

A.A. GUN MOUNTING SERIAL NO.

NOTES
on the
CONSTRUCTION & HANDLING
of the
QUADRUPLE GUN MOUNTING
FOR THE .300" MARLIN MACHINE GUN.

Manufactured by -
PHILLIPS & POWIS AIRCRAFT LTD.

Issued by -
Ministry of Aircraft Production,
Factory Defence Section,
MILLBANK, LONDON, S.W.1.

QUADRUPLE MOUNTING

for the

.300" MARLIN MACHINE GUN.

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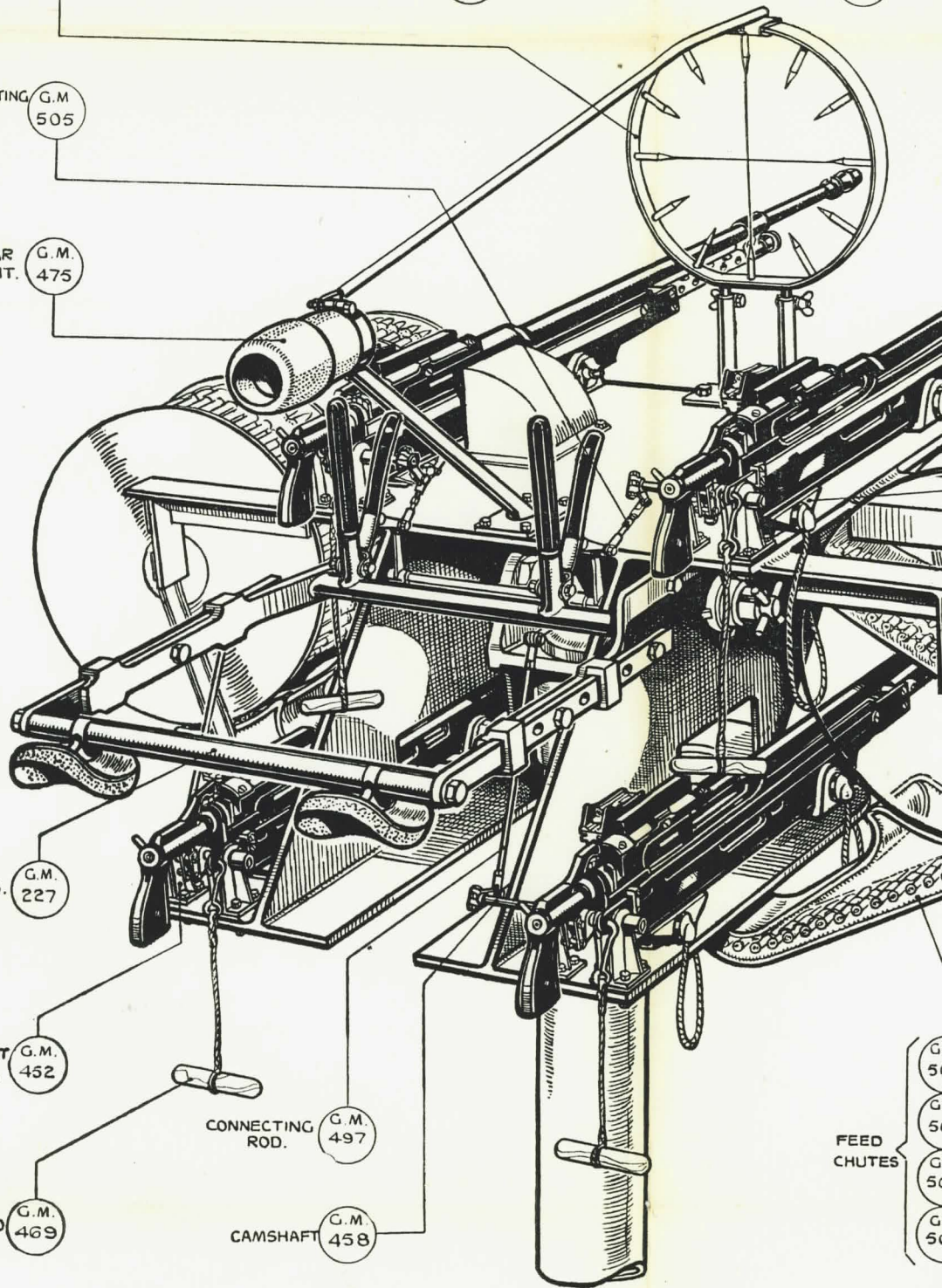
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452

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469

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FEED
CHUTES



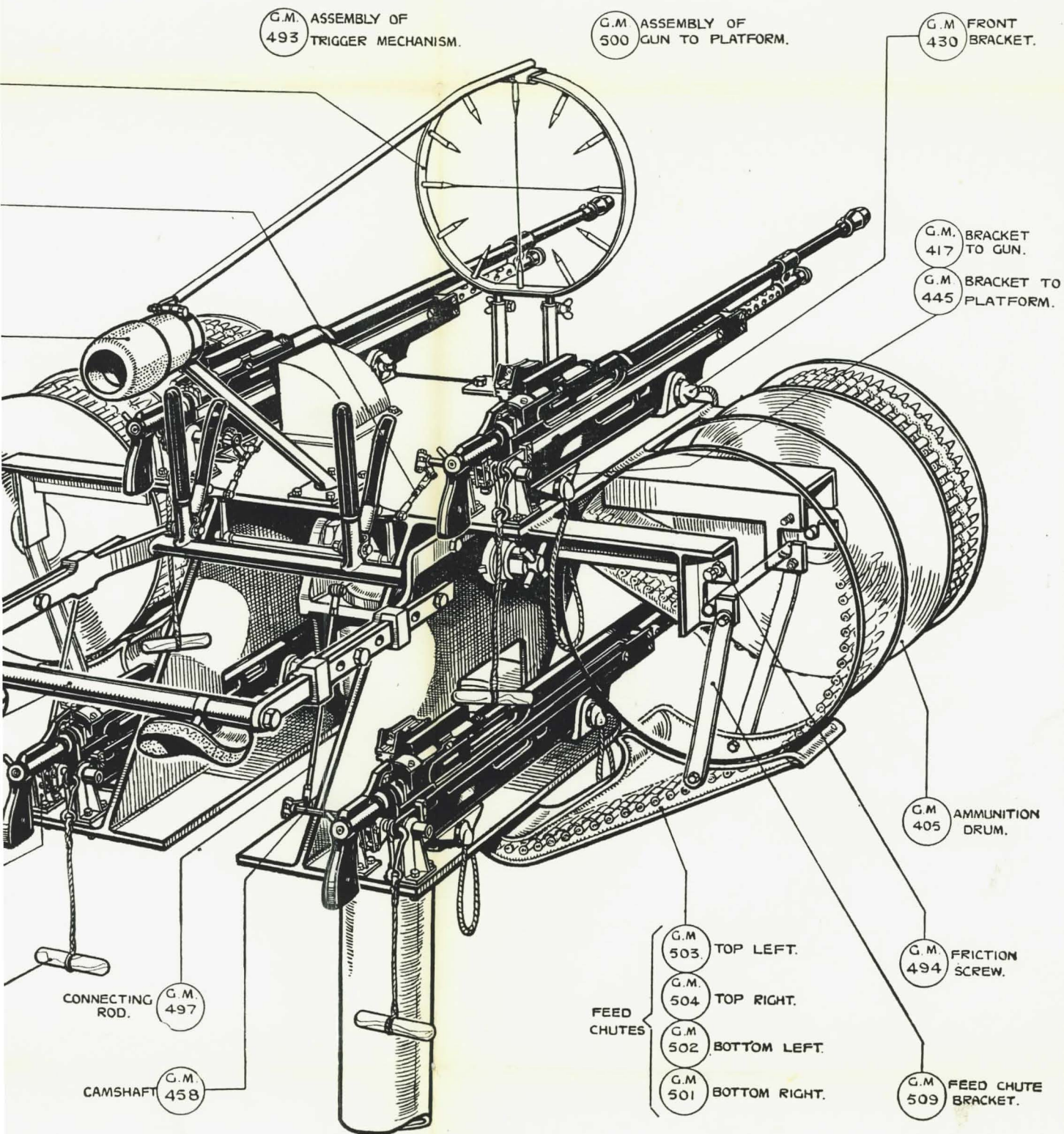


FIG. 1.

I N T R O D U C T I O N

This mounting provides for four Marlin Machine Guns, calibre .300", which can be traversed continually through 360°, elevated vertically to 85° and depressed to approximately 20°, in any condition of traverse. Design approved by C.I.S.A.

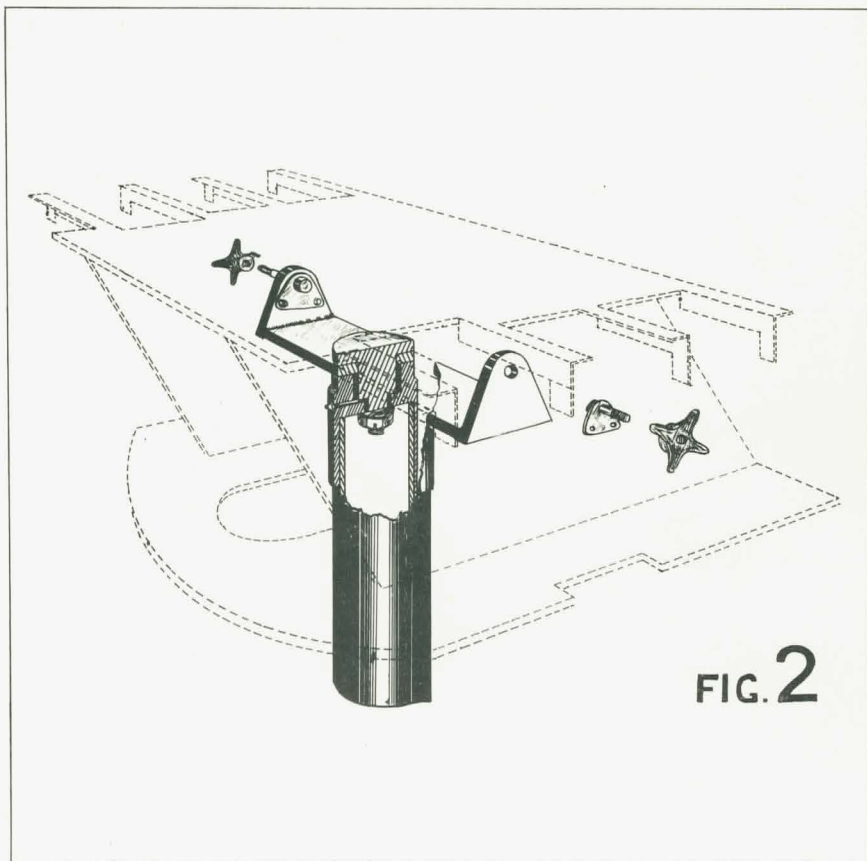
CONSTRUCTION

The upper portion of the unit consists of two steel platforms mounted one above the other and connected by two steel side plates. See Fig. 2.

Two guns are mounted on the upper platform and one each side, outboard of the side plates, on the lower platforms.

The two lower guns are stepped back in relation to the upper guns.

The complete platform assembly is attached to the two vertical lugs of the crosshead by bolts through the side plates which incorporate a friction damping device to react upon the ease of effort required to elevate or depress the armament.



ELEVATION AND TRAVERSE PIVOT.

The crosshead transmits elevation and traverse loads through a thrust bearing which is housed at the top of a vertical steel tube mounted in a cast iron base of ample proportions.

Provision is made for lubricating the thrust bearing through the medium of a Tecaletmit grease nipple. Illustrated in Fig.2.

The cast iron base is provided with feet and rag bolts to secure the complete unit to any suitable foundation.

AMMUNITION DRUMS.

Mounted athwartships of the upper platform are four ammunition drums, each drum has a capacity of 300 rounds of .300" calibre ammunition when loaded in a fabric belt. The end of this belt is hooked on the screw head protruding from the core of the drum.

The side plates of the ammunition drums are constructed from multiply and the core from hard wood. The raw edges of the side plates are suitably protected by a strip of serrated tape.

An adjustable friction device operates on each flange of the ammunition drum to prevent the drums from over-running when the armament is in operation, (see Fig. 3 which illustrates the construction of the drum.) This friction device consists of two 2 B.A. bolts with spherical ends bearing on a steel washer which is integral with the drum assembly. These bolts also serve to locate the drums fore and aft so that the periphery of the side plates are in alignment with the bell mouth of the feed chutes.

It is necessary only to introduce slight friction to prevent spinning of the drums which otherwise should be quite free from other sources of friction. Care should be exercised in the handling and storage of these drums which are of plywood construction.

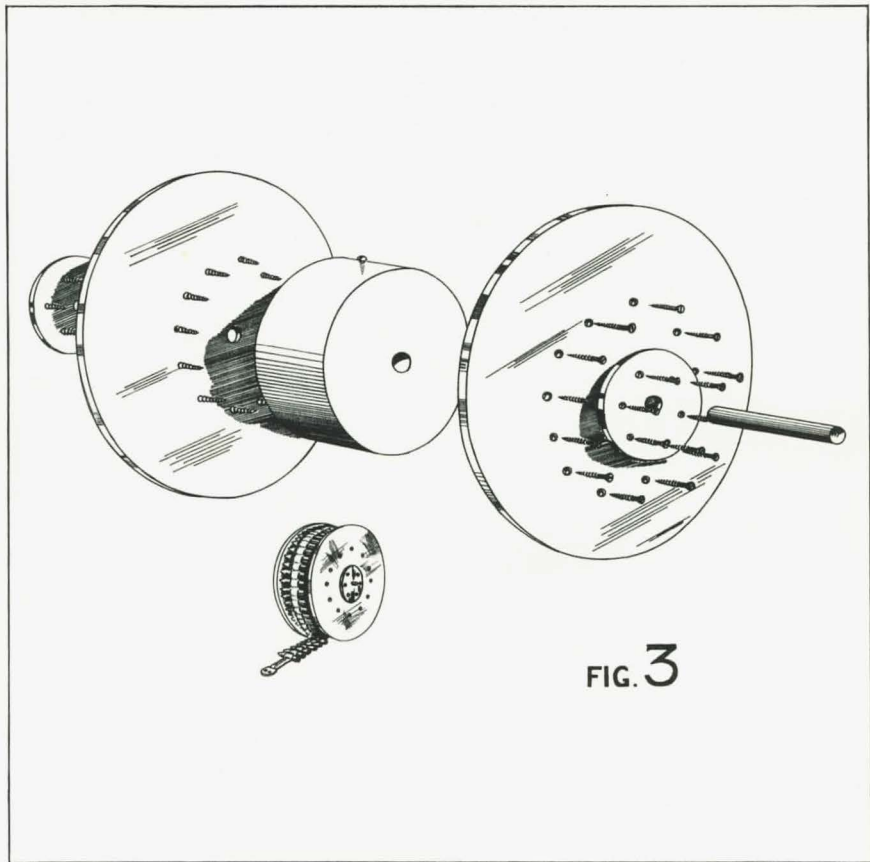


FIG. 3

FEED CHUTES.

The ammunition belts are guided to the paddle wheel of the respective guns by means of chutes manufactured from reinforced plastic material suitably shaped to prevent the belt from twisting and to ensure perfect presentation of individual Rounds to the paddle wheel of the gun at all angles of elevation.

If at any time it is necessary to remove a feed chute from the mounting, care must be taken when refitting the feed chute to ensure that the centre line of the throat of the chute lines up with a fore and aft centre line on the side plate of the gun above the feed aperture.

Similarly the chute should be so adjusted as to ensure correct lateral location - that is chamfered edge on the bottom gun plate must be in alignment with the inner surface of the throat of the chute.

A typical feed chute assembly is illustrated at Fig.4.

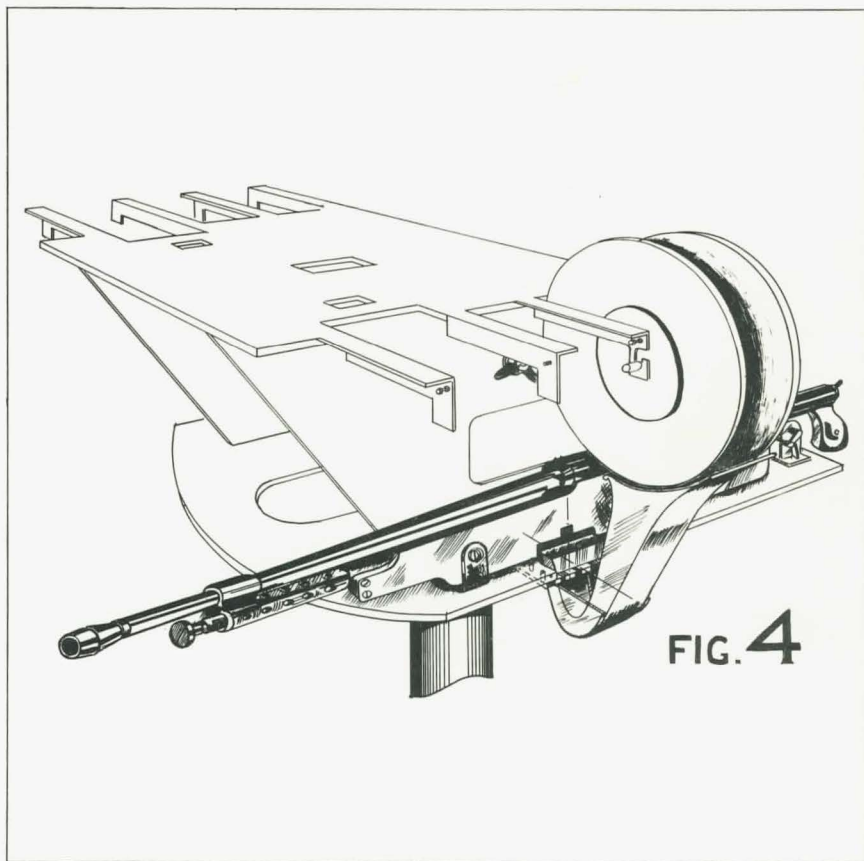


FIG. 4

EMPTY CARTRIDGE CASES.

The empty cartridge cases are ejected in the case of the upper left hand gun through a suitably shaped shroud which is bolted to the upper platform.

In the case of the lower left hand gun a small deflexion chute is bolted to the side plate, this ensures that no cartridge case, when the armament is elevated, will injure the gunner.

No chutes are fitted to the upper and lower right hand guns because the ejection is outboard.

Your attention is directed to the fact that cartridge cases eject with considerable velocity. Gun crews should, therefore, stand on the left hand side of the unit.

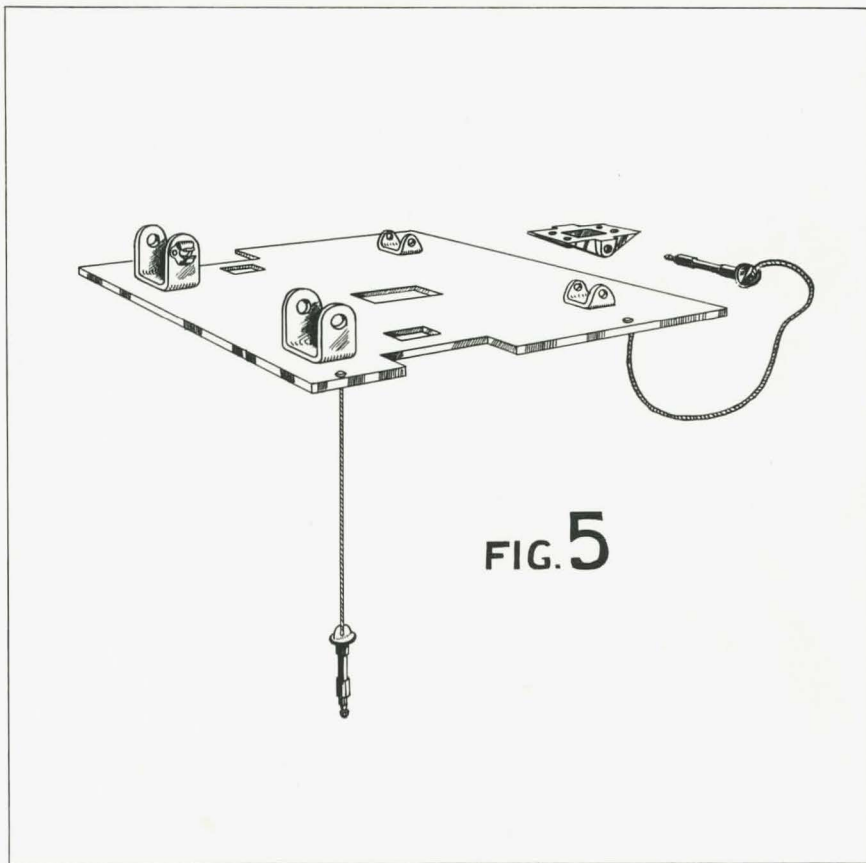
LOADING UP.

Safety catches should be in "Safe" and guns cocked. Belts should be loaded with 250 rounds. Tracer should be loaded into the belts of the upper guns only in the proportion of one tracer to five ball. Avoid tight or shrunken belts; new belts should be stretched. Two feet of loose belt should be left free at each end. The leading end should be fed into the chute with the assistance of a piece of wire threaded through the slots in the underside of the lower feed chutes. Pass the brass tag end over the feed wheel and then down through the holes or slots provided in the base plates - for the two port guns. The loose end for the top starboard gun should pass over the forward drum. In the case of the lower starboard gun the belt will pass straight down rear of the feed chute. Care should be taken to protect the belt ends from mud or grit as they reach the ground in operation.

LOADING THE GUNS.

Having fed the loose end of the belt through the gun, pull on the loose end with one hand and push in the first round with the other until the feed wheel is turned through one notch. Release the cocking handle and allow the action to go forward with a slam. Repeat this cocking motion once more when a round will be fed into the breech. (It is advisable to perform these cocking motions with the guns in the horizontal position). Cocking actions should be performed vigorously. The forward motion should be performed by merely releasing the cocking handle from its engagement on the side plate, and allow it to go forward by spring action - see that the lanyard handle does not hinder the full travel. Before firing see that the Action has gone right forward - that is the bob weight at the rear end of the piston rod should be making actual contact with the base of the gas cylinder. If it is not, the "feed-in" is not complete, and the gun should be cocked again - this time ejecting a live round and release once more. (Gun crews should stand to the left of the mounting to avoid injury by ejected cases).

Another check can be made by examining the cartridge extractor (through the inspection door - right side) and see that it has gripped the rim of the next round in the belt. It is reiterated that the certainty of the "feed-in" depends upon the positive and unimpeded forward movement.



REMOVAL OF GUNS.

Provision has been made to enable the armament to be cleaned without removal from the mounting, but owing to the construction of the gun any detailed stripping necessitates complete removal from the mounting. This is readily accomplished by withdrawal of the two quick release pins, Fig.5. These should be given a half turn and withdrawn. Removal of the gun by this method does not upset the alignment of gun barrels or feed chutes; fixed portions of the brackets are indicated in Fig.5 and are positioned by the manufacturers. Guns should, however, be marked, one, two, three and four, so that they are replaced in the same positions. This precaution will obviate any re-adjustment of trigger mechanism.

NOTE - OPERATORS MUST ASCERTAIN
THAT THERE IS CLEARANCE
BETWEEN THE CAM AND THE
TRIGGER SHEATH WHEN THE
FIRING LEVERS ARE IN
THE OFF POSITION

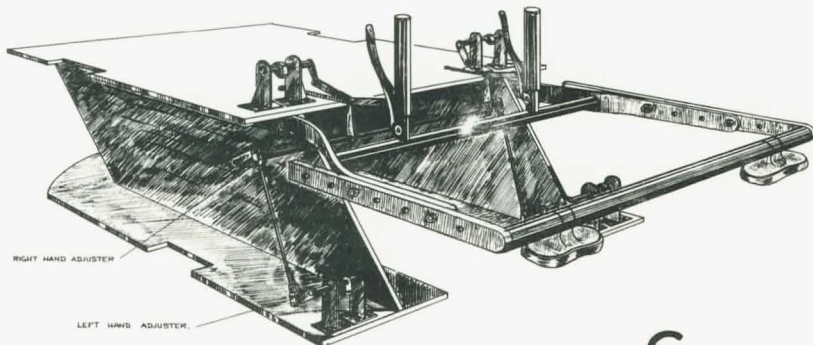


FIG. 6

FIRE CONTROL MECHANISM.

The fire control mechanism is illustrated in Fig.6.

Each of the two fire control handles operate two guns, and they are coupled up so that the top left and bottom right, and top right and bottom left guns fire conjointly.

Fire control operates through the medium of cams bearing on a sheath bolted to the trigger of the gun. Location of this sheath is obtained by a half round slot cut in the trigger which registers with the upper securing bolt of the sheath. See Fig.7. The cam, manufactured from hard red fibre, is connected by levers and links to the two hand grips which are mounted vertically on the perambulator type bar. Extension of this bar is adjustable to suit the length of any individual's forearm. Two sorbo rubber covered revolving arm pads are positioned to suit the bend of the arm. See Fig.6.



FIG. 7.

SYNCHRONISING THE FIRE CONTROL.

The adjustable pull rods have left and right hand threads at the yoke ends. Adjustment is provided by turning the rod in the required direction by means of the hexagon at the centre of the rod.

It is important that the trigger sheath should have clearance between it and the cam face - otherwise there is danger of automatic fire when cocking, and it will not be possible to engage the safety catches.

The hammers of each pair of guns should fall simultaneously when the control lever is depressed. Tests should be made (with unloaded guns) by slowly pressing the control lever, when the hammers will be heard to fall. Synchronisation will be ensured by correct adjustment of the pull rods.

NOTE
 FORESIGHT MUST BE ADJUSTED IN
 HEIGHT TO ALIGN SIGHTS WITH GUNS.
 FORESIGHT MUST BE DEPRESSED
 0-055' IN RESPECT TO REAR SIGHT
 TO ALLOW FOR GRAVITY DROP OF
 BULLET AT 500 YDS. + 60° ELEVATION

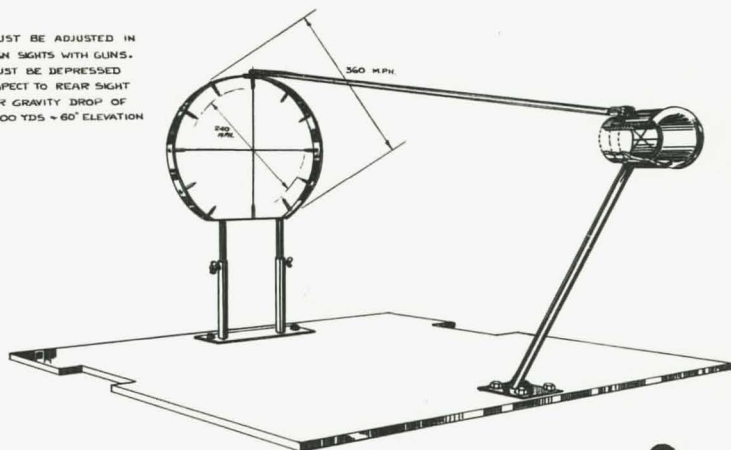


FIG. 8

CHECKING OF GUN SIGHTS.

Alignment of the gun barrels and the correct adjustment of the sights have been carried out at the Factory. The fixed portions of the gun brackets on the base plates ensure permanence. The forward ring sight is depressed with respect to the aperture sight by 0.055" to allow for gravity drop of the bullet at 500 yards range and 60° elevation. The adjustment is marked suitably for this position to simplify removal.

Should it be necessary to check the sights the following procedure is recommended.

- (1) Select a suitable target, not less than 500 yards distant. Sight one gun on this target by looking through the barrel (with bolt and pistol grip removed). Then sight the other three barrels similarly, with the first barrel held on the target. Should any adjustment be necessary this can be effected by the use of shims under the brackets or repositioning the front brackets in the clearance holes.
- (2) With all four barrels sighted on the target adjust the sights to a point 7 ft. below the barrel line of sight. (The forward ring sight has provision for any necessary correction).

The "Sight Base" is 25 inches, that is the distance between the centre of the ring sight and the eye.

Note: If, for the purpose of these adjustments the fixed portions of the gun brackets are moved, it will be necessary to make corresponding adjustments to the feed chutes to correct any misalignment brought about by the above - see page 7.

RESERVE AMMUNITION DRUMS.

Accompanying each unit is a spare set of ammunition drums; these drums are fitted to the unit in a matter of seconds.

The spindle of the drum is offered up to the slots of the mounting channel, pushed forward and dropped home; any necessary tensioning of the drum being carried out via the set screws adjacent to the spindle. Cellulose paint, however, should be removed on spindles and friction discs of new drums, preparatory to mounting. Reserve ammunition on loaded spare drums must be kept dry.

WATERPROOF COVER.

A waterproof cover is supplied with each unit. It is advisable that use be made of this cover to ensure that rain, dust and dirt do not interfere with the component details of the guns and mounting. Care should be used when drawing off the cover suddenly not to damage the forward ring sight. A tie bar is fitted between the two rights as additional support.

SITING THE MOUNTING.

These A.A. weapons come under the control of A.A. Commands for Operations and Training.

It may be possible to position the mounting at a point compatible with A.A. Command requirements and at the same time commanding a field of fire appropriate to a ground (land) defence weapon. In all such matters however A.A. Command should be consulted.

Subject to the above, it is possible in some cases, to predetermine the path through which the enemy aircraft will fly in low level attack over the factory. This path is likely to be the longest straight line across the factory buildings (subject to local conditions, obstructions, etc.). Where two quadruple mountings are available, a two point defence - each some 200 yds. or more away from the centre of the target - is possible, (as distinct from positions on the roof of the factory). In the former case the enemy aircraft is more likely to come within range of one of the gun mountings before releasing his bombs.

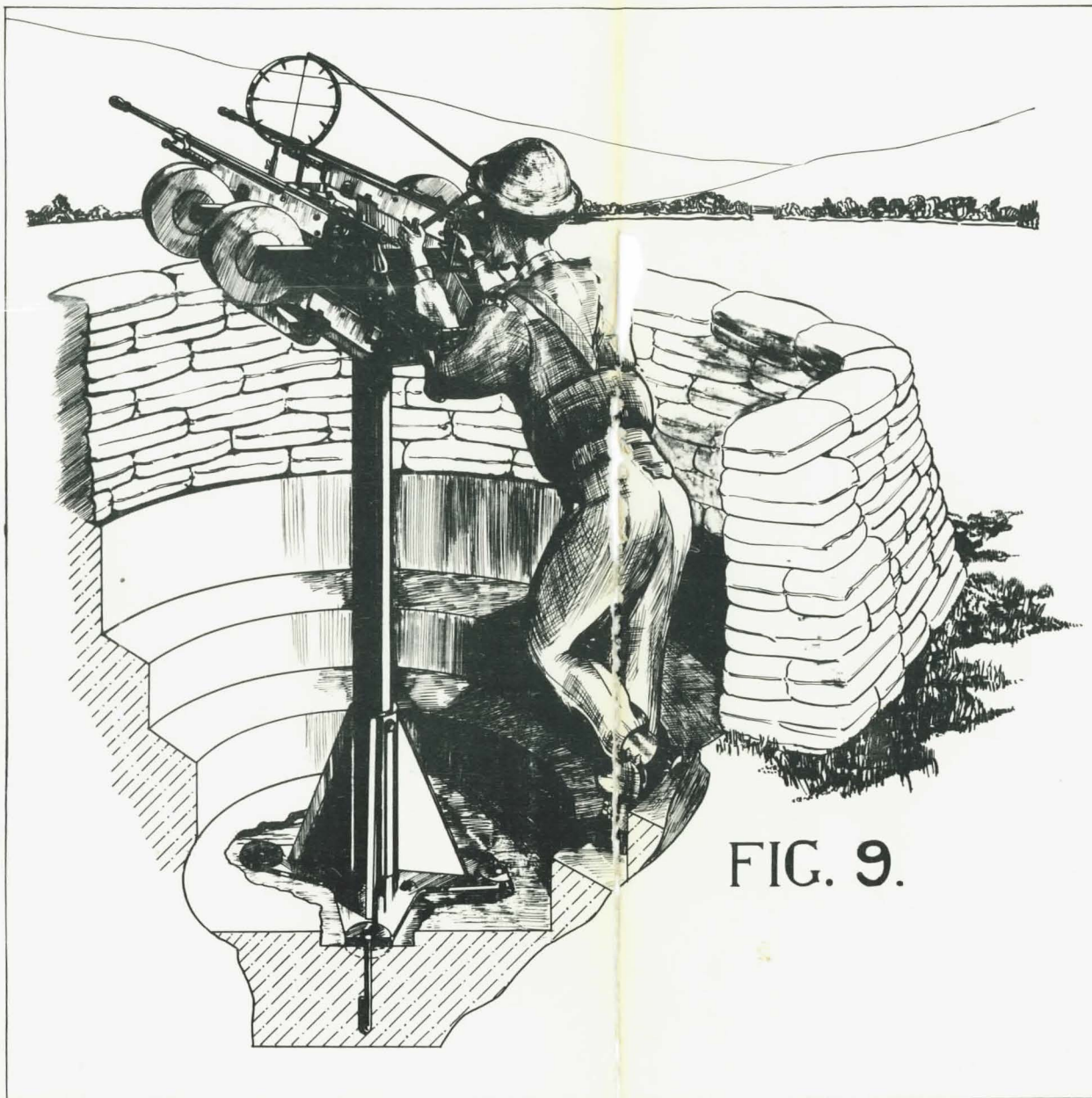


FIG. 9.

POSITIONING THE MOUNTING.

The method of securing the mounting is left to the individual requirements at each factory; a typical location is illustrated in Fig. 9.

It is recommended that the mounting be bolted down to a concrete base wherever possible. The rigidity thus obtained will absorb most of the reaction when the guns are in action and tend to a steadier aim.

Where, however, the Mounting is positioned on the roof, it will not always be possible to secure it to a concrete base. In this instance, it is suggested that the mounting should be secured to sleepers by means of rag bolts.

Protection can be provided by means of a sand bag surround or brickwork. The height of the protecting wall will be dependent upon the gun barrel height in horizontal position (or brought higher still if the guns are used as A.A. weapons only).

The overall height and other necessary dimensions for the construction of the two fire steps in the sunken pit are shown in Fig. 10.

Some form of camouflage is recommended.

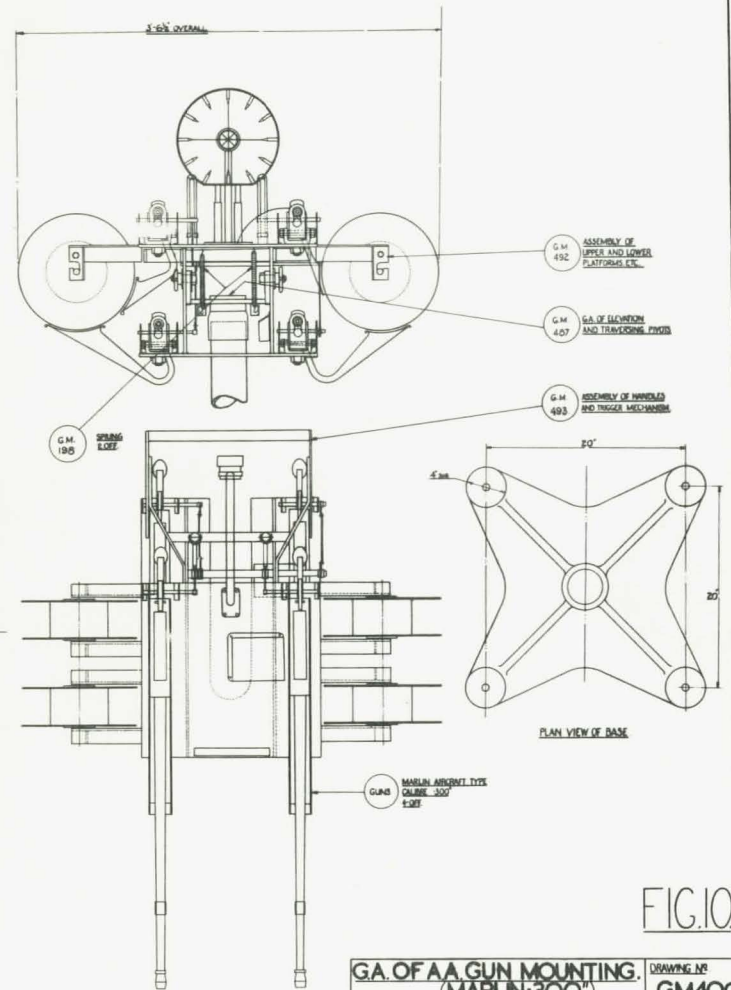
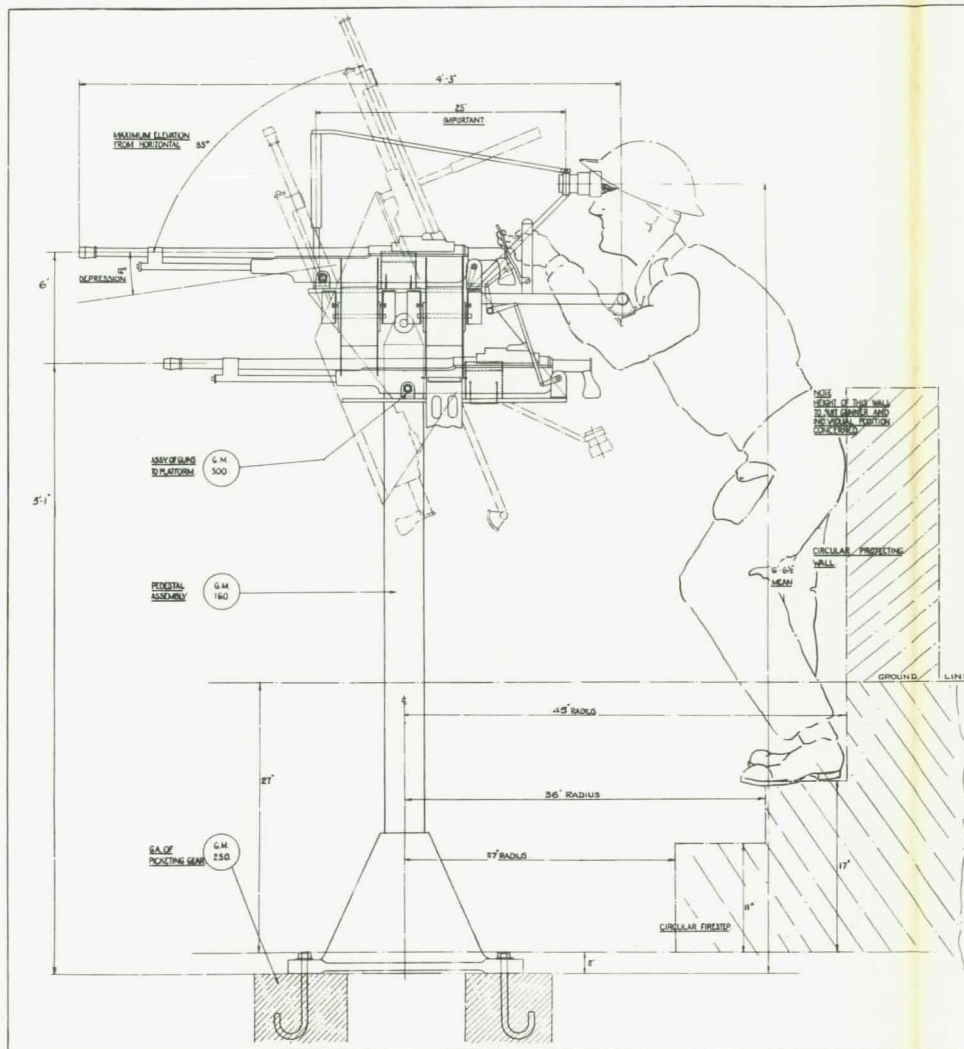


FIG. 10

GA OF AA GUN MOUNTING
(MARLIN 300)

DRAWING NO.
GMA00

RING AND APERTURE GUN SIGHTS.

The ring and aperture anti-aircraft sights consist of a 360 miles per hour ring foresight (speeds of 240 m.p.h. are indicated by the tips of the pointers) and an aperture back sight. Both sights have cross wires to assist alignment. The sight base is 25".

Note. The height of the fire steps in the gun pit should be adjusted to the comfortable standing height of the gunner. The length of the adjustable perambulator bar (under which the crook of the elbows should be placed) should be set to the length of the forearm.

These precautions will ensure a comfortable control of the guns at all angles of elevation and traverse, and at the same time enable the gunner to hold the eye close up to the sorbo pad on the Aperture sight - which is essential for correct alignment of cross wires.

SIGHTING.

As soon as an aircraft has been identified as hostile, it should be followed with the gun-sight, fire should be held however until the enemy aircraft comes within a range of 500 yards. This not only avoids a probable waste of ammunition but also delays the evidence of engagement until it is too late for the enemy to take evasive action.

It will be found more effective if the guns are layed on a point in the path of flight of the enemy aircraft in advance of the correct "aim off" position. The enemy aircraft will then "fly into" the steady cone of fire. This is a more effective method of aim than "following" continuously.

To engage an enemy aircraft flying at 90° to the axis of the Gun Barrels and at a speed of 360 m.p.h., lay the guns so that the cross wires are coincident and position the target aircraft so that it lies on the outer ring of the foresight and appears to be flying towards the centre of the cross wires. This is the condition of full deflection. The amount of deflection or "aim off" will, however, vary according to the speed and angle of approach. These two factors, speed and angle of approach, (or retreat) can only be estimated and, therefore, the accuracy of fire will depend largely upon the training and experience of the gunner. For example, an enemy aircraft in dive bombing attack will probably have a speed of 240 m.p.h. (the approximate speed of a dive bomber using air brakes). In this instance the enemy aircraft will be placed on the inner ring, represented by the tips of the pointers (240 m.p.h.),

and should appear to be flying towards the centre of the cross wires.

An enemy aircraft in a straight dive in the direction of the gunner will be placed on the cross-wires - point blank aim.

When troop-carrying enemy aircraft or parachutists are landing within range, it will be generally advisable to hold fire until they are almost stationary.

For enemy aircraft flying at low speeds preparatory to landing, aim must be taken with the nose of the aircraft flying towards, and close to, the centre of the cross wires.

The use of tracer ammunition in the lower guns provides a satisfactory trace if the proportion of five ball to one tracer is used. It is recommended, however, that crews who have not hitherto had experience in tracer firing should be given some instruction in its advantages as well as its deceptions under particular conditions.

It is suggested that gun crews should familiarise themselves with the principles of "Close Range Anti-Aircraft Fire" ("Eye Shooting"), A.A. Command being the responsible authority for A.A. training.

MARLIN MACHINE GUN.

THE MARLIN MACHINE GUN.

The .300" American 1918 Pattern Machine Gun is a belt-fed Aircraft Gun. It is not wellknown in this country (although it was a standard weapon in the American Air Force for some years). The Tank Pattern Marlin Gun (which is the type adapted to the Quadruple Mounting) is a slightly modified Aircraft gun. Air cooling fins were fitted to the Tank Type Gun (omitted for the Quadruple Mounting) and a pistol grip with trigger replaces the Constantinesco Interrupter firing gear fitted to the original aircraft gun. The rate of fire is 600/700 rounds per minute.

Modifications carried out on the Marlin Gun for Quadruple Mounting are :-

- (1) Hand grip on the Cocking Handle has been removed, leaving the limit stop on the slide in position.
- (2) A 5/16" hole has been drilled at the rear end of the cocking handle slide to take the dog collar clip of the lanyard cocking handle.

Note. This hole is positioned with its centre $\frac{3}{4}$ " from the end of the slide. (In some cases however, the hole is positioned with its centre one inch from the end;

in such instance approximately $\frac{1}{4}$ " should be cut off the rear end of the slide).

- (3) A small half round register has been cut in the rear face of the trigger to locate the trigger sheath.
- (4) Rear Gun Mounting brackets with 4 screws per gun are supplied with the mountings by the Manufacturers (including the lanyard handles and Trigger Sheath). As these screws are not tapped with American threads, but instead, with B.S.F. $\frac{5}{16}$ " threads, it will be necessary to drill out the threaded $\frac{1}{4}$ " holes in the heel of the bottom plate and re-tap to $\frac{5}{16}$ " B.S.F. This work should be carried out by Consignees.

SUPPLEMENTARY NOTES ON HANDLING THE MARLIN MACHINE GUN.

Careful study should be made of the Marlin Instruction Manual.

A thorough understanding of the function of each part of the gun should be acquired by examination of each part. It is advised that half a dozen dummy rounds in a belt be worked through the gun by hand so that the full cycle of operations can be observed.

It is very important that the action should be free, smooth and certain, both backwards and forwards, to the fullest extent of its travel. This gun depends upon spring energy for forward action and feed in. Therefore any resistance due to stiffness, or excessive drag on the belt in the feed chute will prevent a full "feed in". It is most important therefore to ensure that the action parts of the gun are quite free, thoroughly clean and well oiled.

When cooking the gun, use the lanyard handle smartly and pull back hard to the fullest extent letting the slide fall into the rearmost notch of the guide. The forward action should always be released by disengaging the cooking handle from the notch and allowing the action to slam forward

without hindrance, thus using the full energy of the spring and momentum of the moving parts to ensure a "full feed-in". Always see that the rear end of the piston rod is making actual contact with the gas cylinder, thus indicating that the action has moved right home. If it has not, the "feed in" will not have been completed. In this event the gun should be cocked again, ejecting the live round. Practise with dummy rounds will show how best to operate the cocking motion.

Observation through the sliding inspection cover (right side) will also show if the cartridge extractor has gripped the next round.

There are only two adjustments in the guns

- (a) The trip gear
- (b) Gas chamber.

The trip gear is very important and the correct setting of the trip by means of the gauge should be checked frequently and adjusted as set out in the Armament Inspection Schedule - see page 42.

The gas chamber adjustment is not critical. It is recommended that it be screwed in to within one turn.

It is essential that any excessive oil should be removed from the gas chamber, piston, barrel, and barrel mouthpiece before firing, as after a few rounds have been fired the excessive lubricant burns and a smoke cloud obscures the target.

The guns mounted on the A.A. Quadruple Mounting have no aluminium air cooling fins. It has been found that the gun is capable of firing 100 rounds in "auto-fire" without undue heating. The moving parts are, however, more exposed to dust and atmosphere and it is therefore recommended that the protecting cover issued with these mountings should be in position at all times when the guns are not in use.

Before issue guns will have been de-greased, stripped and overhauled. Such new parts as have been found necessary from tests by C.I.S.A., will have been fitted and all guns have been proof-fired. Providing always the foregoing conditions are maintained there should be very little trouble experienced with Marlin guns.

It is suggested that, during Alerts, guns should be cocked (a round in the chamber) and safety catches in "Safe". The guns can then be brought into action at once after lifting safety catches.

ARMAMENT INSPECTION ON MARLIN GUNS.

A study of the Marlin Handbook is recommended. The Armourer will then understand and appreciate the functions of the various working parts and familiarise himself with the American nomenclature.

The limiting factor with this gun - common to machine guns of this type - is the small reserve of spring energy for the forward movement and "feed in". Any friction or excessive resistance (which can arise from a number of causes) will tend to prevent a full "feed in" on the forward action.

Spare parts and springs are issued with each gun, and use of the standard issue of tools equipment is recommended.

The Armament Inspection (A.I.) will consist of :-

- (a) Stripping and thoroughly cleaning.
- (b) Testing and replacing springs. (see para.15.)
- (c) Examination for wear and replacement with new parts.
- (d) Honing or rubbing down when necessary to ensure absolute free movement.

- (e) Assembling, oiling and proof test.

Receiver -

- (a) The four threaded holes for lock container will probably require rubbing down on the inside as they are situated in the path of the bolt (spring washers must be replaced for the screws otherwise the screws protrude).
- (b) The slide grooves should be cleaned out and scraped if necessary.
- (c) The buffer block should be removed and springs tested.
- (d) The bolt (complete) should be slid up and down in the receiver to ensure that it is free throughout its travel.
- (e) Remove all particles of brass (from cartridges) inside Receiver and especially under the Ejector.
- (f) Examine Ejector for wear or stiffness, (also spring and plunger) and see that it slides freely in the grooves.
- (g) Examine cartridge retainer plunger and spring (415,417). When refitting,

retainer screw (416) should be just flush with side of receiver. (If screwed up tight spring will be compressed coil on coil thus preventing cartridge rising). Ensure that the right spring (417) is replaced.

- (h) When refitting Action Spring Guide (355) see that the dove-tail attachment to receiver is properly engaged.

Slide.

- (a) Examine for bends or distortion and burrs. Test sliding action in receiver guides (dry) and rub down as necessary to ensure free action. Examine lugs (for feed lever) for wear and burrs as outer surfaces bear on side plates. Free movement of this component is essential.
- (b) Examine Cartridge Guides (left and right 85 and 86) for shape and wear and replace if necessary.
- (c) Examine Cartridge Extractor and spring (87 and 89) for wear and spring tension respectively and replace if necessary.

Piston and Cylinder.

Gas chamber and cylinder at forward end should be scraped out (decarbonised) so as to ensure free travel of piston. Clear gas hole. Piston should be screwed into the slide only hand tight up to the nearest notch. Adjustment of gas chamber is not critical but it should be screwed inwards to within one turn for maximum gas pressure.

Barrel.

Clean chamber, examine for damage or burrs to Extractor slot (barrel cannot be unscrewed or screwed up with bolt in the forward position.)

Bottom and Right Hand Plates.

Dismantle feed wheel (63), feed wheel dog and spring (66, 68). Ratchet lever, pawl and spring (76, 78, 79). Feed lever (70). Carefully clean and examine especially the springs in Ratchet Pawl and feed wheel dog. Extractor cam and spring (376, 378) should also be dismantled and examined (feed wheel can be assembled the wrong way round). Over the Ratchet Lever (76) is fitted a pressed steel pawl engagement device (not shown in the Manual). This has an important safety function in preventing the jamming of the round should the latter fail to be extracted from the belt.

Bolt.

Clean and rub down high points. Examine firing pin (and spring) for wear, straightness and protrusion through bolt for priming. Action should be free. Examine shell extractor and spring for wear and damage (15 and 16). Remove any burrs on sides of bolt Fin. Try loosely in receiver for free movement and hone down as necessary. Examine and test fit of bolt pin.

Action Test.

Assemble the slide without action spring into Receiver with buffer in position. Assemble the Bolt (complete) and pin. Screw in the barrel and fit the Carrier. Attach side and bottom plates with feed mechanism.

The following can then be observed:-

- (a) Full travel and positive action transmitted to the feed wheel through feed lever.
- (b) A load should be placed on the feed wheel equivalent to the lift of 100 round belt. This will show up any lost motion between Feed Lever, Ratchet, Ratchet Pawl and Feed Wheel. Any lost motion here will prevent a full feed.

- (c) The Feed Wheel dog (66) should engage positively behind the feed wheel before the feed lever has reached full forward travel. Similarly the Ratchet Pawl should engage upon the next sprocket tooth before full rearward travel has been reached by the feed lever. (The feed lever is moved backwards and forwards by the lugs on the Slide).
- (d) Feed stoppages will occur if the bullet guide on the left side plate is distorted.
- (e) Observe the engagement and movement of the Carrier and Dog.
- (f) The whole moving action should be quite free, smooth and easy.

Lock Container.

Thoroughly clean registers and test the fit (before assembly) on receiver. Remove burrs on under side around screw holes. Examine Sear and Trigger noses for wear, (correct Sear spring tension is an important safety factor). Examine hammer and hammer spring. First assemble hammer without spring and test for free movement on axis pin and clearance through slot on top of receiver. Four screw holes in lock container should be reamed out if "threaded" by the screws.

Assemble all parts with oil ensuring a bedded fit and screw down firmly, not forgetting the important spring washers for this and for the rear Sight block. If the lock container body is not a good fit on the top of the receiver, distortion will result when screwed down.

Trip Lever.

The trip adjustment is vital. First cock the gun. Insert the thick end of the trip gauge against the base of the gas cylinder and release the action. When the trigger is pressed the hammer should not fall. Cock the gun again and insert the thin end of the gauge against the base of the gas cylinder. When the trigger is pressed the hammer should fall. Adjustment is made by bending the Trip lever. Closing the angle of this lever advances the action of the trip. Such bending of the trip lever should be very slight and be carried out very carefully.

All springs should be removed for examination of length and compression poundage. All the moving springs described below are important but the Action Spring (254) and Ratchet Lever Pawl spring (79) are vitally important. It is recommended that all springs should be treated together for complete test. Spare springs are available for visual comparison of length. If a set of new springs are kept together as a

Master set no special spring testing gear is necessary. The only spring requiring compression measurement is the Action spring. The rated poundage at deflection (compressed to $11\frac{5}{8}$ " as in the gun with Action forward) is 22 lbs. If this falls below 19 lbs. it should be changed. A spring balance is quite satisfactory for this measurement.

List of important springs.

| | <u>Part No.</u> |
|---------------------------------------|-----------------|
| A. Action Spring | 354 |
| B. Firing Pin Spring. | 19 |
| C. Hammer Spring. | 518 |
| D. Ratchet Lever Pawl Spring. | 79 |
| E. Ejector Spring. | 390 |
| F. Trigger Spring. | 9 |
| G. Sear Spring. | 11 |
| H. Carrier Stop Spring. | 393 |
| I. Carrier Dog Spring. | 26 |
| J. Cartridge Extractor Spring. | 89 |
| K. Cartridge Extractor Cam Spring. | 378 |
| L. Feed Wheel Dog Spring. | 68 |
| M. Cartridge Retainer Plunger Spring. | 417 |
| N. Buffer Spring. | 360 |

Note: In the event of the hammer spring (518) being changed, and should the gun afterwards persist with a feed stoppage, one coil should be removed as some of the new springs are excessively strong.

Modifications to Guns for Quadruple Mounting.

Cocking Handle Guide. When assembling, care should be taken to tighten firmly the screws in the rear guide as they have a tendency to shear if loose. It is difficult to remove the broken portion as the screw is hard and the side plate soft.

Bolt Pin Retainer. Recent issues of Marlin Guns have been deficient of the Bolt Pin Retainer - a split plug fitted into a hole in the left-hand side plate. Its purpose is to prevent the bolt pin working out to the left. Supplies of this part are exhausted and it has been decided that the special manufacture of this Retainer is not warranted.