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FUSE ADJUSTING DEVICE.

APPLICATION FILED JUNE 3, 1908. RENEWED OCT. 13, 1909.

944,466. Patented Dec. 28, 1909.

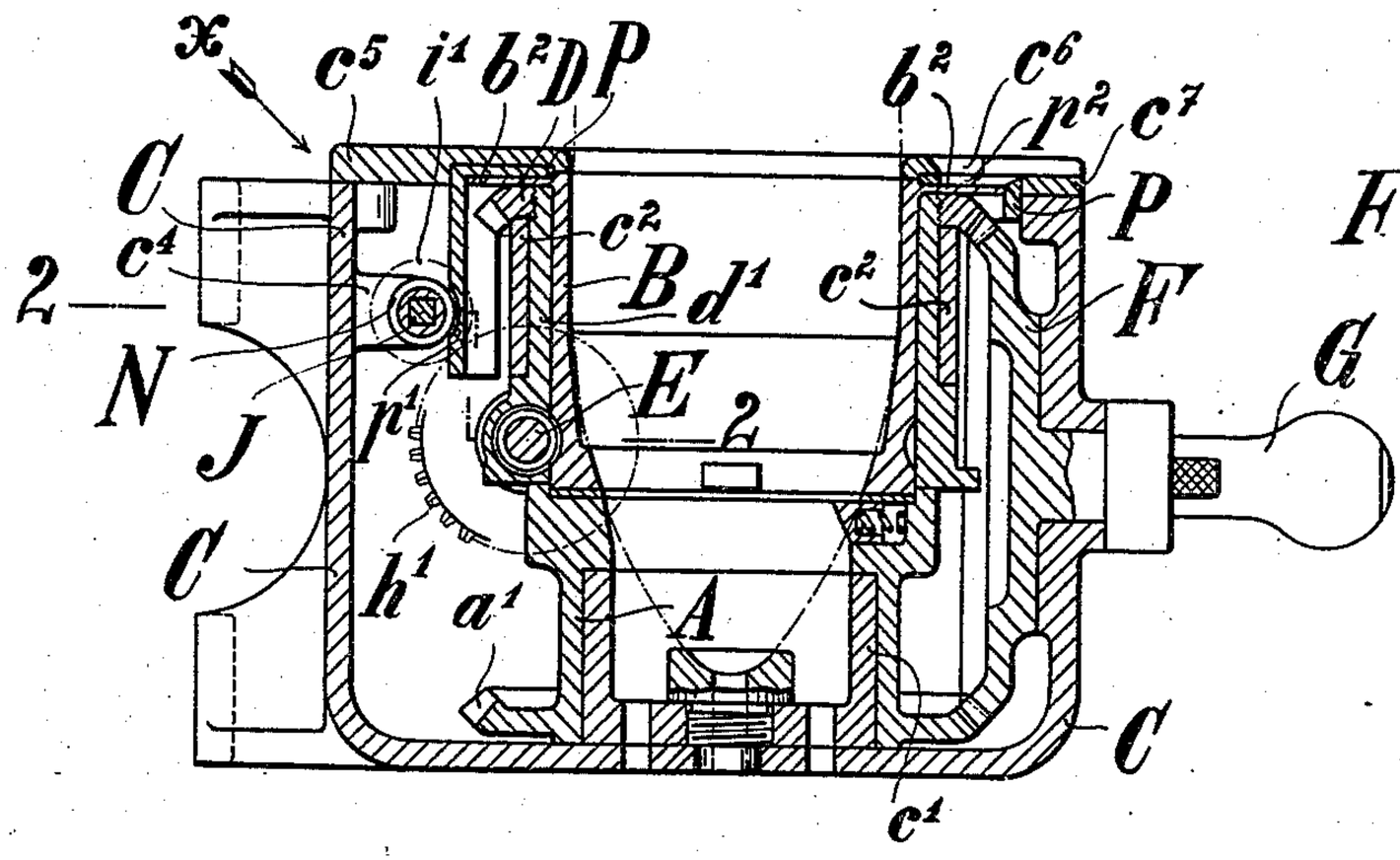


Fig. 1.

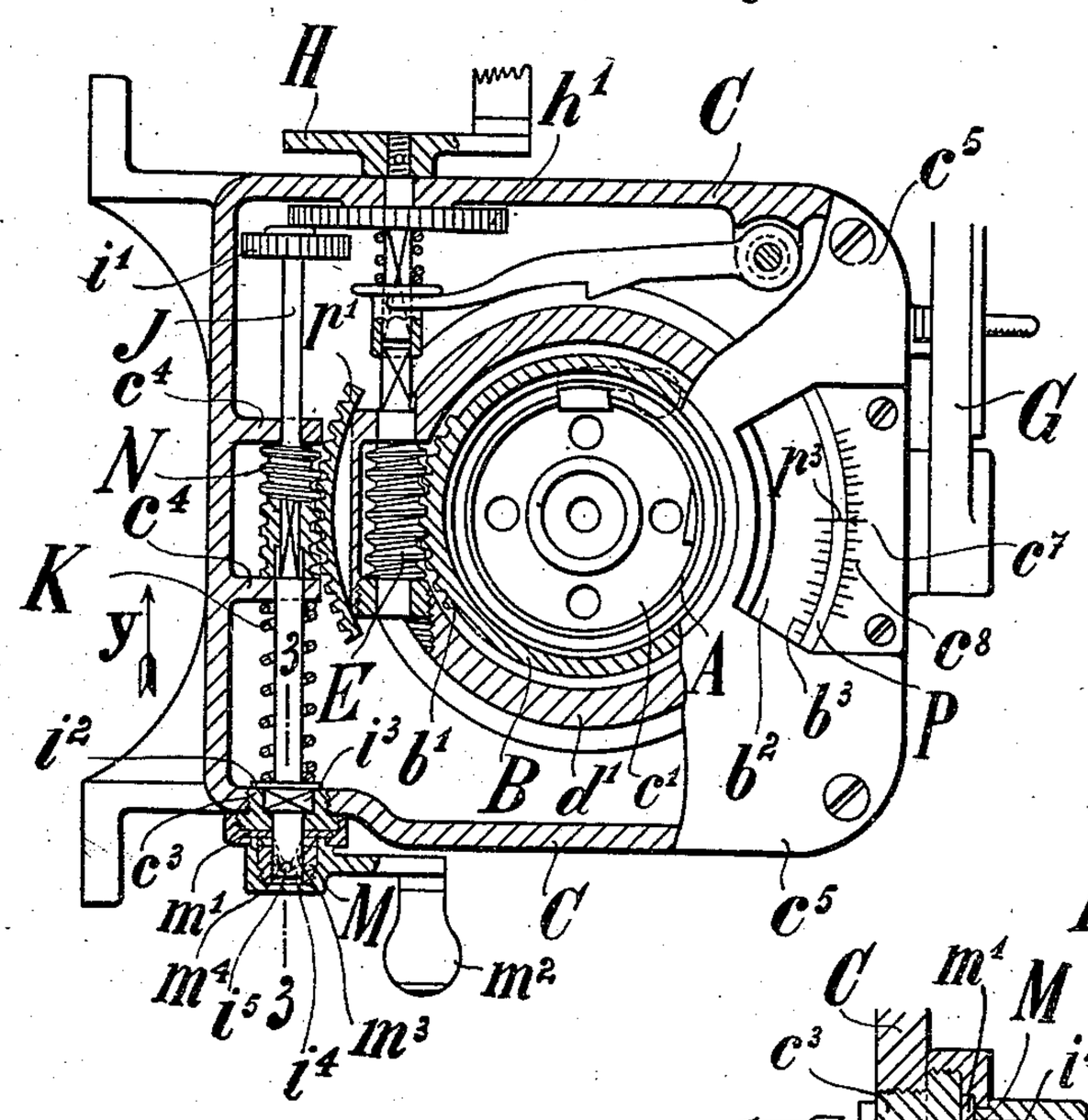


Fig. 2.

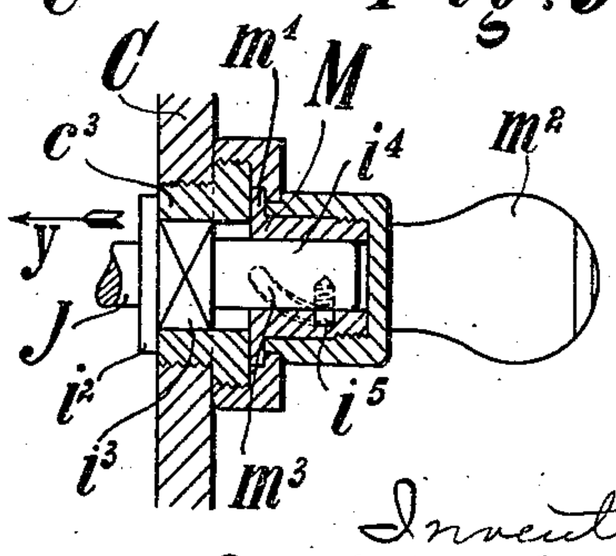
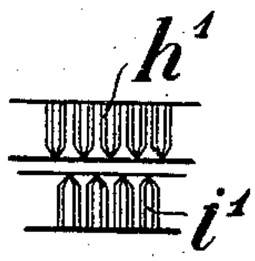


Fig. 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

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FUSE-ADJUSTING DEVICE.

944,466. Specification of Letters Patent. **Patented Dec. 28, 1909.**

Application filed June 3, 1908, Serial No. 436,508. Renewed October 13, 1909. Serial No. 522,488.

To all whom it may concern:

Be it known that we, WILHELM SCHWARTZ, residing at Bredeney-on-the-Ruhr, Germany, and ULRICH WILCK, residing at Essen-on-the-Ruhr, Germany, both subjects of the Emperor of Germany, have invented a certain new and useful Improvement in Fuse-Adjusting Devices, of which the following is a specification.

The present invention relates to fuse adjusting devices and especially to the means for correcting the main adjustment in the type of fuse adjusting devices in which the main adjustment and the correction of the main adjustment are effected by turning the same adjusting member. In the known fuse adjusting devices of this type the adjustment takes place in the following manner: The operator first turns the particular adjusting member until the mark used to read off the main adjustment registers with that division line of the appurtenant scale which corresponds to the desired main adjustment. Thereupon the operator adjusts the mark or the scale to an extent corresponding to the desired correction, according to whether the mark or the scale remains at rest when the main adjustment is obtained. Finally the operator once more turns the adjusting member until the mark for reading off the main adjustment again registers with the aforesaid division line of the corresponding scale. This mode of adjustment is disadvantageous in that two different operations must be carried out, one after the other, for the adjustment of corrections.

The object of the invention is to provide a device of the aforesaid type, which makes it possible to carry out these two operations simultaneously.

In accordance with the present invention, this object is attained by providing means whereby the operating gear for the adjustment of corrections may be positively connected to the adjusting member, through which the main adjustment of the machine is effected.

In the accompanying drawings, one embodiment of the invention is shown applied to a fuse adjusting machine, by way of example.

Figure 1 is an axial longitudinal section through the fuse adjusting machine; Fig. 2 is a section on line 2—2, Fig. 1, partly in top view; Fig. 3 is a section on an enlarged scale, on line 3—3, Fig. 2, looking from the left, and Fig. 4 shows a detail on an enlarged scale.

In the following, it will be assumed that the adjusting machine is a machine for adjusting burning time fuses.

A designates the adjusting member, which is adapted to be coupled to the adjustable composition ring of a burning time fuse and B designates the adjusting member which is adapted to be coupled to a fixed part of the fuse, such as the fuse base. The adjusting member A, which is provided with a toothed crown a^1, can turn on a hollow trunnion c^1 which is secured to the base of the housing C of the fuse adjusting machine. The adjusting member B is mounted in the nave d^1 of a cone-wheel D (Fig. 1), which is rotatably mounted in a bearing c^2 (Fig. 1), which is secured to two opposite side-walls of the housing C. The adjusting member B can be turned into a suitable angular position through the medium of a worm E, which is journaled in the nave d^1 of the cone-wheel D, and which meshes with a toothed portion b^1 on the member B. A cone-wheel F (Fig. 1), which is of the same diameter as the cone-wheel D and the crown a^1 meshes with the cone-wheel D and the crown a^1. The cone-wheel F can be turned by means of a crank G and can be secured in the position of rest shown in the drawing relatively to the housing C through the medium of a device, the special construction of which is of no importance for the present invention. A crank-disk H (Fig. 2), which is journaled in one of the side walls of the housing C, forms the operating member for the worm E. When the crank G is in the position of rest shown in the drawing, the crank-disk H is connected with the worm E by means of a coupling which, through the medium of a releasing device, is automatically released when the crank G leaves its position of rest. It is unnecessary to give a detailed description of the coupling and its releasing device, as these devices are without importance for the present invention.

On the shaft of the crank-disk H is mounted a toothed driving wheel h^1. A toothed wheel i^1 which is secured on a shaft J, which is slidably mounted in the housing C, can

enter into engagement with the toothed wheel h^1. The teeth of the toothed wheels h^1 and i^1 have their opposing faces inclined as shown in Fig. 4, which shows a part of a front view of the wheels h^1 and i^1, looking in the direction of the arrow x (Fig. 1). By forming the teeth in this manner, the wheels can more easily enter into engagement with one another. In the drawing, the slidable shaft J is shown in the position in which the toothed wheel i^1 is out of engagement with the toothed wheel h^1. This position of the shaft J will in the following be referred to as the position of rest. By sliding the shaft J in the direction of the arrow y (Fig. 2), the shaft can be shifted into a position in which the toothed wheel i^1 engages with the toothed wheel h^1. This position of the shaft will be referred to as the working position. In the position of rest, a helical spring K causes a collar i^2 on the shaft J to abut against the inner face of a bush c^3 which is secured in one of the side walls of the housing C and in which fits a square i^3 on the shaft J. The arrangement is selected in such a manner that, in the position of rest of the shaft J, the square i^3 engages in the bush c^3 while in the working position of the shaft J, the square is located outside of the bush c^3.

On the end of the shaft J which projects out from the bush c^3 is inserted a sleeve M, which is provided with a flange m^1 and which, in the manner shown in the drawing, is rotatably but non-slidably connected with the bush c^3. The sleeve M can be rotated by means of a crank m^2 which is rigidly secured to the sleeve. In the sleeve M is cut a curved groove which consists of two parts m^3 and m^4, each of which extends over about 90°. The parts m^3 and m^4 of the curved groove run in oppositely wound spiral lines. A pin i^5, which is secured on the end i^4 of the shaft J, engages in the curved groove m^3 m^4. In the position of rest of the shaft J, the pin i^5 is located in the middle of the curved groove m^3 m^4. By reason of this arrangement, which constitutes means for establishing a positive connection between the driving gear i for the correction-adjustment and the part P which carries means for indicating the correction-adjustment, a turning movement of the crank m^2 must first result in an axial movement of the shaft J as the shaft in its position of rest is prevented from turning due to the engagement of the square i^3 in the bush c^3. This axial movement of the shaft always takes place in the same direction, whether the crank m^2 is turned in one direction or the other. The arrangement is selected in such a manner that this axial movement of the shaft J can cause the shaft to be shifted from its position of rest to its working position. When the shaft J has reached its working position, the pin i^5 is located at one end or the other of the curved groove m^3 m^4 according to the direction of rotation of the crank m^2. In this position the pin i^5 couples the crank m^2 to the shaft J when the turning of the crank is continued in the same direction. As the square i^3, in the working position of the shaft J, does not any longer engage in the bush c^3 the shaft J is now free to partake of the turning movement of the crank m^2.

On the shaft J is mounted a worm N which has its end faces abutting against two lugs c^4 arranged on the wall of the housing C. The worm N is connected with the shaft J in such a manner that it must partake of rotary motion of the shaft while it is possible for the shaft J to move axially relatively to the worm N. The worm N meshes with a toothed sector p^1 which is provided on a ring P (see especially Fig. 1). The ring P is mounted on a flange b^2 of the adjusting member B. On the upper surface of the flange b^2 is provided a scale b^3 for the burning lengths (Fig. 2), which is visible through a window p^2 (Fig. 1) in the ring P and a cut-away portion c^6 of the cover c^5 of the housing C. At the edge of the window p^2 is provided a mark p^3 (Fig. 2), which serves for reading off the scale b^3 for the burning lengths and also serves for reading off a scale c^8 for corrections of the burning lengths. The scale c^8 is provided on a disk c^7 secured to the housing C. When the shaft J is in its working position, a turning movement of the crank must on the one hand be transmitted by the worm N to the ring P and must on the other hand be transmitted to the adjusting member B and the flange b^2 through the medium of the wheel-gear i^1 h^1 and the worm E. The arrangement is selected in such a manner that the ring P and the flange b^2 thereby turn the same angle and in the same direction. Furthermore, the arrangement is selected in such a manner that, when the mark p^3 exactly registers with a division-line of the scale c^8, the square i^3 assumes such angular position relatively to the bush that the square can enter the bush under the action of the spring K, when the operator releases his hold on the crank m^2.

The fuse adjusting machine is adjusted in the following manner: If necessary, the crank G is turned to the position of rest shown in the drawing. Thereupon the crank-disk H is turned and through the medium of the worm E, which in the position of rest of the crank G is coupled to the crank-disk H, the turning movement of the crank-disk is transmitted to the adjusting member B and the flange b^2 with the scale b^3 for the burning lengths. A transmission of the turning movement of the crank-disk H to the shaft J cannot take place, because the

spring K holds the shaft J in the position of rest shown in the drawings in which the toothed wheels i^1 and h^1 are out of mesh; the worm N and the ring P with the mark p^3 therefore remain at rest. The turning movement of the crank-disk H is continued until the mark p^3 registers with that division-line of the scale b^3 which corresponds to the desired burning length. The adjusting member B has then been adjusted relatively to the adjusting member A, an angle corresponding to the desired burning length. The adjustment of corrections of the burning length is effected by turning the crank m^2. During the first part of the turning movement of the crank m^2, the shaft J will be shifted in the direction of the arrow y from its position of rest to its working position against the action of the spring K, the direction of turning of the crank being immaterial, and the toothed wheels i^1 and h^1 will thus be brought into mesh. When the shaft J has reached its working position, the turning movement of the crank m^2 is partaken of by the shaft J. The turning movement of the shaft J is on the one hand transmitted by the worm N to the ring P, and the mark p^3, and is on the other hand transmitted by the gearing i^1 h^1 to the worm E and thence to the adjusting member B and the flange b^2 with the scale b^3. The turning movement of the crank m^2 is continued until the mark p^3 registers with that division-line of the scale c^3 which corresponds to the desired correction of the burning length. The adjusting member B has then been adjusted relatively to the adjusting member A an angle corresponding to the desired correction. No change in the adjustment of the mark p^3 relatively to the scale b^3 has taken place because the ring P with the mark p^3 and the flange b^2 with the scale b^3 have turned in the same direction and the same angle. If the crank is now released the spring K causes the shaft J to snap back into its position of rest, the shaft being free to do so, because the square i^3 assumes such an angular position that it can enter the bush c^3.

Having thus described the invention, what is claimed and desired to secure by Letters Patent is:

1. In a fuse adjusting device having a main adjustment and an adjustment for corrections, the combination with a main adjusting member mounted in a stationary casing, of a correction adjustment member also mounted in said stationary casing, means for moving said main adjusting member independently of said correction adjustment member, and means for bringing said correction adjustment member into geared relation with said main adjustment member whereby the correction adjustment can be effected through said main adjustment member.

2. In a fuse adjusting device having a main adjustment and an adjustment for corrections, the combination with a main adjusting member mounted in a stationary casing, of a correction adjustment member also mounted in said stationary casing, means for moving said main adjusting member independently of said correction adjustment member, and means for bringing said correction adjustment member into geared relation with said main adjusting member, said last-named means comprising two gears adapted to be thrown into and out of engagement at will.

3. In a fuse adjusting device having a main adjustment and an adjustment for corrections, the combination with a main adjusting member mounted in a stationary casing, of a driving shaft for correction adjustment also mounted in said stationary casing, means for moving the main adjustment member independently of said driving shaft, means for bringing the driving shaft into geared relation with said main adjusting member, and means for holding said driving shaft against rotation until after it has been brought into geared relation with said main adjusting member.

4. In a fuse setting device having a main adjustment and an adjustment for corrections, the combination with a member to be adjusted; of a driving shaft through which the main adjustment is effected; a second driving shaft through which the correction-adjustment movement is imparted to the main adjustment drive shaft, said correction-adjustment shaft comprising two relatively movable parts; a gear mounted on the main-adjustment drive shaft; a gear carried by one part of the correction-adjustment drive shaft; a coupling between the parts of the correction-adjustment drive shaft said coupling being adapted to be thrown into and out of gear at will; and means whereby a positive connection is established between the driving shaft for the correction-adjustment and a part carrying correction-indicating means.

5. In a fuse setting device having a main adjustment and an adjustment for corrections, the combination of an adjustable member, a driving shaft through which the main adjustment is effected, a driving shaft through which the correction-adjustment is effected, said last-named shaft comprising two parts; a coupling between said parts, said coupling being adapted to be thrown into and out of gear at will; means establishing positive connection between the driving gear for the correction-adjustment and a part carrying correction indicating means; and means for holding the driving gear for the correction-adjustment non-rotatable until after the coupling is thrown into gear.

6. In a fuse setting device having a main

adjustment and an adjustment for corrections, the combination of a member to be adjusted, a driving gear through which the main adjustment is effected, a driving gear through which the correction-adjustment is effected and having parts in common with the driving gear for the main adjustment, a coupling between parts of the driving gear for the correction-adjustment, said coupling being adapted to be thrown into and out of gear at will and means establishing positive connection between the driving gear for the correction adjustment and a part carrying correction indicating means; the correction-adjustment drive gear being provided with a drive shaft and a manual driving means connected to cause first a longitudinal movement of the shaft, and then a rotation of the same.

7. In a fuse setting device having a main adjustment and an adjustment for corrections, the combination of a member to be adjusted, a driving gear through which the main adjustment is effected, a driving gear through which the correction-adjustment is effected and having parts in common with the driving gear for the main adjustment, a coupling between parts of the driving gear for the correction-adjustment, said coupling being adapted to be thrown into and out of gear at will and means establishing positive connection between the driving gear for the correction adjustment and a part carrying correction indicating means; the driving gear for the correction-adjustment having means preventing its rotation until after the coupling is thrown into gear, comprising a longitudinally movable shaft through which it is rotated, constructed with an angular portion, moved into a correspondingly formed recess and arresting rotation of the shaft, when the coupling is thrown out.

8. In a fuse setting device having a main adjustment and an adjustment for corrections, the combination of a member to be adjusted, a driving gear through which the main adjustment is effected, a driving gear through which the correction-adjustment is effected and having parts in common with the driving gear for the main adjustment, a coupling between parts of the driving gear for the correction-adjustment, said coupling being adapted to be thrown into and out of gear at will and means establishing positive connection between the driving gear for the correction-adjustment and a part carrying correction indicating means; the driving gear for the correction-adjustment having means preventing rotation until after the coupling is thrown into gear, comprising a longitudinally movable shaft through which it is rotated, constructed with an angular portion, moving into a correspondingly formed recess and arresting rotation of the shaft, when the coupling is thrown out, and a spring adapted to move said shaft in the direction of throwing out the coupling; and the relation between the angles of the shaft and the index for the correction scale being such that the shaft can enter its angular recess only when the index registers with a division mark on the scale.

9. In a fuse adjusting device having a main adjustment and an adjustment for correction, the combination with a member carrying a scale for indicating said main adjustment and a member carrying an index appertaining to said scale, of a main adjustment member mounted in a stationary casing, a correction adjustment member also mounted in said stationary casing, means for moving said main adjusting member independently of said correction adjustment member, means for bringing said correction adjusting member into geared relation with said main adjusting member, means for establishing positive connection between the scale-carrier and one of said adjusting members, and means for establishing positive connection between the index-carrier and the other of said adjusting members, said connection-means being adapted to move the scale and the index jointly in the same direction and the same distance, when the correction adjustment member is in geared relation with the main adjustment member.

The foregoing specification signed at Dusseldorf, Germany, this sixteenth day of May, 1908.

WILHELM SCHWARTZ.
ULRICH WILCK.

In presence of—
PETER LIEBER,
WILHELM FLASCHE.