Handbook

on the

Armalite AR-10 Infantry rifle

Caliber 7,62 mm NATO

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CALIBER 7,62 mm NATO

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Chapter 1

Description and technical data

1.1. Description

1.1.1. The AR-10 rifle (fig. 1, 2, 3 and 4) is an automatic weapon which may be fired semi-automatic or full automatic.

The weapon was designed by the Armalite Division of Fairchild Engine and Airplane Corporation, Los Angeles, U.S.A.

It is manufactured under licence by Staatsbedrijf Artillerie-Inrichtingen Hembrug-Zaandam, the Netherlands.

In this weapon several main parts (upper receiver, lower receiver and buffer housing) are machined from forged aluminum-alloy. This is possible because of the special locking-system of the rifle, in which the barrel, barrel-extension and bolt form one part that takes up the forces caused by the gas-pressure when the round is fired. The upper and the lower receiver serve to conduct the recoil from the barrel to the butt-stock.

1.1.2. The construction of the weapon is based on the „straight-line" principle, i.e. the recoil force follows a straightline from barrel to butt-plate, reducing the climbing tendency to a minimum.

— The weapon is gas-operated; when the bullet has passed beyond the gas port in the barrel, the gas-pressure can reach the bolt group through the gas-tube and thus ensure proper functioning with a minimum of moving parts.

— The locking mechanism consists of two main parts, viz. the bolt and the bolt-carrier, which serve as gas piston and gas cylinder respectively.
For this purpose the bolt is provided with 3 piston rings.
The butt-stock contains the buffer and the action-spring.

— The weapon can be put on semi-automatic, full-automatic or safe by means of the safety; cocking and loading of the weapon can be effected in each position of this switch.
The full-automatic fire can be blocked by a stop automatic fire in the trigger-mechanism; this stop is quickly detachable by means of an Allen-wrench.

— After firing the last round of a magazine the bolt is held in its rearmost position by the bolt-catch; after inserting a full magazine a slight pression on the bolt catch lever is sufficient to load and lock the weapon.

— The weapon is sand-, dust- and mudtight; if the weapon is not fired, the ejection port is masked by an automatic spring-operated dust cover.

— The front end of the barrel is provided with a grenade launcher which forms an integral part of the rifle ready for instant use. This part also serves as a flash-hider and to contain an attachment for firing blanks.

1.2. Technical data

Overall length	1050 mm
Weight w/o magazine	4050 g
Weight of bipod	335 g
Weight of empty magazine	119 g
Weight of loaded magazine	600 g
Number of rounds in magazine	20 rds
Length of barrel with extension	521 mm
Number of land and grooves (right-hand twist)	4
Pitch	304,8 mm
Length of rifling	450 mm
Caliber	7,62 mm NATO
Length of cartridge case	51 mm
Muzzle velocity	820 m/sec.
Muzzle energy	305 kgm
Rate of fire (cyclic)	appr. 700 rds/min.
Rate of fire (practical, full-automatic)	100-110 rds/min. in short bursts
Rate of fire (practical, semi-automatic)	appr. 50 aimed shots/min.
Sight adjustment	from 100 m up to 500 m
Sight radius	522 mm

Chapter 2

Operation and handling

2.1. Loading

2.1.1. Put the safety on "Safe".
Insert a loaded magazine.

2.1.2. Pull charging handle fully to the rear and release it. The dust cover opens automatically.

2.2. Reloading

2.2.1. Press magazine catch button with index of right hand. Remove the empty magazine with the left hand.

2.2.2. Insert a full magazine.

2.2.3. Push the upper tip of the bolt catch lever; this allows the bolt to close feeding a new round into the chamber.

2.3. Unloading

2.31. Put the safety on "Safe".

2.3.2. Remove magazine.

2.3.3. Pull charging handle fully to the rear and inspect the chamber.

2.3.4. Release the charging handle.

2.3.5. Put the safety on "Semi".

2.3.6. Keeping the muzzle pointed up, pull the trigger.

2.3.7. Put the safety on "Safe" and close the dust cover.

Chapter 3

Disassembly and assembly for cleaning the weapon after firing

3.1. Disassembly (use a dummy or live cartridge)

3.1.1. Unload the weapon as described in 2.3.

3.1.2. Press the take down pin to the right and open the rifle.

3.1.3. Withdraw the bolt assembly from the upper receiver.

3.1.4. Pull the charging handle fully to the rear. Push the front part downward and withdraw till the rear side lugs can be segregated from the rear part.
Remove the rear part (note the correct position of the fork legs, fig. 5)
Remove the front part through the open underside of the upper receiver.

3.1.5. Disassemble the bolt assembly as follows:

3.1.5.1. With cartridge, push out the firing pin retaining pin and withdraw it from bolt carrier.

3.1.5.2. Remove firing pin.

3.1.5.3. Remove cam pin.

3.1.5.4. Withdraw bolt from bolt carrier.

3.1.5.5. Using the firing pin to start it, pull out the extractor pin and remove the extractor. The extractor spring will remain in the extractor.

3.1.6. Cock the hammer and depress the buffer retainer plunger. The buffer assembly with action spring and guide may now be removed from the buffer tube.

3.1.7. Turn the handguard locking ring to the rear until it is free from the handguard halves. Remove the handguard halves.
Remove the liner halves.

3.1.8. In order to turn the gasregulator, the spring loaded detent must be depressed. This is done by means of inserting the point of a cartridge into the hole next to the detent and slightly pressing the cartridge towards the weapon.
When the gasregulator is turned until the flat section on its right hand side is directed upwards (fig. 10), it can be pushed out to the left.

3.1.9. The magazine should be disassembled as follows :

3.1.9.1. Put the point of a bullet in the hole in the floor plate and press in the floor plate retainer.

3.1.9.2. Push the floor plate to the rear, meanwhile retaining the spring with the thumb.

3.1.9.3. Remove the follower and spring from the magazine.

3.2. Assembly

3.2.1. Assemble the rifle in reverse order as described in 3.1., thereby noting the following points.

3.2.1.1. If the bolt is inserted in the bolt-carrier in the correct position, the extractor is in right upper position. If the bolt is in wrong position, the cam pin cannot be assembled.

3.2.1.2. The upper liner half is provided with a slit through which the gas tube passes. The handguard halves have a reinforcement on the front part of the bottom.

3.2.1.3. After assembling the rifle, pull the trigger to uncock the hammer.
Put the safety on "Safe".

Chapter 4

Disassembly and assembly of the trigger mechanism

4.1. Disassembly

4.1.1. Press the take down pin to the right and open the rifle.

4.1.2. Uncock the hammer slowly (do not allow it to snap against the lower receiver).

4.1.3. Press out the automatic sear pin; remove the automatic sear.

4.1.4. If the rifle is provided with a stop automatic fire, unscrew the screw with an Allen-wrench and remove the stop.

4.1.5. Press out the hammer pin; remove the hammer with hammer spring and trigger pin detent spring.

4.1.6. Put the safety on "Auto"; press out the trigger pin; remove the sear and the trigger.

4.2. Assembly

4.2.1. Assemble the trigger mechanism in reverse order as described in 4.1., thereby noting the following points.

4.2.1.1. The telescopic hammer spring should be assembled to the hammer in the correct position with its rear lug pointing upward.

4.2.1.2. The trigger pin retaining spring

should be assembled in its correct position with the rear leg resting on the trigger pin.

4.2.1.3. The stop automatic fire can be assembled with the safety in either „Semi" or „Safe" position.

Chapter 5

Functioning of the weapon

5.1. The rearward movement

The weapon is loaded and the safety is on "Semi".
Upon pulling the trigger the hammer strikes the firing pin which detonates the primer; the powder starts to burn and develops gas which drives the bullet through the barrel with increasing velocity.
When the bullet passes beyond the gas port in the barrel, the gas flows through the gas regulator and the gas tube and into a chamber formed by the bolt carrier and the bolt, of which the latter is in locked position and acts as a stationary piston.
The entering gas pressure causes the bolt carrier to move to the rear.

This rearward movement causes :

— the firing pin to be withdrawn from the primer;

— the cam pin to follow its groove in the bolt carrier, thereby turning the bolt 1/16 turn. The cam pin groove is designed in such a way that the bullet has full opportunity to leave the barrel before the turning and unlocking of the bolt starts.
When the bolt is fully unlocked and starts to move rearward, the gas is already exhausted

through ports in the side of the bolt carrier. These safety measures are incorporated in the mechanism to ensure that no gas pressure can remain in an unlocked rifle. The bolt carrier has now accumulated enough energy to travel fully to the rear, thereby :

— extracting and ejecting the empty case;
— pressing the hammer down into its cocked position;
— pressing in the action spring into the buffer tube.

The rearward movement ends when the action spring guide meets the bottom of the buffer tube. The remaining energy of the bolt carrier is then absorbed by the steel Belleville springs of the buffer, thus damping the shock of the recoil.

5.2. The forward movement

When the bolt assembly travels forward under pression of the action spring, a new cartridge is fed from the magazine into the chamber by one of the two lower locking lugs of the bolt. Upon seating of the cartridge in the chamber by the bolt, the extractor hook passes over the rim of the cartridge case and engages the groove; simultaneously the ejector is pressed in by the bottom of the case against the tension of its spring.

The cam pin follows its groove and turns the bolt 1/16 turn into its locked position. The 7 locking lugs of the bolt are now positioned opposite and in front of the respective lugs of the barrel extension.

5.3. Semi-automatic fire

When the safety is in its "Semi" position, the

automatic sear is kept out of the way of the hammer and does not partake in the functioning of the mechanism.
When the hammer is pressed down by the recoiling bolt carrier, it is caught by the front tip of the sear and held down when the bolt carrier has returned to its foremost position (fig. 14a). Owing to the construction of the spring loaded plunger in the rear tip of the sear, the trigger must be released before another round can be fired (fig. 14 b).

5.4. Automatic fire

When the safety is in its "Auto" position, the automatic sear can turn backwards under the tension of its spring, which causes the lower lug of the automatic sear to get in the way of the hammer. At the same time ~~time~~ the trigger can be pulled farther backwards owing to a milled cut in the body of the safety just over the rear part of the trigger. When the trigger is now pulled, the front tip of the sear is kept fully free from the hammer (fig. 14c), whenever this part is pressed down by the bolt carrier after firing a cartridge. However the hammer is now caught by the lower lug of the automatic sear and kept in this position (fig. 14d) until the bolt carrier has almost ended its forward travel, the bolt then being in locked position and the weapon ready to be fired.
At this moment the lower rear edge of the bolt carrier strikes the upper lug of the automatic sear, causing it to turn forward and to free the hammer; the hammer then again strikes the firing pin, firing the cartridge in the chamber.
This action continues as long as the trigger is

being pulled. Releasing the trigger lifts the front tip of the sear and brings it in the way of the hammer, keeping this in cocked position.

5.5. The "Safe" position

In the "Safe" position the round side of the body of the safety blocks the rear end of the trigger and prevents this part from turning. The front end of the sear keeps the hammer in its cocked position.

An extra lug on the body of the safety prevents the sear from releasing the hammer accidentally, when the weapon is subjected to a heavy shock. The weapon can be put to "Safe" in either cocked or uncocked position of the hammer.

An unloaded and "Safe" weapon can be normally loaded without the necessity of altering the position of the safety.

5.6. Empty magazine

After firing the last round from a magazine, the follower of the magazine contacts the front lug of the bolt catch and pushes it upward. This will bring the bolt catch in the way of the bolt at the start of its forward stroke, the bolt being kept in rear position.

After inserting a loaded magazine, the loading and locking of the rifle is effected by means of pushing the lever of the bolt catch.

Chapter 6

Gas adjustment

6.1. Purpose and use of the gas regulator

The gas regulator (fig. 6) enables the user to adapt the rifle to the ammunition used and to the circumstances in which the rifle has to operate.

The regulator has 3 orifices : normal, medium and large; its position can be read by means of the 3 slits in its head.

The size of the slit next to the spring loaded detent of the regulator indicates the position of the latter (normal, medium or large).

The positions "normal" and "medium" are meant for a rifle under normal shooting conditions, and differ only because some kinds of ammunition give a higher rate of fire than others, depending upon the specific pressure diagram of the powder used.

The rate of fire should be from 650 to 750 rounds per minute, which ensures proper functioning of the rifle under normal conditions.

Under adverse conditions (dust, mud, water etc.) the regulator should be set on its "large" position; as soon as these conditions are no longer extant, the regulator should be turned back (see 3.1.8.) to its original setting because of the unnecessary strain on the weapon when operating with maximum gas pressure under normal conditions.

6.2. Cleaning of the gas regulator

6.2.1. For disassembly of the gas regulator, see pt. 3.1.8. Cleaning consists of wiping with an oily cloth to remove carbon deposits from body and slits, and should be performed when cleaning the other parts of the rifle after firing.

6.2.2. Cleaning of the gas tube is sometimes necessary after the firing of blank cartridges, and it can be effected by means of the gas tube cleaning brush (fig. 7), which should then be drawn through the tube from front to rear.

Chapter 7

Sight adjustment

7.1. Technical data

The rear sight can be adjusted for distances from 100 m up to and including 500 m.
The turning of the elevation spool is regulated clickwise by a spring loaded detent (one click is 100 m), which prevents unwanted rotation of the spool.

7.2. Zeroing in on 100 m

The sight having been set to figure 1 (100 m), the locking screw on the right side of the bottom of the spool can be loosened (fig. 5).
The rear sight nut (upper) and the elevation spool (lower) can then be turned with respect to each other.
By turning of the rear sight nut the rear sight is then set at the correct height (this height to be determined by shooting), which makes the point of impact coincide with the point of aim.
When the rear sight nut is turned clockwise (viewed from above), the rear sight aperture moves upwards; the point of impact will then ascend as well.
When the rear sight nut is turned over the distance between 2 consecutive clicks (the elevation spool being kept in the same position) the line of sight ascends or descends 1/3 of a mil.

This means that at a distance of 100 m the point of impact is shifted 3,3 cm up or down.
Tightening of the locking screw into the respective hole of the elevation spool will rejoin the rear sight nut and the elevation spool into one single part.

7.3. Zeroing in on 25 m and 50 m

Proceed as above, but note that the point of impact must be
at 25 m ..... 6 cm and
at 50 m ..... 4 cm **under** the point of aim.
When thus zeroed in, the point of impact will at 100 m coincide with the point of aim.

7.4. Windage adjustment

For windage adjustment the aperture clamp screw must be slackened, which enables the shooter to move the aperture laterally.
When the mark of the aperture is moved over the distance between two marks on the rear sight elevation screw, the sight line moves over an angle of 2 mils.
This implies that at a distance of 100 m the point of impact shifts 20 cm.
A displacement of the aperture to the right causes the point of impact to move likewise to the right.

Chapter 8

Cleaning of the weapon

8.1. General

In order to prevent corrosion, the metal parts are finished after machining. The kind of finishing depends upon the material of the parts and generally consists of:

— for steel parts: phosphating or chrome-plating. Phosphate finish requires a little oil to keep its rust preventive characteristics efficient. Chrome-plating needs a little oil only to reduce friction to a minimum.

— for aluminum parts: hard-anodizing. This finish consists of a very hard oxide-layer that requires no further attention other than wiping off dirt and carbon deposits.
Wherever it is necessary to reduce friction, the parts have been treated with a solid film lubricant, which does not need any other care than cleaning either.

8.2. Cleaning after firing

Especially when using non-corrosive primers, cleaning of the rifle is very simple and consists of:

— cleaning the barrel with a brush or patch soaked with OX-52 or an equivalent rifle bore cleaner. For the barrel extension use the special brush (fig. 7).

Cleaning of the barrel should be continued until the cleaning patch is no longer soiled when run through the bore.

— disassembling and cleaning of the bolt. All these parts are chrome-plated, which facilitates the wiping-off of the carbon deposits with an oily cloth.

— cleaning the gas regulator. For this part, see pt 6.2.1.

After cleaning the steel parts these should be slightly oiled with OX-52 or an equivalent oil to ensure maximum corrosion prevention and proper functioning.

8.3. Maintenance during cold weather

During cold weather the normal rifle oil (OX-52) should be replaced by a lighter oil (OX-13 or similar) to prevent sluggish functioning.
To prevent freezing together of metal parts the weapon should be kept moisture-free.

8.4. Maintenance under adverse conditions

Cleaning under adverse conditions should be done as described in pts 8.2 and 8.3 but be performed more frequently to prevent agglomeration of sand, dust etc., which could hamper the proper functioning of the rifle.

8.5. Special points for the user

8.5.1. Because the life-expectancy of a rifle barrel is directly connected with the temperature that the user allows it to reach during shooting, it is recommended to restrict the automatic fire to bursts of approx. 100 rounds.
Cooling the rifle after such a burst will prolong the life of the barrel substantially.

8.5.2. Special care should be taken that no live cartridges be left in an overheated rifle, so as to prevent a "cook-off".
Under normal conditions a "cook-off" will not occur in this weapon until at least 200 rounds have been discharged in quick automatic fire.

Chapter 9

9.1. Stop automatic-fire (fig. 8)

See 4.1.4.

9.2. Sling

The rifle sling is made of a special webbing material and its length is adjustable by means of a non-slip metal buckle.

9.3. Bipod

9.3.1. The rifle can be fitted with a quickly detachable folding bipod.
The spring loaded detent of the hinge can be pushed in with the bullet point of a cartridge (fig. 9).
9.3.2. When fitting a bipod, the rifle should also be provided with the special handguard and lower linerhalf, designed to enable the user to fold the bipod back into the handguard.

9.4. Blanks firing attachment

This accessory is inserted in the grenade launcher (fig. 10) and should be screwed in **tightly** to shut off the gas escape from the barrel after firing a blank. Pressure in the barrel will run up sufficiently high to make the rifle function as when using live cartridges.
The construction of the thread of the attachment is such that it will clean the thread of the grenade launcher when this has been soiled by carbon deposits.
The gas can escape through two small holes in

the side of the body of the attachment; this provision diminishes the danger which is always present in firing blanks, but the normal safety-precautions for this type of ammunition are still recommended.

N.B. *Always make sure that no live ammunition be loaded when using the blanks firing attachment.*

9.5. Grenade launching sight

9.5.1. The rifle is fitted with a grenade launcher for launching the normal AT and AP grenades whose tail tubes have an internal diameter of 22 mm.
Aiming is done with the aid of the speciale sight, which should be attached to the lug on the front sight (fig. 6).
Sighting for targets at 100 m and 75 m is effected by means of lining up the pertaining arch of the sight with the outline of the grenade head. The line of sight thus obtained must be aimed at the target.
At the distance of 50 m the normal front sight is used in combination with the outline of the grenade head to determine the line of sight.

9.5.2. The gas regulator should be set to the "normal" position before launching a grenade. This will avoid unnecessary strain on the moving parts of the rifle.

9.5.3. Supporting the rifle when firing a grenade should preferably be done with the upper part of the butt plate resting against the support. If possible, the support should be sand or earth; should this not be available, any solid object of wood, stone etc. will serve.

9.5.4. Loading rifle grenades is done with the safety on „Safe"; firing is done in the „Semi" position.
After mounting a grenade onto the launcher a special launching cartridge is fed into the chamber, either by hand or from a magazine.

9.6. Bayonet

The bayonet is fixed to the rifle above the grenade launcher (fig. 11), and is of special design, i.e. the point of impact of the rifle is not changed by the bayonet.

9.7. Magazine filler

To facilitate the loading of magazines from 5-round clips, a magazine filler is provided (fig. 12).
This filler will guide the cartridges to their proper position in the magazine when these are stripped from the clip.

9.8. Scope

9.8.1. **General**
The rifle can be fitted with a special upper receiver machined to receive a scope (fig. 13).
The scope is quickly attachable and detachable.
The parts are made of a strong, black-anodized aluminum alloy.
The telescope is provided with a movable rainshield at the front end.

9.8.2. The construction of the means for setting range and windage lacks the protruding knobs common to conventional military scopes. Instead, the setting of this scope is effected by turning two knurled rings around the scope body; the

rear ring serves the range setting, the front ring serves the windage setting.
The zero-marks on these rings can be set to the desired positions by holding the respective knurled rings with one hand and turning the stiff-slipping scale rings by means of a special wrench. In order to facilitate the setting of the scope in the dark, the zero-marks of the scale rings and the knurled rings are provided with feeler-pins. Each setting-ring is first brought in its zero position by aligning these pins on feeling and then turned to the required setting by counting the clicks (one click is ½ mil).

9.8.3. Before mounting the scope, care should be taken that the scope-bedding surface is free from dirt etc.
The scope should be mounted from front to rear; first the rear V-notch clamp of the scope engages its position in the scope bedding, after which the front end of the scope is pushed down against the tension of the V-notch clamp spring.

9.8.4. Technical data

Magnification	3,6 X
Distance between E.P. and end of sight	75 mm
Dia Exit Pupil	7,0 mm
Field of View	5°
Setting of distance	100 m up to 800 m with ½ mil clicks
Setting of windage, left and right	max. 5 ‰ with ½ mil clicks
Weight	340 g
Optics	coated
Weight	340 g

Zaandam, june 1961

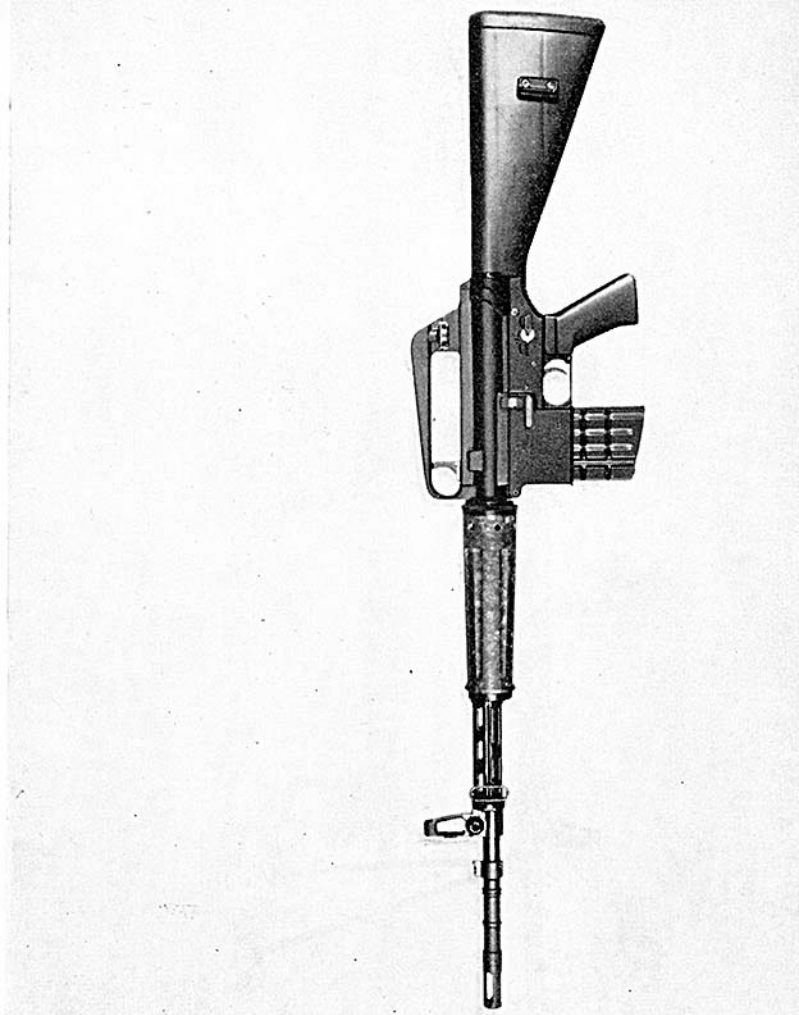


Fig. 1

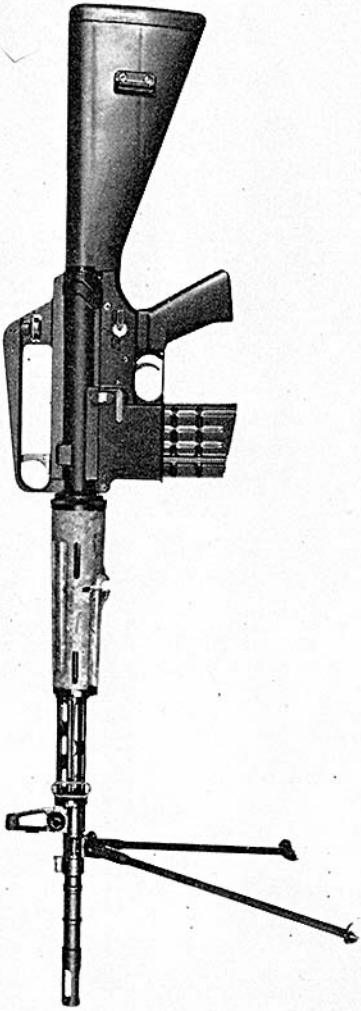


Fig. 2

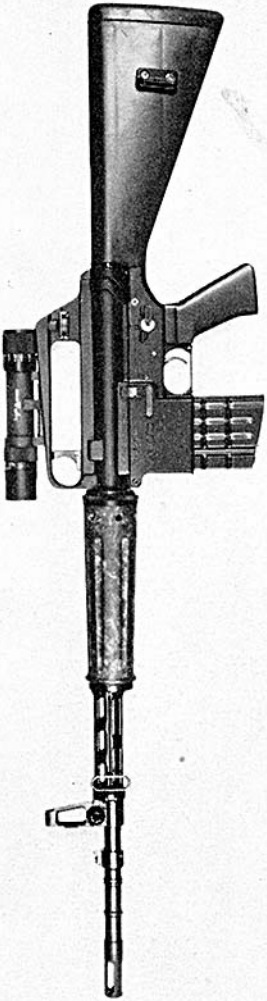


Fig. 3

Fig. 4

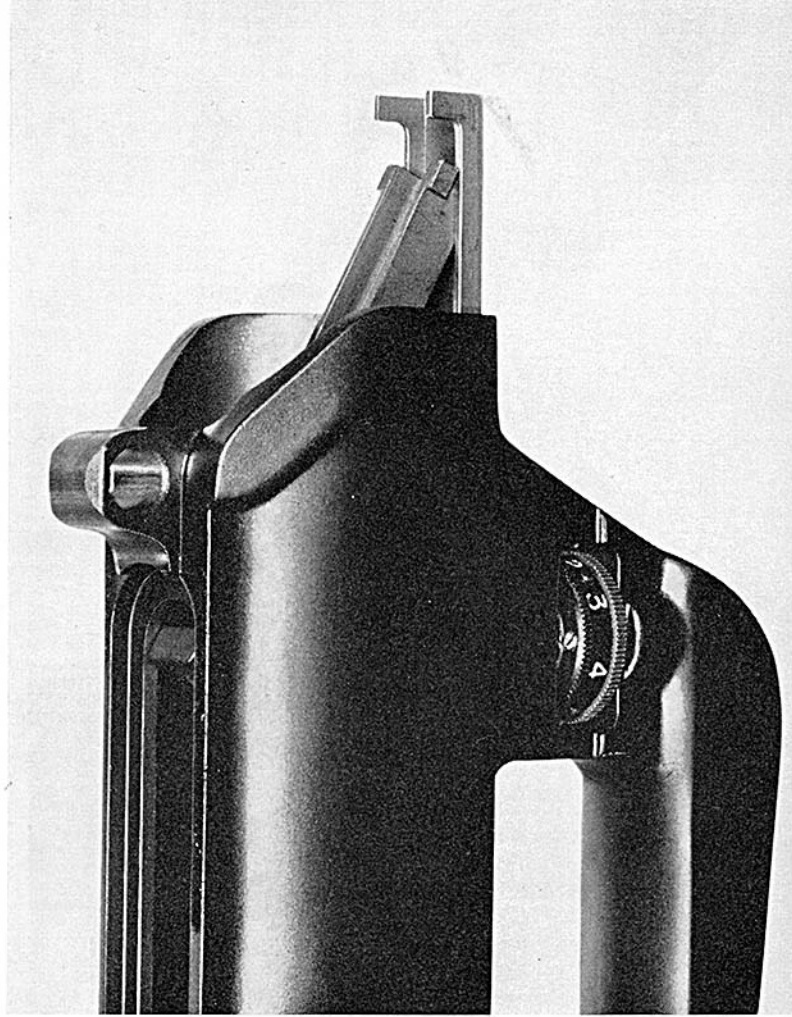


Fig. 5

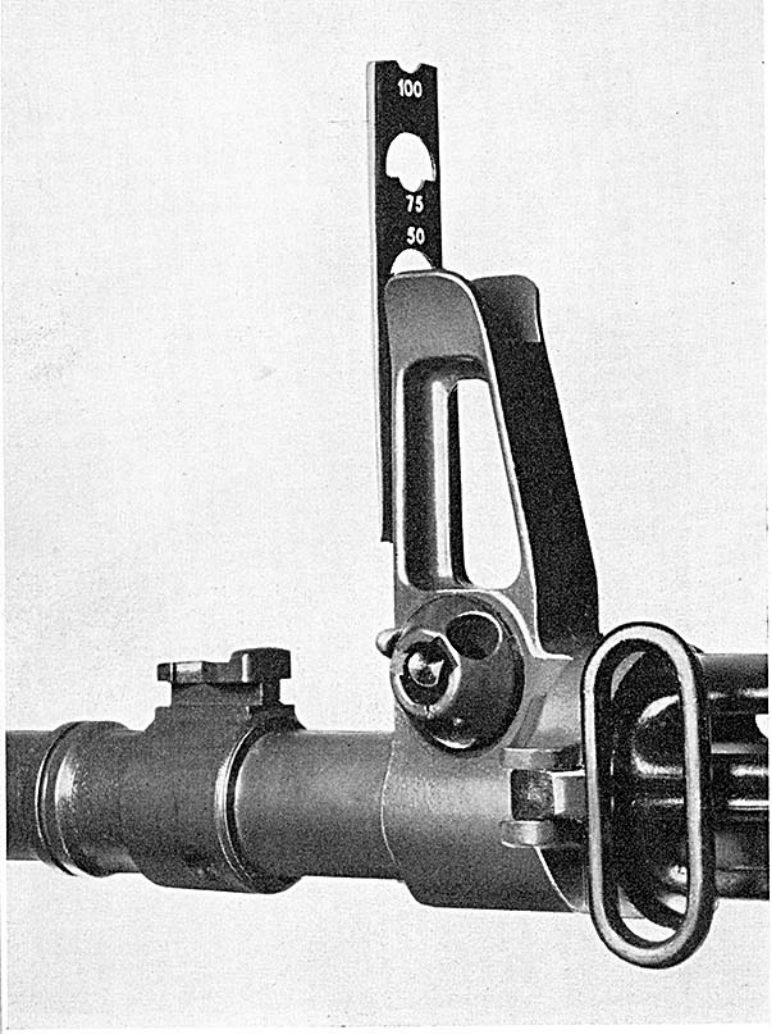


Fig. 6

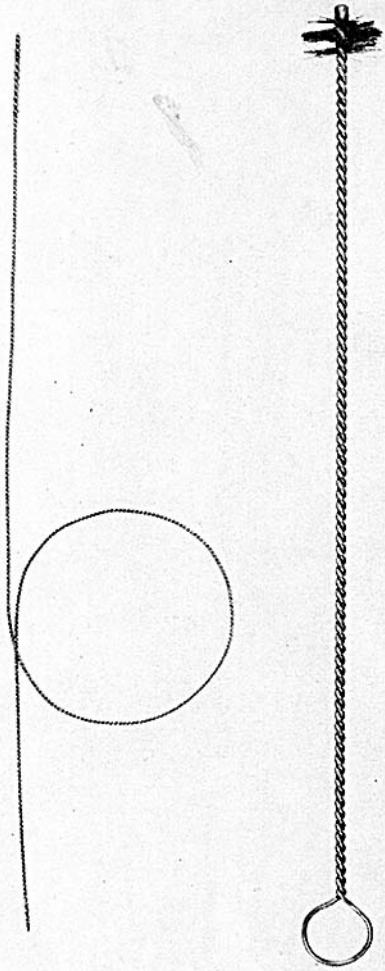


Fig. 7

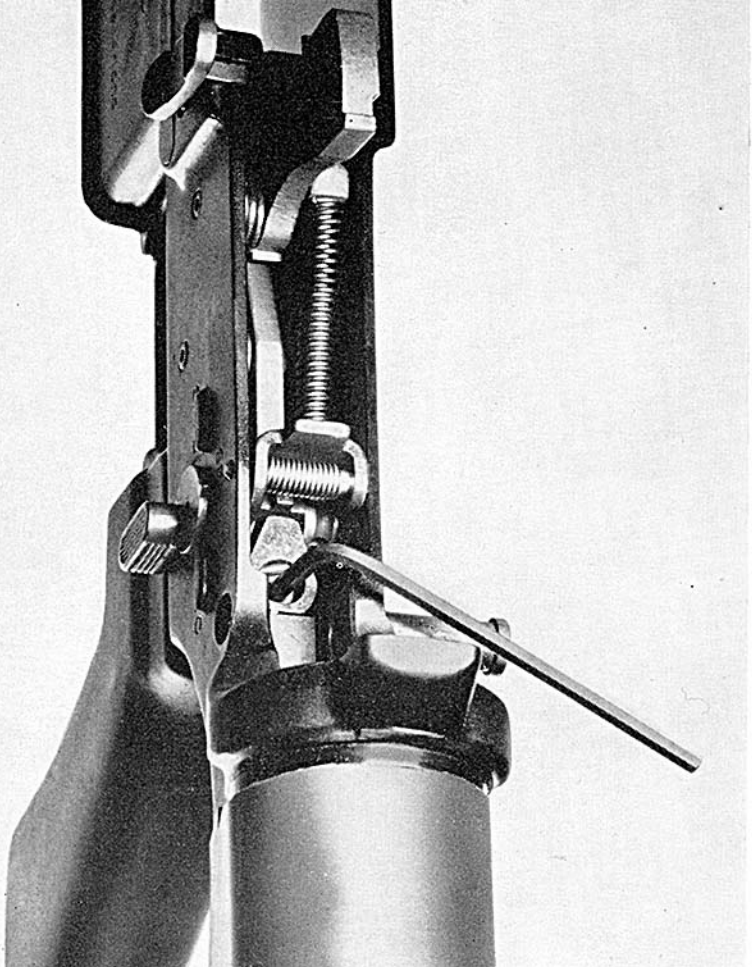


Fig. 8

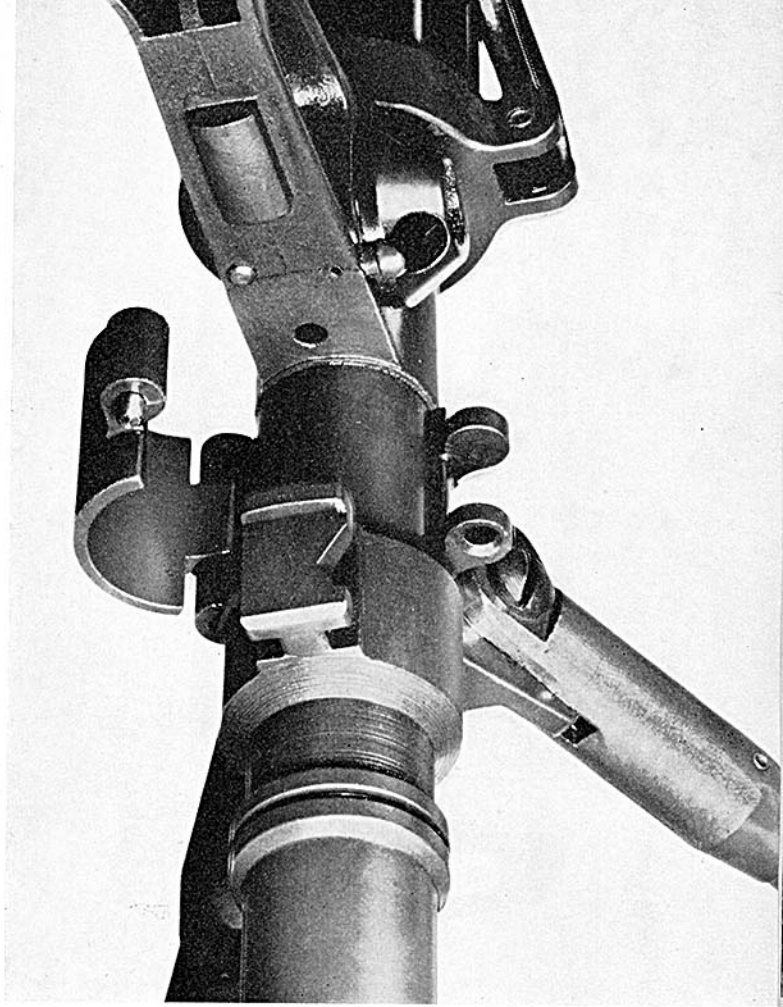


Fig. 9

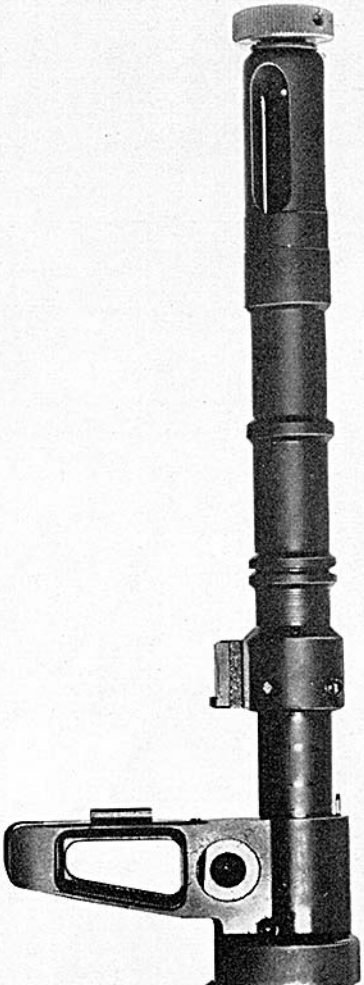


Fig. 10

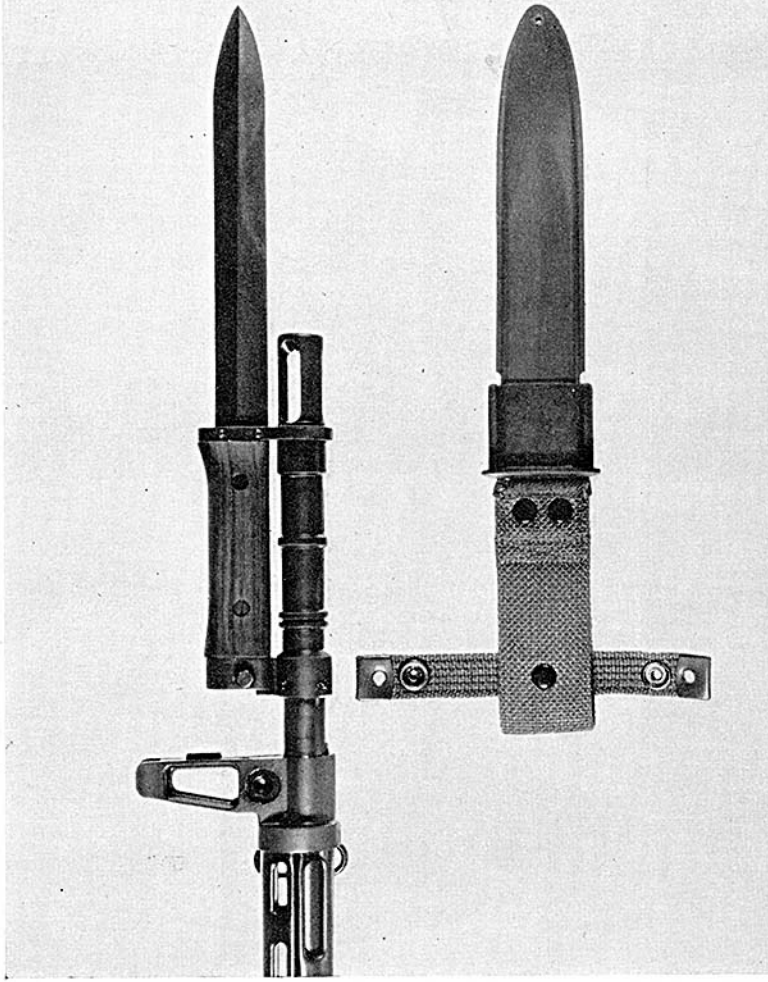


Fig. 11

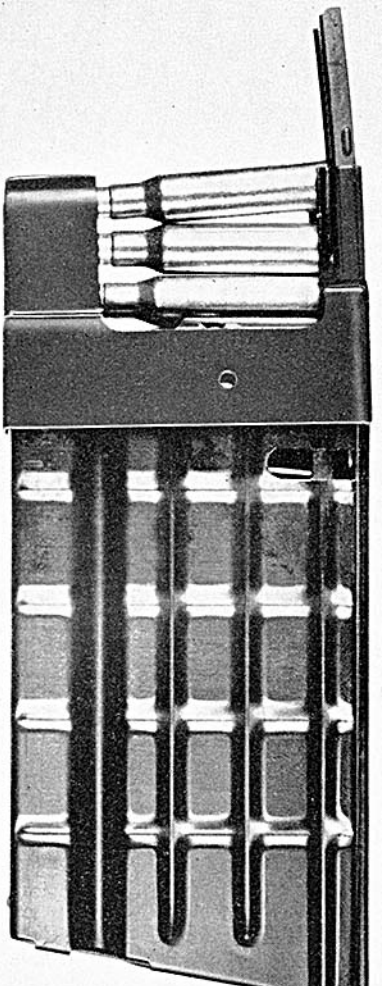


Fig. 12

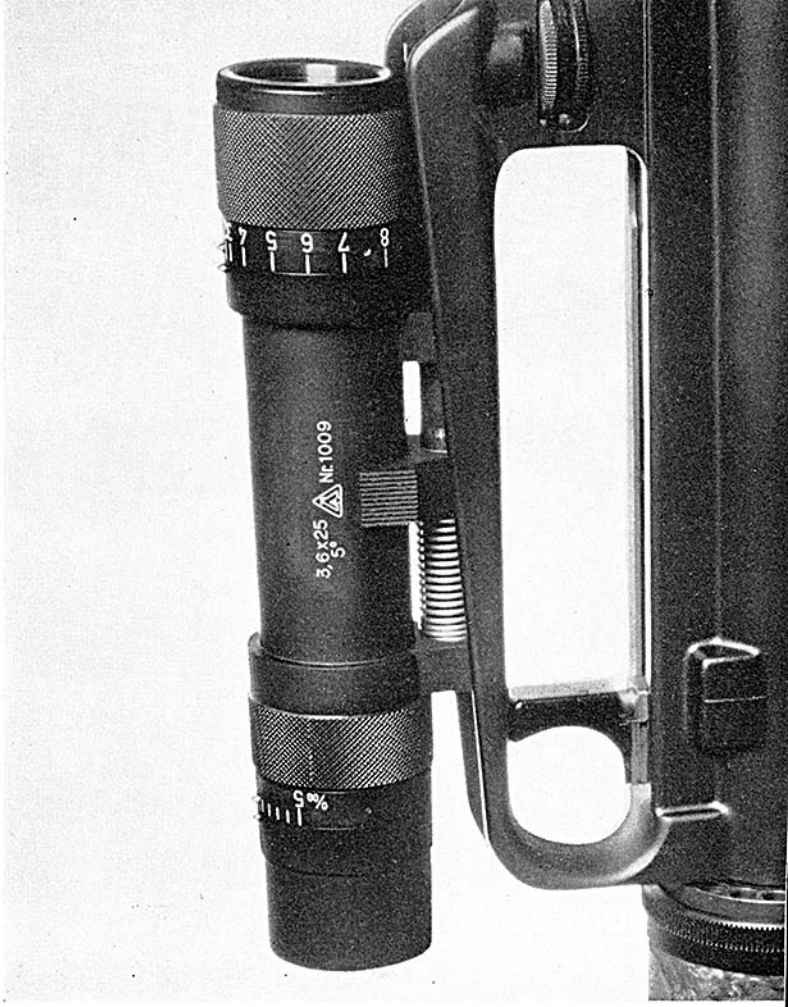
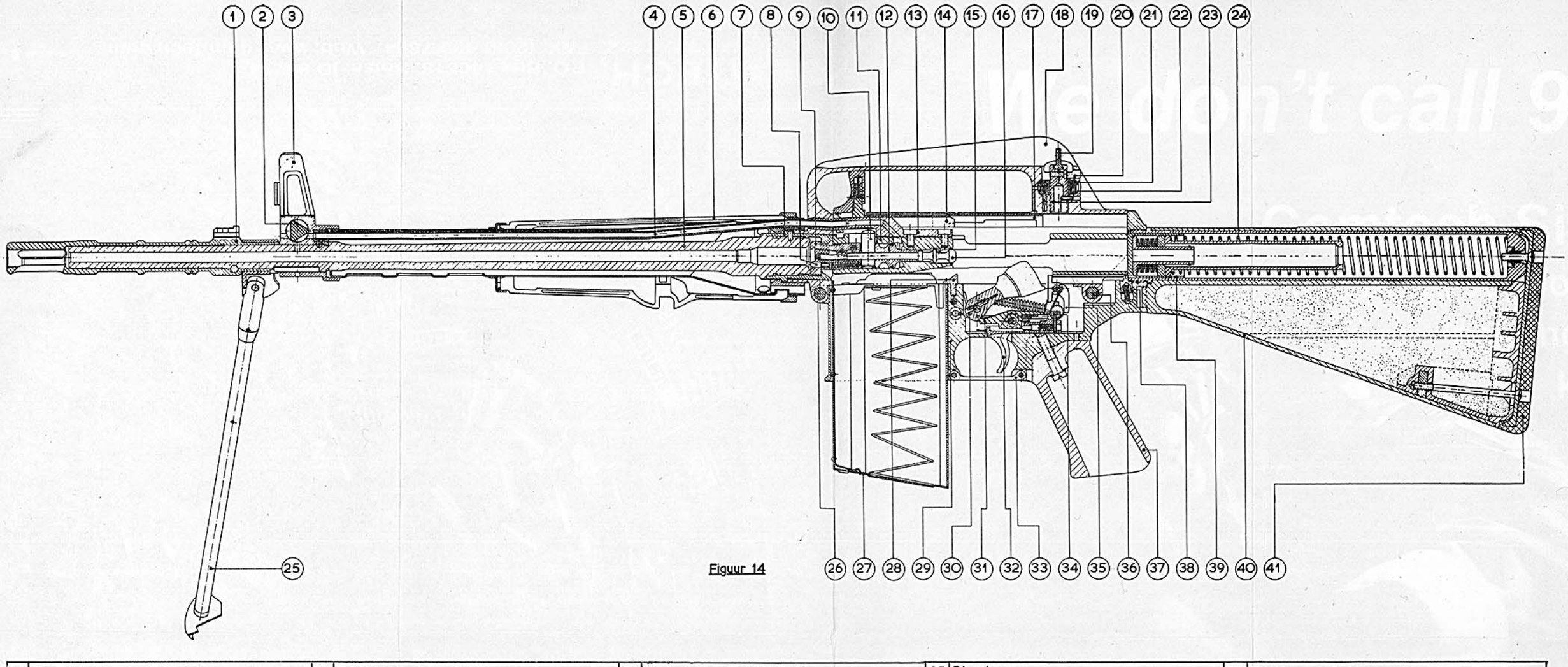


Fig. 13



Figuur 14

1	Flashhider_grenade launcher	9	Extractor	17	Charging handle, rear part	25	Bipod	33	Trigger guard
2	Gasregulator	10	Cam pin	18	Upper receiver	26	Hinge pin	34	Safety
3	Front sight	11	Bolt carrier	19	Rear sight aperture	27	Magazine	35	Automatic sear
4	Gas tube	12	Bolt	20	Hole for the aperture clampscrew	28	Bolt catch	36	Take down pin
5	Barrel	13	Key of the bolt carrier	21	Rear sight nut	29	Lower receiver	37	Pistol grip
6	Handguard	14	Charging handle, front part	22	Elevation spool	30	Hammer	38	Buffer retaining pin
7	Barrel extension	15	Firing pin retaining pin	23	Elevation screw	31	Sear	39	Buffer
8	Ejector	16	Firing pin	24	Action spring	32	Trigger	40	Butt stock
								41	Recoil pad

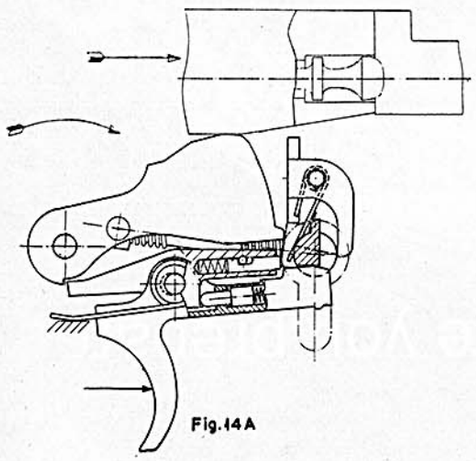


Fig.14A

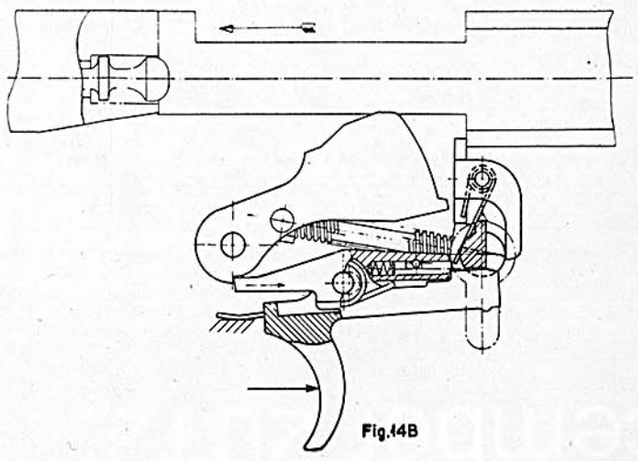


Fig.14B

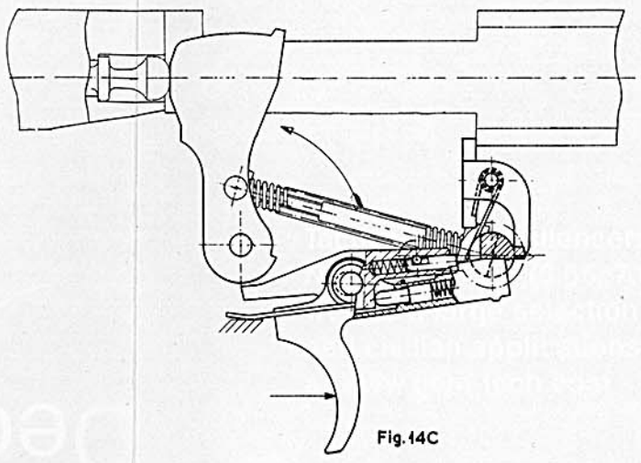


Fig.14C

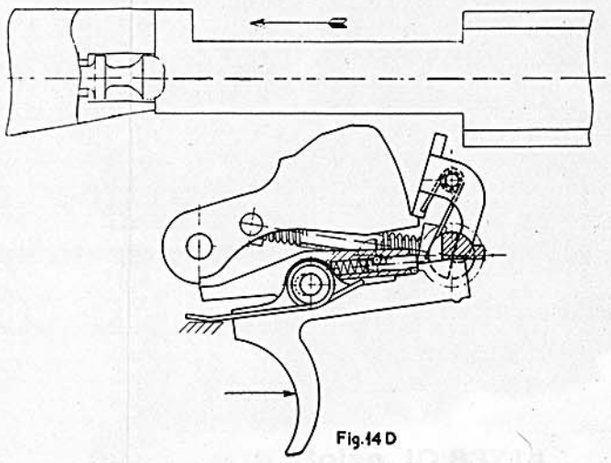


Fig.14D