

Nov. 29, 1966

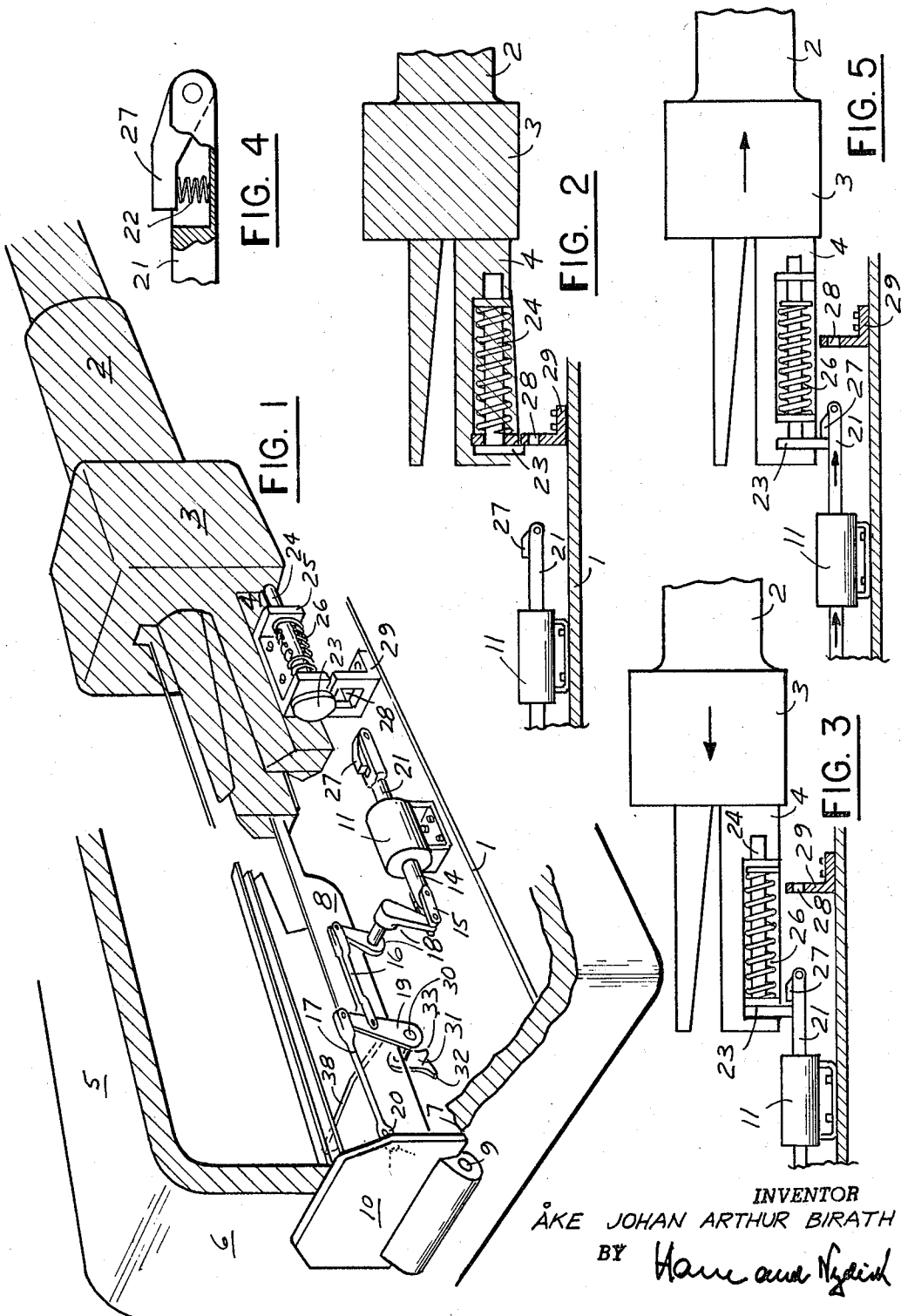
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3,288,029

CLOSURE DEVICE FOR A CASING DISCHARGE PORT OF A GUN

Filed April 1, 1965

2 Sheets-Sheet 1



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FIG. 6

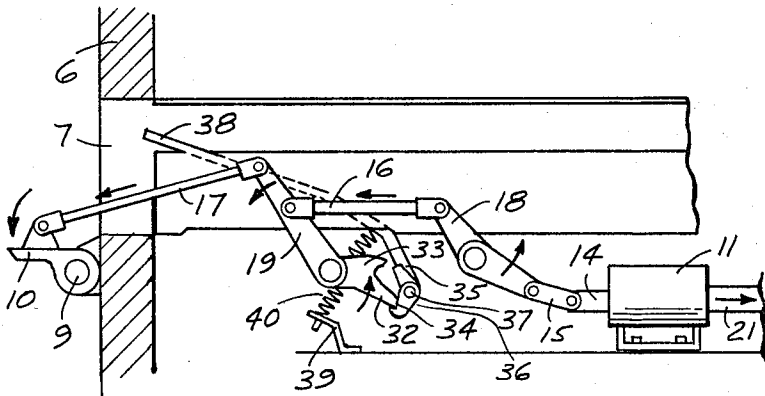
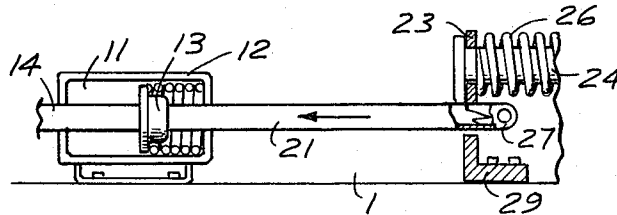


FIG. 7

FIG. 8

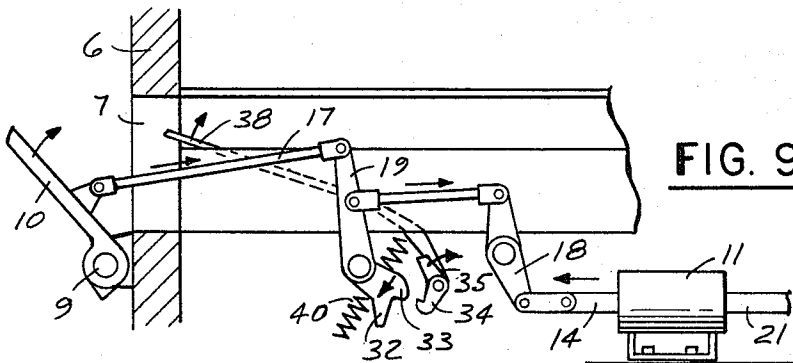
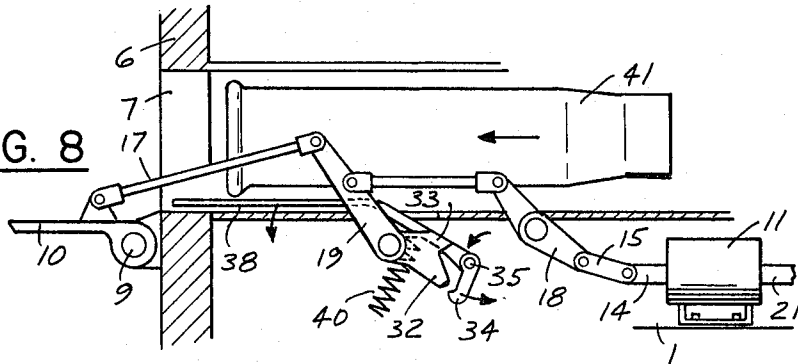


FIG. 9

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CLOSURE DEVICE FOR A CASING DISCHARGE PORT OF A GUN

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5 Claims. (Cl. 89—33)

The present invention relates to a device for opening and closing a closure member such as a door for a port in a protective wall encasing the loading and cartridge casing ejection mechanism of a gun, in particular an automatic recoiling gun.

With movable guns, the vital operational parts of which are enclosed by armor-plating and the empty cartridge casings, of which, are rearwardly ejected after the firing of each round, it is of great importance that a discharge port for ejection of the empty casings through the portion of the protective wall located behind the ejection mechanism is open only for the short period of time required for the passage of an ejected casing. Obviously, a prolonged opening of the port entails the danger of damage to the gun by pieces of material propelled through the port and against the gun parts to be protected by the protective wall.

It is an object of the invention to provide a port control device which uncovers the port for the passage of an empty cartridge casing through the wall just before the ejection of the casing from the cartridge chamber of the gun barrel and while the casing is moving along a cartridge casing guide extending rearwardly of the barrel, and which recloses the port immediately after the passage of the ejected casing therethrough, the device being actuated automatically in dependence upon the recoil of the gun and the ejection of a casing.

To attain this object of the invention and other objects to be pointed out hereinafter, the device comprises, in combination, a closure member such as a door for opening and closing the port, an energy storing means linked to the door to apply a force thereto actuating the door to move it from an open position to a closed position, the energy storing means being arranged to store, during a motion of the door from the closed to the open position, the energy necessary for closing the door; a member for moving the door from the closed to the open position, said member including a first pawl coupling means arranged for releasable cooperation with a gun component which is movable during the operational cycle of the gun between the firing of two successive rounds shortly prior to the rearwardly ejection of an empty cartridge casing, preferably a gun component which is movable together with the gun barrel during the run-out and run-in movement thereof due to the recoil. This gun component has a movable actuating member arranged to cooperate with said first pawl coupling means in the position thereof in which the door occupies its closed position so as to engage the member for moving the door into the open position and to be released from cooperation with said pawl coupling means after the door has been brought into open position. A second pawl coupling means is arranged to retain the door in the open position against the action of the force executed on the door by said energy storing means and comprises a first coupling member connected to the door and a second coupling member connected to a coupling releasing means, said coupling releasing means being pivotal into and out of the path of a casing ejected from the barrel towards and through the port to release

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said second pawl coupling when actuated by an empty casing during the ejection thereof.

With such a device, the discharge port will be opened by action of a movable gun component actuating the door shortly before the ejection of a casing during a firing cycle. The door will then be retained in open position by action of the second pawl coupling means, the first pawl coupling means after the opening of the door having released the member for opening the door from its cooperation with the actuating member of the reciprocating gun component. Thus, the door will be retained in open position during the following ejection of the casing; the casing, when moving rearwardly from the cartridge chamber, actuating the coupling releasing means of the second pawl coupling means to release the door and to free it for return to closed position by action of the force of the energy storing means.

The releasing means of the second pawl coupling, for obvious reasons, is preferably arranged with in the space closed by the door and, if this is the case, the empty casing may strike against the releasing means before having passed through the port and past the door. To prevent a closing of the door so early that it is hit by the casing or even prevents the casing from passing the port, the second pawl coupling is arranged, in a preferred embodiment according to the invention, in the manner of a mechanical escapement. The component of the pawl coupling connected to the door and also as the component thereof connected to the coupling releasing means comprises each two stop noses, arranged for pairwise cooperation. More specifically, the components of the coupling comprise two first stop noses, one on each of the two components, arranged for mutual cooperation to hold the door in the open position after the motion thereof into this position by the action of the actuating member of the reciprocating or recoiling gun component as long as the releasing means is still protruding into the path of an ejected casing, and the two second stop noses, one on each of the two components, arranged relative to each other so as to engage each other after the disengagement of the first two noses when the releasing means, by the action of a casing, is swung out of the path of the casing. The two components of the coupling are thus entirely disengaged from each other when the releasing means returns to its previous position clear of the path of an ejected casing. The releasing means is actuated by a directional force tending to hold it in this position.

The invention will become more clearly apparent from the following description of a preferred embodiment as illustrated in the accompanying drawings in which:

FIG. 1 is a perspective view showing a device according to the invention in a preferred embodiment thereof;

FIGS. 2-6 diagrammatically illustrate components for opening the door in dependence of actuating means reciprocating together with the gun barrel, and the energy storing means for closing the door after ejection of a casing and charged during the opening of the door; and

FIGS. 7-9 illustrate the releasing means for the door to move into closed position after the ejection of a casing.

FIG. 1 illustrates components of the device according to the invention arranged in part on a support 1, a gun barrel 2, a breech ring 3 and a cartridge ramming guide 4 for cartridges to be fired. The gun barrel 2, during firing, performs a recoil movement in its longitudinal direction in relation to the support. The gun components illustrated in FIG. 1 are enclosed by armor plate 5 comprising a rear wall 6 having an outlet port 7 for empty casings ejected rearwardly from the cartridge chamber of the gun barrel along a casing guide 8. A door 10 is hinged to the rear wall 6 by a hinge 9, the

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door being pivotal between the position illustrated in FIG. 1 in which the port 7 is closed thereby, to a position illustrated in FIGS. 7 and 8 in which the passage through the wall is open for a casing moving backwardly along the casing guide 8.

Normally, the door is held in its closed position actuated by a force applied thereto by an energy storing means, which, in its simplest form, may comprise a spring mechanism, against the action of which the door may be opened. As illustrated, a spring 12, FIG. 6, arranged in a spring housing 11, abuts at one end against a wall of the housing secured to the support 1, and at the other end against a collar 13 of a displaceable rod 14. This rod 14 is connected by links 15, 16 and 17, and pivotal levers 18 and 19 to a bracket 20 on the door. Thus, the door is pivotal from the closed to the open position and vice versa by a movement of rod 14 in the respective direction, spring 12 biasing the door into its closed position.

The means for opening the door, in this embodiment, are so arranged that the door is opened during a forward motion of the gun barrel and the components connected thereto, and these means are common to the means for closing the door, except for the means directly affecting storing of energy for closing the door, namely spring housing 11, spring 12 and collar 13. The rod 14, which is thus linked to the door by links 15, 16 and 17 and pivotal arms 18 and 19, has an extension 21 extending through the housing 11. The forward free end of the extension mounts a coupling means including a pivotal pawl 27 which cooperates with an actuating member 23 attached to a component, which participates in the recoil movement of the gun barrel.

In the embodiment as illustrated, this actuating member 23 is secured to a rod 24 which is lengthwise displaceable in a bracket 25 against the action of a shock absorbing spring 26. The actuating member 23, is arranged relative to the pawl 27 so as to engage this pawl when moving backwardly to a rear position, and is then taking the rod 14 with it forwardly, while at the same time loading the spring 12, whereby the door is opened during a following run-in of the barrel. The pawl 27 is actuated by a spring 22 to a position to engage with the actuating member 23 (FIG. 4).

A coupling releasing means, as illustrated, comprise an edge defining a cut-out 28 in a bracket 29 secured to the support 1. This edge is located in the way of the pawl 27 so as to move the same out of engagement with the actuating member 23 against the action of spring 22 when the actuating member, after having returned from the rearward or recoil position, has reached a certain front position and the door is consequently opened.

After the release of the pawl 27, the door is prevented from being returned into its closed position by action of the spring 12 by a second pawl coupling, an embodiment of which is illustrated in detail in FIGS. 7, 8 and 9. This second pawl coupling locks the door in the open position shortly before the pawl 27 is released from the actuating member 23 by action of the edge of cut-out 28. The second coupling comprises a pawl 31 carried by a pivot 30 secured to arm 19. Pawl 31 has two noses, 32 and 33, one of which cooperates with a nose 34 and the other with a nose 35 of a coupling member 36 which is pivotal about a pivot 37 mounted on a coupling releasing means 38 arranged to be swung into and out of the way of a cartridge casing along the casing guide 8. This coupling releasing means 38 is normally held in a position extending into the guide by action of a spring 40 arranged between an abutment member 39 and the coupling releasing means 38 so as to protrude into the path of a cartridge casing 41 being ejected from the cartridge chamber of the barrel 3 towards the port 7, as illustrated in FIGS. 7 and 9, but when it is passed by an ejected casing, FIG. 8.

When the door is moved into open position by the action of the actuating member 23 carrying the rod 21 for-

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wardly and the coupling between the actuating member 23 and rod 21 is released by the edge of cut-out 28 freeing the pawl 27, the nose 32 of the second coupling moves into engagement with nose 34 of coupling member 36, as illustrated by arrows in FIG. 7. When the pawl 27 is released from the actuating member 23 as illustrated in FIG. 6, the door is prevented from moving back into closed position by action of the spring 24 by nose 32 engaging nose 34. However, when a casing 41 is there- after ejected through the casing guide 8, the coupling releasing means 38 is, as illustrated in FIG. 8, moved downwardly, that is, out of the way of the casing. During this movement of the coupling releasing means 28, nose 35 is moved into a position to catch the nose 33 in the same way as in a conventional mechanical escapement, the door thus still being prevented from being brought into closed position by action of spring 12.

When having been passed by the casing, the coupling releasing means 38 returns into the space within the cartridge casing guide 8, by action of spring 40, whereby the nose 35 releases nose 33, the second coupling means 31 to 36 of the device thus being released to free the door for being moved back into closed position by action of spring 12, as illustrated in FIG. 8. Thus, the starting position of the device as illustrated in FIG. 1 is restored.

While the invention has been described in detail with respect to certain now preferred examples and embodiments of the invention, it will be understood by those skilled in the art, after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention, and it is intended, therefore, to cover all such changes and modifications in the appended claims.

What is claimed is:

1. A closure device for opening and closing a discharge port for empty shell casings ejected by the ejecting mechanism of a gun, said device comprising, in combination, a movable closure member for opening and closing a casing discharge port in a protective wall for a gun; energy storing means coupled to the closure member, said means being loaded by an opening of said closure member and urging the same into its closed position; a linkage means coupled with the closure member for moving the same from the closed position into the open position; a casing-ejecting mechanism including an actuating member movable in response to an activation of said ejection mechanism by firing a round from the gun; first coupling means supported by said linkage means and coupling the same to said actuating member in the closed position of the closure member for moving said member into its open position by a movement of said actuating member; first coupling-release means coacting said coupling means for releasing the same from the actuating member upon movement of the closure member into the open position; second coupling means coacting with said closure member for holding the same in its open position against the action of said energy-storing means; and second coupling-release means coacting with said second coupling means to release the latter for return of the closure member into its closing position by the action of said energy-storing means, said second coupling-release means being activated by engagement with an ejected casing moving toward said port and return into an inactive position upon passage of the casing.

2. A device according to claim 1, wherein said ejection mechanism comprises a guide means for guiding an ejected casing toward said port, and wherein said second coupling-release means comprises a pivotally mounted actuating arm biased to protrude into the path of a casing passing through said guide means, engagement of said arm with a passing ejected casing causing a pivotal movement of the arm, said pivotal movement activating said coupling-release means for release of the second coupling means.

3. A device according to claim 1, wherein said second

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coupling means comprise an escape mechanism, said mechanism including a member linked to said linkage means and a means linked to said second coupling-release means, each of said two members having a first and a second catch nose, said first noses of the two members engaging each other to hold the closure member in its open position when and while said second coupling-release means are inactive and being released when said second coupling-release means are activated by said engagement with an ejected casing, and said second noses of the two members engaging each other when the second coupling-release means are activated and being released when the second coupling-release means return into the inactive position upon passage of the casing.

4. A device according to claim 3 and comprising spring

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means biasing said second coupling-release means into the inactive position.

5. A device according to claim 3, wherein said second coupling-release means comprise a pivotally mounted actuating arm biased to protrude into the path of an ejected casing, engagement with a passing ejected casing pivoting said arm out of the path of the casing, said protruding arm position constituting the inactive position of the second coupling-release means, and said pivoted arm position constituting the activated position of the second coupling-release means.

No references cited.

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