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EXPLOSIVE PEST-SCARING DEVICE

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Fig. 1.

INVENTOR

Peter J. Bender

BY Connolly and Hutz

ATTORNEYS

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Fig. 2.

INVENTOR

Peter J. Bender

BY Connolly and Hutz

ATTORNEYS

EXPLOSIVE PEST-SCARING DEVICE

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Fig. 3.

INVENTOR

Peter J. Bender

BY Connolly and Hutz

ATTORNEYS

EXPLOSIVE PEST-SCARING DEVICE

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Fig. 4.

INVENTOR

Peter J. Bender

BY Connolly and Hutz

ATTORNEYS

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INVENTOR

Peter J. Bender

BY Connolly and Hutz

ATTORNEYS

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EXPLOSIVE PEST-SCARING DEVICE

Peter J. Bender, River Road, R.D. 2, New Castle, Del.

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This invention relates to an explosive device for scaring pests such as birds away from farm crops, and it more particularly relates to such a device which incorporates a carbide gun.

Explosion-generating means of the carbide gun type are now widely used for scaring birds such as black birds, crows and starlings away from farm crops. A rudimentary gun of this type is described in U.S. Letters Patent 1,384,366. However, presently existing guns now incorporate automatic means for controlling the generation of the acetylene gas and for firing it at periodic intervals thereby making them substantially automatic in operation over an extended period of time, such as six hours after they are charged with calcium carbide and water. Most of the guns now being used in the United States are apparently being imported from The Netherlands. These guns are quite effective for maintaining an area of approximately two hundred yards directly in front of them clear of birds and other animal pests; however, birds soon become accustomed to the sound and tempo of their regular firing and approach much closer to the sides and rear of such guns.

An object of this invention is to provide a means for improving the pest-scaring ability of an automatic explosive device such as a carbide gun.

Another object is to accomplish such improvement by automatically varying the direction of successive discharges of the gun; and

A further object is to also promote the transmission of the sound of the explosions to longer distances.

In accordance with this invention, the explosive device is mounted eccentrically upon a turntable to cause its expanding gases to be discharged substantially tangentially relative to the axis of the turntable. The resistance to motion of the turntable is set to cause the angle of orientation of the gun to vary after each explosion. This causes the direction of transmission of the sound to progress about the axis of the turntable which deters pests from encroaching to the rear of the gun. Furthermore, when the angle of movement of the gun varies in unequal increments such as approximately a little more than ¼ revolution for each explosion, the character of the sound resulting in a particular area from the explosions changes appreciably each time the gun fires which prevents birds and animals from becoming accustomed to its pattern and encroaching close to it.

The efficiency of such a device can be further enhanced by choking and diverting the expanding gases discharged from the gun. The choking provides the dual benefits of increasing the velocity of the discharged gases and lengthening the transmission of the sound of their explosion. This promotes rotation of the turntable and also makes the gun effective to longer distances. A particularly effective means of choking and diverting may be provided by installing an elbow with a choked outlet upon the end of the discharge tube of the gun with this outlet disposed tangentially to the axis of the turntable. This lengthens the tangential radius of the expanding gases and also lengthens the range of their sound. With such an elbow the axis of the gun itself may also be arranged tangentially to the axis of the turntable to add its reaction to the gases to that of those passing through the elbow in propelling the turntable in its rotational movement.

Novel features and advantages of the present invention

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will become apparent to one skilled in the art from a reading of the following description in conjunction with the accompanying drawings wherein similar reference characters refer to similar parts and in which:

FIG. 1 is a plan view of one embodiment of this invention;

FIG. 2 is a side view in elevation with the timing valve and gas generator sections partially broken away in cross section of the embodiment shown in FIG. 1;

FIG. 3 is an enlarged rear view in elevation with the timing valve section partially broken away in cross section of the embodiment shown in FIG. 1 in one phase of operation;

FIG. 4 is an enlarged rear view in elevation with the timing valve section partially broken away in cross section of the embodiment of this invention shown in FIG. 1 in another phase of operation; and

FIG. 5 is a plan view on a reduced scale of the embodiment shown in FIG. 1 in various successive angular orientations.

In FIG. 5 is shown a pest-scaring device 10 including an automatic explosion-generating means on gun 12 mounted upon a movable section 14 of turntable 16. Explosion-generating means 12 is mounted eccentrically to the axis of rotation 18 of turntable 16 for discharging the expanding gases 20 tangentially relative to axis 18. These expanding gases 20 cause a reverse reaction upon explosion-generator 12 and the movable portion 14 of turntable 16 upon which it is mounted. This reaction is tangential to axis 18 and propels movable portion 14 and gun 12 in a rotational movement about axis 18 which causes each explosion to vary the angular orientation of gun 12. The resistance of turntable 16 to this rotation is, for example, adjusted by a frictional braking device 22 which includes, for example, a spring leaf 24 in resilient contact with a roughened circular track 26 provided by pits 27 upon the stationary portion 28 of turntable 16. However, the inherent frictional resistance of turntable 16 itself might be used to control the degree of angular rotation of gun 12 caused by each explosion. This amount of angular motion is advantageously varied in increments which do not repeat themselves upon successive revolutions to cause the direction of firing to progress about the axis 18 which causes the direction and pattern of explosion to continuously change.

Details of this invention are described in FIGS. 1–4 in which explosion-generating means 12 is, for example, a carbide gun which incorporates automatic means for periodically firing it over a considerable period of time. A gun of this type is described in a publication entitled "ZON Automatic Scarecrow Model M60 Operating Instructions; Maintenance Instructions; Parts List" published by B. M. Lawrence & Company, 244 California Street, San Francisco 11, California.

Carbide guns of this type, for example, include a megaphone portion 30 which incorporates a combustion chamber 32 and a discharge tube 34. Combustion chamber 32 is charged with acetylene gas from an automatic timing valve section 36 which is supplied with acetylene gas from a gas generator 38. FIGS. 1–4 indicate how this existing carbide gun is mounted upon turntable 16 and its outlet portion somewhat modified in accordance with this invention. Heretofore, guns 12 incorporating valve 36, generator 38 and their supporting frame work 40 were transported by handle 42. However, the additional weight of turntable 16 and its legs 44 make the unit now too heavy for one person to carry by handle 42.

FIG. 2 shows nut and bolt assembly 46 and bearing 48 which form axis of rotation 18 about which gun 12 rotates. Roller bearings 50 are supported from brackets 52 attached to movable turntable section 14 and roll

between sections 14 and 16 to promote its rotation in contrast to the frictional resistance of leaf spring 24 which bears in frictional contact with stationary turntable section 16 to control the degree of rotation of turntable portion 14 and gun 12.

Although details of gun 12 are not directly part of this invention, they are now described to provide a complete description of one embodiment of this invention. Gas generator 38 includes a water tank 54 mounted above a carbide holder 56 which contains a charge of calcium carbide 58. Water drops 60 drip upon calcium carbide particles 58 to generate acetylene gas in a well-known manner, which gas is conducted to timing valve 36 through hose 62. FIGS. 3 and 4 show the two extreme conditions of operation of timing valve section 36 which includes a diaphragm-actuating linkage 64, a gas-admitting valve 66, and a spark-striking device 68.

Operating stem 70 of gas-admitting valve 66 is actuated to its open or fully raised position shown in FIG. 4 from its closed or lowered position shown in FIG. 3 by an operating fork 72 pivoted at 74 upon guide frame 76 of valve 66. Fork 72 straddles oscillating lever 78 which is pivoted at 80 upon frame 82 of timing assembly 36 as shown in FIG. 2. A spring 84 pulls downwardly upon the end of lever 78 causing its stem 86 lying within fork 72 to be urged upwardly. Stem 86 also lies between upper prong 88 and lower prong 90 of diaphragm-actuating plunger 92 connected to disc 94 which bears against diaphragm 96 sealing the upper portion of gas cylinder 98 by the retention of its edge under sealing ring 100. Plunger 92 is moved upwardly from the lower position of FIG. 3 to the upper position in FIG. 4 against the force of compression spring 102 by the pressure of gas conducted through hose 62 into cylinder 98. In the lower diaphragm position shown in FIG. 3, valve 66 is closed which allows the pressure to build up in cylinder 98 to raise diaphragm 96 and plunger 92. Prong 90 attached to plunger 92 accordingly raises the contacted stem 86 of lever 78. Stem 86 in response contacts the upper arm 104 of fork 72 thereby opening valve 66.

Prior to the opening of valve 66, auxiliary rod 105 attached to the top of diaphragm disc 94 by its loose insertion within cup 108 is also raised to the position shown in FIG. 4 by upward movement of diaphragm 96 and disc 94 thereby rotating firing-actuating shaft 110 clockwise as shown in FIG. 4 through its rotatable connection to forked connecting rod 112 only partially shown in FIGS. 3 and 4. This rotates locking lug 114 also secured to shaft 110 also in a clockwise direction which allows it to be engaged and latched by stepped locking lug 116 which is connected to an unlocking arm 118. Both lug 116 and arm 118 are rotatably mounted about pivot 120. A resilient means which is, for example, a torsion spring 122, schematically indicated in FIGS. 3 and 4, maintains arm 118 and attached latching lug 116 urged in the clockwise locking direction. In this position it engages lug 114 to maintain shaft 110 locked in the clockwise direction in opposition to the force of another torsion spring 124.

A spark-actuating lever 126 is secured to the rear end of shaft 110. In FIG. 4 lever 126 is shown in the upper latched position in which it maintains attached slim connecting rod 128 raised to cock flint-striking mechanism 130. Flint-striking mechanism 130 is of the pawl and ratchet actuated type which causes wheel 132 to strike a spark from flint 134 adjacent aperture 136 in explosive chamber 32 upon each downward movement of slim connecting rod 128. A flint magazine 138 extends downwardly from the position of flint 134.

Firing Operation

The firing operation of gun 12 is described in the following with reference to the extreme conditions of operation shown in FIGS. 3 and 4. FIG. 3 shows the condition of gun 12 immediately after it has been fired. Diaphragm 96 and disc 94 are urged into the downward position by spring 102 because there is no gas in cylinder 98 to oppose the force of spring 102. As gas is generated by the dripping water in generator 38 it flows through hose 62 into cylinder 98 which raises diaphragm 96 from the condition shown in FIG. 3 to that of FIG. 4. This pressure can be created because valve 66 is closed in all positions of fork 72 connected to valve stem 70 through pin 73 approximately up to that shown in FIG. 4.

As diaphragm 96 moves upwardly, it carries disc 94 up with it which raises plunger 92 and rod 106. Lower lug 90 upon plunger 92 raises stem 86 upwardly which raises arm 104 of fork 72 along with it. As stem 86 rises, it allows unlocking arm 118 to be rotated up in a clockwise direction by torsion spring 122. This engages latching lug 116 to hold lug 114 connected to shaft 110 in the latched position to which it is raised by rod 106 against the force of torsion spring 124. This cocks and latches the flint-striking mechanism 130.

In FIG. 4, lever 86 has raised fork 72 high enough to open valve 66 which allows gas to flow through tube 140 from cylinder 98 to valve 66 and through tube 142 into explosive chamber 32 in the direction of the arrows disposed alongside tubes 140 and 142. This suddenly relieves the pressure in chamber 98 which permits compression spring 102 to suddenly move disc 94 and diaphragm 96 downwardly from the position of FIG. 4 to that of FIG. 3. This causes prong 88 of plunger 92 to suddenly force lever 86 downwardly and drive arm 144 of fork 72 down to insure closure of valve 66. It also trips unlatching bar 118 to disengage latching lug 116 from lug 114 and permit torsion spring 124 to rapidly rotate flint-actuating lever 126 in the counter-clockwise direction. This pulls slim rod 128 rapidly down to cause a spark to be generated by flint-striking mechanism 130. This spark ignites the gas supplied to explosive chamber 32 which detonates to create a loud noise and a flow of expanding gases flowing outwardly through discharge tube 34. This cycle successively repeats as long as the supply of water and carbide lasts.

Another aspect of this invention is the provision of deflecting and choking means 150 upon the end of discharge tube 34. Deflecting and choking means 150 is, for example, an elbow having an outlet section 152 of reduced diameter. Outlet section 152 is, for example, formed as a section of a cone which smoothly concentrates the flow of expanding gases 20 through it to increase their velocity. This promotes the reaction of gases 20 upon gun 12 which helps rotate movable turntable portion 14, and it also lengthens the range of the transmission of the sound from each explosion. Outlet section 152 is advantageously disposed with its longitudinal axis tangentially disposed relative to axis of rotation 18 of turntable 16, and the force of the reaction is also promoted by disposing the axis of discharge tube 34 itself tangential to axis of rotation 18.

Rotational Operation

As each explosion is caused with its flow of expanding gases 20 discharged from discharge tube 34, it reacts upon the gun and any flow-deflecting or choking means such as elbow 150 to propel movable turntable portion 14 in a rotational movement. The amount of this rotational movement is governed by the frictional resistance to turning of the parts of the turntable, and it may be adjusted by a resilient means such as braking device 22 incorporating a leaf spring resisting element 24 which engages a circular track 26 which is, for example, made up of a series of pits 27 upon the upper surface of stationary turntable portion 28. This amount of rotation is advantageously adjusted to cause a non-integral amount of rotation such as slightly more than ¼ revolution thereby causing the explosions to occur at progressively moving

stations about axis of rotation **18**. Gun **12** may, for example, be adjusted to fire every 30 seconds which provides a complete rotation in firing within two minutes. This is rapid enough to prevent pests such as blackbirds or crows from encroaching to the rear of the gun and maintains them substantially cleared from an area having a radius of approximately 400 yards. This is a substantial improvement over the ability of the prior non-rotational guns of this type which are only effective to approximately 200 yards directly in front of them and 100 yards to their rear with intermediate coverage therebetween. This invention, therefore, more than quadruples the theoretical effective area of coverage of guns of this type. Furthermore, the improvement is even greater than this theoretical comparison of areas of coverage because the changing sound caused by the changes in direction of the gun relative to any given position within its area of coverage results in uneven variation in the character of this sound which prevents any pests such as birds and animals from becoming accustomed to the sound pattern and encroaching to a minimum tolerable distance. In contrast the changing nature of the sound provided by this invention prevents the creation of a regular sound pattern to which birds and animals could become accustomed.

What is claimed is:

1. An explosive pest-scaring device comprising an automatic explosion-generating means which periodically discharges expanding gases with a loud sound, a turntable, said explosion-generating means being mounted upon said turntable, a discharge tube upon said explosion-generating means, a flow diverting means mounted upon the end of said discharge tube for directing said discharged expanding gases at a substantial angle to the direction of said discharge tube and substantially tangentially relative to the axis of rotation of said turntable whereby a substantial rotational force is imparted to said turntable, and the resistance of said turntable to rotation

being adjusted to cause the angle of orientation of said explosion-generating means about the axis of rotation of said turntable to vary after each explosion whereby said pests are prevented from encroaching to the rear of said explosion-generating means and varies the sound pattern to prevent said pests from becoming accustomed to it.

2. An explosive pest-scaring device as set forth in claim 1 wherein the extreme end of said discharge tube is reduced in diameter to form a choke which increases the velocity of said discharged expanding gases and promotes the transmission of the sound of said explosions to longer distances.

3. An explosive pest-scaring device as set forth in claim 1 wherein said flow diverting means comprises an elbow mounted upon the end of said discharge tube.

4. An explosive pest-scaring device as set forth in claim 3 wherein an outlet choke is mounted upon the end of said elbow for increasing the rotational force caused by said explosion-generating means and the distance to which said sound is transmitted.

5. An explosive pest-scaring device as set forth in claim 4 wherein the axis of said outlet choke is disposed approximately tangentially to the axis of rotation of said turntable.

6. An explosive pest-scaring device as set forth in claim 5 wherein said discharge tube is mounted remote from the axis of rotation of said turntable and substantially tangentially relative thereto.

References Cited in the file of this patent

UNITED STATES PATENTS

2,138,282	Lanninger	Nov. 29, 1938
2,719,751	Orr	Oct. 4, 1955

FOREIGN PATENTS

633,933	France	Feb. 6, 1928
200,445	Australia	Dec. 1, 1955
209,727	Australia	Feb. 23, 1956