W. W. BATCHELDER.

Lighting Device.

No. 201,485. Patented March 19, 1878.

Fig. 1.

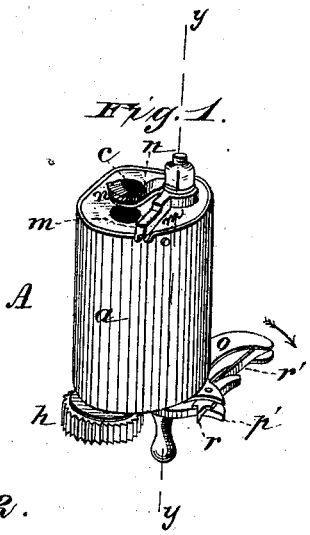


Fig. 2.

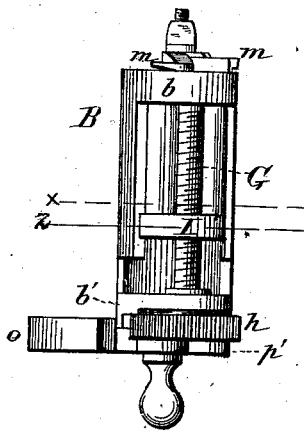


Fig. 5

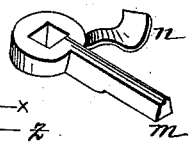


Fig. 3.

Fig. 7.

Fig. 4.

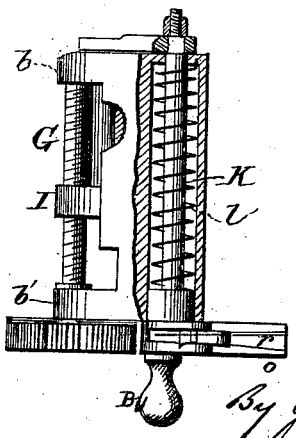
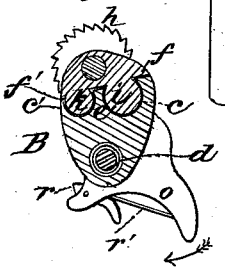


Fig. 6.



WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM W. BATCHELDER, OF NEW YORK, N. Y.

IMPROVEMENT IN LIGHTING DEVICES.

Specification forming part of Letters Patent No. **201,485**, dated March 19, 1878; application filed March 9, 1878.

To all whom it may concern:

Be it known that I, WILLIAM W. BATCHELDER, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Repeating Match or Igniter, of which the following is a specification:

This invention relates to an improved repeating match or igniter, adapted for use in lighting gas or tinder, firing powder or fuses, or causing combustion of any substance capable of ignition from a flash.

The object of my invention is to provide a reliable, safe, handy, and cheap device for producing ignition without trouble; and its principle lies in securing, in convenient position for having small portions brought in contact with each other, but the main portions perfectly separated, different substances which are not explosive in themselves, but which produce explosion or rapid combustion when mixed or united.

In the accomplishment of its intended purpose, my invention consists, first, in the combination of two or more substances or compounds which, in themselves, are non-explosive, but which, if mixed or united and rubbed, or otherwise mechanically acted upon, will explode or burn rapidly, each of said substances or compounds being separated and arranged in such manner to each other as to produce a flash or flame, or a succession of flashes or flames, without danger of igniting the mass; second, in a suitable case divided into adjacent chambers, each of which is adapted to contain a compound or substance which will produce combustion when mixed or united with the compound or substance of the other chamber or chambers, in combination with a suitable scraping or conveying device for mixing or uniting small portions of the said compounds or substances with each other, and an automatic feeding device for forcing said compounds or substances into position to be operated upon by the said scraping or conveying device, whereby the compounds or substances may be kept normally perfectly separated, but readily brought in contact with each other in proper quantity, and ignition produced at will; third, in a novel case for repeating match or igniter, the same consisting of two separate adjacent chambers with open ends, connected by a flush platform or plate, a spring-scraper, or conveying, rubbing, and igniting device, adapted to play across said platform, and followers or pushers fitting in said chambers, and adapted to move automatically therein simultaneously with the operation of the scraper in one direction, whereby, when said chambers are filled with the compound or substance, portions thereof at the open ends or mouths of the chambers will be removed therefrom by the action of the said scraper, and mixed or united with each other, for the purpose of producing combustion or a flash, or succession of flashes, and said compounds or substances will be kept always projected sufficiently across the path of said scraper or conveyer to be removed thereby; fourth, as a new article of manufacture, a suitable case divided into two adjacent chambers, each of which contains a compound or substance which will produce combustion when brought in contact with that of the other, and provided with a suitable scraper, or conveying, rubbing, and igniting device, for bringing small portions of the said compounds or substances in contact with each other and igniting the same, and an automatic feeding device for forcing said compounds or substances sufficiently across the path of said scraper to be removed thereby, and rubbed one upon the other for producing combustion.

In the accompanying drawings, Figure 1 is a perspective view of my improved repeating match or igniter. Fig. 2 is a view, in elevation, of the chambered case and operative parts in proper position, the outer shell or inclosing-case being removed. Fig. 3 is a section on line *x x*, Fig. 2. Fig. 4 is a view, partly in elevation and partly in section, on line *y y*, Fig. 1, showing the device for operating the scraper, conveyer, and igniter. Fig. 5 is a view of the under side of the scraper, conveyer, and igniter detached. Fig. 6 is a section on line *z z*, Fig. 2; Fig. 7, a view of the composition sticks.

The letter A designates the complete apparatus, *a* indicating the inclosing-shell. B is a casing of approximately semi-elliptical cross-section, provided with a nearly-oval base-

plate, b', and a similar-shaped top plate, b, and having arranged longitudinally therein three parallel chambers, c, c', and d.

The terms "base" and "top" are used merely for convenience in description, as the apparatus may be held in any desired position.

The chambers c c' are of different diameters, and are separated by a thin partition, e, and have longitudinal slots f f' in the outer portions of their walls. G is a screw-threaded shaft, the ends of which are journaled in the top and base plates b b', respectively, its lower end projecting through the base-plate, and provided with a ratchet-wheel, h. I is a traveling nut, fitting upon the screw-shaft G, and having projecting therefrom two lugs, i k, of different sizes, extending through the slotted walls of the chambers c c', and fitting within said chambers, respectively, so as to be moved in a longitudinal direction therein by the turning of the screw-shaft, and constitute pushers or followers, for feeding forward the contents of the chambers, as hereinafter explained.

The letter K indicates a rod arranged in the chamber d, and having its opposite ends projecting beyond the ends of said chamber. This rod is surrounded within the chamber d by a helical spring, l, one end of which is fixed to the rod, and the other to the base-plate b'. The upper projecting end of this rod is squared to fit a similar-shaped opening through one end of an arm or scraper, conveyer, and igniter, m, arranged to sweep across the top plate when the rod is rocked. The under surface of this arm is beveled or rabbeted, so that only its rear longitudinal edge rests upon the top plate b, while under the other portion of said arm is a space, in which are received and conveyed the small portions of the substances which are at the same time rubbed one upon another for producing ignition, as hereinafter explained. This arm is secured to the rod by a suitable nut, and has a flat arm projecting from its inner end at an acute angle, so that said arm will stand partially over the mouths of the chambers, while the arm m lies clear of them, thus preventing the substances from falling out of the chambers, or becoming abraded when the apparatus is not in use.

Upon the lower end of rod K, which projects below the base-plate b', is fixed an arm or thumb-lever, o, having lugs p p' projecting laterally in opposite directions from its inner end. The lug p' is held, by the action of the spring l, against a stop, q, projecting downward from the base-plate b'; and the opposite lug p is bifurcated, and has mounted within its fork a spring-pawl, r, the tail of which is pressed outward by a spring, r'.

The description now given covers the construction of the case and its operative parts, which may, of course, be formally modified according to fancy or for the purpose of adapting the apparatus to special uses.

Now, in order to complete the character of this case as a repeating match or igniter, the chambers c and c' are filled with different substances or compounds, respectively, which are of themselves not explosive, but which, when brought in frictional contact with each other, produce an explosive combustion or flash. These substances I prepare in the shape of small cylinders or sticks, which fit into and fill the chambers c and c', the inner ends of said sticks or cylinders resting upon the followers or pushers i k, so that when the ratchet-wheel h is rotated to cause the nut I to advance, the outer ends of the sticks will be projected a corresponding distance beyond the open ends of the chambers and in the path of the rear edge of the scraper, conveyer, and igniter when it sweeps across the top plate or platform b; and these projecting portions will be scraped off from the mouths of the chambers and rubbed together upon the exposed surface of one of the sticks, when explosion or combustion will take place.

The separate sticks for the respective chambers c c' are prepared as follows: For the composition of one of these sticks I take chlorate of potash, three (3) parts; clay, one (1) part, and mix these substances thoroughly, forming, by the addition of water, a thick paste, which I then mold into sticks of the proper size and allow them to dry. For the other sticks I take amorphous phosphorus, three (3) parts; clay, one (1) part; mix, mold, and dry as above. The color of the first-named sticks is white; that of the latter, red, and they should be arranged in such relative positions in the chambers that the white or chlorate-of-potash compound will be first removed by the scraper or conveyer, and rubbed thereby across the exposed surface of the red or phosphorous composition. This order of scraping and rubbing together the substances I have, in practice, found preferable; but ignition may be produced by rubbing the red substance upon the white.

In order to prevent mistake in arranging the sticks in their most effective relative positions, I form the chambers of different sizes, and the respective composition sticks of corresponding sizes—thus the larger chamber being designated for the reception of the white stick, and the smaller for the red, or vice versa.

While I have found the ingredients and proportions thereof above named to answer quite satisfactorily, I do not, of course, limit myself to them, as it is well known that there are many substances and compounds which might be substituted therefor. Nor do I confine myself to two chambers or two separate compounds, as three or more compositions may be formed to produce ignition under the general principle of my invention.

When the apparatus is not in use the arm n of the scraper, conveyer, and igniter lies partially across the open mouths of the composition-chambers. Now, when it is desired to produce combustion, the thumb-lever o is

pressed in the direction of the ratchet-wheel, causing the rod K to turn and throw the conveyer, scraper, and igniter in the direction of the arrow, Figs. 1 and 3; and when the arm *m* is clear of the mouths of the chambers, the dog or pawl *r* will engage with a tooth of the ratchet-wheel, turning said wheel sufficiently to cause the traveling nut and pushers or followers *i k* to advance and project the substances in the chambers *c c'* far enough beyond the top plate *b* to be in the path of the rear edge or lip *m'* of the scraper, conveyer, and igniting-arm *m;* and now, when the thumb-lever is released, the action of the spring *l* returns the parts briskly to their normal position, the scraping-edge of the arm *m* removing a small portion of the composition extending beyond the mouth of the chamber *c*, and conveying it across the projecting portion of the composition of the other chamber, *c'*, and the top plate beyond, the frictional contact between the two parts thus produced causing ignition and a flash when the substances heretofore named are used in the composition of the contents of the respective chambers.

What I claim is—

1. The combination of two or more substances or compounds which in themselves are non-explosive, but which, if mixed or united and rubbed, or otherwise mechanically acted upon, will explode or burn rapidly, said substances or compounds being separated and arranged, substantially as described, to produce a flash or flame, or a succession of flashes or flames, without danger of igniting the mass.

2. The combination, in a suitable casing, of two or more separate substances or compounds which will not explode when separate, but will burn violently or explode when mixed or brought in contact with each other and rubbed, or otherwise mechanically acted upon, and a suitable device for accomplishing such mixing or uniting and ignition of said substances or compounds, substantially as set forth.

3. A suitable casing divided into adjacent chambers, each of which is adapted to contain a compound or substance which produces explosion or combustion when brought in frictional contact with that of the other or others, and provided with a suitable device for traversing the mouths or open ends of said chambers, and bringing small portions of said compounds or substances in such contact with each other, substantially as and for the purpose set forth.

4. A suitable case divided into adjacent chambers, each having one end open, and adapted to contain a compound or substance which will produce combustion when brought in contact with the compound or substance of the other chamber or chambers, in combination with a suitable scraping or conveying and igniting device adapted to traverse the open ends of said chambers, for bringing small portions of the said compounds or substances in frictional contact with each other, and an automatic feeding device for forcing said compounds or substances into position to be operated upon by the said scraping or conveying and igniting device, substantially as and for the purpose set forth.

5. A novel case for a repeating match or igniter, the same consisting of two separate adjacent chambers with open ends, connected by a flush platform or plate, a spring-scraper, or conveying, rubbing, and igniting device, adapted to play across said platform, and followers or pushers fitting within said chambers, and adapted to move automatically therein simultaneously with the operation of the scraper, conveyer, and rubbing and igniting device, substantially as described.

6. As a new article of manufacture, a suitable case divided into two adjacent chambers, each of which contains a compound or substance which will produce combustion when brought in contact with that of the other, and provided with a suitable scraper, or conveying, rubbing, and igniting device, for bringing small portions of the compounds or substances in contact with each other, and an automatic feeding device for forcing said compounds or substances into the path of the said scraper, conveyer, or rubbing and igniting device, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand in the presence of the subscribing witnesses.

W. W. BATCHELDER.

Witnesses:

JAMES L. NORRIS,

JAMES A. RUTHERFORD.