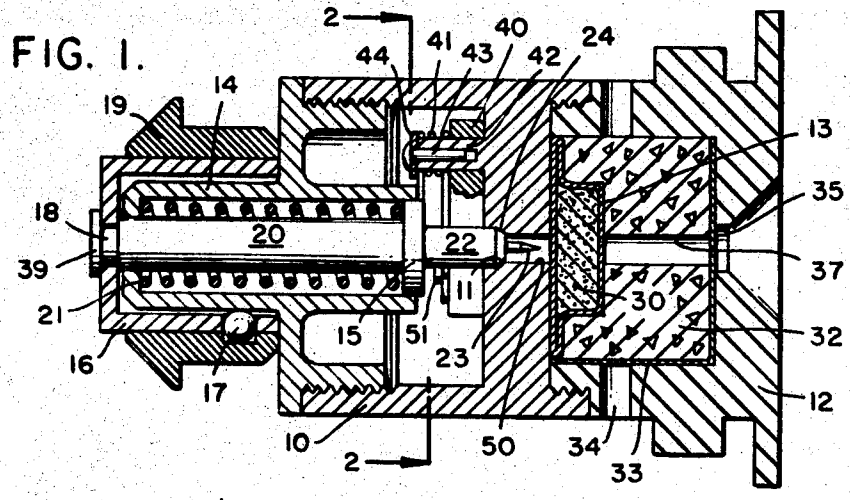
July 16, 1968 R. C. NOLES 3,392,672

FLARE LIGHTER

Filed May 29, 1967

FIG. 1.



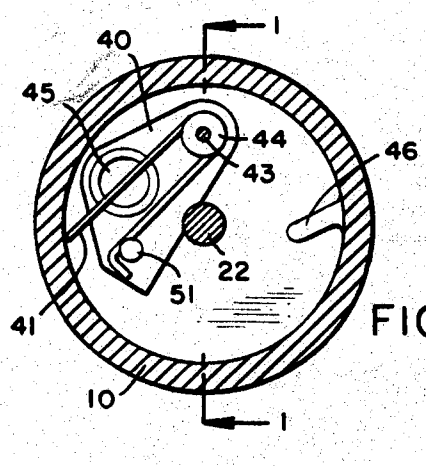


FIG. 2.

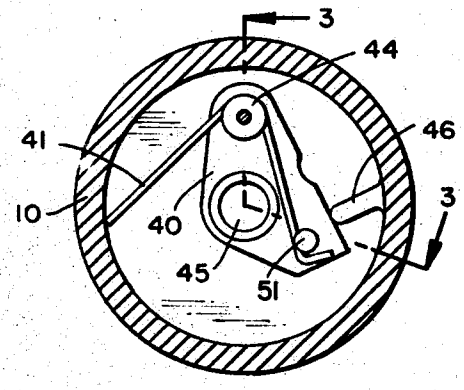


FIG. 4.

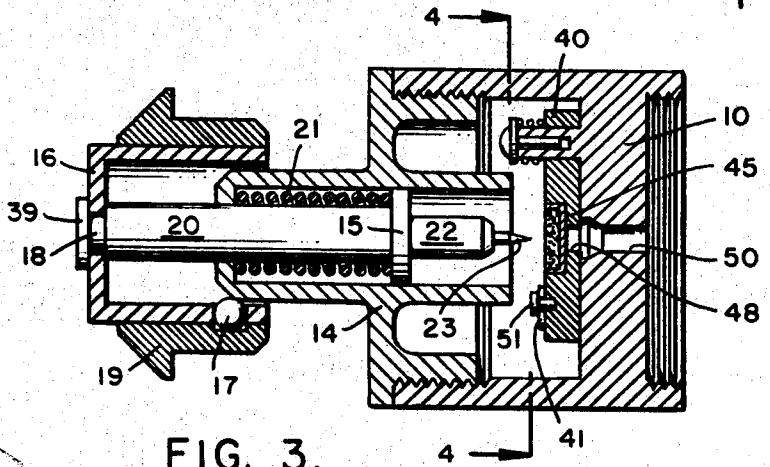


FIG. 3.

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5 Claims. (Cl. 102—70)

ABSTRACT OF THE DISCLOSURE

A firing pin type ignition device designed to have the firing pin body fit into and block the ignition port and also hold aside the primer shutter when in the "safe" position and adapted to be fired by application of a single slight unidirectional force.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates to ignition means for pyrotechnic devices and particularly to long burning flares or candles carried by a balloon or parachute. Long burning flares and candles are commonly manufactured from materials which are not easily ignited. It has been the practice, therefore, to include a "first fire mix" on the ignition end of the candle. Ignition devices for these candles needed only a primer and a starter to ignite the first fire mix in the candle. Such ignition devices commonly incorporated numerous safety features including the shutter type primer carrier designed to be maintained out of firing position when in the "safe" condition and often the shutter was arranged to cover the firing port in the "safe" position. Usually such devices were also provided with a safety pin which had to be pulled before the firing pin could be cocked and the device put into a "ready" condition. The device was then ready to be fired by a tripping mechanism. These prior art ignition devices and candles presented two main problems. First, the inclusion of a highly incendiary first fire mix in the candle made the handling and storage of these candles hazardous. Secondly, the complicated procedure necessary for assembling, arming, cocking and tripping the device was complicated and presented a source of error and was necessarily time consuming.

It is, therefore, an object of this invention to provide an igniter device which is safely, reliably and easily armed, cocked and fired by a pull force of only about 6–8 pounds.

Another object of the present invention is to provide an ignition device which will reliably ignite a flare or candle without the necessity for such flare or candle having a "first fire" device.

Further and ancillary objects of the invention will appear from a study of the following specification and drawings in which:

FIG. 1 is a longitudinal sectional view of one practical embodiment of an ignition device according to the present invention;

FIG. 2 is a cross section of the disclosed device taken along line 2—2 of FIG. 1;

FIG. 3 is a longitudinal sectional view of the device with the firing pin retracted sufficiently to allow the rotor to be in position over the ignition port; and

FIG. 4 is a cross sectional view taken along line 4—4 of FIG. 3.

Referring now to FIG. 1, a generally cylindrical housing member is shown at **10**. Housing **10** is internally threaded at each end and receives, in the one end, a firing pin assembly **20** and, in the other end, a booster cup **12**. Located centrally of the housing is a coaxial, cylindrical

firing port **50**. This firing port has a relieved portion **11**, complementarily formed to receive a portion **24** of firing pin **22**. A shutter **40** is pivoted on post **42**, integral with housing **10**, and is biased to a "firing" position by means of a spring **41**. Spring **41** acts against the side of the housing **10** and against a pin **51** provided on the shutter. See FIGS. 2 and 4. The spring and shutter are confined on the post **42** by means of washer **44** and pin **43**. When the device is first assembled, the shutter **40** is held out of firing position by firing pin **22** as shown in FIGS. 1 and 2. The shutter carries a primer **45** and is so shaped and positioned that, when released, the primer **45** will be positioned directly over the firing port **50**. Firing pin **22** is maintained in this initial position by means of firing pin spring **21** acting upon guide washer **15** and a flange of the adapter **14**. At its outer end the firing pin is attached to a flanged portion of sleeve **16** as by forging a head **39** on reduced portion **18** of the pin. Sleeve **16** has one or more holes therein adapted to receive a detent ball **17**. A pull cap **19** is slidably received on sleeve **16** and is retained in place thereon by detent ball **17**. The booster cup **12** has a central cylindrical cavity, coaxial with the firing port **50**, and is chambered to receive an ignition pellet **32**. The ignition pellet **32** is chambered to receive a container **13** of a starter mix **30**. Ignition pellet **32** is held in position in the cup by a pellet support **33**. Booster cup **12** is provided with a central fire hole **35** coaxial with the firing port **50** and, in some applications, also may have a number of peripheral ports **34**. When the device is in its safe position as shown in FIG. 1, the rotor **40** is maintained out of position by intervention of firing pin section **22**.

In its operational use, the firing device is actuated simply by applying a force to pull cap **19** in a direction to the left as viewed in FIG. 1. This force is transmitted to sleeve **16** by means of detent ball **17** and thus firing pin **20** is pulled out of interfering relationship with rotor **40** as shown in FIG. 3. When rotor **40** is free to assume the position shown in FIG. 4, rotor spring **41** positions the rotor against stop **46**. In this position, primer **45** is in line with the central firing port with the primer port **48** in coincidence with firing port **50**. Further motion of the firing pin in the same direction will result in ball **17** being in a position to ride off of adapter **14** and to move inwardly and allow pull-cap **19** to then slide off of sleeve **16**. With pull cap **19** out of the way, sleeve **16** and firing pin **20** are free to be urged in the opposite direction by firing pin spring **21**. Primer **45** is in position to be struck by the point **23** of the firing pin and is thus ignited. The primer fires through the firing port **50**, starting the starter mix **30**, which in turn ignites an ignition pellet **32**. Ignition pellet **32** creates a heat sufficient to ignite ordinary flare candle compositions through ignition port **35** and/or a heat generator device through ports **34**.

Referring again to FIG. 1, it may be seen that the firm seating of firing pin portion **22** into mating portion **11** of the housing is sufficient to maintain the ignition device in a safe condition without the necessity of safety pins, safety wire or other such safety devices usually employed in prior art ignition devices. From the above description it should be noted that the device of the present invention is removed from a safe condition, armed, and fired all in one smoothly moving operation by the application of a slight pull.

While the above is a description of, what at present is considered the preferred embodiment of the present invention, it will be understood by those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is, therefore, intended in the appended claims to cover all such changes and modifications that fall within the true scope and spirit of the invention.

What is claimed is:

1. An ignition device comprising:
a housing;
partition means in said housing dividing said housing into first and second chambers,
said partition having a central firing port therein communicating between said chambers,
primer means in said first chamber;
said primer means carrying a percussive primer and having a primer port and being biased to a firing position wherein said primer and said primer port are in coincidence with said firing port,
firing means in said first chamber,
said firing means including a firing pin biased in a direction toward said firing port and normally occupying an initial position wherein said firing pin fits into and blocks said firing port and simultaneously holds said primer means in a "safe" position with the primer port remote from coincidence with said firing port;
an ignition element in said second chamber,
said firing pin and said firing port comprising cylindrical mating surfaces and conical mating surfaces such that, when said firing pin is in said initial position, the conical surface on said pin closely mates with the conical surface in said firing port to prevent accidental firing of said ignition means in the event of premature ignition of said primer.

2. An ignition device according to claim 1 including:
means for moving said firing pin from said initial position to thereby sequentially open said firing port, clear said primer means for movement to firing position over said firing port, and

release said firing pin for return travel toward said primer means.

3. An ignition device according to claim 1 wherein:
said firing means includes releasable detent means arranged to connect the firing pin to a pull cap for moving the firing pin from said initial position and for releasing said firing pin after a predetermined travel of said firing pin.

4. An ignition device according to claim 1 further including a booster cup removably attached to said second chamber,
said booster cup providing; a cavity for holding said ignition element, and
an ignition port leading outwardly from said cavity.

5. An ignition device according to claim 4 including:
said booster cup further comprising a plurality of peripheral ignition ports.

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