# Device for stabilizing and controlling a video camera (abstract)

The invention is related to controllable mechanical platforms for video cameras that make it possible to control the camera's rotation and to stabilize its position. The inertial and active stabilization of the camera are used simultaneously. The control signal is summarized with the electronic gyroscope signal and is sent to the servomechanism. There is no rigid connection between the servomechanism and the axis of the camera's rotation. The main area of application are lightweight, unmanned flying devices.

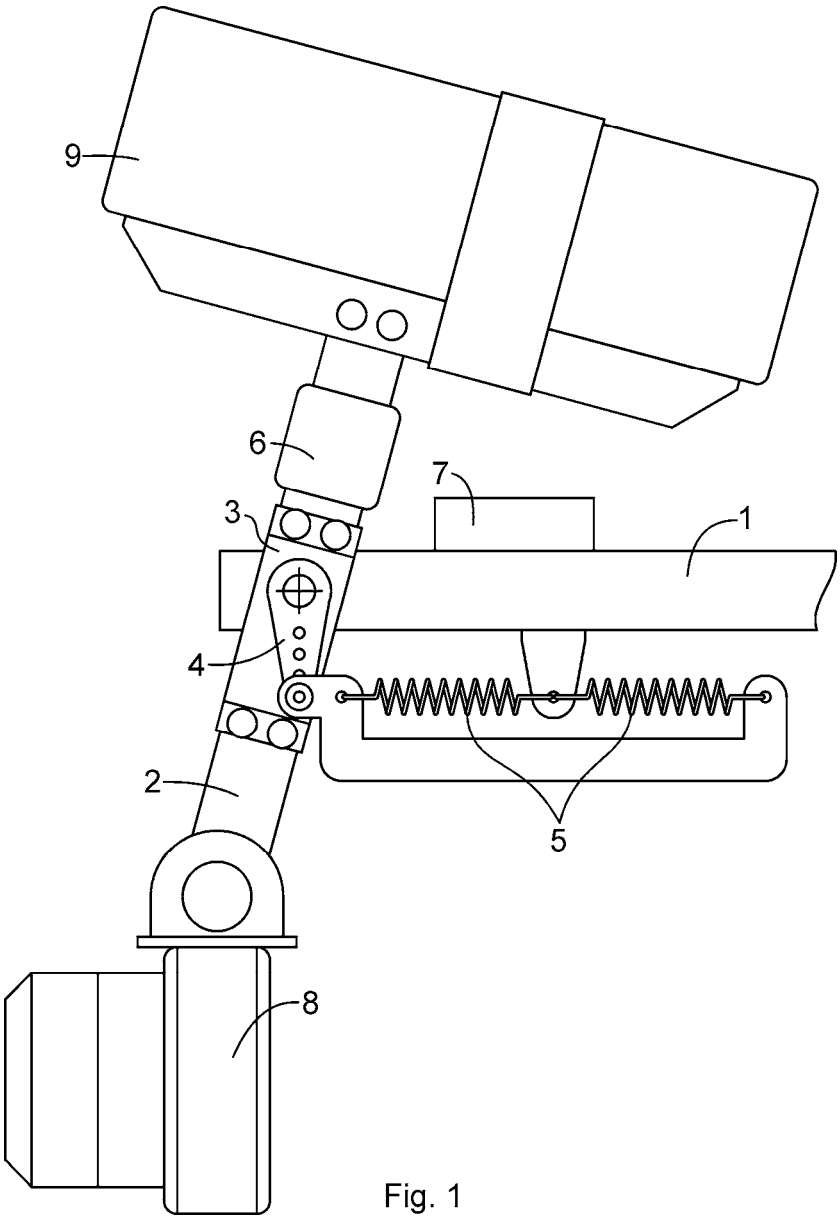



Fig. 1

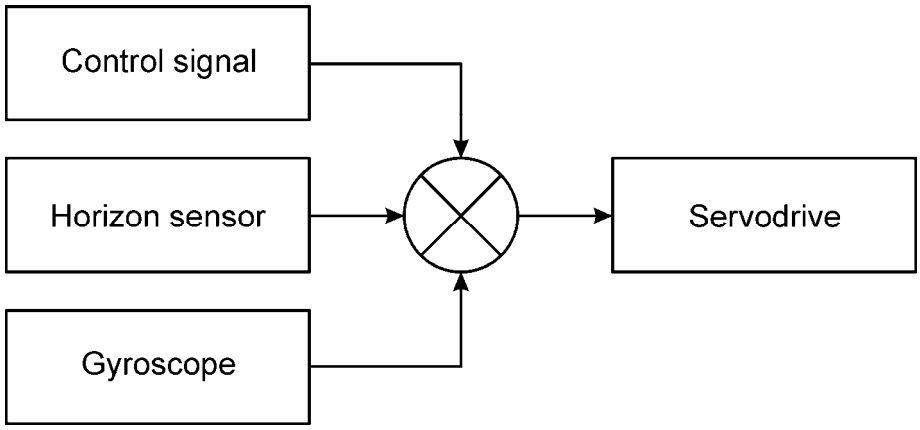
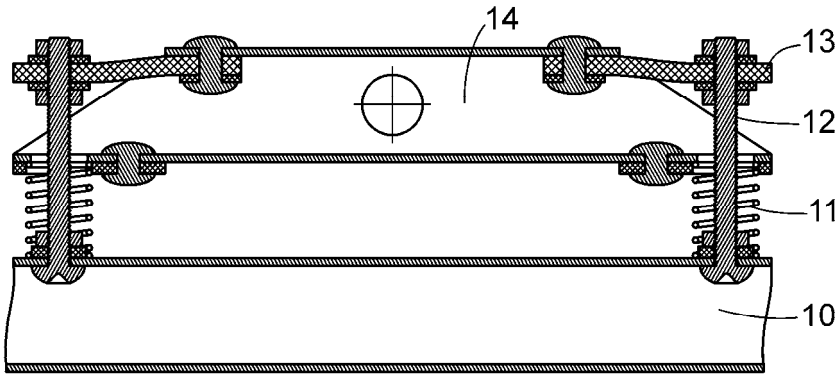

Control signal
Horizon sensor
Gyroscope
Servodrive

Fig. 2


14
13
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11
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Fig. 3

# Device for stabilizing and controlling a video camera

The invention relates to video camera stands that make it possible to tilt the camera using a servomechanism.

Currently controllable platforms with servo drives for video cameras are used not only to turn a camera, but also to actively stabilize its position. An example of a servo drive for such a platform is described in patent LT5753. The drawback of this stabilization system is constant trembling of the camera with a small amplitude. This trembling or jittering is explained by the delay of the servo drive's reaction to the electronic gyroscope signal. The delay arises both in the electronic scheme and in the mechanical part of the servo drive. This drawback is absent in inertial stabilization systems. An example of inertial camera stabilization appears in patent US2007215. The drawback of a simple inertial system is the inability to control the camera without disrupting its stability. Because there is no control, the camera gradually drifts from the fixed direction.

The objective of the invention is to reduce unwanted trembling of the camera by using a servo drive. The objective is achieved by using a complex of technological solutions, outlined below.

The control and stabilization system is described using the example of one axis, although three axes have to be mounted for full camera stabilization. The platform with the video camera is balanced precisely on the rotation axis. It is recommended to use a counterweight so the rotation axis is located between the camera and the counterweight. For a counterweight, one of the heaviest elements of the device upon which the camera is mounted may be used, for example, accumulators. A servomechanism is used whose arm position is determined by the control signal. The servomechanism is mounted on the stabilized part of the device. The servomechanism's axis coincides with the axis of the platform's rotation. If the servomechanism is used only for stabilization within the boundaries of an insignificant deviation, then it can be mounted on the unstable part of the device and the rotation axes do not have to coincide. The servomechanism's arm connects with the unstable base through a spring or through two extended springs. The springs can be extended or compressed when there is a deviation in both directions. The lack of a rigid connection makes inertial stabilization of the camera possible and prevents trembling during the servomechanism's operation. An electronic gyroscope is mounted on the stabilized part of the device. The electronic gyroscope is necessary to prevent the platform from swinging. An inertial horizon sensor is mounted on the unstable part of the device. The signal of the horizon sensor is proportional to the tilt angle. The deviation of the servomechanism proportionally corresponds to the signal of the horizon sensor. The horizon sensor prevents the stabilized platform from gradually drifting. To prevent drifting along the panorama axis, the horizon sensor should be replaced with an electronic compass. The signal of the manual or automatic control is summarized with the gyroscope signal and is sent to the servomechanism. To prevent high-frequency vibrations and shaking, the construction of the stabilized platform is mounted on the shock absorbers. The shock absorbers are on one vertical level with the camera's rotation axes.

Figure 1 shows an example of the mechanism of the camera's tilt axis. The designated positions are: 1 - unstable base; 2 - stabilized platform; 3 - servomechanism; 4 - arm; 5 - springs; 6 - gyroscope; 7 - horizon sensor; 8 - video camera; 9 - vehicle-borne battery.

Figure 2 shows the flow chart of processing the control and stabilization signals.

Figure 3 shows an example of a light shock absorber in cross-section. The designated positions are: 10 - unstable base; 11- spring; 12 - fixture screw; 13 - rubber latch; 14 - frame for fixing the rotation axis

The main area of application of the above video camera stabilization system are lightweight, unmanned flying devices. Upgrading a video camera's stabilization system enables artistic shooting or observations with higher image quality.

**Climes**

1. The device for stabilizing and controlling a video camera with one or more rotation axes, **characterized in that**, the servomechanism is mounted on the stabilized part of the video camera's platform, the servomechanism's axis coincides with the axis of the platform's rotation, and the servomechanism's arm is connected to the unstable base through a spring.

2. The device for stabilizing and controlling a video camera according to clime 1, **characterized in that** an electronic gyroscope is mounted on the stabilized part of the platform, whose signal is summarized with the horizon sensor signal, summarized with the control signal, and sent to the servomechanism.

3. The device for stabilizing and controlling a video camera according to clime 1, **characterized in that** a video camera and additional weight are mounted on the stabilized platform, with the rotation axis located between the video camera and the additional weight.

4. The device for stabilizing and controlling a video camera according to clime 1, **characterized in that** the rotation axis is not controllable but stabilized, and the servomechanism is located on the unstable part of the platform and its axis does not coincide with the axis of the platform's rotation.

5. The device for stabilizing and controlling a video camera according to clime 1, **characterized in that** the fixture of the platform's rotation axes is mounted on the shock-absorbers that are located on one vertical level with the rotation axes.