

Jan. 13, 1931.

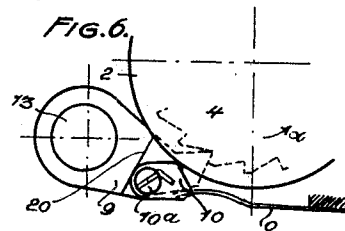
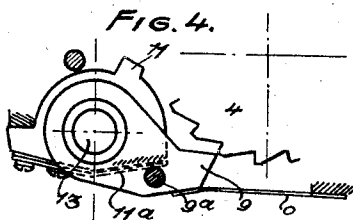
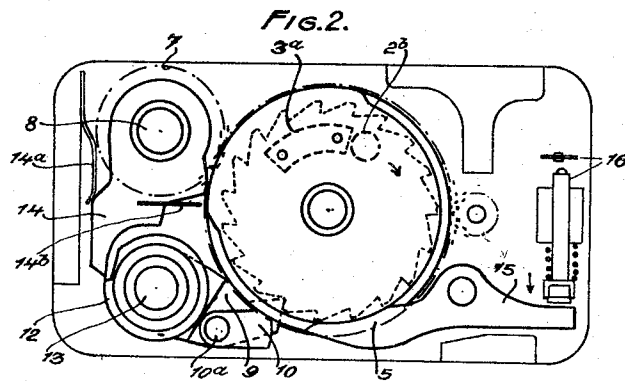
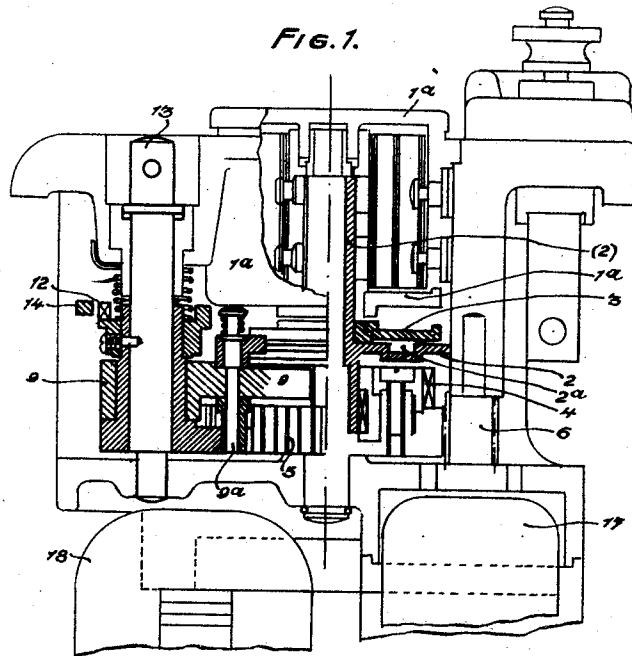
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1,788,892

DYNAMO ELECTRIC IGNITING DEVICE

Filed Dec. 20, 1929

2 Sheets-Sheet 1



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DYNAMO ELECTRIC IGNITING DEVICE

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2 Sheets-Sheet 2

FIG. 3.

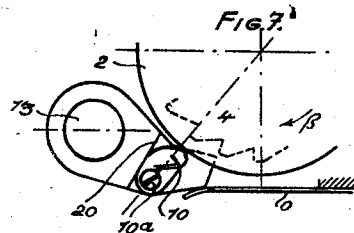
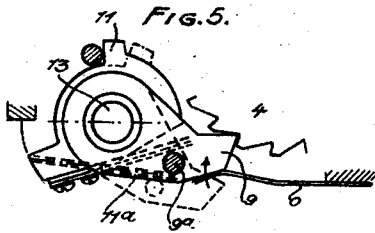
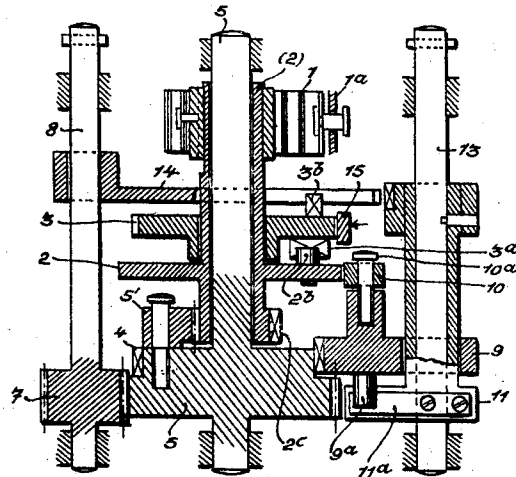


FIG. 8.

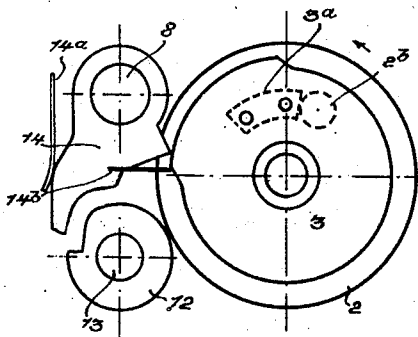
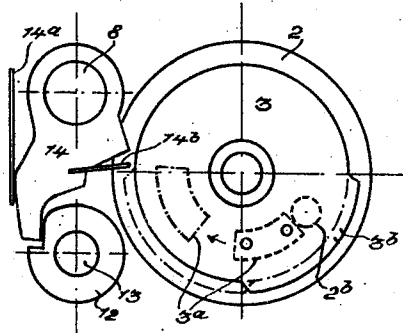


FIG. 9.



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DYNAMO-ELECTRIC IGNITING DEVICE

Application filed December 20, 1929, Serial No. 415,534, and in Austria November 9, 1929.

The invention relates to improvements in dynamo electric igniting devices especially mine igniting devices driven by a spring and has for its purpose to increase the reliability of the device and specifically to prevent the driving spring from being released as long as it is not completely tensioned.

For this purpose two governing or controlling members are provided, one of which is connected on the one hand to the winding up mechanism by a unilaterally acting coupling for example a ratchet device and on the other hand to one end of the driving spring, said member controlling a pawl or the like for locking and releasing the armature driving gear, whereas the second controlling member is displaced by the first member only in the end portion of its stroke in order to unlock the usual releasing bolt for the purpose of enabling the driving spring to be released and preferably also to actuate the contact device of the igniting circuit to be actuated for firing the mines.

The invention further consists in specific arrangements and structures of the said locking and releasing pawl and the checking member for the releasing bolt.

In the annexed drawings:

Fig. 1 shows the upper portion of an improved mine igniting apparatus in a longitudinal section. Fig. 2 is a top view of the apparatus. Fig. 3 shows merely diagrammatically the driving spring and mechanisms coacting therewith. Figs. 4 and 5 show the locking and releasing pawl in the releasing and locking positions respectively. Figs. 6 and 7 show the said pawl being provided with a tappet holding the pawl in disengaged position during the time the armature is driven by the driving spring. Figs. 8 and 9 show the two controlling members and the checking lever which is disengaged from the releasing bolt after the driving spring has been completely tensioned.

The tension or driving spring 1 which is enclosed in a casing 1a is connected to a controlling disk 2. The latter may be provided with an annular groove 2a and with teeth forming a ratchet wheel 2c. The usual driving wheel 5 is provided with a ratchet pawl 5' engag-

ing the ratchet wheel 2c, so that the wheel 5 can move the ratchet wheel 2c and the disk 2 only in one direction. A second controlling disk 3 is provided with a segmental piece 3a which engages the annular groove 2a of this controlling disk 2 and may travel therein. In the disk 2 and within the groove 2a a pin 2b is fixed which interrupts said groove 2a. The two portions 2^b and 3^a form pegs which limit the movement of the disk 3 in both directions. Fig. 8 shows the position of the disks 2 and 3, when the driving spring 1 has been unwound, i. e. before the tensioning of the same is commenced.

The driving gear 5 which engages both the pinion 6 for driving the armature of the apparatus and the winding up pinion 7 is connected or provided with a ratchet gear 4. When the winding up bolt 8 which is connected to the pinion 7, is turned in clockwise direction, the driving gear 5 and the controlling disk 2 is revolved by means of an unilateral coupling for example a ratchet device 5', 2^c, so that the driving spring 1 is wound up. A locking and releasing pawl 9 engaging the ratchet gear 4 prevents the tension spring 1 from unwinding.

During the winding up operation the disk 3 remains in its position, until, after approximately $\frac{3}{4}$ of a complete revolution of the driving wheel 5, the peg 2^b of the latter meets the portion 3^a, when the disk 3 is also moved. The tension spring 1 is completely tensioned after about $1\frac{3}{4}$ revolutions of the wheel 5. When said spring is completely tensioned the disk 3 takes the position shown in Fig. 8. A cam like elevation 3^b (Fig. 3) of the disk 3 acts on a checking lever 14 which is thereby disengaged from a cam 12 of the releasing bolt 13, so that the latter is unlocked and the driving spring may be released by such bolt, i. e. the pawl 9 serving this purpose may be disengaged from the ratchet gear 4 connected to one end of the spring 1 by the gear 5. But so long as the disk 3 3^b does not disengage the checking lever 14 from the cam 12 as is shown in Fig. 8 the driving spring cannot be released by the bolt 13. In the diagrammatic Fig. 3 the cam like elevation

is shown to be a projection 3^b on the upper side of the disk 3.

On the pawl 9 a tappet 10 is hingedly secured by means of a screw bolt 10^a, a spring 5 tending to force the tappet 10 toward the periphery of the disk 2. Moreover the pawl 9 is forced by means of a spring O into engagement with the ratchet gear 4. If now the driving spring 1 is tensioned by turning the winding up bolt 8, so that the disk 2 is turned 10 in the direction of the arrow α , the tappet 10 owing to its friction on the disk 2 is moved against the action of its spring in the position shown in Fig. 6, and the pawl 9 is allowed 15 to engage the gear 4. But in case the pawl 9 is disengaged from the gear 4 for the purpose of firing the mines, the tappet 10 is moved by its spring in the position shown in Fig. 7, so as to prop against the abutment 20, 20 and said tappet holds the pawl 9 in disengaged position (Fig. 7). The spring 1 now unwinds and the disk 2 turns in the direction of the arrow β , the tappet 10 being always held in contact with the abutment 20, 25 so that the pawl 9 is prevented from engaging the ratchet gear 4 during the time the driving spring unwinds. The pawl 9 is not directly connected to the releasing bolt 13 but is moved by a driver 11 by means of an 30 intermediate spring 11^a in one direction. By such spring 11^a is ensured, that the pawl 9 must always be completely disengaged from the ratchet gear 4 i. e. disengaged to such extent that the tappet 10 bears on the abutment 35 20 (Fig. 7), since in disengaging the pawl 9 from the gear 4 a large friction due to the rather high pressure of the spring 1 is to be overcome, whereby the spring 11^a (Fig. 4) is tensioned, and as soon as the pawl 9 is disengaged 40 from the ratchet gear 4, so that the latter is released, the pawl 9 will be jerked outwards by the spring 11^a against the action of the spring O which is less strong than the spring 11^a, whereby is ensured that the tappet 10 is brought in the propping position 45 shown in Fig. 7. The disk 3 causes by its elevated or cam like portion 3^b not only the checking lever 14 to be disengaged from the cam 12 but also the switching in lever 15 50 (Fig. 2) to be actuated, which in turn acts on the contact device 16, whereby at the end of the phase in which the driving spring 1 is unwound the igniting circuit is opened in the case of an igniting apparatus with series 55 winding and is closed in the case of an igniting apparatus with shunt winding, i. e. the igniting current is allowed to pass through the igniting circuit. The spring 14^a has for 60 its purpose to force the checking lever 14 to the cam 12. The spring 14^b of the lever 14 has for its object to prevent the disk 3 or its cam like portion 3^b from being suddenly thrust onto the lever 14, so that both parts 3, 65 3^b and 14 are prevented from being damaged,

the inertia of the disk being taken up by said spring 14^b.

It is repeatedly remarked, that the releasing of the driving spring is only possible, if the same is completely tensioned. The tappet 10 acts reliably in cooperation with the disk 2, whereas the controlling disk 3 which may be freely moved over $\frac{3}{4}$ of one revolution (360°) enables the disengagement of the pawl 9 from the teeth 4 by the releasing bolt 13, if the disk 3 has disengaged the lever 14 from the cam 12. After the driving wheel 5 has performed say $1\frac{3}{4}$ revolutions, the driving spring is completely tensioned. Then during the unwinding of the driving spring the disk 3 again lags by $\frac{3}{4}$ of its stroke and actuates at the end of its stroke the contact device 16. That is to say, the igniting circuit is cut in either by closing it or by interrupting the usual short circuit. By the 85 spring 11^a the pawl 9 is sufficiently lifted for enabling the tappet 10 to prevent the pawl 9 from reengaging the ratchet gear 4.

What I claim is:

1. In a dynamo electric igniting device an armature, a gearing device, a driving spring for moving said armature, a winding up device and a releasing device for such spring, two controlling members, one of which members is connected to one end of said driving spring and to said gearing device by means of a unilaterally acting coupling, and serves also to control a checking and releasing member for said gearing device, the second controlling member being moved by the first 100 named controlling member only in the end portion of its stroke for the purpose of unlocking said releasing device, so that the driving spring is capable of being released by the said releasing device, a contact device included in the igniting circuit and means for actuating said contact device for firing. 105

2. In a dynamo electric igniting device an armature, a gearing device, a driving spring for moving said armature, a winding up device and a releasing device for such spring, two controlling members, one of which members is connected to one end of said driving spring and to said gearing device by means of a unilaterally acting coupling, and serves also to control a checking and releasing member for said gearing device, the second controlling member being moved by the first 115 named controlling member only in the end portion of its stroke for the purpose of unlocking said releasing device, so that the driving spring is capable of being released by the said releasing device, a contact device included in the igniting circuit, said second controlling member also serving to actuate 120 said contact device for firing. 125

3. In a dynamo electric igniting device an armature, a gearing device, a driving spring for moving said armature, a winding up device and a releasing device for such spring, 130

two controlling members, one of which members is connected to one end of said driving spring and to said gearing device by means of a unilaterally acting coupling, and serves also to control a checking and releasing member for said gearing device, a coupling between said two controlling members for the purpose of permitting one of said controlling members to perform a sufficient idle stroke before the other controlling member is moved for unlocking said releasing device, when the latter is capable of being operated for the purpose of releasing the driving spring.

4. In a dynamo electric igniting device an armature, a gearing device, a driving spring for moving said armature, a winding up device and a releasing device for such spring, two controlling members, one of which members is connected to one end of said driving spring and to said gearing device by means of a unilaterally acting coupling, and serves also to control a checking and releasing member for said gearing device, one of the controlling members having a segmental projection and the second controlling member a pin, said pin extending into the path of the segmental projection, so that the latter may meet such pin for actuating said second controlling member, whereby the said releasing device is unlocked and the latter is capable of being operated for the purpose of releasing the driving spring.

5. In a dynamo electric igniting device an armature, a gearing device, a driving spring for moving said armature, a winding up device and a releasing device for such spring, two controlling members, one of which members is connected to one end of said driving spring and to said gearing device by means of a unilaterally acting coupling, and serves also to control a checking and releasing member for said gearing device, the second controlling member being moved by the first named controlling member only in the end portion of its stroke for the purpose of unlocking said releasing device, so that the driving spring is capable of being released by the said releasing device, resilient means being interposed between the said releasing device and the said checking member, so that the latter is disengaged by said resilient means from the gearing device, if the releasing device is actuated.

6. In a dynamo electric igniting device an armature, a gearing device, a driving spring for moving said armature, a winding up device and a releasing device for such spring, two controlling members, one of which members is connected to one end of said driving spring and to said gearing device by means of a unilaterally acting coupling, and serves also to control a checking and releasing member for said gearing device, the second controlling member being moved by the first named controlling member only in the end portion of

its stroke for the purpose of unlocking said releasing device, so that the driving spring is capable of being released by the said releasing device, a spring being connected to said releasing device and acting on a pawl forming said checking member, so as to disengage the same, a spring tending to force said pawl into engagement with the gearing device said spring being less strong than the spring for disengaging said pawl.

7. In a dynamo electric igniting device an armature, a gearing device, a driving spring for moving said armature, a winding up device and a releasing device for such spring, two controlling members, one of which members is connected to one end of said driving spring and to said gearing device by means of a unilaterally acting coupling, and serves also to control a checking and releasing member for said gearing device, the second controlling member being moved by the first named controlling member only in the end portion of its stroke for the purpose of unlocking said releasing device, so that the driving spring can be released by the said releasing device, a spring being connected to said releasing device and acting on a pawl forming said checking member so as to disengage the same from the gearing device, a spring urged tappet on said pawl coacting with the first named controlling member for maintaining said pawl in disengaged position when the driving spring unwinds and for allowing said pawl to engage the gearing device when the spring is wound up.

8. In a dynamo electric igniting device an armature, a gearing device, a driving spring for moving said armature, a winding up device and a releasing device for such spring, two controlling members, one of which members is connected to one end of said driving spring and to said gearing device by means of a unilaterally acting coupling, and serves also to control a checking and releasing member for said gearing device, the second controlling member being moved by the first named controlling member only in the end portion of its stroke, the said releasing device comprising a releasing bolt, a spring urged lever which locks said releasing bolt and is actuated by the second controlling member.

9. In a dynamo electric igniting device, an armature, a gearing device, a driving spring for moving said armature, a winding up device and a releasing device for such spring, two controlling members, one of which members is connected to one end of said driving spring and to said gearing device by means of a unilaterally acting coupling, and serves also to control a checking and releasing member for said gearing device, the second controlling member being moved by the first named controlling mem-

ber only in the end portion of its stroke, the said releasing device comprising a releasing bolt, a spring urged lever which locks said releasing bolt and is actuated by the second controlling member and a cushioning device
5 on said lever for compensating shocks exerted by said second controlling member when acting on said lever.

10 10. In a dynamo electric igniting device an armature, a gearing device, a driving spring for moving said armature, a winding up bolt and a releasing bolt for such driving spring, two controlling disks, one of which
15 disks is connected to one end of the driving spring and to said gearing device by a unilaterally acting coupling, a checking and releasing pawl engaging said gearing device, a spring urged tappet on said pawl cooperating with said first named controlling disk
20 for maintaining such pawl in disengaged position when the driving spring unwinds, the second controlling disk being rotated by the first named controlling member in the terminal portion of its stroke, a lever for
25 checking the releasing bolt, which lever is disengaged from said bolt by said second controlling disk.

In witness whereof I affix my signature.

KONRAD SCHAFFLER-GLÖSSL.

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