

W. SCHWARTZ & U. WILCK.
FUSE ADJUSTING DEVICE.
APPLICATION FILED MAY 6, 1908.

932,182.

Patented Aug. 24, 1909.

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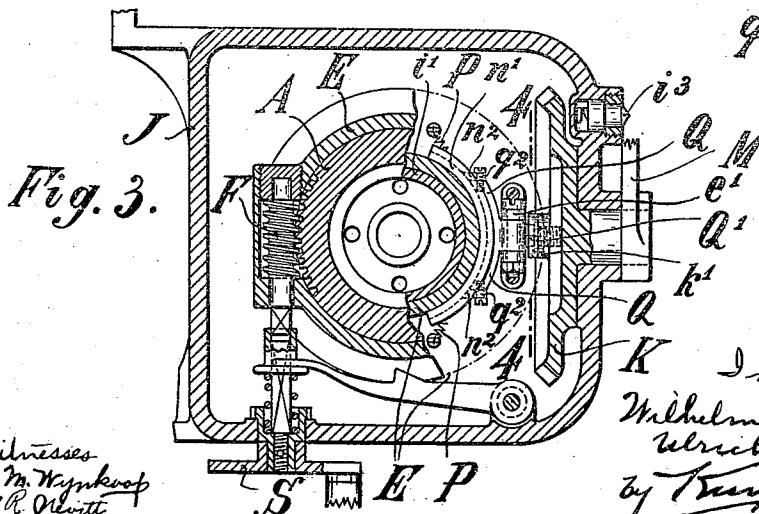
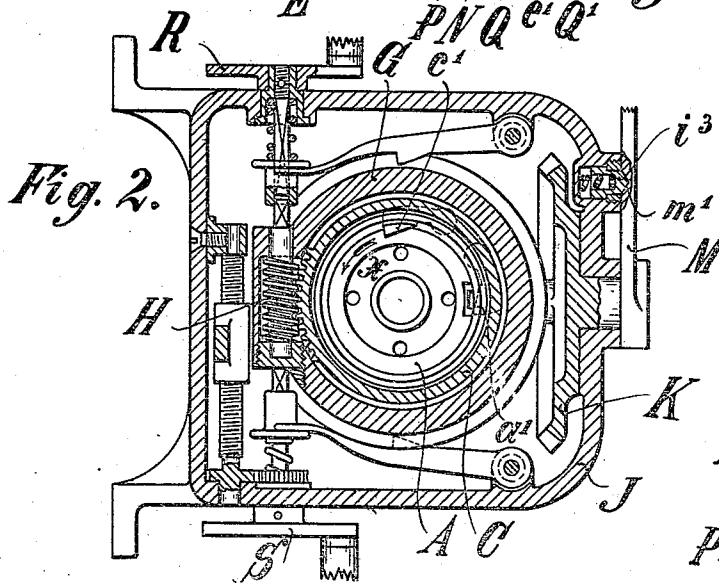
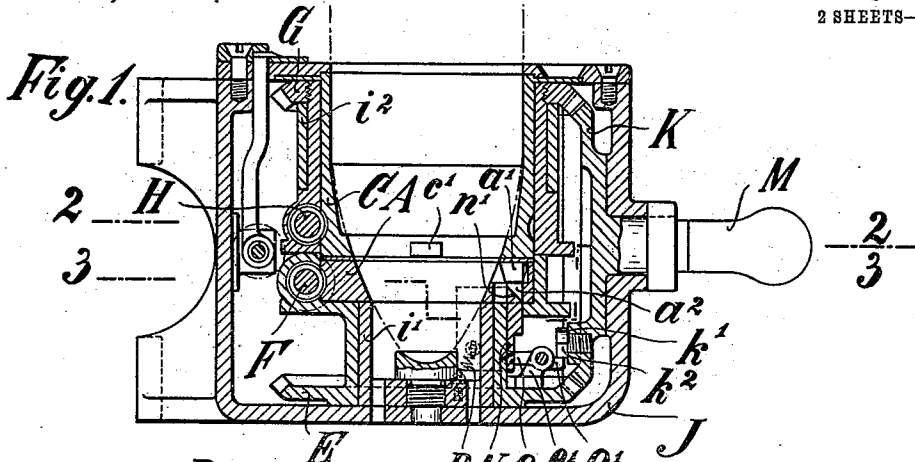
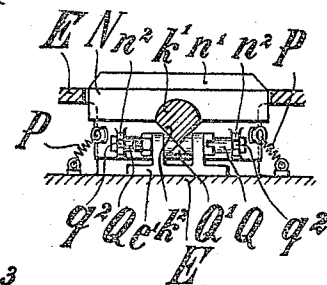


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

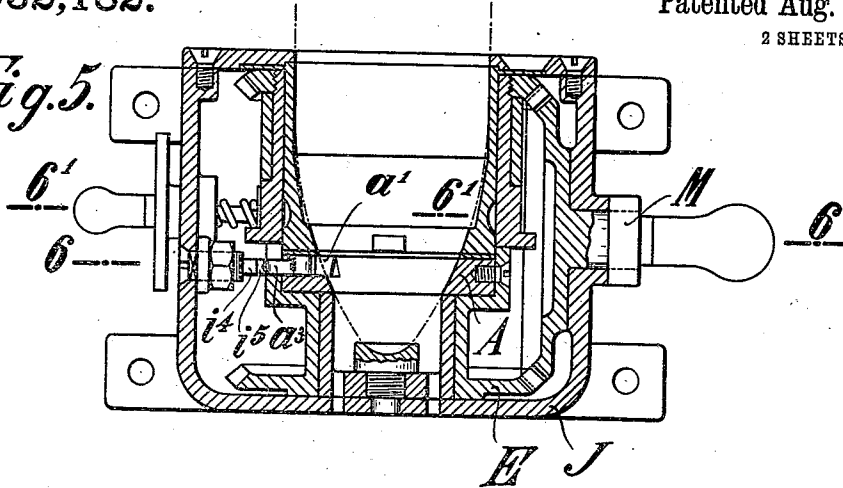


Fig. 6.

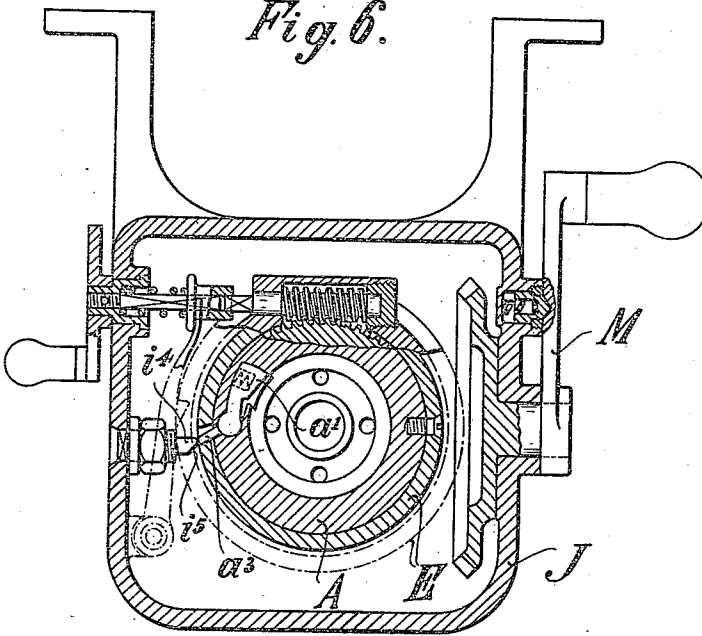


Fig. 7.

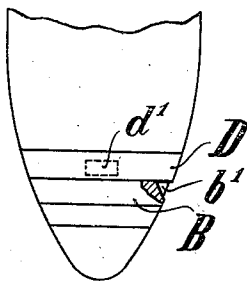
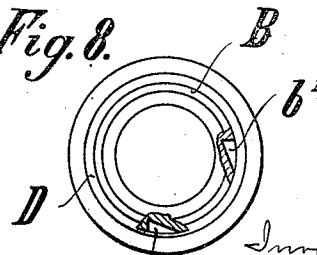


Fig. 8.



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UNITED STATES PATENT OFFICE.

WILHELM SCHWARTZ, OF BREDENEY-ON-THE-RUHR, AND ULRICH WILCK, OF ESSEN-ON-THE-RUHR, GERMANY, ASSIGNORS TO FRIED. KRUPP AKTIENGESellschaft, OF ESSEN-ON-THE-RUHR, GERMANY.

FUSE-ADJUSTING DEVICE.

932,182.

Specification of Letters Patent.

Patented Aug. 24, 1909.

Application filed May 6, 1908. Serial No. 431,214.

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 the type of fuse adjusting devices which is provided with two relatively rotatable adjusting members one of which is adapted to be coupled to the adjustable part of the fuse while the other is adapted to be coupled to a fixed part of the fuse, such as the fuse-base. In the known fuse adjusting devices of this type the coupling between the adjustable part of the fuse and the corresponding adjusting member is not released until the fuse is removed from the adjusting device. Hence it may easily occur that inaccuracies take place in the adjustment of the fuse and this is especially the case in the type of fuse adjusting devices (fuse adjusting machines) in which, during the adjusting operation, rotation is imparted to the adjusting member which is coupled to the fixed fuse-part, and consequently also to the projectile. When, for instance, this adjusting member is rotated with considerable angular velocity the projectile, by reason of its momentum, tends with considerable kinetic energy, to continue its rotation relatively to the adjustable part of the fuse, after the adjusting operation ends. This rotation of the projectile can even take place when the coupling between the fixed part of the fuse and the corresponding adjusting member is effective in both directions of rotation. In this case the projectile first turns with the corresponding adjusting member to such extent beyond its regular end-position as is permitted by the unavoidable play in the operating mechanism of the adjusting device. When the play has been exhausted a rather violent shock takes place which causes the coupling between the fixed part of the fuse and the corresponding adjusting member to become loosened so as to permit a further small angular rotation of the projectile together with the fixed fuse-part independently of the adjusting member. In this manner excessive errors in the adjustment of the fuse are

caused. These errors become particularly great when, for the purpose of avoiding the aforesaid concussion which may give rise to breakage of the operating mechanism, the coupling between the fixed fuse-part and the corresponding adjusting member is constructed in such a manner that it is only effective in one direction of rotation. In that case the projectile can continue its rotation entirely independent of the adjusting member. Finally, in the use of the known fuse adjusting devices, errors in the adjustment of the fuse may take place if the projectile turns while being removed from the fuse. In that case it may happen that the adjustable part of the fuse becomes displaced.

The object of the present invention is to provide a fuse adjusting device in which these drawbacks are avoided.

Two embodiments of the invention are, by way of example, shown in the accompanying drawings applied to a fuse adjusting machine.

Figure 1 is an axial longitudinal section of one embodiment of the invention; Fig. 2 is a section on line 2—2, Fig. 1 looking from above; Fig. 3 is a section on line 3—3, Fig. 1 looking from above; Fig. 4 is a section on line 4—4, Fig. 3 looking from the right; Fig. 5 shows the other embodiment of the invention in a view corresponding to that shown in Fig. 1; Fig. 6 is a section on line 6—6 and 6¹—6¹, Fig. 5, looking from above; Fig. 7 is a side view of a burning time fuse, and Fig. 8 is a bottom view of Fig. 7, partly in section.

Reference will first be had to the embodiment shown in Figs. 1 to 4. A designates the adjusting member which is adapted to be coupled to the adjustable composition ring B (Figs. 7 and 8) and C designates the adjusting member which is adapted to be coupled to the fuse-base D and which is arranged co-axially with the adjusting member A. The adjusting member A is provided with a spring-pressed latch *a*¹ which serves to couple the member to the composition ring B and the adjusting member C is provided with a spring-pressed latch *c*¹ which serves to couple the member of the fuse-base D. The composition ring B and the fuse-base D are provided with notches *b*¹ and *d*¹ for the latches *a*¹ and *c*¹. The latch *c*¹ and the corresponding notch *d*¹ are formed in such a

manner that rotation of the adjusting member C in the direction of the arrow x only (Fig. 2) can be transmitted to the projectile while the coupling $c^1 d^1$ becomes automatically released and the projectile turns in the direction of the arrow x when the adjusting member C comes to a standstill. By means of a worm F the adjusting member A can be turned in the nave of a cone-wheel E and by means of a worm H the adjusting member C can be turned in the nave of a cone-wheel G. The worms F and H are mounted in the naves of the cone-wheels E and G. The worm H serves to adjust the desired burning length and the worm F serves to adjust corrections of the burning length. The devices R and S for adjusting the worms H and F are similar to those shown and described in the co-pending application of Wilhelm Schwartz, filed March 9, 1908, Serial No. 419996, and they, therefore, need not be described in detail. This is equally true of the corresponding devices for reading the adjustments. The cone-wheel E can turn on a hollow trunnion i^1 secured on the bottom of the housing J and the cone-wheel G can turn in a bearing i^2 (Fig. 1) secured to two opposite side-walls of the housing J. A cone-wheel K, which is journaled in a side wall of the housing J and which can be rotated by means of a crank M, meshes with the two cone wheels E and G. The crank M is provided with a conical notch m^1 (Fig. 2). When the crank M is in the position shown in the drawings a spring-pressed bolt i^3 (Fig. 2) which is mounted in the housing J can snap into the notch m^1 . The position which the crank M assumes when the bolt i^3 rests in the notch m^1 will in the following be termed the position of rest of the crank.

The latch a^1 , which serves to couple the adjusting member A to the adjustable part B of the fuse, is provided on its under side with a nose a^2 which projects into the path of an axially movable slide N (Figs. 1 and 4) which is mounted on the nave of the cone-wheel E. The slide N only partially surrounds the outer surface of the nave of the cone-wheel E and is provided on its upper end with an inclined face n^1 which is adapted to coöperate with the nose a^2 . The arrangement is selected in such a manner that a movement of the slide N from its lowermost position to the uppermost position shown in Fig. 1 can cause the latch a^1 to be shifted from its effective to its ineffective position. On the other hand, when the slide N is in its lowermost position the latch a^1 is free to pass from its ineffective to its effective position. Two helical springs P which are secured between the cone-wheel E and the slide N tend to hold the slide in its lowermost position. On the upper face of the cone-wheel E is secured a support e^1 in which is journaled a double-armed lever

Q Q¹. The arm Q of the lever is provided with two pintles q^2 (Figs. 3 and 4) which extend parallel to the axis of oscillation of the lever and engage in corresponding bearing-eyes n^2 on the slide N. The pintles q^2 have so much play in the eyes n^2 that no binding can take place between the pintles q^2 and the eyes n^2 when the lever Q Q¹ is turned. By reason of this arrangement a turning movement of the lever Q Q¹ must result in an axial displacement of the slide N. The arm Q¹ of the lever Q Q¹ is adapted to coöperate with a striker k^1 when the crank M is rotated. The striker k^1 is secured on the inner surface of the cone-wheel K and is provided with an inclined face k^2 which, when it hits the lever-arm Q¹, is capable of depressing the arm Q¹ to such an extent that the slide N passes into its uppermost position (see in Figs. 1 and 4). The arrangement is selected in such a manner that the striker k^1 hits the lever-arm Q¹ toward the end of a complete revolution of the crank M and that the lever-arm Q¹ assumes its lowermost position at the end of the revolution of the crank, that is to say when the bolt i^3 has snapped into the notch m^1 of the crank M. Furthermore the relative arrangement of the parts is selected in such a manner that the striker k^1 again releases the lever-arm Q¹ immediately after the commencement of a revolution of the crank.

In the following description of the mode of operation of the improved adjusting device it will be assumed that the parts are in the position shown in the drawings. The crank M is in its position of rest; the striker k^1 holds the lever-arm Q¹ in its lowermost position; the slide N is therefore in its uppermost position and holds the latch a^1 in its ineffective position through the medium of the face n^1 and the nose a^2 . When a projectile has been inserted in the adjusting device a complete revolution is imparted to the crank M. Through the medium of the cone-wheel K the rotation of the crank M is transmitted to the cone-wheels E and G. The rotation of the cone-wheels E and G is partaken of by the worms F and H, the coupling between the worms and their operating members S and R being automatically released at the commencement of the turning movement of the crank through the medium of the means fully described in the aforesaid co-pending application. The adjusting members A and C also partake of the rotation of the cone-wheels E and G as the members are coupled to the cone-wheels through the medium of the worms F and H. The rotation of the crank M takes place in such a direction that the adjusting member C turns in the direction of the arrow x while the adjusting member A turns in the opposite direction. Immediately after the commencement of the turning movement of the

crank the striker k^1 , which partakes of the rotation of the cone-wheel K, releases the lever-arm Q^1 . The springs P then draw the slide N down into its lowermost position which causes the lever-arm Q^1 to move into its uppermost position. As the latch a^1 is now free to snap into the notch b^1 of the adjustable composition ring B when reaching the notch the coupling between the adjusting member A and the adjustable composition ring B will be effected during the further turning movement of the crank, as will also the coupling between the adjusting member C and the fuse-base D. When the coupling between the adjusting members A and C and the corresponding parts of the fuse has been effected the adjustment of the adjustable composition ring B takes place. Short time before the crank M again reaches its position of rest the striker k^1 again hits the arm Q^1 of the lever Q . While the crank M traverses the last part of its path the face k^2 of the striker k^1 moves over the lever-arm Q^1 and depresses the arm which causes the arm Q to move the slide N upwardly against the action of the springs P and, through the medium of the face n^1 and the nose a^2 the latch a^1 is swung out of the notch b^1 of the adjustable composition ring. When the bolt z^3 has snapped into the notch m^1 of the crank M all the parts of the adjusting device are again in their original position. The latch a^1 is in its ineffective position and the desired adjustment has been imparted to the fuse. As above-stated the coupling between the fuse-base D and the adjusting member C is only effective in one direction and the projectile, therefore, continues to rotate in the direction of the arrow x independently of the adjusting member C, until the kinetic energy of the projectile is consumed by the friction. While this takes place the latch c^1 automatically leaves the notch d^1 of the fuse-base. A displacement of the adjustable composition ring B cannot any longer take place because the latch a^1 is already out of engagement with the notch b^1 when the projectile commences the turning movement which is independent of the adjusting member C. Attention is also drawn to the fact that the projectile passes into its position of rest without any concussion whatever. Nor can any displacement of the adjustable composition ring take place while the projectile is being removed from the adjusting device as the latch a^1 is not any longer in engagement with the notch b^1 .

The embodiment shown in Figs. 5 and 6 merely differs from the other embodiment in the following respects: The adjusting member A is non-rotatably connected with the nave of the cone-wheel E, the worm F for adjusting the member A being dispensed with. The latch a^1 of the adjusting member A is provided with an arm a^3 which can

project beyond the outer surface of the nave of the cone-wheel E through corresponding perforations in the side-walls of the adjusting member A and in the nave of the wheel E surrounding the member A. When the crank M is turned the arm a^3 is adapted to coöperate with a striker i^4 secured on one of the side-walls of the housing J. The striker i^4 is provided with an inclined face i^5 along which the arm a^3 can slide when the cone-wheel E rotates and the latch is in the effective position. The arrangement is selected in such a manner that the arm a^3 hits the striker i^4 toward the end of a complete revolution of the crank M and that the latch a^1 is shifted into its ineffective position at the end of the crank-revolution through coöperation of its arm a^3 with the face i^5 . Furthermore the arrangement is selected in such a manner that the arm a^3 is released by the striker i^4 immediately after the commencement of a crank-revolution.

The mode of operation of the second embodiment need not be further explained in view of the full description given of the mode of operation of the first embodiment. It will also be apparent, without further explanation, that the second embodiment has the same advantages as the first embodiment.

Having thus described the invention what is claimed and desired to be secured by Letters Patent is:

1. An adjusting device for fuses comprising a rotatable adjusting member having means for coupling it to an adjustable part of the fuse, means comprising a driving element for rotating said adjusting member, and means actuated by said driving element whereby said coupling means is automatically released.

2. An adjusting device for fuses comprising a rotatable adjusting member having means for coupling it to an adjustable part of the fuse; means comprising a crank for rotating said adjusting member; means adapted to engage said coupling means during the rotation of said member to automatically uncouple said member from said part at the end of the adjusting movement; and means rigidly secured to the crank for engaging said uncoupling means.

3. An adjusting device for fuses comprising a rotatable adjusting member having means for coupling it to an adjustable part of the fuse; mechanism for rotating said member to adjust said part, said mechanism comprising a driving member provided with a striker; and means engaging said coupling means near the end of the adjusting movement to automatically withdraw the coupling means from said part at the end of the adjusting movement said last means being actuated by the striker on the driving member.

4. An adjusting device for fuses compris-

ing a rotatable adjusting member, means carried by said member for coupling the member to an adjustable part of the fuse, operating mechanism for rotating said member to adjust the fuse, and means actuated by one of the elements of said mechanism to withdraw the coupling means from said part at the end of the adjusting movement.

5. An adjusting device for fuses comprising a rotatable adjusting member, means carried by said member for coupling the member to an adjustable part of the fuse, an operating member for rotating said adjusting member to adjust the fuse, an operating mechanism, and a striker partaking of the movement of said operating member and adapted to actuate said operating mechanism to uncouple the adjusting member from said adjustable part at the end of the adjusting movement.

6. An adjusting device for fuses comprising a member adapted to engage the fixed part of a fuse of a projectile; an adjusting member rotatable relatively to the first-named member; coupling means carried by the adjusting member whereby said adjusting member is adapted to be coupled to the adjustable part of the fuse; means for rotating said adjusting member to adjust the

fuse; uncoupling means movable in the path of travel of said coupling means to uncouple the adjusting member from the adjustable part of the fuse; and further means connected with said adjusting member for actuating said uncoupling means.

7. An adjusting device for fuses comprising a housing; relatively movable members mounted in said housing and adapted to engage the relatively movable rings of a fuse; a latch carried by one of said members for engaging one of said rings; means for holding the other member against rotation relatively to the other ring; means for rotating the member with the latch to adjust the fuse; and a striker into engagement with which said latch is brought during the movement of the adjusting member whereby the latch is removed from engagement with the ring at the end of the adjusting movement.

The foregoing specification signed at Düsseldorf, Germany, this 27 day of March, 1908.

WILHELM SCHWARTZ.
ULRICH WILCK.

In presence of—

PETER LIEBER,
WILHELM FLASCHE.