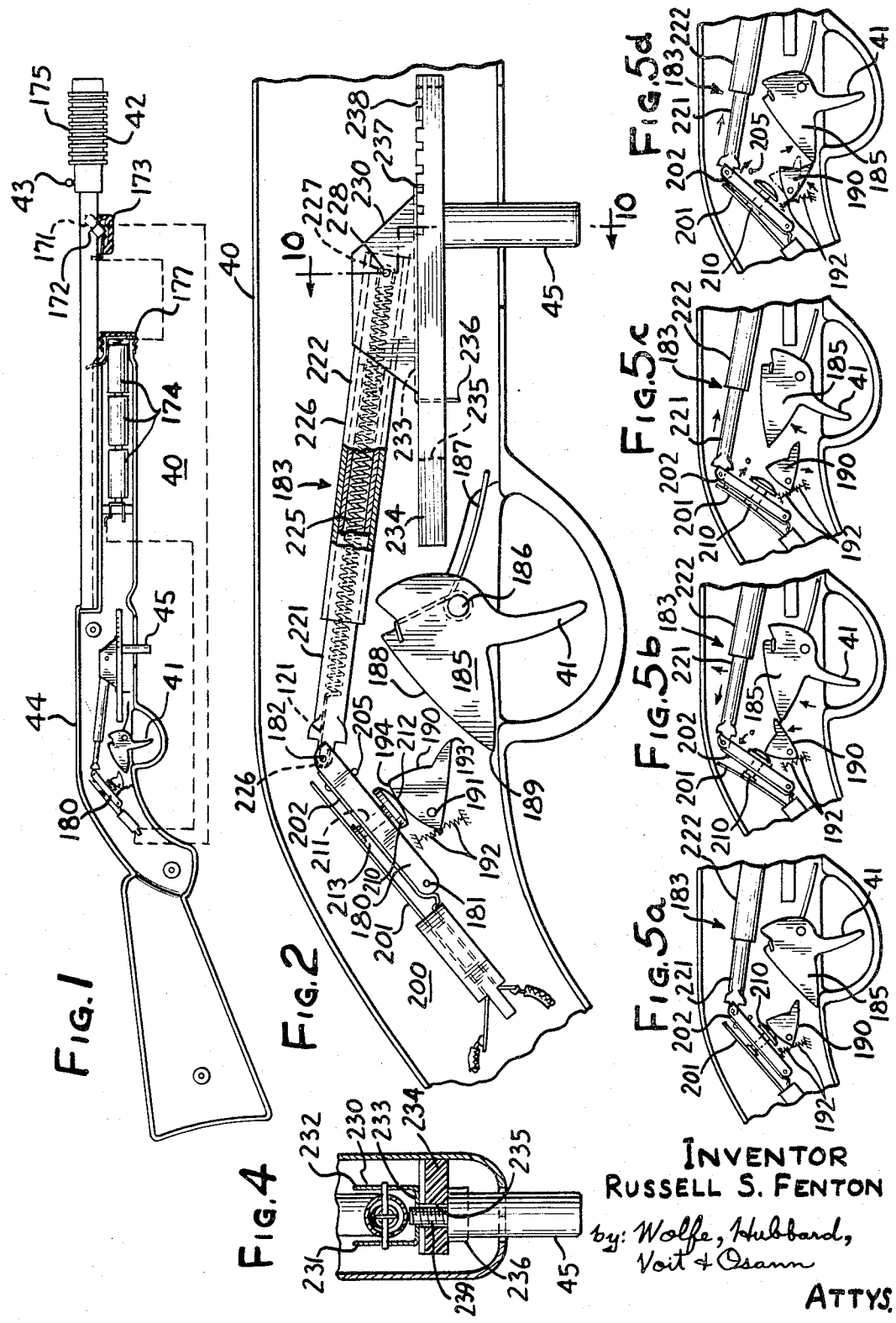
Dec. 17, 1968 R. S. FENTON 3,417,237

INTERVAL CONTROL MECHANISM FOR LIGHT GUN OR THE LIKE

Original Filed Feb. 5, 1965 2 Sheets-Sheet 1



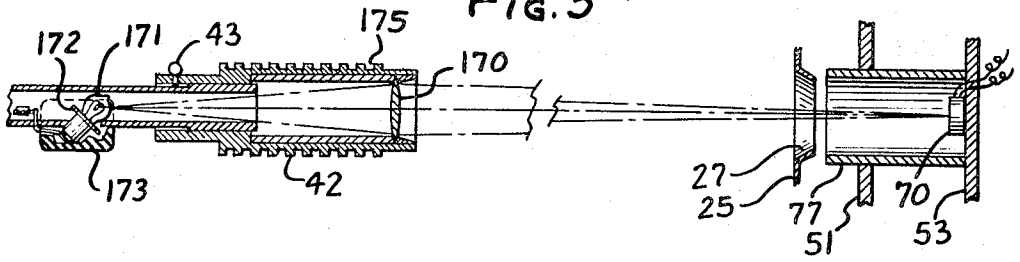
INVENTOR
RUSSELL S. FENTON
by: Wolfe, Hubbard, Voit & Osann
ATTYS.

Dec. 17, 1968 R. S. FENTON 3,417,237

INTERVAL CONTROL MECHANISM FOR LIGHT GUN OR THE LIKE

Original Filed Feb. 5, 1965 2 Sheets-Sheet 2

FIG. 3



INVENTOR
RUSSELL S. FENTON

BY Wolfe, Hubbard, Voit & Osann
ATTORNEY

United States Patent Office 3,417,237 Patented Dec. 17, 1968

3,417,237

INTERVAL CONTROL MECHANISM FOR LIGHT GUN OR THE LIKE

Russell S. Fenton, 308 Eaton St., Northfield, Ill. 60093

Original application Feb. 5, 1965, Ser. No. 430,553, now Patent No. 3,376,039, dated Apr. 2, 1968. Divided and this application May 19, 1967, Ser. No. 639,818

9 Claims. (Cl. 240—10.62)

ABSTRACT OF THE DISCLOSURE

A gun providing a light beam of variable duration. A pair of spring type contacts are connected in series with a lamp and normally biased open by a mechanism formed by a pair of telescoping tubes, one of which is movable in response to operation of a trigger and the other of which is stationary, separated by a thin viscous film and interconnected at their respective remote ends by a bias spring. One of the contacts is connected to the movable tube of the bias mechanism and thus urged toward the other contact when the trigger is pulled. A trigger operated plunger is forced against the other contact as the trigger is pulled to prevent actuation of the lamp until trigger pressure is released. The duration of engagement of the contacts is governed by the preset position of the stationary tube which predetermines the bias force applied to return the one contact to its normal disengaged position.

Disclosure

This is a division of my copending application Ser. No. 430,553, filed Feb. 5, 1965 now Patent No. 3,376,039.

The present invention relates to target apparatus and more particularly to a novel target gun providing an aimable light beam.

It is an object of the invention to provide a target game which has action and appeal for all ages, from a young child barely able to hold a gun to the most accomplished adult marksman. It is, more specifically, an object of the present invention to provide a target gun which may be set to produce either a light beam of long duration, which may be visually guided to the bullseye without necessity for sighting the gun, or a short burst of light requiring accurate pre-sighting. Thus it is an object to produce a target gun which is capable of two distinct modes of operation and which is continuously adjustable between these modes to accommodate any level of ability. It is nonetheless an object of the present invention to provide a target gun which requires a minimum of mechanical and electrical power, which is simple and inexpensive to construct, and which is highly reliable even when subjected to the repeated and rough usage of children.

A more detailed object of the present invention is to provide a novel light gun capable of producing a succession of light bursts of exactly predetermined but adjustable duration and in which the adjustment covers a broad range of time interval. In this connection it is an object to produce a light gun having realistic trigger action producing a timed beam immediately upon the trigger's reaching its point of release and in which the timing means is powered entirely by energy imparted during the trigger stroke. It is a related object of the invention to provide a light gun which is reliable, consistent, and long lived, but which is nevertheless simple and economical to manufacture. It is a further object of the invention in one of its aspects to provide an interval-determining mechanism in which it is capable of turning on an electrical circuit for a predetermined time interval following triggering action but which is not, necessarily, limited

to use in toy guns and which may be employed in other types of devices requiring determination of consistent, but adjustable, time intervals.

Other objects and advantages of the invention will become apparent upon reading the attached detailed description and upon reference to the drawings, in which:

FIG. 1 shows a gun constructed in accordance with the invention with the near side of the frame removed.

FIG. 2 is an elevational view of the gun mechanism with the parts enlarged to show detail.

FIG. 3 is a vertical section taken through the front end of the gun to show the optics and focusing upon the target.

FIG. 4 is a transverse fragmentary section taken along the line 4—4 in FIG. 2.

FIGS. 5*a*–5*d* constitute a set of stop-motion views, forming a typical operating cycle, FIG. 5*a* showing the initial state of the gun mechanism, FIG. 5*b* showing the positions of the elements during the pulling of the trigger, FIG. 5*c* showing the release at the end of the trigger stroke to begin the timed interval, and FIG. 5*d* showing the idle wiping of the trigger past the pawl as the trigger is restored to its initial condition.

While the invention has been described in connection with a preferred embodiment, it will be understood by one skilled in the art that the invention is not limited to the particular embodiment shown but that I intend, on the contrary, to cover the various modified and equivalent constructions included within the spirit and scope of the appended claims.

Turning now to the drawings for the purpose of directing an aimable light beam to a target "bullseye," a gun **40** is provided, preferably in the form of a simulated hunting rifle or shotgun having a trigger **41** and an integral light projector **42** capable of throwing a focused beam of light upon the target for a predetermined time interval each time the trigger **41** is pulled. The light beam may be precisely sighted upon the target by a front sight **43** and an optional rear sight **44**, as in the case of a real gun. In accordance with an important aspect of this invention, the gun is capable, by means of an adjustment **45**, of producing a light beam of extremely short duration, on the order of one-tenth second, requiring accurate pre-focusing of the light beam on the bullseye, and a beam of longer duration, say up to two seconds permitting the beam to be guided to the bullseye by visual observation of the spot of light and without accurate use of the gun sights. This permits use of the gun in a "sighted" mode for expert users, a "guided" mode for younger children, or a combination of the two for those of intermediate ability.

Referring to the FIGS. 1 and 3 and the internal construction of the gun **40**, for the purpose of projecting the beam of light from the muzzle of the gun an optical system is provided including a simple convex lens **170** which receives its light from a small lamp **171**. This lamp, which is preferably of the miniature type used in flashlights, has a mounting flange which may be conveniently slipped into an angled slot **172** cut in the underside of the gun barrel. The lamp may be held in position, and its lower portion covered, by means of a snap-on clip **173**. For the purpose of making contact with the base and tip of the lamp, any desired arrangement of spring contacts may be used forming a simple loop circuit with a battery **174** as diagrammatically shown in FIG. 1.

In order to achieve a realistic looking rifle and to permit use of an objective lens **170** of maximum light-gathering power, the lens is preferably fitted into the front end of a "choke" **175** which is snugly slidable over the end of the gun barrel. This "choke" is adjusted backwardly and forwardly until a bright and well-defined spot

of light is produced at the shooting distance. Such spot is, in fact, the enlarged image of the lamp filament so that proper focusing becomes an easy matter. Moreover, light actuated targets such as disclosed in my aforementioned application are sufficiently sensitive that focusing is not critical thereby permitting the gun to be moved toward or away from the target through a distance of several feet without affecting the response of the target. The battery **174** preferably consists of three cells mounted in the forward portion of the stock and retained by a screw cap **177**.

Novel means are provided for causing the lamp to turn on as a result of pulling the trigger, and at the end of trigger movement, for a predetermined short time interval which is dependent upon adjustment of a time delay mechanism and which cannot be affected by the manner in which the trigger is operated. Thus in accordance with the invention a movable contact-making member is provided which is biased to a normal rest position and which is moved by the trigger against the force of bias into a cocked position where the member is released for return movement. Novel fluid friction means interposed between the movable member and the frame of the gun inhibits the return movement over a predetermined time interval, during which eletrical contact is made. Thus referring to FIGS. 1 and 2, I provide a movable member **180** preferably in the form of a rockable link having one end pivoted to the frame of the gun by a pin **181** and the other end secured by a pin **182**, to a biased fluid friction assembly generally indicated at **183**.

The trigger **41** has a trigger body **185** pivoted on a pin **186**, with the trigger being biased forwardly by a trigger return spring **187**. On the back side of the trigger body there is formed a wiping surface **188** terminating in a drop-off **189**.

Interposed between the body **185** of the trigger and the member **180** is a pawl **190** pivoted at **191** and having a pawl-centering spring **192** so arranged that the pawl tends to be centered in the position shown in FIG. 2, resiliently resisting movement in either direction. The pawl is provided with a trigger engaging tip **193** and a rear camming surface **194**.

For the purpose of making electrical contact, a contact assembly **200** is provided having a first contact member **201** which is formed of a leaf spring and which may, for convenience, be referred to as the "follow-up" contact, and a second contact member **202** which is also in the form of a leaf sping and which travels with the rockable member **180**. Under normal conditions the member **180** is positioned against a stop **205** and the contact **201** is relatively unstressed so that the two contacts do not engage one another.

In accordance with one of the aspects of the present invention means are provided for insuring that the contacts remain out of engagement with one another, thus effectively disabling them, during the retraction of the rocking member **180**, i.e., while the trigger is being pulled, and for allowing them to come together to make contact during the time that the rocking member is being restored to its initial condition thereby insuring that the lamp is lighted only after the trigger completes its movement and at the same instant of time that a shell would be fired from a conventional gun. This disabling is brought about in the present instance by providing a lost motion force transmitting member **210** between the pawl **190** and the member **180**. The force transmitting member, as shown, is in the form of a small plunger having a shank **211** which is slidable in the member **180**, a first or enlarged end **212**, and an inner end **213** which engages the underside of the contact leaf **201**. Briefly stated, when the trigger is pulled and when the pawl **190** is rocked upwardly, the lost motion is taken up so that the member **210** presses against the contact leaf **201** keeping it separated from the leaf **202** but permitting the contacts to come together just as soon as the member **180** drops clear on the return stroke.

In accordance with one of the aspects of the invention novel means are provided for both biasing and inhibiting return movement of the rockable member **180**, inhibition being achieved by a pair of telescoping tubes having a film of viscous fluid between them. Thus in the present instance I have provided an inner tube **221** and an outer tube **222** telescopingly overlapped and with a radial clearance between them on the order of a few thousandths of an inch, for example, two and one-half thousandths. The viscous fluid which I prefer to use is silicone damping fluid manufactured by the Dow Corning Company and identified as their No. 200 having a viscosity, at 25° C., on the order of 60,000 centistokes. Chemically the fluid is identified as a dimethylpolysiloxane. It is found that such fluid gives an almost unlimited number of inhibited operations which are consistent from one to the next, for a given degree of overlap adjustment between the tubes, the interval remaining constant in spite of temperature changes.

In accordance with one of the features of the present invention the biasing spring is preferably contained within the telescoping tubes and has its ends secured to the ends of the respective tubes so that a straight line of force is applied between them. Thus I provide a coil spring **225** having its stationary end **226** connected to the pin **182** and its movable end **227** anchored to the pin **228**. The axial application of force tends to insure that the tubes will not be "cocked" with respect to one another which might tend to shear off the film upon repeated operation.

For the purpose of varying the time interval, the tension force of the spring and the degree of overlap between the two tubes is adjusted, preferably simultaneously, and with cumulative effect. In the present instance I prefer to adjust the position of the stationary mounting pin **228** with respect to the frame of the gun. To this end, the pin **228** is mounted in an adjustable cradle **230** (see FIG. 4) having side walls **231**, **232** and a base **233** which is seated on a supporting rail **234**. The latter is centrally slotted as indicated at **235**, and a guiding tongue **236** is bent downwardly at the rear end of the cradle for entering the slot. For the purpose of adjusting the position of the cradle **230**, the member is provided at its forward edge with a transverse lip **237** which is registered with a selected one of a series of transverse notches **238** in the rail. The adjusting member, indicated at **45**, has a threaded tip **239** which is threaded into the lower wall **233** of the cradle. To change the adjustment the adjusting member **45** is unscrewed to release the lip **237** following which the adjusting member is moved forwardly or rearwardly to register with a new notch **238** and screwed tight in the new position. Because of the fact that both the spring tension and degree of frictional overlap are changed simultaneously with a change in adjustment, a wide range of time interval is attainable which may in a practical case vary from 0.1 second to, say, two seconds or even longer.

While the operation of the gun mechanism will be apparent based upon the above description a set of stop-motion views *5a–5d* are presented herewith to aid in understanding. Thus FIG. *5a* which corresponds to FIG. 2, shows the condition of rest. When the trigger is pulled the surface **188**, wiping against the tip **193** on the pawl **190**, rocks the pawl upwardly thereby bottoming the lost motion connection **210** and to cause the rockable member to rock upwardly into the position shown in FIG. *5b*. During this upward stroke the end of the lost motion member pressing against the contact **201** prevents it from engaging the cooperating contact **202**.

As the drop-off **189** on the trigger body slips clear of the pawl, the pawl is released permitting the rocking member **182** to rock downwardly under the force of bias. Release of the lost motion connection permits the contacts to touch and contact is maintained during the

descending motion of the member **180** (see FIG. 5*c*). The amount of time that the contacts remain in engagement is dependent upon the amount of time that it takes the rockable member to move back to its initial condition. Upon release of the trigger the drop-off **189** on the trigger member wipes idly past the tip **193** of the pawl **190**. As the member **180** approaches the fixed stop **205** the contact **201** remains stationary and the final retreating movement of the contact **202** causes separation of the contacts thereby turning off the lamp. The device is thus in readiness for a second trigger stroke. When the mechanism has been adjusted for a short time interval, the device is capable of responding, and measuring out an accurate interval, just as quickly as the trigger may be operated.

It will be apparent to one skilled in the art that the gun is constructed in a novel fashion to produce two separate modes of operation. In the first or "sighted" mode, using an extremely short time interval on the order of a tenth of a second, too short to permit guiding of the spot of light, accurate sighting is necessary, and the gun must be accurately sighted on the target "bullseye" at the time that the trigger is pressed. In the opposite or "guided" mode, using a longer time delay on the order of two seconds it is not necessary to use the sight and the spot of light on the front of the target may be manually guided into coincidence with the "bullseye." The latter operation is particularly suited for small children. Intermediate time settings permit sighting with only a minimum amount of guiding of the beam thus suiting the gun to those of intermediate ability. As ability increases it is a small matter to move the adjustment **45** forwardly step-by-step.

It is to be noted that the present arrangement enables the rise time of the target actuating photocell to be coordinated with the rise time of the light emitted by the gun. Thus the system is to be contrasted with those employing capacitor discharge in which the speed of response of the lamp may exceed the rise time of the photocell so that the initial portion of the burst of light is wasted—the photocell cannot act sufficiently rapidly to make use of it. It is found that where a lamp is operated with a slight overvoltage, say up to 50%, the rise time of the light corresponds rather closely to the speed of response of a typical cell of the cadmium sulfide type. Moreover, while batteries are used to energize the lamp, the term is intended to be used in its broader sense as a source of electricity, and if desired, the gun may receive its current from a wall socket with suitable stepping down of voltage by a resistor or transformer.

While I prefer to use a gun of the type shown nevertheless the invention is not limited thereto and the gun may take other configurations as for example pistol shape. With regard to the internal timing mechanism the movable member **180**, instead of being rocked about a fixed pin, may be, instead, mounted for other types of movement to bring about equivalent result, again, without departing from the invention. The term "pawl," as used in the gun construction, is intended to be a general term covering any force transmitting member which may be interposed between the trigger and the movable member which actuates the contacts.

While the timing mechanism has peculiar and desirable utility for timing of a light beam, it will be understood that this portion of the invention is, in its broader aspects, not limited to formation of a beam of light and the contacts may be connected to any suitable responding means where interval control and variation is designed. Indeed, the time control and adjusting mechanism is not necessarily limited to the particular gun environment and may be employed, if desired, in other environments with the same or analogous benefits.

I claim as my invention:

1. In a light gun for a target game, the combination comprising a frame, optical means including a lamp and battery for forming a light beam, a trigger, a movable member having a biasing spring for urging the same to a normal rest position, force transmitting means interposed between the trigger and the movable member for retracting the member against the force of bias into a cocked position when the trigger is pulled and for thereafter releasing the same for return movement, fluid friction means interposed between the movable member and the frame for inhibiting the return movement to provide a finite time interval, and electrical contact means coupled to the movable member and actuated during the return movement for turning on the lamp during said time interval.

2. The light gun of claim **1** wherein said movable member is a rocking member pivoted to the frame, said force transmitting means includes a pawl interposed between the trigger and the rocking member, and said fluid friction means includes a pair of telescoped tubes respectively connected to the frame and to the movable member having a film of viscous fluid therebetween for inhibiting the return movement of the member to thereby define said time interval.

3. The light gun of claim **1** wherein said fluid friction means includes a pair of telescoping tubes, one tube being connected to the movable member and the other tube being connected to the frame and a film of viscous liquid interposed between the tubes to inhibit return movement of the member and wherein said spring has its ends connected to the tubes for drawing the tubes and movable member into said normal rest position.

4. The light gun of claim **1** wherein said spring has a point of anchoring with respect to the frame, said force transmitting means includes a pawl interposed between the trigger and the movable member and actuated upon pulling the trigger for retracting the member against the force of bias into a cocked position and for thereafter releasing the same for return movement, and said fluid friction means includes a first fluid friction member connected to the movable member, a second fluid friction member having means for anchoring the same to the frame, and a viscous fluid between said friction members, at least one of the said points of anchoring to the frame being adjustable thereby to vary the time interval during which the beam is turned on.

5. The light gun of claim **4** wherein said pawl is constructed to wipe clear of the movable member after the movable member has been retracted to a cocked position so that the latter is released for return movement under the force of bias, and said spring and second fluid friction member are anchored to the frame by a common anchoring member, and further including means for adjusting the anchoring member with respect to the frame of the gun for simultaneously varying the spring tension and the amount of overlap of the tubes thereby to provide a wide variation in the length of time that the beam is turned on.

6. A light gun according to claim **1** further including means responsive to the pulling of the trigger for disabling the contacts during the time that finger pressure is applied to the trigger so that contact is made lighting the lamp only during the time that the rocking member is being restored to its rest position.

7. The light gun of claim **1** wherein said force transmitting member has a lost motion connection with respect to the movable member for engaging one of the contacts during the time that the lost motion is taken up and thereby preventing the contacts from touching while finger pressure is applied to the trigger so that contact is made only during the time that the movable member is returning to its rest position.

8. A contact making device for use in a light gun or the like, the combination comprising a frame, a member mounted for movement with respect to the frame, first and second relatively telescoping tubes having a sliding fit, a coil spring contained within the tubes and having its ends respectively secured to the outer ends of the tubes,

said first tube being anchored to the movable member and the second tube being anchored to the frame, means including a force transmitting member for retracting the movable member against the spring force into a cocked position and for releasing the movable member for return movement, electrical contact means coupled to the movable member for making contact during the return movement thereof, and a film of viscous liquid interposed between the tubes for inhibiting the return movement, at least one of the tubes having an adjustable anchoring point for simultaneously varying the tension in the spring and the amount of overlap between the tubes thereby to vary the time interval of the return movement.

9. A contact making device for use in a light gun or the like comprising, in combination, a frame, a movable member mounted for movement with respect to the frame, said movable member having a biasing spring for biasing the same to a normal position, a first contact carried by the movable member, a second contact for cooperating therewith and having a resilient mount, said second contact being out of engagement with the first contact when the movable member occupies its normal position but moved toward the first contact when the member is displaced from its normal position, a force transmitting member for moving the movable member against the force of spring bias into a cocked position and for thereafter releasing the member, said biasing spring having an associated fluid friction device for inhibiting return movement of the movable member so that it take a predetermined length of time following release to move back to its normal position, and means operated by the force transmitting member for maintaing the contacts separated during the cocking movement so that the contacts are engaged with one another only during the time interval defined by the return movement to normal position.

References Cited

UNITED STATES PATENTS

2,119,005	5/1938	Carter	240—6.41
3,240,924	3/1966	Darby	240—10.62

NORTON ANSHER, *Primary Examiner.*

W. A. SIVERTSON, *Assistant Examiner.*

U.S. Cl. X.R.

273—101.1