connection with access to the access chamber.

39. A cover as claimed in claim 38 wherein, the data comprises information regarding whether access was authorised or unauthorised.

40. A cover as claimed in claim 38 or claim 39 wherein, the monitoring means comprises a communication link for communicating the data to a remote location.

41. A cover as claimed in any of claims 36 to 40 wherein, the monitoring means is capable of receiving a signal over a communications link and controlling the opening means in accordance with the signal.

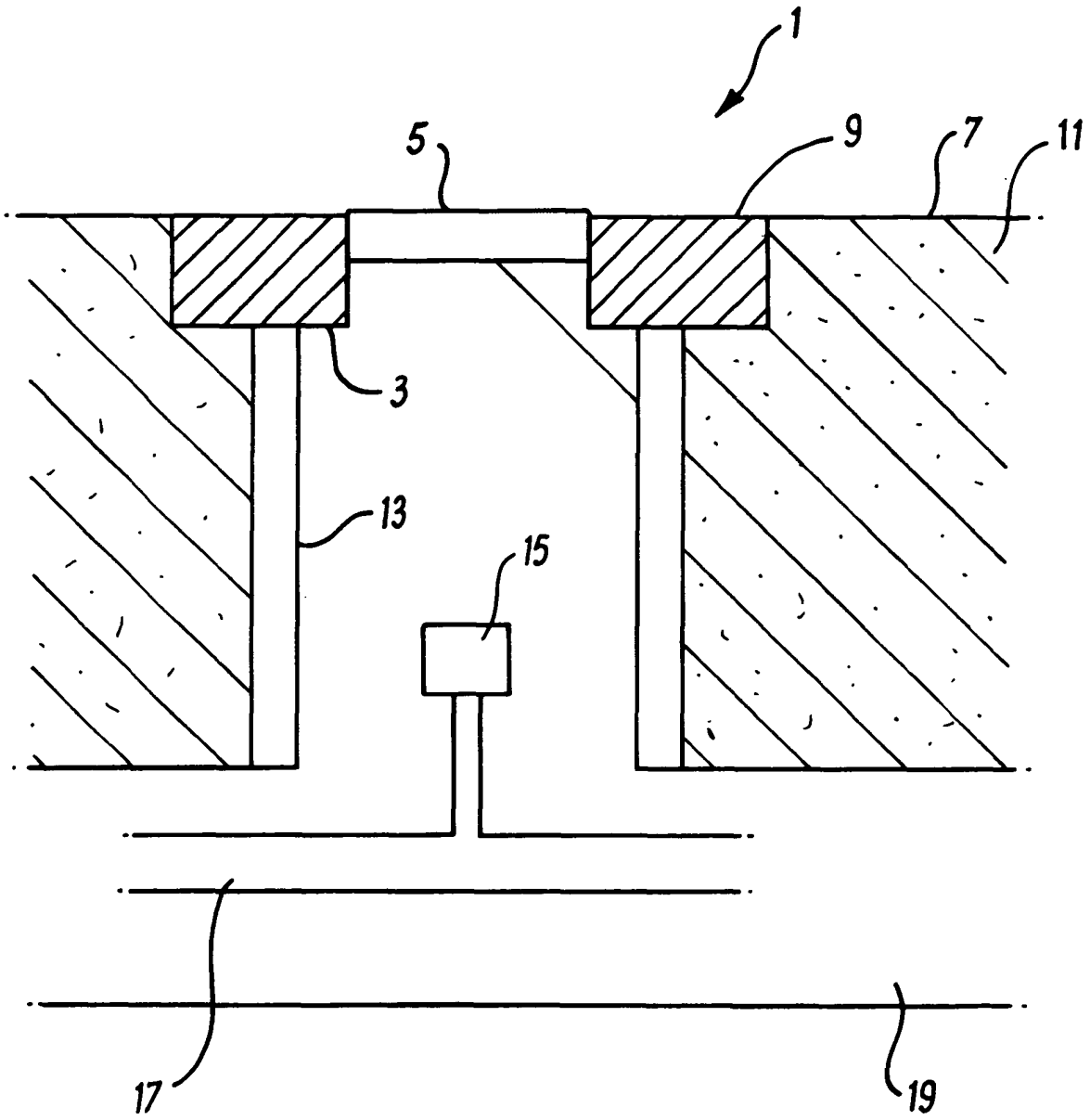

FIG. 1

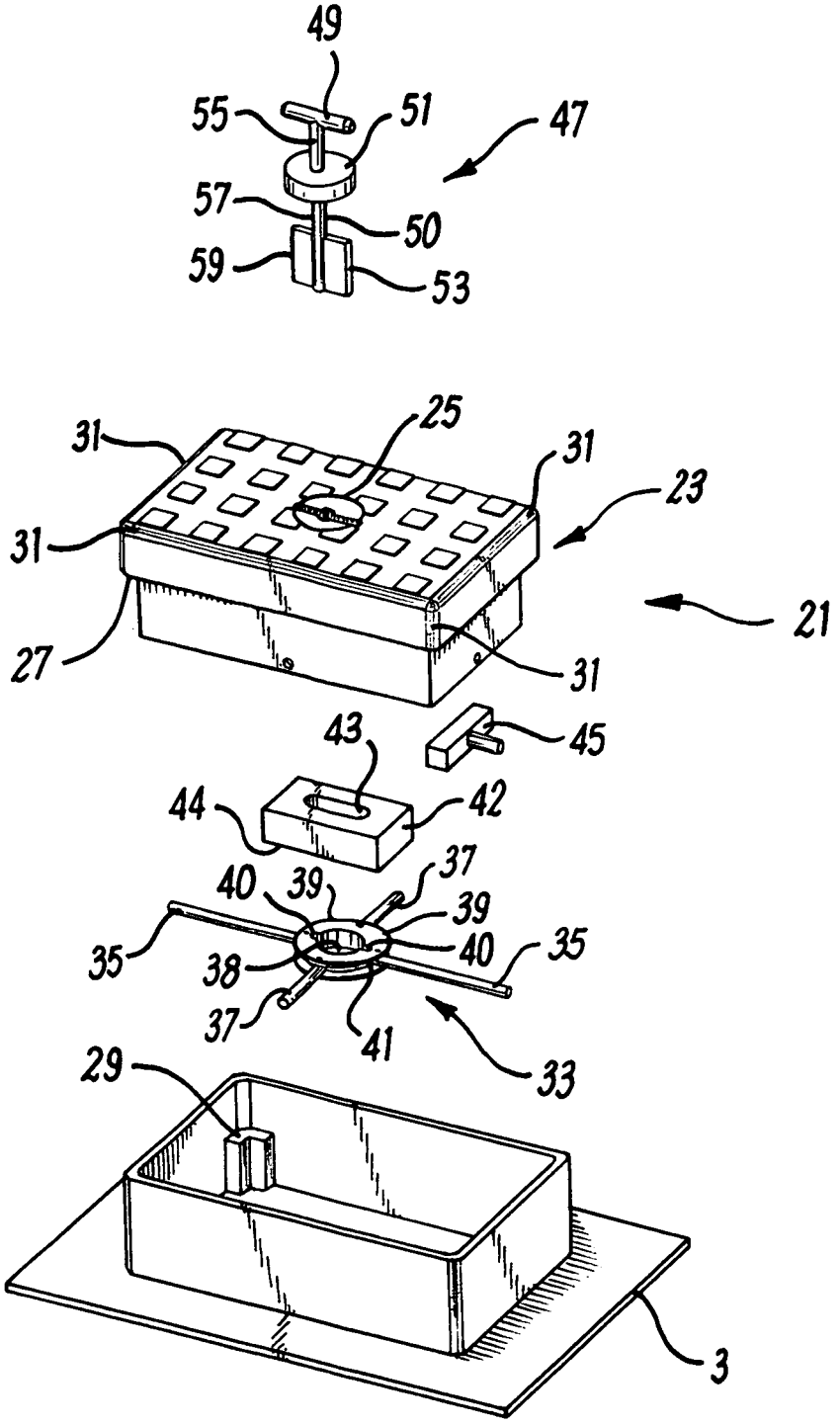
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FIG. 2

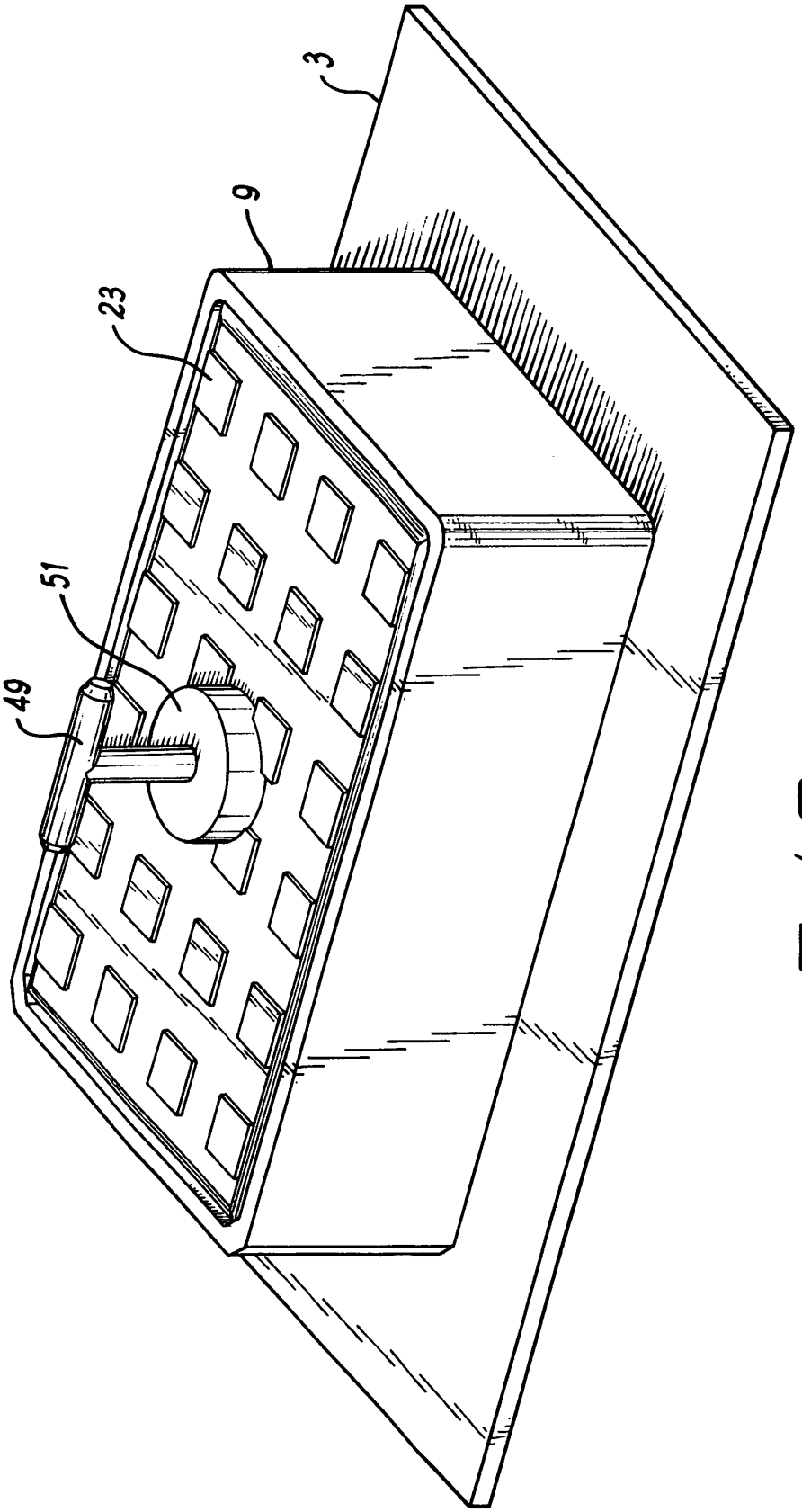

FIG. 3

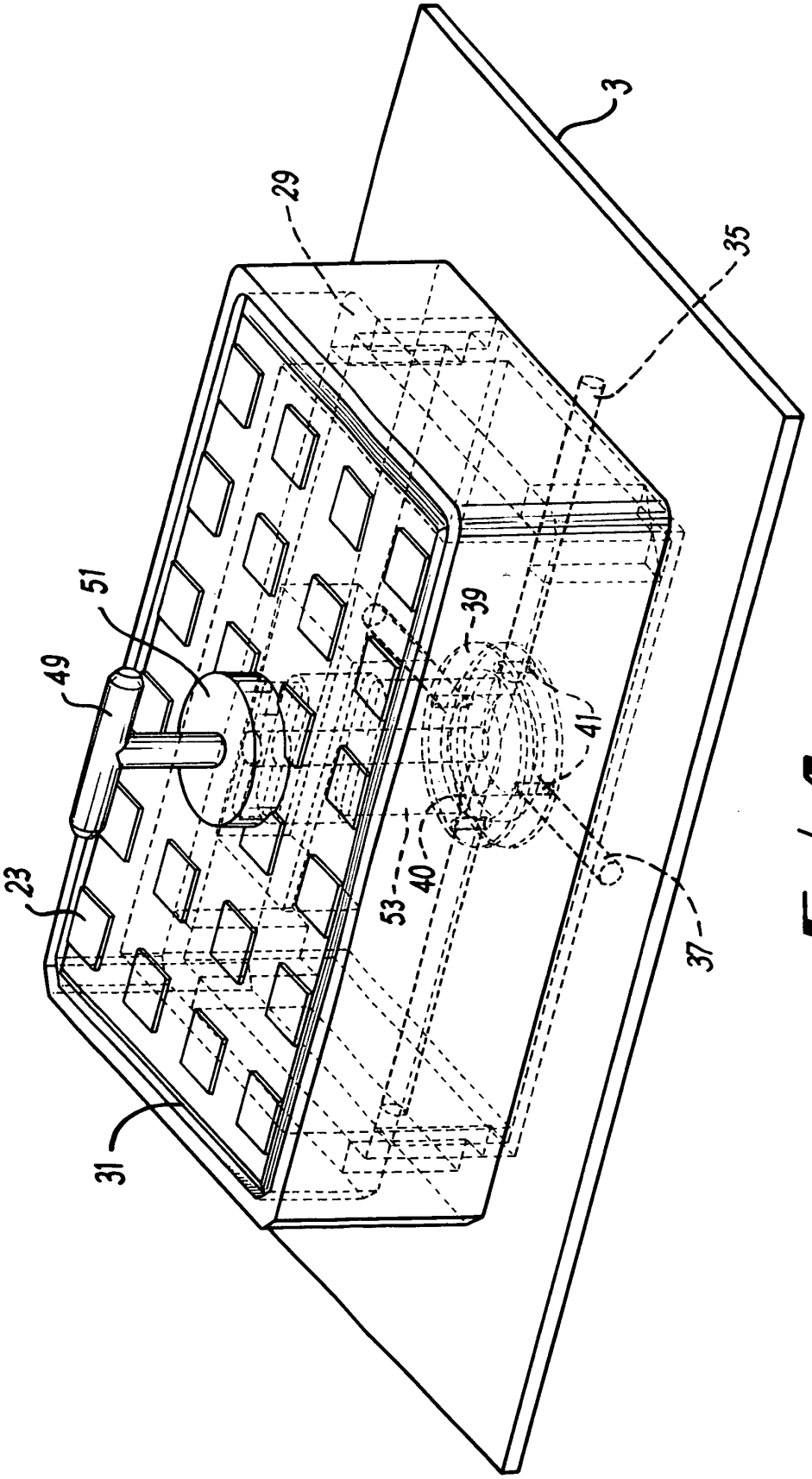

FIG. 4

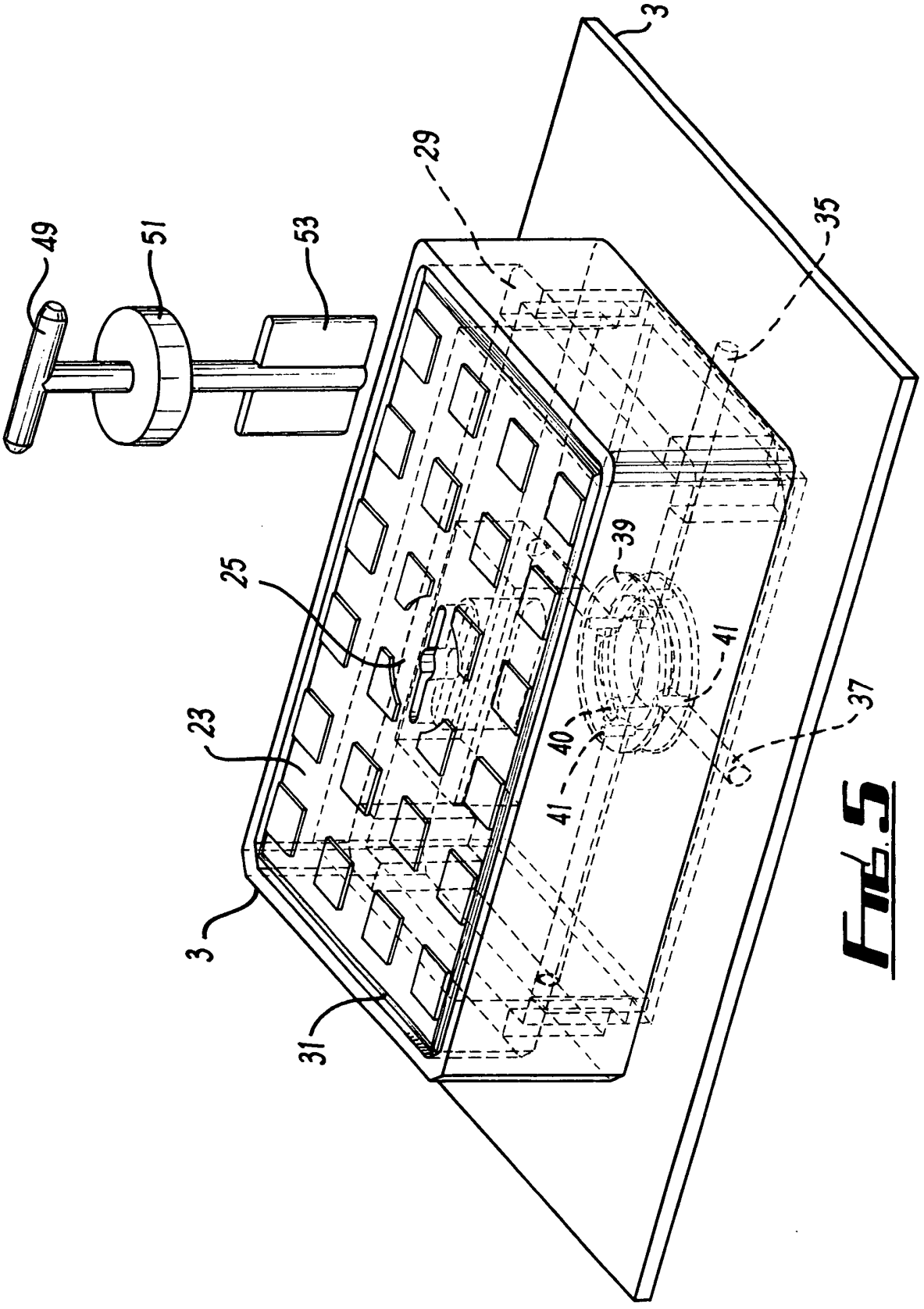

FIG. 5

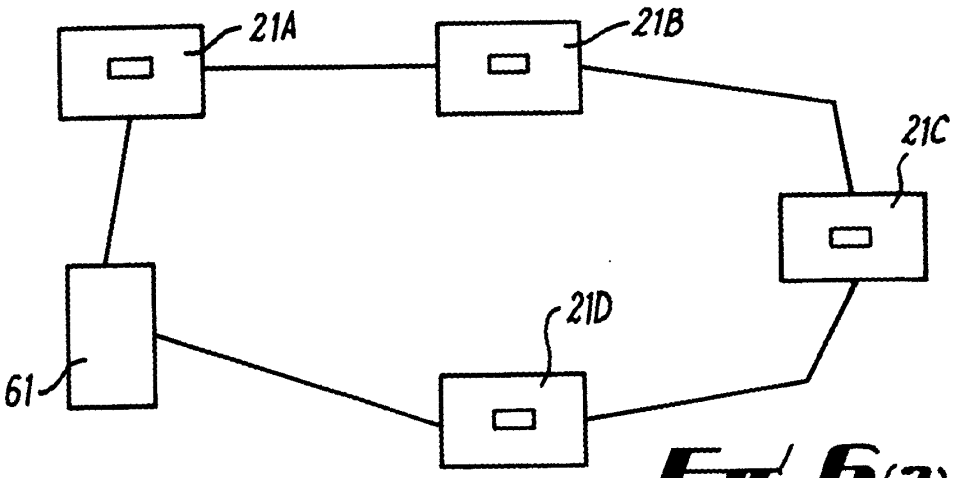

FIG. 6(a)

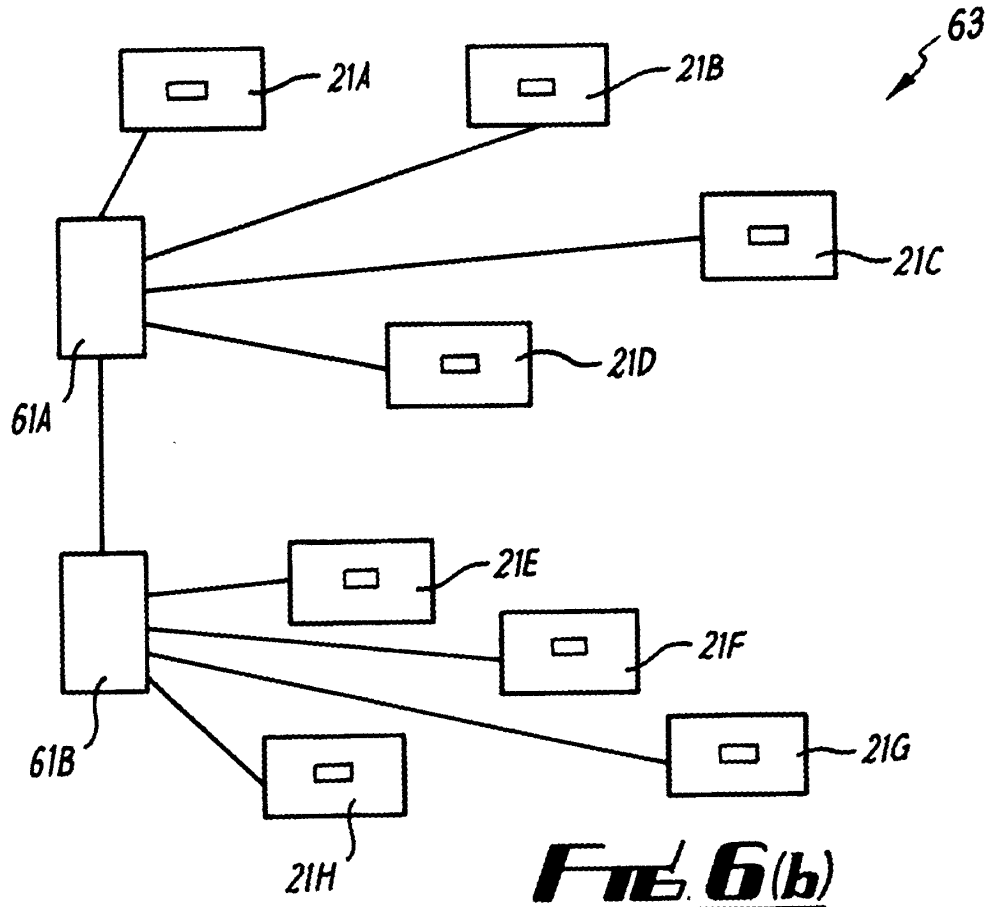

FIG. 6(b)