

March 10, 1925.

1,528,772

P. KAMINSKI

ELECTRICAL ARRANGEMENT FOR THE TELECONTROL OF GUNS OR THE LIKE

Original Filed Jan. 27, 1921

Fig. 1.

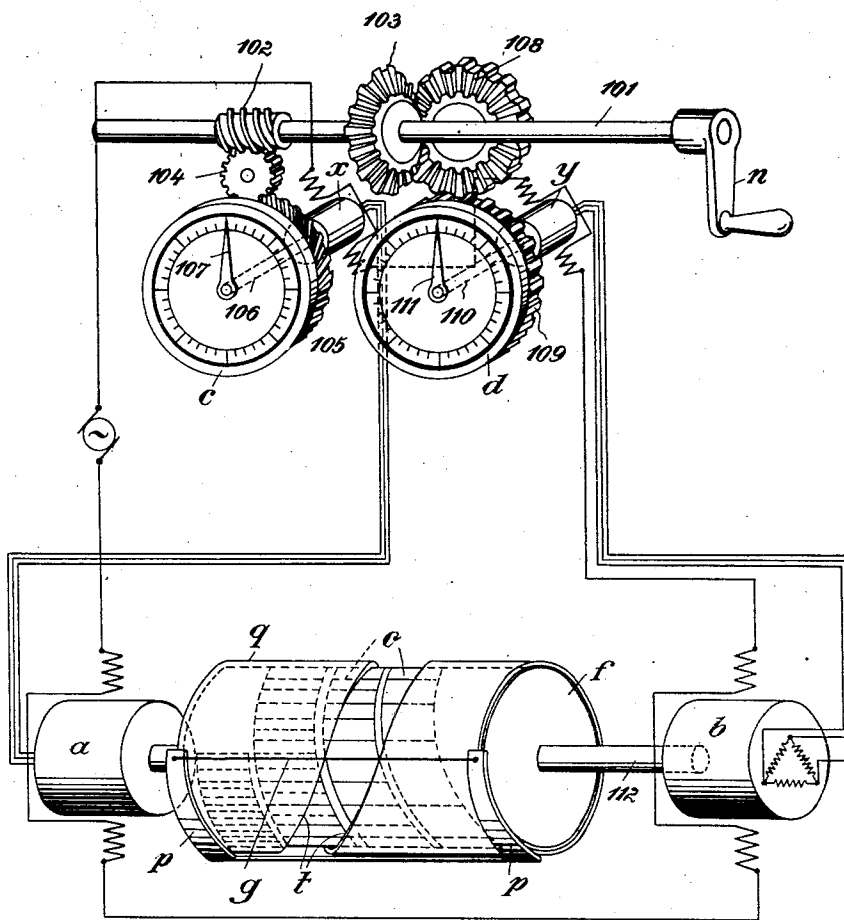
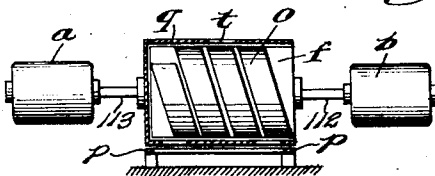


Fig. 2.



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PAUL KAMINSKI, OF BERLIN-PANKOW, GERMANY, ASSIGNOR TO SIEMENS & HALSKE, AKTIENGESellschaft, OF SIEMENSSTADT, NEAR BERLIN, GERMANY, A CORPORATION OF GERMANY.

ELECTRICAL ARRANGEMENT FOR THE TELECONTROL OF GUNS OR THE LIKE.

Original application filed January 27, 1921, Serial No. 440,551. Divided and this application filed December 2, 1921. Serial No. 519,405.

To all whom it may concern:

Be it known that I, PAUL KAMINSKI, a citizen of the German Empire, residing at Berlin-Pankow, Germany, have invented certain new and useful Improvements in Electrical Arrangements for the Telecontrol of Guns or the like, for which I have filed applications in Germany November 8th, 1918, Ser. No. 49214 VIII/74 c; Denmark, July 19th, 1920, Ser. No. 2235; Holland, August 5th, 1920, Ser. No. 15975; Italy, June 25th, 1920, S. No. 39065; Norway, June 24th, 1920, Pat. Nr. 33075; Sweden, June 22nd, 1920, Ser. No. 2930/20; Spain, July 2nd, 1920, Pat. No. 74393; Japan, July 28th, 1920, Ser. No. 59342, and of which the following is a specification.

My invention relates to electric signal systems embodying transmitters and receivers for coarse and fine adjustment and a scale with unequal graduations at the receiving station.

The present invention constitutes a division of my copending application, Serial No. 440,551, filed January 27th, 1921, Patent No. 1,470,368, issued October 9, 1923.

Follow-the-pointer systems are known, by means of which accurate adjustments on guns,—e. g. of the sighting arrangement of guns are effected by pointers or systems on the gun being controlled electrically from a central control station, whilst during the setting of the sighting device by hand, other pointers or systems are moved, which are made to follow the electrically controlled pointer or system.

With such arrangements it is also possible to effect the adjustment of the gun proper or its sighting device, and the following pointer or system, not by hand operation but, for instance by means of a motor, the circuit of which is closed selectively by contacts, two of which are provided on the following system, and one on the pointer controlled electrically from the central control station, such as has been described for instance in my patent application Serial No. 468,966 filed May 12th, 1921. In order to enhance the accuracy of such installations, the transmission from the central control station is preferably effected through two systems of transmitters which are coupled

together through a train of gears in such a manner that the fine system makes several revolutions during the period when the coarse system carries out one revolution. Double systems coupled together at the same ratio must also be provided on the electric receiving stations at the guns and on the following pointers or following systems depending upon the position of the guns. With such arrangements it is only necessary, in order to accomplish the desired adjustment of the gun, to cause the following pointers or following systems depending upon the position of the gun, to register with the pointers controlled electrically from the central control station, without the necessity of reading off the angle of inclination or the range. According to the theory of ballistics, however, the angle of inclination necessary for a gun to hit the target, increases more rapidly than the linear range of the target; hence the receiver system may either be subdivided according to "angles of inclination" or according to "range of the target." As the adjusting device of the sighting telescope sets equal values of angles on the sighting device for equal distances through which it passes, it is favourable from the point of view of accuracy of the transmission of the transmitter movement, to cause also the receivers and, at the same time the transmitters of the following pointer systems, to pass through equal distances for equal angles of inclination of the gun. In this case, a uniform division on the transmitters and receivers will consequently represent "angles of inclination of the guns." In this manner, however, it becomes difficult to indicate by means of the same apparatus also the range of the target, which may be required at the gun for other purposes, this range not increasing uniformly in proportion to the values of the angles. For instance, it might well be possible to provide the coarse system with a non-uniform division for the "range of the target," but for most purposes this scale would not be sufficiently accurate. It would be out of the question, for increasing the accuracy, to resort to the fine system because, as for each revolution of the fine system different distances must be covered on

the varying scale of the coarse system, the fine system would have to be subdivided differently for each revolution.

The object of this present invention is to overcome these difficulties and to render accurate reading of the range possible on the gun, notwithstanding the subdivisions on the transmitter being made so as to indicate the inclination.

This is accomplished by adjusting elements being connected to the rotatable parts of the coarse and fine receivers, the adjusting member of the fine receiver being provided with a scale arranged in a multiple of helical turns, whilst the adjusting member of the coarse receiver covering the former, is fitted with a helical slit, the pitch of which is in the same ratio to the pitch of the scale of readings as the numbers of revolutions of the coarse and fine transmitters are to each other, it being thus possible to read off the order transmitted on the fine receiver opposite a stationary mark.

In the drawings an example is represented by way of diagram of how this invention may be carried into effect.

Fig. 1 showing the whole arrangement partly in perspective view partly diagrammatically, and

Fig. 2 showing a constructional detail partly in longitudinal vertical section.

In the drawing x represents the electric transmitter of the coarse system and y that of the fine system. a is the receiver of the coarse system and b that of the fine system. The stators of the transmitters and receivers are connected in series to a common source of alternating current. Through a three wire system the rotors of the coarse system of the transmitter are connected with the rotors of the coarse system of the receivers and the rotors of the fine system transmitters to the corresponding receiver rotors. The transmitter shaft 101, supported in the apparatus casing, may be turned by the hand crank n and therewith turns the worm 102. This worm 102 turns a worm gear 104 which engages a tooth gear 105. The tooth gear 105 is fastened upon a shaft 106 supported in the apparatus casing which, at its one end carries the rotor of the coarse system and at its other end the pointer 107. The pointer 107 moves above a scale c fixed to the apparatus casing which is divided with uniform divisions such as for instance according to degrees of the angle of inclination. The shaft 101 moreover rotates through the bevel gears 103 and 108, i. e. with a transmission ratio different from that of the coarse system and by way of the toothed gear 108 the spindle 110 in the man-

ner described above. The shaft 110 turns the rotor of the fine transmitter and the pointer 111 which moves over a corresponding scale d . In this manner through turning the hand crank n of the transmitter arrangement the transmitter rotors are displaced by a certain amount relative to their stators. On the receiver systems the rotors a of the coarse system and b of the fine system are adjusted by the same amount. The rotor b is fixed to a shaft 112 which is journaled in the apparatus casing and which carries a drum f (see Fig. 2).

The division of the range of the target is marked upon this drum f in the shape of a helical screw band o with several turns. This division is not uniform because the range of the target does not increase uniformly relative to the angular amount of inclination adjusted at the transmitter. For reading, the thread g is employed which is held in two brackets p fixed to the apparatus casing. In order to obtain a reliable reading on the drum f notwithstanding the multiple windings of the scale, the shaft 113 of the rotor a of the coarse receiver carries a hollow drum q (see Fig. 2) which is placed over the drum f of the fine system and is provided with a helical aperture t . The pitch of the slit t is in the same ratio to the pitch of the scale drum f as the ratio of the turning speed of the coarse transmitter x to the turning speed of the fine transmitter y . Consequently at the reading-off point marked g only one turn of the helical band o is visible at one time.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is:—

In an electrical telecontrol arrangement, electrical transmitters for coarse and fine adjustment each having a scale uniformly graduated in suitable units, receivers for coarse and fine adjustment operatively connected with said transmitters, a scale drum provided with a non-uniform graduation in units other than those on the transmitter scale and being distributed over several helical turns on said drum, means for rotatably connecting said drum to said fine receiver, and a hollow drum placed over said scale drum, means for rotatably connecting said drum to said coarse receiver, said hollow drum being provided with a helical slit whose pitch has the same ratio to the pitch of the said helical drum scale as the transmission ratio between said coarse and fine transmitter, and a stationary mark for reading off the setting of said scale drum.

PAUL KAMINSKI.