United States Patent [19]

Geimer

[11] **3,827,360**

[45] **Aug. 6, 1974**

[54] **PNEUMATIC LAUNCHER AND COMBINATION FLARE-IGNITOR**

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[22] Filed: **Apr. 21, 1972**

[21] Appl. No.: **246,300**

[52] **U.S. Cl.** ..... **102/70 F,** 102/37.4, 102/37.8

[51] **Int. Cl.** **C06d 1/10**

[58] **Field of Search** ..... 89/1.5; 129/11; 102/37.4, 102/37.8, 70 R, 70 F, 64, 65, 65.2, 35, 35.6, 35.2, 35.4, 37.6

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[57] **ABSTRACT**

This invention relates to a pneumatic launcher and to a flare ignitor. The flare ignitor permits the flare to be automatically ignited once it leaves launcher as well as providing a means to readily hand ignite a flare. The launcher permits a plurality of devices to be sequentially launched.

13 Claims, 10 Drawing Figures

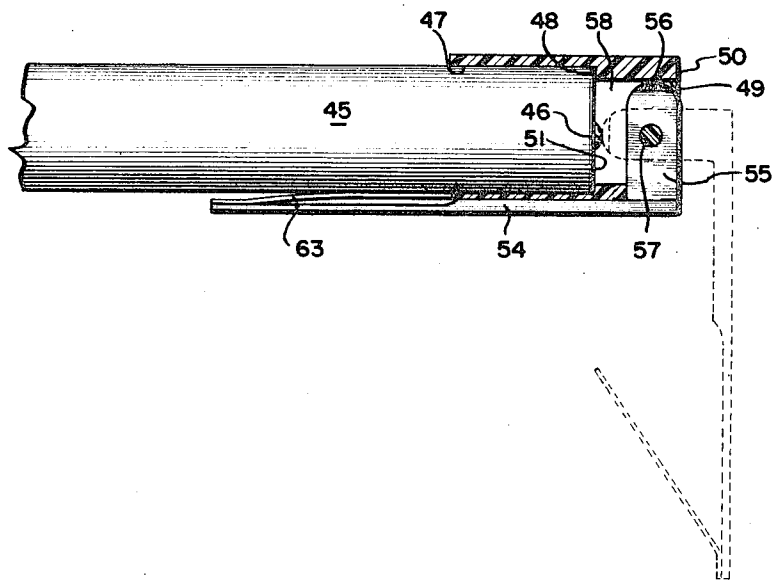


FIG. 1

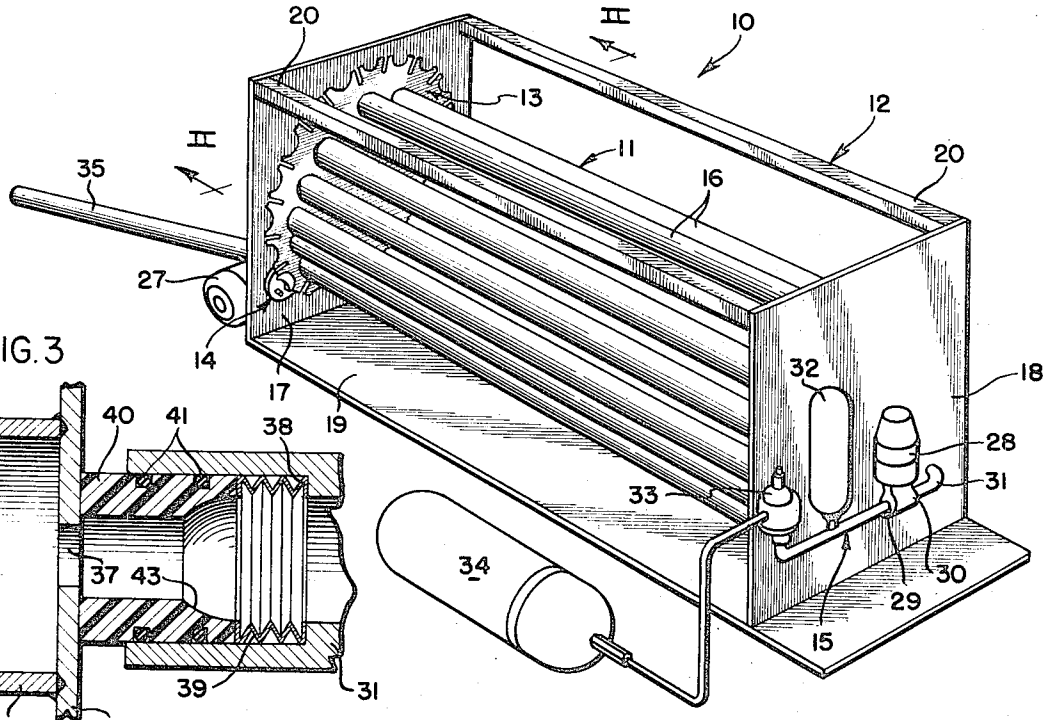


FIG. 3

FIG. 2

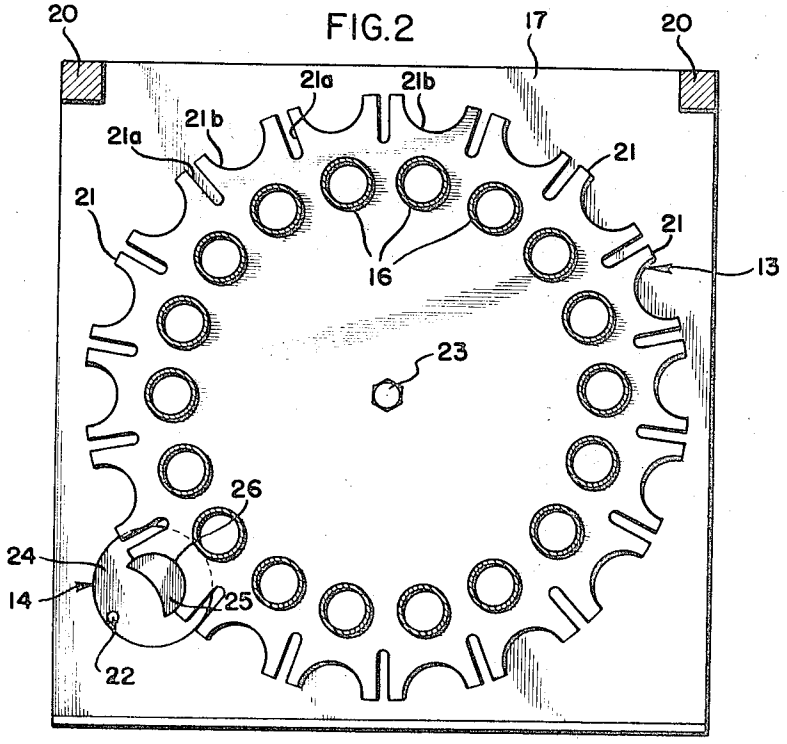


FIG. 4

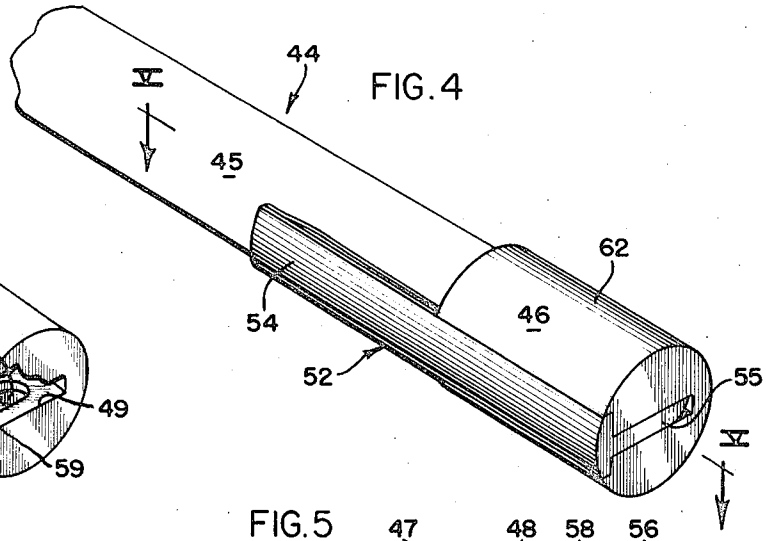


FIG. 6

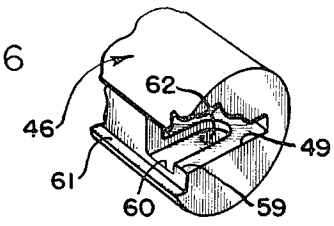


FIG. 5

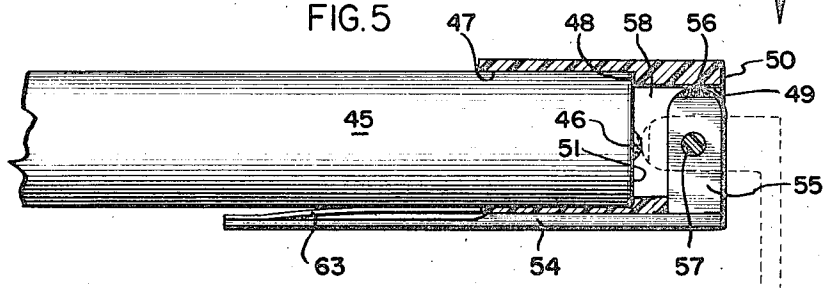


FIG. 9

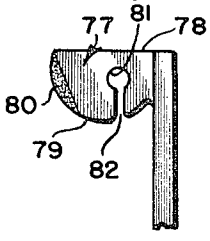


FIG. 7

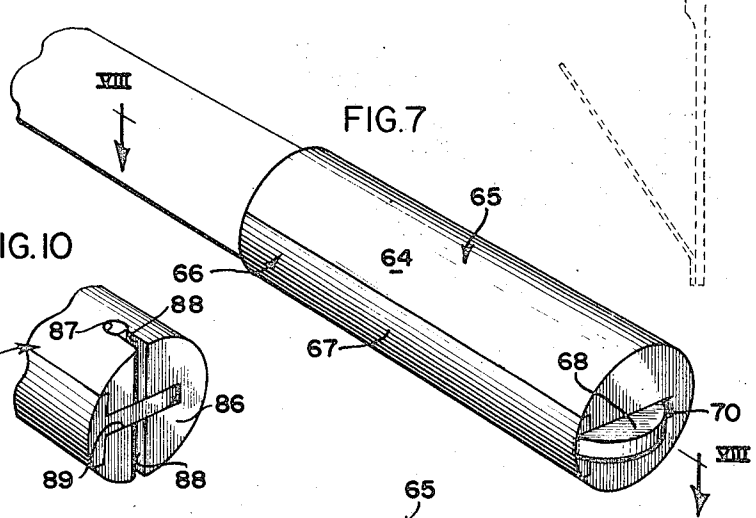
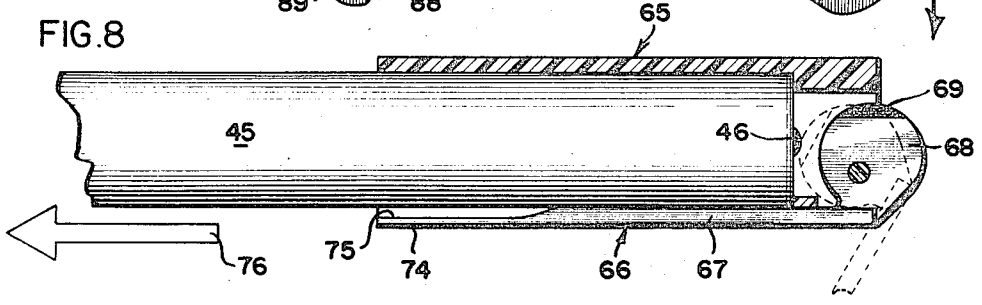


FIG. 10

FIG. 8



PNEUMATIC LAUNCHER AND COMBINATION FLARE-IGNITOR

BACKGROUND OF THE INVENTION

This invention is directed to devices which are utilized to launch flares. These launchers are utilized in railroad cars, police cars, or on commercial vehicles which require flares to be launched in case of an accident. However, the device may be readily adapted to launch sonobuoys, beacon transponders, radio receivers or transmitters, chaff and so forth from airplanes or ships. Further, the present invention relates to a flare ignitor which allows the flare to be self-ignited after it is dispensed from the pneumatic launcher. Also, it allows a person to readily ignite a flare without the dispenser.

The prior art in this area provides complicated pneumatic launchers which do not have the simplified and readily repairable system provided by the present invention. Such devices are illustrated by the sonobuoy launcher of the Jones U.S. Pat. No. 3,240,200. This patent is mainly directed to a complicated valve mechanism connected to a launcher barrel through which the sonobuoys are ejected. However, this device only allows a single sonobuoy to be loaded and ejected. The present invention provides for multiple sonobuoys to be ejected in a timed sequence if desired or at intervals without the necessity of reloading after each individual firing. Further, the present invention provides a relatively simplified system for permitting loading or ejecting sonobuoys without depressurizing the airplane cabin.

Likewise, multiple flare ejectors, for railroad cars can be evidenced by the Temple U.S. Pat. No. 2,462,922. This device, however, requires a special fuse configuration and does not use the ordinary fuse. Also, the Temple ejector requires a special ignition head in order to ignite the flare as it passes through the discharge port. Further, the flares are stacked upon each other and the accidental ignition of one flare would cause all of the flares to ignite. Also, each flare must first drop into position before it can be ejected. This feed mechanism is quite different from the turret system of the present invention.

There are many other types of flare launchers utilized in the railroad field but all lack the relatively economic and reliable firing and launching system which is provided by the present invention.

Further, flare ignitors which permit the flares to be ignited in a manner other than the usual manner have not been widely used or manufactured. Flares are still sold and manufactured as they have been for many years. That is, the most prevalent way of igniting flares is by tearing off the headpiece which contains a striking surface and the striking surface on the headpiece is utilized to scratch a circular button-like projection at the top of the flare body which is made of a special igniting compound that upon being scratched causes the flare to ignite. Although patents have been applied for and shown for self-igniting these flares, they have not been generally utilized in that they are not practical, for either a launcher nor are they readily usable by the lay person. Such a patent can be evidenced by McKown U.S. Pat. No. 2,807,208 granted Sept. 24, 1957. McKown shows a flare ignitor that utilized a tape lever having attached thereto the appropriate striking material for striking the fuse head to ignite it. The problem derived with such a mechanism is that the tape mechanism must be pulled rather strongly and could not be readily operated by a small person. Further, yanking the tape vertically upward and with a fast motion would have the tendency of preventing the striking material from even hitting the head. If this did occur, then of course it would be difficult to ignite the flare.

SUMMARY

I have now provided a novel pneumatic launcher as well as a novel flare ignitor which is specifically adapted for use with the launcher as well as for separate hand operation.

It is therefore an object of the present invention to provide a simplified pneumatic launcher for flares and other devices which is economical and operates with relative ease.

Another object of the present invention is to provide a pneumatic launcher which is capable of launching a signal device in controlled sequence.

An additional object of the present invention is to provide a pneumatic launcher which is capable of launching in timed sequence a number of flares as well as launching individual flares and providing a safe sequential firing.

It is another objection of the present invention to provide a pneumatic launcher which has a cylindrical storage and firing means with the cam operating a feed means.

It is still a further object of the present invention to provide the combination pneumatic launcher and ignitor which ignites the flare after it leaves the launcher.

A still further object of the present invention is to provide a flare ignitor means to permit easy hand ignition of a flare.

Another object of the invention is to provide a flare ignitor which utilizes a handle and lever action for igniting the flare.

Further and additional objects and advantages of the invention will become apparent from the following description and drawings.

GENERAL DESCRIPTION OF THE INVENTION

In accordance with one embodiment of this invention there is provided a pneumatic launcher comprising a turret having more than one firing chamber, means to rotate the turret to a predetermined position, and pneumatic means to inject gas into one of the firing chambers when the turret is at said predetermined position.

Another embodiment is the disc drive wheel that is used to drive the turret. This drive wheel has a plurality of teeth in the outer circumference which are interconnected by grooves of a predetermined shape. Each tooth further has a radial slot that is used to turn the drive wheel by a special drive cam. This drive cam is still another embodiment of the invention and comprises a surface which is slightly larger than the grooves between the drive wheel teeth and is shaped to fit in these grooves. Also, the drive cam has a drive pin that is adapted to fit in the radial grooves of the drive wheel to rotate the drive wheel. Still another embodiment is the flare ignitor which is used in combination with a flare or with the pneumatic launcher of the present invention. The flare ignitor comprises a cap being

adapted to cover the top of a flare, a handle cap, the handle having a hand portion and a head portion means pivotally connecting said handle to said cap, said head portion having a striking surface adapted to scratch a flare ignitor head.

Other embodiments of the invention will become clearer especially when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a perspective view of the pneumatic launcher of the present invention.

FIG. 2 is a sectional view of the launcher taken along lines II—II of FIG. 1 illustrating drive wheel and drive cam.

FIG. 3 is a partial sectional illustrating the connection of the feed line to the turret of the launcher of FIG. 1;

FIG. 4 is a perspective view of one flare-ignitor combination of the present invention;

FIG. 5 is a partial sectional view taken along lines V—V of FIG. 4;

FIG. 6 is a partial perspective view of the ignitor having a break-away portion to illustrate the pivotal connection of the ignitor handle;

FIG. 7 is a perspective view of another flare-ignitor combination of the present invention;

FIG. 8 is a partial sectional view taken along lines VIII—VIII of FIG. 7;

FIG. 9 is a partial side view of an ignitor handle; and

FIG. 10 is a partial perspective view of an ignitor.

PREFERRED EMBODIMENTS

The turret, **11,** is composed of a plurality of firing barrels or tubes, **16,** which are circumferentially spaced from each other. The barrels are metal tubes which may be welded to or pressure-fitted into the circular rear plate **36** (FIG. 3) at one end and welded or pressure-fitted into the drive wheel **13** at the other or outlet end.

Each tube is sufficiently long to accommodate a normal flare and is sized or shaped for any other items which it is intended to be utilized. However, for simplicity purposes only, I am going to describe the pneumatic launcher as being used to dispense or launch flares and it being understood that the various means may be adapted to launch other devices, which have been noted above. The essential feature being the manner in which I have provided the various components to produce an effective pneumatic launcher.

The housing, **12,** has a front wall or plate, **17,** a rear wall or plate, **18,** interconnected by a bottom wall, **19,** a pair of top struts, **20.** The housing may of course be of more elaborate in construction if desired. It may be enclosed completely if this is desired or is required by the particular manner in which the launcher is to be used.

The drive wheel, **13,** and drive cam, **14,** are best shown in FIG. **2.** The drive wheel has a plurality of slotted teeth, **21.** Each tooth has formed therein a radial slot, **21**a. This radial slot is adapted to fit the pin, **22,** on the drive cam, **14.** Each tooth, **21,** is separated by a semi-circular groove, **21***b*. Radially spaced inwardly from the grooves, **21***b*, are a plurality of holes. Each hole is sized to accommodate the firing tube, **16,** and is large enough to permit a flare and flare ignitor to pass therethrough. The holes are spaced so that the radius of the semi-circular slots is contiguous with the radius of the holes and the radius of the drive wheel, **13,** there being one hole for each groove, **21***b*, each tooth, **21,** and radial slot, **21***a*.

Attached to the center of the drive wheel is a rotating axial, **23.** The rotating axial, **23,** is rotatably connected to the front cover plate, **17,** of the pneumatic launcher **10.**

Although the drive wheel, **13,** is described as being at the exit end of the launcher, it is understood that the drive wheel shown may be positioned anywhere along the axis of the turret simply by permitting the holes therein to be large enough to permit the tubes, **16,** to pass therethrough. Likewise, the drive wheel may replace the circular rear plate if so desired. Also, although the drive wheel is shown as being a disc shape, it is obvious that the drive wheel may be a ring type shape using other rotatably support means than the shaft, **23,** for rotatably supporting the turret. Further, it is not necessary for the drive wheel to be sized such that it has a diameter larger than the diameter than the turret, but could be sized so that it is smaller than the circumference of the turret tubes with the turret tubes being supported by a circular plate and the smaller drive wheel being attached to the front of the plate or fixedly attached to a shaft such as **23.** However, the size of the drive wheel would be predetermined so that it would operate in the manner as hereinafter described in detail.

The drive cam, **14,** has a circular disc, **24,** projecting from the center of one side of the disc, **24,** is a drive shaft, (not shown). Projecting from the other side of the disc, **24,** opposite the drive shaft, **16,** is an arcuate cam, **25,** having a cam surface, **26.** The drive pin, **22,** is sized to fit into the drive wheel slots, **21***a*, whereas the cam surface, **26,** is adapted to fit within the drive wheel grooves, **21***b*. In operation, the drive pin, **22,** engages, the teeth **21** by fitting in the slots **21***a*, as the cam, **14,** is rotated it rotates the drive wheel, **13,** by the drive pin, **22,** being in the slots, **21***a*. As the drive cam, **14,** continues to rotate a portion of the cam surface, **26,** engages the groove, **21***b*. When the pin, **22,** is disengaged from the slot, **21***a*, the drive wheel stops rotating. At this time only a portion of the cam surface, **26,** is in the groove **21***b*. The cam continues to rotate without corresponding movement of the drive wheel until the cam surface, **26,** is engaged in the grooves, **21***b* as is shown in FIG. **2.** The drive wheel, is now locked into position and cannot rotate on its own without actuation by the drive cam, **14.**

To accommodate this operation the cam, **25,** is arcuate in shape with its surface, **26,** being greater than the semicircular groove, **21***b*. The arc of the surface, **26,** is about 200° to 260° and preferably about 225°.

It being further understood that it is not necessary for the grooves, **21***b*, and the cam surface, arcuate in shape, they may have any convenient configuration with the corresponding cam surface, **26,** having the same configuration. The reason the cam, **25,** and the grooves, **21***b*, is preferably of an arcuate shape is to allow ready manufacture thereof, without expensive machining or stamping.

Although the turret is shown here and the drive wheel are shown here as containing 18 firing tubes, it is understood that the number of firing tubes will vary according to the desire of the particular user. Six is the

preferred minimum in that a lesser number of firing tubes would require a constant reloading and would be inefficient for multiple accident cases where a number of flares must be dispensed.

Referring back to FIG. **1**, the drive cam, **14** is rotated by a motor **27**. The motor used in this instance is a International Harvester Windshield Wiper Motor. However, any suitable motor or energy of this nature may be used.

The pneumatic firing means **15** is composed of a two-way inline valve **28** having an inlet end **29**, and an outlet **30**. Connected to the outlet end **30** is a fixed feed line **31**. The fixed feed line **31** is positioned so that it will inject gas into a firing tube **16**, which is in a predetermined position. The valve, **28**, is a solenoid valve operated by a solenoid used to open and close the valve. The inlet end, **29**, is connected to a supplemental air tank **32** which in this instance is maintained under a pressure of 50 psi. It is understood that the tank may contain supplemental air under higher pressures if such is desired for the particular use of the launcher. Connected to the supplemental air tank **32** is a pressure regulator valve **33** which is used to maintain the pressure within the tank **32** at 50 psi, or whatever pressure is desired. Connected to the regulator valve **33** is a supply tank **34** which is maintained under a high pressure and is utilized to feed air to the supplemental tank. Although we have discussed this as using air, it is of course understood that any pressurized gas may be used to eject the flares. However, air is the most economical and safest gas to use and that is the reason why I described this invention in relation thereto. However, air is to be considered as a preferred embodiment.

The two-way in-line valve **28** used in this embodiment is the solenoid operated two-way in-line valve manufactured by Norgren Co. The valve operates by supplying a suitable electrical current to the solenoid which will open the valve and cause air to pass into the feed line, **31**. As soon as the electrical current is shut off the valve closes.

In order to effectively utilize the pressurized air, the feed line **31** may have connected to the end thereof on the inside of the dispensor and plate, **31**, a plastic, rubber or tefelon seal used to abut against the circular end plate and surround the hole leading into the firing tube, **16**.

On the exit end of the launcher is a suitable firing barrel **35**. The firing barrel **35** is fixedly secured to the end plate, **17**, and it is adapted to coincide with one of the firing tubes **16**. The purpose of the firing barrel, **35**, is so that when the launcher **10** is mounted in a vehicle, for instance, the trunk, of a police car, the barrel, **35**, may be used to extend outside of the vehicle. The launcher, **10**, is suitably mounted into the trunk of a vehicle by bolting the base plate **19** to the vehicle.

Referring to FIG. **3**, there is illustrated the end of the feed line **31** in a fixed position to deliver pressurized air to firing tube **16**. The firing tube is attached to the circular rear plate **36** and receives air through the holes **37** formed therein for each firing tube. To enable the launcher to be used under pressurized conditions, for example, a pressurized airplane, the launcher is equipped with a seal means in both the feed line and the firing barrel **35**. The feed line seal means is provided by having the end of the feed line counterbored to provide a shoulder **38**. Inserted into the feed line to abut against the shoulder **38** is a spring **39**. The spring is normally compressed to force a tubular seal **40** outwardly and into sealing engagement with the back plate **36**. Also, provided are a pair of spaced O-rings **41** which fit in appropriate grooves in the seal **40**. The O-rings prevent air from leaking between the feed line and the seal. The tubular seal **40** also has its inner end **42** counterbored to provide an arucate shoulder **43**. The shoulder **43** aids the spring in forcing the seal into sealing engagement with the rear plate **36** when pressurized air moves in the direction of the rear plate from the feed line.

The firing barrel seal is the same as the feed line seal and is therefore not shown. In a pressurized cabin, the firing barrel would extend out of the cabin. The outside conditions then could only pass through the firing barrel **35** into one firing tube **16** and into the feed line **31**. It would then be blocked by the closed valve **28** and would not enter the cabin because of seal **40** in the firing barrel **35** and feed line **31**. The seals **40** are preferably made of teflon, but may be made of any suitable material.

Referring to FIG. **4** and **5**, we see the combination flare and flare ignitor **44** comprising a flare **45** and flare ignitor **46**. The flare, **45**, has a cylindrical body which has the normal cardboard outer covering and is filled with a phosphorous-type material. At the top end of the body is a fuse head **46** which is a circular button-like projection of a special igniting compound that causes the fuse to ignite. This compound is ignited when it is scratched by an appropriate striking material. Attached to the flare is the ignitor, **46**. The ignitor **46** is constructed to provide on a lower inner diameter **47**, a shoulder **48**, and a top slot **49**. The inner cylindrical diameter **47** is sized to tightly fit around the flare **45**, such that it cannot be removed easily but requires more than normal exertion by an ordinary adult.

Spaced inwardly from a top end **50** of the ignitor is the inner shoulder or ridge **48**. The inner ridge is used as an abutment for the top end **51** of the flare **45** to prevent it from moving any further in the ignitor and also to provide the distance necessary in the ignitor as will hereinafter be explained.

As is readily understood, the shoulder **48** may be formed by a separate ridge extending inwardly from the inner diameter **47** at a predetermined distance from the top end **50**.

The top portion of the ignitor **45** is solid and presents a flat end surface **50** with an appropriate slot **49** formed therein. The circumference of the end **50** is such that it snugly fits within the turret firing tubes **16**.

The ignitor **46** also comprises a handle **52** having a hand portion **54** and a head portion **55**. The head portion **55** extends perpendicular to the hand portions **54** and is preferably integral therewith. The head **55** has a general rectangular shape with a rounded end **56** formed of striking material adhered therto. The striking surface **56** is made of materials to ignite the flare head **46**. A pivot pin **57** is fixedly connected or is integral with the head **55** and extends from both sides of the head **55**.

The pivot pin **57** is appropriately connected to the inner walls **58** which form the slot **49**. Referring to FIG. **6**, there is illustrated the top portion of the ignitor **46** having formed therein the slot **49** which has an upper portion **59**, and a lower portion **60** and there is shown a groove **61** that extends the full length of the ignitor. The slot portion **59** accommodates the head **55** and the

slot **60** accomodates the pivot pin **57.** The slot **60** is slightly narrower than the length (from end to end) of the pin **57** at its entrance and its width is the same as the length of the pin **57** at its inner end **62.** This allows the pin to freely pivot within the slot **60** and also prevents the head from falling out of the slot **49.**

The same construction is used when the pin **57** is not fixed to or an integral part of the head **55.** In that instance, the head is rotatably mounted on the pin **57** and the entire width of the slot **60** is slightly smaller than the length of the pin **57** to insure that the pin is nonrotatably connected to the walls **58** that form the slot portion **60.**

The hand portion **54** is sized so that it fits within the groove **61** and its outer surface forms a continuous arc with the outer surface **62** of the ignitor **46.** In this manner, the ignitor snugly fits within the firing tube **16.** The ignitor handle, **52,** has attached thereto a spring **63.** The spring is set such that it tends to pivot the handle **54,** on the pivot pin **57,** away from the ignitor surface **62.** In this manner, the striking surface **56,** which is normally facing the inner surface of the ignitor is pivoted into contact with the flare head **46** as is shown in dotted lines in **4** and **5** to scratch the flare head and thus ignite the flare. The spring **63** is not necessary either in operating the ignitor by hand or in using the ignitor in the launcher **10,** as was shown.

The ignition body is preferably burned at approximately the same rate as the flare body. This is also true of the handle **52.** However, any portion or all of the handle **52** may be made of metal if it is so desired.

For safety reasons, it is necessary that no portion of the striking surface **56** comes into contact with the flare head **46** until the handle hand portion **54** has moved through an arc of at least 45°. The preferred embodiment being that no ignition takes place until the hand portion moves through an arc of at least 75° with that shown in FIG. **5** being at approximately 90°.

Although the ignitor **46** has been illustrated as being cylindrical, with a closed end **50** having a slot **49** therein, it is understood that the groove **61** may be formed such that it forms a slot either partially or totally along the outer surface **62.** If a slot is formed, then the body must be made of material which is flexible enough to tightly grip the flare. Also, referring to FIGS. **7** and **8** there is illustrated an ignitor **64** having a body **65** and a handle **66.** The handle **66** extends for the full length of the body **65.** The handle **66** has a hand portion **67** and a circular head **68** with a striking surface **69** adapted to contact the flare head **46** when the handle is pivoted (as is illustrated in dotted lines in FIG. **8**) approximately 60°.

The ignitor body is arcuate in shape having a slot **68** extending the entire length thereof. The slot **68** has a lower portion sufficiently wide to accommodate the handle hand portion **67** and an upper portion sufficiently wide to accommodate the circular head **68.** The upper portion of the ignitor body has formed therein a slot **70** which is the same as the slot **49** illustrated in FIG. **6.** The circular head **68** is preferably integral with the handle hand portion **67** as is the pivot pin **73.** However, the circular head **68** may be a separate member which is fixedly connected to the handle hand member **67** and the pivot pin **73** may be a separate member fixedly or rotatably connected to the head **68.** The operation of the handle will determine whether the pin and head are pivoted together or the head pivoted about the pin. This being explained above in conjunction with FIGS. **4** to **6.**

Referring to FIG. **8,** the lower **74** end of the handle is tapered on the inside thereof to provide an air lift pocket **75** between the handle and the ignitor body **65** at the lower ends thereof. The air lift pocket enables the handle to pivot without the necessity of having a spring attached to the handle. The flare exits the firing barrel in the direction of the arrow **76** and air enters the pocket **75** to lift and pivot the handle **66.** The lever and air dry action on the handle pivots the handle approximately 60° from the ignitor body where the striking surface **69** on the head **68** comes into ignition contact with the flare head **46** as is shown in dotted lines in FIG. **8.**

The pivot pin **73** is connected off center of the circular head **68** to provide a cam type movement. However, the head **68** does not have to be a full circle but can be an arc with the top portion being flat. FIG. **9** illustrates an arcuate head **77** having a flat upper surface **78** and a bottom arcuate surface **79** having adhered at a predetermined location a flare striking material **80.** Formed off-center through the head **77** is hole **81.** A slot **82** having a diameter less than the hole **81** is formed in the head **77** and extends from the hole **81** to the surface **79.** The hole **81** is sized to accommodate a pivot pin. The head **77** is attached to the pivot pin by being pressed thereon. The head is preferably made of plastic and when the pivot pin is forced into slot **82** the slot will spread so that the pin can be placed in the hole **81.** This type of construction is especially advantageous when the pivot pin is made as an integral part of the ignitor body or is separately attached to the ignitor body. In this way the head **77** may be connected to the body with relative ease.

The size of the hole **81** is again determined by the type of movement of the pivot pin and head **77.** If the pin is to pivot with the head, then the hole has a diameter slightly less than the diameter of the pin. If the head is to pivot about the pin, then the diameter of the hole is slightly larger than the diameter of the pin.

FIG. **10** illustrates another embodiment of the present invention. There is shown a partial top portion **84** of an ignitor body **85.** Formed axially through the ignitor body **85** at a predetermined distance from the top end **86** of the body is a hole **87** and a slot **88.** The slot **88** extends longitudinally from the hole **87** to the end **86** and has a diameter less than the diameter of the hole **87.** The slot **88** is sized to permit a pivot pin to be pressed therethrough into the hole **87.** The size of the hole **87** is determined by whether or not it is to fixedly hold the pivot pin or to allow the pivot pin to rotate. Also, formed in the top portion **84** is a slot **89** which is sufficiently large to permit the head portion of an ignitor handle to pivot therein.

Of course, if desired, the slots **82** and **88** of FIGS. **10** and **11** may be eliminated with just having the holes **81** and **87** respectively. These holes being sized to fixedly hold a pivot pin which has been forced therethrough or to rotatably hold a pivot pin.

Also, another embodiment would be to have a tubular shaped ignitor with the inner or shoulder ridge formed by identing the outer surface of the body or by actually forming a ridge on the inner surface of the tube. If desired, the shoulder or abutment for spacing the ignitor head from the flare head a predetermined

distance may be formed on the upper portion of the handle.

In the operation of the present invention, the flare and ignitor combination is manufactured so that a removable tape is used to secure the handle portion in the position shown in FIGS. **4** and **7** where the handle is substantially parallel to the axis of the flare. When a person desires to hand ignite the flare, he or she merely removes the tape and pivots the handle away from the body so that the striking surface comes into contact with the flare head as is shown in FIGS. **5** and **8.** This will immediately ignite the flare. If the person desires to place the flare in position, this may be done by placing the flare into the earth by way of its spike at one end and then removing the tape and pivoting the handle to ignite the flare. It is thus seen that the hand operation of igniting the flare-ignitor combination of the present invention, provides a simplified and a safe manner of igniting a flare.

In the operation of the flare launcher, flares containing the flare ignitor of the present invention, are inserted into tube **16** with the head portion of the ignitor facing the end plate **18.** The flares are fed through an appropriate hole (not shown) in end plate **17.** All of the tubes are filled with the combination flare ignitor. Of course, the tape holding the handles down is removed from each of the flares. In the non-operating condition the feed line **31** is aligned with a tube **16** as illustrated in FIG. **3.** When it is desired to launch one or more flares from the vehicle, this can be accomplished by turning on a switch which is appropriately attached to the dashboard of the vehicle. The switch operates the drive cam **14.** Drive cam **14** rotates the turret **11** until feed line **31** alignes with hole **37** in circular rear plate **36** of adjacent tube **16.** At this stage, an electric contact in motion **27** closes to operate solenoid valve **28.** As soon as the solenoid is open, pressurized air is allowed through the feed line **31** into the aligned flare tube **16** which pushes the flare ignitor out of the tube **16** of the barrel **35.** As soon as the flare-ignitor exits the barrel **35** air current catches the bottom portion of the handle and causes the handle to pivot away from the flare body. The pivoting of the handle may be aided by a spring, if this is so desired. However, the speed at which the flare exits the barrel **35** is sufficient to provide the necessary air pressure to cause the handle to pivot as was described above.

At the stage of firing the cam surface **26** is approximately half-way in the groove **21***b* and the drive pin **22** is out of the slot **21***a*. The continued rotation of the drive cam cause the cam **25** to be in its locking position shown in FIG. **2.** Just before reaching its locking position the contacts in the motor assembly **27** are opened to cut off the current to the solenoid valve and thus close the valve. If it is desired to launch more than one flare or to continuously launch flares then the switch on the dashboard is kept on so that it will continuously operate the motor assembly **27** and flare-ignitors will be continuously launched from the firing barrel **35** for as long as desired or when all the tubes **16** are empty.

The particular switching mechanism is not a part of this invention and would be evident to the skilled artisan. Therefore, I have not described the circuitry or the specific connections.

I claim that:

1. A flare ignitor comprising a tubular body adapted to cover the top portion of a flare, said tubular body having an inner diameter sized to tightly fit around the flare, an inwardly extending ridge or shoulder means formed on the inner surface of the body, said ridge being spaced a predetermined distance from the top of the body and being positioned to abut against the top of the flare; a handle said handle having an elongated hand portion with a head portion at one end thereof, said head portion extending inwardly from the hand portion, the inward surface of said head portion having a flare striking surface thereon, pivot means mounted on said body above said ridge means, said handle head being mounted on said pivot means so that said head is spaced a predetermined distance above said ridge means, said distance being such that the striking surface of the handle head will only strike an ignition head on the flare when the handle is pivoted a predetermined amount.

2. The ignitor of claim **1** wherein the elongated hand portion of the handle extends axially along the ignitor body and flare and the head portion extending radially inwardly into said ignitor body with the striking surface facing the inner walls of the ignitor body.

3. The ignitor of claim **2,** wherein said head portion striking surface is shaped so that when the hand portion of the handle is parallel with the axis of the ignitor body the striking surface is in said inoperative safety position facing the inner surface of the ignitor body, and when the handle portion is pivoted at least 45° to the axis of the ignitor body at least one portion of the striking surface intersects the ignitor body axis.

4. The ignitor of claim **3** wherein the hand portion of the handle must be pivoted at least 75° to the axis before one portion of the striking surface intersects the ignitor body axis.

5. The ignitor of claim **2** wherein the tubular body is a single plastic piece having a solid slotted top portion that is adapted to be above the flare and a cylindrical bottom portion, the top portion is slotted to provide the pivot means for the handle head.

6. The ignitor of claim **2** wherein the handle is a single piece with the head portion extending radially inwardly from one end thereof.

7. The ignitor of claim **6** wherein a pivot pin extends substantially perpendicular from each side of the head portion.

8. The ignitor of claim **1** wherein the other end of the handle hand portion is shaped so that it is spaced to form an air pocket between the handle and the ignitor body or flare to permit the handle to be pivoted by air pressure.

9. The ignitor of claim **1** wherein the handle head has a predetermined arcuate shape and a predetermined portion of the edge of the head has adhered thereto a flare striking composition to form the striking surface.

10. The ignitor of claim **1** wherein the head portion is pivotly connected to the ignitor body by a pivot pin connected to the handle head and extending from both sides thereof; radial slots being formed in the top portion of the ignitor body; and said radial slots having inner indented portion to provide a snap fit for said pivot pin.

11. The ignitor of claim **1** wherein the body is made of cardboard.

12. The ignitor of claim **1** wherein the body is a split tube and being sized and made to tightly grasp a flare.

13. The ignitor of claim **1** wherein the body is made of material that ignites along with the body of a flare.

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