

April 2, 1946.

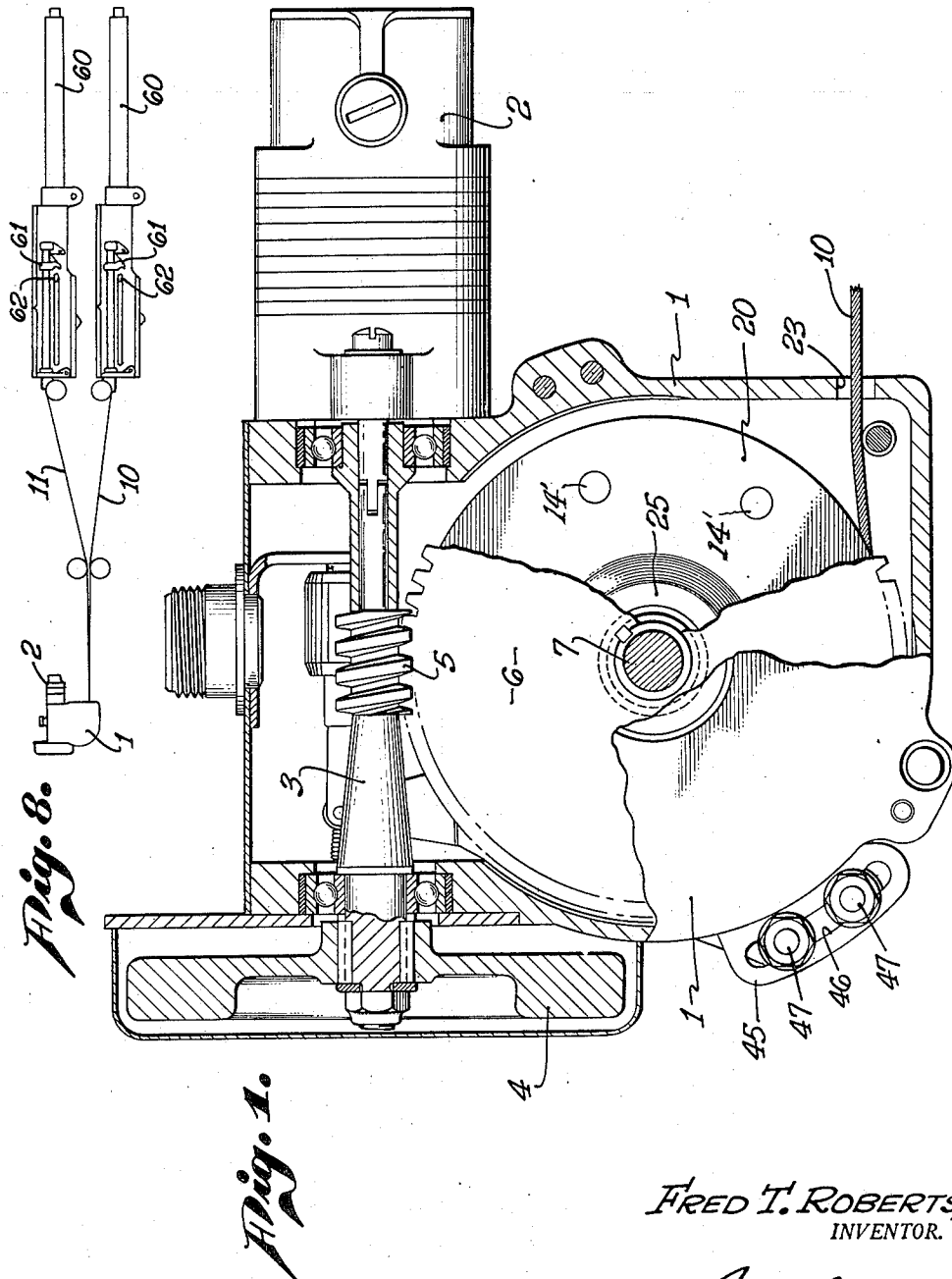
F. T. ROBERTS, JR

2,397,507

REMOTE CONTROL GUN CHARGER

Filed Oct. 4, 1943

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

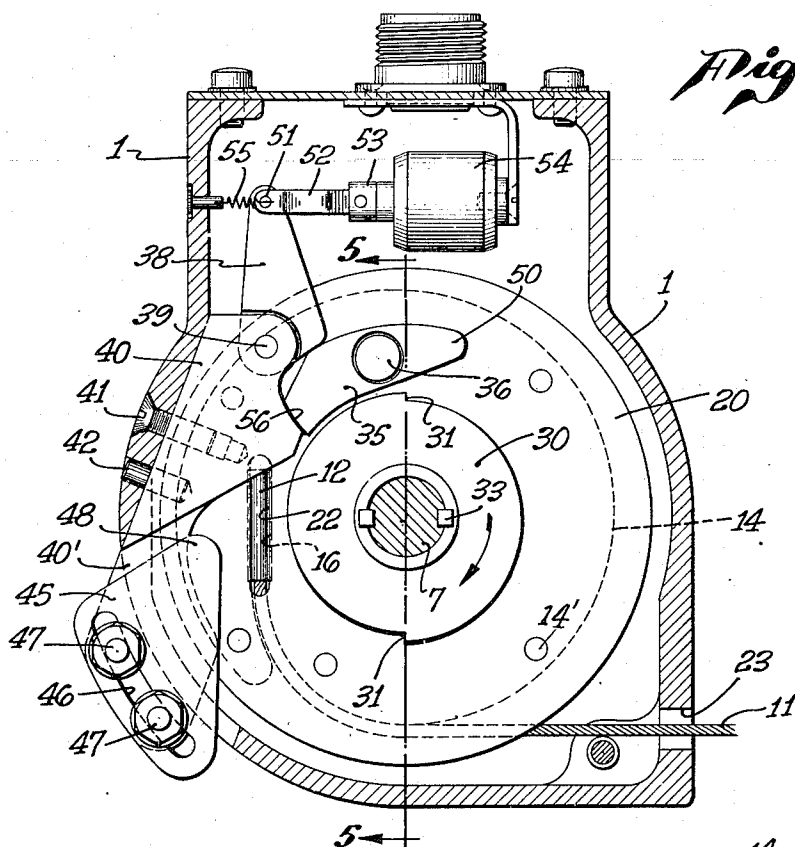


Fig. 2.

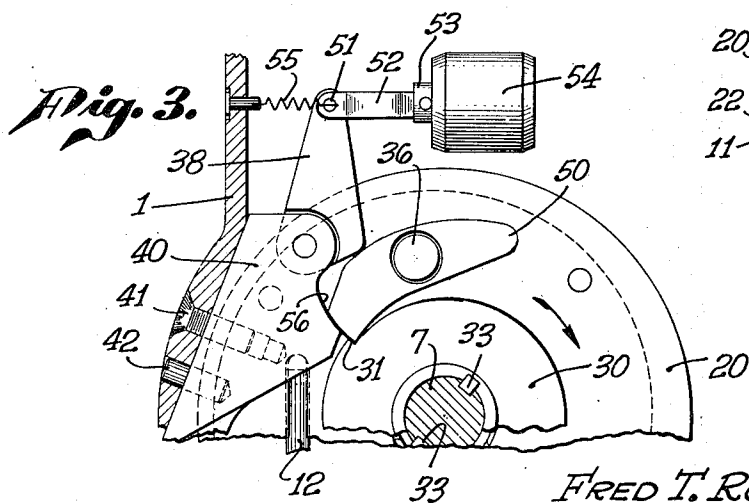


Fig. 3.

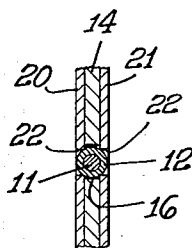


Fig. 7.

INVENTOR.
FRED T. ROBERTS, JR.,
BY *Henry Robinson*
ATTORNEY.

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F. T. ROBERTS, JR

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3 Sheets-Sheet 3

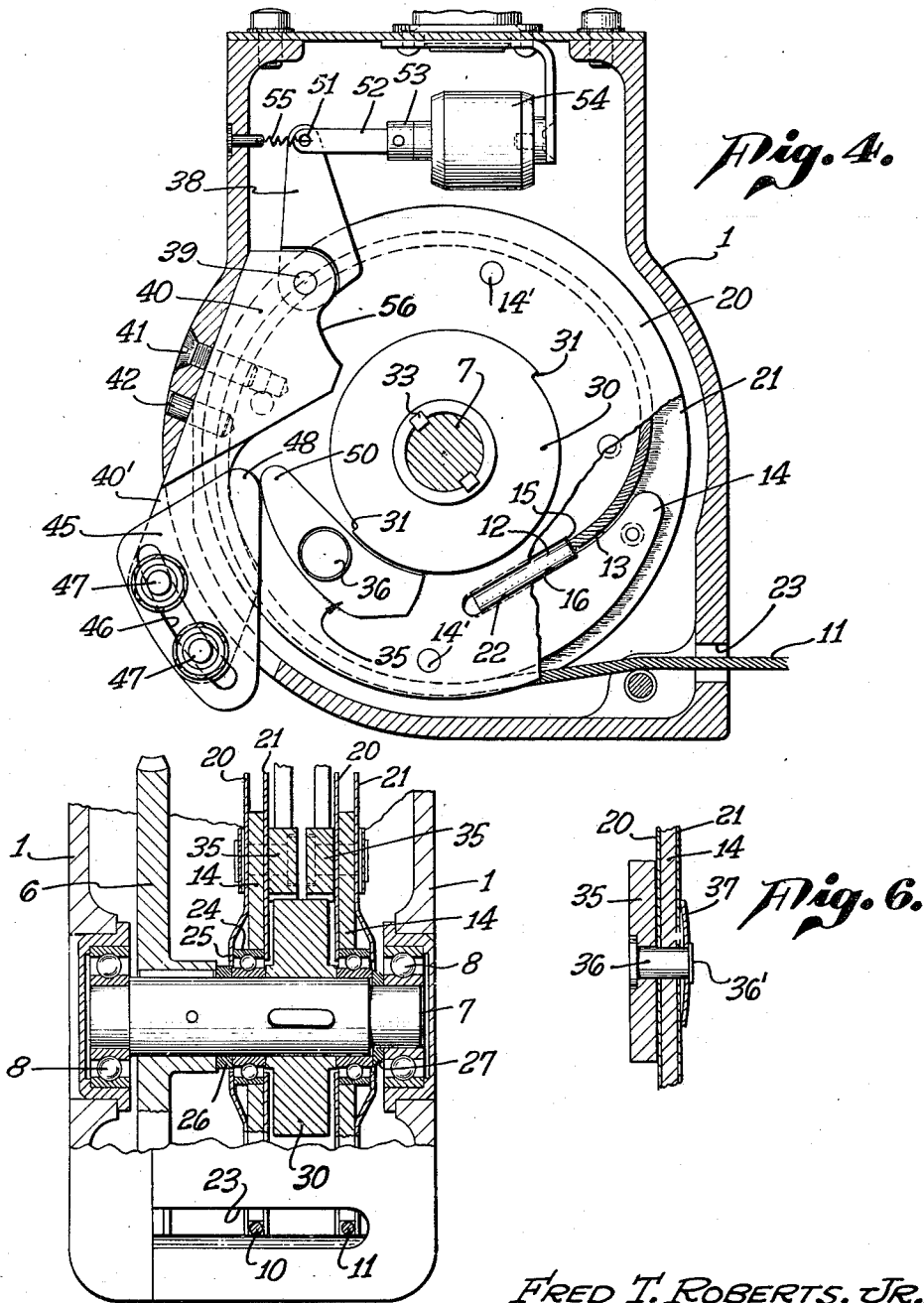


Fig. 5.

FRED T. ROBERTS, JR.,
INVENTOR.

BY *Samuel R. Abraham*

ATTORNEY.

UNITED STATES PATENT OFFICE

2,397,507

REMOTE-CONTROL GUN CHARGER

Fred T. Roberts, Jr., Los Angeles, Calif., assignor
to Interstate Aircraft and Engineering Corp., a
corporation of California

Application October 4, 1943, Serial No. 504,916

2 Claims. (Cl. 254—185)

This invention relates to gun chargers which are designed to set the gun at firing position to assure the proper firing of the gun and resetting of the gun into firing position on failure of the function of the gun.

Heretofore gun chargers of the class described, both of the mechanical and hydraulic type, have been designed for manual control. This is objectionable as it requires that the controlling device be mounted in a position handy to the pilot or other member of the crew. In the case of a gun operated by the pilot it is necessary for the pilot to remove his hands from the flight control for the purpose of operating the charging controlling device of the gun. In the case of a gunner the gunner must remove his hands from the directional control to operate the charging control device of the gun.

It is an object of the present invention to provide a gun charger of the class described of simple and compact construction which may be remotely controlled so that the charger may be mounted in any available space in the wings, turret or fuselage and be operated by the pilot merely by pressing a button located handily on the flight control or by the gunner by a button on the gun directional control to control an electric circuit.

Another object is to provide a simple form of gun charger in which the mechanism returns to normal position after the setting operation has been performed.

Another object of the present invention is to provide a gun charger of the class described in which the operating shaft may be continuously rotated in one direction by means of an electric motor or the like.

Other objects and advantages will appear hereinafter from the following specification and drawings, in which is illustrated the preferred form of gun charger embodying my invention.

Referring to the drawings, which are for illustrative purposes only—

Fig. 1 is a vertical sectional view partly broken away showing the complete gun charger;

Fig. 2 is a vertical sectional view transversely through the operating shaft showing the associated parts when such parts are in the position when the gun is properly operating;

Fig. 3 is a view similar to Fig. 2 showing the parts when a gun is not firing and requires charging to load the gun;

Fig. 4 is a view similar to Figs. 2 and 3 showing the parts in the position assumed after the device has operated to a position to reset the gun. In

other words, in released position wherein the cable is freely rotating the cable cam;

Fig. 5 is a vertical section view, partly in elevation, on line 5—5 of Fig. 2;

Fig. 6 is an enlarged sectional view showing the manner of mounting the pawl on the retaining plates;

Fig. 7 is a sectional view through a unit showing the manner of mounting a cable therein; and

Fig. 8 is a diagrammatic view of the charger and gun connection.

More particularly referring to the drawings, 1 designates the housing having mounted thereon an electric motor 2 which operates a motor shaft 3. Mounted on the end of the motor shaft assembly is a fly wheel 4 and also mounted on this shaft is a worm indicated at 5 which meshes with the worm wheel indicated at 6. The worm wheel 6 is keyed to what may be termed a driving shaft or ratchet shaft indicated at 7. Shaft 7 is mounted in anti-friction bearings 8 at each end of the shaft in the side walls of the housing indicated at 1.

In the form of invention illustrated in the drawings the parts are arranged for the operation of two guns through the medium of cables 10 and 11. The ends of these cables, as indicated particularly in Fig. 4, are sheathed in a sleeve indicated at 12. This sleeve 12 is swaged or otherwise secured to the end of the cable 10 which lies in a slot 13 in a cable drum indicated at 14. The forward end of the sleeve 12 forms a shoulder indicated at 15 which abuts against a shoulder formed by the continuation 16 of slot 13 in which one of the cables, 10 or 11, lies between the two retaining plates 20—21, such retaining plates each having a slot indicated at 22 to receive the sleeve 12 or that portion of it which projects beyond the side of the cable cam 14.

Referring to continuation 16 of the slot 13, the cable is wound around the periphery of cable drum 14 and extends through an opening 23 in the housing to the ordinary or usual connection to the gun bolt.

The cable drum 14 and retaining plates 20, and 21 are mounted to freely rotate on ball bearings indicated at 24 on shaft 7, such ball bearings being kept in alignment by means of an offset center portion 25 on the outer of the retaining plates 20 or 21, which offset portion extends outwardly to cover the sides of the respective ball bearing 24. These bearings are kept in proper position on shaft 7 by means of washers or rings indicated at 26 and 27.

In the form shown there are two units, each

unit consisting of a cable drum interposed between the two retaining plates held together by rivets 14', each unit being connected as heretofore described with the cable for operating one gun.

As shown in Fig. 5 there is mounted between the two units a ratchet indicated at 30 having two teeth indicated at 31. As shaft 7 is continuously rotated through the medium of the worm wheel 6, the ratchet 30 being keyed to shaft 7 by means of keys 33, the ratchet also continuously rotates in one direction.

Mounted on each unit and engageable with the ratchet 30 is a pawl indicated at 35. This pawl is pivotally mounted upon and frictionally held against the sides of the unit by bolt 36 which extends through the pawl and the unit having a spring washer indicated at 37 on the outside of the unit held against the unit by means of a head 36' on the bolt 36. This structure permits the movement of the pawl as hereinafter described.

The pawl is designed to be moved into engaging position with either of the teeth 31 by means of a lever indicated at 38, which is mounted by means of pin 39 on a block 40. This block 40 is mounted by means of a screw 41 and pin 42 on the housing indicated at 1, and the block extends into the space between the two units. Adjustably mounted on block 40 is a stop or cam indicated at 45. This stop 45 is provided with a slot 46 through which extends two bolts indicated at 47 mounted on an extension 40' on block 40. The end 48 of stop 45 extends into the path of the pawl arm 50 on the pawl 35, so that when the arm 50 engages with the end 48 of stop 45 the pawl is moved free of the ratchet, as more fully hereinafter described.

Lever 38 is operated in the following manner: the upper end of the lever is pivoted by means of pin or bolt 51 to a link 52 pivotally connected to the core 53 of a solenoid 54, such lever being held in an outward position by means of a coil spring 55 attached to housing 1. Unless the solenoid is energized the parts remain in the position shown in Fig. 2, in which position the pawl 35 is out of engagement with the ratchet. In this position the pawl 35 is in engagement with a shoulder 56 on the block 40, such shoulder being contoured to conform to the shape of the contacting end of the pawl 35, as indicated in Fig. 2 and is yieldingly held in such position by the tension of the cable 10.

In operation, it is to be understood that shaft 7 continuously operates so as to drive the ratchet in the direction of the arrow shown on the ratchet in Fig. 2. As shown in that figure it is to be understood that the motor and shaft, just referred to, are continuously rotating and the parts may be said to be in normal position, that is, the gun is properly firing and there is no

occasion for using the charger to reset the gun. However, in the event one of the guns fails to fire by reason of the firing bolt not being operated to eject the shell, the pilot or gunner may push a button and through the medium of an electric circuit (not shown) energize the solenoid 54, causing lever 38 to move into the position shown in Fig. 3 of the drawings and cause the pawl to engage one of the teeth 31 on the ratchet 30. By reason of the engagement of the pawl with the ratchet the unit carrying the pawl, that is, the retaining plates and cable drum together with the cable, are caused to rotate in the direction of the arrow shown in Fig. 3. This operation winds the cable on the cable drum and consequently pulls on the cable and through its connection with the gun mechanism operates the firing bolt of the gun to reset the gun into firing position. As the pawl 35 travels into the position shown in Fig. 4 the arm 50 of the pawl engages the stop 45 moving the pawl into the position shown, thereby releasing the unit and due to the tension on the cable by the gun returns the unit to the normal position shown in Fig. 2 of the drawings.

In Fig. 8 is diagrammatically represented two guns 60 each having a charging rider 61 attached to the cables 10 and 11, which rider engages and operates the bolt 62 of the gun.

I claim as my invention:

1. In a gun charger, the combination of: a housing; a rotatable shaft mounted in the housing; means for rotating said shaft in one direction only; a ratchet fixed on said shaft; a cable unit on each side of said ratchet freely mounted on said shaft; a cable attached to each cable unit; a pawl mounted on each cable unit engageable with said ratchet; stationary cam means adjustably mounted on the housing engageable by said pawls for moving the pawls out of engagement with said ratchet during rotation of the ratchet; and a stop mounted on said housing for each pawl engageable with its associated pawl to limit the return movement of its associated unit.

2. In a gun charger, the combination of: a housing; a rotatable shaft mounted in the housing; means for rotating said shaft in one direction only; a ratchet fixed on said shaft; a cable unit on each side of said ratchet freely mounted on said shaft; a cable attached to each cable unit; a pawl mounted on each cable unit engageable with said ratchet; and an adjustable stationary cam means mounted on said housing engageable by each pawl for moving the pawls out of engagement with said ratchet during rotation of the ratchet; each of said cable units comprising a wrap around cable receiving drum and a retaining plate on each side of said cable receiving drum.

FRED. T. ROBERTS, JR.