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S. CZAPSKI.

ORDNANCE BORE SIGHTING TELESCOPE.

APPLICATION FILED OCT. 2, 1906.

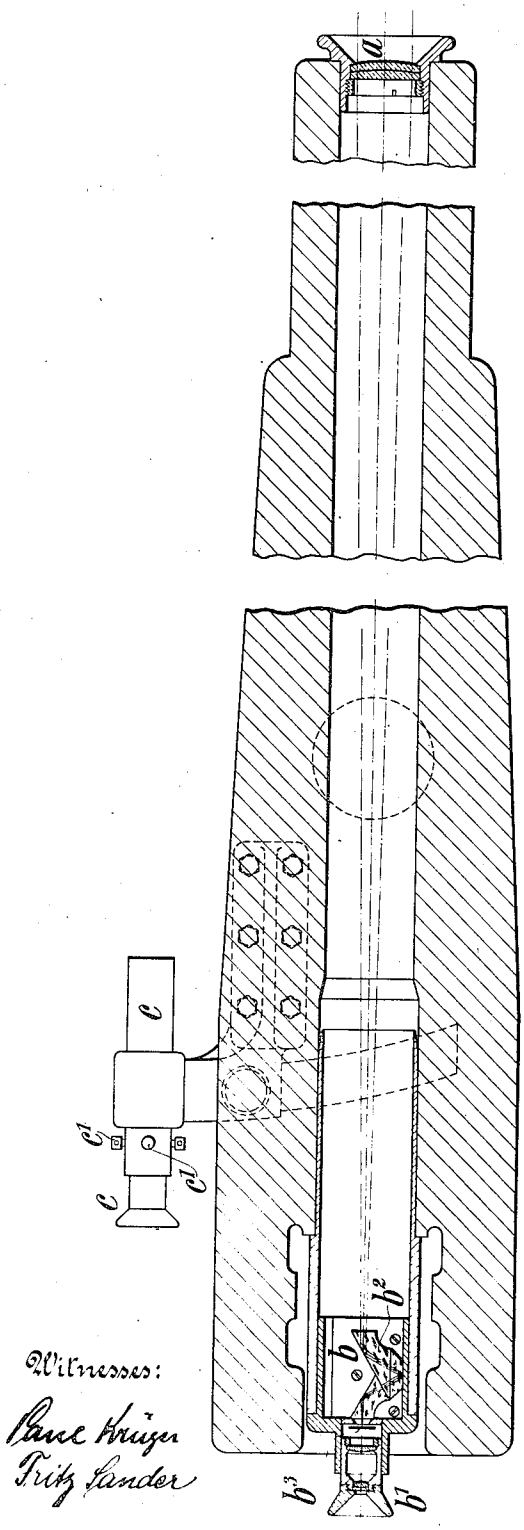


Fig. 1

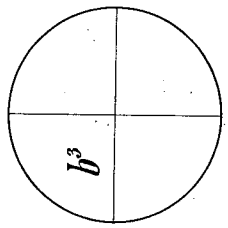


Fig. 2

Witnesses:

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ORDNANCE-BORE SIGHTING-TELESCOPE.

No. 893,836. Specification of Letters Patent. Patented July 21, 1908.

Application filed October 2, 1906. Serial No. 337,130.

To all whom it may concern:

Be it known that I, SIEGFRIED CZAPSKI, doctor of philosophy, a citizen of the German Empire, and residing at Carl-Zeiss strasse, Jena, in the Grand Duchy of Saxe-Weimar, Germany, have invented a new and useful Ordnance-Bore Sighting-Telescope, of which the following is a specification.

The invention relates to optical appliances to be inserted into the bore of guns.

Testing the adjustment of the gun sighting device, telescopic or ordinary, that is, investigating whether the line of aim in its zero position be parallel to the axis of the bore (that is, whether both be directed upon the same far distant point) has hitherto ordinarily been carried out in the following manner. An ordinary sighting telescope is set in the middle of an insertion piece, which fits into the breech of the gun and this insertion piece is placed in position. In correct adjustment of this bore sighting telescope, its line of sight coincides with the axis of the bore. The bore sighting telescope can then be employed in testing the adjustment of the sighting device. This is done by directing the gun, until a very distant point lies in the line of sight of the bore telescope, and thereafter examining, whether this point lies also in the line of aim of the gun, when the sighting device of the latter is set to zero. A bore sighting arrangement as described must be tested each time before use, by inserting a frame with cross-wires or the like into the muzzle of the gun and focusing the telescope thereupon, to see whether its line of sight passes through the middle point of the muzzle or whether the telescope should be re-adjusted to cause its line of sight to do so. The zero position of the line of aim could not otherwise be determined with the necessary high accuracy. With careful construction of the bore sighting telescope the relative position of the line of sight to the telescope casing will not readily undergo displacement, but, in general, the relative position of the telescope casing to the insertion piece and particularly that of the insertion piece to the barrel of the gun does not in each renewed adaptation of the appliance coincide sufficiently exactly with that in which the sighting telescope was originally adjusted. This will be understood from the facts, that the dimensions both of the telescope and the insertion piece are comparatively small and a minute angular displacement of the bore telescope represents a coarse error as regards the direction of its line of sight.

Modifying the usual arrangement, so that the specified coincidence takes effect automatically with adequate accuracy and needs no longer to be tested each time before use, is the purpose of the present invention. With this end in view, the insertion piece is divided into two separate portions, of which one portion is fitted into the muzzle of the gun and only carries an objective system, whose focal length is approximately equal to the length of the barrel, while the other portion of the insertion piece occupies the former position in the breech but is only provided with the ocular and the cross wires or other mark for sighting. Since in this arrangement the two points, by which the line of sight is determined, namely the back nodal point of the objective system and the middle point of the mark for sighting, lie separated by the length of the barrel, the relative position of the line of sight to the barrel can no longer be perceptibly influenced, in successive adaptations, by the unavoidable small angular differences between successive positions of the two portions of the insertion piece.

In the annexed drawing: Figure 1 is a longitudinal vertical section through a gun barrel equipped with a telescopic sighting device and the improved gun bore sighting arrangement. Fig. 2 is a front view on an enlarged scale of a cross-lined plano-parallel glass plate comprised in the said arrangement.

The objective system a is inserted into the muzzle. Its axis coincides with the axis of the bore. The terrestrial ocular system b, consisting of an astronomical ocular b^1 and an erecting prism b^2, is inserted with its elongated mount into the cartridge chamber. In the focal plane of the objective, between the astronomical ocular and the prism system, cross lines are provided on a plano-parallel glass plate b^3, their point of intersection lying on the common axis of the bore and the objective in the focal point indicated in Fig. 1 by converging rays. The telescopic sighting device c of the gun is placed on the top of a curved bar shown as adjusted in the zero position, in which the line of aim should be parallel to the axis of the bore. To test this, the gun is directed to some far distant point, so that the image of this point coincides with the center of the cross lines on plate b^3. If then

in the sighting device *c* the image of the same point does not likewise coincide with the center of the sighting mark, such coincidence may be effected by means of the adjusting screws c^1 which control the position of the sighting mark.

I claim:

An optical appliance adapted to be inserted into the bore of a gun and consisting of two separate portions, a muzzle portion and a breech portion, the muzzle portion carrying an objective system, the focal length of which is approximately equal to the length of the barrel, and the breech portion carrying an ocular system with a mark for sighting.

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