

P. B. TYLER.

Manufacture of Friction Matches.

No. 50,860.

Patented Nov. 7, 1865.

Fig: 1. Fig: 2. Fig: 3.<sup>a</sup> Fig: 3.

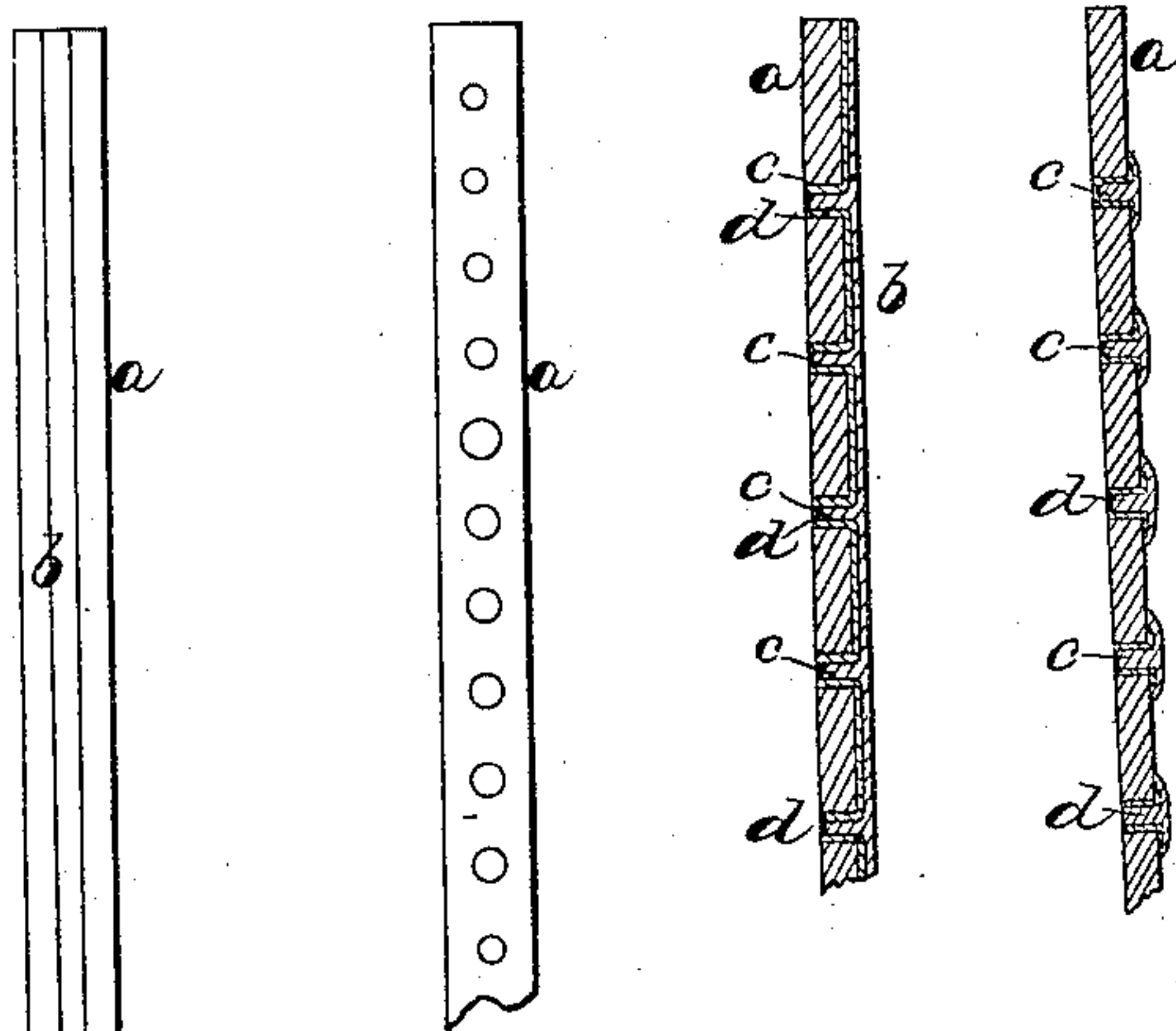


Fig: 7.

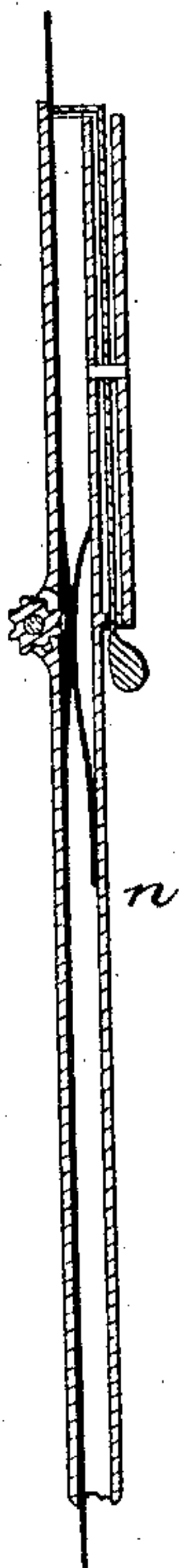


Fig: 5.

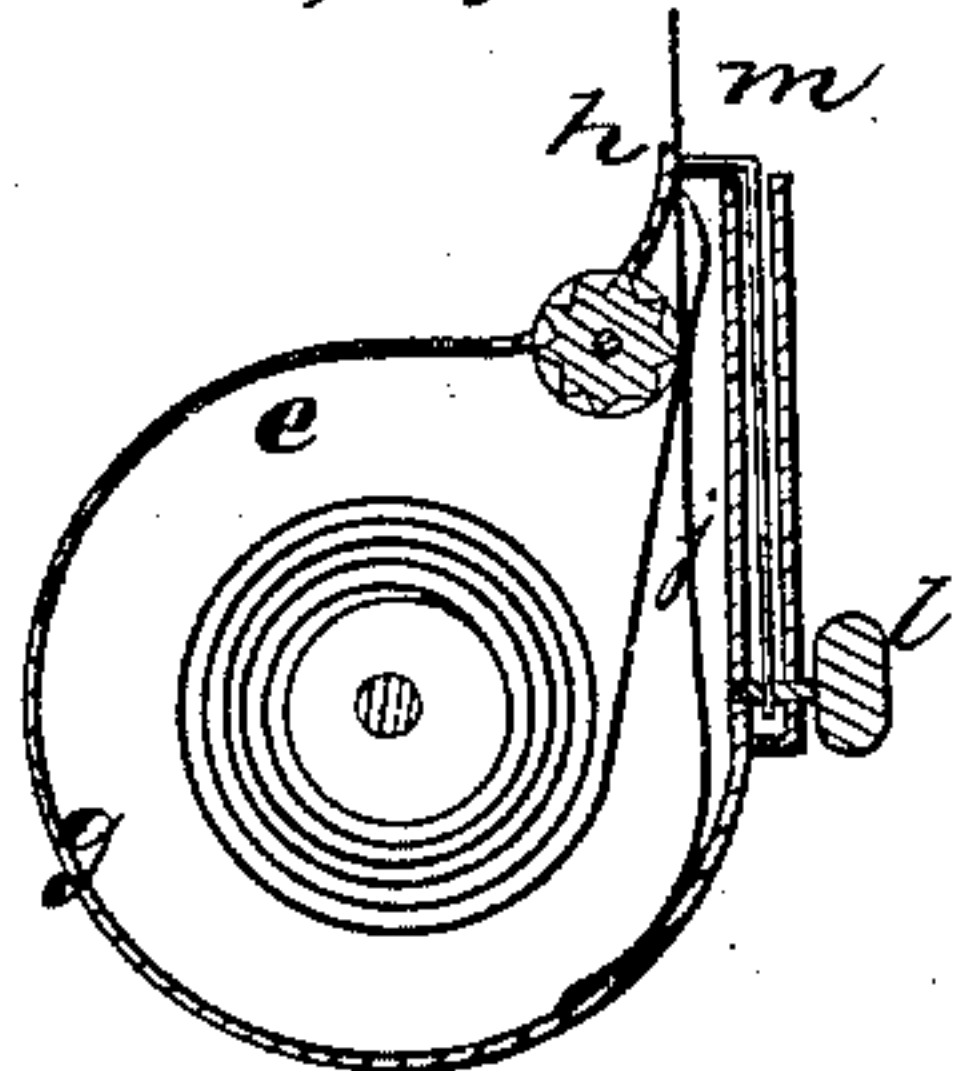


Fig: 4.

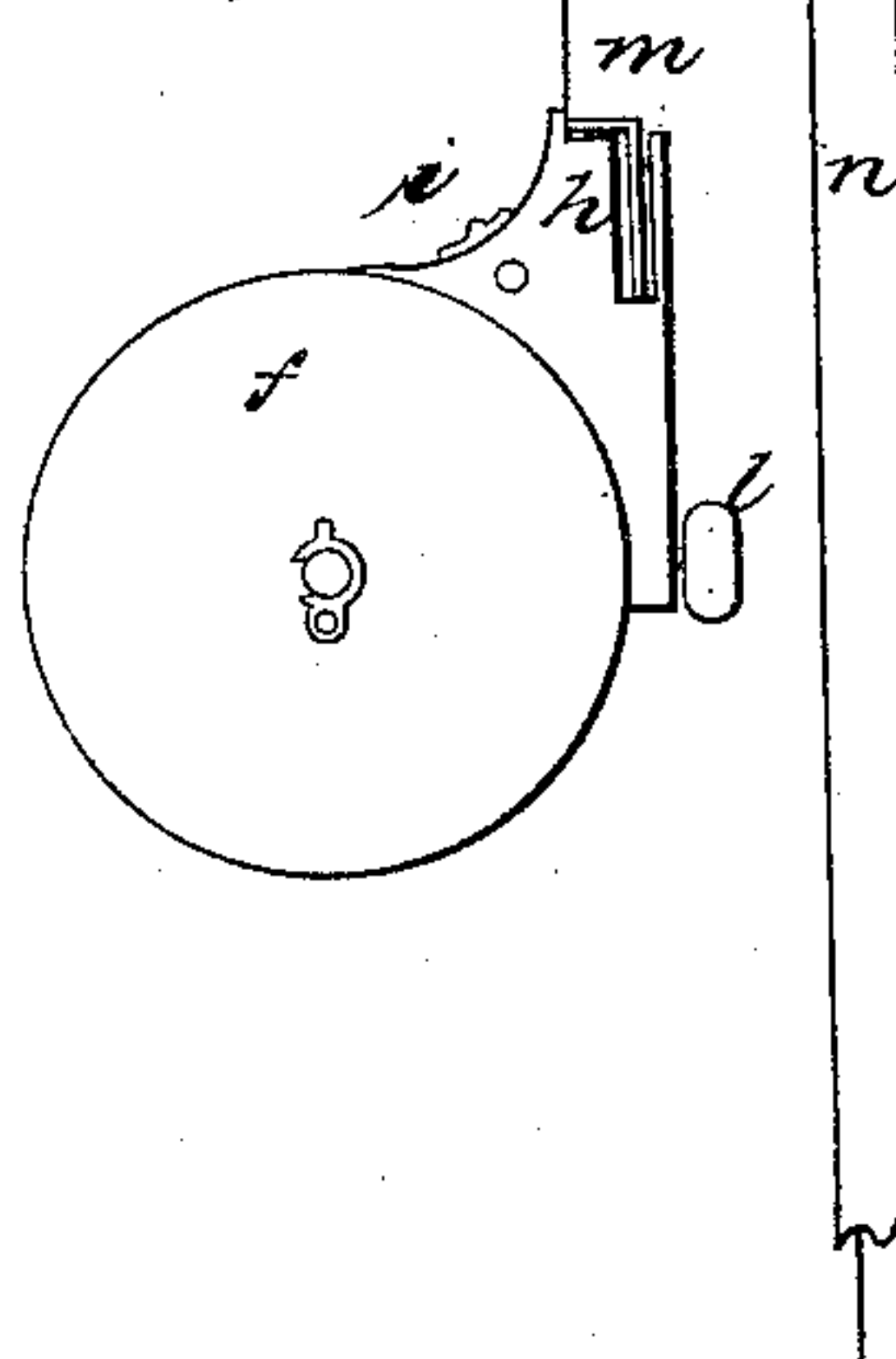


Fig: 6.



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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN THE MANUFACTURE OF FRICTION-MATCHES.

Specification forming part of Letters Patent No. 50,860, dated November 7, 1865.

*To all whom it may concern:*

Be it known that we, PHILOS B. TYLER and WILLIAM M. CHANDLER, of Springfield, in the State of Massachusetts, and L. F. STANDISH, of Chicopee Falls, in the State of Massachusetts, have invented certain new and useful Improvements in Friction-Matches and Apparatus for Using Them; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a face view of a continuous match; Fig. 2, a like view of a repeating-match; Fig. 3, a longitudinal section of a repeating-match; Fig. 3<sup>a</sup>, another longitudinal section of a continuous match, (both sections drawn on a large scale;) Fig. 4, a side view; Fig. 5, a section of one form of apparatus for using such matches, and Figs. 6 and 7 like views of another form of such apparatus.

The same letters indicate like parts in all the figures.

Prior to our said invention matches for producing flame have been made in separate pieces of some material which, when ignited, would produce a flame, generally splints of wood, rendered more readily ignitable by having one end coated for a short distance with sulphur, and the extreme end thereof with phosphorus or other substance which will readily ignite by friction. At each ignition the entire of one such match is either entirely consumed, or, if not entirely consumed, what is left of it thrown away, and generally the modes of keeping and using such matches are attended with inconvenience and danger.

The object of our said invention is to form a continuous or repeating match requiring only so much of it to be used as may be required and then extinguished, and the residue retained for further use, until, after repeated use, the whole is consumed; and our said invention also relates to apparatus for containing and using such continuous or repeating matches. We prepare our said continuous or repeating matches by taking a strip, *a*, of paper or tape of any desirable length and about quarter of an inch in width, and saturate it with stearine or equivalent combustible sub-

stance, which, when ignited, will produce a flame and burn more slowly and steadily than the paper or tape, and when ignited will continue to burn with a flame throughout the entire length, unless it be extinguished by some means.

For a continuous match we apply to one surface of the prepared strip, and along the middle portion thereof, as at *b*, sulphur and phosphorus, applying the sulphur first and then the phosphorus, or instead other equivalent substance or compound for igniting by friction may be so applied; but for making what we term a "repeating-match," instead of applying the sulphur and phosphorus or equivalent therefor continuously, we apply it in spots at equal distances apart, leaving a length of the prepared strip between every two sufficient to make a flame for the required length of time; and as the material for igniting by friction does not adhere to the surface of the prepared strip with much force, and for that reason would be likely to be rubbed off in making friction upon it to ignite it, a part of our said invention relates to a means for securing such preparation, and consists in punching holes *c* through the strip, either before or after it has been prepared with the inflammable matter, so that the phosphorus or equivalent therefor when applied will enter such perforations, as at *d*, and become thereby securely connected with the strip, so that it cannot be rubbed off.

For the convenient use of our continuous or repeating matches the strip is to be placed in a case of a circular form, as represented at *e*, the strip being coiled up in the form of a volute, and one side, *f*, of the case being fitted to the circular rim *g* so that it can be put on or taken off readily, like the cover of an ordinary snuff-box; or it may be hinged to the rim. The end of the match-strip is pushed out through an opening in the rim, and into and through a tangent nose-piece or beak, *h*, the under part of which is provided with a toothed roller, *i*, the teeth of which act on the under face of the strip, which is borne against the said roller by a slight spring, *j*, so that by turning the said roller with the finger the required length of match is pushed out beyond the end of the nose-piece; but instead of turning this roller



by the finger acting on the under part, it may be entirely inclosed in the nose-piece of the case and its arbor provided with a thumb-and-finger wheel.

An instrument which we term the "igniter" is attached at its rear end to a little arbor mounted in the outer or top plate of the nose-piece, and this arbor is formed outside with a thumb and finger piece, *l*, so that it can be turned, and the extreme end of this igniter extends to the outer end of the nose-piece, and is there formed with a slightly-projecting lip, *m*, brought to a point or roughened on the lower edge, which bears on the match. The igniter is narrow, so that when turned to one side the lip lies by the side of the strip, and when the end of the match has been pushed out beyond the nose it is ignited by giving a slight vibratory motion to the igniter, which carries its pointed or roughened lip across the surface of the match. When the match has been ignited and inflamed the flame can be continued as long as desired by pushing out more of the match beyond the nose of the case, for it will only become extinguished when the flame reaches or rather approaches the end of the nose, which cuts off the supply of atmospheric air which feeds the flame.

The form of case above described is that which we deem best suited for general use; but for lighting chandeliers, gas-burners, &c., at a height beyond the reach of the hand we make the case in the form of a straight tube, *n*, into which the match-strip is inserted, the upper end of the tube being provided with a nose-piece, roller, and igniter in like manner as the case already described.

We wish it to be understood that with reference to the matches we do not limit ourselves to the use of any special material for the strip, nor for saturating the strip to make it burn with a flame, nor to the kind or preparation of material for igniting by friction. We have named the materials and preparations which we deem best; but as there are many substances and preparations possessing equiv-

alent properties any of these may be readily substituted without departing from our said invention; and, in fact, the strip may be prepared so as to be sufficiently inflammable to be ignited by the phosphorus without the use of sulphur. In short, our invention does not relate to the preparation or combination of materials for producing a flame by friction, but to the structure of an inflammable match by which it is rendered continuous or repeating.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The continuous or equivalent repeating match composed of a strip of substance which, when ignited, will burn with a flame, combined with the preparation of sulphur and phosphorus, or the equivalent thereof, which will ignite by friction, put on along the whole length, or, as the equivalent thereof, in spots at given distances apart along the whole length, substantially as and for the purpose described.

2. Piercing the strip with holes, and applying the material that ignites by friction thereto, to prevent such material from becoming detached therefrom, all substantially as described, and in the apparatus for using continuous or repeating matches, the nose-piece or tube through which the match passes, in combination with the vibrating igniter, or the equivalent thereof, substantially as and for the purpose described.

3. In combination, the nose-piece through which the match passes, the roller, or equivalent thereof, for moving the match, and the igniter, or the equivalent thereof, as and for the purpose described.

4. In combination the case for containing the match, the nose-piece, the roller for moving the match, and the igniter, or the equivalents of them, as and for the purpose described.

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