# United States Patent [19]

**Skillern**

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[45] **May 28, 1974**


[54] **ELASTIC BAND GUN**


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[21] Appl. No.: **221,960**

[52] **U.S. Cl.** ..... **124/19,** 124/35 R, 124/30 R

[51] **Int. Cl.** ..... **F41b 7/02**

[58] **Field of Search** ..... 124/19, 17, 18, 35 R, 41, 124/31, 1; 33/265, 244; 89/36 E



[56] **References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 2,289,490 | 7/1942 | Fisher | 124/19 |
| 2,550,873 | 5/1951 | Siders | 124/19 |
| 2,697,425 | 12/1954 | McElveen | 124/19 |
| 3,119,385 | 1/1964 | Ashley | 124/19 |



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*Assistant Examiner*—William R. Browne
*Attorney, Agent, or Firm*—Wolf, Greenfield & Sacks



[57] **ABSTRACT**

An elastic band gun having a plurality of pivotally mounted releasers which are serially located from front to back on the stock. Each releaser is adapted to support the rear end of a stretched elastic band and upon actuation to release the band at a level above that of the tops of any forwardly located releasers. A spring action powered, manually cocked, escapement-type sequencing system responsive to actuation of the trigger works either semi-automatically or fully-automatically to free the releasers to discharge the bands. In another form, the bands are retained in notches, and scrapers controlled by the sequencing system free the bands from the notches to discharge them. A combination safety shield and sighting device is designed to capture rearwardly discharged elastic bands.


**15 Claims, 17 Drawing Figures**

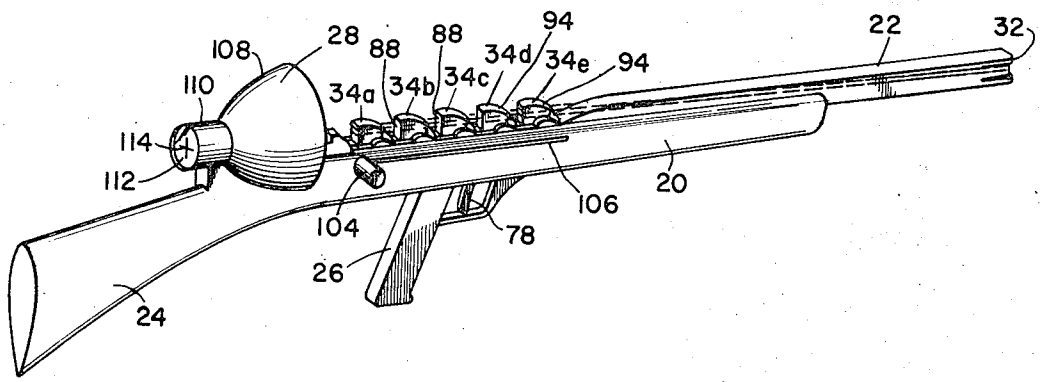


FIG. 1

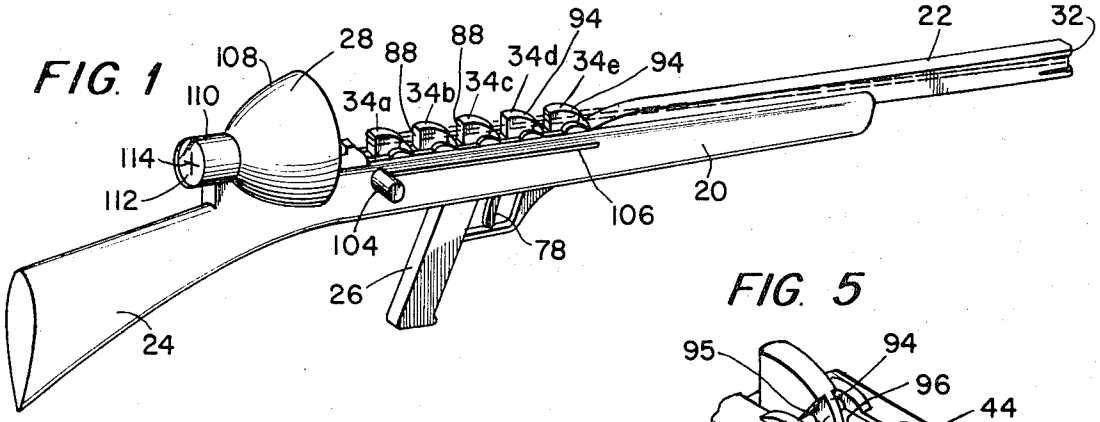



FIG. 5

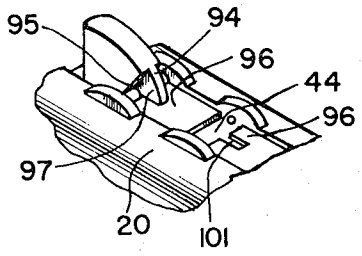



FIG. 2

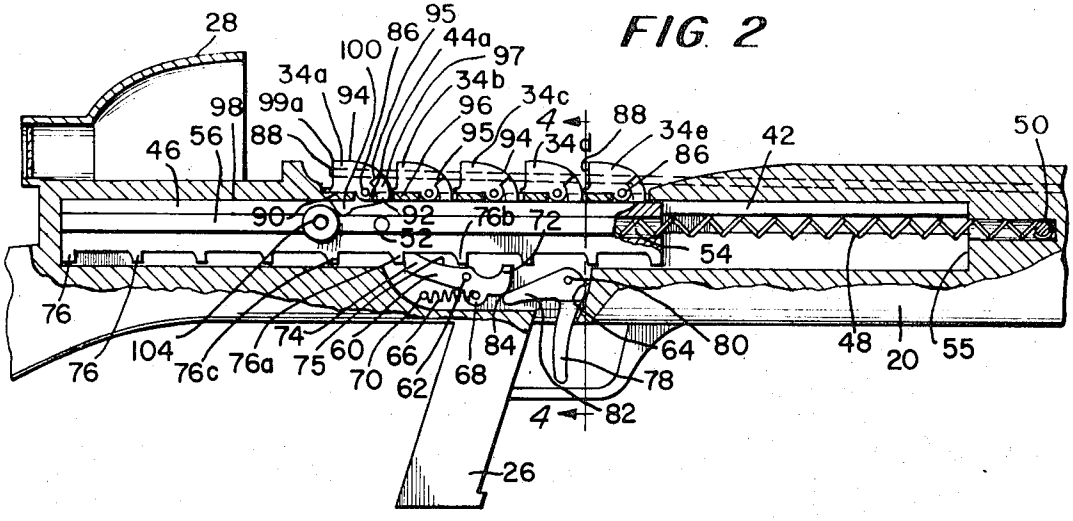



FIG. 3

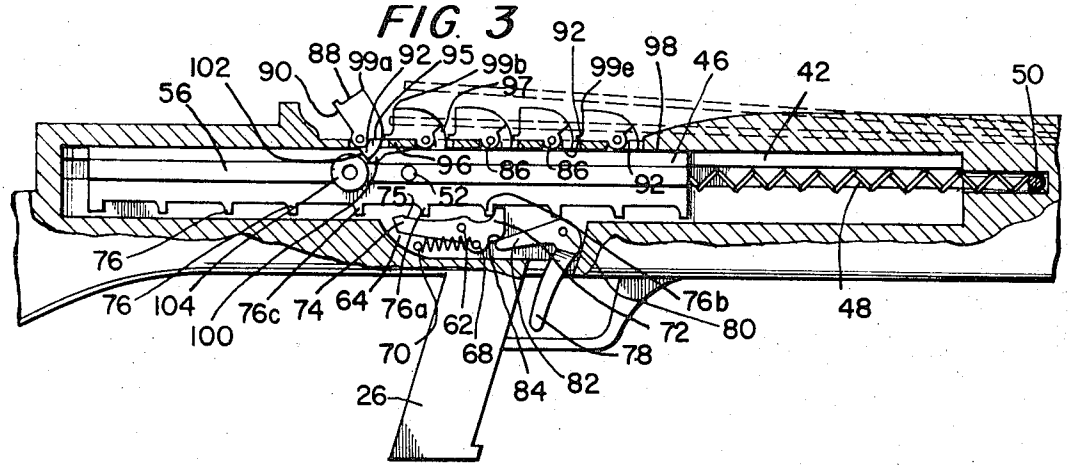


FIG. 4

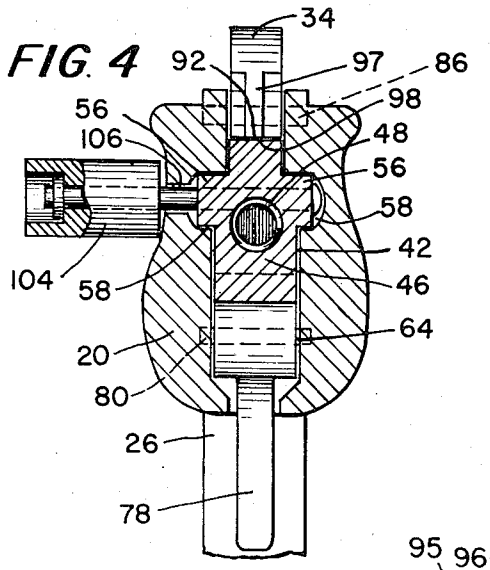



FIG. 8

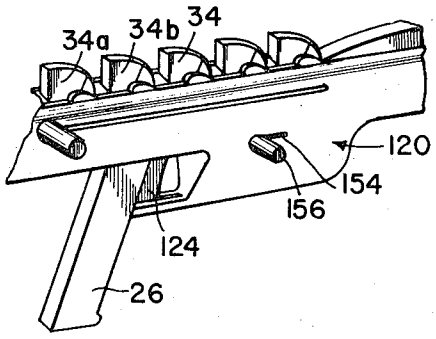



FIG. 6

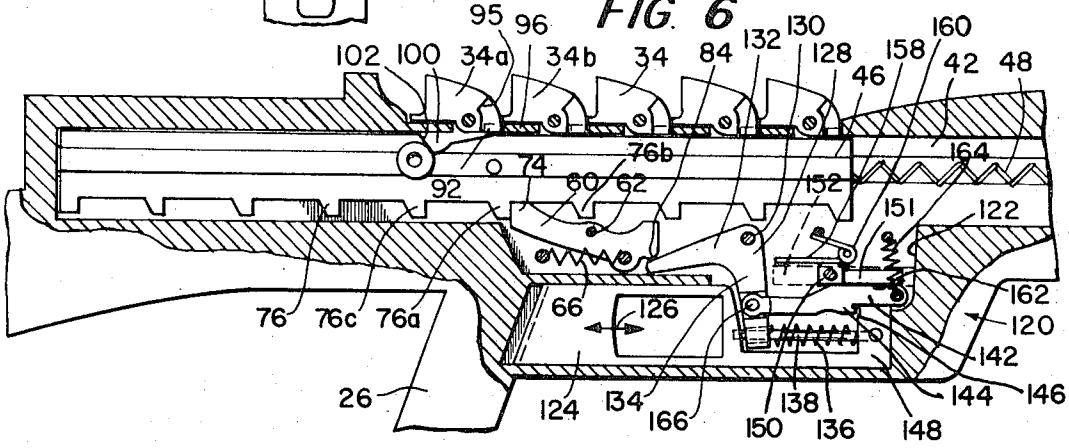



FIG. 7

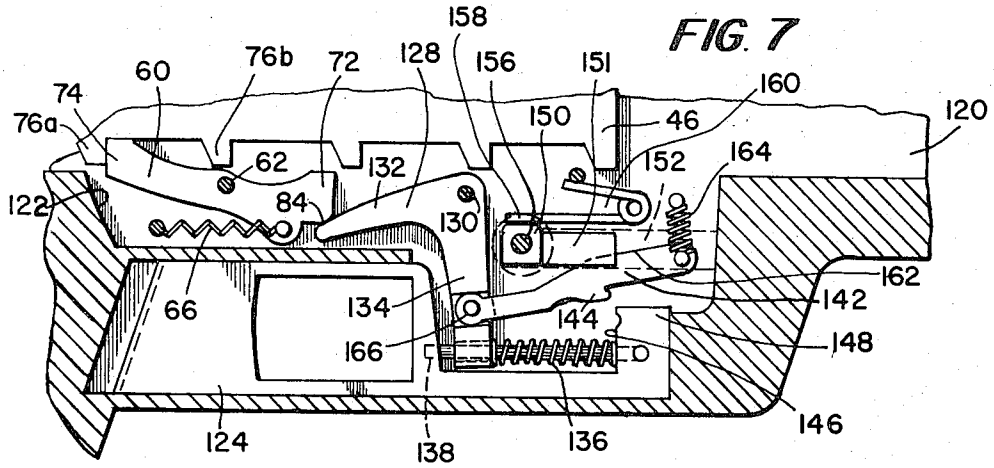


FIG. 9

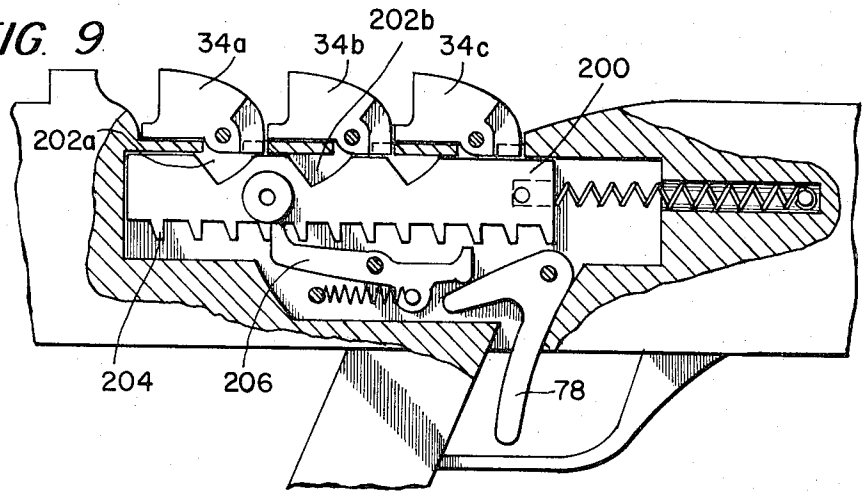
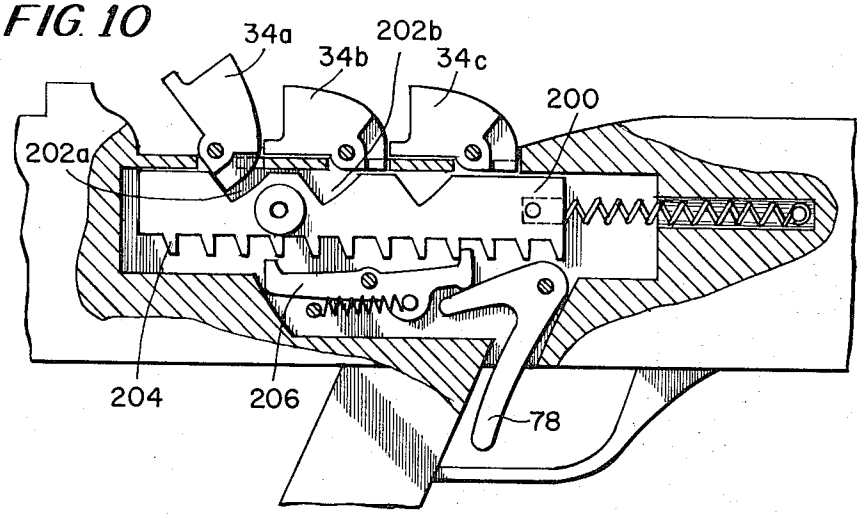

34a
34b
202b
34c
200
202a
204
206
78

FIG. 10


34a
34b
202b
34c
200
202a
204
206
78

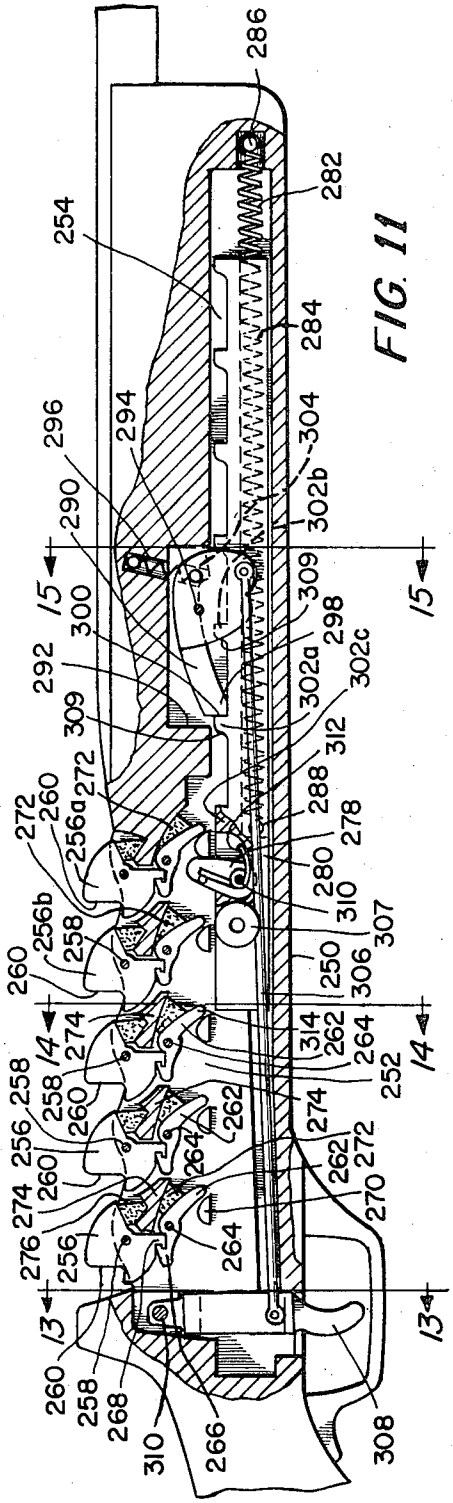


FIG. 11

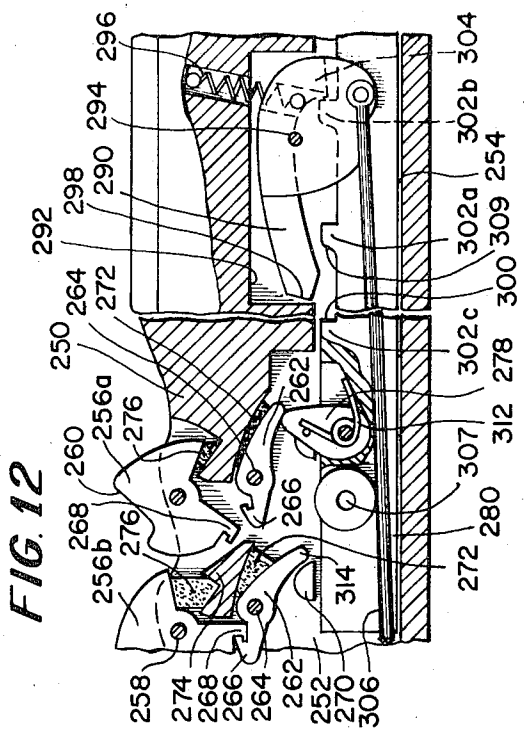


FIG. 12

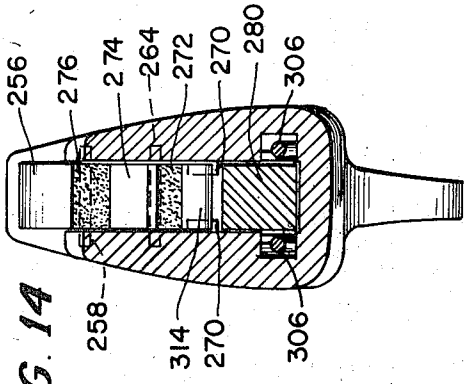


FIG. 14

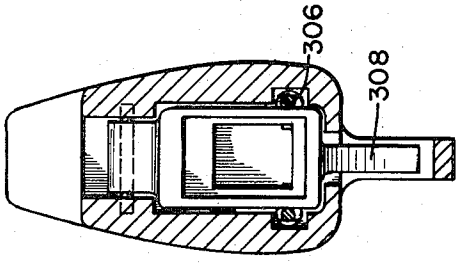


FIG. 13

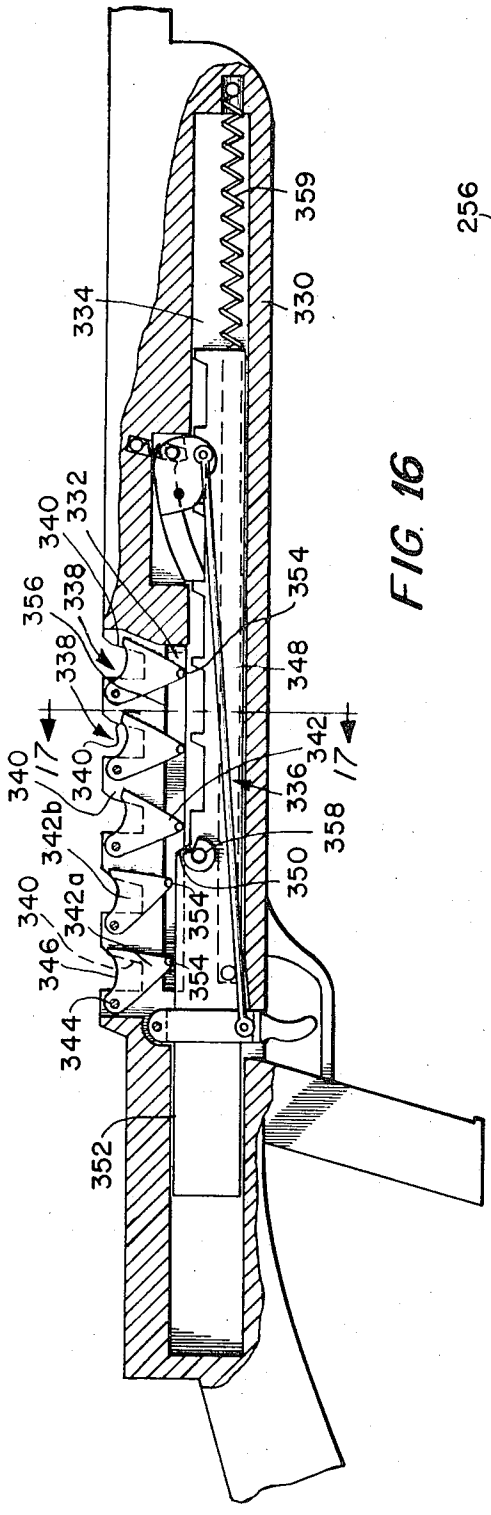



FIG. 16

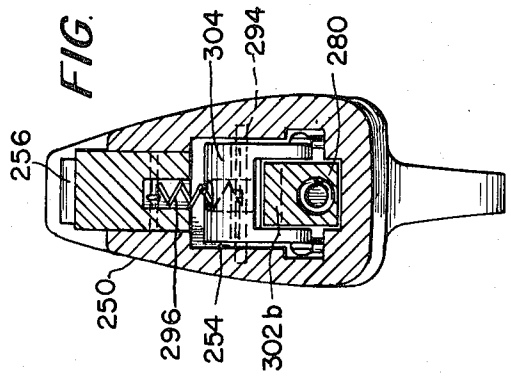



FIG. 15

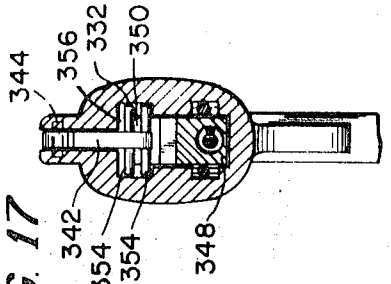



FIG. 17

# ELASTIC BAND GUN

## INTRODUCTION

The invention relates to toy guns and more particularly comprises new and improved means for shooting elastic bands. The embodiments of this invention, particularly as shown in the drawings, are designed to shoot elastic bands which are significantly larger than the ordinary household or office variety. The bands which typically may be three-eighths inch wide and 12 inches in circumference (relaxed) provide substantially greater range and accuracy than the smaller variety commonly used. It is to be understood however, that this invention is suitable for use with bands of all sizes.

## BACKGROUND OF THE INVENTION

The prior art contains a variety of elastic band guns, many of which are designed to hold and sequentially discharge a plurality of bands. One such device found in the prior art employs a number of parallel mounted, rotational-type releasing members. Elastic band guns of that design have several disadvantages. For example, they are difficult to load. Another variety of elastic band gun found in the prior art employs a braid under the band. Those guns are inconvenient to load, require considerable force to fire, and do not accurately simulate real fire arms. Yet another variety of elastic band gun found in the prior art utilizes a camming action for discharging the bands. These devices require that the most rearwardly located elastic band be loaded first, then the next most rearwardly one, etc. This makes the loading of several larger size elastic bands impractical.

None of the prior art devices known to applicant include means which allow them to be readily changed between fully automatic and semi-automatic operation, they have problems of user safety, especially when aiming a shoulder type model, and they provide no indication of operation, either visual or audible, when used without being loaded with elastic bands.

## OBJECTS OF THE INVENTION

The object of this invention is to provide an improved elastic band gun for holding and discharging a plurality of elastic bands, and which includes

a. Elastic band releasing members which are serially located from front to back on the stock, and which can be loaded with elastic bands one by one in a sequence away from the front of the barrel. This allows each newly loaded band to rest on the top of all those which have been previously loaded;
b. A visual and audible indication of firing whether the gun is used when loaded or not;
c. Means for readily changing between semi-automatic and fully automatic modes of use;
d. No braids or other similar devices associated with band discharge;
e. A triggering device that may be actuated with nominal trigger pressure even when using large elastic bands;
f. Features which make its appearance and operation as analagous as possible to that of a real fire arm;
g. Maximum user safety features;
h. Reliability and convenience.



## SUMMARY OF THE INVENTION

To accomplish the foregoing objects, the elastic band guns of this invention generally include a plurality of pivotally mounted, rotating, lifting elastic band releasing members which are serially located along the top of the stock and which are loaded in the sequence front releaser to rear releaser. The separate releasing members are acted upon by an escapement-type trigger actuated sequencing system, which in turn includes a spring powered, manually cocked, axially movable shaft that gives both an auditory and a visual indication of operation. In the preferred form of this invention the gun includes provision for convenient optional mode selection between semi-automatic and fully-automatic operation. A combination safety shield and sighting device mounted rearwardly of the releasers protects the user, especially when aiming a shoulder type model.

## BRIEF FIGURE DESCRIPTION

FIG. 1 is a perspective view of one embodiment of elastic band gun constructed in accordance with this invention;

FIG. 2 is a vertical section through the gun of FIG. 1;

FIG. 3 is similar to FIG. 2 but showing the mechanism in an actuated condition and with the shield and safety device omitted;

FIG. 4 is a cross-sectional view taken along the section line 4—4 of FIG. 2;

FIG. 5 is a fragmentary perspective view of the gun of FIG. 1 with one releaser removed;

FIG. 6 is a fragmentary vertical section through another embodiment of this invention capable of either semi-automatic or fully automatic operation and in the semi-automatic mode;

FIG. 7 is a fragmentary section of the gun of FIG. 6 with the mechanism in the fully automatic mode;

FIG. 8 is a fragmentary perspective view of the gun shown in FIGS. 6 and 7;

FIG. 9 is a fragmentary cross-sectional view of another embodiment of this invention;

FIG. 10 is a fragmentary cross-sectional view similar to FIG. 9 but showing the mechanism in the actuated condition;

FIG. 11 is a fragmentary cross-sectional view of yet another embodiment of this invention;

FIG. 12 is a fragmentary view similar to FIG. 11 showing the mechanism in an actuated condition;

FIGS. 13–15 are cross-sectional views taken along the corresponding section lines in FIG. 11;

FIG. 16 is a fragmentary cross-sectional view of still another embodiment of this invention; and

FIG. 17 is a cross-sectional view taken along section line 17—17 of FIG. 16.

## DETAILED DESCRIPTION

The elastic band gun shown in FIGS. 1–5 includes a stock 20, barrel 22, butt 24, grip 26, combination sight and safety shield 28 and the following visible members of the elastic band releasing mechanism; a manual retraction knob 104, which is used to cock the gun, multiple releasing members 34*a*–34*e*, and a trigger 78. While the embodiment shown is designed as a semi-automatic device for sequentially discharging five elastic bands, it is to be understood that either fewer or more releasers may be accommodated with equal facility.

In order to load the gun the manual retraction knob **104** is pulled back to the limit of the slot **106** in the side of the gun body as shown in FIG. **1.** Next multiple elastic bands are loaded by placing them one by one, over the rounded notch **32** at the end of the barrel and then pulling them back until they can be placed on the elastic seating faces **88** of the first unoccupied rotating releaser. The loading sequence is thus from the front releasing member **34***e* to the rear releasing member **34***a*. Less than five elastic bands may be loaded, and reloading of empty releasers may be accomplished with equal ease whether or not all bands have been expelled.

In FIGS. **2–5** the elastic band releasing mechanism is shown in detail. The stock **20** is formed with an elongated channel **42** with openings along the top **44** (FIG. **5**) which register with the forward portions of the releasing members **34.** The operating mechanisms are enclosed within this channel **42** and within the well **64.**

The axial motion of a shaft **46,** which has been previously manually cocked, acts to directly control the sequential operation of each of the five releasers **34***a*–**34***e* mounted in the openings **44***a*–**44***e*. Shaft **46** is spring biased to a forward position in channel **42** by coil spring **48** anchored at its front end to stock **20** by pin **50** and at its rear end to the shaft itself by pin **52.** A central shaft cavity **54** extends from pin **52** to the front end of shaft **46** and houses the spring **48** concentrically with the shaft and channel **42** in the stock. Relatively little force is required to pull the shaft forward, whether or not the gun is loaded. This is an advantage since it reduces the force required to pull the trigger and the subsequent impact of the shaft during operation. A shaft stop **55** provides a firm limit for the shaft when it has completed its travel.

A pair of runners **56** (see FIG. **4**) are secured to the sides of shaft **46** and travel in grooves **58** formed in the sides of channel **42** to precisely guide movement of shaft **46** in the channel. Referring again to FIG. **2,** teeth **76** on the bottom of the shaft provide surfaces upon which a sear **60** can act to control the sequencing of the shaft.

Sear **60** is pivotally supported by pin **62** in well **64** provided in the bottom of channel **42** above grip **26.** The sear is biased to the position shown in FIG. **2** by means of spring **66** secured at one end to ear **68** of the sear and at the other end to pin **70** mounted in well **64.** The sear includes front and rear posts **72** and **74** that extend upwardly from the sear body and cooperate with the several teeth **76** spaced along the bottom of shaft **46** to control shaft movement. In the position of FIG. **2** post **74** engages the leading edge of tooth **76***a*, to limit travel of shaft **46** under the influence of spring **48.**

Trigger **78** pivotally supported in well **64** by pin **80** carries a finger **82** positioned to engage the cam surface **84** of the sear and pivot it about its support **62** so as to drop rear post **74** and elevate front post **72,** as shown in FIG. **3.** When this occurs, post **72** is positioned to engage the leading edge of tooth **76***b* next in front of the tooth engaged by the post **74.** Consequently, when post **74** releases tooth **76***a*, shaft **46** moves forwardly a short distance until it is stopped by engagement of next forward tooth **76***b* by post **72.** When the trigger is released, the sear under the influence of spring **66** returns to the position shown in FIG. **2,** and its post **74** engages tooth **76***c* next in sequence behind tooth **76***a*, and the trigger **78** is returned to its normal position. Thus, with each actuation and release of trigger **78,** shaft **46** is allowed to move a single step as defined by the center to center distance between adjacent teeth **76.**

Shaft **46,** as indicated above, directly controls the movement of each of the releasers **34.** Each releaser **34** is pivotally supported on a pin **86** that spans its respective opening **44** at the top of the stock and includes a band supporting, substantially vertical surface **88,** lower rear horizontal surface **90,** lower front horizontal surface **92,** front arcuate upper surface **94** and slanting surfaces **95.** The front portion **97** of each releaser is narrower than the remainder of the releaser and fits in a slot **101** in the opening **44.** Counterclockwise rotation of each releaser **34** is limited by contact of rear lower surface **90** with the plates **96,** which are part of the stock and span the top of the gun. In the position as shown in FIG. **2** the surface **88** is oriented vertically and is in a position to support an elastic band stretched between the releaser and front end **32** of the barrel. Each of the releasers **34** is normally prevented from turning clockwise by the upper surface **98** of shaft **46.**

Notch **100** formed in the upper shaft surface allows each of the releasers to rotate in a clockwise direction as shown in FIG. **3** when placed in registration with their lower forward horizontal surfaces **92.** That is, when notch **100** aligns itself with the surface **92** of a releaser, the releaser rotates in a clockwise direction under the force of the elastic band supported on it, and the band is released by the retaining surface **88** of the releaser and projected over the tops of any subsequent releasers **34***b*–**34***e* and off the end of the barrel **32.** This is accomplished by placing the releaser lip **99***a* to the rear of the center of rotation thus resulting in a lifting action which causes bands to be released above the lips **99***b*–**99***e* of the subsequent "locked" releasers **34***b*–**34***e*. This is suggested by the broken line showing of the bands in FIG. **3.**

Upon release clockwise rotation of each releaser is limited by engagement of surface **92** with the rear side **102** of notch **100** and/or by the engagement of the releaser surfaces **95** with the top of the plate **96.** The impact caused by these connections also promotes discharge.

It will be appreciated from the foregoing description that as shaft **46** moves forward step by step under the influence of spring **48** and control of sear **60,** the notch **100** successively registers with the individual releasers, and the releasers in sequence are allowed to rotate clockwise and expel their bands.

It will be noted in FIG. **3** that the separate releasers **34** are free to rotate only during the time that the trigger **78** is depressed. During the period when the shaft moves from the position of FIG. **2** to the position of FIG. **3,** releaser **34a** is allowed to move as shown and all others **34***b*–**34***e* are fixed in place. When the trigger **78** is released, the sear **60** returns to the position shown in FIG. **2** and shaft **46** moves forwardly until rear post **74** of the sear engages tooth **76***c*. The additional forward travel of the shaft from the position shown in FIG. **3** causes rear edge **102** of the notch to rotate the releaser **34***a* in a counterclockwise direction. The releaser actually tends to return to the normal position of FIG. **2** by the force of gravity when the gun is held in a conventional upright position. Motion of the shaft after release of the trigger assures that the normal position is reassumed. These actions, except for the rota-

tion of the releasers, occur whether or not the gun is loaded and generate an appealing mechanical sound. Also since the discharging action is relatively independent of loading any size or type of elastic band may be used. The shape of the notch 100 is such that the right amount of rotation is allowed while at the same time greatly reducing the probability of jamming during manual retraction of the support removal shaft.

It will be noted in the drawings that the several teeth 76 formed along the bottom of shaft 46 have substantially vertical front faces to bear firmly against teeth 72 and 74 of sear 60. The rear faces of the teeth, however, are rounded and cooperate with the canted front face 75 of post 74 to allow easy retraction of the shaft under the pull of handle 104 when the gun is being recocked.

The handle 104 enables the user to cock the gun by drawing the shaft rearwardly in the stock so as to position the notch 100 rearwardly of the releaser 34*a*, or others, in preparation for loading with elastic bands and then successive actuation of the loaded releasers 34.

The combination sight and safety shield 28 mounted on the rear of the stock is axially aligned with the several releasers 34 and serves a very important function. Safety of course is a paramount concern of all manufacturers of toys and recreational devices. The most critical danger with elastic band guns is that of eye injury especially if an elastic band breaks and flies rearwardly during aiming. The combination sight and shield provides maximum safety for the eyes and at the same time does not impede easy loading or convenient use of the gun.

The shield basically is composed of two sections, a rearwardly tapered cone section 108 and a sighting cylindrical section 110. The cone-shaped section 108 is positioned so that it will capture any backward flying band which is accidentally or otherwise released from the front end 32 of the barrel. The rear cylindrical section 110 is preferably closed by a non-breakable transparent material 112 such as Lexan, which may in turn be provided with a cross-hair 114. It is apparent from an examination of the drawings that a rearwardly released elastic band will be trapped in the cone-shaped shield 28 so as to fully protect the person using the gun.

The shield may be either an integral part of the gun body or a separate fixed or moveable component. It is applicable to elastic band guns in general.

The various components of the gun may typically be injection molded using a variety of possible plastics which are particularly suited due to their properties of high resistance to shear and wear, self-lubricating ability, impact resistance, dimensional stability, moldability, etc. The use of two parallel rows of rotating releasers is also envisaged whereby either two elastic bands are discharged simultaneously or where provision is made for single discharges by means of reducing the shaft travel per trigger pull.

The elastic band gun shown and described in connection with FIGS. 1–5 is a semi-automatic device, which is manually loaded with a number of elastic bands, each of which may be successively discharged by repeated actuations of the trigger. The gun does not include means which enable it to operate as a fully automatic device. The embodiment of FIGS. 6–8 includes means for selectively using the gun either in a fully automatic or a semi-automatic mode.

In the embodiment of FIGS. 6–8 the stock 120 is basically unchanged from the stock 20 of the embodiment in FIGS. 1–5, except for an enlargement of the well which accommodates the trigger mechanism, sear etc. The releasers 34, shaft 46, shaft spring 48, sear 60 and sear spring 66 are identical to the parts bearing like numbers in the first embodiment and need not be described again. The two principle differences from the first embodiment involve the operation of the sear and its relationship to the trigger mechanism, and the shape and location of the notch located on the top of the shaft. The operation of these parts are described in detail below.

Stock 120 is provided with a well 122 which houses a sliding finger operated trigger 124 movable back and forth in the well as suggested by arrow 126. Appropriate guides and restraints, (not shown) are provided in well 122 to confine motion of trigger 124 to the translational motion indicated by the arrow. Unlike the first embodiment, trigger 124 of this embodiment does not act directly upon the sear 60, but rather trigger 124 and sear 60 are interconnected by means of the intermediate trigger lever 128 pivotally supported on a pin 130 which spans well 122. The rearwardly extending arm 132 of lever 128 engages the cam surface 84 of sear 60 in the manner of arm 82 of the trigger in the first embodiment, and when lever 128 pivots clockwise from the position of FIG. 6, sear 60 pivots in a counterclockwise direction about its axis 62 so as to cause rear post 74 to release the tooth 76a which bears against it, in precisely the manner described previously. The downwardly extending arm 134 of intermediate trigger lever 128 is operatively connected to sliding trigger 124 either by means of coil spring 136 mounted on pin 138 positioned between forward post 148 and the main body of the trigger 124 or by a trigger latching member 142.

Trigger latching member 142 is pivotally supported on arm 134 of lever 128 by pin 166 and is provided with a hook 144 adapted to engage the rear surface 146 of forward post 148 of trigger 124 as shown in FIG. 6 when held in the position by mode selector engaging member 150. The mode selector mechanism consists of engaging member 150, with slides 151 on either side which ride within grooves 152 in the gun body; and a selector handle 156 which extends through a slot 154 in the stock. The continuous downward force of the arm 158 of the biasing spring 160 on the top of the engaging member 150 acts to maintain the mode selector member in whichever position it has been placed. The ends of the external slot 154 provide limits for the mode selector member. The selector handle 156 may readily be positioned by the operator to select the firing mode of the gun.

When the mode selector mechanism is positioned as shown in FIG. 6, held in place by spring 160, it bears against the upper surface 162 of trigger latching member 142 to hold the latching member in the position shown in FIG. 6, against the bias of spring 164 which constantly urges the latching member to pivot counterclockwise about pin 166 on the arm 134 of intermediate lever 128. When mode selector member 150 is disposed in the position shown in FIG. 7 the trigger latching member 142 is released to the influence of spring 164 and thereby moves to the elevated position shown

in FIG. 7 so as not to engage forward post 148 of trigger 124.

When the trigger latching member is positioned as shown in FIG. 6 a solid mechanical link exists between trigger 124 and sear 60. It is evident that a rearward pull on trigger 124 (in the direction of grip 26) causes trigger latching member 142 to pivot the intermediate trigger lever 128 clockwise so as to pivot sear 60 counterclockwise and cause its rear post 74 to release tooth 76*a* and shaft 46 bearing against it, just as in the manner described in connection with the embodiment of FIGS. 1–5. Shaft 46 then moves forward under the influence of spring 48 thus permitting rotation of releaser 34*a* and release of the elastic band supported by it. When the trigger is released, the sear 60 is rotated clockwise by the action of its spring 66, which in turn rotates the intermediate trigger lever 128 counterclockwise thus returning it to the position shown in FIG. 6. This action places post 74 in the position to engage the front edge of the next tooth 76*c* on shaft 46. To discharge the next elastic band supported on releaser 34*b*, the trigger 124 must again be actuated.

In order to allow fully automatic operation the rear side 102 of notch 100 on top of the shaft 46 must be located a fraction of an inch more to the rear than in the embodiment of FIGS. 1–5. This results in the clockwise rotation of each releaser being limited only by engagement of the releaser surfaces 95 with the top plate 96 and not by engagement of the releaser surface 92 with the rear side 102 of the notch 100 as in the embodiment of FIGS. 1–5.

When the mode selector engaging member 150 is positioned as shown in FIG. 7, trigger 124 does not act directly upon the intermediate trigger lever 128, but rather lever 128 is actuated by spring 136 acting in compression. When spring 136 exerts sufficient force on arm 134 of the intermediate trigger lever to rotate it clockwise, sear 60 pivots counterclockwise and releases the tooth 76*a* engaged by its rear post 74. With the sear rotated out of position, shaft 46 is released to the influence of spring 48, and the next forward tooth 76*b* on the shaft in turn hits the forward post 72 of the sear, which forces the sear to rotate clockwise against the restraint of springs 66 and 136 and return temporarily to the position shown in FIG. 7. This action, which occurs before the rear side 102 of notch 100 contacts surface 92 of the rotated releaser, compresses spring 136, causing that spring in turn to pivot the sear 60 once again to move post 74 out of the way of next tooth 76*c*. This action is repeated until the shaft 46 is stopped in its forward travel by engagement with the front of chamber 42 in stock 20. Thus, prolonged retraction of trigger 124 toward grip 26 will cause shaft 46 to move successively forward thereby allowing each of the releasers 34 to sequentially discharge their separate elastic bands.

The modification of the invention shown in FIGS. 9 and 10 is also a semi-automatic system. The modification from that shown in FIGS. 1–5 lies in the notch arrangement on the shaft for releasing the several releasers. Namely there is a notch 202 for each releaser 34 rather than only one notch as previously. It is apparent that either fewer or more than three releaser-notch combinations may equally well be used.

Notch 202*a* is shown in FIG. 9 positioned so that the next actuation of trigger 78 will cause the notch to register with releaser 34*a* (see FIG. 10) and permit it to turn clockwise under the influence of the elastic band supported by it and discharge that band. The spacing of teeth 204 on the bottom of shaft 200 is such that sear 206 will not permit as much translation of shaft 200 during each cycle of firing as was permitted with the embodiments of FIGS. 1 and 6. When trigger 78 is again actuated, the notch 202*b* will register with releaser 34*b*, which will discharge its band.

Although the principal of operation is essentially the same as in the embodiments of FIGS. 1 and 6, the use of a plurality of notches, one for each releaser, shortens both the length of shaft 200 and its travel distance per discharge. Because the step length of each movement of the shaft 200 is shorter for each firing cycle than in the other embodiments, the impact on each shaft tooth 204 as it hits the sear is lessened. Consequently shaft 200 and sear 206 may be made of reduced thickness and/or somewhat lighter stock without increasing the likelihood of mechanism breakage.

This method of release is especially amenable to use with pistol type guns and is also convertible to fully automatic operation by methods similar to those previously described.

Yet another embodiment of this invention is shown in FIGS. 11-15. In this embodiment each releaser is provided with its own separate triggering device. Stock 250 in this embodiment is formed with a compartment 252, which communicates with a forwardly extending shaft chamber 254. A series of releasers 256 are each pivotally mounted on pins 258 that span the top of compartment 252, and each releaser has an elastic band retaining vertical surface 260 which cooperates with the front of the gun barrel (not shown) in the manner described in connection with the other embodiments to support an elastic band to be discharged by the gun.

Each releaser 256 has its individual triggering device 262, pivotally supported on a pin 264, that spans compartment 252 just below its releaser. The triggering device is in the form of a latch provided with a hook 266 for engaging the downwardly extending finger 268 of the releaser so as to lock the releasers in the position shown in FIG. 11, especially when force is applied to the releasers by the elastic bands stretched about them.

The triggering devices 262 are restrained against clockwise rotation by the stops 270 which extend inwardly from the sides of compartment 252 (see FIG. 14). Counterclockwise rotation of the individual triggering devices 262 is yieldably restrained by pillows 272 mounted beneath supports 274 that span the compartment between the releasers and triggering devices.

When the triggering device 262 is rotated counterclockwise against the restraint of the cushion 272 the mating contact between the latch 266 and the finger 268 is broken. This permits the respective releaser 256 to pivot clockwise under the influence of the elastic band supported on it so as to discharge the band. A second pillow 276 is mounted above each support 274, which yieldably resists clockwise rotation of the releaser. The resistance of that pillow to rotation of the releaser is overcome by the force exerted by the elastic band itself, but when the band is discharged, the pillow acts to return the releaser to the biased position shown in FIG. 11.

Triggering devices 262 are positioned in compartment 252 to be serially actuated by tongue 278 carried on shaft 280 which is slidably mounted in chamber 254. Shaft 280 is biased to a forward position in chamber 254 by spring 282 disposed in cavity 284 formed in the shaft, and the spring is connected at its front end to stock 250 by anchor 286 and at its rear end by anchor 288. Motion of shaft 280 under the influence of spring 282 is controlled by sear 290 mounted in cavity 292 in stock 250 and in communication with chamber 254.

Sear 290 is pivotally supported on pin 294 and is biased in a counterclockwise direction by spring 296. In FIG. 11 sear 290 is shown in the biased position wherein its rear edge 298 is in position to engage the front face 300 of each of the teeth 302 carried on the upper surface of shaft 280. Sear 290 carries a stop 304 adjacent its forward end, which is adapted to engage the front face of each tooth 302 when the sear 290 is pivoted, as shown in FIG. 12. The position of sear 290 is controlled by a pair of connecting rods 306 which extend rearwardly from the sear to trigger 308 which is pivotally supported by pin 310 in the rear of compartment 252. When the trigger is actuated it causes the sear 290 to pivot clockwise to release the particular tooth on the shaft engaged by sear rear edge 298, and shaft 280 moves forward in the chamber 254 until stop 304 on the sear engages the next forward tooth 302*b*. That is, when the sear as shown in FIG. 11 pivots clockwise and releases tooth 302*a*, shaft 280 moves forward until stop 304 engages tooth 302*b* as in FIG. 12. Release of the trigger 308 in turn allows spring 296 to return sear 290 to the position shown in FIG. 11, and the rear edge 298 of the sear is once again positioned to engage the next tooth in series 302*c*.

In use, the gun shown in FIGS. 11–15 operates as a semi-automatic device. The gun is cocked by retracting the shaft 280 rearwardly by means of handle 307 which extends through the stock. As the shaft 280 is drawn rearwardly sear 290 rides up the inclined rear face 309 of each tooth 302, and tongue 278 pivots clockwise on its pin 310 against the bias of spring 312 as the tongue passes beneath the lower end 314 of each triggering device 262. The shaft is retracted to a position wherein tongue 278 lies rearwardly of the rearwardmost releasing device 262.

Elastic bands are loaded in the same fashion as in the previous embodiments with the first band being stretched between the front end of the barrel and the forwardmost releaser 256*a*. The next band is stretched over the first band between the front end of the barrel and the second releaser 256*b*, and the succeeding bands are applied the same way.

As a semi-automatic gun, each actuation of the trigger will cause sear 290 to move from the position shown in FIG. 11 to that of FIG. 12, and tongue 278 will push one releasing device 262 counterclockwise so as to free the releaser 256 which works with it. When the trigger 308 is released, the sear 290 returns to the position shown in FIG. 11 and engages the next rearward tooth in series. This sequence is repeated until all of the bands are discharged. It will be evident that the embodiment of FIGS. 11–15 can be converted to a fully automatic device by the techniques shown in the embodiment of FIGS. 6–8.

In the embodiment of FIGS. 11–15, a releaser is free only during the time the mechanism is in the position shown in FIG. 12. At other periods, all of the releasers are locked by their releasing devices. If any releaser fails to lock during retraction of the shaft, it can easily be locked manually by pushing it to the biased position shown in FIG. 11, assisted by its pillow 276.

The embodiment of FIGS. 16 and 17 differs from the previously described embodiments in the manner in which band discharge is effected. In each of the other embodiments, the bands are retained in the loaded position directly upon releasers which are pivotally mounted on the stock. When the releasers are allowed to pivot under the influence of the force applied by the bands themselves, the bands are discharged. In this embodiment, the bands are retained in place in fixed notches formed directly in the gun stock, and individual scrapers are provided to lift the bands out of the notches.

In FIG. 16, stock 330 is shown having a well 332 which communicates with a forwardly extending chamber 334 that houses shaft-sear assembly 336. The assembly 336 is substantially the same as found in the embodiment of FIGS. 11–15. The particular spring used to move the shaft may be somewhat heavier than required in the embodiment of FIGS. 11–15.

A number of notches 338 are formed in the top of the stock in communication with well 332, and each slot includes a slightly sloped band retaining surface 340 to support bands stretched between the front end of the barrel (not shown) and its notch. Separate scrapers 342 are mounted beneath each notch in well 332, and each is pivotally supported on its own pin 344 that spans the well. Each scraper has a cup shaped face 346 positioned to engage the band mounted in its cooperating notch so as to lift and scrape the band off surface 340. This arrangement is evident in FIG. 16 wherein scrapers 342*a* and 342*b* have been pivoted to their band releasing position while the remaining lifters are in their retracted position so as not to discharge the bands which are retained in their respective notches.

Shaft 348 of the shaft-sear assembly 336 is formed with a shoulder 350 and a raised surface 352 oriented to engage the bottom of each scraper 342 and support them in the position of scrapers 342*a* and 342*b* as the shoulder moves along the well 332.

Each scraper is provided with a horizontal stop 354 at its bottom, positioned to engage the upper margin 356 of well 332 to limit the counterclockwise rotation of the scrapers. It is evident that as the shaft moves forward, all scrapers disposed rearwardly of shoulder 350 are maintained in the elevated (band releasing) position until the shaft is manually retracted by its handle 358 in the manner described in connection with the other embodiments. It is evident that springs may be optionally used in connection with each of the scrapers to retain them in their retracted position.

The spring 359 used to actuate shaft 348 may be somewhat heavier than that required in the embodiment of FIGS. 11–15, since the shaft spring itself is the primary force which lifts the individual scrapers to force the bands out of the notches 338, and the force required for that purpose is considerable.

It should be appreciated that the construction of FIGS. 16–17 may be converted to a fully automatic unit by employing the principals of the embodiment shown in FIGS. 6–8.

The embodiments shown are especially designed for use with rubber bands which are somewhat heavier than the household or office variety of elastic in com-

mon use. However, it is to be understood that no limitation as to elastic material or band size is intended. Typically the bands fired by the guns of this invention may be three-eighths inch wide and approximately 12 inches in circumference (relaxed).

In all of the embodiments shown, the releasers are controlled by an escapement-type sequencing system, which discharges the rearmost band first and subsequently those in front of it in sequence. In the embodiments of FIGS. 1, 6, 9 and 11 the releasers are pivotally mounted and when actuated they are either directly or indirectly released by the escapement-type sequencing system, which then allows the releasers to pivot and discharge the bands. In the embodiment of FIG. 16 the bands are retained in notches formed in the stock, and scrapers (or lifters) are employed to elevate the rear of each band from its notch so as to free the band for firing.

In each embodiment the bands are stretched on the body and no unusual posts or projections are employed to support the bands, which would give an unnatural appearance to the gun. In each of the embodiments shown the shaft of the escapement-type sequencing system is powered by means of a spring. The same function could, however, be equally well accomplished by pneumatic means. In either case it will be appreciated that as the shaft moves forward to trigger the various releasers, an audible sound will be emitted which simulates a regular weapon. That is, the gun will issue a report to simulate the actual discharge of a firearm. Each of the embodiments shown is insensitive to orientation of the gun. That is, they work equally as well upside down, pointed upward or downward as in their normal positions.

From the foregoing description those skilled in the art will appreciate that numerous modifications may be made of this invention without departing from its spirit. Therefore, it is not intended to limit the breadth of this invention to any of the specific embodiments illustrated and described. Rather, it is intended that the scope of this invention be determined by the appended claims and their equivalents.

What is claimed is:

1. An elastic band gun comprising

a body,

means on the body for releasably retaining one end of a plurality of stretched elastic bands,

a plurality of independently pivotally operative band retaining and releasing assemblies disposed rearwardly of the first recited means and oriented in a row extending front to back on said body, each of said assemblies being constructed and arranged to retain the other end of an elastic band stretched between it and the first recited means, and release said band upon actuation by an actuating means for discharging the band beyond the one end,

and an actuating means mounted on said body for sequentially actuating said independently pivotable assemblies to permit said pivotal assemblies to release or retain stretched elastic bands, said actuating means including an axially reciprocative shaft and spring means, said spring means being separate from the elastic bands and being operative to bias said shaft to selected positions to cause the shaft to disengage or engage the assemblies to, respectively, release or retain stretched elastic bands held on the assemblies,

and a manually operated sequencing means operative to permit sequencing movements of the shaft by engaging or disengaging the shaft while the latter is being biased by the spring means.

2. An elastic band gun as described in claim 1 further characterized by

teeth provided on the shaft, and

said manually operated sequencing means including a shaft restraining and releasing member pivotally mounted on the body which cooperates with the teeth on said shaft, and a trigger operatively connected to the shaft restraining and releasing member.

3. An elastic band gun as described in claim 2 further characterized by

an adjustable linkage means interconnecting the trigger and the shaft restraining and releasing member for selectively connecting the trigger and the shaft restraining and releasing member causing the shaft with a single pull of the trigger to actuate one or multiple band retaining and releasing assemblies for semi-automatic or fully automatic operation of the gun.

4. An elastic band gun as described in claim 1 further characterized by said reciprocative shaft having an assembly supporting surface,

said retaining and releasing assemblies being pivotally mounted releasers which are supported in the band retaining position by said supporting surface on said reciprocative shaft,

said supporting surface further having an interruption which sequentially aligns with the forward portion of said releasers upon movement of the reciprocative shaft under the action of said spring means for discontinuing said support of said releasers thus permitting the pivotal discharge of any of the bands retained on said releasers.

5. An elastic band gun as described in claim 1 further characterized by said reciprocative shaft having an assembly supporting surface,

said retaining and releasing assemblies being pivotally mounted releasers which are supported in the band retaining position by said supporting surface on said reciprocative shaft,

said supporting surface further having a plurality of interruptions, one for each releaser, which become sequentially aligned with the forward portion of their respective releasers upon movement of the reciprocative shaft under the action of said spring means for discontinuing said support of said releasers thus permitting the pivotal discharge of any of the bands retained on said releasers.

6. An elastic band gun as described in claim 1 further characterized by

said retaining and releasing assemblies including pivotally mounted releasers and pivotally mounted triggering devices, one for each releaser, said triggering devices latchingly engaging said releasers to maintain said releasers in a band retaining position,

movement of said reciprocative shaft under the action of the spring means acting to sequentially trip said triggering devices out of latching engagement with said releasers thus permitting the discharge of any of the bands retained on said releasers.

7. An elastic band gun as described in claim 1 further characterized by

said retaining and releasing assemblies including a plurality of notches on the body for retaining the back ends of stretched elastic bands, and separate pivotally mounted scraping means on the body associated with each of the notches for sequentially lifting the back ends of any retained elastic bands out of their respective notches when said pivotally mounted scraping means are actuated by movement of said reciprocative shaft under the action of said spring means thus discharging said bands.

8. An elastic band gun comprising
a body,
means on the body for releasably retaining one end of a plurality of stretched elastic bands,
a plurality of pivotally mounted elastic band releasing means for releasably retaining stretched elastic bands, said releasing means being disposed rearwardly of the first recited means and oriented in a row extending from front to back on said body, each of said releasing means retaining one end of one of said elastic bands stretched between it and the first recited means, and upon release being pivotally operative to release said one end of one of said bands
and a movable member on the body, said movable member having a means over a substantial length of the movable member for supporting the releasing means in stretched band retaining positions, and supporting means having a means intermediate the ends of the movable member for permitting selective releasing and pivoting of each of the releasing means as the movable member is moved along the body in a stepwise manner, and the pivoting of each of said releasing means permitting the release of a stretched elastic band,
said supporting means supporting each releasing means in its stretched band retaining position at all times except when the releasing means support is discontinued at a particular associated releasing means thereby singularly permitting that releasing means to pivotally release its retained elastic band.

9. An elastic band gun comprising
a body,
means on the body for releasably retaining one end of a plurality of stretched elastic bands,
a plurality of pivotally mounted releasers mounted on the body oriented in a row from front to back on said body, said releasers each being constructed and arranged to retain the other end of an elastic band stretched between it and the first recited means, and upon release to pivotally discharge said band at a level generally above that of the tops of any forwardly located unreleased releasers,
and an axially movable member on the body having a surface for selectively supporting the releasers in the band retaining position,
said movable member being positioned within a groove in the gun body,
said movable member further having opposite surfaces engaging corresponding surfaces of the groove to support said movable member during its axial movement in said body, and
an actuating means on the body spaced from the movable member and confined to a region substantially beneath the releasers for permitting travel of the movable member.

10. An elastic band gun comprising
a body,
first means on the body for releasably retaining one end of a plurality of stretched elastic bands,
plurality of second disposed rearwardly the first recited means and oriented in a row extending front to back on said body for retaining and independently pivotally releasing the other ends of said stretched elastic bands upon actuation for discharging each band beyond the first means,
a manually retractable reciprocative shaft which operates during a movement in a forward direction to sequentially actuate each of said second means to discharge any retained bands in the order back to front, and said shaft in its fully retracted position underlying said second means and preventing actuation thereof
and a third means for biasing each of said second means which is not loaded with an elastic band stretched between said second means and the first means, when the gun is in a generally upright, horizontal position, to a band retaining position when the shaft is under the second means or when the shaft is not under the second means to enable the unfettered rearward retraction of said shaft underneath the second means.

11. An elastic band gun as described in claim 10 further characterized by
said second means including releasers each mounted on a pin extending transversely of the body,
said shaft having a supporting means for selectively supporting the releasers in a band retaining position and discontinuing said support to permit release of the bands by pivoting of the releasers under the force of any bands impressed on said releasers,
said releasers each having a portion located forward of its pin axis, which portion is supported by the supporting means whenever that releaser is being maintained in a band retaining position,
each of said releasers further having its center of gravity located rearwardly of its pin axis whenever each of the releasers is in a band retaining position and the gun is in a generally upright, horizontal position.

12. An elastic band gun as described in claim 10 further characterized by
said second means including releasers each mounted on a pin extending transversely of the body,
said shaft having a supporting means for selectively supporting the releasers in a band retaining position,
said supporting means having an interruption for discontinuing said support to permit release of the bands by pivoting of the releasers under the force of any bands retained on said releasers,
said releasers each having a portion located forward of its pin axis, which portion is supported by the supporting means whenever that releaser is being maintained in a band retaining position,
said interruption having a slanted forward surface which during the retraction of the shaft acts in cooperation with said forward portion of a releaser to restore that releaser to a band retaining position should that releaser become partially rotated out of a band retaining position during retraction of the shaft.

13. An elastic band gun comprising
a body simulating in form a shoulder firearm,
means on the body for releasably retaining one end of a plurality of stretched elastic bands,
a plurality of spaced apart means disposed rearwardly of the first recited means and oriented in a row extending front to back on said body for individually retaining the other end of an elastic band stretched between it and the first recited means and for releasing a stretched band,
a safety shield disposed generally to the rear of said spaced apart means, said shield having openings in the front and rear, said front opening being spaced from and substantially larger than the rear opening, said openings being aligned to allow sighting on a target objective through the openings in the shield, over the tops of said spaced apart means and along the top of said body,
said front opening of said shield having edges extending beyond both sides of the gun and above the gun to at least partially arrest a band discharged rearwardly along the body,
said shield being of such length that no portion of a band in part arrested by the front opening can reach the facial area of a user who is sighting through said shield in a conventional manner.

14. An elastic band gun as described in claim 13 further characterized by
a transparent panel closing the rear opening of said shield.

15. An elastic band gun comprising
a body,
means on the body for releasably retaining one end of a plurality of stretched elastic bands,
a plurality of pivotally mounted releasers each mounted on a pin extending transversely of the body and disposed rearwardly of the first recited means and oriented in a row extending front to back on said body, each of said releasers retaining the other end of an elastic band stretched between it and the first recited means, and upon release to pivotally discharge said band beyond the one end,
and a movable member on the body having a supporting surface for selectively supporting the releasers in the band retaining position and discontinuing said support to release the releasers to the force of any bands retained on said releasers,
said releasers each having a portion located forward of its pin axis, which portion is supported by the supporting surface whenever that releaser is being maintained in the band retaining position,
each of said releasers further having means which upon the rotation of said releasers to discharge a stretched elastic band contacts the top surface of the gun body to limit the rotation of said releasers on their pins.

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