as a risk of influence on a human body via generation of poisonous gas inside the sewerage pipe line and a risk by inundation when a rainfall rapidly occurs. And, also in the method of positioning a television camera inside the pipe, there are problems such as an sufficient inspection speed being not obtained, and difficulty in controlling the car when the water level inside the sewerage pipe line rises.

[Summary]

[0004]

Therefore, the present invention aims to provide a method, which does not require direct visual observation by an investigator and which has good efficiency, of taking images inside a closed-type space (or a confined space) such as a culvert (a waterway provided underground).

[0005]

According to an aspect of the present disclosure, there is provided an unmanned aerial vehicle comprising at least four rotary wings (rotors), a thrust generation propeller, a drive device that drives the at least four rotary wings and the thrust generation propeller, a control signal generation circuit that generates a control signal for causing the drive device to drive the at least four rotary wings and the thrust generation propeller, and an imaging camera, wherein the unmanned aerial vehicle is configured to fly inside a closed-type space (confined space) by propelling by rotations of the thrust generation propeller while floating by rotations of the at least four rotary wings with driving the at least four rotary wings and the thrust generation propeller while taking (capturing) images inside the closed-type space by means of the imaging camera.

[0006]

It is possible to further provide the above unmanned aerial vehicle with a member for preceding impact (collision) which is for causing an impact on a boundary surface in advance when the unmanned aerial vehicle impacts on (collides with) the boundary surface of the closed-type space.

so that it further includes a direction of travel imaging camera and a direction of travel imaging data transmitter, and that the unmanned aerial vehicle flies inside the closed-type space while taking images of the direction of travel inside the closed-type space by means of the direction of travel imaging camera and while transmitting, to the outside, the obtained direction of travel imaging data from the direction of travel imaging data transmitter.

[0012]

According to an aspect of the present disclosure, there is provided a method of causing a unmanned aerial vehicle having at least four rotary wings (rotors), a thrust generation propeller, a drive device that drives the at least four rotary wings and the thrust generation propeller, a control signal generation circuit that generates a control signal for causing the drive device to drive the at least four rotary wings and the thrust generation propeller, and an imaging camera, to fly inside a closed-type space (confined space) by propelling by rotations of the thrust generation propeller while floating by rotations of the at least four rotary wings with driving the at least four rotary wings and the thrust generation propeller while taking (capturing) images inside the closed-type space by means of the imaging camera.

[0013]

By the present disclosure, taking of images inside the closed-type space with higher safety and without necessity of going underground by an investigator, becomes possible. In addition, in comparison to a self-propelled car, the unmanned aerial vehicle does not tend to impair its mobility even in a case where there is water inside the closed-type space, thus more efficient imaging becomes possible.

[Brief Description of Drawings]

[0014]

[Figure 1A] A perspective view (oblique drawing) of an unmanned aerial vehicle as one embodiment of the present invention

[Figure 1B] A figure showing the unmanned aerial vehicle of Figure 1A