May 3, 1949. S. T. FARRELL ET AL 2,469,333

MACHINE GUN MOUNT

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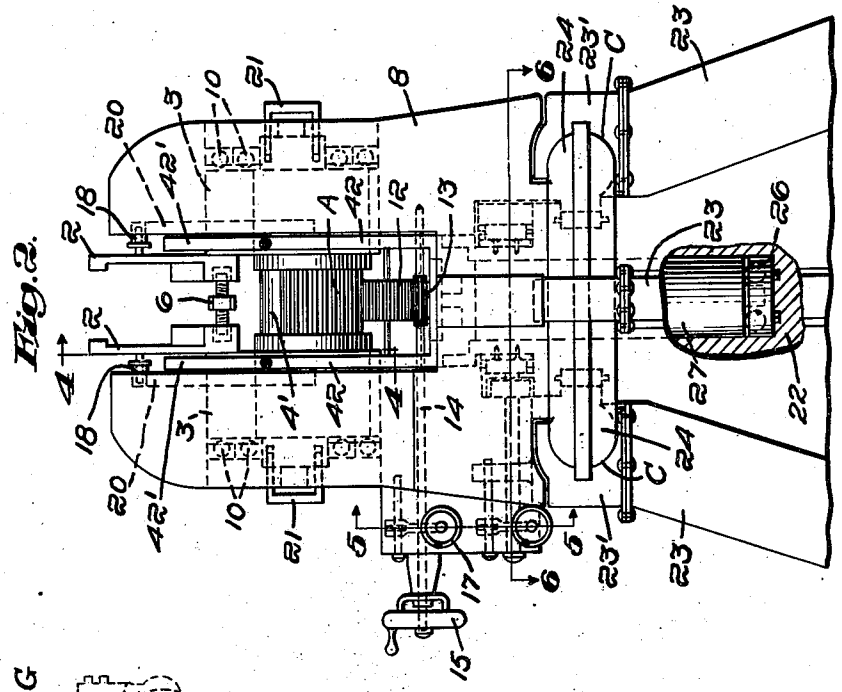


Fig. 2.

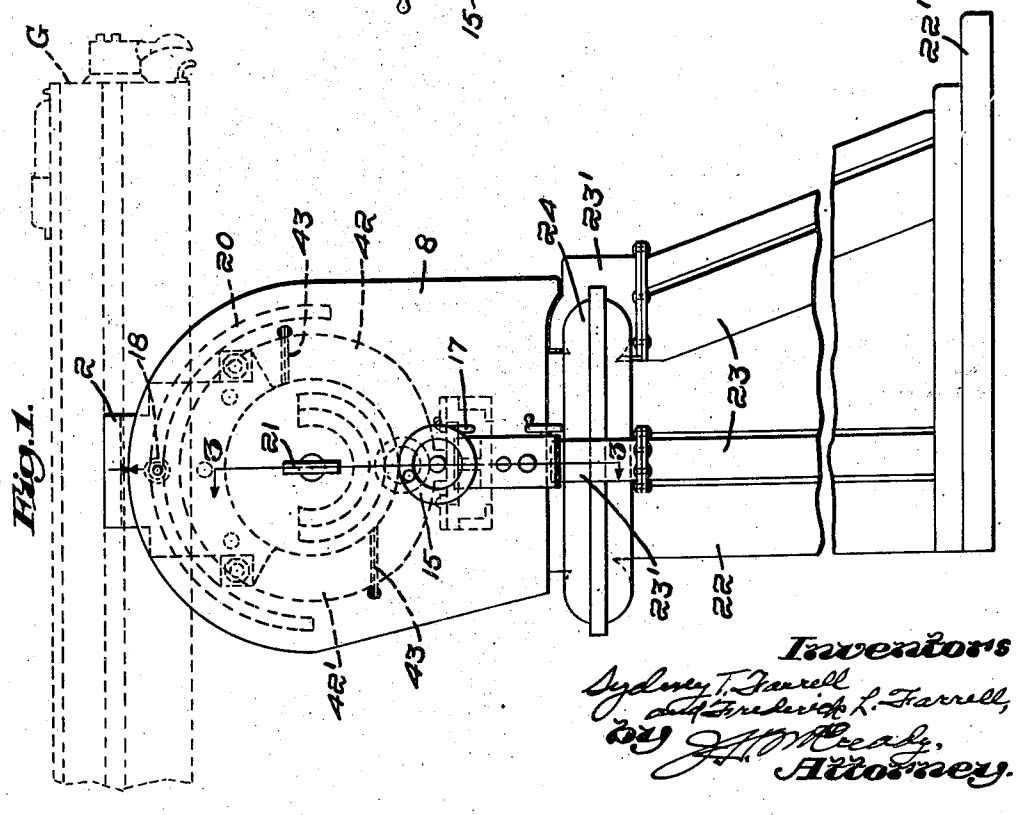


Fig. 1.

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MACHINE GUN MOUNT

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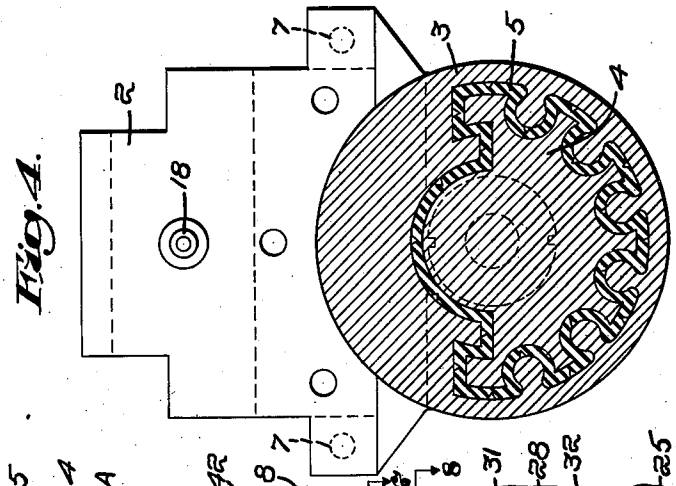


Fig. 4.

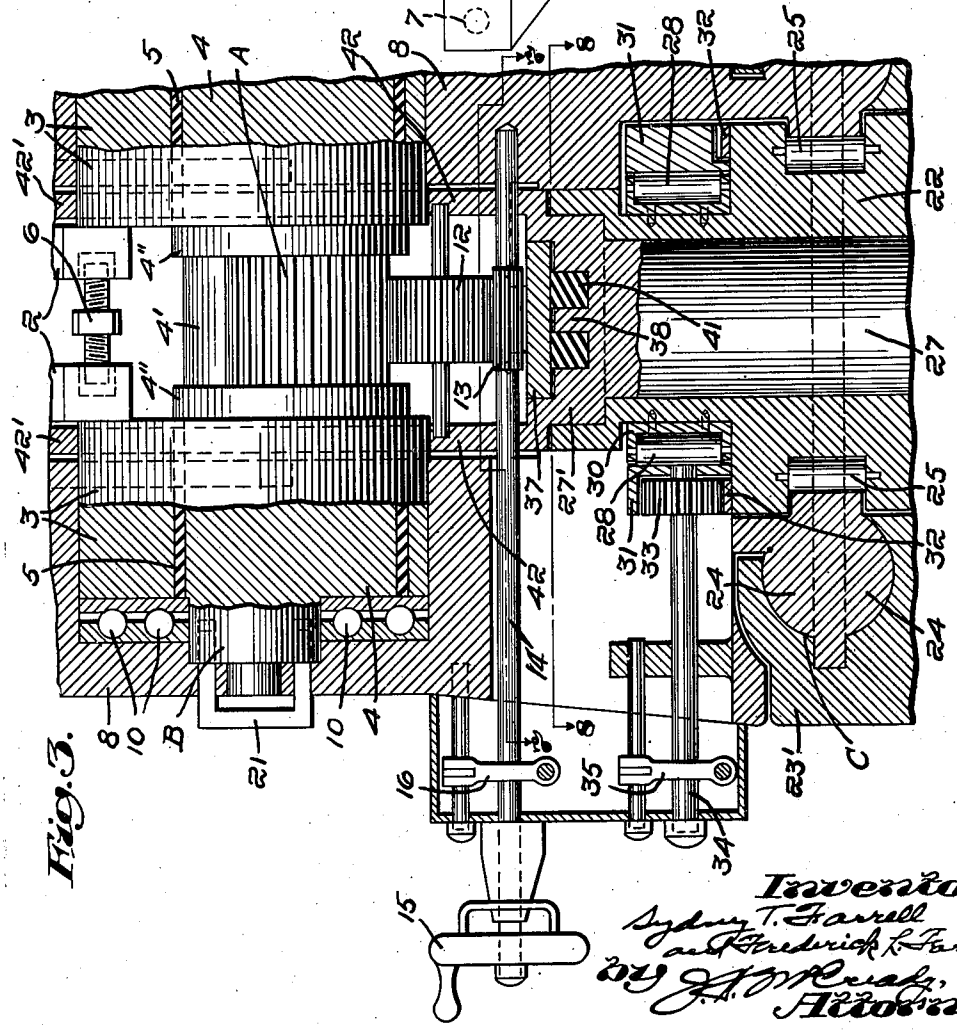


Fig. 3.

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MACHINE GUN MOUNT

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Fig. 6.

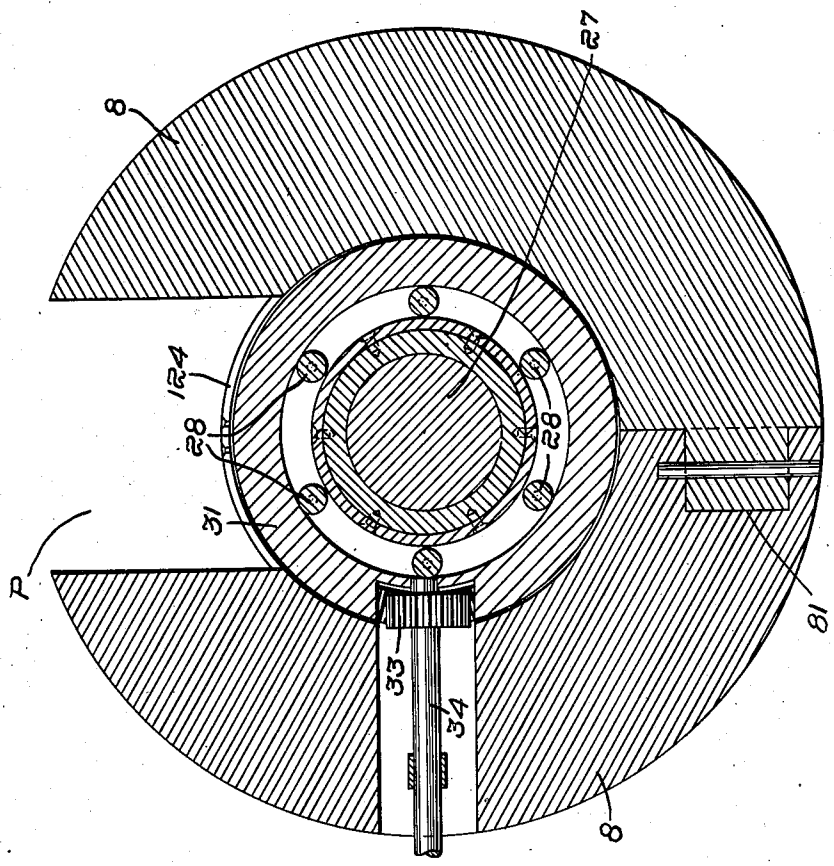
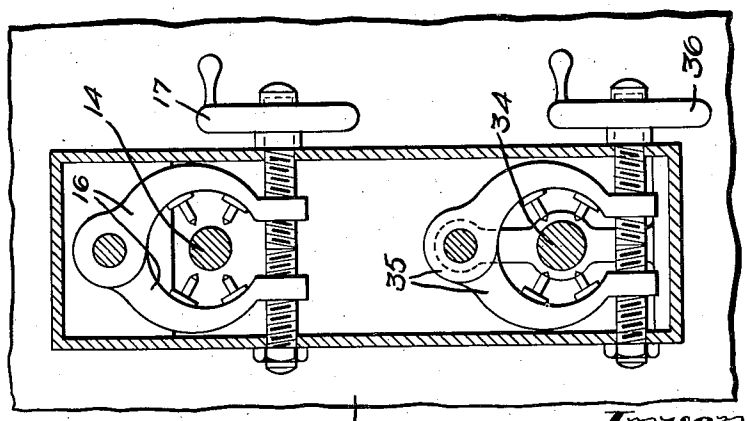


Fig. 5.



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MACHINE GUN MOUNT

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Fig. 8.

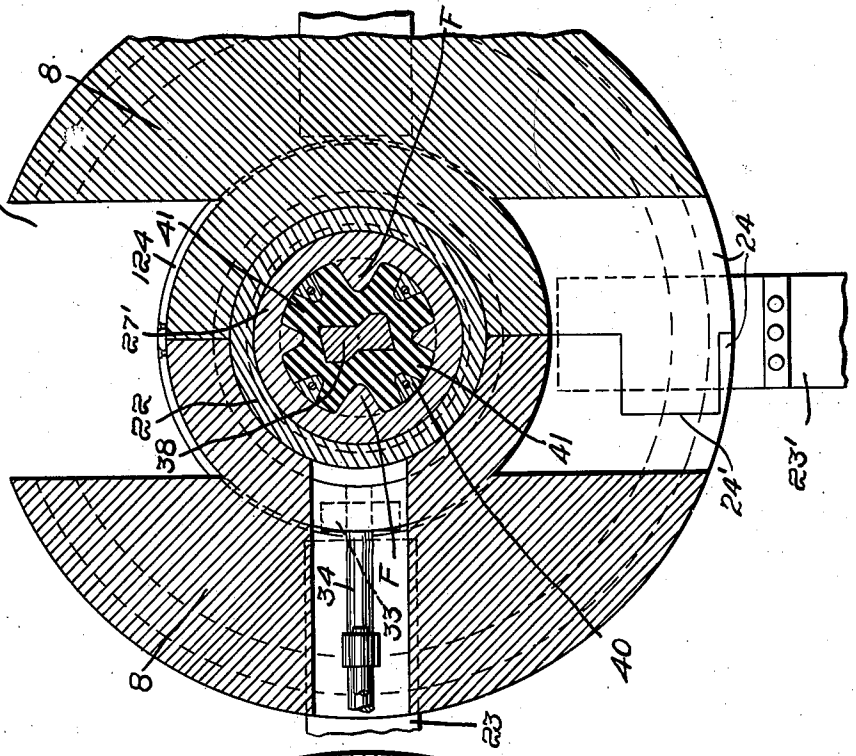
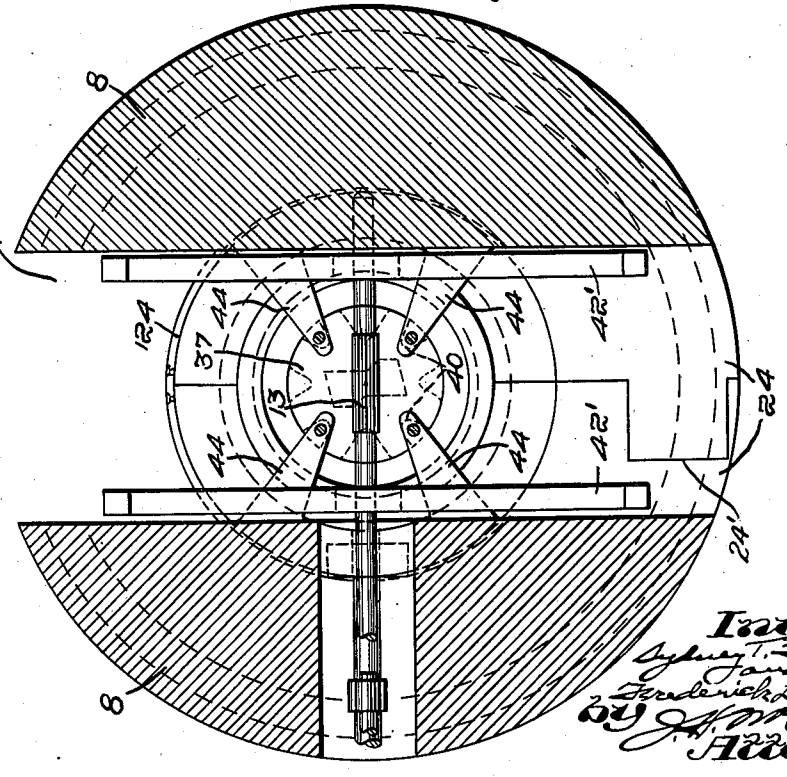


Fig. 9.



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MACHINE GUN MOUNT

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Fig. 9.

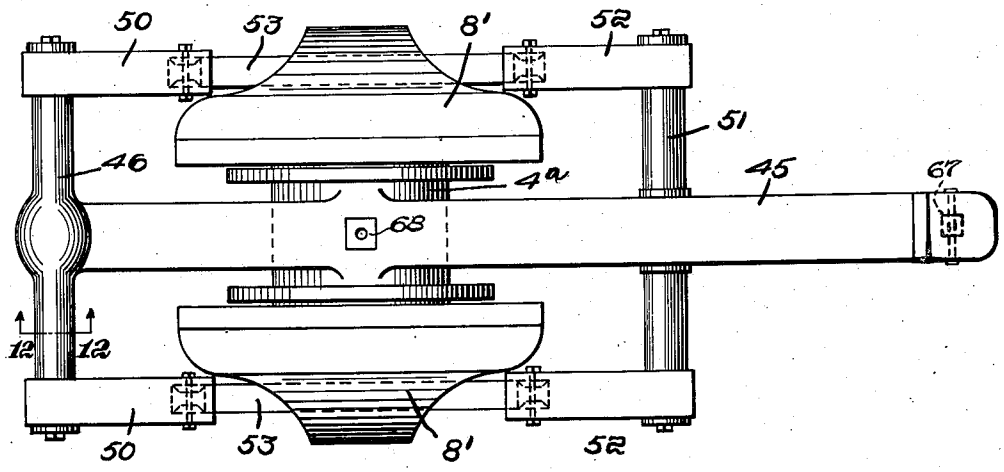
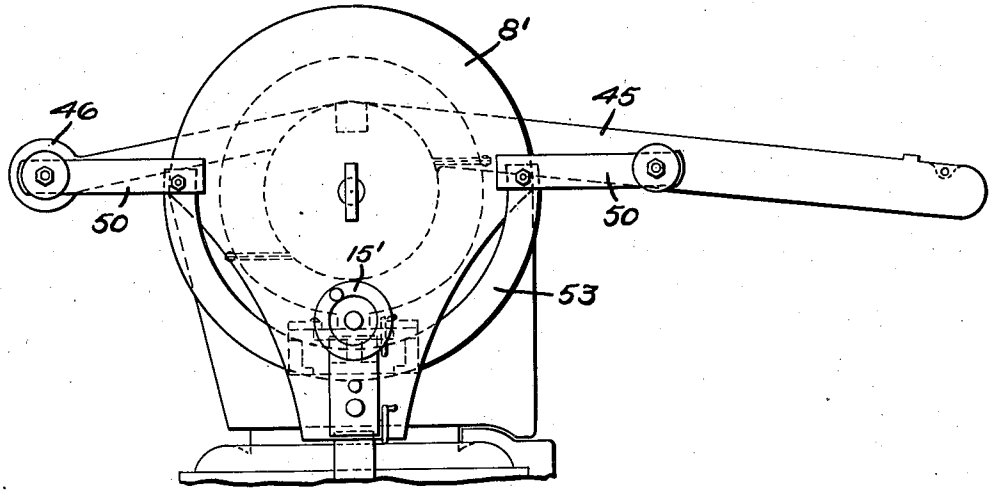


Fig. 10.



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Fig. 11.

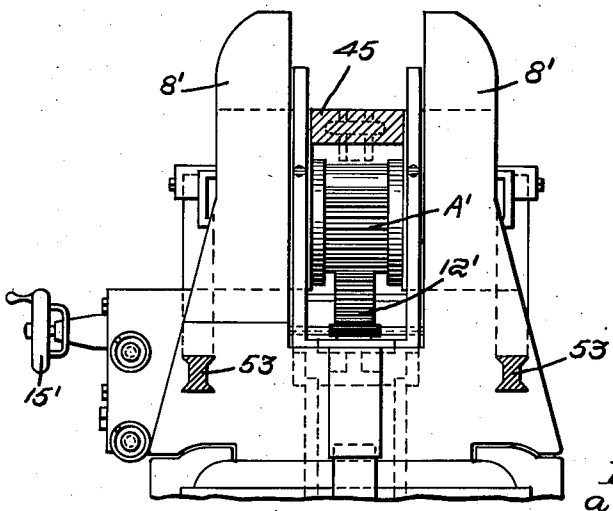


Fig. 12.

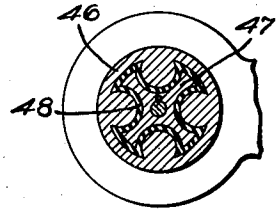


Fig. 13.

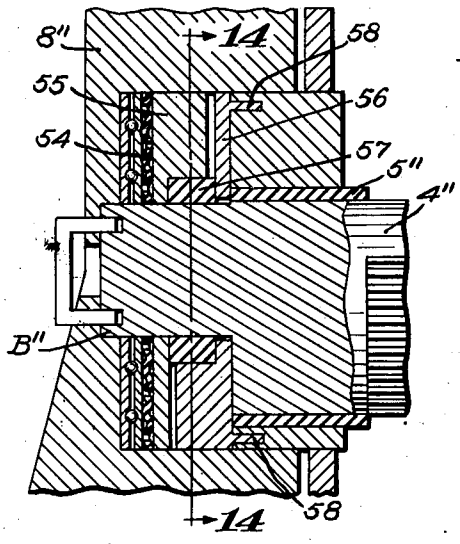


Fig. 14.

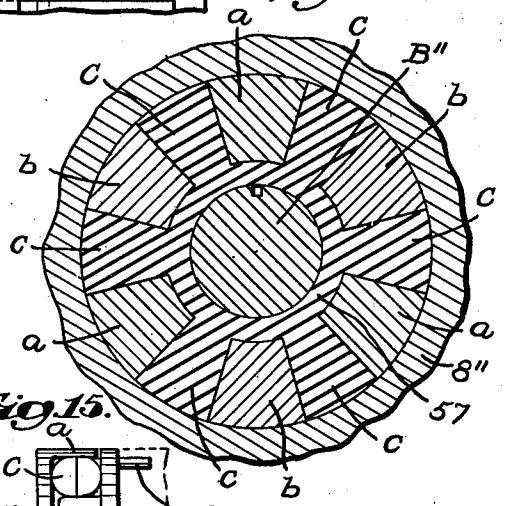
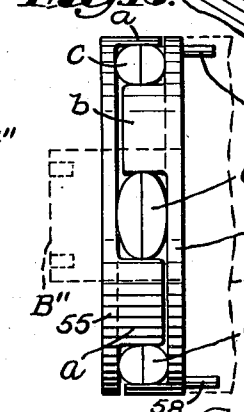


Fig. 15.



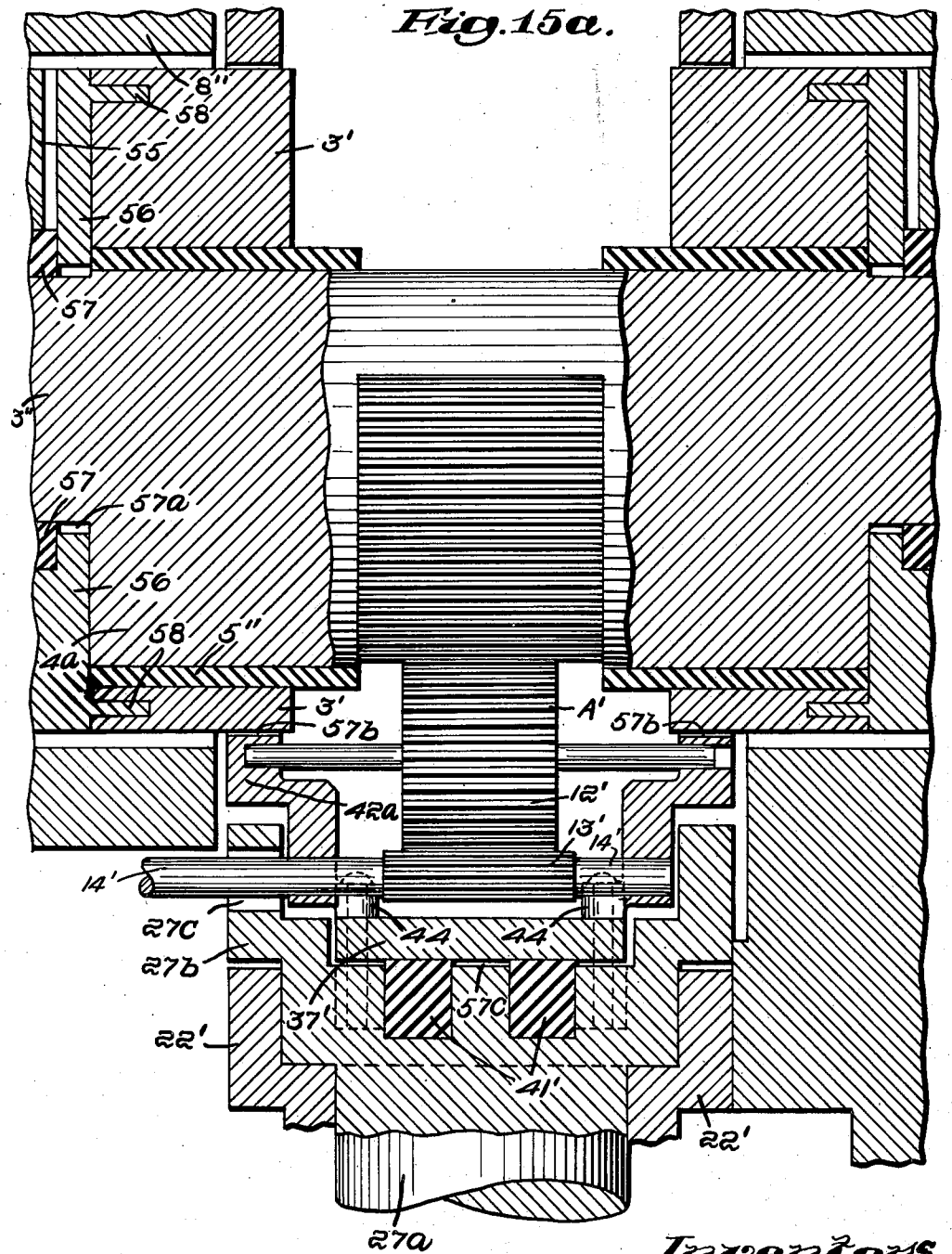
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Fig. 15a.



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MACHINE GUN MOUNT

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Fig. 16.

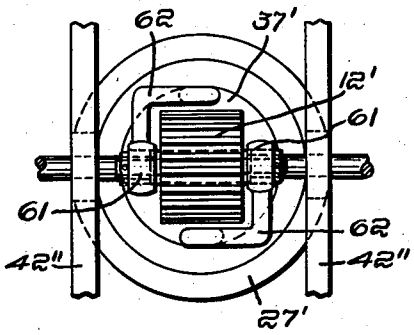


Fig. 17.

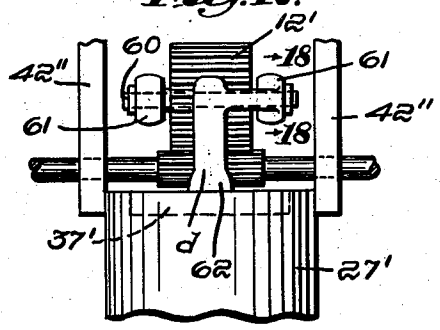


Fig. 18.

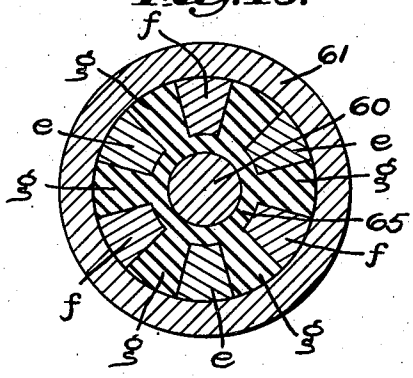
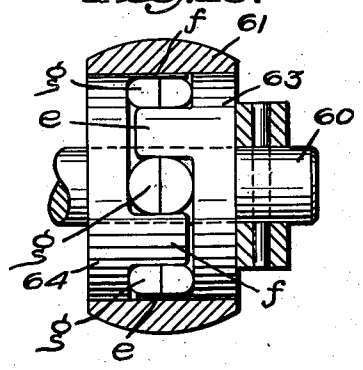


Fig. 19.



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UNITED STATES PATENT OFFICE

2,469,333

MACHINE GUN MOUNT

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Application August 12, 1943, Serial No. 498,300

3 Claims. (Cl. 89—37)

1

This invention relates to machine gun mounts, and is directed primarily to the object of devising a support or mount for a machine gun which will relieve the gunner from much of the shock and strain imposed by the rapid recoil of the gun, and which also will reduce the wear and tear on parts of the gun mount itself occasioned by such recoil.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

In the drawings,

Fig. 1 is a side elevation of a gun mount constructed in accordance with this invention;

Fig. 2 is an end view of the mount shown in Fig. 1;

Figs. 3 and 4 are vertical, sectional views taken, respectively, on the line 3—3, Fig. 1, and the line 4—4, Fig. 2;

Figs. 5 and 6 are sectional views taken, respectively, on the lines 5—5 and 6—6 of Fig. 2;

Figs. 7 and 8 are horizontal, sectional views taken, respectively, on the lines 7—7 and 8—8 of Fig. 3;

Figs. 9 and 10 are plan and side views, respectively, of a slightly different form of gun holder;

Fig. 11 is an end view of the holder shown in Figs. 9 and 10 with some parts in section;

Fig. 12 is a sectional view on the line 12—12, Fig. 9;

Fig. 13 is a sectional view of a portion of the bearing for the left-hand end of the inner core section 4 showing additional shock absorbing members which may be used, if desired, and which usually will be found preferable;

Fig. 14 is a vertical, sectional view on the line 14—14, Fig. 13;

Fig. 15 is a side elevation of parts of the construction shown in Fig. 13;

Fig. 15a is a cross sectional view further illustrating the structure shown in Figs. 13, 14, and 15;

Fig. 16 is a plan view of an arrangement which may be substituted for that shown in Fig. 11 to cushion or substantially isolate the intermediate gear through which the elevation of the gun is adjusted;

Fig. 17 is a front elevation of the construction shown in Fig. 16;

Fig. 18 is a vertical, sectional view on the line 18—18, Fig. 17; and

Fig. 19 is a partial sectional view at right angles to Fig. 18.

Referring first to Figs. 1 to 4, the construction there shown comprises two right and left gun

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clamping members 2—2 between which the machine gun shown in dotted lines at G in Fig. 1 may be clamped, it being understood that the nature of the parts that engage and grip the gun may be modified in accordance with the design of the particular gun used. These parts 2—2 are integral with two outer cylindrical sleeve members 3—3, which are duplicates, the two being located at the right and left-hand sides, respectively, of the mount. Each encircles an inner core section 4 of irregular and partly scalloped contour, as best shown in Fig. 4, the external shape of the core member being complemental to, but smaller than, the bore of the outer member, so that a space of uniform thickness is provided between these parts to receive a continuous layer of rubber, or other cushioning material, 5. The core sections 4—4 of the two sleeve members 3—3 are integral with and are connected by an intermediate section 4', Fig. 3, of reduced diameter, and by two collar sections 4'' at opposite ends of said reduced section. The shock absorbing material 5, if made of rubber, should be sufficiently porous, or have perforations in it, which will give it the desired cushioning effect. The outer surface of this material may be coated with graphite, or some other dry lubricant compatible with the nature of rubber, so that the outer sleeve members 3—3 can have a substantial degree of adjusting movement lengthwise of the core. The parts 2—2 integral with these sleeve-like members are connected by a bolt 6, Fig. 3, having right and left screw sections threaded into holes 7—7, Fig. 4, in said clamping members, so that by turning these screws the clamping members may be moved toward and from each other to grip or release the gun.

The peripheral sections of the sleeve members 3—3 above described are located in cylindrical apertures formed to receive them in opposite side pieces or pillow blocks 8—8, best shown in Figs. 1 and 2, and they have sufficient clearance to permit the adjustment of them toward and from each other, as above described. They are supported between sets of ball bearings 10—10 located at opposite ends of the sleeve members themselves. The inner core member 4 has a reduced section or stub shaft B formed integral with, and projecting from, opposite ends of it, and these two stub shafts are supported in bearings formed in the pillow blocks or trunnions 8—8. One of these stub shafts is clearly shown in this relationship in Fig. 3. In order to adjust the gun for elevation, the reduced section 4' of the core member is toothed, as shown at A,

Figs. 2 and 3, to mesh with a pinion 12 which is driven by another pinion 13 fast on a shaft 14 that is supported in suitable bearings in the pillow blocks 8—8, and has a hand wheel 15 secured to its outer end. Consequently, by revolving this hand wheel, the elevation of the gun can be changed, as desired. It may be locked in any adjusted position by means of a brake 16, Fig. 5, arranged to be operated by another hand wheel 17, as will be obvious from an inspection of that figure. During the rotary adjustment of the core member 4, the clamp members 2—2 are given lateral support by small rolls 18—18, Figs. 2 and 4, which they carry and which run in arcuate grooves 20, Figs. 1 and 2, these grooves being formed in the inner or adjacent surfaces of the two pillow block members 8—8.

When the gun is not in use, or is to be shipped, it is desirable to lock the inner member 4 of the supporting bearing roll rigidly against rotative movement relatively to the pillow blocks, and for this purpose holes are provided in the latter, and in the end portion of a reduced journal section B, Fig. 3, of the core member, to receive a U-shaped locking key 21. The same construction is provided at both ends of the member 4.

The entire assembly above described is mounted on a supporting casing or base comprising a body 22 rising from a bed plate 22' and also including ribs or legs 23 extending laterally from said body section. This support of the upper assembly on said base is accomplished by providing the two pillow block members 8—8 with bearing pieces 24—24, each integral with its respective pillow block member. The two sections 24—24 are connected at the front side of the mount by a strap 124, Fig. 6, where an opening or clearance P is provided to permit greater freedom of adjustment of the gun barrel. These sections 24—24 are also connected internally at the back of the mount by a joint 24', Fig. 7, so that together they form a nearly continuous annular bearing member. The joint is like that shown at 81 in Fig. 6 connecting the parts 8—8. This section composed of the parts 24 is supported in sockets, complemental in vertical cross-sectional form to the member itself, and formed in the head pieces 23' which are bolted to the tops of the respective flanges or legs 23, as clearly shown in Figs. 1 and 2. In assembling these parts the respective head pieces are inserted one at a time through the space P into operative relationship to the bearing pieces 24 and then moved around into the correct relationship to their respective legs 23 where they are bolted or riveted in place.

As will be evident from an inspection of Figs. 2 and 3, much weight is borne by a vertical shaft 27, Figs. 2 and 3, which is rotatably supported in a well or socket formed for it in the base 22, the lower end of the shaft resting on a step bearing 26, Fig. 2.

The upper assembly is guided radially, partly by the shaft 27 but chiefly by two sets of roller bearings 25 and 28, Fig. 3, the lower set being installed in an annular recess provided to receive it in the base 22 and cooperating with the inner bearing surfaces of the member 24, while the other is set into a similar recess in the base and cooperates with inner and outer races 30 and 31, the former being secured to the base and the latter to the pillow blocks 8—8.

Training adjustment of the gun mount may be made simply by swinging the gun itself, but the parts may be locked against rotative movement in a horizontal plane by means of a stationary

circular rack 32 secured to the base and set into the recess above referred to in the part 22, as shown in Fig. 3. This rack meshes with a pinion 33 fast on the shaft 34 with which a brake 35 cooperates, as shown in Fig. 5, the brake being set or released by operation of the hand wheel 36. There is sufficient clearance or play in this mechanism to enable the operator to revolve the gun and the support to which it is rigidly secured with that degree of freedom necessary for easy operation.

An important feature of this invention resides in the means for supporting the guns and those parts rigid therewith, in a yielding manner so as to reduce the transmission of the shock of recoil to the operator and to cushion that shock itself. Certain means for accomplishing this object, so far as those parts supporting the gun for elevation adjustment, have been above described. Additional means, roughly similar to that just referred to, are provided to take care of lateral and torsional shock around a vertical axis.

Referring to Figs. 3 and 8, it will be observed that the shaft 27 has a cavity in its upper end just below the cover plate 37, Fig. 3. This cavity is of generally circular form but has four lugs F, Fig. 8, integral with the shaft and extending inwardly toward the axis of the shaft. Also, this shaft has an extension 38, Fig. 8, projecting upwardly into the center of the cavity. The cap 37 has four lugs 40, Fig. 8, extending downwardly therefrom into the spaces between the lugs F, and the space between the lugs and the extension 38 is approximately filled with a disk 41 of cushioning material which may be like that indicated at 5 in Fig. 3. The arms of this disk may be made of any suitable shape and that shape necessarily will depend somewhat on the composition of the cushioning material. If made of soft rubber of the nature used in automobile tires, then they preferably are rather oval-shaped in cross-section, approximately as indicated by the cushioning member shown in Fig. 15. In any event, these cushioning elements isolate from each other the two metal members which they separate while still providing the mechanical relationship between them necessary to transmit the desired motion from one to the other.

As shown in Fig. 3, the upper end or head 27' of the shaft 27 is given an externally and circumferentially stepped formation fitting freely in a socket provided to receive it in the upper end of the base 22. Extending upwardly from opposite sides of this head portion of the shaft 27, are two arms 42—42, each of which forms the lower section of a yoke that closely encircles one of the bearing sleeves 3. Two end sections 42 and 42' of one yoke are indicated in dotted lines at opposite sides of the device as viewed in Fig. 1. These yoke ends meet to form the joints 43—43. They are bolted together at the joints so that they can be separated for convenience in disassembling the parts, and they serve to transmit torque to the parts 27' and 27. Their use is optional. Projecting almost radially toward the axis of the shaft or post 27 are four arms 44, Fig. 7, two of which are integral with one of the pillow blocks 8 and the other two being integral with the other block. Their ends rest on top of the cover 37, as shown in Fig. 7, directly over the lugs 40 provided in that cover, and they are secured to it by screws. The weight of these parts is transmitted through these members to the cover and thence through the cushioning material 41 to the vertical shaft 27. Thus the lateral or torsional vibration

or shock created in the gun and transmitted thereby to the parts to which it is rigidly secured, are cushioned in their transmission to the stationary support and the post **27**, thus easing the strain both on the gun, the mount, and the gunner.

In Figs. 9, 10 and 11 a modification is shown of those parts directly connected with a gun to support it and also of some of those members which cooperate with these parts. In these figures parts corresponding to those in the earlier figures are indicated by the same, but primed, reference characters.

The pillow blocks **8'—8'** are made somewhat different in shape from those shown in Figs. 1 and 2, but the same mechanism for training the gun and adjusting the elevation are employed, except for the changes hereinafter noted. In this construction the gun is clamped to a long lever or bar **45** which is connected with the sleeve members **3** in essentially the same manner as in the construction above described in connection with Figs. 1 and 2, but both in front of and behind this members the bar is supported on a cushion mounting. Referring to Figs. 9 and 11, it will be observed that the bar **45** terminates at its forward end in a transverse tubular section **46**, best shown in Fig. 12. This member is mounted on a core **47** but is connected therewith in essentially the same manner as are the parts **3** and **4** of the bearing members above described. That is, the core had radial fins or projections; the inner surface of the sleeve **46** is of complemental shape; and the space between these members is filled with cushioning material **48**. The core only is secured to the supporting arms **50—50**, the outer sleeve or tube **46** not being directly connected with these arms.

A similar construction is used at the opposite side of the assembly, consisting of a tube **51** rigid with the bar **45** and a core separated by cushioning material and secured at its ends to arms **52—52** similar to the arms **50**. Both sets of these arms are secured rigidly to guide pieces **53—53**, curved about the axis around which the gun is adjusted, these guides being approximately I-shaped in cross-section, shown in Fig. 11, and passing through grooves of corresponding shape in the lower portions of the pillow blocks **8'**, thus acting as "outriggers" to afford lateral support for the gun, additional to that afforded by the bearing pieces **3** and their supporting parts **4** and **5**.

When this mount is used to support a gun having a high degree of recoil as, for example, the fifty caliber machine gun, then it will probably be found desirable to isolate the parts to which the gun is directly secured, both axially of the core **4**, as well as radially of it, so that a cushioning or shock absorbing effect will be provided in all three directions or planes, thus easing the strain on the operator. A construction suitable for so cushioning the left-hand end of the core **4** is illustrated in Figs. 13, 14 and 15, 15a, the parts there shown being indicated by the same numerals used to designate them in Figs. 3 and 4, but the numerals being double-primed, except the part corresponding to that shown in the earlier figures at **4** which, where shown in these later figures, is designated at **4a**. Here the same radial cushioning means designated at **5''** is provided as in Figs. 3 and 4 and, in addition, two more cushioning members are installed. The first, indicated at **54** in Fig. 13, consists of a rubber disk preferably either corrugated or perforated, or both, so as to increase its shock absorbing capacity, this member being inserted between the inner race for the ball bearing and a spider-like member **55** which forms one element of another cushioning device better shown in Figs. 14 and 15. The part **55** has three axially extending arms *a* projecting toward the right and overlapped with reference to, but spaced apart from, similar arms *b* integral with another disk-like member **56** essentially like the part **55**. These arms are so dimensioned as to receive between them the resilient arms *c* of a second cushioning member **57** which spaces the two members **55** and **56** continuously from each other, both in axial and circumferential directions. The two members **55** and **56** are mounted on the extension B'' of the core **4a**, the former being keyed to this member while the latter is held against rotation relatively to the part **3''** by means of a pin **58**. The cushion members **5''**, **56** and **57** thus function advantageously in conjunction with one another and in cooperating relation with respect to the cushion **41'**, as may be more readily observed from an inspection of Fig. 15*a*. As shown in the latter figure, the core **4a** is, as before, isolated from sleeve **3'** by the cushion member **5''**. The reduced end B'' of core **4a**, however, although lying in contact with the cushion member **57**, occurs in slightly spaced-apart relation to the cushion element **56** as indicated by the clearance **57a**. A second clearance **57b** is provided between the sleeve **3'** and immediately adjacent surfaces of the arms **42a**. Extensions **44** of arms **42a** are bolted to plate **37'** and plate **37'** as before is spaced slightly above the metal parts between and close to the cushion members **41** by a clearance **57c**. Disposed transversely through one side of the shaft extension **27b** and the arms **42a** is shaft **14'**, which it will be observed is arranged in spaced relation to the members **27b** by clearance **27c**.

The multiple cushioning effect of these elements may be more fully understood from a consideration of specific shock forces applied thereto. Thus in the case of "side sway" or horizontally acting forces, the sleeve **3'** may slide laterally along cushion **5''**, and the shock is absorbed by the portions C of cushion **57**. When exposed to a vertical shock or "kick up" however, sleeve **3** bears downwardly upon cushion **5''** and compresses the latter element against the core member **4a**. As the shock develops in intensity, the cushion **5''** is compressed to its limit and simultaneously the cushion **57** takes up a part of the shock as provided for by the clearance **57a**. At this point the sleeve **3'** closes the clearance **57b** and begins to bear against the cradle portions of the arms **42a**, thus taking up the more extended part of the shock force. This force is transmitted through the extensions **44** to the plate **37'** and finally absorbed by the cushion members **41'** as provided for by the clearances **57c** and **27c**.

From this arrangement it will be apparent that cushion **41'** supplements cushions **5''** and **57**, assuming and cushioning the heavier part of the shock load after its initial force has been absorbed by cushions **5''** and **57**. A similar transmission of force takes place with reference to recoil shock. In the case of torsional or twisting shocks, the cushion element **41'** cooperates with with both cushion **5''** and **57** in a somewhat different although supplementary manner. Torsional shock causes sleeve **3'** to compress cushion **5''** against core **4a** to the limit of its elasticity, after which arms **42a** through extensions **44** transmit

the torsion force to the cover 37'. This member in turn bears against the cushion 41' in a twisting movement; consequently 41' is compressed against the rigidly held lugs 38 and F (Fig. 8). From the foregoing it will be seen that while the uppermost cushions such as 5'' and 57 have their special functions, cushion 41' supplements both of them and provides a secondary shock-absorbing action to forces in all directions.

The construction above described is duplicated at the opposite end of the core 4a. In some cases either one only of these cushioning members may be found necessary, while in other cases it will be found preferable to use both. Each serves to absorb shock transmitted axially of the core 4a, and the cushioning member 57 also absorbs torsional shock or vibration exerted around the axis of said core member.

A similar expedient may also be found desirable in the modification illustrated in Figs. 9, 10 and 11 to isolate the intermediate pinion 12' from the parts which support it. This pinion is mounted on a shaft 60 which is not supported directly in the parts 42—42, as in the construction illustrated in Fig. 3, but is made considerably shorter than is the shaft of the latter construction, and is mounted, as shown in Figs. 16 and 17, in bearing members 61—61. These members form the terminals of two brackets 62—62, each including an upright post *d* rising from, and preferably made integral with, the plate 37' supported as shown at 37 in Figs. 3 and 7. Two right-angle sections, each integral with a post *d*, Fig. 17, extend from the upper ends thereof, respectively, in opposite directions, first toward opposite ends of the mount, as also shown in said figure, and then toward the front and back of the mount, respectively.

Each end of the shaft 60 is supported in one of the members 61 but it is mounted as illustrated in Figs. 18 and 19 in a cushioning device very similar to that shown in Figs. 14 and 15. That is, it comprises a disk-like member 63 pinned to the shaft and having a series of lugs or fingers *e* integral therewith and extending axially therefrom. Secured on the shaft 60 is another member 64 similar to the part 63 and having fingers *f* extending in the opposite direction to the fingers *e* and located between them. The two sets of fingers and the two disk-like members are spaced apart by an intermediate cushioning member 65 having parts *g* located between each of the opposing pairs of fingers and holding them yieldingly spaced circumferentially. This member additionally spaces the bodies of the disks 63 and 64 axially from each other.

The same construction is used at both ends of the shaft 60 and it thus absorbs shock transmitted through the pinion and shaft.

It will be evident from the foregoing that the invention provides a construction in which the training and elevational adjustments of the gun cannot only be made quickly and with a minimum of effort, but in which, also, the transmission of shock to the gunner, and to the parts which he is holding, is so minimized as to greatly reduce the strain on him.

A further important advantage of the mounts provided by this invention lies in the ease and speed with which the gun can be mounted or dismounted. As above pointed out in connection with Figs. 1 and 2, the gun is clamped and released simply by the manipulation of the single bolt 6, Fig. 2. In that form of the invention illustrated in Figs. 9, 10 and 11, the gun is secured in place by inserting two bolts, one at the front of the mount where it locks the gun in the socket 68, Fig. 9, and the other securing it to the bottom plate connection 67. This ease of mounting and dismounting is of great advantage on board ship, or wherever a fixed mount is used, because if a machine gun should jam or become over-heated, it is simply necessary to replace it with another of the same type. This can be done with a minimum loss of time in the constructions provided by this invention.

Having thus described out invention, what we desire to claim as new is:

1. In a gun mount, the combination of a gun holder, supporting means for said holder including a base, spaced-apart upright side pieces located on the base, two sleeves slidably received in the side pieces, a core member extending between the two sleeve members, and presenting a scalloped peripheral surface lying in close proximity to a complementary scalloped surface formed on the inner periphery of the sleeve members, scalloped cushion members interposed between the said core member and adjacent complementary sleeve surfaces, said core being formed with reduced extremities which project into the side pieces, cushion elements for resiliently supporting said extremities in the side pieces, gear mechanism operatively connected to the core for adjusting the position of the gun mount, a pair of supporting arms arranged at the under sides of the sleeve members, said arms having secured at their lower sides a plate member, a shaft located centrally of the base member, the said shaft presenting at its upper extremity a cushion member extending into contact with the said plate and cooperating with the arms and plate to provide a shock-absorbing means which supplements the shock-absorbing action of the first two noted cushion elements.

2. In a gun mount, the combination of a gun holder, supporting means for said holder including a base, spaced-apart upright side pieces located on the base, two sleeves slidably received in the side pieces, a core member extending between the two sleeves and having reduced end portions which extend into and are supported by the side pieces, a pair of supporting arms arranged at the under sides of the sleeve members, gear mechanism transversely located through the supporting arms for adjusting the position of the gun holder, a pair of cushion elements interposed between the reduced end portions of the core end and adjacent surfaces of respective side pieces, a second pair of cushion elements located between the core member and respective adjacent sleeve surfaces, a third cushion element arranged in the path of downward movement of the supporting arms when the said first and second cushion elements are compressed by a shock, thereby to provide a secondary shock absorber.

3. In a gun mount, the combination of a gun holder, supporting means for said holder, including a base, spaced-apart upright side pieces located in the base, two sleeves slidably received in the side pieces, a core member extending between the two sleeves and having reduced end portions which project into the side pieces, cushion elements interposed between the sleeves and adjacent core surfaces to absorb a shock applied to the sleeve from the holder, a second pair of cushion elements surrounding the reduced end portions of the core and adapted to progressively absorb a shock force transmitted from the sleeve

to the core, a central upright shaft mounted in the base, a pair of supporting arms extending between the shaft and sleeve members, gear mechanism located between the supporting arms for controlling the position of the gun holder, a plate member secured to the arms immediately above the said shaft, a cushion element mounted between the shaft and plate in a position so chosen that it functions as a supplementary shock absorber of forces transmitted from the core and sleeves to the plate.

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