HAND BOOK OF

C.C. GEAR

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"C.C." GEAR.

(The Constantinesco Fire Control Timing Gear.)

DESCRIPTION.

The gear is made of the following units:—

The Generator, **G.**
The Trigger Motor, **M.**
The Reservoir, **R.**; with Bowden Control, **49.**
The Pipe Line, **50** and **51.**

THE GENERATOR consists of a shaft and cam, 1, running in bearings 5 and 6, held in the casing 2 and actuating the piston 4, in the cylinder 3, which is screwed into the casing. An oil retaining cover 7, is provided and holes are drilled in the bearings to facilitate lubrication.

THE TRIGGER MOTOR is attached to the back of the Vicker's Gun so that the slot in its plunger 14, engages with the new trigger bar lever 26, provided with the gear, and is held by the two screws (Nos. 60 and 61 in Vicker's .303 Machine Gun Hand Book). It consists of the plunger 14, packed by a U-ring 18 and working in a cylinder against the action of the strong square section spiral spring 16. The back of the plunger is conical and is held by the spring against the valve seat 20 in the T piece at the back of the trigger motor. This T piece contains the damping valve 25, spring 24, and a needle valve 23, for releasing air from the system. The main pipe line is soft soldered into the T piece 21.

THE RESERVOIR contains the small cylinder 28, and the piston 30, operated by the spring 33. At the bottom of the cylinder 28, there is a 3-way valve (made of parts Nos. 44, 45, 46 and 42) which is operated through a Bowden wire 49, from the joystick.

PIPE CONNECTIONS.—The main line consists of a $\frac{1}{4}$in. bore copper pipe 50, connecting the generator cylinder to the trigger motor. The secondary line is a $\frac{1}{16}$in. bore copper pipe 51, connecting the outlet at the bottom of the reservoir to the main pipe line at the generator union 10.

ERECTION.

THE GENERATOR.—The cylinder 3, must be arranged to be pointing as nearly vertically downwards as convenient, so that the pipe line can be led away by easy bends and without any chance of an air lock.

The lubricating oil filling hole and plug 8, must be placed so that oil can be conveniently filled through it before each flight. The oil retaining cover 7, can be moved round and rebolted in a convenient position ; the generator must be seven-eighths filled with pure engine lubricating oil.

THE TRIGGER MOTOR.—The Vicker's Gun is prepared for receiving the Trigger Motor by removing parts 25, 13, 59, 60, 60a, 61, 62, 63, 12 and 14 (*see* Vicker's Hand Book).

The small bridge piece holding the safety catch spring (50, Vicker's Hand Book) in position, must be filed away. The hole through which the plunger 14, passes must be enlarged to be a clearance hole for it.

The trigger motor is fitted to the back of the gun by securing it in the place of parts 12 and 14 (Vicker's Hand Book) with the screws 60 and 61 (Vicker's Hand Book) and with its plunger passing through the back of the gun, the slot being vertical. The new trigger bar lever 26, is placed in position with its forked end upward, the wider arm of the fork being to the front and with its lower end engaging in the slot of the trigger motor plunger. The T pin (25, Vicker's Hand Book) is then replaced, and the union nut 9, of the T piece is tightened up on the back of the trigger motor. The plunger will be seen to be pushed forward slightly and to move the trigger bar lever so that the lug on the trigger bar (52 Vicker's Hand Book) engages in the fork when the lid of the gun is closed. The action of closing the lid will draw the trigger bar slightly backwards.

THE RESERVOIR is to be fitted into the machine in such a position, not more than 45° from the vertical, that the pilot can conveniently fully pull up the handle 34. The Bowden Control Lever 49, is to be fitted in a convenient position on the joystick and the cable led to the three-way valve at the bottom of the Reservoir without interfering with any of the controls.

THE PIPE LINE.—The $\frac{1}{4}$in. bore copper pipe 50 should be so adjusted between the generator and trigger motor that the curves are as easy as possible, and that no air pockets can be formed when it is filled. The pipe is then to be soft soldered into its unions at both ends. The small

bore copper pipe 51 is to be similarly adjusted and soft soldered to the generator union and the reservoir. Both pipes are to be run alongside each other as far as possible and clipped in convenient places so that they are prevented from vibrating. Pipes, where clipped, to be protected from chafing, by leather or rubber packing. The length of the main line should be at least 9 feet, the secondary line to be not less than 6ft.

FILLING.

The pipe line must be filled through a strainer with a clean mixture of nine parts of paraffin to one of lubricating oil. The reservoir is first filled through the filling hole provided and the handle 34 pulled up. It will remain in its top position when released and hold some liquid under pressure under the piston until the Bowden Lever is gripped, when it will force it into the pipe line; the union 9 at the generator end must be left slack and the air valve 23 at the trigger motor end left open during filling. The operation of pulling up the handle and working the Bowden Lever must be repeated until liquid is freely forced past the slack union of the generator, more liquid being added to the reservoir when necessary. The generator union nut 9 is then to be tightened up while liquid is running from it, so that it is certain that no air is trapped at that end. The operations are then repeated until liquid flows freely through the screw-down needle valve 23 at the trigger motor which is then closed.

TESTING THE GEAR (WITHOUT FIRING).

The lid of the gun is first opened. The engine is then started and the cam 1 of the generator will push the piston 4 to the end of its stroke where it will remain. The gear is now entirely out of action and only the cam is rotating. The handle of the reservoir is then pulled up and released and some liquid will be held under pressure. The Bowden Lever is then gripped and some liquid will thus be forced into the pipe line through the small bore pipe; this will force the piston 4 of the generator up against the cam and a wave will be generated each time the cam actuates the piston. The wave travels along the pipe line and operates the trigger motor plunger 14. The liquid under pressure in the reservoir will maintain the piston in contact with the cam and compensate for any slight leakage which may arise due to bad erection. When the Bowden Lever is released the 3-way valve at the bottom of the reservoir allows the liquid to be forced by the next movement of the generator piston through the small bore pipe back into the reservoir. The generator piston 4 will then again remain at the end of its stroke and will no longer follow the cam, thus stopping the action of the trigger motor.

The gear must be run for a minute and the needle valve then opened to release any air which may not have been got rid of when filling and which may have accumulated at that end of the line.

The Bowden lever must then be pressed again and the top of the trigger bar lever watched to see that it has a definite and rapid movement. Satisfactory operation of the gear will also be shown, when the Bowden lever is gripped, by the movement of the reservoir handle 34, which should fall quickly through a short distance only.

It is advisable that the gear should be inspected and tested as just described before each flight. Then the handle of the reservoir should be pulled right up and the gear will then be ready for firing when the gun is loaded and its lid closed.

UPKEEP.

THE GENERATOR should always be seven-eighths full of oil, and the piston 4 should be inspected regularly, and if in a defective condition replaced by a new one.

THE TRIGGER MOTOR.—The valve seat at the back in part No. 20 should be inspected, and if hammered out excessively, so that the piston does not seat properly, fit a new T piece. The square section spring should be inspected at intervals, and if small metal pieces are found to have been broken off the end coils of the spring these pieces should be removed, and the whole spring renewed if necessary. If there is leakage past the piston into the trigger motor body, the U-ring 18 must be replaced.

THE RESERVOIR.—The level of liquid in the reservoir should be noted occasionally, and replenished when necessary with clean liquid. When gun is not in use if plunger is pulled up it should remain in the up position, failure to do so means that either the non-return valve 44 or U-leather 30 are leaking and both should be inspected, the leather being renewed if necessary. The piston should move freely throughout its stroke when the spring is removed.

RATE OF FIRE, Etc.

With the "C.C." Gear and a properly tuned up Vicker's Gun, a rate of fire of 600 rounds per minute can be obtained with no stray shots.

Stray shots are never obtained with this gear if no air is left in pipe line. The rate of fire varies as gun and trigger bar movements synchronise or otherwise.

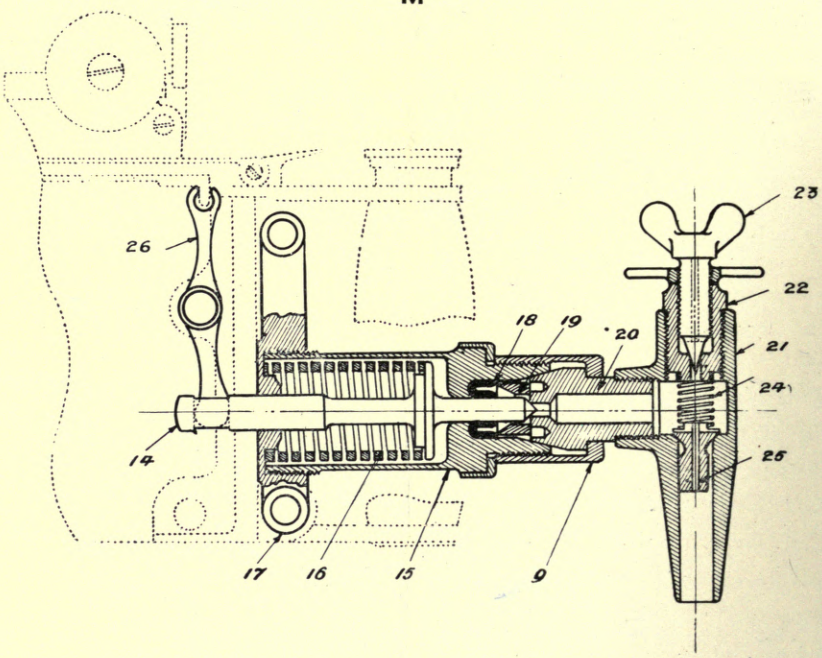
It will be found that the Bowden Lever can be pressed so that single shots are fired, but after 4 or 5 pressures the handle of reservoir will need to be pulled up. One long burst can be kept up for an almost indefinite period if started with the reservoir handle pulled right up.

CONSTANTINESCO FIRE CONTROL TIMING GEAR

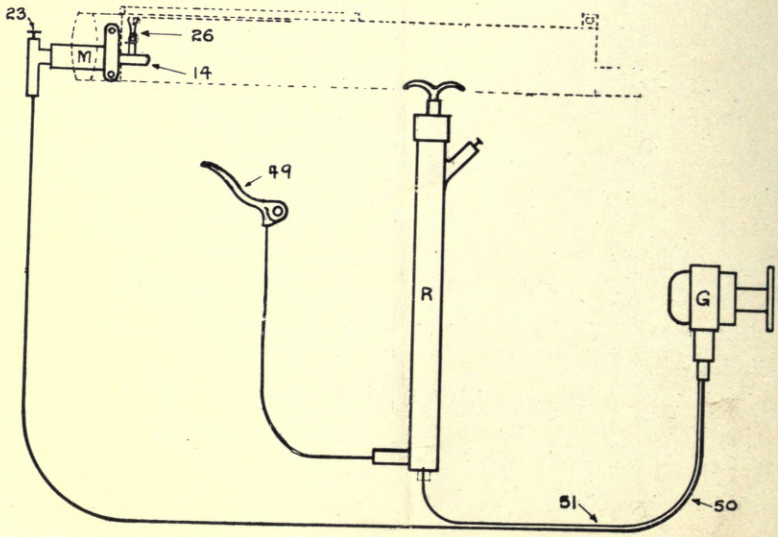
PART LIST

Name	No.
Cam	1
Body of Generator	2
Cylinder	3
Piston	4
End Cover with Stuffing Box	5
End Cover Speedometer side	6
Oil Retaining Cover	7
Plug for do.	8
Union Nut	9
Tail Piece	10
Gland Nut	11
Gland Ring	12
Coupling Flange	13
Plunger	14
Body Trigger Motor	15
Spring	16
Attachment to Gun	17
U Ring for Trigger Motor	18
Retaining Ring	19
Combined Tail Piece & Valve Seat	20
Tee Piece	21
Air Valve Seat	22
Needle Valve	23
Damping Valve Spring	24
Damping Valve	25
Trigger Bar Lever	26
Main Tube Reservoir	27

Name	No
Plunger Guide	28
Plunger Rod	29
U Ring for Reservoir	30
Nut for do.	31
Washer for do.	32
Spring	33
Handle	34
Nut	35
End Cap	36
Filler Cap and Washer	37
Cylinder for Control	38
Needle Attachment	39
Spring for Control	40
Gland Ring	41
Needle	42
Cable Attachment	43
Valve	44
Valve Spring	45
Valve Plug	46
Union Nut Reservoir	47
Tail Piece (Reservoir)	48
Bowden Control	49
Main Pipe Line	50
Secondary Pipe Line	51
Bolts and Nuts for Generator	52
Adjustable Stop	53
Gauge	54



General Arrangement.



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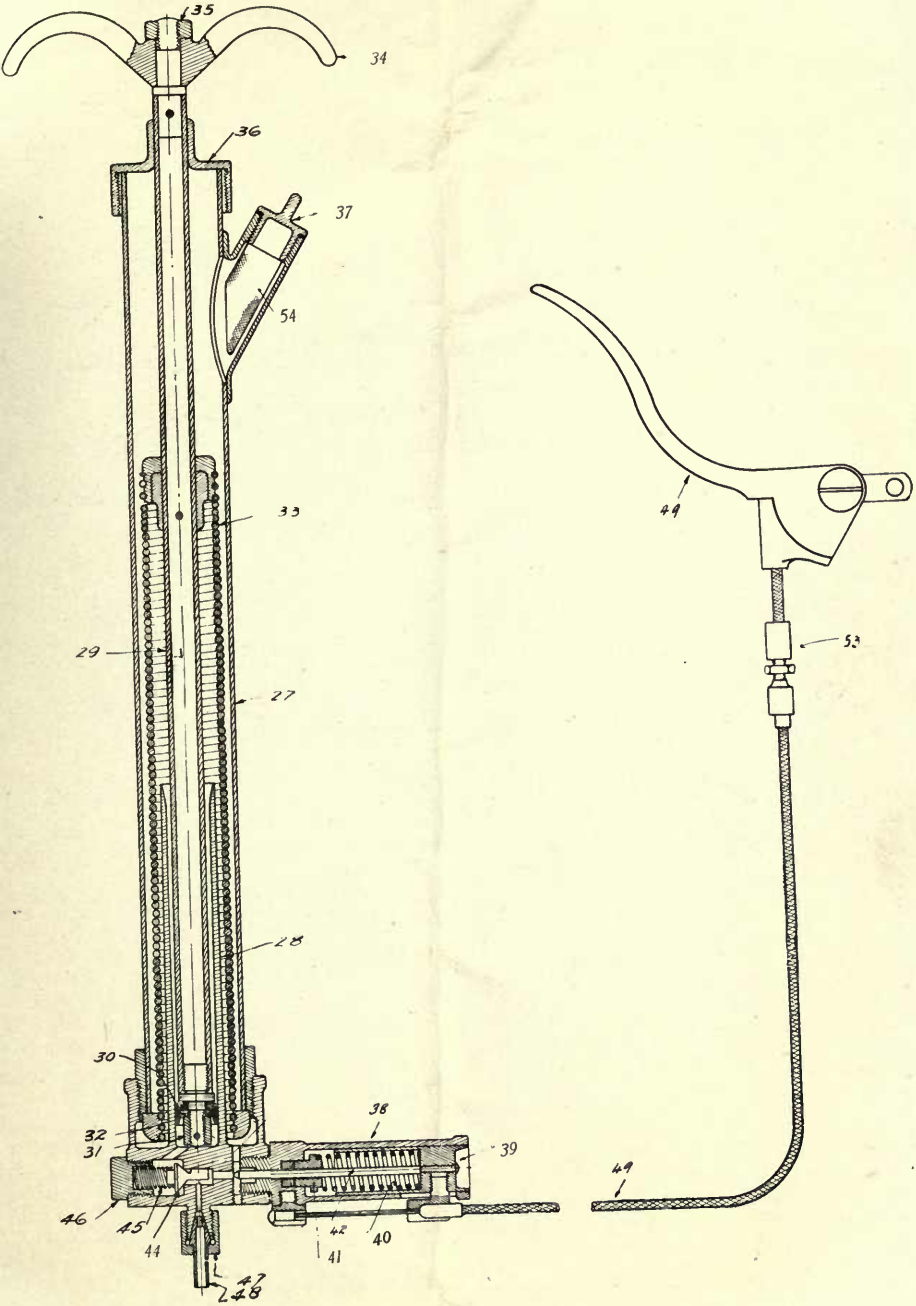
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