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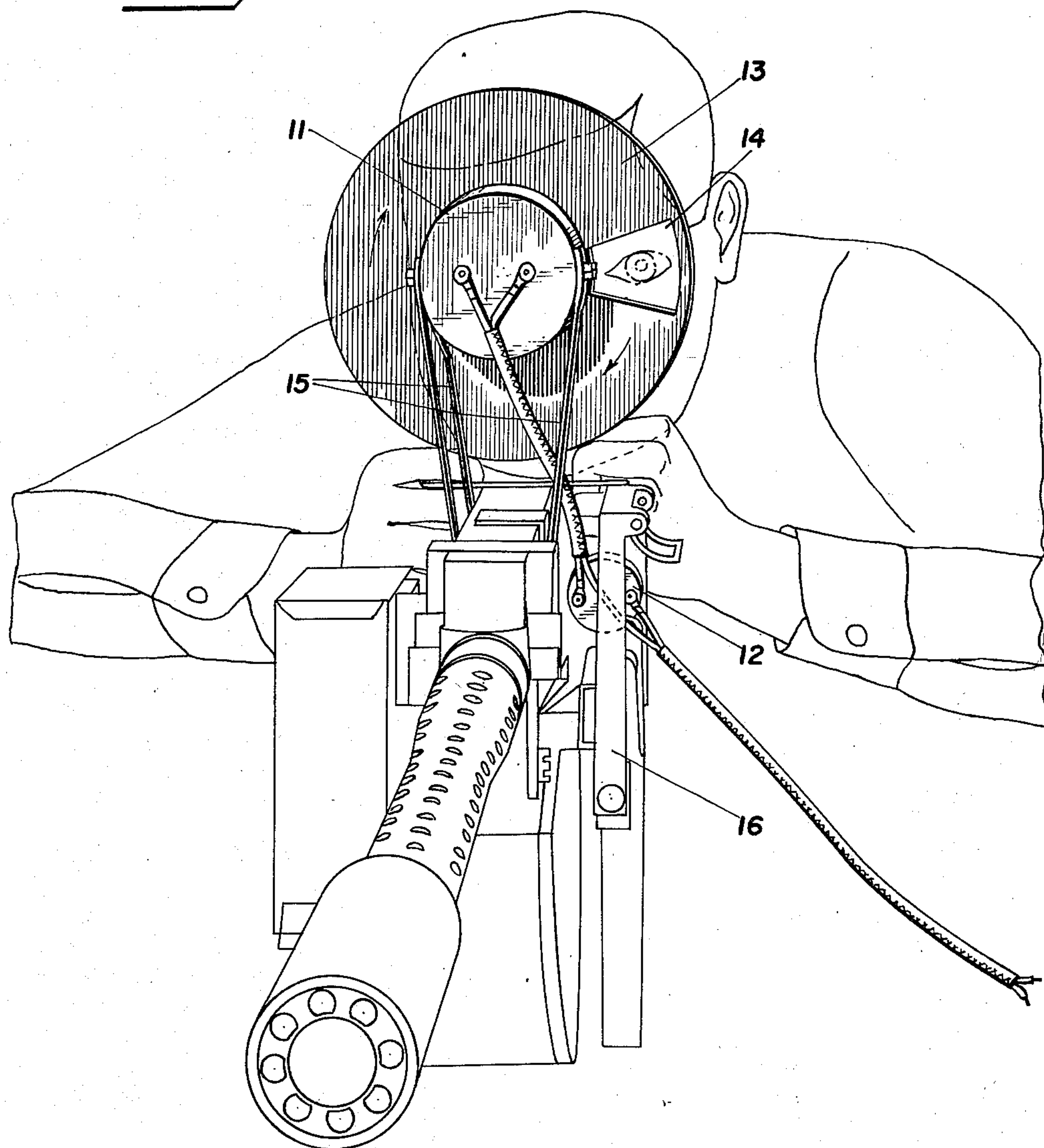
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STROBOSCOPIC FIRE CONTROL DEVICE

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FIG. 1



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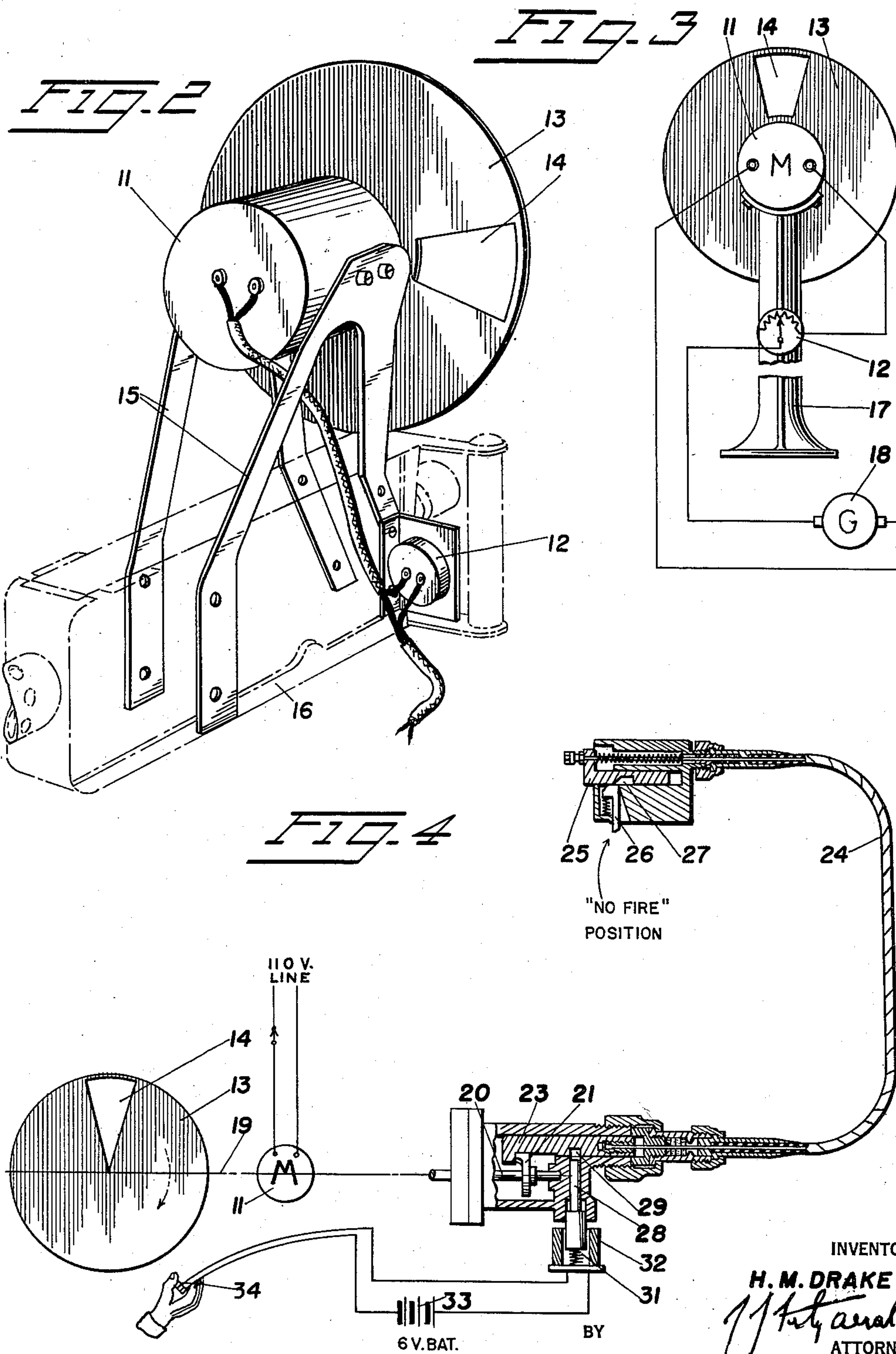
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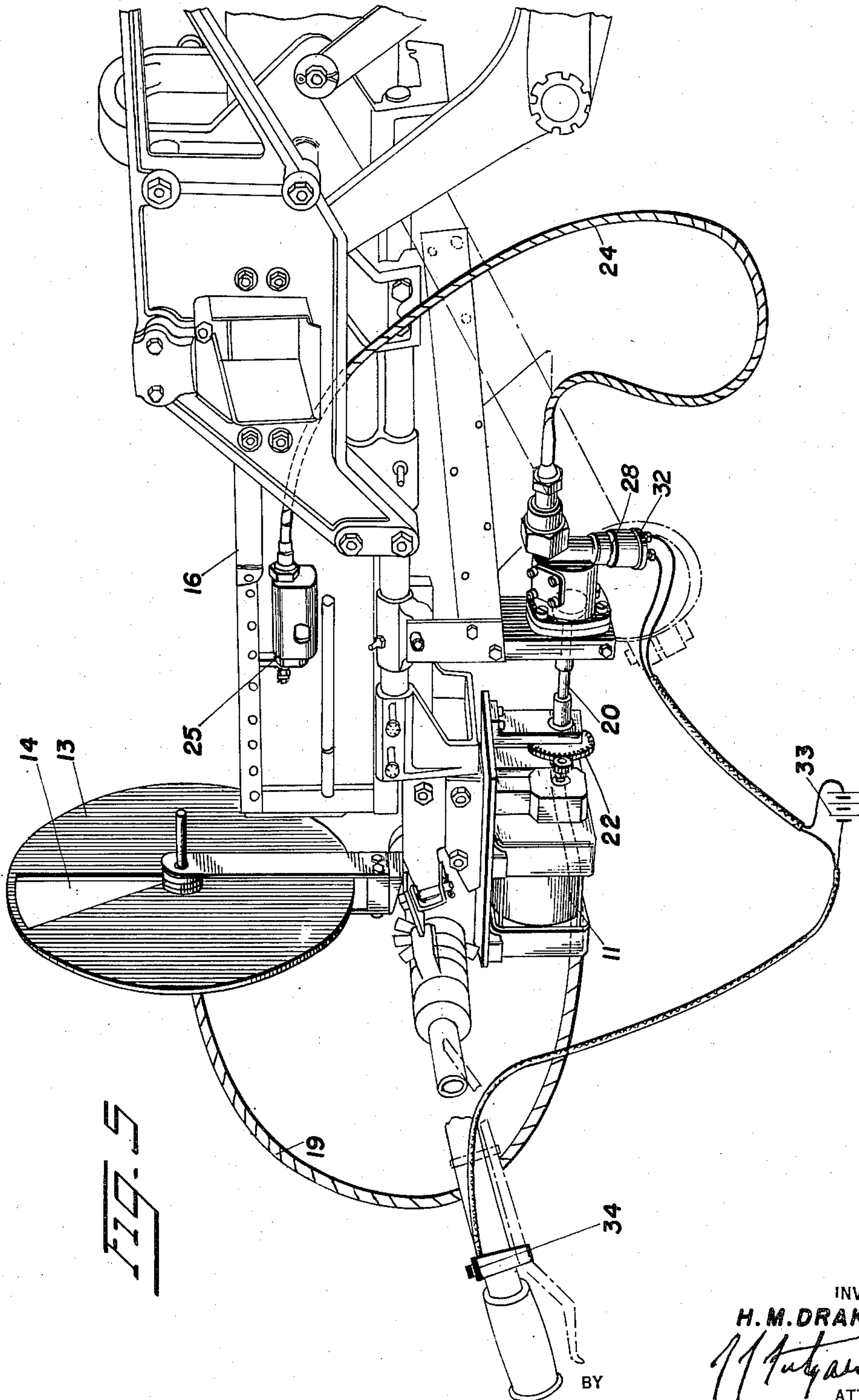
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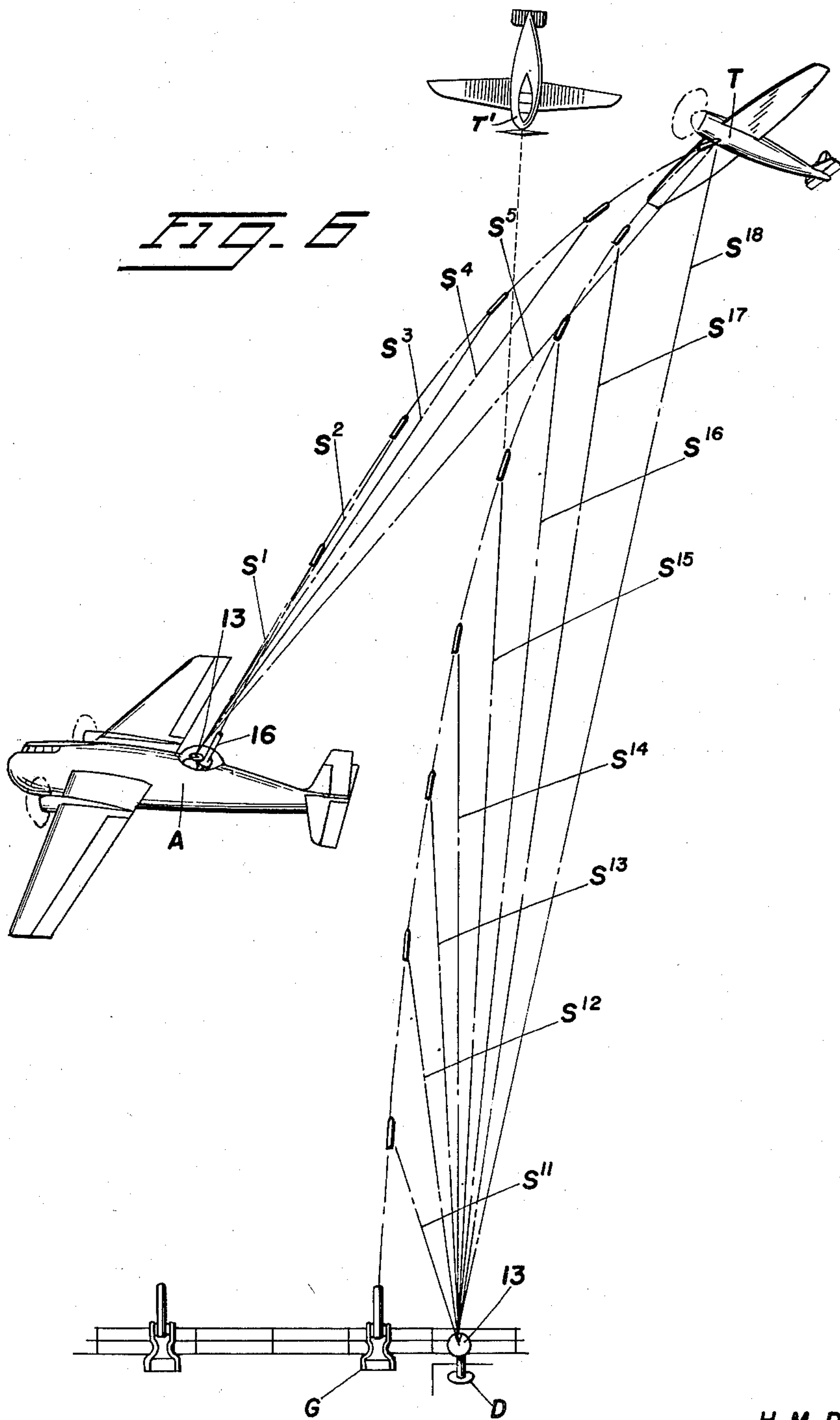
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## STROBOSCOPIC FIRE CONTROL DEVICE

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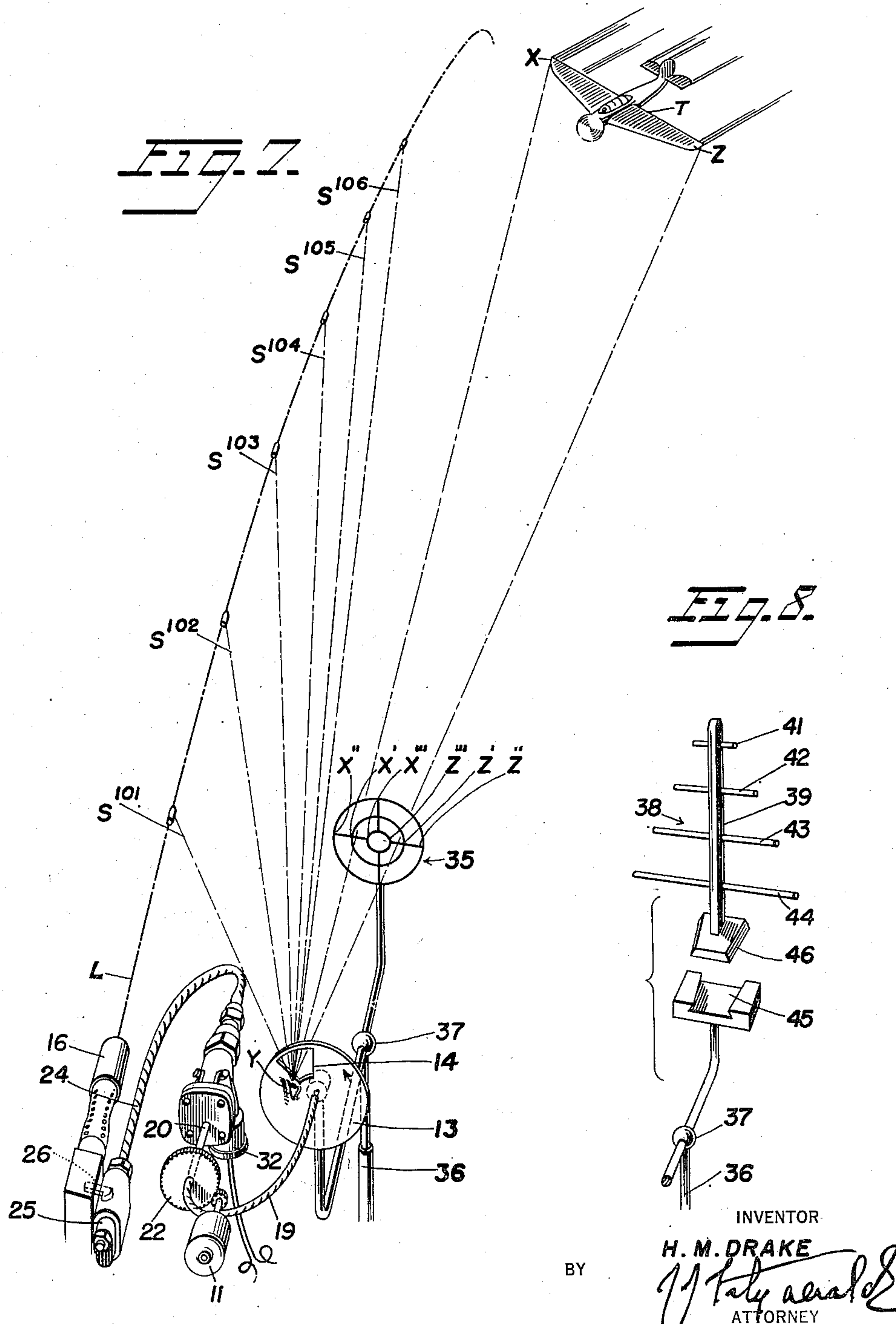
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STROBOSCOPIC FIRE CONTROL DEVICE

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## UNITED STATES PATENT OFFICE

2,538,769

## STROBOSCOPIC FIRE CONTROL DEVICE

Harrington M. Drake, United States Navy

Application July 27, 1942, Serial No. 452,546

4 Claims. (Cl. 33—49)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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This invention relates to ordnance, fire control, and particularly to means for and methods of sighting guns that will enable a gunner to quickly determine the relationship of projectile trajectories to a target and effect a hit thereon.

The most effective system for directing of fire from machine guns and other light armament, up to the present time, has been to use tracer ammunition either entirely or in a certain proportion to the service ammunition fired from the gun. These bullets, as is well known, become luminous while in flight and render the trajectory of flight visible to the eye. In using this type of ammunition the gunner directs his gun so that the line of flight of these tracers appears to intersect the target. The difficulty in practice is that the human eye is incapable of sufficient depth perception at the distances necessary for successful operation. Another difficulty is that usually neither the apparent nor the actual curves of the trajectories of the bullets are constant, so that even if the eye could estimate ranges for a target at rest, it could not accommodate itself to a swiftly moving target, such as an approaching airplane.

An attempt to solve the problem produced by these conditions is disclosed in a system of fire control shown in U. S. Patent No. 1,355,841 to Robert V. Morse, issued October 19, 1920. As taught in this patent, the ammunition used comprised explosive shells provided with crude time fuzes. These fuzes were to be set so as to explode the shells at varying intervals of time, and were loaded in a machine gun belt in sequential order so that after they were fired from the gun they would mark the range of fire in progressive orderly steps at regular intervals of range, determined by the settings of the individual fuzes. It was further disclosed that the shells could be so arranged either to mark the nearest range first, and successive ranges at increasing distances, or so that the shells with the maximum time setting (indicating the farthest range) would be fired first from the gun, in which case all of the explosive bursting in a set would take place at nearly the same time, thus creating a pattern showing the various ranges simultaneously. Another method disclosed by this patent provided that all of the fuzes be set to explode at the same time interval, the result being a continuous indication of a single range.

In practice the method proposed in the Morse patent introduced obstacles such as the impracticability of designing fuzes for small cartridges which would have the requisite accuracy to ex-

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plode at precisely the correct range for which they were intended. It also requires too much care in the loading of belts for use in the field inasmuch as the rounds of ammunition would necessarily have to be loaded in the correct order, and once having been loaded, it would be impossible to change the sequence of operation without refitting new cartridge belts. In addition, because the ranges short of the target as well as over it are indicated by the disintegration of the shells, only a fraction of the shells would reach the target at all, the rest of them having exploded at some point in mid-air short of the desired range.

Another attempt to solve this problem is disclosed in U. S. Patent No. 2,157,575 to Grayson Schmidt, issued May 9, 1939. In this patent the method proposed comprises the use of tracer ammunition, a shutter mechanism for the gunner, and an observer located to one side of the origin of fire, who operates the shutter. In using this device the gunner observes the flight of the tracer through the shutter, which remains open while the bullet travels between the gun and target. The observer views the flight of the tracer bullet from some distance away and at the moment when it appears to him that the trajectory of the tracer bullet has intercepted the target he operates the shutter mechanism by pressing a button. This momentarily closes the shutter so as to obscure the gunner's view of the tracer for an instant, and it indicates to him that the bullet appears to the observer to be on the target at that moment. If it does not at that same instant appear to the gunner also to be on the target, the gunner will readjust the direction of fire of his gun so as to bring it more into line with the target. In other words, the mechanism takes advantage of parallax due to the fact that the target is viewed from two widely separated angles.

The shutter mechanism may also be operated to give a single range indication by an appropriate mechanism which operates the shutter at a predetermined interval of time after the tracer is fired from the gun. This last proposition is subject to the disadvantages present in any single range indicating means, in that these methods are of no use in the case of rapidly changing ranges such as when firing at airplanes, particularly dive bombers.

But the principal limitation to the mechanism disclosed in this patent is that no more than one tracer may be in visible flight at the same time, else the observer and gunner will see a vis-



ual interruption of the line of flight at more than one place at a given time and thus be confused as to which one is supposed to be on the target. The attempt to correct fire by means of an observer and a gunner introduces too many factors when the fire must be rapid and against fast-moving targets. It would require that the same two men work together at all times as a team in order that the gunner may be able to make corrections in his fire without in one instance over-compensating, or in another instance under-compensating, for the reactions of his observer. This also requires that the gunner and observer be placed somewhat apart, a condition which cannot be satisfied when in an aircraft, or aboard a ship.

This invention provides a gun sighting apparatus which facilitates normal depth perception by making the trajectory of tracer bullets fired from the gun visible only at spaced intervals along the line of flight. The ranges of these visible traces will be known and will be few enough in number so as to be clearly distinguishable from one another. It will thus be possible for the gunner to set the line of fire from his gun, at a definite range, on the target before it approaches that range and keep it on the target until it must inevitably come into the zone of fire at that range. Or, if the gunner is provided with means for instantaneously determining the range of a moving target, he may direct the fire from his gun so that by observing the visible traces of the bullets at different known ranges, the zone of fire may be shifted to move with the target.

Furthermore, this device is capable of operation regardless of the proportion of tracers fired from the gun, and in fact, will be particularly effective when a number of tracers are in flight at the same time.

Therefore, with this preamble in mind it may be stated that one object of the device is to provide a sighting means for guns firing at rapidly moving targets.

Another object of this invention is to provide a sighting means for rapid fire guns.

Still another object of the device is to provide a sighting means for rapid fire guns which are directed against swiftly moving targets.

A still further object of the invention is to provide a range estimating means which may be used for instantaneous determination of ranges.

Still further objects, advantages, and improvements will be apparent from the following description of the invention taken in connection with the accompanying drawings, of which:

Figure 1 is a perspective view of a simple form of the invention in operation, mounted upon a machine gun of conventional design.

Fig. 2 is a close-up perspective view of the device shown in Fig. 1.

Fig. 3 is a diagrammatic outline of the device shown in Figs. 1 and 2, using a modified form of mounting and illustrating a wiring diagram which may be used for its operation.

Fig. 4 is a diagrammatic outline of a modified form of the device showing a synchronizing apparatus and wiring diagram for operating the device in synchronism with the firing of a gun.

Fig. 5 is a perspective view of the modification diagrammatically shown in Fig. 4.

Fig. 6 shows in diagrammatic fashion a method of operation of the device.

Fig. 7 shows in diagrammatic fashion a method

of operation of a modified form of the device including a means for quickly determining range.

Fig. 8 is a perspective view of an alternative form of range-computing sight.

Referring now to the drawings, on which like numerals of reference are employed to designate like parts throughout the several views, and more particularly to Figs. 1 and 2, there is shown a motor 11 in connection with the design, driven by a source of electric current (not shown) through the rheostat 12.

Attached to the end of the rotating shaft of the motor is a disc 13 which is provided with an aperture 14 so that rotation of the disc produces a shutter-like effect. The motor and disc may be mounted by a suitable bracket 15 on a gun 16 of any suitable design. It will be understood that this shutter mechanism need not necessarily consist of a rotating disc but could comprise a shutter of the iris or focal plane type, or any other mechanism which will permit intermittent viewing of the object. In the drawings a machine gun is shown which may be of any caliber, but it is to be understood that the sighting means may be used equally well with guns which fire only a single shot at a time.

Furthermore, it is not necessary for the sighting mechanism or shutter to be mounted upon the gun for proper operation. It may be mounted upon a support of its own, 17, as shown in the diagrammatic outline in Fig. 3. This figure shows a conventional wiring diagram which may be employed in the operation of the device as shown in Figs. 1 and 2 and shows a source of electric power, 18, which may be either a generator or a battery.

In the operation of the device as shown in Figs. 1, 2, and 3, the provision of the rheostat 12 is intended to provide a fixed relationship between the speed of the shutter 13 and the rate of fire of the gun 16. This relationship will depend upon ratio of tracer bullets to service ammunition in the cartridge belt and upon the choice of intervals at which it is desired to make the trajectory of the tracers visible.

Referring now to Figs. 4 and 5 there is shown another means by which coordination between the shutter mechanism and firing mechanism may be obtained. In this modification a motor 11 drives the shutter mechanism 13 by means of a flexible or other suitable motion-transferring mechanism 19 through a suitable gearing 22.

A definite relationship between the operation of the shutter 13 and the firing of the machine gun 16 may be maintained by means of a device which is commonly used to obtain synchronization between the firing of a machine gun and the rotation of a propeller, ordinarily used where the gun is intended to be fired through the rotating blades of a propeller. Such a device is diagrammatically shown in Fig. 4 and a specific application of it is shown in Fig. 5, although it is to be understood that the invention is not limited to the use of any particular type of synchronizing mechanism.

In this particular modification the motor 11, in addition to driving the shutter, also drives a cam 21 which is connected to the gear 22 by means of a shaft 20. This cam actuates a cam follower 23 which is attached to one end of a Bowden wire 24 or any similar device which transmits the motion of the cam follower 23 to a sliding cam 25. This sliding cam 25 engages a trigger motor slide 26 which is so located with respect to the firing pin of the gun that it prevents operation



of the firing mechanism when in its projected position as shown in the drawing. The gun may be fired whenever the slide 26 is retracted into a depression 27 in the sliding cam 25. This retraction can occur only when the cam follower 23 is engaged by the low side of the cam 21. A solenoid core 28 is normally urged into engagement with a hole 29 in the cam follower 23 by a spring 31 so as to lock the gun in a "no fire" position. When the circuit is completed through a coil 32, battery 33 and switch 34 the solenoid may be withdrawn from the locking position, thus permitting operation of the gun.

When the device is in operation the shutter 13 is operating so as to cut off the gunner's view of the trajectory of the tracer bullets except during certain definite intervals of time, it being the purpose of this device to have these intervals occur regularly with respect to successive bullets so that the portions of the traces of each successive bullet which will be visible will appear to be in the same position as the traces of the preceding bullets. The cumulative effect will be that of a series of practically coincident, relatively short, dashes appearing to stand in mid-air, representing the passage of the tracer bullets and marking their positions at different ranges, instead of the usual continuous streaks of light. In order to obtain this stroboscopic effect, the shutter 13 should be operated in such a manner as to provide very short periods of sight therethrough as compared with the length of time that the gunner's or fire control observer's vision is cut off. To effect this result, in the case of the disc shutter 13 the aperture 14 therein may be made very small relative to the remainder of the disc along the path of disc rotation. As one example, it has been found that an aperture occupying one twelfth of the disc's rotational path accomplishes the above results when used in conjunction with a conventional .30 caliber machine gun, having every third round a tracer, and with the disc operated at the rate of one revolution per tracer fired. In the case of iris, focal plane, or similar type shutters, their operation can be readily controlled to produce a similar suitable relationship between open shutter and closed shutter time intervals.

The distance between the visible traces will be a function of the speed of operation of the shutter. As an example of this suppose that a .30 caliber machine gun fires at the rate of 1250 shots per minute. If this gun is provided with a cartridge belt in which every third bullet is a tracer, then there will be approximately 417 tracers fired per minute, which is roughly 7 per second. If the muzzle velocity of the bullets is 2680 feet per second, and if the shutter is operated once for every time that a tracer is fired (7 times per second approximately) then the trace of the bullet will be made visible at intervals 380 feet apart, assuming constant speed of the bullet. However, the speed falls off after leaving the gun so that succeeding intervals of the visible trace will be progressively closer together. These intervals can all be calculated from the ballistic curve of the particular type of gun and bullet being used, as is well known. It is not necessary for the operation of this device that the intervals at which the visible traces appear be uniformly spaced from each other; it is essential only that the ranges of the successive traces be known.

Referring now to Fig. 6 there are shown two

examples of a practical use of the above described system when employed to fire a fixed barrage. An attacking airplane A is shown provided with a machine gun 16 and a shutter mechanism 13, as just described in connection with Figs. 4 and 5. Target airplanes are shown at T and T1.

The gunner is observing the short traces of the flight of the bullets along the sight lines S1, S2, S3, S4, and S5, each of which traces is spaced a known distance from the others, and from the gun.

There is also shown in Fig. 6 a gun G mounted on shipboard which may be operated by remote control by a director, or an observer, located at D which may be at a distance from the location of the gun G. Suitable means may be provided for the operation of the shutter mechanism 13 at D such as an electric motor with a source of power and rheostat as shown in Fig. 3. The observer at D will thus see the short traces of the trajectory of the tracer bullets fired from the gun G along the sight lines S11, S12, S13, S14, S15, S16, S17, and S18. The ranges of these traces will thus be known.

With the installations shown in Fig. 6, because no means for quickly computing the range of the target has been provided, a fixed barrage system of fire is preferably employed. By this method a zone of fire is set up at some convenient range which zone at all times appears to the gunner, director, or observer, to be intercepting the target. Consequently, although the target will at first only appear to be in the zone of fire, eventually it must actually enter this zone and be destroyed. Assume in this case that the gunner in the airplane A had chosen a range of six hundred yards, represented by the trace viewed along the sight line S5, and the gunner at D had chosen a range of eight hundred yards, represented by the trace viewed along the sight line S18. The target airplane T has just entered the zone of fire of both guns and is being hit.

In the case of the target airplane T1, it will be observed that the gunner stationed at D has chosen a range of say five hundred yards, represented by the trace viewed along the sight line S15. In the present instance the gun is aimed so that this trace appears to the observer or gunner at D to be intercepting the airplane T1, although actually this is not true. But if the gunner at D continues to direct the gun G in such a manner that the trace viewed along sight line S15 continues to appear to intercept the target, it is obvious that it will intercept it actually when the target comes within the zone of fire at five hundred yards.

Another system of firing contemplates the use of a moving barrage, which requires that a means be provided for furnishing the gunner with instantaneous calculations of the range of the moving target. These calculations may be furnished by another observer, but preferably a suitable means should be provided whereby the gunner may determine ranges instantaneously while at the same time aiming his gun.

Referring now to Figure 7, a form of device is there diagrammatically represented, in which the shutter mechanism 13 may be of a type already described or of any convenient design, and is mounted with a range-finding sight 35 upon a support 36 by means of a universal connection 37. The line of fire L is coming from the gun 16 firing from an independent mounting,



although the shutter and range-finder could be mounted with the gun.

The shutter mechanism is coordinated with the firing of the tracer bullets by any suitable mechanism such as that shown which is substantially similar to that of Figs. 4 and 5 except that the motor 11 and the camming mechanism are shown mounted separately from the gun 16.

The range-finding sight shown at 35 consists essentially of a series of concentric rings, and is in common use as a lead computing sight and for range-computing. The eye of an observer, or gunner, is shown at Y, while the target is at T. Thus the wing-spread XZ of the target airplane T subtends the angle XYZ. This angle will vary inversely as some function of the range of the target, but the dimension XZ will always be proportional to that of X'Z', which is the distance subtended by the angle XYZ on the range-finding sight 35. Therefore if the dimension XZ of the target is known the range of the target can be approximately determined by observation of the distance X'Z' on the range-finding sight. The concentric rings of the usual sight are constructed to read in mils for the purpose of estimating leads so that some interpolation would be necessary in order to use the conventional sight in the manner proposed. Therefore it is preferable to construct a range-finding sight from which the correct range may be directly read for targets of different dimensions.

The specially constructed sight may be made in the form of the usual ring-sight as previously described, or it might be constructed as shown in Fig. 8. For convenience this sight is shown mounted on the support 36 by means of the universal joint 37 in the same way as was the ring-sight in Fig. 7, but it will be understood that the position of the sight will be largely a matter of convenience.

The sight shown in Fig. 8 comprises a central stem 39 provided with a plurality of horizontal bars 41, 42, 43, and 44 of varying lengths. Four are shown but more or less would be satisfactory. Each of the horizontal bars on any given sight is designed to exactly subtend an angle, when viewed by the gunner or observer, corresponding to the angle subtended by a particular type of target at a range identical with that of one of the visible bullet traces observed through the shutter mechanism. A different range-finding sight may be furnished for each size of target that it is expected will be encountered, and a quick-detachable mounting may therefore be provided in order that the various sights may be quickly interchanged. Such a mounting may consist of a wedge-shaped slot 45 suitably supported on a mounting, the sight itself being provided with a wedge 46 which fits snugly into the slot 45.

As an example of a possible form of construction, although not one to which the device is to be limited, the horizontal bar 41 may be made in a length so that when the wing-spread of the target airplane appears to the gunner to be as wide as the bar 41 the airplane will be at the exact range of the trace viewed along the line S106. Similarly, when the wing-spread appears to correspond in length to the bar 42 the airplane will be at the exact range of the trace viewed along the sight-line S105. Similarly for the bars 43 and 44, and the traces viewed along the sight-lines S104 and S103, respectively.

If a ring-sight is used for determining the range, the diameters of each of the concentric

circles will in the same manner be constructed so that when a target appears to correspond in width to the diameter of one of the circles, it will be at the exact range of one of the visible traces of the bullets being fired from the gun. It will be obvious that the sight need not only comprise bars or circles, but that reference points may be established by the use of various shaped devices, such as rectangles, triangles, or ovals.

By the use of a range-finding sight calibrated in terms of the visible traces, it is possible to compensate in the sight for the decrease in the speed of the bullets and consequent decrease in the intervals between traces.

The system of firing a moving barrage using an instantaneous range-finder will now be described. In Fig. 7 the distance X'Z' on the ring-sight subtends an angle which will be subtended by the particular target airplane T when at a range corresponding to that of the visible trace viewed along the sight-line S106. When the target is at that range the gunner will primarily be interested in aiming the gun so the trace at that sight-line will intercept the target T. But he will also be observing the other traces along the lines S101, S102, S103, S104, and S105 through the shutter mechanism 13. The distance X''Z'' will correspond to the range of the trace observed along the sight-line S103 while the distance X'''Z''' will correspond to the range of a trace (not shown) which is at some greater distance than that viewed along the sight-line S106. Thus if the target reaches a point where it intercepts a distance on sight 35 which is approximately half-way between X'Z' and X''Z'', the gunner will shift his attention to the visible trace which is half-way between the traces viewed along the lines S106 and S103 while shifting the gun so as to bring that trace in contact with the target. In this instance the zone of fire would have shifted from the range of the visible trace along the line S106 to a point midway between the visible traces viewed along the sight-lines S105 and S104. If the target airplane has not been destroyed and succeeds in coming closer until it subtends the distance X''Z'' on the ring sight then the zone of fire will have been shifted by the gunner to the visible trace as viewed along the sight-line S103. Of course it will be realized that this process of shifting of the zone of fire should be made gradually and continuously in proportion to the rate of speed with which the range of the target is shifting. The object of the gunner will be to maintain a zone of fire at all times at the range of the target which zone of fire will follow the target. Thus a moving barrage will be maintained as distinguished from the fixed barrage which is maintained at one range and through which it is expected the target will go.

While it has been stated that range-finding sights may be used which operate on the principle above described, namely that based on the proportionate lengths of the sides of similar triangles, other types of sights may be used. One of these alternative types is the ordinary stereoscopic range-finding sight. Because this sight increases the effective interpupillary distance of the eyes it enhances normal depth perception, which is further aided by magnification. A reticule embodied in the sight provides a series of reference points from which the ranges may be read direct.

In the absence of other means for determining range it is possible to obtain some indica-



tion of the range of a target being fired upon by a gun coordinated with a shutter mechanism which has been described above. This presupposes that the ranges of the visible traces viewed through the shutter mechanism are known and that they are spaced far enough from each other so that they may be individually identified. The procedure will be to fire at the target until a hit has been scored. The range may be determined by identifying the visible trace which made the hit, the range of which is already known. The device is also useful in the study of exterior ballistics inasmuch as the series of short visible traces may be photographed or otherwise-recorded for the purpose of later study.

An unusual effect has been observed in the use of this invention. It has been observed that the color of the disc, when a rotary disc shutter is used, affects the maximum range at which the tracers may be seen. If the color of the disc matches the color of the background against which the fire is directed, the tracers are visible to the point of burn-out. But the more contrast there is between the color of the disc and the background of the target the shorter becomes the range at which the tracers will be at all visible to the eye. This effect may be utilized so as to make invisible all the traces in excess of the usual range of effectiveness of the bullets employed. This effect is probably the result of a lack of accommodation by the eyes due to retinal fatigue.

While the invention has been described with reference to certain preferred examples thereof which give satisfactory results, it will be understood by those skilled in the art to which the invention pertains, after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is my intention, therefore, to cover in the appended claims all such changes and modifications.

The invention herein described may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A stroboscopic fire control device for guns employing tracer ammunition comprising a rotatably mounted substantially opaque disc, said disc having a sighting aperture formed therein occupying a small portion of the rotational path of said disc relative to the remainder thereof, and means cooperating with a gun for rotating said disc in timed relationship with the firing of tracer projectiles from the gun to enable intermittent sighting through said aperture of fired tracer projectiles for very brief periods of time and at regular time intervals, thus producing a stroboscopic effect in the observation of said projectiles and providing a view of a plurality of substantially stationary small light dashes along the flight path of said tracer projectiles separated by known range increments as determined by the relation of the rate of disc rotation to the tracer projectile firing rate and flight velocity.

2. A stroboscopic fire control device for guns employing tracer ammunition comprising a rotatably mounted disc, said disc having a sighting aperture therein, and means cooperating with a gun for revolving said disc in timed relationship with the firing of tracer projectiles from the gun to enable intermittent sighting through said aperture of fired tracer projectiles for very brief periods of time and at regular time intervals, to produce a stroboscopic effect in the observation of said projectiles, thereby providing continual observation of said projectiles at a plurality of known range increments as determined by the relation of the rate of disc rotation to the tracer projectile firing rate and flight velocity.

3. A fire control device for guns employing tracer ammunition comprising a shutter means, means cooperating with a gun for operating said shutter in timed relationship with the firing of tracer projectiles from the gun to enable intermittent sighting through said shutter of fired tracer projectiles for very brief periods of time and at regular time intervals, thus producing a stroboscopic effect in the observation of said projectiles and enabling continual observation of said projectiles at a plurality of known range increments as determined by the relation of the rate of shutter operation to the tracer projectile firing rate and flight velocity, and a range finder positioned in the line of sight through said shutter for determining the range of a target, thereby facilitating the intersection of the projectile flight path with the target.

4. A fire control device for guns employing tracer ammunition comprising a shutter means, and means cooperating with a gun for opening and closing said shutter in timed relationship with the firing of tracer projectiles from the gun, the open shutter intervals being brief relative to the closed shutter intervals, to enable intermittent sighting through said shutter of fired tracer projectiles for very brief periods of time and at regular time intervals, thus producing a stroboscopic effect in the observation of said projectiles and providing a view of a plurality of substantially stationary small light dashes along the flight path of said tracer projectiles separated by known range increments as determined by the relation of the rate of shutter operation to the tracer projectile firing rate and flight velocity.

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#### REFERENCES CITED

The following references are of record in the file of this patent:

#### UNITED STATES PATENTS

Number	Name	Date
1,814,756	Levy	July 14, 1931
2,157,575	Schmidt	May 9, 1939
2,286,474	Durham et al.	June 16, 1942
2,322,806	Jackson	June 29, 1943

#### FOREIGN PATENTS

Number	Country	Date
832,814	France	July 11, 1938