Jan. 30, 1945. Q. BERG 2,368,191

ELEVATING MECHANISM

Filed April 13, 1943 2 Sheets-Sheet 1

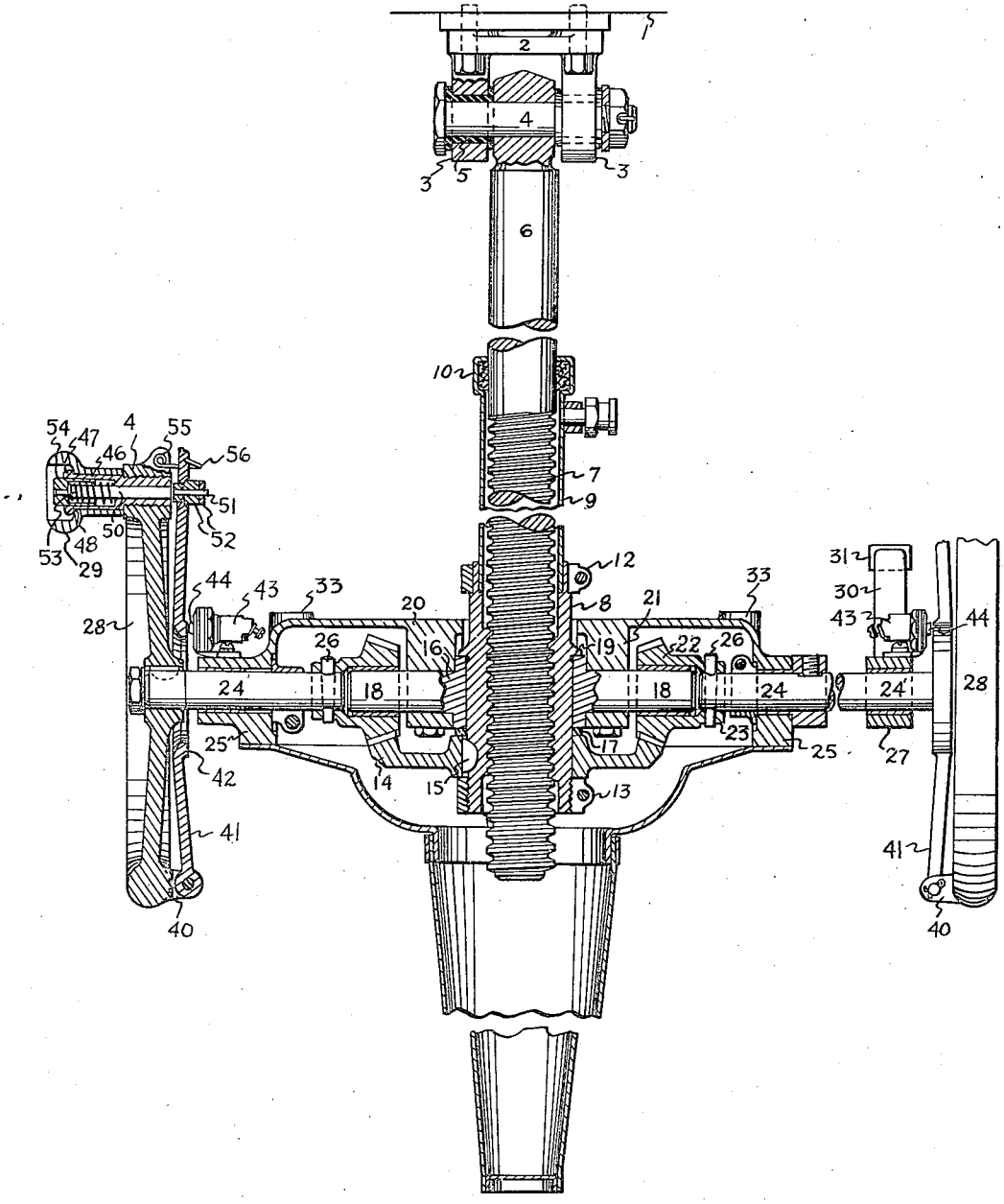


FIG. 1

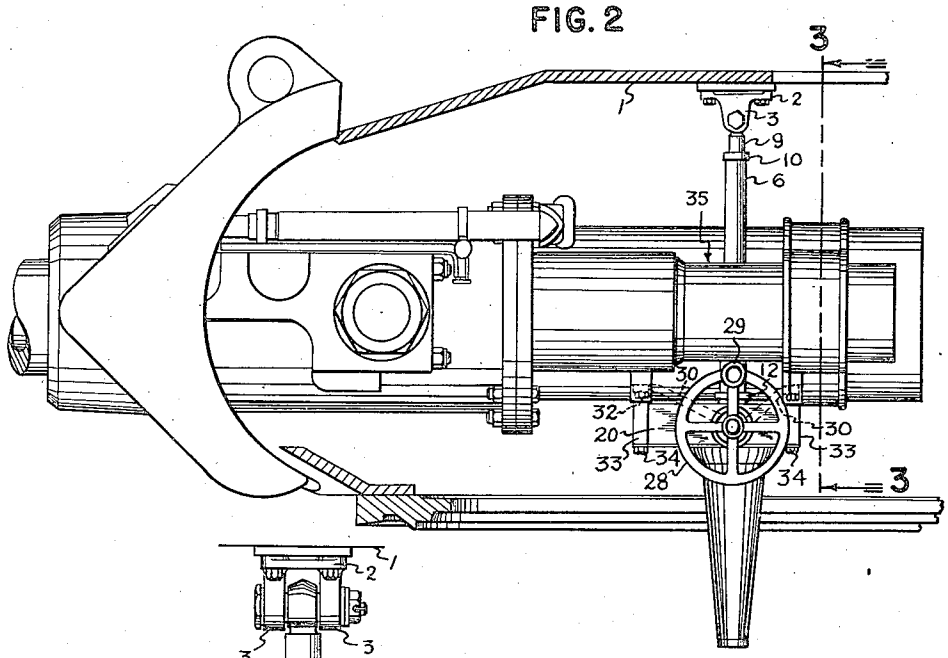
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FIG. 2



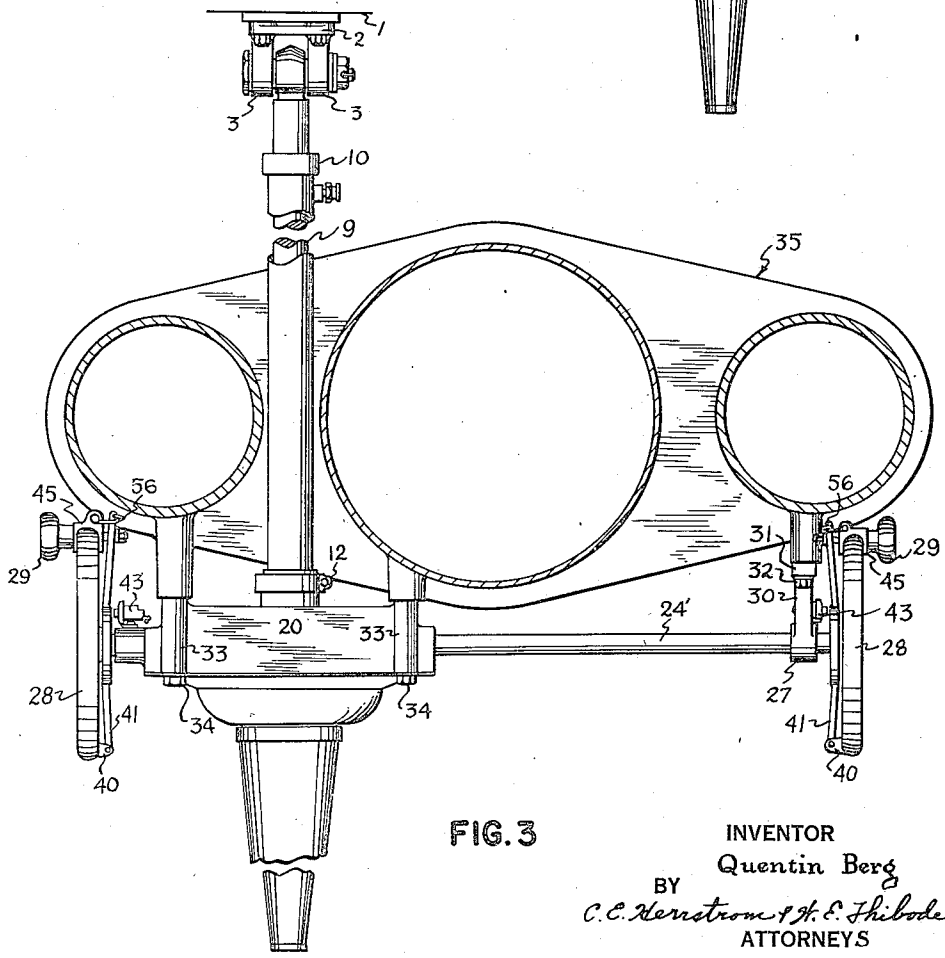


FIG. 3

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UNITED STATES PATENT OFFICE

2,368,191

ELEVATING MECHANISM

Quentin Berg, Detroit, Mich.

Application April 13, 1943, Serial No. 482,863

4 Claims. (Cl. 89—41)

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

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

The present invention pertains to, and has for its object, a comparatively simple, durable and easily operated gun elevating mechanism.

The vertical movement of elevation is obtained by causing a nut to turn on a suspended threaded shaft. The nut is rotated through a gear keyed thereto, and the gear is turned through a pair of smaller gears meshing therewith. The physical support for the smaller gears includes a hub member carried by the nut and carrying oppositely directed radial pivot studs on which these gears are loosely mounted. A housing for the gearing is mounted on the studs and carries a pair of shafts in alinement with the studs and having the smaller gears secured thereto. A crank or hand wheel is fastened on each shaft for operating the mechanism from either side of the housing. The housing in turn is attached to the gun cradle, whereby the gun is elevated on turning one of the cranks and thereby moving the nut and housing up or down on the threaded shaft.

Also included in the invention is a firing mechanism associated with each crank. This includes a firing switch carried by the housing adjacent to each crank and a stem slidable in the crank handle for operating the switch through an actuating member pivotally mounted on the crank and attached to the slidable stem. By this device the operator can fire with the thumb of the same hand that holds the crank handle, with a minimum loss of time between gun adjustment and firing.

The invention is fully disclosed by way of example in the following description and in the accompanying drawings in which:

Fig. 1 is a vertical section of the device.

Fig. 2 is a side elevation, and

Fig. 3 is a section on the line 3—3 of Fig. 2.

The numeral 1 represents a suitable overhead support from which the gun elevating mechanism may be suspended. In this case the support is the top of the gun turret of a combat tank or tank destroyer, although this support may be a part of an installation that is fixed and stationary or merely rotatable.

To the underside of the member 1 is fastened a bracket comprising a plate 2 and a pair of horizontally alined apertured lugs 3. A pin 4 is fitted in the lugs 3 with interposed resilient bushings 5, and a shaft 6 is suspended from the pin, between the lugs and fitted tightly on the pin.

The lower portion of the shaft 6 is threaded at 7 and receives an elongated nut 8. A sleeve 9 is fitted in the upper end of the nut, extending upwardly some distance along the shaft and receiving in its upper end a suitable dust seal 10 engaging the shaft. An appropriate clamping device 12 is provided on the sleeve.

A collar 13 is secured on the lower end of the nut 8 and supports a bevel ring gear 14 fitted on the nut and keyed thereto at 15. On the top of the gear is mounted a hub member 16, with a washer 17 interposed, from which extend a pair of pivot studs 18 radially in opposite directions. A collar 19 on the nut 8 overlaps the member 16.

A housing 20 is mounted on the studs by means of depending bearings 21 which receive the studs. On each stud is rotatably mounted a bevel pinion 22 meshing with the gear 14. Each pinion has an extended hub 23 into which is fitted a shaft 24 mounted in a bearing 25 formed in the peripheral wall of the housing 20. Each hub is secured to its shaft 24 by a pin 26.

In this instance the particular construction requires that one of the shafts be extended outwardly at 24' to the other side of the gun cradle and an outboard bearing 27 is provided to receive the extension. On each shaft, externally of the housing 20, is mounted a hand wheel 28 with a handle or operating knob 29. It will be shown that the housing 20 is not rotatable, and it is now evident that rotation of either hand wheel imparts rotation to the gear 14 and nut 8, whereupon the nut 8 and housing 20 with its enclosed parts are moved lengthwise of the shaft 6.

A pair of arms 30 diverge from the bearing 27 and are formed at their outer ends with ears 31 receiving studs 32 attached to the gun cradle 35. Similarly, the more remote side of the housing 20 is formed with bosses 33 receiving bolts 34 also secured to the gun cradle. The housing 20 is thus constrained for movement with the gun cradle while either hand wheel 28 is turned and is permitted to rock with the cradle through its pivotal mounting on the studs 18.

Each hand wheel is formed with a peripheral lug 40 to which is hingedly attached a spoked member 41 having a portion lying adjacent to the handle 29 as shown in Figure 1. Around the center of this member is formed a ring 42 providing ample clearance for the shaft 24. On each of the bearings 25 and 27 is mounted an electric firing switch 43 wired to the detonator in any suitable manner. The switch includes a movable element 44 normally lying closely adjacent to the ring 42.

Diametrically opposite the lugs 40, the hand wheel is formed with a boss 45 to which the handle 29 is secured by a tube 46 threaded into the boss and having an end flange 47 bearing against a shoulder 48 within the handle. A stem 50 is slidably mounted in the tube and projects inwardly beyond the boss 45 at 51. The extension 51 passes through the member 41 and is secured thereto by nuts 52. The outer portion of the stem 50 is surrounded by a coil spring 53 seated in a cap 54 secured on the outer end of the stem. Thus the stem and actuator 41 normally maintain the position shown in Figure 1.

The gun is fired by pressing inward on the cap 54 to bring the ring 42 against the plunger 44 and close the circuit through the switch 43. This operation is performed by the thumb of the same hand that holds the handle 29, whereby the gun is fired without appreciable loss of time after the adjustment has been made. This subject matter is described and claimed more fully in my copending application Serial Number 489,361, filed June 2, 1943, for Gun firing. A wire 55 attached to the boss 45 is hooked at 56 around the edge of member 41 to limit the outward movement thereof.

It will now be seen that the invention provides a simple, durable and easily operated mechanism for elevating the gun.

Although a specific embodiment of the invention has been illustrated and described, it will be understood that various alterations in the details of construction may be made without departing from the scope of the invention as indicated by the appended claims.

What I claim is:

1. In a gun elevating mechanism, a suspended threaded shaft, an elongated nut thereon, a hub surrounding said nut, pivot studs extending radially from said hub in opposite directions, a gear fixed to said nut, gears loosely mounted on said studs and meshing with the first named gear, means for turning the second named gears, a housing rotatably supported by said studs, and means for attaching said housing to a gun.

2. In a gun elevating mechanism, a suspended threaded shaft, an elongated nut thereon, a hub surrounding said nut, pivot studs extending radially from said hub in opposite directions, a gear fixed to said nut, a housing rotatably supported by said studs, second shafts journaled in said housing in line with said studs, gears fixed on said second shafts and meshing with said first named gear, the second named gears being loosely mounted on said studs, means for selectively turning said second shafts, and means for attaching said housing to a gun.

3. A gun elevating mechanism comprising an elevating screw and means for attaching said screw to a fixed pivot, a nut threaded upon said screw, a hub journalling said nut, a pivot stud extending from said hub, a first gear mounted for rotation on said stud and means for rotating said gear, a second gear fixed to said nut and meshing with said first gear, a bearing carried by said stud, and means for fixedly attaching said bearing to a gun.

4. A gun elevating mechanism comprising an elevating screw and means for attaching said screw to a fixed pivot, a nut threaded upon said screw, a hub journalling said nut, pivot studs extending radially from said hub in opposite directions, first gears mounted for rotation on said studs, a second gear fixed to said nut and meshing with said first gears, bearings carried by said studs and supporting a housing, second shafts journalled in said housing in line with said studs and affixed to said first gears, means for selectively turning said shafts and means for fixedly attaching said housing to a gun.

QUENTIN BERG.