May 3, 1932. A. E. ELSEA 1,856,987

TRAVERSING MACHINE GUN MOUNTING

Filed Aug. 13, 1931 2 Sheets-Sheet 1

FIG. 1.

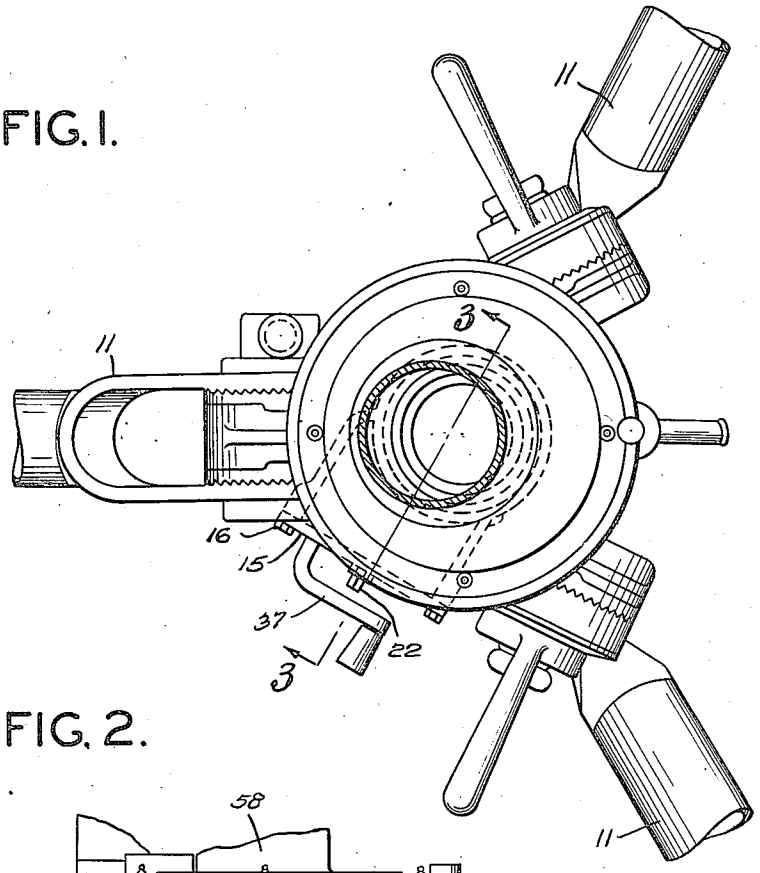
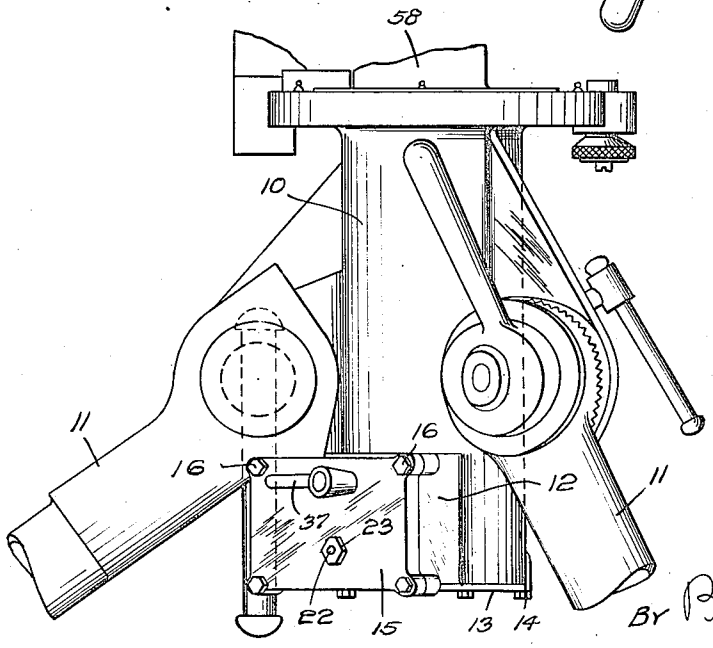


FIG. 2.



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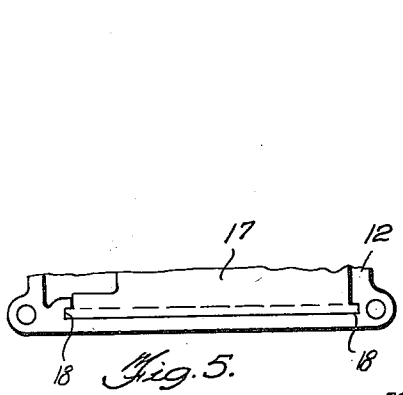

Fig. 5.

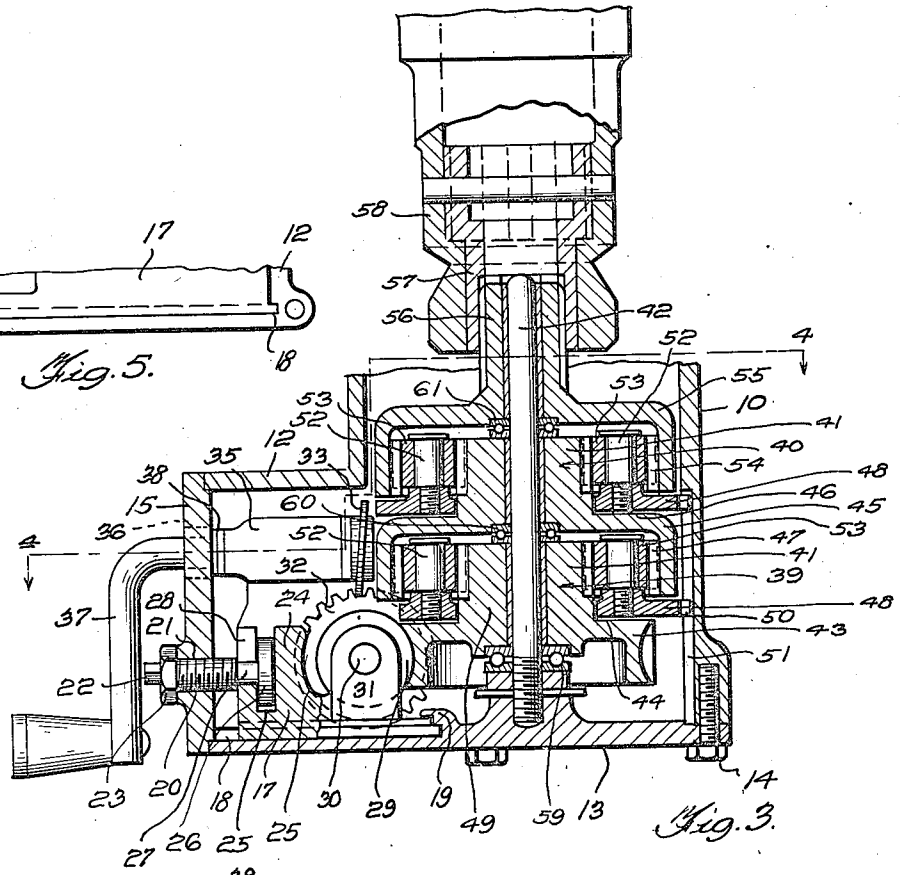

Fig. 3.

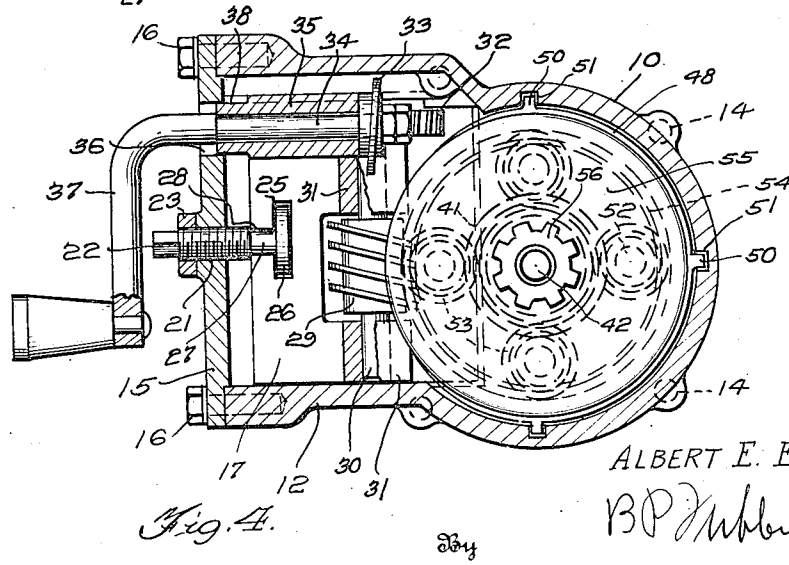

Fig. 4.

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1,856,987

UNITED STATES PATENT OFFICE

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TRAVERSING MACHINE GUN MOUNTING

Application filed August 13, 1931. Serial No. 556,886.

My invention relates to means for traversing machine guns.

Important objects of the invention are to provide mechanical means for traversing a machine gun during action, with accuracy, to provide a device of this character which can be easily and quickly changed from the mechanical to the hand-operated means for traversing the machine gun, to provide means of the above-mentioned character which properly cushions or absorbs the shocks from the firing of the machine gun, whereby the mechanical traversing means remain accurate in operation, to provide a device of the above-mentioned character which is so constructed that upon each turn of the handle for a complete revolution, the machine gun traverses slightly less than one infantry mil, whereby the cones of fire are slightly lapped, to provide a device of the above-mentioned character so constructed that the machine gun is traversed in the same direction with the turning movement of the handle, to provide a mechanically operated device for effecting the traversing of the machine gun over the entire field of fire, to the right or left, to provide a device which may be properly operated without a great amount of training of the operator, to provide a device of the above-mentioned character which is formed of few and simple parts, which may be assembled in the dark or under firing conditions, to provide simple and reliable means for rendering the mechanically operated traversing means inoperative with respect to fulfilling its function, thereby restoring the manual traversing operation of the machine gun, to provide a device of the character described which is light, strong, compact, and having all operating parts enclosed within a housing, for protection.

In the accompanying drawings, forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a plan view of a device embodying my invention,

Figure 2 is a side elevation of the same,

Figure 3 is a central vertical section taken on line 3—3 of Figure 1,

Figure 4 is a horizontal section taken on line 4—4 of Figure 1,

Figure 5 is a fragmentary end elevation of the housing, the end plate being removed.

In the drawings, wherein for the purpose of illustration is shown a preferred embodiment of my invention, the numeral 10 designates a vertically arranged cylindrical housing, included in the tripod mount of the machine gun, and having legs 11, adjustably connected therewith, as is well known. At one side and near its lower end, the housing 10 is provided with a horizontal extension 12, preferably square in cross-section, and preferably formed integral therewith. The bottoms of the housing 10 and extension 12 are closed by a common plate or cover 13, attached thereto by bolts 14, or the like. The open end of the housing extension 12 is closed by a plate or cover 15, attached thereto by bolts 16, or the like.

Mounted to slide within the housing extension 12 is a carriage 17, the longitudinal edges of which engage within undercut grooves 18, Figure 5, whereby the carriage is held against tilting action. The forward end of the carriage is also adapted to be moved beneath an overhanging flange 19, Figure 3, when shifted to the forward position. Means are provided to shift the carriage 17 longitudinally and to lock the same in a selected adjusted position, comprising a feed screw 20, having screw-threaded engagement within a screw-threaded opening 21, formed in the cover 15, and having an outer polygonal portion 22, for engagement with a wrench or other tool, to turn the same. A lock nut 23 is provided to clamp the feeding screw in the adjusted position. The carriage 17 is provided with an upstanding block 24, pref-

erably formed integral therewith, and this block is provided with a recess 25, for receiving a cylindrical head 26, rigidly carried by a smooth extension 27 of the feeding screw 20. The head 26 has a sliding engagement with the opposite walls of the recess 25, and thereby serves to accurately shift the carriage in either direction. The extension 27 is passed through a vertical slot 28, formed in the block 17, as shown.

Speed reducing worm gearing is bodily mounted upon the carriage 17, and is shiftable therewith. This worm gearing embodies a worm 29, carried by a shaft 30, rotatable within bearings 31, which are rigidly attached to the carriage 17 and project above the same. Rigidly attached to one end of the shaft 30 is a worm wheel 32, arranged beneath a worm 33, having a single thread or turn. This worm 33 is rigidly mounted upon a horizontal shaft 34, operating within a bearing 35, which is rigidly mounted upon the carriage 17, and projects above the same, as shown. The shaft 34 extends outwardly beyond the housing, through an opening 36, and is equipped with a handle 37, for manual actuation. The bearing 35 has a reduced extension 38, adapted to slide outwardly through the opening 36, as shown. It might be stated at this point, that by removing the cover 15, the carriage 17 and all elements constituting the worm gearing unit, may be removed from within the housing extension 12.

Planetary gearing is mounted within the vertical housing 10, and this planetary gearing embodies planetary gear units 39 and 40. Satisfactory results are obtainable by using two of these planetary gearing units, but the invention is, in no sense, restricted to this precise number. Each planetary gearing unit embodies a sun gear 41, rotatably mounted upon the vertical shaft 42, rigidly attached to the bottom plate or cover 13, by any suitable means. The sun gear 41 of the unit 39 is provided at its lower end with a worm wheel 43, having an upper horizontal shoulder 44. This worm wheel is arranged to be engaged by the worm 29, and driven thereby, when the carriage 17 is shifted to the forwardmost position. The sun gear 41 of the unit 40, is provided with an orbit gear 45, preferably formed integral with its lower end, and effecting a horizontal shoulder 46. This orbit gear has an internal set of gear teeth 47. Annular planetary gear carriers 48 are included in each unit, and the openings of these annular carriers are sufficiently large to receive the sun gears, these annular carriers having a sliding fit with hub portions 49 of the sun gears. At their peripheries, the annular carriers 48 have a sliding fit with the inner surface of the housing 10, and are equipped with radial teeth 50 to enter longitudinal grooves 51, thereby effecting a splined connection between the carriers and the housing 10. The carriers 48 are provided with stub-shafts 52, rigidly secured thereto by any suitable means, and project above the same, and pivotally carry the planetary gears 53. The planetary gears 53 in the unit 39 engage the sun gear 41 and the internal gear teeth 47 of the orbit gear 45, while the planetary gears 53, in the unit 40, engage the sun gear 41, of this unit, and internal gear teeth 54 of an orbit gear 55, rotatably mounted upon the shaft 42. The orbit gear 55 has a tubular hub 56 formed integral therewith. The tubular hub 56 is inserted within a bushing 57, and has a detachable splined engagement therewith, so that these parts turn as a unit, and the bushing is arranged within a pintle 58, and is rigidly attached thereto. The machine gun is mounted upon this pintle, as is well known.

I arrange an end-thrust bearing 59 beneath the sun gear 41, of unit 39, an end-thrust bearing 60 between the two sun gears 41, and an end-thrust bearing 61 between the sun bearing 41 and unit 40, and the orbit gear 55, as shown.

The grooves 51 preferably extend through the bottom edge of the housing 10, and this permits of the insertion of the planetary gearing, as a unit, through the bottom end of the housing, when the plate 13 is disconnected therefrom.

Particular attention is called to the fact that the annular carriers 48 have a sliding fit with the hub 49 and with the interior of the housing 10, and thus serve to positively brace the shaft 42, holding it against bending action.

The combined action of the worm gearing and the planetary gearing is such that the tubular hub 56 is turned for slightly less than one infantry mil when the handle 37 has been turned for a complete revolution. The machine gun is, therefore, traversed by the intermittent rotation of the handle 37, with the result that each cone of fire slightly overlaps with the preceding cone of fire. I have discovered that satisfactory results cannot be obtained by using worm gearing alone, for traversing the machine gun, for this worm gearing becomes inaccurate in operation, due to the jars and shocks transmitted to the same from the firing of the machine gun. However, if the worm gearing is combined with the planetary gearing, I have found that the planetary gearing serves to cushion the shocks from the machine gun, during operation, and thereby renders it possible to use the gearing practically indefinitely, and to have the same retain absolute accuracy in traversing the machine gun. Attention is called to the fact that the action of the combined worm gearing and planetary gearing is such that the machine gun is traversed in the same direction in which the handle 37 is turned, and that the direction of rotation of the handle may be reversed, at will, depend-

ing upon the desired direction in which the machine gun is to be traversed. When it is desired to discontinue the mechanical traversing of the machine gun, and to manually sweep the same in either direction, the feed screw 20 is turned in the direction to shift the carriage 17 outwardly, so that worm gear 29 will disengage worm wheel 43, subsequently to which the machine gun may be swept manually, as is customary.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of my invention, or the scope of the subjoined claims.

Having thus described my invention, what I claim is:

1. A traversing mounting for a machine gun, comprising a support, worm gearing mounted upon the support, planetary gearing mounted upon the support and driven by the worm gearing, a machine gun pintle connected with a part of the planetary gearing to turn therewith, the planetary gearing serving to absorb shocks from the action of the machine gun, and means to actuate the worm gearing.

2. A traversing mounting for a machine gun, comprising a support, worm gearing mounted upon the support, planetary gearing mounted upon the support and driven by the worm gearing and having an operating part, a machine gun pintle mounted upon the operating part to be turned thereby, and a rotatable element to drive the worm gearing, the combined action of the worm gearing and the planetary gearing being such that the operating part is turned for slightly less than an infantry mil upon a complete revolution of the rotatable element.

3. A traversing mounting for machine guns, comprising a support, worm gearing mounted upon the support, manually operated means to drive the worm gearing, planetary gearing mounted upon the support and driven by the worm gearing, the worm gearing and planetary gearing coacting to produce a speed reducing gearing, and means for mounting the pintle of a machine gun upon a part of the planetary gearing.

4. In a traversing mounting for machine guns, a support, worm gearing mounted upon the support, means to drive the worm gearing, planetary gearing mounted upon the support and normally driven by the worm gearing and having an operating part, a machine gun pintle for connection with the operating part, and means to render the worm gearing inoperative with respect to driving the planetary gearing, so that the machine gun may be manually swept.

5. In a traversing machine gun mounting, a support, worm gearing mounted upon the support, planetary gearing mounted upon the support and normally driven by the worm gearing and having an operating part, a machine gun pintle for connection with the operating part, and means whereby the worm gearing may be disconnected from the planetary gearing so that the planetary gearing can operate independently of the worm gearing.

6. In a traversing machine gun mounting, a support, a movable carriage mounted thereon, worm gearing bodily mounted upon the carriage to be shifted thereby, means to move the carriage, planetary gearing mounted upon the support and having a part engaged by the worm gearing when the carriage is in a selected position, and disengaged therefrom when the carriage is shifted from the selected position, said planetary gearing having an operating part, and a machine gun pintle for connection with the operating part.

7. In a traversing machine gun mounting, a housing, a shaft arranged within the housing, planetary gearing including planetary gear units embodying sun gears rotatably mounted upon the shaft, said sun gears having hubs, said units further embodying annular carriers arranged between the hubs and the inner wall of the housing, an operating element connected with one planetary gear unit, a machine gun pintle for connection with the operating element, and means to drive the planetary gearing.

8. In a traversing machine gun mounting, planetary gearing having an operating part, a machine gun pintle connected with the operating part, and means to drive the planetary gearing.

9. In a traversing machine gun mounting, planetary gearing embodying an upstanding operating part, a machine gun pintle mounted upon this operating part, and means to drive the planetary gearing.

10. In a traversing machine gun mounting, a housing, planetary gearing mounted within the housing and having an operating part, the arrangement being such that the planetary gearing may be removed as a unit from the housing, and a machine gun pintle for connection with the operating part.

11. In a traversing machine gun mounting, a housing, planetary gearing mounted within the housing and embodying carriers having a splined connection with the housing, gearing including an operating element, the arrangement being such that the planetary gearing is removable as a unit from the housing, a machine gun pintle for connection with the operating element, and means to drive the planetary gearing.

12. In a traversing machine gun mounting, a housing, planetary gearing mounted within the housing and embodying carriers having a splined connection with the housing, gear-

ing including an operating element, the arrangement being such that the planetary gearing is removable as a unit from the housing, a machine gun pintle for connection with the operating element, manually operated worm gearing to drive the planetary gearing, the arrangement being such that the worm gearing is also removable as a unit from the housing.

In testimony whereof I affix my signature.

ALBERT E. ELSEA.