March 22, 1966 C. M. CHRISTIANSSON 3,241,447

CARTRIDGE RAMMING DEVICE OF A GUN

Filed Nov. 30, 1964

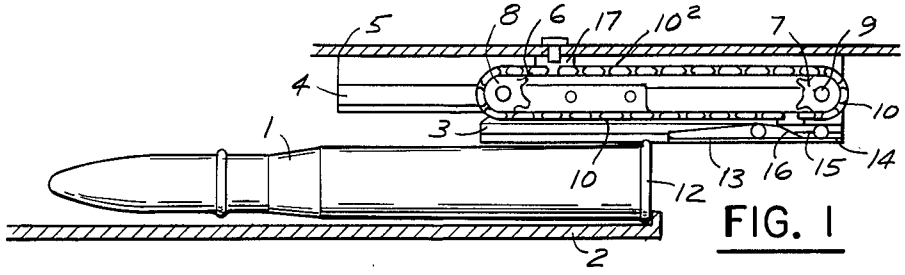

FIG. 1

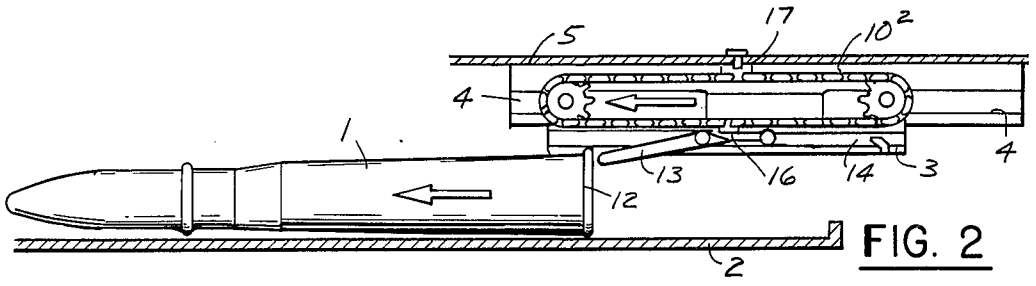

FIG. 2

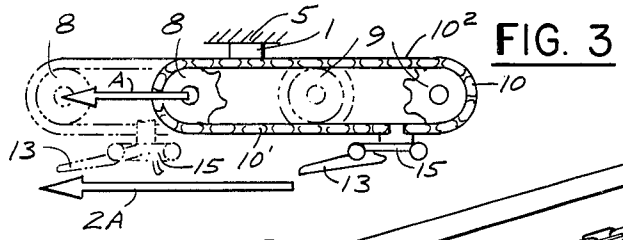

FIG. 3

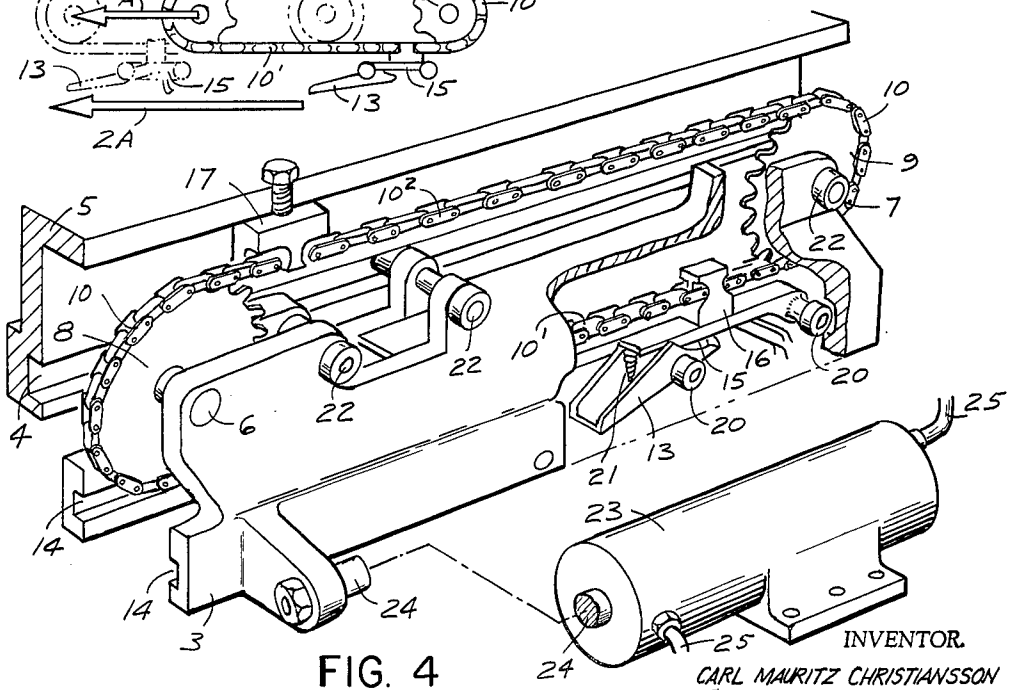

FIG. 4

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CARTRIDGE RAMMING DEVICE OF A GUN

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3 Claims. (Cl. 89—47)

This invention relates to a cartridge ramming device for introducing cartridges into the cartridge chamber of the barrel of a gun, in particular an automatic gun.

The period of time required between the firing of two successive shots of an automatic gun is greatly dependent on the speed, with which a cartridge can be introduced into the cartridge chamber of the barrel after ejection of cartridge case of the precedently discharged cartridge.

One object of the invention is to provide a reciprocating cartridge ramming mechanism by means of which ramming of a cartridge, that is, the bringing forward of a cartridge along a cartridge guide or other cartridge supporting means located behind the barrel and to which the cartridges are being conveyed one by one from a cartridge magazine of the gun, can proceed with a very high speed as compared with the speed obtainable with ramming mechanisms hitherto known. In order to obtain this desired result, the reciprocating ramming mechanism according to the invention is so constructed, that a substantial part of such components of the ramming mechanism which are movable back and forth during ramming and return movement following thereon, and which, with respect to the function they have to fulfil, must necessarily possess a substantial inertia, when performing their movements during ramming and, consequently, also during a back stroke, need only move half the distance over which the cartridge has to be brought forward during ramming, and, consequently, at only half the speed with which the cartridge is being brought forward.

Thus, the present invention relates to a cartridge ramming device of the kind comprising a reciprocating cartridge ramming means including a cartridge actuating means arranged to cooperate with the shell bottom of a cartridge to be rammed, said cartridge actuating means being movable forward and backward between a rear end position and a front end position lengthwise of a cartridge supporting means located rearwardly of the cartridge chamber of the gun barrel, and a driving means to drive said cartridge actuating means forward and backward between said front end position and said rear end position. According to the invention, said reciprocating ramming means comprise a member mounted to move lengthwise of said cartridge supporting means and rigidly secured to a driving component of said driving means to be driven thereby in a reciprocating movement, and an endless traction means mounted to run in a loop over two pulleys mounted on said member at a distance from each other at least corresponding to half of the distance of the movement of said cartridge actuating means between the front end position and the rear end position thereof required for a ramming motion, the cartridge actuating means of the device being secured to one of the parts of said endless traction means located between said pulleys, and the second part of the endless tracking means being secured to a gun component which is stationary relative to the gun barrel during ramming.

By this arrangement the desired result is obtained, that is, the motion of the cartridge actuating means proceeds with twice the speed with which the member of the ramming means to which the cartridge actuating means are

coupled via the endless traction means and the pulleys is moving by action of the driving means. Further, a gain of space is obtained, in that the distance over which a substantial part of the components of the ramming means is to be moved, is only half the distance which would otherwise be required. In the rear position of the ramming means the cartridge actuating means is thus located near the rear end of the member which carries the pulleys and adjacent the rear one of the pulleys. The front pulley then occupies a position near the point at which the endless traction means is secured to a stationary part of the gun. In the foremost position of the ramming means the cartridge actuating means is located adjacent the front pulley, while the rear pulley occupies a position near the point at which the traction means is secured to the stationary part.

Preferably, and in order to obtain a desired guidance of the cartridge actuating means, said means are preferably mounted on a carriage arranged to run along a guide which extends lengthwise of the path along which a cartridge is to be moved during ramming. Preferably, said carriage guide means constitute part of the components of the member carrying the pulleys, all essential parts of the ramming means thus together constituting a constructional unit.

The invention will be further illustrated by the following description of a preferred embodiment thereof as shown in the accompanying drawings, in which:

FIG. 1 is a diagrammatical side view of a ramming device according to the invention in its rearmost position and ready for bringing a cartridge forward in a ramming motion,

FIG. 2 shows the same ramming device during a ramming motion,

FIG. 3 is a diagrammatic view illustrating movements of components of the ramming means during ramming, and

FIG. 4 is a perspective view of an embodiment of the ramming device according to the invention.

FIGS. 1 and 2 schematically show a cartridge guiding member 2 constituting a path along which a cartridge 1 is to be brought forward to the cartridge chamber, not illustrated, in the gun barrel during ramming. A cartridge ramming means according to the invention is mounted adjacent this cartridge guiding member 2 to be movable forward and backward lengthwise of the barrel axis for bringing forth cartridges one by one to the cartridge chamber, and is for this purpose connected to a driving means, an embodiment of which is by way of example schematically illustrated in and described with reference to FIG. 4. The cartridge ramming means comprises a carriage 3 which is carried in and guided by guide grooves 4 in a component 5 of the gun which is stationary in relation to the cartridge chamber during the forward and backward strokes of the ramming means. Adjacent each end of the carriage 3 in the lengthwise direction thereof the carriage comprises a pulley 8 and 9, respectively. These are each freely rotatable about an axle 6, 7, respectively, and carry an endless traction means running in a loop over the pulley. This endless traction means thus comprises two parts of which each extends between the two pulleys. As more closely described below one of these parts is fastened to a component of the gun which is stationary in relation to the gun barrel ramming, while the second part is connected to the cartridge actuating means proper of the device, which is arranged to engage the bottom 12 of a cartridge casing for pushing forward the cartridge during ramming. The cartridge actuating means is illustrated as comprising a rammer detent 13 pivotally fastened to a slide block 15 running in guide grooves 14, the rammer detent 13 being

pivotal between a position in which it is cooperative with the bottom of a cartridge and a position in which it is swung out of the way of the cartridge, by means not illustrated as not belonging to this invention, in order not to obstruct the way of an empty shell casing ejected rearwardly after firing.

As illustrated in the drawing, guide block **15** comprises a lug **16** fastened to the traction means, illustrated as an endless chain **10**, at one of the parts 10^1 thereof extending between the pulleys, the distance between pulleys **8** and **9** being so dimensioned that guide block **15** can move between the pulleys while running in the guide grooves **14** a distance at least corresponding to half the distance for the rammer dent **13** to move forward for ramming a cartridge. The other part 10^2 of chain **10** extending between the pulleys is fastened to a lug **17** secured to the stationary part **5**, this part 10^2 thus being at rest in relation to the stationary part **5** during a movement of carriage **3** in the stationary guide grooves **4**. Consequently, the chain part 10^1 moves in the same direction as carriage **3**, although at double the speed of the carriage, taking the guide block with it. Thus, the ramming detent **13** is brought forward a distance relative to the stationary part **5** which is twice the distance of movement of the carriage, and at a speed which is, consequently, also twice as high as the speed of the carriage.

FIG. 3 illustrates movements of components of the ramming means during ramming, the pulleys **8** and **9** together with the carriage moving a distance indicated by arrow A, and the guide block **15** and the rammer detent **13** carried thereby during the same course of events moving a distance indicated by arrow 2A.

It will be obvious that such components of a device according to the invention which move the entire distance necessary for the device to fulfil its proper function may easily be designed so as to obtain a mass which is only a relatively small fraction of the mass of the movable components of the device as a whole. Consequently, inertia forces exerted on a considerable part of the components are greatly reduced.

FIG. 4 illustrates, more in detail, an embodiment of a ramming device according to the invention, the function of which has been described with reference to FIGS. 1–3.

The guide block **15** comprises rollers **20** engaging guide grooves **14**. A spring means **21** is arranged between the pivotal rammer detent **13** and guide block **15** to normally bring detent **13** in a position for cooperation with the bottom of a cartridge and against the action of which detent **13** can be swung out of the way for an empty casing ejected rearwardly of the gun barrel. The rammer carriage **3** is carried in guide grooves **4** by rollers **22**.

The ramming device further comprises a driving means of any convenient construction suitable for applying to the ramming means a reciprocative motion by being connected to the carriage **3**. As an example this driving means is illustrated in FIG. 4 as a hydraulic or pneumatic piston motor **23** comprising a connecting rod **24** secured to a lug of carriage **3**, the cylinder space of said motor communicating, via suitable and obvious controlling means, with a source of impelling fluid.

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 thereof, 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 cartridge ramming device for introducing cartridges into the cartridge chamber of the barrel of a gun, in particular an automatic gun, comprising a reciprocating cartridge ramming means including a cartridge actuating means (**13**) arranged to cooperate with the shell bottom of a cartridge to be rammed, said cartridge actuating means being movable forward and backward between a rear end position and a front end position lengthwise of a cartridge supporting means (**2**) located rearwardly of the cartridge chamber of the gun barrel, and a driving means (**23–25**) to drive said cartridge actuating means forward and backward between said front end position and said rear end position, wherein said reciprocating ramming means comprise a member (**3**) which is movable lengthwise of said cartridge supporting means (**2**) and is rigidly secured to a driving component (**24**) of said driving means (**23–25**) to be driven thereby in a reciprocating movement, and an endless traction means (**10**) mounted to run in a loop over two pulleys (**8, 9**) mounted on said member (**3**) at a distance from each other at least corresponding to half of the distance of movement of said cartridge actuating means between the front end position and the rear end position thereof, the cartridge actuating means (**13**) of the device being secured to one of the two parts (10^2) of said endless traction means (**10**) located between said pulleys (**8, 9**), and the second part of the endless tracking means located between said pulleys (**8, 9**) being secured to a gun component (**5**) which is stationary relative to the gun barrel during ramming.

2. Device according to claim **1**, wherein said cartridge actuating means (**13**) is mounted on a carriage (**15**) arranged to run along a guide (**14**) which extends lengthwise of said cartridge supporting means (**2**) said one part (10^2) of said endless traction means.

3. Device according to claim **2**, wherein said carriage guide means (**4**) constitute part of said member (**3**) carrying the pulleys (**8, 9**).

No references cited.

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