W. J. FRISBIE.

SPARK PRODUCING MECHANISM.

APPLICATION FILED JULY 27, 1921.

1,407,142. Patented Feb. 21, 1922.

Fig. 1.

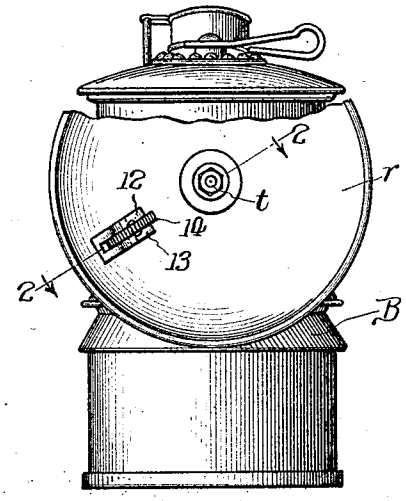


Fig. 2.

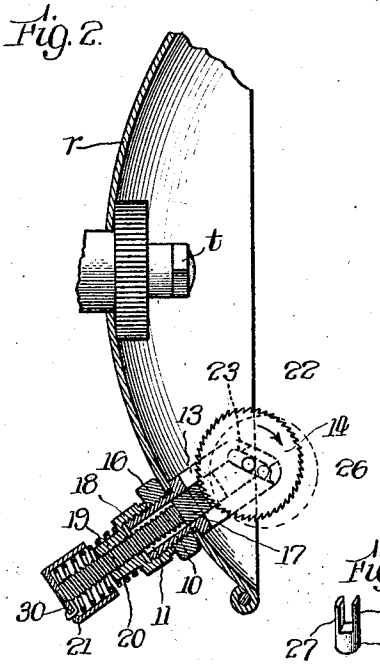


Fig. 6.

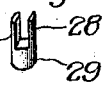


Fig. 3.

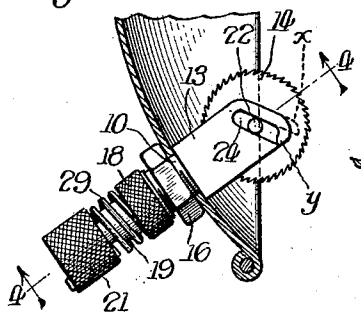
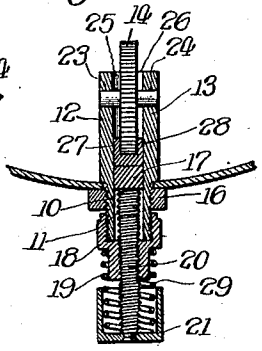


Fig. 4.



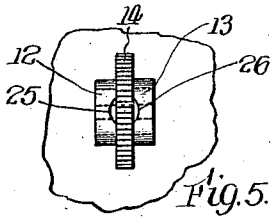


Fig. 5.

Fig. 7.

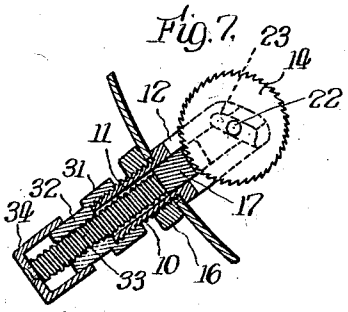


Fig. 8.

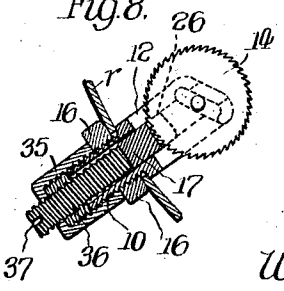
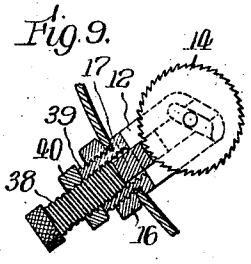


Fig. 9.



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Atty.

UNITED STATES PATENT OFFICE.

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SPARK-PRODUCING MECHANISM.

1,407,142. Specification of Letters Patent. Patented Feb. 21, 1922.

Application filed July 27, 1921. Serial No. 487,956.

To all whom it may concern:

Be it known that I, WILLIAM J. FRISBIE, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Spark - Producing Mechanism, of which the following is a specification.

My invention relates to spark producing mechanism of the type in which a serrated disk or wheel has frictional engagement with a piece of pyrophoric material. The mechanism can be used alone for general lighting purposes but is particularly useful as an attachment in connection with the gas tips on miners' acetylene lamps.

In the construction of these devices as heretofore used a barrel has parallel walls extending therefrom between which a serrated friction wheel is pivoted for rotational movement, but has no bodily movement. Through the barrel extends the bore for the block or pellet of pyrophoric material, usually cylindrical. The pyrophoric material is at all times pressed against the wheel by a spring, compressed by means of a cap having threaded engagement with the barrel. In this prior construction, the diameter of the bore and pyrophoric pellet and the thickness of the friction wheel are about equal. However, in the arrangement disclosed in the co-pending application of Charles J. Schmidt, Serial No. 478,822 of June 20, 1921, where the friction wheel has bodily movements away from the pyrophoric material, as well as rotational movement, provision should be made to hold the pyrophoric block in proper position and to prevent escape thereof from the barrel when the friction wheel is moved away. One of the important objects of my invention is therefore to provide improved means for holding the pyrophoric block in proper position for producing sparks and for preventing escape thereof from the barrel. This I accomplish by making the bore of the barrel of a diameter which is greater than the thickness of the friction wheel, and extending the bore between the walls which pivot the friction wheel. With this arrangement only the inner zone of the pyrophoric pellet is worn away by the friction wheel, the sides of the pellet remaining and engaging in the bore sides or grooves in the wall, such engagement holding the pyrophoric pellet in proper alignment at all times and preventing escape thereof. Such aligning and retaining of the pellet will also enable practically all of the pellet to be used up before it must be discarded and a new pellet inserted.

The pyrophoric pellet must be adjusted from time to time to compensate for the wear, this being usually accomplished by turning a threaded member which forces an abutment member against the pellet to shift it in the bore. A very important object of my invention is to provide improved means for preventing displacement of the adjusting members due to jarring and jolting of the lamp on which the sparking device is applied. In the form of sparking device or attachment in which my invention is particularly adaptable, the friction wheel supporting trunnions engage in diagonally extending slots in the supporting walls, and another important feature of my invention is to provide a simple and easy way for forming these slots.

The above and other features of my invention are disclosed in the structure shown on the accompanying drawing, in which drawing—

Fig. 1 is a front elevational view of a miner's cap lamp,

Fig. 2 is an enlarged sectional view on plane 2—2 Fig. 1,

Fig. 3 is an enlarged side elevational view of a spark producing attachment with parts of the supporting reflector shown in section,

Fig. 4 is a sectional view on plane 4—4 Fig. 3,

Fig. 5 is an end view of the spark producing attachment,

Fig. 6 is a perspective view showing the pyrophoric pellet partly worn away, and

Figs. 7, 8, and 9 show modified arrangements.

On the drawing I have shown my improved spark producing device applied to the reflector of a miner's acetylene cap lamp. The lamp shown comprises the structure B in which the gas in generated, the reflector r, and the tip t from which issues the gas which is generated in the lamp. The spark producing attachment shown comprises the barrel 10 having the bore 11. From the upper end of the barrel extend the parallel walls 12 and 13 between which is the friction wheel 14. The barrel 10 is extended through the hole 15 in the reflector and is externally

threaded to receive the nut 16, the reflector wall being clamped between the nut and the base of the walls 12 and 13. The attachment is positioned to bring the friction wheel in a radial plane so that sparks will be directed toward the gas outlet tip *t*. Slidable in the bore 11 is the cylindrical block or pellet 17 of pyrophoric material which is held within range of the friction wheel by suitable mechanism. As shown in Figures 1 to 4 this mechanism comprises a sleeve or cap member 18 having threaded engagement with the barrel 10 and having the contracted outer extension 19 which is internally threaded to receive the abutment screw 20 which at its outer end is secured to a shell or cap 21, which is adapted to pass over the extension 19. The cap forms a handle for turning the abutment screw 20, and as this screw is turned the pyrophoric pellet is advanced to compensate for the wear thereon by the friction wheel.

In accordance with my invention, the diameter of the bore 11 and the pyrophoric pellet is greater than the thickness of the friction wheel, and the bore is extended between the walls 12 and 13 to or beyond the pivot point of the friction wheel. In the arrangement shown the friction wheel is adapted for bodily movement as well as rotational movement. The trunnion pin 22 for the wheel extends into the diagonally disposed slots 23 and 24 in the walls 12 and 13, the slots extending in such direction that when the friction wheel is turned in clockwise direction (Figure 2) the trunnion pin will have a tendency to roll outwardly along the slots to bodily shift the wheel away from the pyrophoric pellet. If the thickness of the wheel or the distance between the walls 12 and 13 were equal to the diameter of the bore 11, then the pyrophoric pellet would tend to tilt, especially after it had been worn down and it could then readily escape from between the walls. However, by having the thickness of the wheel less than the diameter of the bore all this is prevented. In the arrangement of Figures 1 to 4 the bore is continued throughout the extent of the walls 12 and 13 so as to provide the grooves or channels 25 and 26 in the wall sides adjacent the wheel. As the wheel is then rotated, it will wear away only the inner zone of the pellet and will leave the walls 27 and 28 thereon which engage between the wheel and the walls in the grooves 25 and 26. Such engagement keeps the pellet at all times in alignment and prevents escape thereof, and the alignment will be maintained until the pellet has been cut entirely through by the wheel. The wheel can therefore be moved bodily away from the pellet without danger of the pellet losing its proper alignment. In order to use up as much as possible of the pyrophoric material, the wheel need be made only sufficiently thinner than the bore to insure sufficient strength in the walls 27 and 28 of the pellet to hold it against displacement. The advantages of the pivot slots for the trunnion pin are clearly set forth in the co-pending application referred to. It prevents sticking of the wheel against the pyrophoric material, for when the wheel is turned and the pyrophoric material tends to stop it the trunnion pin will roll along the slots and the wheel will be bodily moved away from the material to loosen itself therefrom, so that the wheel can always be easily turned to produce efficient sparking.

The feeding or adjusting means for the pyrophoric pellet, already described, will tend to work loose and escape during jolting or jarring of the lamp or other device on which the sparker is attached. One of the objects of my invention is to provide means for preventing this. In the arrangement of Figures 1 to 4 I interpose a compression spring 29 between the sleeve 18 and the cap 21, the spring extending into the cap and encircling the reduced extension 19 on the sleeve. This spring will exert tension on the adjusting stem 20 to keep its thread in sufficient frictional engagement with the extension 19 to prevent displacement or loosening of the stem. To prevent losing the spring when the stem is entirely withdrawn it may be secured at its outer end to the cap by being inserted through a hole therein and bent over as clearly shown at 30 in Figure 2.

When a pellet has been worn out the remaining walls 27 and 28 must be removed and a fresh pellet inserted. This is accomplished by unscrewing the sleeve 18. A fresh pellet is then inserted in the barrel 10 and the sleeve is reapplied, the stem 20 being however, screwed outwardly a sufficient distance to leave enough space for the new pellet. The cap 21 is then turned to shift the screw against the pellet until it is brought into proper position for sparking co-operation with the wheel. The threaded bore of the extension 19 is of sufficiently less diameter than the bore to prevent dropping out of the pellet when the stem is entirely removed from the extension 19, and when the stem is removed the spring cannot be lost as it is secured to cap 21 as above explained. The spring will permit the stem to be readily turned to feed the pellet but it will lock the stem after adjustment so that the setting of the pellet will be maintained during any jolting or jarring of the lamp.

Another feature of my invention resides in the formation of the diagonal slots for receiving the friction wheel trunnion pin. Instead of drilling these slots, which would be a laborious and costly operation, I form them by milling. By means of a milling cutter slots are cut into the walls 12 and 13 diagonally from one edge thereof and the

slots will then be open at one end as indicated at X at Figure 3. The ends of the sections of the walls above the slots are then deflected downwardly against the lower walls of the slots as indicated at Y Figure 3, this closing the slots and preventing escape of the trunnion wheel. These primarily open slots are advantageous because the trunnion pin can be inserted in the friction wheel before the wheel is applied, the trunnion pin being slipped into the slot before the ends are turned down to close the slot.

In Figures 7, 8, and 9 I have shown modified arrangements for locking the pyrophoric pellet setting mechanism against loss or displacement. In Figure 7 the sleeve 31 which engages the outer end of the barrel 10 has the reduced cylindrical section 32 through which threads the adjusting screw or stem 33 which at its outer end has the cap 34 secured thereto. This cap has such internal diameter that it will frictionally engage with the extension 32, this frictional engagement, although readily permitting turning of the screw to set the pyrophoric pellet, preventing displacement or loss of the screw during use of the device with which the sparking attachment is used.

In Figure 8 the threaded cap 35 engages the outer end of the barrel and seats against the nut 16 which secures the attachment to the reflector or other supports. The adjusting screw 36 has frictional threaded engagement in the head of the cap and it has the slot 37 for receiving a screw driver or other convenient tool whereby the screw may be turned to set the phyrophoric pellet.

In the arrangement of Figure 9 the adjusting screw 38 engages with the threaded interior of the barrel 39, and after setting of the pyrophoric pellet by the screw the screw is locked against displacement by the jam nut 40 which engages against the end of the barrel.

With my improved arrangement the greatest efficiency can be obtained out of the pyrophoric material. On account of the diagonal slots and the bodily movement of the friction wheel there will be no waste of the pyrophoric material and only enough will be scraped therefrom during turning of the wheel to cause sufficient sparking for ignition purposes. On account of the arrangement for holding the pyrophoric pellet in accurate alignment the pellet can be cut entirely through by the wheel and thus practically all of the material is available for sparking use. The locking means for the pellet adjusting mechanism assists in keeping the pellet in proper position to co-operate with the wheel. I do not desire to be limited to the exact construction and arrangement shown and described as changes may be made which will still come within the scope of the invention.

I claim as follows:

1. In spark producing machanism of the class described, the combination of a frame having a longitudinally extending bore, said frame being longitudinally slotted at one end, said slot being of less width than the diameter of said bore, a friction wheel pivoted in said slot, a block of pyrophoric material in said bore, and means for holding said block within range of said friction wheel.

2. In pyrophoric spark producing mechanism, the combination of a frame having a bore extending longitudinally therethrough, one end of said frame having a diametrally extending slot of less width than the diameter of said bore, a friction wheel supported in said slot to rotate axially and shift in its plane, a block of pyrophoric material within said bore, and means for holding said block within range of frictional engagement by said wheel, said block being of substantially the same diameter as said bore whereby it will engage and be held in the bore sections alongside of said wheel while its central zone is being worn away by the wheel, said block being thus prevented from tilting.

3. In sparking mechanism of the class described, the combination of a frame having a cylindrical bore extending longitudinally therethrough, the end of said frame being slotted diametrally, said slot being of less width than the diameter of said bore and extending through said bore whereby to leave channels at the side of said slot, a friction wheel pivoted in said slot, a block of pyrophoric material in said bore, and means for holding said block within frictional engagement range of said wheel, said channels receiving and holding said block in alignment while its central zone is being worn away by said friction wheel.

4. In pyrophoric spark producing mechanism of the class described, the combination of a frame having opposed walls, said frame having a bore extending therethrough from the base of said walls, a friction wheel pivoted between said walls to rotate axially and to move bodily toward and away from the base of said walls, said wheel being of less thickness than the width of said bore, a block of pyrophoric material slidable in said bore, means for supporting said block within range of the wheel to be frictionally engaged thereby when rotated, and abutments on said walls for aligning and retaining said block in proper co-operative position with reference to said wheel.

5. In a spark producing device of the class described, the combination of a frame, opposed walls on one end of said frame, said frame having a bore extending therethrough from the base of said walls, a friction wheel pivoted between said walls to rotate axially and shift bodily, a block of pyrophoric mate-

rial fitting said bore and slidable therein, means for holding said block within co-operative range of said wheel, said wheel being of a less thickness than the width of said bore whereby it will wear away only a portion of said block, and a channel in one of said walls for receiving the uncut part of said block to thereby hold said block in alignment during co-operation thereof with said wheel.

6. In a spark producing device of the class described, the combination of a frame having opposed parallel walls extending from one end, a bore extending through said frame from the base of said walls, a friction wheel between said walls pivoted to rotate axially, a block of pyrophoric material fitting said bore and slidable therein, means for positioning said block in the end of said bore within range of said wheel, said wheel being of less thickness than the width of said bore whereby to engage with and wear away only the central zone of said block, and channels in said walls for receiving the uncut sides of said block to thereby guide said block and prevent displacement thereof during co-operation therewith by said wheel.

7. In pyrophoric spark producing mechanism, the combination of a frame, opposed parallel walls extending from one end of said frame, a longitudinal bore in said frame open to the space between said walls, a friction wheel between said walls pivoted to rotate axially and shift bodily, a block of pyrophoric material fitting said bore and slidable therein, means for positioning said block in said bore within range of said wheel, said wheel being of less thickness than said block whereby it will wear away only the intermediate zone of said block, and channels in said walls for receiving the uncut sides of the block to guide said block and hold it against tilting.

8. In a sparking device of the class described, the combination of a frame, parallel walls extending from one end of said frame, said frame having a bore extending from said walls, a friction wheel between said walls pivoted for axial rotation and bodily movement toward and away from said bore, a block of sparking material in said bore, means for holding said block to project from said bore into the space between said walls and within range of said wheel, and means between said walls for preventing tilting of said block against the lateral pressure exerted thereon when said wheel is rotated.

9. In a sparking device of the class described, the combination of a frame, opposed walls extending from one end of said frame, a bore through said frame communicating with the space between said walls, a friction wheel between said walls pivoted to rotate axially, a block of pyrophoric material slidable in said bore, adjustable means for holding said block in the bore to project into the space between said walls and within range of said friction wheel, and means acting independently of said bore for holding said block in parallelism with said bore under transverse pressure thereon by said wheel when rotated.

10. In the sparking device of the class described, the combination of a frame, walls extending from one end of said frame, a bore through said frame communicating with the space between said walls, a friction wheel between said walls having pivot extensions, slots in said walls extending at an angle with the axis of said bore for receiving said pivot projections to permit rotation and bodily movement of said wheel, a block of pyrophoric material in said bore, means for positioning said block at the end of said bore to project into the space between said walls, said wheel being of less thickness than the width of said bore and said block whereby said wheel will wear said block only at its intermediate zone when rotated thereagainst, and channels in said walls for receiving the projecting uncut sides of said block to guide said block and hold it against tilting when frictionally engaged by said wheel.

11. In a sparking device of the class described, the combination of a frame, walls on one end of said frame spaced apart, a bore through said frame communicating with the space between said walls, a friction wheel pivoted to rotate between said walls, a block of pyrophoric material in said bore, a sleeve detachably secured on the end of said frame and having a threaded passageway, an adjusting rod for said block having threaded engagement in said passageway for positioning said block with reference to the friction wheel, and means for preventing turning of said rod after adjustment thereof.

12. In a sparking device of the class described, the combination of a frame having a bore therethrough, a friction wheel positioned near the outlet of said bore, a block of pyrophoric material slidable in said bore, a cap detachably secured on said frame and having a threaded passageway, an adjusting rod extending through and having threaded engagement in said passageway, said rod serving to adjust said block with reference to the friction wheel, a manipulating member on the outer end of said rod for adjustably turning said rod, and means between said member and sleeve for preventing accidental turning of said rod after adjustment thereof.

13. In a sparking device of the class described, the combination of a frame having a bore therethrough, a friction wheel positioned near the mouth of said bore, a block

of pyrophoric material in said bore, a sleeve detachably secured on said frame and having a threaded passageway therethrough, an adjusting rod threading through said passageway for positioning said block with reference to said wheel, a manipulating member on the end of said rod for controlling the adjusting turning thereof, and friction means interposed between said member and sleeve for locking said rod against accidental turning after adjustment thereof.

14. In a spark producing device of the class described, the combination of a frame having a bore therethrough, a friction wheel positioned near the outlet of said bore, a block of pyrophoric material within said bore for co-operating with said wheel, a sleeve detachably secured on said frame and having a threaded passageway, an adjusting stem threading through said passageway for positioning said block with reference to the wheel, a manipulating member on the outside of said rod for controlling the adjusting rotation thereof, and a spring between said member and said sleeve for locking said rod against accidental rotation after adjustment thereof.

15. In a spark producing device of the class described, the combination of a frame having a bore, walls on said frame adjacent the mouth of said bore, a friction wheel between said walls having pivot extensions, slots cut in from the edges of said walls for receiving said pivot projections, the ends of said walls being deflected to close said slots to prevent escape of said pivot extensions, pyrophoric material in said bore, and means for holding said material within range of said wheel.

16. In a sparking device of the class described, the combination of a frame, opposed walls extending from said frame, said frame having a bore communicating with the space between said walls, slots cut into said walls near the outer end thereof and from one side thereof, a friction wheel between said walls having pivot projections for engaging in said slots, the outer corners of said walls being turned inwardly to close said slots to prevent escape of said pivot projections after insertion in said slots, a block of pyrophoric material in said bore, and means for positioning said block in said bore to co-operate with said wheel.

In witness whereof, I hereunto subscribe my name this 22nd day of July A. D., 1921.

WILLIAM J. FRISBIE.