

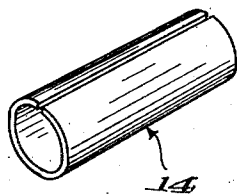
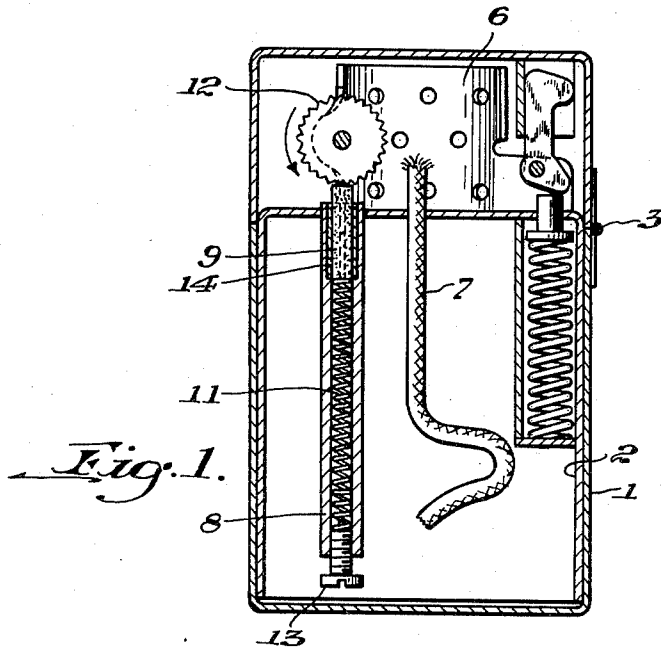
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2,517,191

PYROPHORIC LIGHTER

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# UNITED STATES PATENT OFFICE

2,517,191

## PYROPHORIC LIGHTER

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1

This invention relates to pyrophoric lighters and, in particular to lighters which are ignited by sparks thrown from a flint.

A widely-used lighter of a type for which the improvements of this invention are particularly suitable is that disclosed in United States Patent 2,032,695 which shows, generally, the construction of the well known "Zippo" lighter. This is a pocket lighter with telescoping outer and inner hollow casings, the inner casing carrying a vertical flint-receiving tube, a wick and a packing of cotton-waste, or the like, saturated with lighter fluid. The flint is urged upwardly in the tube into engagement with a rotatable, toothed wheel, which, when rotated, throws sparks that ignite the wick.

It has been found that the flint tube of such a lighter must be formed of a corrosion-resisting non-ferrous metal such as brass, copper, etc., so that any dampness present in the atmosphere will not rust its interior and either prevent insertion of a flint or bind the flint screw which, normally, closes the lower end of the tube. However, the use of such material gives rise to one rather serious difficulty, this being that the material is so soft that pressure exerted by the flint on the tube when the spark-throwing wheel is rotated soon files or mashes the upper end of the tube and produces an oval shape. Such a shape then allows the flint to rock back and forth so that, frequently, the flint binds the wheel and makes further rotation of the spark-throwing wheel difficult or impossible.

It is therefore an object of this invention to provide a simple, inexpensive and effective manner of preventing such flint-produced, wheel-binding distortions of a corrosion-resisting flint-holding tube.

According to the invention, such an object is achieved by fitting a hard metal bushing into the upper end of the distortable flint-holding tube. Preferably, the body of the bushing is formed of a rigid or hard steel which is plated, or otherwise covered, with a rust-resisting material, such as zinc. The flint lies within this bushing, and the hardness of the bushing is sufficient to prevent it, or the tube, from being distorted by flint wheel pressures acting on the flint.

The preferred embodiment of the invention is illustrated in the accompanying drawings of which Fig. 1 is a vertical section through a common type of lighter provided with the improvement of this invention; and Fig. 2 an enlarged perspective view of the above-mentioned bushing.

2

Referring to Fig. 1 of the drawings, the lighter there used to illustrate the invention includes outer and inner telescoped casings 1 and 2, the outer casing being hinged at 3 to provide a cover, and special means, unrelated to this invention, are provided to hold the cover in an open or a tightly closed position. Casing 2 has a wind screen 6 formed on its top wall, this casing normally being filled with a cotton-waste, or the like, which is kept saturated with an inflammable lighter fluid. Also, within this inner casing is placed a wick 7 that extends up into the wind screen.

The improvements of the invention are concerned solely with the flint-holding member which, as shown, is a vertical tube 8 mounted in the inner casing. Customarily, this tube is formed of a non-ferrous, corrosion-resisting metal, such as brass, so that any moisture from the atmosphere which may find its way into the casing will not corrode it. A flint 9 is slidably mounted within the tube and a spring 11 is provided which presses the flint upwardly out of the tube against a toothed wheel 12 rotatably mounted on a horizontal axis above the top of tube 8. The bottom of the tube is closed by a small brass screw 13 against which spring 11 presses and the lighter is operated in the customary manner by rotating toothed wheel 12 so as to throw the sparks against the upper end of saturated wick 7 thereby igniting the wick or the vapor in it.

As is well known, flint is quite a hard substance, and, in fact, is so hard as compared with the corrosion-resisting metal of which the tube is formed that any movements of the flint within the tube are capable of distorting the circular, cross-sectional shape of the tube. Such movements of the flint are set up when sparking wheel 12 is rotated, this rotation causing an upward and downward movement of the flint which files and mashes the tube and eventually changes it from a circular to an oval shape so that it is permitted to rock back and forth. As a consequence, the flint often is rocked into a position which binds sparking wheel 12 and renders its rotation extremely difficult or impossible.

According to this invention means are provided to prevent this distortion and continuously to allow easy rotation of the sparking wheel, such means being a bushing 14, shown in Fig. 2. This bushing is sized to fit into the upper end of tube 8 and, for this purpose, the tube's upper end is counterbored for a distance approximately equal to the length of the bushing. Also, to facilitate the placing of the bushing in the tube it is pref-

erable to use a split bushing which can be pressed together for insertion. In order to prevent distortion of the bushing and the tube by the flint, the tube is formed of a metal which approximates the hardness of the flint, this, most suitably, being a hard steel. Also, it is recognized that there is a possibility of the bushing itself so rusting or corroding as to prevent a flint from fitting into it, and accordingly, it is desirable to plate the bushing with a corrosion-resisting material, such as zinc, or to form it of corrosion-resisting steel, such as stainless steel which contains 18 per cent of chromium and 8 per cent nickel. As a result of this simple, but effective, manner of avoiding tube distortion, the sparking wheels of such lighters do not become bound and the extreme annoyance of such a bound wheel is completely eliminated. While the invention has been illustrated by the particular type of lighter described, it will be understood that it is equally suitable for use in any lighter that has flint-receiving tubes formed of distortable, corrosion-resisting material.

According to the provisions of the patent statutes, we have explained the principle of our invention and have illustrated and described what we now consider to represent its best embodiment. However, we desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

**We claim:**

1. A flint-receiving tube for use in a pyrophoric lighter, said tube comprising an elongate tubular member formed of a non-ferrous readily distortable metal, and a bushing formed of a hard metal, said tubular member being counterbored at one end, and said bushing fitting closely into said counterbore to strengthen the tube against deformation in the operation of the lighter, the outer end of said bushing being substantially flush with the outer end of said tube.

2. A flint-receiving tube for use in a pyrophoric lighter, said tube comprising an elongate tubular member formed of a readily distortable non-ferrous metal, and a bushing formed of a hard metal having corrosion-resisting surfaces, said tubular member being counterbored at one end, and said bushing fitting closely into said counterbore to strengthen the tube against deformation

in the operation of the lighter, the outer end of said bushing being substantially flush with the outer end of said tube.

3. A flint-receiving tube for use in a pyrophoric lighter, said tube comprising an elongate tubular member formed of a non-ferrous distortable metal, and a split steel bushing, said tubular member being counterbored at one end and said bushing being plated with a corrosion-resisting material and being fitted closely into said counterbore to strengthen the tube against deformation in the operation of the lighter.

4. In a pyrophoric lighter comprising a casing having a top wall provided with an opening for the top of a flint-receiving tube and having a rotatably mounted sparking wheel disposed adjacent to said opening, a flint-receiving tube formed of a non-ferrous readily distortable metal having its upper end extending into said opening and attached to said wall, the upper end of said tube being counterbored, and a rigid steel bushing fitted closely in said counterbore to strengthen the upper end of said tube against deformation by the action of the flint wheel upon flint in the tube, the outer end of said bushing being substantially flush with the outer end of said tube.

5. In a pyrophoric lighter comprising a casing having a top wall provided with an opening for the top of a flint-receiving tube and having a rotatably mounted sparking wheel disposed adjacent to said opening, a flint-receiving tube formed of a non-ferrous distortable metal having its upper end extending into said opening and attached to said wall, the upper end of said tube being counterbored, and a rigid steel bushing fitted closely in said counterbore, said bushing being plated with a corrosion-resisting material and being fitted closely into said counterbore.

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