

[54] GUN TURRET WITH AN OBSERVATION  
OPENING CLOSABLE BY A HATCH COVER

301,283 5/1968 Sweden..... 89/36 K

[75] Inventors: André Mechulam, Tarbes; Bruno M. Saintours-Payerne, St. Etienne; Guillaume A. Gay-Chatain, St. Etienne; Paul R. Montjallard, St. Etienne, all of France

Primary Examiner—Stephen C. Bentley  
Attorney, Agent, or Firm—Waters, Schwartz & Nissen

[73] Assignee: Etat Francais, Paris, France

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[51] Int. Cl.<sup>2</sup> ..... F41H 5/22

[58] Field of Search ..... 89/36 R, 36 B, 36 C, 36 G, 89/36 H, 36 Z, 36 J, 36 K, 36 L, 40 B

[56] References Cited

FOREIGN PATENTS OR APPLICATIONS

1,932,991 1/1971 Germany..... 89/40 B

[57] ABSTRACT

A turret for military use having at least one gun mounted for pivotal movement in elevation on the turret under the control of an operator within the turret. The turret has an upper wall with an observation opening thereon and a hatch cover is pivotably mounted on the upper wall adjacent the observation opening for opening and closing the same, the hatch cover being so pivotably mounted on the upper wall to provide a field of view through the observation opening corresponding to the direction of aim of the gun. The cover and gun are coupled by a releasable connection to cause the cover to follow the pivotal movement of the gun for angles of elevation of the gun greater than a threshold level. A releasable latch mechanism can hold the cover in closed position.

10 Claims, 6 Drawing Figures

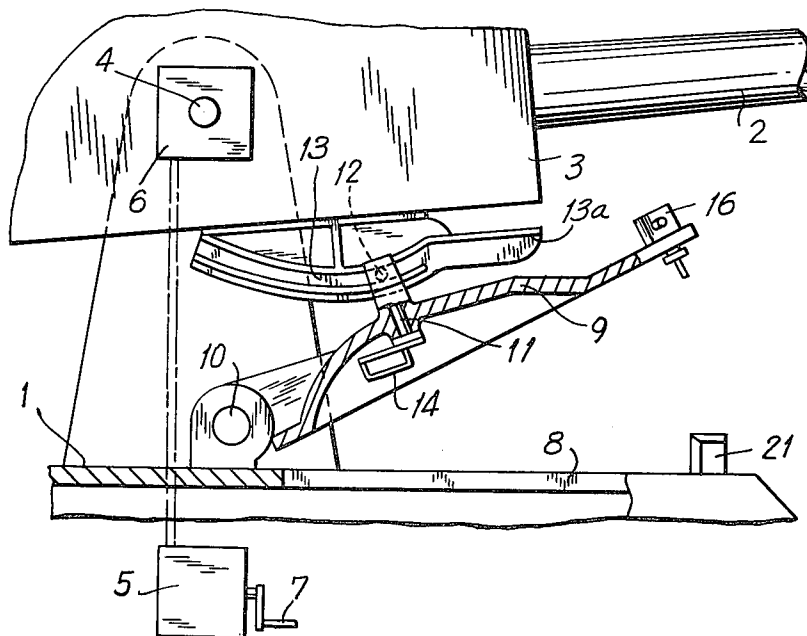


FIG. 1

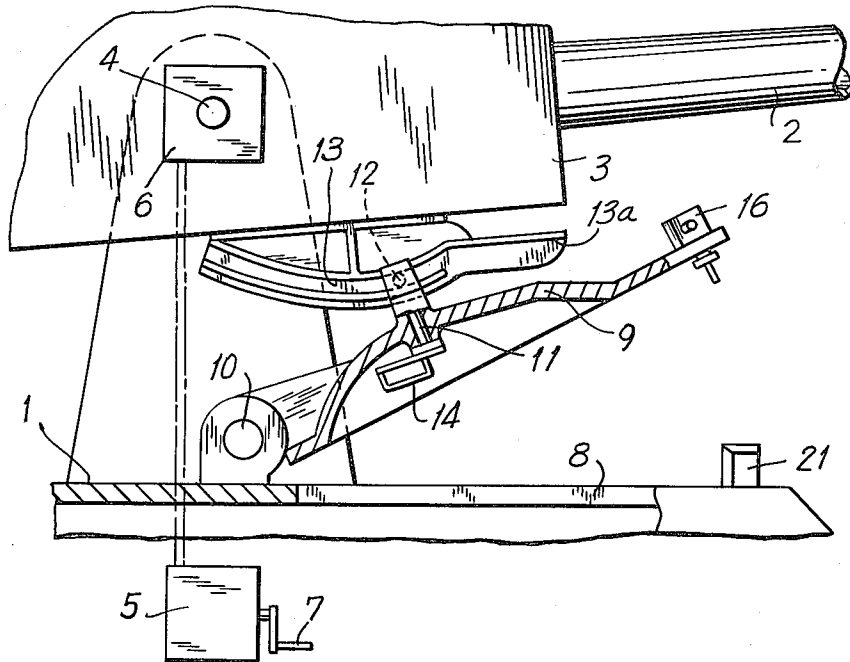


FIG. 2

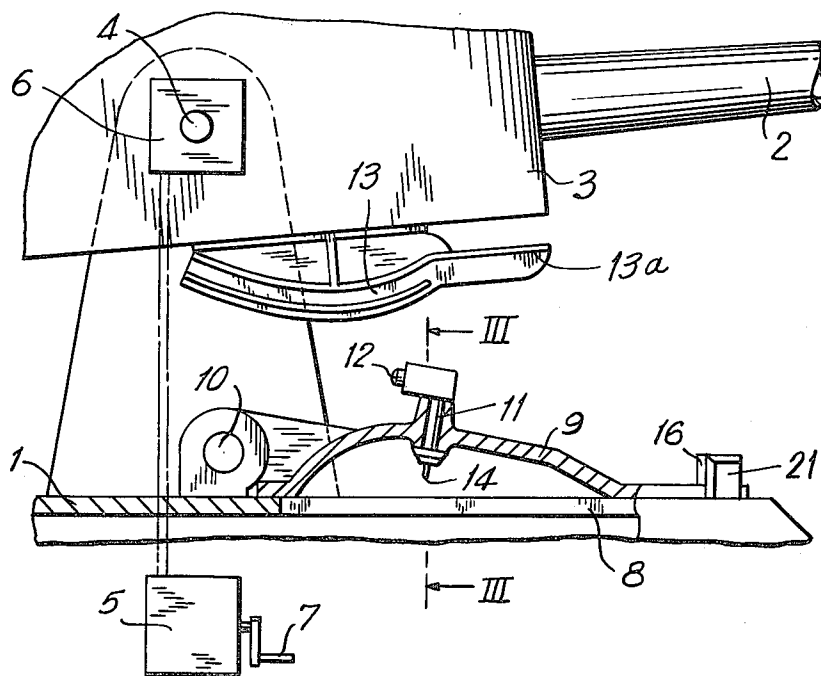


FIG. 3

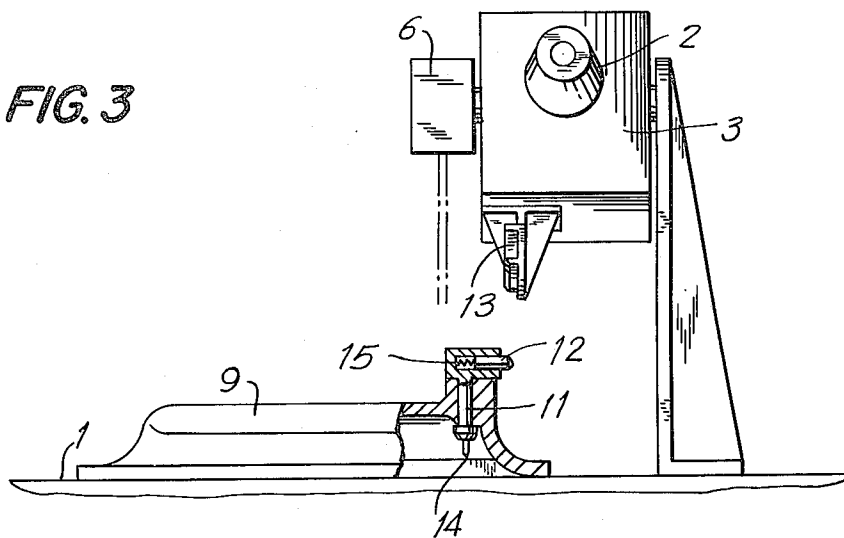


FIG. 4

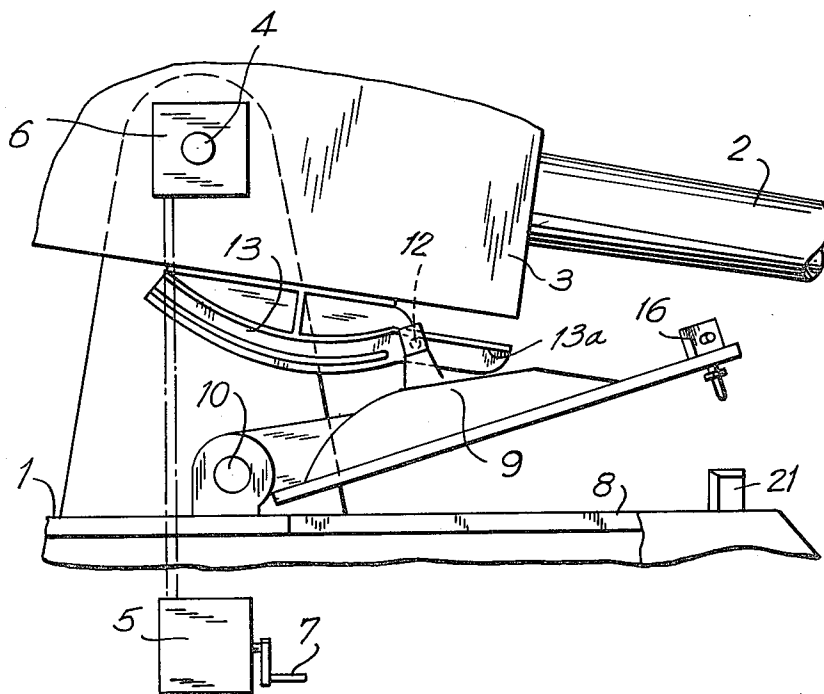


FIG. 5

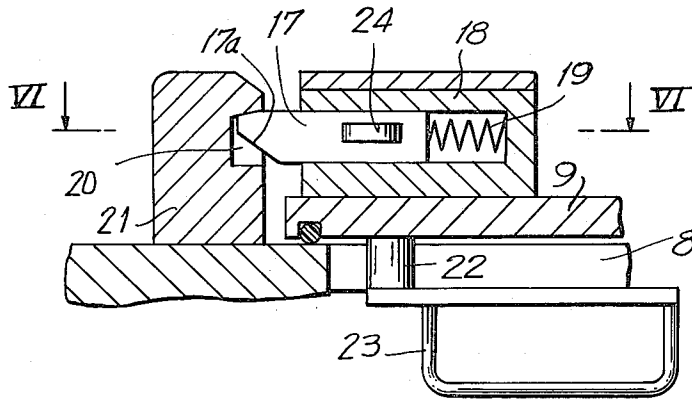
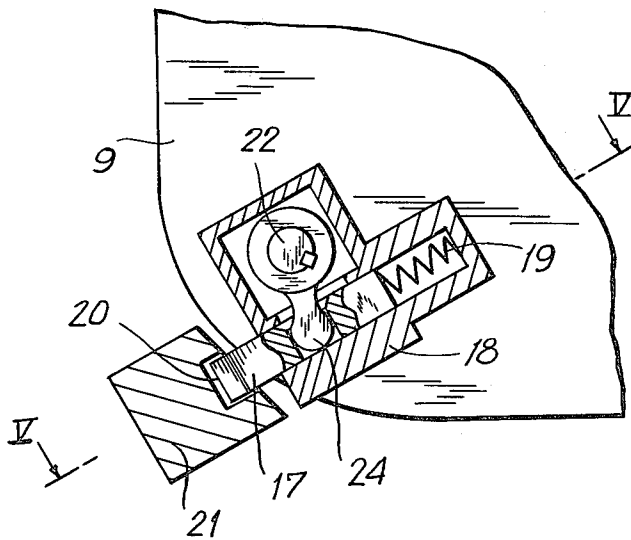


FIG. 6



**GUN TURRET WITH AN OBSERVATION OPENING CLOSABLE BY A HATCH COVER**

**BACKGROUND**

**1. Field of the Invention**

The invention relates to military equipment having a turret associated with at least one gun whose aim results from the orientation of the turret and whose range or elevation is effected by a rotation of the gun cradle about a horizontal axis, this rotation movement being effected by an operator by means of an elevation control mechanism within the interior of the turret.

It is suitable to note that the association of such a turret and of its corresponding gun can be obtained either in the most general case of carrying the gun by the turret in a mounting on the roof of the turret, or by mounting the gun on an independently turnable support about an axis parallel to that of the turret and providing transmission means for conjugating rotation movements of the turnable support and of the turret such that they always present identical angular orientations.

It is also to be noted that the term "military equipment" with the gun turret is used here in a general sense and includes military uses with a fixed post, such as fortresses with gun turrets, ground vehicles, navel vessels and aircraft with gun turrets.

Furthermore, within the domain of a vast application (military equipment having fixed or movable turrets associated directly or indirectly with at least one gun), the invention is particularly adapted to armored cars equipped with a gun turret, such as combat vehicles, tanks, reconnaissance vehicles or personnel carriers (wheeled or tracked) equipped with at least one gun mounted on the roof of the turret.

**2. Prior Art**

It has already been proposed to provide in the upper wall of turrets of this type, an observation opening permitting location operations and external sighting (with the aid of an external viewer) of ground, naval or aerial targets, the opening also serving as an emergency exit for personnel and also as a ventilation opening.

Such observation opening is generally closable by an armored hatch cover pivotably mounted on an axle situated rearwards of the opening with respect to the direction of aim of the gun, such that progressive opening of the cover provides the operator with a field of observation gradually increasing in height notably to furnish direct observation (possibly with an externally mounted rough sighting device of reduced field) of an aerial target from the horizon through gradually increasing angles of sight.

When the operator seeks to effect an observation, the hatch is opened to a maximum degree to give a maximum angle of view, but this causes unnecessary risk of a surface attack (for which only a small opening of the hatch is necessary for visibility) or an aerial attack from an angle less than that of the maximum opening.

**SUMMARY OF THE INVENTION**

An object of the invention is to provide means for such military equipment to eliminate the risk to an operator, at the time of marking or location operations or in following an aerial target or ground vehicle, due to an unnecessary degree of opening of the hatch cover of the observation opening should the operator of the sighted target fire a tracer or aiming round at the turret with the hatch unnecessarily open.

The military equipment according to the invention comprises on the one hand a turret associated with at least one gun pivotably mounted on a horizontal axle and controlled by an apparatus for regulating its elevation, and on the other hand an observation opening formed in the upper wall of the turret and capable of being closed by an armored hatch cover which is opened by pivotal movement around a horizontal axle mounted rearwardly of the cover with respect to the direction of aim of the gun, such that the field of observation formed by the opening of the hatch cover presents the same orientation in direction as the gun associated with the turret, the equipment being characterized in that it further comprises coupling means between the gun and the hatch cover to provide corresponding movement between the two from a predetermined threshold level at an intermediate elevation position of the gun such that the opening of the hatch cover follows the elevational movements of the gun in the same direction.

In this way, it is assured, at least from the threshold level, that the opening of the cover (obtained by the action of elevating the gun) will not reach an unnecessary degree with respect to the angle of elevation of the gun as determined by the observer, who, in the case of an aerial object, acts on the apparatus for gun elevation control and hence keeps the gun at least approximately pointed at the sighted target.

When in the general case, the gun is carried by the turret, rotably on the roof thereof, the coupling means comprises a simple mechanical connection between the cradle of the gun and the hatch cover to correlate the angular elevational movements thereof in the same direction.

Preferably, the coupling means can be rendered inoperative such that the operator can, in case of danger and assuming the cover to be at least partially open, decouple the coupling means and close the cover while the gun remains at the same angle of elevation to which it was placed at the time of decoupling, this being advantageous for the operator when he follows the object (with the hatch cover closed) by utilizing sighting apparatus in the interior of the turret generally coupled to the gun to follow the aim thereof.

When the gun is carried by the turret and its cradle is coupled to the hatch cover by a simple mechanical coupling to be rendered inoperative below a given threshold level at an intermediate point in the angle of elevation of the gun, the coupling comprises a hooking system so constructed that when the angle of elevation of the gun is above the threshold level, the cover can be automatically connected to the gun cradle to provide a particular degree of opening of the cover, the closure of the latter being effected by the operator via a manually operable member causing decoupling of the hooking system.

It is further noted that hooking systems of this type are conventional in door latches having a bolt with an inclined face subjected to a spring action, the user being able to close the door by simply pushing the same towards the door frame whereas to open the door, it is only necessary to turn the handle and pull or push the door.

In this way, once the cover is hooked to the gun cradle, it is assured that the cover will not undergo risk of untimely release to strike the head of the operator,

such risk being prevalent in the case of a turret on a vehicle intended to travel over rough terrain.

Preferably, the hatch cover is provided on the one hand, with a controlled latch bolt permitting locking of the cover in closed position, and on the other hand, with recall means capable, when the latch bolt is released, of urging the cover to a completely open position.

When the connection between the gun cradle and cover is to be prevented below the threshold lever, there is advantageously provided on the gun cradle an abutment which limits the opening of the cover.

According to a particularly simple embodiment, in the case where the gun is externally mounted on the turret above the hatch cover, the cover is provided with an automatic latching bolt whose release is manually controlled from within the turret, the cover being subjected to the action of a spring tending to open the cover. Additionally, the cover can carry at its upper part a bracket extending in the direction of the gun cradle, said bracket being provided at its upper extremity with a hooking finger for automatic engagement with the gun cradle when the latter is above the threshold angle of elevation, the gun cradle being provided with a curved slot in which the hooking finger is engaged and entrained as the gun is raised and lowered in elevation to cause the cover to follow these movements, a manual control element being operative to release the finger from the slot to permit decoupling of the cover from the gun cradle if it should become necessary to rapidly close the cover. The gun cradle can carry an abutment such that when the gun is at an elevation below the threshold level, said abutment limits the opening of the cover.

In accordance with the adopted embodiments of the invention, the operator of the military equipment is assured of a limited vulnerability (as compared to equipment with a hatch cover which is either all open or closed) i.e. without unnecessary risk corresponding to the operations of marking and sighting of an aerial object and a reduced vulnerability (cover partly open and free) in facing enemy fire operating at ground level, which is usually the most accurate and therefore the most dangerous.

#### BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a side view, partly in section, of the upper portion of a gun turret of a military ground vehicle, the turret being shown with its cover open and connected to the cradle of a gun mounted on the roof of the turret.

FIG. 2 is similar to FIG. 1 except that the cover of the turret is disconnected from the cradle of the gun and is in closed position.

FIG. 3 is a transverse part-sectional view taken on line III—III in FIG. 2,

FIG. 4 is similar to FIG. 1 except that the cover of the turret is shown disconnected from the cradle of the gun and is in a position in which it is held partly open,

FIG. 5 is a sectional view taken along line V—V in FIG. 6 showing a closure latch for the turret cover, and

FIG. 6 is a sectional view taken along line VI—VI in FIG. 5.

#### DETAILED DESCRIPTION

Referring to FIG. 1, therein is seen the roof 1 of a turret of a military armored vehicle, the roof 1 serving to support a gun 2 which can be a cannon or a machine

gun or the like. A cradle 3 of the gun is mounted for pivotal movement on horizontal axle 4 and is subject to the action of a control apparatus such as gearboxes 5, 6 controlled by a crank 7 in order to adjust the elevation of the gun from the interior of the turret.

In the roof 1 of the turret there is provided an observation opening 8 which is capable of being closed by an armored cover 9 which is opened by being pivotably moved around horizontal axle 10 mounted rearwardly of the cover with respect to the direction in which the gun is pointed.

The elevation movements of the gun 2 and the opening of the cover 9 are conjugated in the same sense from a given limit of elevation of the gun, for example, above the horizontal, by a bracket having a journal pin 11 mounted in the cover approximately perpendicularly to cradle 3, the journal pin 11 being provided at its external extremity with a hooking finger 12 capable of being engaged in a curved guide slot 13 carried on the cradle and being concave upwards.

The opposite internal extremity of the journal pin 11 is provided with a handle 14 for turning the pin 11 to disengage the hooking finger 12 and to free the cover 9 which can thus close without modification of the elevation of the gun.

The guide slot 13 is extended forwardly by an abutment ledge 13a, the slot 13 and ledge 13a being positioned with respect to the cover such that when the operator opens the cover, the finger 12 abuts the ledge 13a below the threshold of elevation chosen for the connection of the cover and the cradle, thereby to prevent such connection, whereas at elevations above the threshold level, the finger comes into engagement with the slot 13 to permit connection of the cover 9 with the cradle 3.

Preferably, the hooking finger 12 is constituted as a lock bolt with an inclined face subjected to the action of a spring 15 (see FIG. 3) such that the finger automatically engages in the slot 13 when it arrives thereat, its disengagement being controlled by handle 14 whose normal position is one in which the finger is engaged in the slot.

The cover 9 is shown in FIG. 1 in open position connected to the cradle, while in FIGS. 2 and 3 it is closed and disconnected. In FIG. 4, the cover is partly open but disconnected from the cradle.

The cover is preferably subjected to the action of a recall spring (not shown) tending to open the cover, the cover then being equipped with a closure latch 16 which automatically closes and holds the cover in closed position and can be controllably released.

By way of example, FIGS. 5 and 6 illustrate an embodiment of such a closure latch which comprises a bolt 17 with an inclined face 17a, the bolt 17 being slidably mounted in a guide 18 fixed to the external wall of the cover 9, the bolt 17 being subjected to the action of a spring 19 which urges the bolt towards a recess 20 formed in a boss 21 fixed on the roof 1 of the turret in facing relation with the path of travel of guide 18. The closure latch further comprises a manual control assembly to effect displacement of bolt 17 against the opposition of spring 19, said control assembly including a journal pin 22 extending through cover 9 and carrying at its internal extremity a handle 23 for imparting rotation to the pin 22 and at its external extremity a transverse ball-shaped finger 24 pivotably engaged in a notch provided in the pin 17.

Hence, when the handle 23 is turned to disengage bolt 17 from recess 20, the cover is urged outwards by its recall spring (not shown). If the gun is at an elevation above the threshold value, the pin 12 can engage in slot 13 to connect the cover with the gun cradle. Continued elevataion of the gun will produce raising of the cover. Manual disengagement of the cover from the cradle can be effected by turning handle 14, whereupon the cover can be manually lowered and locked in closed position by engaging bolt 17 of the closure latch in recess 20 in boss 21.

Although the invention has been described with reference to specific embodiments thereof, numerous variations and modifications thereof will become evident to those skilled in the art without departing from the scope and spirit of the invention as defined in the appended claims.

What is claimed is:

1. Military equipment comprising a turret, at least one gun mounted for pivotal movement in elevation, means controlled from within the turret to adjust the angle of elevation of said gun, said turret including an upper wall with an observation opening therein, a hatch cover pivotably mounted on said upper wall adjacent said observation opening to controllably open and close the same, the hatch cover being so pivotably mounted on said upper wall to provide a field of view through the observation opening corresponding to the direction of aim of the gun, and means outside said turret for coupling said cover and gun to cause the cover to follow the pivotal movement of the gun, said coupling means comprising means for providing a coupling connection between said cover and gun only for angles of elevation of the gun greater than a threshold level.

2. Military equipment as claimed in claim 1 comprising a manually operated latch which holds the cover in closed position and is released from within the turret.

3. Military equipment as claimed in claim 1 comprising respective parallel axles supporting said gun and cover for corresponding pivotal movement.

4. Military equipment comprising a turret, at least one gun mounted for pivotal movement in elevation, means controlled from within the turret to adjust the angle of elevation of said gun, said turret including an upper wall with an observation opening therein, a hatch cover pivotably mounted on said upper wall adjacent said observation opening to controllably open and close the same, the hatch cover being so pivotally mounted on said upper wall to provide a field of view through the observation opening corresponding to the

direction of aim of the gun, and means for coupling said cover and gun to cause the cover to follow the pivotal movement of the gun, said coupling means comprising means for providing a coupling connection between said cover and gun only for angles of elevation of the gun greater than a threshold level.

5. Military equipment as claimed in claim 4 wherein said gun includes a cradle pivotably mounted on said upper wall of the turret, said coupling means comprising a mechanical connection joining said cradle and cover.

6. Military equipment as claimed in claim 5 wherein said coupling means includes means for decoupling the same to free the cover from said cradle.

7. Military equipment as claimed in claim 5 wherein said coupling means includes means on said cradle and cover for effecting automatic locking engagement therebetween when the gun exceeds the threshold level of angular elevation.

8. Military equipment comprising a turret, at least one gun mounted for pivotal movement in elevation, means controlled from within the turret to adjust the angle of elevation of said gun, said turret including an upper wall with an observation opening therein, a hatch cover pivotably mounted on said upper wall adjacent said observation opening to controllably open and close the same, the hatch cover being so pivotally mounted on said upper wall to provide a field of view through the observation opening corresponding to the direction of aim of the gun, and means for coupling said cover and gun to cause the cover to follow the pivotal movement of the gun, said coupling means comprising a turnable pin mounted in said cover and having an external end of the pin, a control member on the internal end of the pin and a guide member with a curve slot on said cradle, said pin and guide slot being relatively positioned such that said locking finger is engageable in said slot when the angle of elevation of the gun has exceeded a predetermined threshold angle of elevation.

9. Military equipment as claimed in claim 8 wherein said cradle includes an abutment flange extending in prolongation of said guide slot to limit the degree of opening of the cover when the angle of elevation of the gun is less than the threshold value.

10. Military equipment as claimed in claim 8 wherein said coupling means further comprises a spring acting on said locking finger in a direction to urge the same into said slot.

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