

Privately printed for CAPT. H. GODSAL from the Official  
Notes, with additional NEW METHODS and MECHANISM.

# LEWIS Machine Gun

(MODEL 1915)

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## MECHANISM AND STOPPAGES.

*Fifth Edition.*

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WITH OFFICIAL NOMENCLATURE.

May, 1916.

Part  
C/1

Class

Date

Position behind counter piece

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2. Right hand side of counter

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## SPECIAL METHOD FOR LEARNING LEWIS GUN MECHANISM.

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When learning the mechanism of the Lewis gun, learners have often been noticed holding such parts as the body cover, or the bolt, upside down whilst examining them. This generally creates a confused idea in the minds of those learning the mechanism. In order to visualise and thoroughly understand the action of the pawls under the body cover, or how the striker post works in the cam slot of the bolt, it is necessary to hold each of them above one's head **and look up at them from below.**

This particularly applies to the action of the striker post in the bolt. In order to clearly understand this action, the bolt, the feed-arm actuating stud, and the rack should be assembled; then with the left hand holding the feed-arm actuating stud, and the right hand holding the rack, the learner should hold these assembled parts well above his head and look upwards. The right hand can then move the rack forwards or backwards when the action of the striker post in the cam slot, and the consequent forward movement resulting in the rotation of the bolt and the locking action of the four resistance lugs, can be clearly observed.

If two people hold the completely assembled gun high up whilst the instructor draws back the cocking-handle, allowing it to go slowly forward, the learner by standing on the right hand side of the gun and looking upwards and under the magazine can thus clearly see and understand how the dummy cartridges do not drop, but are forced (with a positive feed) to leave the magazine, and how the loading of the gun is accomplished.

# LEWIS GUN.

## Notes on Mechanism.

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### SEQUENCE OF INSTRUCTION

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#### TO FILL MAGAZINE.

1. Test magazine before filling by spinning it on a loading handle.  
Examine rim and see that it is not distorted.
2. Explain how magazine is filled.

#### TO LOAD.

1. See that cocking-handle is forward.
2. Place filled magazine on magazine post, with catch to the right; see that it is pressed right down, at the same time rotating it slightly in both directions, but do not use force, or it may be distorted.
3. Pull cocking handle to rear; by this action a cartridge has been placed in position in slot on top of body by action of feed-arm, ready to be pushed forward by bolt into chamber. At the same time the return spring has been wound up by the action of the rack on the pinion.

The piston rod is held back by the nose of the sear engaging with the bent on the rack.

The gun is now ready to be fired.

#### TO FIRE.

If the trigger is pressed the gun will fire, and it should continue to fire as long as the pressure on the trigger is maintained, or until the magazine is empty.

- (a) If pressure on the trigger is released during firing, the cocking handle will stop in the "back position," and the gun will be loaded and ready to fire.

- (b) If fire ceases, owing to the magazine being empty the cocking handle will be in the "forward position," and the gun will be unloaded, provided pressure on the trigger is maintained.

#### TO UNLOAD.

1. *Normal Method when in Action.*—Press the magazine catch, remove the magazine and press the trigger, thus firing the cartridge which was in position on slot flanges on top of body

2. *When it is not considered advisable to fire the round.*—The gun may be unloaded as follows:—

- (a) Remove magazine.
- (b) Hold cocking-handle with right hand, press the trigger with the left hand, ease the cocking-handle forward with just sufficient force to push cartridge from slot into the body.
- (c) Pull back the cocking-handle until the bent on rack engages with the nose of the sear.
- (d) Raise safety catch.
- (e) With the point of a bullet of a spare round pushed through the slot on top of the body, press against the rim of the cartridge on the left side, and draw to the rear and to the right, which will push cartridge out through ejection opening.
- (f) Lower safety catch, press the trigger.

NOTE.—If the gun has been firing, and the chamber has consequently become heated, method two should **not** be employed, for fear of causing self explosion of cartridge.

## BACKWARD MOVEMENT.

### ACTION OF THE GASES.

Supposing the gun to have fired. When the bullet is passing from the gas hole to the muzzle, part of the power gases enter through the gas hole into the gas chamber, thence into the gas regulator, where it deposits any solid matter that it carries.

The clean gas now rushes through the aperture in the gas regulator, and a corresponding aperture in the gas chamber, strikes against the cupped head of the piston rod. This forces the piston rod and bolt to the rear.

### ACTION OF PISTON ROD.

As the piston rod is forced to the rear the teeth on the rack are in mesh with the pinion and cause it to rotate, thus winding up the return spring.

When the piston rod has moved back about  $1\frac{1}{2}$  inches the right side of the striker post bears against the right side of the cam slot in the bolt, causing it to rotate one eighth of a turn to the left; this disengages the bolt lugs from their recesses and enables the piston rod, carrying with it the bolt, to travel still further to the rear.

### ACTION OF BOLT.

As the bolt travels back the extractors withdraw the empty case from the chamber until the left side of the case is brought opposite to and struck by the ejector, when it is thrown out to the right through the ejection opening.

### ACTION OF EJECTOR.

The left side lug of the feed-arm actuating stud on the bolt, during its backward movement, strikes against the rear portion of the ejector.

This causes the ejector to turn slightly on its pivoting stud.

The front portion of the ejector projects into the body, passes through a small groove in the front end of bolt, and strikes against the empty case, ensuring its ejection.

### ACTION OF FEED-ARM.

During the backward movement of the bolt, the boss on the top of the feed-arm actuating stud, travelling in a groove on the underside of the feed-arm finger, moves the feed-arm to the left.

As the feed-arm moves to the left it carries a cartridge which has been guided and placed in its slot from the magazine.

This cartridge is also forced under the cartridge guide spring.

The cartridge is thus brought into position in the slot on top of the body, where it rests on the two flanges ready to be pushed forward by the bolt. It is prevented from travelling too far to the left by the raised projection stop on the left side of the feed-arm slot.

14<sup>th</sup> Feb 1918.

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NOTES.

Robert Wilson

~~Stoppage~~

Pos <sup>n</sup> of C.H.	N.B. When Gun stops always look for position of C.H. If C.H. is forward always rotate, or attempt to rotate mag. Immediate action.	How to set up for drill
7	1 attempt to rotate mag. If mag rotates freely change it	Place empty mag on Mag Post
2	2 If mag rotates slightly lock at stop pads	Remove Parts on Spring
3	3 Mag forced Pull back C.H. If no round is ejected let mag rotate. carry on	Space in mag.
4	4 If no round is ejected & mag stops but rotate examine feed arm & coil spring	Broken feed arm pads or spring
5	5 If live round ejected carry on	Miss Fire
6	6 If 2 live rounds ejected in succession examine second If bore not touched by strike unless it change Piston Rod.	Broken slider
7	7 C.H. fixed use wooden handle or double pull H. mag.	Hard Extraction
8	8 If Gun fire, single shot remove Gas Reg Key - Gas Reg. fire one round to clear but replace Gas Reg with large hole to star load carry on	Slightly damaged round in mag.
		nil.

### **ACTION OF MAGAZINE.**

As the feed-arm moves to the left the feed-arm pawl acts against one of the projections on the outside of the magazine, thus causing the magazine to make a partial revolution, clockwise, sufficient to bring the next cartridge into position.

When the feed-arm has reached its extreme position to the left, the left of the three feed arm studs is freed from the right stop pawl, which is then forced out by the pawls-spring and engages into the next recess on the right in the magazine, thus preventing it from rotating too far.

At the same time the left stop pawl, which has been pressed in and passed over by the clockwise rotation of magazine, is engaged in the next recess on the left and prevents the magazine from rotating in the contrary direction. The magazine is thus locked in position during the loading and firing action.

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## **FORWARD MOVEMENT.**

### **ACTION OF RETURN SPRING.**

As soon as the gases have expended their force, the return spring unwinds itself, thus causing the pinion to rotate.

The teeth on the pinion engage with the teeth on the rack, causing the piston rod and bolt to be carried forward.

### **ACTION OF PISTON ROD.**

As the piston rod travels forward it carries the bolt fully home. The left side of the striker post, bearing fully against the left side of the cam slot in the bolt, causes the bolt to rotate one-eighth of a turn to the right, and the lugs on the bolt to engage in their locking recesses, thus locking the bolt. The lugs are now in position to take the shock of discharge, the bolt thus securely closing the breach.

The striker post still continues to travel forward until the striker hits the cap of the cartridge in chamber and fires it.

### **ACTION OF BOLT.**

As the bolt travels forward, the front top edge of the bolt strikes against the bottom edge of the cartridge in position in the slot, and pushes it forward into the chamber; the extractors spring over the rim of the cartridge.



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A hole returns after 2

was set up. C.H.  
over track Jack is  
same as in No 3  
through or under  
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of round is  
carry on  
C.H. found when  
removed as first  
is not in the track  
A step goes in  
it never moved  
A hole returns

### **ACTION OF EJECTOR.**

During the forward movement of the bolt the front end of the ejector is pushed to the left, thus forcing the rear end into the boltway of the body, in rear of the bolt.

### **ACTION OF FEED-ARM.**

As the bolt travels forward, the boss on the feed-arm actuating stud, working in the groove in the under side of the feed-arm finger, causes the feed-arm to move to the right into a position to receive a fresh cartridge from the magazine.

The left stud on the feed-arm bears on the right stop pawl, forcing it back clear of the magazine, to enable the magazine to be rotated by the feed-arm pawl.

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### **FIRING FIRST SHOT.**

On pressing the trigger, the nose of the sear is depressed, thus releasing it from the bent on the rack; this allows the return spring to carry forward the piston rod and bolt. The piston rod carrying the striker on its post, the striker fires the cartridge in the chamber.

### **RAPID FIRE.**

Pressure is maintained on the trigger, therefore the sear is kept depressed and cannot engage with the bent on the rack. The action of the gases forces the moving parts to the rear until they strike against the butt cap, when the return spring carries them forward (as for firing the first shot) and so on.

### **CEASE FIRE.**

On releasing pressure on the trigger the sear is forced to rise by the action of the trigger spring, therefore when the moving parts are right back and begin to move forward, the bent on the rack engages with the nose of the sear, thus arresting the moving parts.

NOTE.—Each portion of the action should be illustrated and explained by the instructor, using the spare parts for this purpose, or stripping gun where necessary.

### POINTS BEFORE FIRING.

1. Thoroughly overhaul the gun to see that no part is deficient, and that the mechanism works freely.
2. See that the barrel is clean and dry.
3. See that the barrel mouthpiece is tight.
4. See that small hole in gas regulator is to the rear.
5. Thoroughly oil all working parts, especially the cam slot and exterior of the bolt, the striker post and piston.
6. Weigh and adjust the return spring.
7. See that the mounting is firm.
8. Examine the magazines and ammunition.
9. See that the spare parts and oil reserve are handy.

### POINTS DURING FIRING.

1. During a temporary cessation of fire, re-oil all working parts.
2. Replace a partly emptied magazine with a full one.
3. Examine the mounting to see that it is firm.
4. See that empty magazines are refilled without delay.

### POINTS AFTER FIRING.

1. Unload.
2. Oil the bore and chamber, piston rod and gas cylinder.
3. Sort out live rounds from empty cases.
4. See that the return spring is eased.
5. Thoroughly clean and oil the gun on returning to quarters. Clean the bore daily for 10 days.

It is of the greatest importance that the points before, during, and after firing should be carefully attended to as otherwise the number of stoppages will be unnecessarily increased.

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**Nine out of ten stoppages are due to want of care.**

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**Immediate action must become instinctive and automatic.**

# LEWIS GUN STOPPAGES.

## General Notes.

**WEIGHING RETURN SPRING.**—When beginning to draw back cocking-handle, weight should be between ten and twelve pounds. Never more than fourteen pounds, and never less than six pounds.

Too much, or too little, tension on Return Spring is liable to cause undue wear and breakage of parts.

*The above figures are those used by the designers and makers of the Lewis Gun, and are those which Captain H. Godsal has found from experience to be apparently correct.*

If the gun continues firing, although pressure has been released off trigger, push trigger forward from left (if attempted on right side of gun the firer's hand may be injured) side of gun. When gun stops, examine bent on piston rod and trigger mechanism (no oil or dirt should be around plunger).

Position of Cocking-handle	Immediate Action	Probable Cause.	Prevention of Recurrence.	Method of Preparation for Instructional Purposes.
Magazine <b>1.—Cocking-handle forward</b>	<p>1. Try magazine, if it rotates freely to the left change it.</p> <p>If magazine is fixed, pull back cocking-handle, continue firing.</p> <p>Note. If, on pulling back cocking-handle, little or no resistance is felt, remove magazine and examine return spring; if light, tighten; if broken, change pinion casing and return spring (see page 12).</p>	<p>Empty magazine, no round in Chamber.</p> <p>(a) Miss-fire. (b) Space in magazine. (causing insufficient rotation of magazine.)</p> <p>Weak or broken return spring.</p> <p>Note. A broken return spring can generally be detected by examining tension screw, and cocking handle may stop in No. <u>III</u> position.</p>		<p>Empty magazine on post. Cocking-handle forward.</p> <p>Filled magazine on post, load and press the trigger.</p> <p><b>On Range.</b> Leave a space empty in magazine.</p> <p>Filled magazine on post, load and press trigger, when No. I begins to pull back cocking-handle, Instructor states: "Little or no resistance."</p> <p><b>On Range.</b> Weaken return spring.</p>

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Feed	<b>1.—Cocking-handle forward.</b> <i>continued.</i>	<p>2. If stoppage recurs, change the magazine. Examine feed-arm pawl and stop pawls.</p>	<p>Fault in feed due to: (a) Damaged magazine. (b) Damaged feed-arm pawl, or stop pawls.</p>	<p>If stoppage still recurs, examine feed-arm pawl and stop pawls. If feed-arm pawl is broken or spring is weak, the magazine will not rotate.</p>	<p>Filled magazine on post, load and press trigger when No. I has pressed trigger after 1st half of immediate action, Instructor states: "Fires a round and stops again."</p> <p><b>On Range.</b> Dummy cartridge. Live cartridge. Dummy cartridge.</p>
Friction, &c.		<p>3. If cocking-handle fixed, use wooden handle, or loop of double pull-through, pull back cocking-handle sharply, see empty case is ejected, continue firing.</p>	<p>Hard extraction due to: (a) Sticking of piston. (b) Abnormal expansion of empty case. (c) Dirt or rust in Chamber.</p>	<p>If stoppage recurs, clean cylinder and piston. Examine chamber.</p>	<p>Remove magazine, pull back cocking-handle, place a slightly damaged dummy in chamber and press trigger, place a filled magazine on post.</p>
Striker		<p>4. If on pressing the trigger, the gun will not fire. Change piston rod.</p>	<p>Damaged or broken striker.</p>		<p>Filled magazine on post, load and press trigger, when No. I after performing 1st half of immediate action, presses trigger, Instructor states: "Gun won't Fire."</p> <p><b>On Range.</b> Put two dummies in magazines.</p>

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## BROKEN RETURN SPRING.

An easily carried substitute, if the above fails and no spare parts are available, can be quickly made as follows:—

Take a piece of indiarubber, such as is used for trench catapults, &c., about nine or ten inches long, and from half-an-inch to five-eighths of an inch diameter. Bind thread (preferably waxed) tightly round each end to get a good hold of the elastic. On top of these bindings bind on a strong cord or tape loop to each end. The total length over all, including loops, being about twelve inches.

One of these loops can be slipped over the cocking-handle, and the other loop attached with strong string or cord either to the tripod, or, if no support is used, then to a piece of cord going round the radiator casing in front of the foresight (with its protecting wings mounted on the clamp ring) and the gas regulator.

With care in the adjustment, this elastic may be made to temporarily perform the functions of the return spring and pinion, thus enabling the gun to continue firing automatically.

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## CARTRIDGE GUIDE SPRING.

In the later pattern of cartridge guide springs, a hinged portion is actuated by a small flat spring, housed behind it, and pressing it outwards. Both the hinge and the bearing surface on which this spring works must be kept well oiled, the same as all other working parts of the gun.

Position of Cocking- handle.	Immediate Action.	Probable Cause.	Prevention of Recurrence.	Method of Preparation for Instructional Purposes.
<p>Cases</p> <p><b>a cartridge.</b></p> <p><b>II.—Back less than length of</b></p> <p><i>May be anywhere between front end of trigger guard and trigger</i></p>	<p>Use wooden handle, or loop of double pull through, pull back cocking-handle, examine cartridge that is ejected.</p> <p>(a) If it is damaged, continue firing.</p> <p>(b) If front portion of a case is telescoped on to cartridge, continue firing.</p> <p>(c) If cartridge which is ejected is correct, remove magazine, unload and clear obstruction from chamber with clearing plug.</p>	<p>(a) <b>Damaged cartridge.</b></p> <p>(b) <b>Separated case</b> which comes out on live cartridge.</p> <p>(c) Separated case which remains in chamber.</p>	<p>If a succession of separated cases occur, change bolt.</p>	<p>(a) Place a damaged dummy cartridge in the magazine. *</p> <p>Place magazine on post, load, but ease cocking-handle forward gently, until extractors spring over rim of damaged dummy in chamber.</p> <p>(b) Place front portion of a case in chamber, which has separated near shoulder. This may telescope on to the next dummy.</p> <p>(c) Place front portion of a case in chamber, which has been separated near base; this may remain in chamber.</p> <p><b>On Range.</b></p> <p>(a) Place a damaged dummy in magazine.</p> <p>(b) File a groove round a cartridge about an inch from the shoulder. §</p> <p>(c) File a groove round a cartridge about an inch from the base. §</p>

§ Care must be taken not to file groove too deep or bullet may be left in the bore.

\* In the chamber is better, because a bulged cartridge might injure cartridge guide spring.

Position of Cocking-handle.	Immediate Action.	Probable Cause.	Prevention of Recurrence.	Method of Preparation for Instructional Purposes.
Magazine	1. Examine ejection opening, if no obstruction and if the cocking-handle cannot be moved, or can be moved only very slightly, remove the magazine; if the cocking-handle then flies forward, put on new magazine and continue firing.	(a) Magazine not pressed fully home. (b) Broken magazine catch spring. (c) Broken magazine rim.		(a) Do not press the magazine fully home. (b) and (c) Use a broken magazine, if available, or insert a slip.  <b>On Range.</b> (a), (b) and (c) As above
Feed	2. If no obstruction, and if on removing magazine, the cocking-handle remains stationary, push cartridge in feed-arm slot into correct position, pull back cocking-handle, examine cartridge guide spring and test weight of return spring.	Weak or broken cartridge guide spring. <b>Too weak a return spring, or too much gas.</b> <i>(i. e.—Rebounds forward before cartridge can be fed into position.)</i> <b>Note.</b> —It is advisable to change cartridge guide spring at once.	If point of bullet is jammed against front end of slot, it may be due to too much gas, see that small hole in regulator is to the rear, and increase weight of return spring.	Do not to set up.
Friction, &c.	3. If no obstruction pull back cocking handle, continue firing; if stoppage recurs, put on safety catch, No. 1 removes magazine, No. 2 takes out gas regulator; fire one round to clear out fouling; No. 2 replaces gas regulator, large hole to rear.	Bolt has not gone back far enough to engage behind rim of cartridge due to: (a) <b>Hard extraction.</b> (b) <b>Friction</b> in gas cylinder, or moving parts, may be due to: (1) Dirt in cylinder or moving parts. (2) Roughness of striker post. (3) Too strong return spring.	If stoppage recurs, clean out gas cylinder, piston rod and oil moving parts. Examine striker post and cam slot in bolt for roughness, if either are rough, change them.	Filled magazine on post, pull back cocking-handle, press trigger and ease cocking-handle forward.

### III.—Cocking-handle back more

May be anywhere between trigger and rear

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Obstruction

end of pistol-grip—generally over pistol-grip.

### than length of a cartridge.

4. If on examining ejection opening, an obstruction is found, namely an empty case, either in the chamber, or in the body, draw back cocking-handle, raise safety catch; remove magazine, push-back cartridge which is in slot on top of body. Remove empty case, see the front is clear, release safety catch, and unload, without firing.

If the empty case is in the chamber, it must be pushed out by cleaning rod from the muzzle and examined.

(1) If rim is cut by both extractors, load and continue firing.

(2) If rim is only cut by one extractor, or rim not cut at all, change the bolt.

If empty case is marked by both extractors, it is due to **hard extraction.**

If not marked, due to **weak extraction.**

If empty case is in body, it is due to weak extractors or broken ejector.

If stoppage recurs of empty case in chamber and extractors are correct, examine chamber.

If stoppage of empty case in body recurs, examine extractors and ejector, exchange which ever are necessary.

**Note.**—The live cartridge removed in unloading, must not be fired, because bullet may have been driven into case and would give a high pressure in chamber.

Place filled magazine on post, load, then place an empty case in the chamber or in the body, press the trigger, and ease cocking-handle gently forward.

**On Range.**

Do not set up

FOR IMPORTANT NOTICE TO ARMOURERS AND OTHERS, See page 16.

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## IMPORTANT.

*Notice to Armourers or other qualified persons in charge of Lewis Guns.*

The efficient working of the Lewis gun largely depends upon the bearing surfaces between the sides of the striker post and the sides of the cam shaped slot in the bolt being kept perfectly smooth. In most guns the action of the gun itself continues to keep the surface of this sliding contact properly smooth, **provided the parts are kept well oiled.** Sometimes however, in the case of new guns, slight "burring" may occur and prevent the smooth working of the gun. Any such roughness or "burring" caused by wear on either the sides of the striker post (generally on the **right** hand side) or on the bearing edges of the cam shaped slot in the bolt (generally on the **left** hand side) must at once be carefully smoothed as follows:—

Use either a very fine oil stone or very fine emery cloth, or powder with oil, and thus remove any roughness and secure perfectly smooth bearing surfaces between both sides of the striker post and both edges of the cam shaped slot in the bolt.

Careful attention must, however, always regularly be given to these most important bearing surfaces, but after the sides of the striker post and cam slot edges have once been carefully smoothed this roughness seldom recurs.

If either too coarse materials, or too much careless force is used to smooth these surfaces the angle of sliding contact may become slightly altered and more roughness or "burring" may be caused.



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