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DEVICE FOR POINTING IN A VARIABLE ALTITUDE AN OPTICAL APPARATUS

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Fig.1

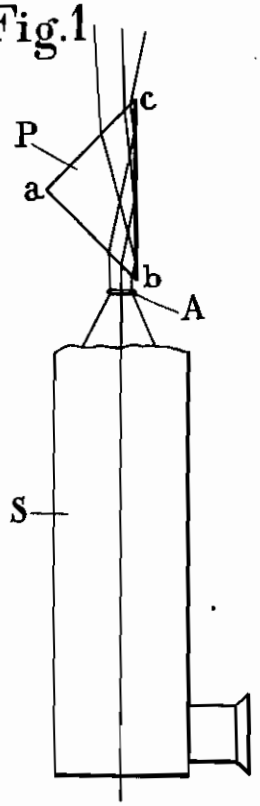


Fig.2

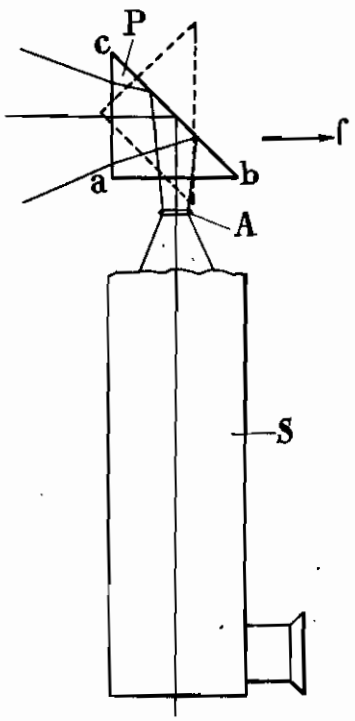


Fig.3

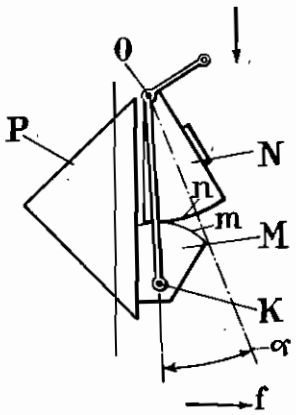
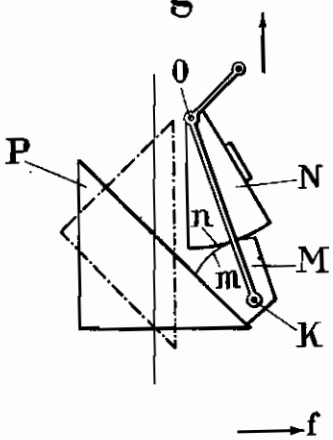


Fig.4



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DEVICE FOR POINTING IN A VARIABLE ALTITUDE AN OPTICAL APPARATUS

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The present invention has for object an optical and mechanical device applicable to all optical apparatus, in particular to periscopes, and allowing the direction of the optical axis of the apparatus to be varied from zero or $-\alpha$ degrees to the zenith, that is to say to $+90°$.

The devices used up to now are constituted, either by a system of two prisms united at 90° and dividing into two equal portions the field in the complete zenithal vision, or by a single prism rotating about any point of its base or outside its base.

Each of these devices has inconveniences as regards visibility and mechanical and optical construction.

In fact, in the first case, the objective is sectioned into two asymmetric parts with alteration of the image given by the optical system, and in the second case, interfering reflections give rise to the formation of multiple images of various intensities which can only be caused to disappear by the use of a prism of exaggerated dimensions rendering the cumbersomeness of the apparatus unacceptable.

The system forming the subject-matter of the present invention allows of obtaining at all altitudes a correct image, without interferences and with a device of minimum cumbersomeness.

Substantially, the invention comprises a prism placed in front of the inlet objective of the apparatus. This prism forms an angle of 45° with the base, but said angle can vary according to the position of the inlet objective of the apparatus.

This prism is constituted by a material having a high refractive index, and is made for instance of light flint, which, notwithstanding the high refractive power, has a maximum transparency and consequently, a reduced absorbing power. It is capable of moving with a double combined movement of rotation and translation, that is to say, that while the rotation takes place, the prism has a movement of translation which is intended to use only the part in which no interfering reflection is possible.

This new assemblage of the prism mounted by way of example, on a periscope will be described hereinafter in greater detail with reference to a preferred embodiment illustrated in the accompanying drawing in which:

Fig. 1 illustrates an optical apparatus composed of a system S and of the prism P in the position pointing to the zenith. A is the inlet obejctive of the system.

Fig. 2 illustrates the pointing prism in the position pointing to the horizontal. The prism P has rotated through 45° relatively to the position previously illustrated in dotted lines, and it has, at the same time, been subjected to a movement of translation in the direction of the arrow *f*.

Fig. 3 diagrammatically illustrates the mechanical system ensuring the rotation and the translation of the prism in the zenithal position.

Fig. 4 illustrates the same system with the prism in horizontal pointing position.

In Fig. 1, the light beam issuing from the objective A of the optical system S is refracted on the face *a b* of the prism P, is reflected on to the base *b c*, and after another refraction issues on the face *a c* with the same inclination as at the incidence.

The angle *a* of the prism P is so calculated that the rays issue without being subjected to interfering reflections.

In Fig. 2, the prism has rotated through 45° and so that it should not be brought forwardly, it is subjected to a movement of translation according to the arrow *f*.

This movement has a double purpose: to avoid that the prism in its rotation should occupy a forward position creating an exaggerated bulk and to cause it to operate at the parts where no interfering reflection is possible.

This double movement is obtained in the example shown, in the following manner:

A sector M (Figs. 3 and 4) rigid with the prism P rolls by its curved face *m* on the curved face *n* of a sector N having a fixed centre O. During this rolling the prism P rigid with M will rotate according to a quantity equal to the rotation of M whilst moving laterally in the direction of the arrow *f*. Any point of the prism therefore describes a cycloid having the sector N for base.

The driving is effected by means of a connecting rod OK pivoted about the point O centre of the sector N, and about the point K, centre of the sector M. By causing said connecting-rod to rotate about O according to the arrow *f*, the cycloidal movement of the prism P will therefore be obtained. The prism is illustrated in dot and dash lines in its zenithal position.

It is to be understood that said double movement of rotation and translation of the prism relatively to the optical system can be obtained in any manner other than with the mechanical device which has just been described; for instance, said movement may be obtained by means of a suitable cam, a system of connecting-rods or levers, etc.

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