Feb. 17, 1953 T. M. SHELTON 2,628,450

SMOKE RING PROJECTOR

Filed May 2, 1949

Fig. 1

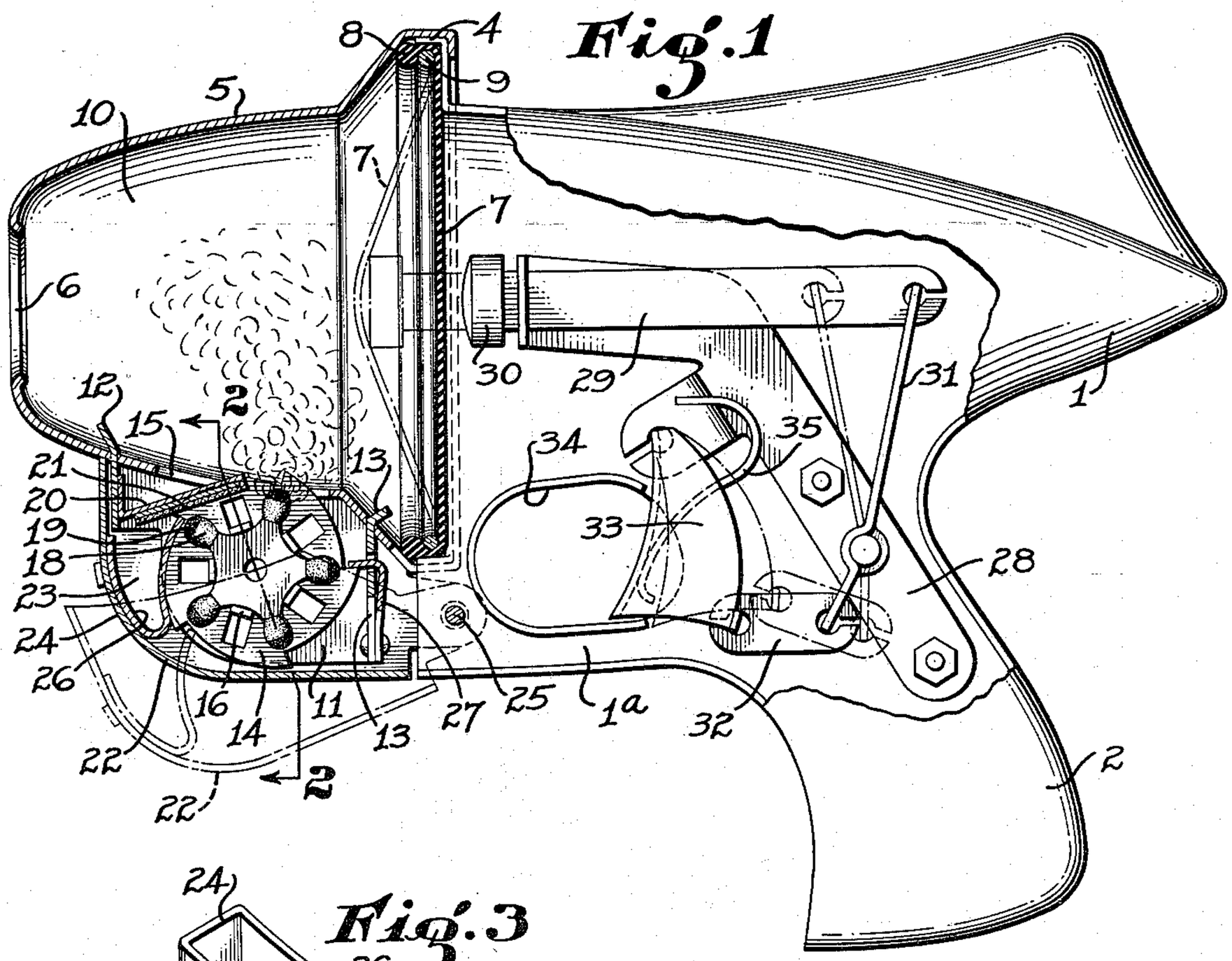


Fig. 3

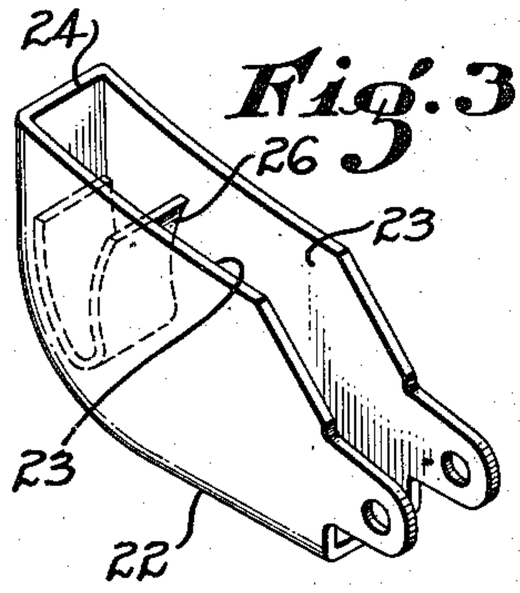


Fig. 2

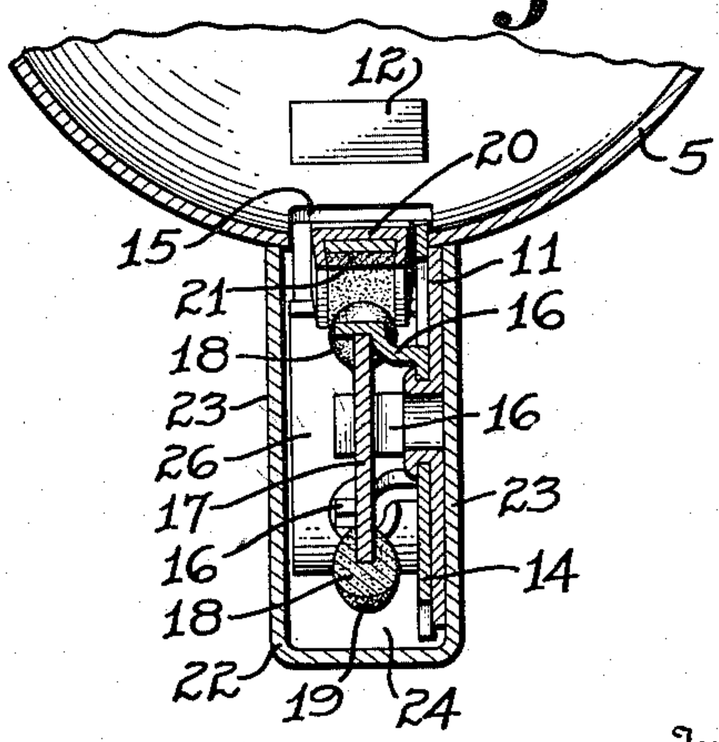
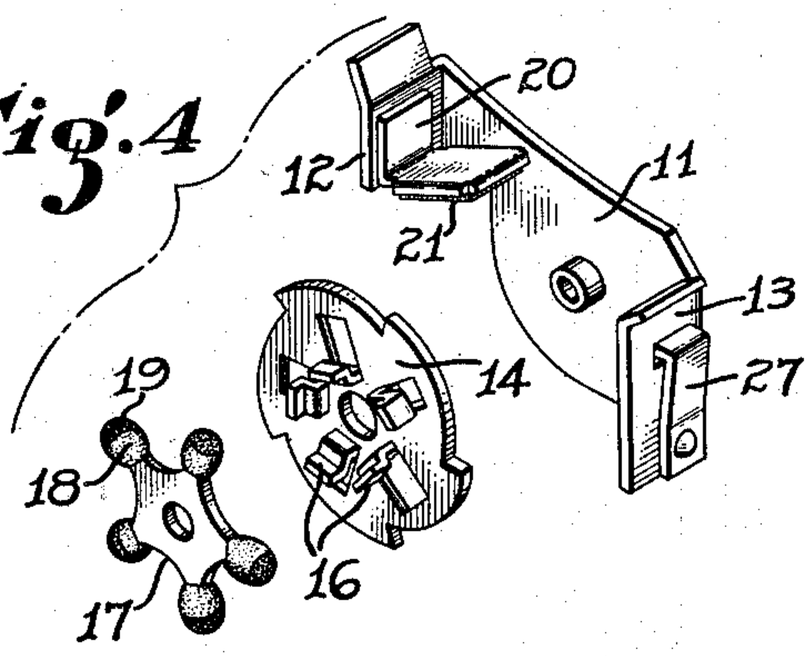


Fig. 4



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SMOKE RING PROJECTOR

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12 Claims. (Cl. 46—9)

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My invention relates to smoke ring firing toy guns and included in the object of my invention are:

First, to provide a toy gun wherein smoke is generated in the chamber and is caused to be emitted forcibly by operation of a trigger actuated diaphragm in such a manner as to produce a succession of smoke rings.

Second, to provide a toy gun which incorporates a novel smoke generating means utilizing a multiple unit cartridge so that a series of smoke charges may be produced before the cartridge need be replaced.

Third, to provide in a toy gun, a simple and effective means for producing smoke charges which means may be readily and quickly reloaded as needed.

Fourth, to provide a toy gun of the type which although designed to produce an expel smoke, is simple to operate and safe for children to use.

With the above and other objects in view as may appear hereinafter, reference is made to the accompanying drawings, in which:

Figure 1 is a side view of my toy gun with parts thereof broken away and in section.

Figure 2 is a fragmentary sectional view through 2—2 of Figure 1.

Figure 3 is a perspective view of the housing or shell which encases the smoke generator and associated mechanism.

Figure 4 is an exploded perspective view of the smoke generator and mounting means therefor.

My toy gun may be formed from a wide variety of materials, but for purposes of illustration is shown as constructed from sheet metal stampings. The gun includes a rear shell 1, preferably circular in cross section and of tapered streamlined form. The shell is formed of complementary sections and includes a depending handle or pistol grip 2. The forward end of the rear shell is provided with a flange 4 which fits within a corresponding flanged rear end of a forward shell 5. The forward shell is likewise circular in cross section and preferably streamlined in the form of the leading portion of an air foil. The forward shell 5 is equipped with a muzzle aperture 6. The mating flanged ends of the shells form an internal channel which receives a diaphragm 7 preferably formed of rubber or similar material. The diaphragm is provided with a peripheral bead 8, which is stretched over a retainer ring 9, coacting with the mating flanges of the shells to hold the diaphragm in place. The interior of the forward shell forms a smoke chamber 10.

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Suspended from the forward shell 5 is a bracket 11, including a forward flange 12 and a rear flange 13 interlocked in slots provided in the lower side of the shell. Mounted on the bracket 11, between the flanges 12 and 13, is a ratchet wheel 14 which may project slightly into the smoke chamber through a clearance slot 15. The ratchet wheel is provided with clip elements 16 arranged about the center of the ratchet wheel.

Smoke is produced by means of a star shaped cartridge 17 adapted to fit between the clip elements 16. The points of the star shaped cartridge are coated with a smoke producing material 18 and tipped with an ignitor compound 19. Secured to the forward flange 12 of the bracket 11 is a leaf spring 20 which carries a striker plate 21, so disposed as to be engaged in succession by the tips of the star cartridge as the ratchet wheel 14 is rotated.

The bracket 11, ratchet 14 and cartridge 17 are enclosed in a housing 22 having side members 23 joined by a web 24 along two sides. The rear shell 1 includes a depending hollow rib 1*a* which projects below the forward shell 5 and is provided with a journal pin 25 pivotally supporting the housing 22 forwardly of the rib 1*a* and in a position underlying the forward shell 5. The housing 22 carries a spring pawl 26, which is so positioned as to engage the ratchet wheel 14 when the housing is moved from its open position shown by broken lines in Figure 1, to its closed solid line position. This movement causes one of the star tips to scrape across the striker plate 21 so as to be ignited and produce smoke which passes through the slot 15 into the smoke chamber 10. The spring pawl 26 includes an arcuate portion which overlies the edge of the ratchet and acts as a means for retaining the housing in its closed position. Backward movement of the ratchet may be prevented by a spring detent 27 conveniently carried by the rear flange 13 of the bracket 11. However, the striker plate 21 may be so positioned that it drops behind each star point as the cartridge is advanced, thereby preventing back motion.

The diaphragm 7 is operated by a trigger mechanism contained in the rear shell 1. The trigger mechanism includes a bracket 28 preferably in the form of a stamping having a forwardly directed portion in which is slidably mounted a hammer bar 29, having a head 30, positioned for engagement with the diaphragm 7. The rear end of the hammer bar 29 is connected to a lever 31 pivotally mounted on the bracket 28 and having an arm which is con-

nected by a link 32 to a trigger 33, which depends from an arm projecting from the bracket 28. The depending hollow rib 1*a* of the rear shell 1 is provided with a trigger opening 34 disposed forwardly and above the piston grip 2 and into which the trigger 33 protrudes. A return spring 35 holds the trigger 33 in a normally forward position.

Operation of my toy gun is as follows:

A star cartridge 17 is placed on the ratchet wheel 14; this being accomplished when the housing 22 is dropped downwardly beyond the broken line position shown in Figure 1 to expose the ratchet wheel. After insertion of the star cartridge, the housing 22 is moved to its solid line position causing the pawl spring 26 to advance the ratchet wheel. The construction of the spring is such, that its resistance coupled with the friction of the striker plate 21 on the corresponding tip of the star cartridge, causes the star cartridge to advance forcibly and automatically ignite one of the smoke producing units 18 as the housing is closed. Each unit is designed to produce smoke sufficient to completely fill the chamber 10. During operation of the smoke producing unit and for several seconds afterward the trigger 33 may be operated rapidly and with each operation the diaphragm is flexed to produce an impulse which discharges a puff of smoke from the muzzle aperture 6. The proportions of the aperture and chamber are preferably such, that smoke rings are produced.

It has been found feasible to employ an ignition compound and a mating compound on the striking plate similar to that used in safety matches. For example, an ignition compound as follows, is satisfactory, the proportions being indicated by weight:

2.5 parts glue
0.6 parts gum tragacanth
7.5 parts gum arabic
.25 part potassium dichromate
42.0 parts potassium chlorate
8.8 parts glass powder
1.2 parts kieselguhr
5.0 parts sulphur
4.0 parts manganese dioxide
37.7 parts water

and as a substitute the bonding agent (glue and gum arabic) polymerized rosin, 115° C. drop melt point, dissolved in benzene may be used.

A replaceable striker surface material may comprise:

54.00 parts red phosphorus
21.0 parts gum arabic
0.8 part gum tragacanth
28.0 parts antimony sulphide

The material is spread on a thin slip of cardboard or wood. It will be observed that these compounds are similar to conventional safety match material, with the exception that a larger percent of red phosphorus and potassium chlorate are used, in order to produce quicker ignition to meet more effectively the conditions of operation.

A suitable smoke producing mixture may comprise:

50 parts sodium chlorate
30 parts ammonium chloride
40 parts binder of dextrin, using water as solvent.

Alternatively, polymeribzed rosin drop point 100° C. dissolved in 50 parts of toluene may be used as a binder. 10% of the oxidizer may be perfumed para dichloride benzene, or other aromatic oil.

It should be observed that the force applied to the diaphragm is proportional to the force exerted on the trigger, consequently light or heavy blows may be applied. This enables the user to vary the manner in which the smoke rings emerge from the smoke chamber; that is, a light impact will produce a slow moving smoke ring, while a hard impact will produce a fast moving smoke ring. Novel effect can be produced; for example one smoke ring can be "shot" through another.

Having fully described my invention, it is to be understood that I do not wish to be limited to the details herein set forth, but my invention is of the full scope of the appended claims.

I claim:

1. A toy gun comprising: a shell structure and a diaphragm defining a smoke compartment and a trigger compartment separated by said diaphragm; said smoke compartment having a muzzle opening, said trigger compartment shaped to define a pistol grip and apertured to form a finger opening; a trigger projecting in said opening; link and lever means including a hammer element operated by said trigger to flex said diaphragm; a frictionally ignitible smoke generating element; means independent of said trigger for forceably moving said element into said smoke compartment; and friction igniting means in the path of said element to ignite the same.

2. A toy gun comprising: means defining a smoke chamber having a muzzle opening; a diaphragm forming a wall of said chamber; a rotatable mounting member adapted to receive a cartridge having a plurality of radiating friction actuated smoke generating elements; a striker disposed for engaging said elements as said mounting member is rotated thereby to produce a smoke charge for said smoke chamber; and means for actuating said diaphragm to discharge puffs of smoke from said muzzle opening.

3. A smoke ring discharging toy gun, adapted to employ a friction activated smoke producing cartridge, said toy gun comprising: a smoke chamber having a muzzle opening and a side aperture; means for creating transient pressure surges therein to drive puffs of smoke from said chamber through said muzzle opening; a holder for a friction element located adjacent said aperture; a device including a hinged housing for closing said aperture and simultaneously forcing a smoke producing cartridge across said friction element into said smoke chamber, thereby to generate smoke therein.

4. A smoke ring discharging toy gun, adapted to employ a friction activated multiple unit smoke producing cartridge, said toy gun comprising: a smoke chamber having a muzzle opening; means for creating transient pressure surges therein to drive puffs of smoke from said chamber through said muzzle opening; a ratchet device incorporating means for holding said multiple unit smoke producing cartridge and disposed in communication with said chamber; an actuating striker engageable with said units as said ratchet is advanced; and hinged hood means enclosing said ratchet and cartridge and incorporating a pawl engageable with said

ratchet to advance said cartridge as said hood is moved from an open to a closed position.

5. A smoke ring discharging toy gun, adapted to employ a friction activated smoke producing cartridge, said toy gun comprising: a smoke chamber having a muzzle opening and a side aperture; a flexible diaphragm forming a wall of said chamber; trigger operated means to strike said diaphragm thereby to produce a series of transient pressure surges for the intermittent discharge of smoke through said muzzle opening; a device adapted to receive a smoke producing cartridge; a friction element disposed adjacent said side aperture to engage said smoke cartridge and means for forceably moving said cartridge past said friction element into said side aperture to ignite said cartridge and produce smoke in said chamber.

6. A smoke ring discharging toy gun, adapted to employ a friction activated multiple unit smoke producing cartridge, said toy gun comprising: a smoke chamber having a muzzle opening; a flexible diaphragm forming a wall of said chamber; trigger operated means to strike said diaphragm thereby to produce a series of transient pressure surges for the intermittent discharge of smoke through said muzzle opening; a ratchet device incorporating means for holding said multiple unit smoke producing cartridge and disposed in communication with said chamber; an actuating striker engageable with said units as said ratchet is advanced; and a hinged hood means enclosing said ratchet and cartridge and incorporating a pawl engageable with said ratchet to advance said cartridge as said hood is moved from an open to a closed position.

7. A smoke ring discharging toy gun, adapted to employ a friction activated smoke producing cartridge, said toy gun comprising: a shell structure defining a smoke chamber and a trigger compartment, incorporating a flexible diaphragm separating said chamber and compartment, said smoke chamber having a muzzle opening and a side aperture; a trigger and hammer mechanism in said compartment, said hammer adapted on manual operation of said trigger to strike said diaphragm thereby to produce a pressure surge in said smoke compartment sufficient to drive a puff of smoke from said muzzle opening; a device adapted to receive a smoke producing cartridge; a friction element disposed adjacent said side aperture to engage said smoke cartridge; and means for forceably moving said cartridge past said friction element into said side aperture to ignite said cartridge and produce smoke in said chamber.

8. A smoke ring discharging toy gun, adapted to employ a friction activated multiple unit smoke producing cartridge, said toy gun comprising: a shell structure defining a smoke chamber and a trigger compartment incorporating a flexible diaphragm separating said chamber and compartment, said smoke chamber having a muzzle opening; a trigger and hammer mechanism in said compartment, said hammer adapted on manual operation of said trigger to strike said diaphragm thereby to produce a pressure surge in said smoke compartment sufficient to drive a puff of smoke from said muzzle opening; a ratchet device incorporating means for holding said multiple unit smoke producing cartridge disposed in communication with said chamber; an actuating striker engageable with said unit as said ratchet is advanced; and a hinged hood means enclosing said ratchet and cartridge and incorporating a pawl engageable with said ratchet to advance said cartridge as said hood is moved from an open to a closed position.

9. A toy gun, comprising: means defining a smoke chamber having a constricted muzzle opening at its forward end and an aperture at its under side; a diaphragm forming the rear wall of said chamber; means for thumping said diaphragm; a housing hinged to the lower side of said smoke chamber and adapted to close said aperture, a frictionally ignitible smoke producing member; a friction member; said members being operatively connected with said housing to interengage as said housing is closed over said aperture to ignite said smoke producing member and fill said chamber with the resulting smoke.

10. A toy gun, comprising: means defining a smoke chamber; means for discharging smoke therefrom; and means for producing smoke in said chamber including a hinged housing member at one side of said smoke chamber, there being an aperture communicating with said chamber and covered by said housing; a friction ignitible smoke producing means disposed for movement into said aperture and operatively connected with said housing to move therein as said housing is closed; and a friction member engageable by said smoke producing means as said housing is closed.

11. In a toy gun having a smoke chamber and means for discharging smoke therefrom, the combination of a smoke generating means comprising: a housing hinged to said smoke chamber and adapted to close an aperture therein; a frictionally ignitible smoke generating cartridge adapted to be operatively connected with said housing to move forceably on closing said housing into communication with said chamber; and a friction element disposed for engagement by said cartridge as said housing is closed thereby to ignite said cartridge.

12. A toy gun comprising: a smoke chamber having a muzzle end and a side aperture; means for discharging smoke from said chamber; a frictionally ignitible smoke generating member; means for forceably moving said smoke generating member into said aperture; and friction means adjacent the margin of said aperture to engage and ignite said smoke generating member.

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