United States Patent [19]

Knight et al.

[11] **3,724,378**

[45] **Apr. 3, 1973**

[54] SHOT CONCENTRATOR

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[22] Filed: **May 13, 1969**

[21] Appl. No.: **824,219**

[52] **U.S. Cl.**.....**102/42 C,** 102/37.7, 102/85, 102/95

[51] **Int. Cl.**.....**F42b 7/08**

[58] **Field of Search**.....102/42, 42 C, 85, 95; 244/3.1

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[57] **ABSTRACT**

A shot concentrator adapted to be mounted in the casing of a shotgun shell having powder and a primer therein. The concentrator includes a cylindrical hollow tube having a capped forward end and an elongated stem projecting from its closed rear end. The stem has a passage therethrough which communicates with the interior and the exterior of the tube. A charge of powder and a charge of shot are positioned in the tube. A fuse is located in the stem in communication at one end with the charge of powder in the tube and adapted for communication at the other end with the powder in the casing so that when the primer is detonated, the shot concentrator will be expelled from the casing by the explosion of the powder in the casing and the fuse will be simultaneously ignited. The fuse has a predetermined burning time to facilitate the flight of the shot concentrator for a desired distance before the charge of powder in said concentrator is ignited by the fuse and the charge of shot is thereby separated from the shot concentrator. In this manner, a more accurate and more concentrated pattern of shot is provided at a greater greater distance from the point of initial firing of a shotgun shell.

1 Claim, 10 Drawing Figures

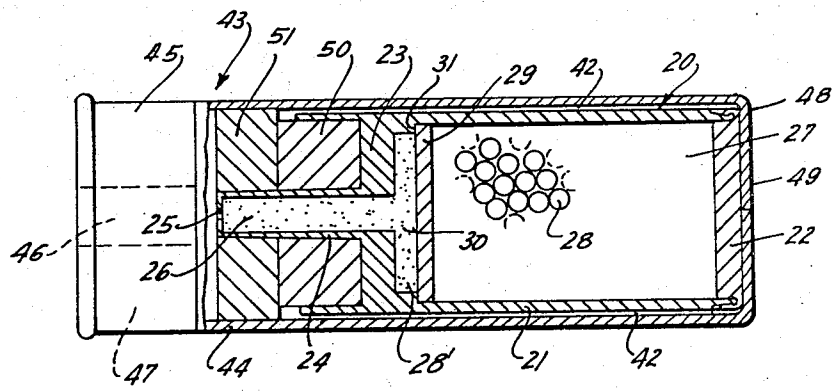
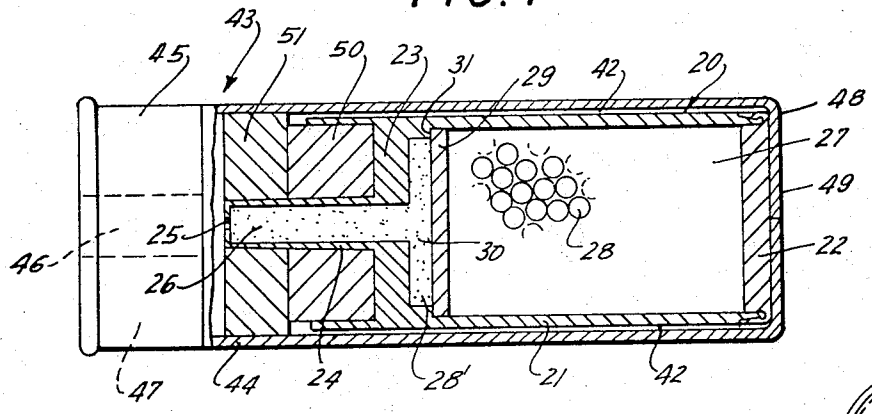


FIG. 1



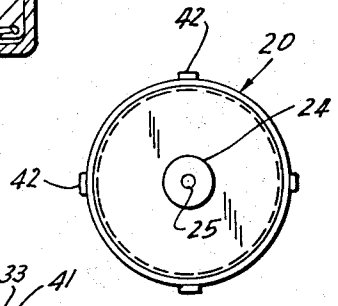
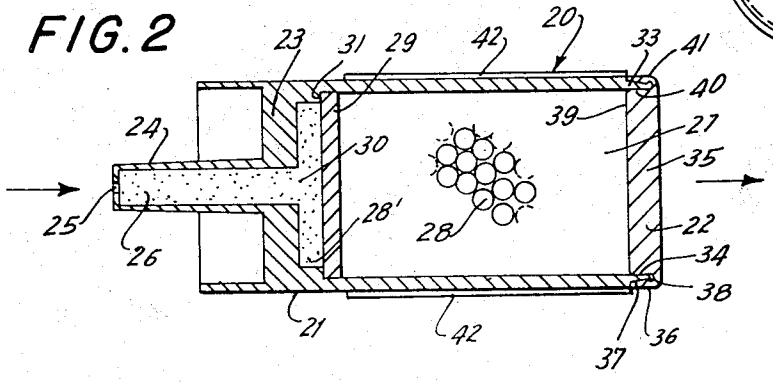


FIG. 4

FIG. 2



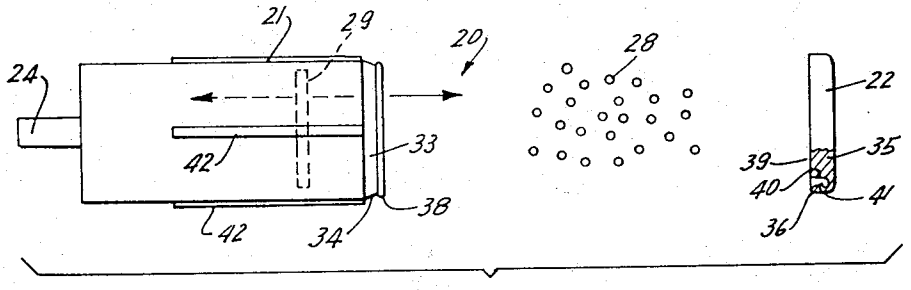


FIG. 3

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FIG. 5

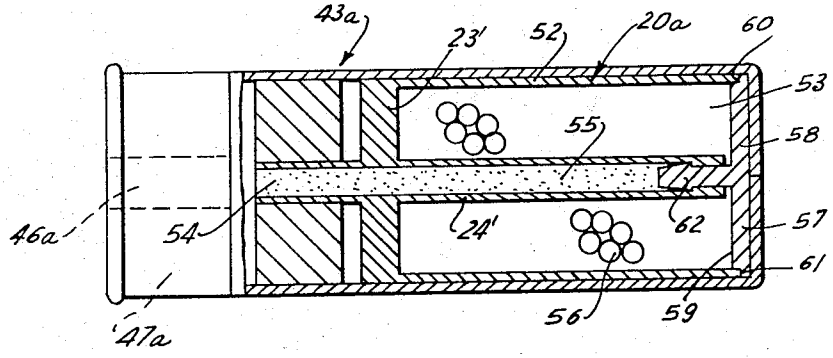
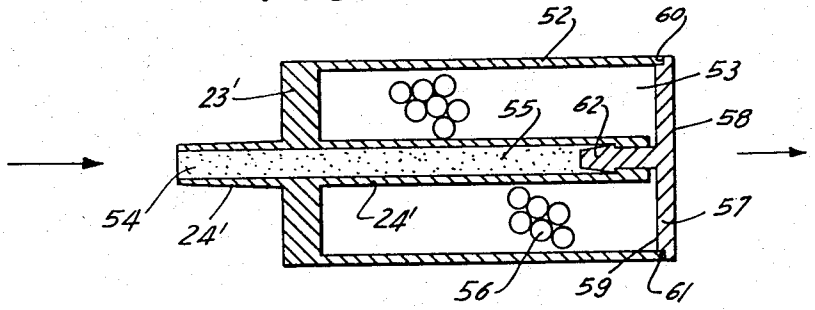


FIG. 6



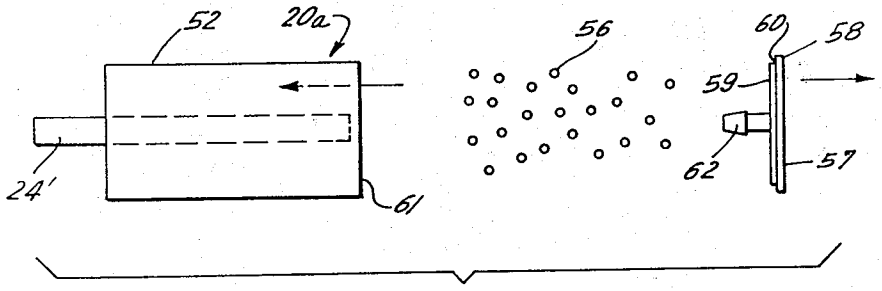


FIG. 7

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FIG. 8

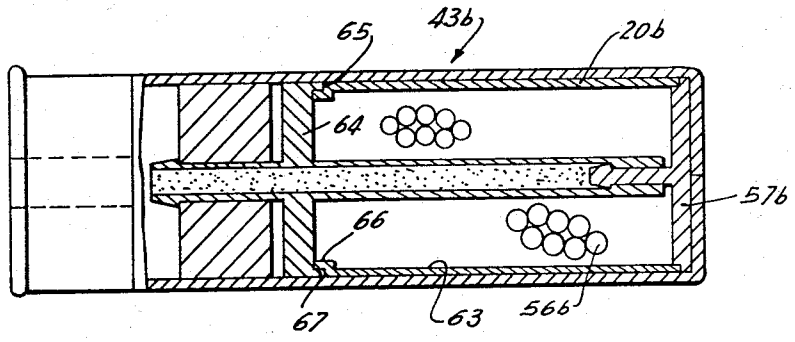
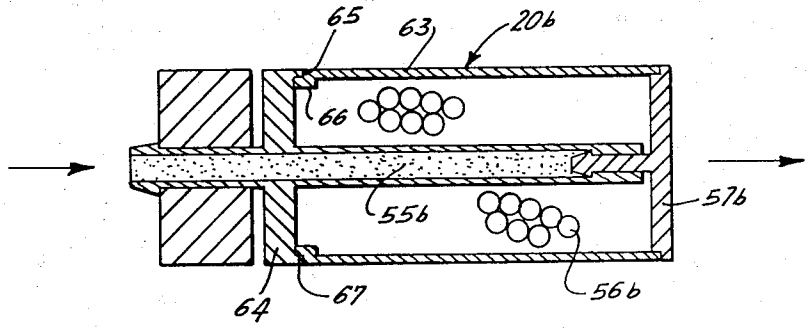


FIG. 9



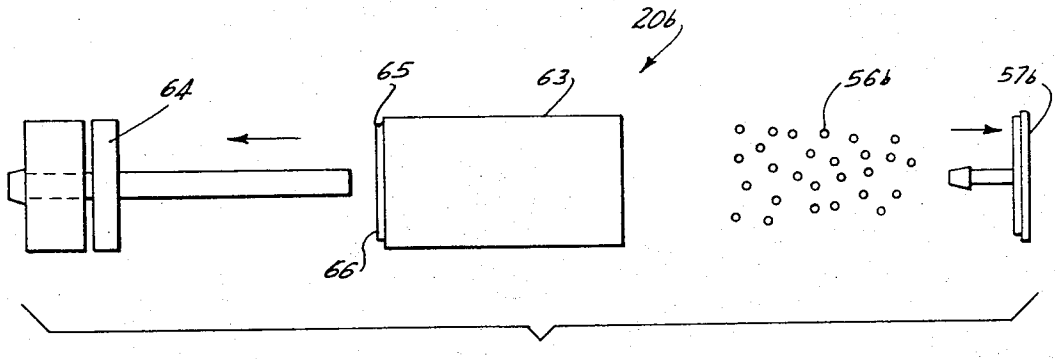


FIG. 10

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SHOT CONCENTRATOR

BACKGROUND OF THE INVENTION

The most recent attempts to significantly increase the effective range of the modern shotgun have been directed principally toward the shotgun choke which was first developed in approximately the latter part of the 19th century. Until the choke principle was introduced, the shotgun was effective to a range of only about 35 yards. The development of the choke on the shotgun barrel itself increased the effective range from about 35 to 55 or 60 yards. This is apparently the limit to which that principle could be applied in order to increase the range of a concentrated mass of pellets of shot after they leave the barrel of the gun.

Therefore, a means is needed to retain the pellets for a period of time and distance after they leave the barrel of the gun before releasing them to form a dispersing pattern. By concentrating efforts in this area, the range of the shotgun can be effectively increased. The shot concentrator concept is directed toward this area and basically can be described in the following manner.

The individual pellets of shot are contained in a mass as they leave the barrel. This is done by the use of a container or closed tube which does not allow the shot to disperse. By retaining the shot in mass, the velocity is retained to a far greater extent than if they are allowed to disperse immediately upon leaving the barrel as is the case with the shot shells on the market today. Then at a predetermined distance, for instance between 35 and 50 yards from the muzzle, the shot would be released to fly independently of one another. The retained velocity of these pellets at 60 to 80 yards, for instance, will be greater than pellets from a conventional shot shell. Also, the pattern diameter at the 60 to 80-yard range would be far less than that of a conventional shot shell whose pellets have been flying independently since leaving the muzzle of the gun.

There have been previous attempts to develop a shot concentrator which will retain the shot in a confined mass for a period of time after the shot leaves the muzzle of the gun, however, the attempts we are aware of have run into problems of stability in the container or capsule as it is in flight. An unstable capsule would naturally have a deleterious effect upon the consistency of release as well as the effective range of the shot particularly in the area of maximum range with which we are concerned.

For example, a previously known shot concentrator assumes the form of a capsule having a sealed forward end and an open rear end as it is fired from the barrel of the gun. The capsule is designed so as to be unstable by nature so that during the flight of the capsule it will invert until the open end of the capsule is forward and the shot will be released in this manner. The delay factor comes into effect in that it takes a period of time for the capsule to invert and reverse its position. As stated above, the use of an unstable capsule has a very undesirable effect upon the consistency of release of the shot as well as the accuracy and effective pattern obtained in the desirable range.

Therefore it would be extremely advantageous in the art to provide a shot concentrator in the form of a capsule which will be stable in flight, will retain the shot in a closed and restricted pattern of flight for a predetermined length of time and then will release the shot thereby achieving a greater effective range for the shot as well as a more accurate and concentrated pattern of shot at that greater range. The result naturally would be a longe range shotgun shell which would be a considerable improvement in the art.

SUMMARY OF THE INVENTION

With the above comments on the state of the art in mind, it is a primary objective of this invention to provide a shot concentrator which will be stable in flight, will not allow the shot to disperse for a predetermined length of time and in doing so retain the velocity to a far greater extent than previously known for shotgun shells. At a predetermined distance from the muzzle of the gun, the concentrator will release the shot to permit the pellets to fly independently of one another and form their normal pattern thereby greatly increasing the effective range of the shot shell by maintaining an accurate and concentrated pattern of shot at a greater distance from the point of initial firing than other known shotgun shells. A further objective of the invention is to provide a method of achieving the above mentioned desirable effects upon the firing of a shotgun shell as well as to provide a shot concentrator to achieve these effects which is readily adaptable to be mounted within conventional shotgun shells known in the art today.

In summary, the shot concentrator is adapted to be mounted in the casing of a shotgun shell having powder and a primer therein. The concentrator includes a cylindrical hollow tube having a capped forward end and an elongated stem projecting from the closed rear end thereof. The stem has a passage therethrough communicating with the interior and the exterior of the tube. A charge of powder and a charge of shot are located in the tube. A fuse is positioned in the stem so as to communicate at one end with the charge of powder in the tube and adapted to communicate at the other end with the powder in the casing of the shell so that when the primer is detonated, the shot concentrator will be expelled from the casing by the explosion of the powder in the casing and the fuse will be simultaneously ignited. The fuse has a predetermined burning time to facilitate the flight of the shot concentrator for a desired distance before the charge of powder in said concentrator is ignited by the fuse and the charge of shot is thereby separated from the shot concentrator thereby providing a more accurate and more concentrated pattern of shot at a greater distance from the point of initial firing of a shotgun shell.

With the above objectives and features of the invention in mind, reference is had to the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a partially sectional side elevation view of a shot concentrator of the invention shown positioned within a conventional shotgun shell;

FIG. 2 is a sectional side elevation view thereof with the arrow showing the direction of flight of the concentrator after it has been shot from the gun and prior to release of the shot contained within;

FIG. 3 is a side elevation view thereof with the arrows showing the relative direction of the shot and the concentrator after the concentrator has released the shot contained within;

FIG. 4 is an end view thereof;

FIGS. 5—7 show similar components and sequence of steps as illustrated in FIGS. 1–3 above in regard to an alternative embodiment of the invention;

FIGS. 8–10 show a similar sequence of steps and component parts as illustrated in FIGS. 1–3 above in regard to a second alternative embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Initially describing the invention in detail, attention will first be directed toward the embodiment disclosed in FIGS. 1–4. The shot concentrator **20** is composed basically of a hollow tubular portion **21** having a cap **22** sealing its forward end and having a substantially solid base portion **23** sealing its rear end. Centrally located with regard to the axis of tube **21** is a stem **24** which extends rearwardly from the base portion **23** of the concentrator **20**.

Stem **24** has an opening **25** at its rear end leading to a continuous passage **26** which communicates with the interior **27** of tube **21**. Contained within the hollow center of tube **21** is a multiplicity of individual pellets or shot **28**, several of which are shown in the drawings, which fill up the majority of chamber **27** and, in particular, all of the forward portion of chamber **27**.

Located at the rear end of chamber **27** is a pocket **28'** which is open and in communication with passage **26** in stem **24**. The forward side of pocket **28** is sealed by means of over powder wad **29**. It should be noted that contained within pocket **28'** is a charge of powder **30** as shown in FIGS. **1** and **2**.

The inner diameter of tube **21** adjacent its rear end is less than the inner diameter along the remainder of the longitudinal length of the tube thereby forming an annular shoulder **31** to engage over powder wad **29**. The outer circumference of over powder wad **29** is substantially the same diameter as the inner surface of tubular portion **21**. Therefore, over powder wad will rest on shoulder **31** prior to explosion of powder charge **30** and will thus provide a separation means between powder charge **30** and shot charge **28**. This engagement will retain over powder wad **29** intact during the flight of the shot concentrator **20** after it has been released from the gun muzzle and until powder charge **30** is detonated.

Turning to the forward end of tube **21** it should be noted that the forward portion **33** of tube **21** tapers inwardly toward the forward end. This taper serves to form a choking action on the shot **28** as it is being ejected from the shot concentrator **20**. A lip or rim **34** is positioned at the outer extremity of forward portion **33** and is adapted to be received within a recess in cap **22** when the cap is positioned on shot concentrator **20** to form a sealed capsule. Cap **22** consists of a solid cylindrical base portion **35** having a depending annular skirt **36** extending rearwardly from base **35** and having its inner surface **37** engaging the outer surface of forward portion **33**. The rearward edge of skirt **36** seats and engages on an annular lip **38** located on the outer surface of tube **21** where forward portion **33** begins to taper inwardly therefrom. Extending rearwardly from the central portion of base **35** of cap or over shot wad **22** is a cylindrical projection **39**. The annular side wall **40** of cylindrical projection **39** and the configuration of skirt **36** of cap **22** combined to form a receiving recess **41** which is deformable to receive rim **34** in a snap fit relationship thereby assisting in the frictional engagement between cap **22** and tube **21**. When cap **22** is properly positioned in sealing relationship as part of shot concentrator **20**, rim **34** will be located within recess **41** and the bottom edge of skirt **36** will seat on lip **38**. In such a position, shot pellets **28** will be sealed within the forward larger portion of chamber **27** and will be isolated from powder **30** located in pocket **28'** at the rear portion of chamber **27** by the presence of over powder wad **29**. The above description of cap **22** is surely representative of one of many workable configurations which the cap may assume as is readily apparent from the scope of the invention and the state of the art. Meanwhile, at the rear end of shot concentrator **20** opening **25** will permit access to fuse **26** in stem **20** with the fuse being in communication with powder **30** in shot concentrator **20**.

On the outer cylindrical tubular surface of tube **21** are a plurality of spaced longitudinal parallel ribs **42** which are present for stabilizing purposes which will be discussed in greater detail below.

Other than the shot **28**, the powder **30** and the fuse **26** the remainder of the shot concentrator is constructed of a polyethylene material in one type of working embodiment. However, other types of material such as pressed paper, metal or other types of plastics are readily adaptable for use in forming the shot concentrator. Similarly, the fuse may be of a variety of different types of commonly known delay burning fuses. For example a fuse which is lead enclosed of a pyrotechnic input and pyrotechnic output type will work satisfactorily such as that manufactured by The Ensign-Bedford Co. of Simsbury, Connecticut. Naturally many other delay devices usable as fuses will work adequately in such environment. The powder and shot utilized are common powder and shot used in shotgun shells such as regular black gunpowder and, normally used shotgun pellets. The concentrator is designed to fit into a standard 12 gauge shotgun shell case or into a larger 10 gauge case or any other case which is similar in function to those above.

Reference is now made to FIG. **1** of the drawings where the shot concentrator **20** is shown positioned within a common type of shotgun shell **43**. Shotgun shell **43** is comprised of an outer casing **44** and a metallic rear capped portion **45** containing a primer **46**. Located within the rear portion of casing **44** is a charge of black gunpowder **47** commonly used in shotgun shells and positioned so that it is in engagement both with primer **46** and with opening **25** in stem **24** so that fuse **26** is also in communication with powder charge **47**. The forward end of shotgun shell **43** is closed at **48** by a crimped outer end portion **49** of casing **44**. Other common type of casing which are readily known in the art and which may be utilized here include a cap on the forward end of the shell which may be held in position by the crimped outer end portion of the casing. The outer dimension of tube **21** is such that sufficient space is preserved to permit ribs **42** to fit within casing **44** so that shot concentrator **20** is snugly positioned within casing **44** prior to firing.

In order to ensure compact and solid engagement between all parts contained within shot shell **43** a base

wad 50 is mounted on stem 24 in engagement with the rear surface of base portion 23 of tube 21. Similarly, also mounted on stem 24 so that its forward surface engages the rear surface of base wad 50 is a gas trap means 51 which is utilized in providing a gas seal to ensure maximum velocity when shell concentrator is exploded from casing 44. Gas seal means 51 is a plastic device commonly used and marketed in the field and it basically consists of a forward solid cylindrical portion and a rearwardly extending outer skirt which expands upon explosion of the powder behind it in casing 44 so as to lock against the inner side walls of casing 44 and reduce the chance of any gas escaping between the inner side walls of casing 44 and shot concentrator 21. In this manner, maximum velocity is achieved upon firing of the shotgun shell. The material used for wadding 50 can be of any common type used in the shell-making art, such as a common waxed fiber material.

In operation, the shell as shown in FIG. 1 is placed within the shotgun, the trigger is pulled and primer 46 is detonated so as to explode powder charge 47 in casing 45. Upon explosion of the powder charge 47, the gases therefrom will drive shot concentrator 20, base wad 50 and gas trap means 51 from the forward end of casing 44. In doing so, crimp 49 will be driven open at the closed forward end of shotgun shell 43 by the force of the shot concentrator as it exits from the shell. Shot concentrator 20 will then exit from the muzzle of the gun and at some early point in its path of travel subsequent to the explosion of shotgun shell 43, base wad 50 and gas trap means 51 will detach themselves from stem 24 of shell concentrator 20. Also, at the time of ignition of powder charge 47, fuse 26 which is in communication with powder charge 47 as discussed above will be ignited and will begin to burn forwardly toward powder charge 30 within shell concentrator 20. During a predetermined length of time in flight, fuse 26 will burn and shot concentrator 20 will appear as shown in FIG. 2.

In order to assure that the flight of capsule or shot concentrator 20 is stable, various features of the arrangement are present to aid in this respect. Both base wad 50 and gas trap means 51 add some assistance during the initial part of the flight and then the distribution of weight in the capsule itself assists in this regard as well as the multiplicity of spaced ribs 42 on the outer surface of tube 21. Naturally the general configuration of the shot concentrator itself also adds to the stability of flight. In this manner, the shell concentrator 20 will proceed in the most accurate and direct path toward the desired target without inverting or changing direction or turning in any substantial manner.

After a predetermined length of time in flight, fuse 26 will have burned sufficiently to contact powder charge 30 in pocket 28' causing powder wad 29, shot charge 28 and cap 22 from the forward end of tube 21. The natural reactive force of the charge will assist in driving the tube 21 rearward while driving the above mentioned parts of the capsule forward so as to more effectively free the shot charge to assume its normal pattern. The particular design features of cap 22 which were discussed in detail above assist in maintaining a tight relationship between the cap 22 and tube 21 prior and subsequent to ignition of powder charge 47 and prior to ignition of powder charge 30 so as to retain capsule or concentrator 20 intact for the desired length of time. Although the design of the cap 22 is such as to provide the above features, it may easily and effectively be removed from the forward end of the tube at the desired time to smoothly effect discharge of the shot pellets. As previously discussed, the forward portion 33 of tube 21 is tapered inwardly to effectively choke the shot charge and add an additional control over the pattern and distribution of the charge in flight after it leaves tube 21.

As also discussed above, over powder wad 29 is also engaged with shoulder 31 in a tight enough relationship to maintain the relationship of parts within concentrator 20 during the portion of its flight prior to explosion of powder charge 30 and then upon explosion of powder charge 30 over powder wad 29 will easily be displaced and assist in completely driving the shot pellets from tube 21. The relative position of the portions of shot concentrator 20 a short time after detonation of powder charge 30 is shown in FIG. 3. The type of cap 22 employed with tube 21 may be varied and should contain among other features a frictional or other common type of engagement with tube 21 to retain the capsule intact during the early portion of the flight and yet be easily removable from the forward end of the capsule to allow freedom of the charge at the desired time upon explosion of charge 30.

A second embodiment of the invention is disclosed in FIGS. 5–7. Since many of the elements are similar in design with that of FIG. 1, like parts will be represented by the same numeral with the addition of a subscript *a*. As will be noted, FIGS. 5, 6 and 7 respectively designate the same stages of action as represented by FIGS. 1, 2 and 3 which depict the above discussed embodiment. The more significant differences in structure between the embodiment discussed above and this alternative embodiment is in the formation of the stem portion of the shot concentrator, the chamber for containing the powder charge within the concentrator and the cap on the forward end of the shot concentrator. The basic shotgun shell 43*a* may be identical to the shotgun shell 43 as described in regard to the first discussed embodiment.

Stem 24' of shot concentrator 20*a* extends substantially the same distance rearwardly from the base portion 23' of tube 52. However, in this embodiment stem 24' extends inwardly almost the entire length of hollow chamber 53 within tube 52 and is substantially parallel, concentric with and centrally located in respect to tube 52. Fuse 54 is contained in the rear portion of stem 24' and once again is in communication with the powder charge 47*a* within shotgun shell 43*a* so as to be ignited upon detonation of primer 46 and the explosion of powder 47*a*. The forward portion of stem 24' which is located within tube 52 contains powder charge 55 which is in communication with the forward end of fuse 54. After the above discussed designated predetermined length of time for fuse 54 to burn down it will ignite powder charge 55 thereby expelling cap 57 forward from concentrator 20*a* and at the same time driving tube 52 rearwardly from shot charge 56.

FIG. 7 illustrates the position of the relevant parts of shot concentrator 20*a* shortly after explosion of powder charge 55 tube 52 has been driven from shot

charge 56. Naturally the reactive force will serve to drive tube 52 rearwardly while driving cap 57 in a forward direction so as to facilitate freeing of the shot so that it may assume its normal and free pattern of flight. The structure of cap 57 is also somewhat different in design is best shown in FIGS. 6 and 7 of the drawings. The cap as comprised of a base disc 58 having an outer diameter equal to the outer diameter of tube 52, an inner cylindrical extension 59 extending rearwardly from base disc 58 and having a lesser outer diameter than base disc 58 thereby forming an annular detent 60 adapted to receive the forward edge 61 of tube 52 in seating engagement. The outer diameter of base disc 58 is substantially the same as the outer diameter of tube 52 thereby providing a uniform outer diameter along the entire length of the capped shot concentrator 20*a*. A post 62 extends rearwardly from cylindrical extension 59 and is substantially centrally located with respect thereto so as to be aligned with the opening in stem 24' when cap 57 is engaged with tube 52. The rearward end portion of post 62 is tapered from a rear end of a smaller outer diameter than the inner diameter of stem 24' to a intermediate point along the length of post 62 where the outer diameter of post 62 is slightly greater than the inner diameter of stem 24'. Therefore, when post 62 is extended within stem 24', stem 24' will be slightly expanded at a point along its length to form a frictional engagement between post 62 and stem 24' and retain cap 57 in positive engagement with tube 52 during the portion of the flight prior to explosion of powder charge 55. Naturally, upon explosion of powder charge 55 once again cap 57 is engaged so that it may be easily driven from the forward end of tube 52 allowing the concentrator 20*a* to be ejected from shot 56. The materials employed for the embodiment described in FIGS. 5–7 may be the same as or similar to the materials employed for the embodiment of FIGS. 1–4.

A third embodiment is disclosed in FIGS. 8–10 and like parts will retain like numbers with the addition of a subscript *b* being added to each number. FIGS. 8–10 in sequence of operation are equivalent to FIGS. 1–3 respectively in regard to the first embodiment and FIGS. 5–7 respectively in regard to the second embodiment discussed above. The embodiment of FIGS. 8–10 is substantially the same as the embodiment of FIGS. 5–7 with the exception that instead of tubular portion 63 of shot concentrator 20b being integral with base portion 64 in the same manner as tubular portion 52 and base portion 23' of embodiment 20*a*, tube 63 and base 64 are in frictional engagement of sufficient strength to maintain the closed position of capsule 20*b* until explosion of powder charge 55*b* within shot concentrator 20*b*. The remaining portions of shot concentrator 20*b* are identical with corresponding portions of shot concentrator 20*a* and the sequence of steps of operation are identical therewith as shown in the Figures with one exception.

This exception lies in the fact that upon explosion of poweder charge 55*b*, base portion 64 will separate from tube 63 as well as cap 57*b*. This additional separation point facilitates the freeing of shot pellets 56*b* quickly and efficiently in order that the pellets may assume their normal pattern of flight.

In order to maintain the uniform outer diameter of tube 63 from the forward edge of cap 57*b* to the rear edge of base portion 64, a detent 65 is provided at the rear end of tube 63 facilitated by the provision of a rear end portion 66 on tube 63 of a smaller inner diameter than the remainder of tube 63 thereby providing a portion of greater thickness adjacent the rear end of tube 63 to facilitate the formation of detent 65 therein. In corresponding fashion, base portion 64 has a forwardly extending annular rim 67 which seats in detent 65 in frictional engagement therewith to assist in forming the closed capsule. It will be noted that the outer diameter of base portion 64, rim 67, tube 63 and cap 57*b* are all substantially the same thereby providing a shot concentrator 20*b* having a uniform outer diameter along its entire length from the forward edge of cap 57*b* to the rear edge of base 64. Once again, the material utilized to form the embodiment disclosed in FIGS. 8–10 can be and generally are substantially the same materials as employed with the two previously discussed embodiments.

To briefly summarize the cogent features of this invention, it should be kept in mind that given a certain size shot, the shot concentrator will retain the velocity of the shot to the extent that at say, for example, 85 yards, the pellet velocity will be equal to the pellet velocity of a conventional shotgun shell at approximately 60 yards. This feature provides the advantage that the shot concentrator can be loaded with shot which will retain the necessary velocity and give a dense pattern effective to approximately 85 yards whereas the same shot in a conventional shotgun shell would be effective at approximately only a maximum distance of 60 yards. The result is that the shot concentrator will produce an effective pattern at a much greater distance, at least as much as 30 or 35 percent improvement over a conventional shotgun shell. As is well known in the art, an effective pattern is one that has sufficient density and pellet velocity or energy. The shot concentrator is useful in attaining a greater range than with shotgun shells presently available. In this manner, a shot shell can be provided which will complement the popular sporting shot shells of today. As previously stated, the shot concentrator is designed to fit in any standard size shotgun gauge shell.

In general consideration of the fuse employed, the length of the delay device can naturally be varied depending upon the length of delay required. This naturally gives a great variety of parameters to work with in designing a shell for the greatest maximum desirable effective range. For example, a workable design has been found in one which employs a length in the delay device of 1.1 inches which would provide a delay of about 100 milliseconds or about one-tenth of a second. As previously discussed, this delay device or fuse extends up the column or hollow stem or shaft from the rear or solid wad end of the stem toward the mouth or cap end of the capsule or concentrator. If used in the second or third embodiments discussed above, in front of this fuse is approximately one-half inch of hollow stem which is utilized in containing the cumbustible element which may be any common shotgun type powder such as normally used fine black gunpowder. The common type of black powder fuse or a solid propellant may be substituted for the fine black gun-

powder to accomplish the same purpose as well as any other common type of explosive material for a shell.

The shot is loaded into the body of the capsule as previously discussed and the cap is placed over the forward end of the capsule to retain the shot within the capsule until the cap is removed by explosion of the powder contained within the shot concentrator.

Upon firing of the shotgun shell, the initial combustion of the powder contained therein ignites the fuse and the capsule is projected from the barrel of the gun. As the capsule is thus projected, the delay device is operating and after a predetermined time, such as a 100 milliseconds, it ignites the combustible powder within the shot concentrator which pushes the cap free while at the same time exerting a backward thrust on the capsule. This combination of forces frees the shot from the capsule. Depending upon the velocity of the capsule, the distance from the barrel at which the shot is freed varies. Due to the various stabilizing features previously discussed in regard to the embodiments of this invention, the capsule or concentrator is maintained in a stable and uniform flight path until explosion of the powder contained within. This naturally assists in providing an accurate and effective release of the shot from the concentrator and results in accurate and effective pattern of shot at a greater firing range. Furthermore, it has been found that a shot shell containing a shot concentrator of this type has less recoil than the "magnum" commercially loaded shot shells.

Several other features disclosed in the above embodiments which add to the effectiveness of the shot concentrator and which may naturally be adapted to all of the embodiments disclosed, is first that a tapered forward end portion of the tube provides a choked effect on the shot to provide an even greater control over the pattern of shot for a greater distance and second that the provision of a ribbed capsule and flexible shot containing concentrator of the general configuration shown in the drawing in regard to all of the embodiments allows easy passage of the capsule through a commonly used choke bored shotgun. In this manner, both the advantageous effects of a choke bored shotgun and of the shot concentrator itself are made use of.

A further alternative embodiment of this invention which should be kept in mind although it is not depicted in the drawings, could consist of a shot concentrator having the general configuration as shown in the embodiments in the drawing with the addition of the provision of at least one channel extending the length of the side wall of the concentrator with the side wall having a greater than normal thickness to accommodate the channel. A fuse of the type discussed in connection with the above embodiments can be located in the channels and being crimped at their forward ends to hold the cap of the shot concentrator in position. The rear end of the channels would be open to the powder charge in a conventional shotgun shell. Upon explosion of the shell, the one or more fuses in the concentrator would be ignited and would burn for the predetermined length of time desired until it reaches the portion at which it holds the cap in place. At that point, the fuse would burn through releasing the cap thereby permitting the shell concentrator to fall away from the charge of shot contained therein which may then assume a free pattern of flight. With this particular embodiment, it is readily apparent that there is no secondary explosion since a second charge of powder is not located in the concentrator itself. The only explosion would be in the initial firing of the shell and the concentrator would hold the shot in a group for the desired length of time until the fuse burns through at the cap end to release the cap and permit the shot to disperse.

Thus, the above discussed objectives and advantages of this invention are most effectively attained.

We claim:

1. A shot concentrator adapted to be mounted in the casing of a shotgun shell having powder and a primer therein, said concentrator comprising:

a cylindrical hollow tube of resilient plastic material having a capped forward end of lesser diameter than the rear end of the tube and an elongated stem projecting from the closed rear end thereof;

an annular skirt extending from the closed rear end of the tube and concentric with the stem to facilitate stability of the concentrator in flight;

said stem having a passage therethrough communicating with the interior and exterior of said tube;

a charge of powder and a charge of shot in said tube;

a fuse in said stem communicating at one end with the charge of powder in said tube and adapted to communicate at the other end with the powder in the casing so that when the primer is detonated, the shot concentrator will be expelled from the casing free of the casing and all other components therein by the explosion of the powder in the casing and said fuse will be simultaneously ignited;

the fuse having a predetermined burning time to facilitate the flight of said shot concentrator for a desired distance before the charge of powder in said concentrator is ignited by said fuse and said charge of shot is separated from said shot concentrator thereby providing a more accurate and more concentrated pattern of shot at a greater distance from the point of initial firing of a shotgun shell;

resilient retention means in the tube to maintain the relative position of the contents of the tube and consequent distribution of weight during flight;

spaced longitudinal ribs are on the exterior surface of the tube to thereby maintain weight distribution and stability of the tube during flight prior to ignition of the charge of powder therein;

the resilient retention means including interengaging resilient surfaces on the cap and the tube in interlocking engagement during flight and adapted to be easily resiliently disengaged upon ignition of the powder and forces exerted thereby;

the resilient retention means including resilient sealing means between the powder and the shot to maintain separation therebetween during flight and to facilitate uniform distribution of shot upon separation from the shot concentrator; and

said resilient sealing means including an annular interior shoulder on the inside of the tube with the charge of powder positioned on one side of said shoulder and the charge of shot on the other side of said shoulder and a resilient wad on said shoulder in sealing engagement therewith and positioned between said powder and said shot in order to maintain the relative positions of said

powder and said shot prior to ignition of the powder in the concentrator.

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