Dec. 23, 1958 H. W. ALDRIN 2,865,254

RECOILING BARREL OPERATED PIVOTED LOADING TRAY MECHANISM

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Fig. 4

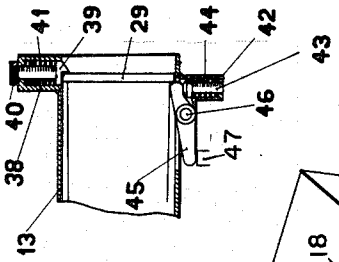
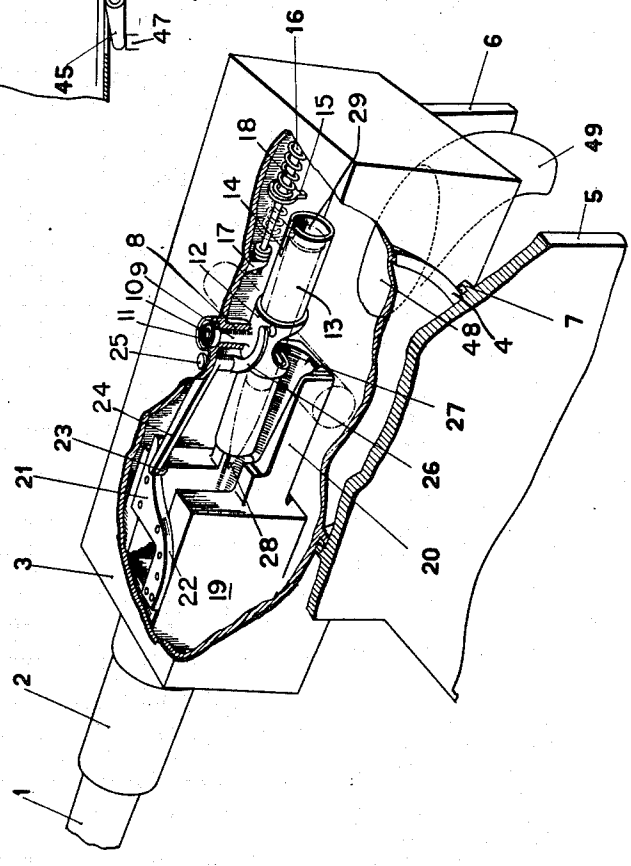


Fig. 1



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RECOILING BARREL OPERATED PIVOTED LOADING TRAY MECHANISM

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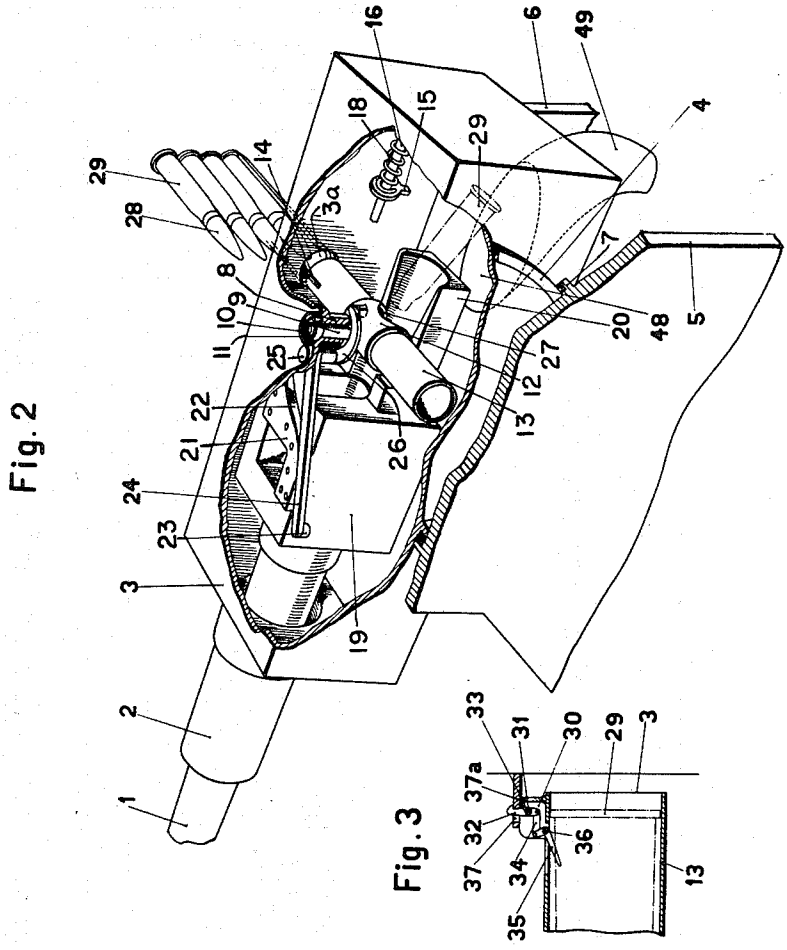

Fig. 2

Fig. 3

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RECOILING BARREL OPERATED PIVOTED LOADING TRAY MECHANISM

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Fig. 6

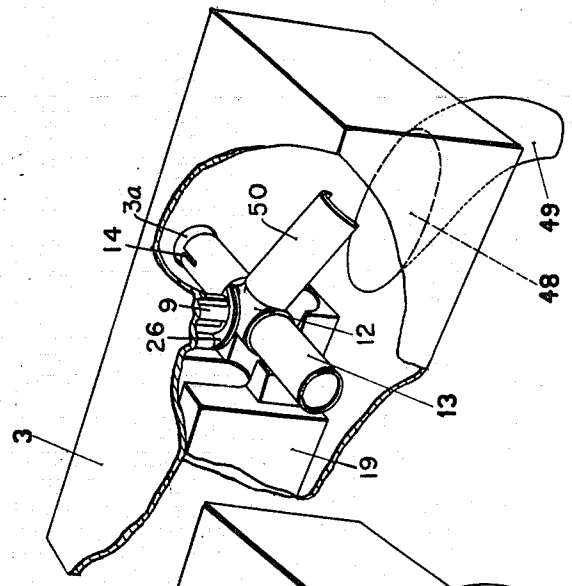

Fig. 5

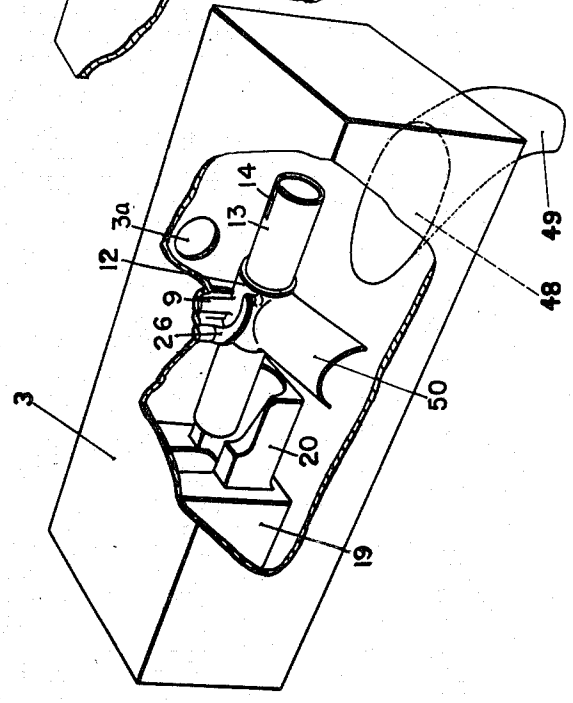

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Fig. 8

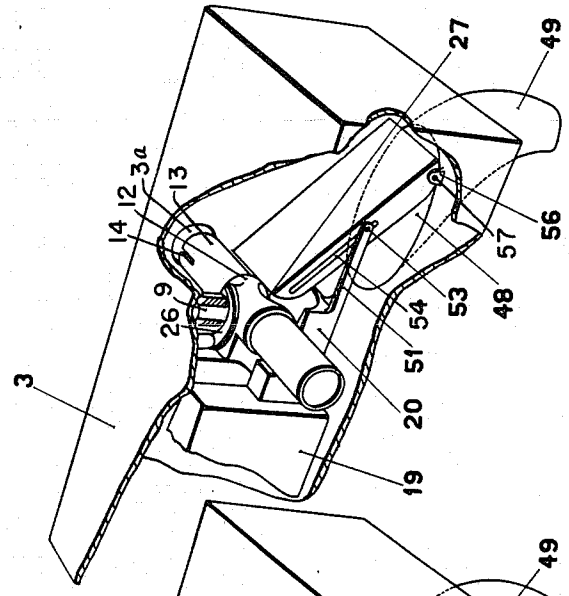
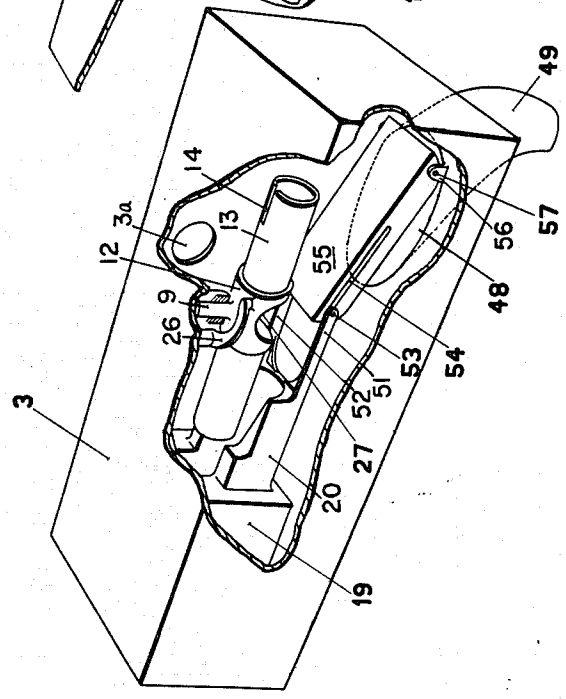


Fig. 7



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United States Patent Office

2,865,254

Patented Dec. 23, 1958

2,865,254

RECOILING BARREL OPERATED PIVOTED LOADING TRAY MECHANISM

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Application September 17, 1954, Serial No. 456,664

Claims priority, application Sweden October 1, 1953

3 Claims. (Cl. 89—45)

The present invention relates to a loading tray arrangement for a firearm especially a recoiling gun, and more particularly to recoiling guns mounted on wheels or tracks.

One of the objects of the invention is to provide a novel and improved loading tray arrangement for guns of the general type above referred to, which permits loading of the gun in any elevational position of the barrel thereof.

Another object of the invention is to provide a novel and improved loading tray arrangement suitable for coaction with a cartridge magazine without requiring to lower or raise the magazine jointly with the gun barrel. Such an arrangement affords the advantage that the total weight of the components to be raised or lowered jointly with the gun barrel is greatly reduced.

Still another object of the invention is to provide a novel and improved loading tray arrangement in which the recoil movement of the barrel automatically moves the tray from the ramming position into the loading position and in which the loading of a shell automatically returns the tray into the ramming position for purpose of ramming a loaded shell.

Other and further objects, features and advantages of the invention will be pointed out hereinafter and set forth in the appended claims forming part of the application.

In the accompanying drawings several preferred embodiments of the invention are shown by way of illustration and not by way of limitation.

In the drawings:

Fig. 1 is an isometric view, partly in section, of a loading tray arrangement according to the invention showing the tray in its ramming position.

Fig. 2 is an isometric view, partly in section, similarly to Fig. 1 but showing the tray in its loading position.

Fig. 3 is a sectional detail view of locking means for releasably retaining the tray in its loading position.

Fig. 4 is a sectional detailed view of locking means for releasably retaining a shell inserted in the loading tray.

Fig. 5 is an isometric diagrammatic view of a loading tray arrangement according to the invention showing the loading tray equipped with cartridge deflecting means in its ramming position.

Fig. 6 is an isometric view similar to Fig. 5 showing the tray and the cartridge deflecting means in the loading position.

Fig. 7 is an isometric diagrammatic view of a loading tray arrangement according to the invention and of a modification of the cartridge deflecting means, the tray being shown in its ramming position, and

Fig. 8 is an isometric view similar to Fig. 7 but showing the tray in the loading position.

Referring first to Figs. 1 to 4 inclusive, these figures show a recoiling gun barrel **1** ending in a breech ring **19**. The breech end of the barrel is slidably mounted in a jacket composed of parts **2** and **3**. Jacket part **3** mounts

two ring sectors **4** which are guided in guide tracks **7** on cradle carriers **5** and **6**. Ring sectors **4** and guide tracks **7** serve to pivot the gun barrel and its jacket for elevation and depression of the gun, the pivot axis of the barrel being coaxial with the axis of loading tray **13** when the same is in the position shown in Fig. 2. To facilitate the pivotal movement of the gun barrel, balls, rollers or needles may be fitted between sectors **4** and tracks **7**.

The top wall of jacket part **3** supports a sleeve **8** through which a shaft **9** is extended. There is further provided coaxially with shaft **9** a housing **10** within which a spiral spring **11** is disposed. One end of the spring is secured to shaft **9** and the other to housing **10**. The end of shaft **9** within jacket part **3** mounts a jacket sleeve **12** in which the loading tray **13** is fitted which is shown as a cylindrical tube. Tray **13** may either occupy the position of Fig. 1 which is the ramming position of the tray or the position of Fig. 2 which is the loading position of the tray. For purpose of ramming a shell inserted in the tray, the tray is slotted at **14**. A rammer **15** may enter the tray by means of the slot. Rammer **15** is axially slidable on a bar **16** one end of which is secured to a bracket **17** extending from the top wall of jacket part **3** and the other to the front wall of jacket part **3**. A spring **18** serves to actuate the rammer. The arrangement and the actuation of the rammer are conventional and a detailed description thereof is not essential for the understanding of the invention.

Breech ring **19** mounts a camming plate **21** having a cam way **22** coacting with a cam roller **23**. Roller **23** is mounted on an arm **24** ending in a shaft **25** pivotally supported in the top wall of jacket part **3**. Shaft **25** has secured thereto a curved arm **26** pivotally linked to jacket sleeve **12** and hence to tray **13**.

Jacket sleeve **12** and tray **13** both have a cut-out **27** so disposed that the cut-out together with a cradle like extension **20** of breech ring **19** forms an ejection path for an ejected cartridge case when the loading tray is in the loading postion of Fig. 2.

In Fig. 1, a shell is shown inserted in the loading tray, the projectile being designated by **28** and the cartridge case by **29**. For purpose of loading the tray through jacket part **3**, an opening **3***a* is provided in the appropriate wall of jacket part **3**. The diameter of this opening should be at least equal to the inner diameter of loading tray **13**.

In order releasably to retain the loading tray in the loading position of Fig. 2 and in alignment with loading opening **3***a*, a releasable locking device is provided. This locking device is shown in detail in Fig. 3 but for reason of clarity of illustration omitted in Figs. 1 and 2. It is mounted on a bracket **30** extending from tray **13** and comprises a catch **32** pivoted to bracket **30** by a pivot pin **31**. Catch **32** extends through a hole **37** in a plate **37***a* fixedly secured to bracket **30** and is engageable with the respective edge of plate **37***a* as can be clearly seen in Fig. 3. A spring **33** urges catch **32** into engagement with plate **37***a*. An arm **34** is on one end pivoted to catch **32** and on the other end linked to a bell crank **35** pivoted at **36** to tray **13**. In the catch position of catch **32** the respective arm of bell crank **35** extends into tray **13** and hence the path of a cartridge casing **29** placed in tray **13**.

The end of tray **13** mounting the locking device of Fig. 3 mounts a second releasable locking device. This second locking device is shown in detail in Fig. 4 but omitted in Figs. 1 and 2 for reason of clarity of illustration.

The second locking device comprises a spring housing **38** fixedly secured to tray **13** and slidably housing a plunger ending in a catch **39**. A spring **41** urges catch **39** into the position shown in Fig. 4 in which the catch

abuts against the bottom rim of a cartridge case **29** inserted in the tray thereby preventing an axial rearward movement of the cartridge case out of the tray. A nut **40** serves to retain the plunger and its catch within spring housing **38**. The second locking device further comprises a sleeve housing **42** in which a plunger **43** is urged by a spring **44** against one arm of a two-arm lever **45** pivoted to tray **13** by a pivot pin **46**. The lever arm coacting with plunger **43** is biased into a position in which it engages the forward edge of the base rim of the cartridge case thereby preventing a forward or ramming movement of the latter. The other end of lever **45** coacts with a release bar **47** which should be visualized as being disposed near the ramming device and as coming into engagement with lever **45** when the loading tray is moved into its ramming position as will be more fully explained hereinafter. Engagement of lever **45** with release bar **47** pivots the lever in clockwise direction against the action of spring **44** thereby releasing the cartridge case for the ramming operation.

As is evident from the previous description, the design of the locking devices of Figs. 3 and 4 may be altered in various respects. It is only necessary that the locking devices are designed to be capable of performing the aforedescribed functions.

Figs. 1 and 2 finally show an ejection hole **48** through the bottom wall of jacket part **3**. This ejection hole leads to a deflector chute **49** and serves to direct a cartridge case **29** leaving cradle like extension **20** away from the gun.

The loading tray arrangement as hereinbefore described, operates as follows:

Let it be assumed that the loading tray is in the position of Fig. 1, that a shell has been inserted in the loading tray and that the shell has been rammed. When the gun is fired, barrel **1** and breach ring **19** will recoil, that is, move towards the right as seen in Fig. 1, relative to the jacket. As a result, roller **23** and with it arm **24** will ride along cam way **22** moving in unison with the breech ring. The rotation of arm **24** will pivot through arm **26** tray **13** into the loading position of Fig. 2 thereby also causing tension of spring **11**. Furthermore, lever **45** is released from release bar **47** and moved by spring **44** into the position of Fig. 4. When the loading tray reaches the position of Fig. 2 it is retained in this position by the locking device of Fig. 3 against the action of the tensioned spring **11** which seeks to return the tray into the ramming position.

The loading tray is now ready for a loading operation. When a shell is inserted in the tray, the locking device of Fig. 3 is released by engagement of the respective arm of bell crank **35** with the cartridge case. Furthermore, catch **39** engages the rearward edge of the rim of the cartridge case and lever **45** the forward edge of this rim thereby securing the shell against axial displacement in either direction. The slanted edge of nose **39** permits passage of the cartridge rim against the action of spring **41**.

The loading tray being released, the tensioned spring will return the tray into the ramming position whereby bar **47** comes in contact with lever **45** and pivots the lever out of engagement with the cartridge rim. The new shell is now ready for ramming and subsequent firing.

As previously mentioned, the cartridge case of a fired shell leaves jacket through cut-out **27**, cradle like extension **20**, ejection hole **48** and deflector chute **49**.

Further to facilitate the ejection of a cartridge case from the jacket, an upper deflector may be provided. This deflector is shown in Figs. 5 and 6 in form of an upside down chute **50**. It extends laterally from the tray, or more specifically from jacket sleeve **12** and is in alignment with the axis of the barrel and cradle like extension **20** when the loading tray is in the loading position.

Figs. 7 and 8 show a design in which the fixed upper deflector of Figs. 5 and 6 is replaced by a movable upper deflector. According to these figures, an upside-down deflector chute **55** is pivoted by means of pivot pins or a pivot shaft **57** to ears or lugs **56** extending from jacket part **3**. The depending side walls of the chute are longitudinally slotted at **54**. Guide pins or a guide shaft **53** on arms **51** and **52** extending from cradle like extension **20** are slidably guided in slots **54**.

As is apparent from Figs. 7 and 8, the recoil of the barrel pivots chute **55** from the shallow position of Fig. 7 into the steep position of Fig. 8 in which the chute forms a downwardly directed continuation of the ejection path provided by cradle like extension **20** and cut-out **27**.

It is further possible to arrange an upper deflector so that its far end is pivotally supported by arms **51** and **52** and its near end bears against the bottom of extension **20** when tray **13** is in the ramming position of Fig. 1. Upon movement of the tray into the position of Fig. 2, the near part of the deflector will be raised into alignment with cutout **27** in a manner similar as has been described in connection with Figs. 7 and 8.

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 as new and desired to be secured by Letters Patent is:

1. In a gun having a recoiling longitudinal barrel with a breech on one end and pivotal about a relatively fixed axis, a jacket slidably housing the breech end of the barrel and mounting means including a relatively stationary transverse axis pivotally supporting said jacket for elevating and depressing the gun barrel, the combination with a loading tray arrangement comprising a loading tray having a transverse center axis, said loading tray being pivotally supported for rotation about said transverse center axis, said axis being disposed within the plane of the elevational movement of said barrel and intersecting the pivot axis of the barrel, whereby said tray is pivotally supported for movement about its transverse center axis between a ramming position substantially in register with the longitudinal axis of the barrel and the loading position substantially coaxial with the pivot axis of the barrel, guide means supported for movement in unison with the recoil movement of the barrel operatively coupled with said loading tray for effecting pivotal movement of said tray from its ramming position into said loading position in response to the recoil movement of the barrel, and yieldable means operatively connected with said loading tray, said yieldable means being tensioned by the pivotal movement of the loading tray into its loading position to return the tray to its ramming position, said guide means including a camming surface on a gun part recoiling together with the barrel and a cam structure riding on said camming surface and operatively connected with the loading tray for pivoting the latter from its ramming position into its loading position upon recoil of the barrel.

2. In a gun having a recoiling longitudinal barrel with a breech on one end and pivotal about a relatively fixed axis, a jacket slidably housing the breech end of the barrel and mounting means including a relatively stationary transverse axis pivotally supporting said jacket for elevating and depressing the gun barrel, the combination with a loading tray arrangement comprising a loading tray having a transverse center axis, said loading tray being pivotally supported for rotation about said transverse center axis, said axis being disposed within the plane of movement of said barrel and intersecting the pivot axis of the barrel whereby said tray is pivotally supported for movement about said transverse center axis between a ramming position substantially in register with the longitudinal axis of the barrel and the loading position sub-

stantially coaxial with the pivot axis of the barrel, guide means supported for movement in unison with the recoil movement of the barrel operatively coupled with said loading tray for effecting pivotal movement of said tray from its ramming position into said loading position in response to the recoil movement of the barrel, yieldable means operatively connected with said loading tray, said yieldable means being tensioned by the pivotal movement of the loading tray into its loading position to return the tray to its ramming position, cartridge deflecting means pivoted to said jacket, and second guide means coupling a recoil part of the gun with said deflecting means for pivoting the latter relative to the loading tray by the recoil of the barrel, said tray having in its wall a cutout forming together with said deflecting means in the loading position of the tray an ejection path for an ejected cartridge.

3. A gun according to claim 2, wherein the said deflecting means comprise an upside-down chute pivoted to the jacket and linked to the breech for tilting the chute by the recoil movement of the barrel into a position juxtaposed to said cut-out for forming said ejection path.

References Cited in the file of this patent

UNITED STATES PATENTS

2,483,837	Nettles	Oct. 4, 1949
2,592,790	Brereton	Apr. 15, 1952
2,624,241	Hill	Jan. 6, 1953
2,649,840	Davidson	Aug. 25, 1953
2,655,079	Aldrin et al.	Oct. 13, 1953