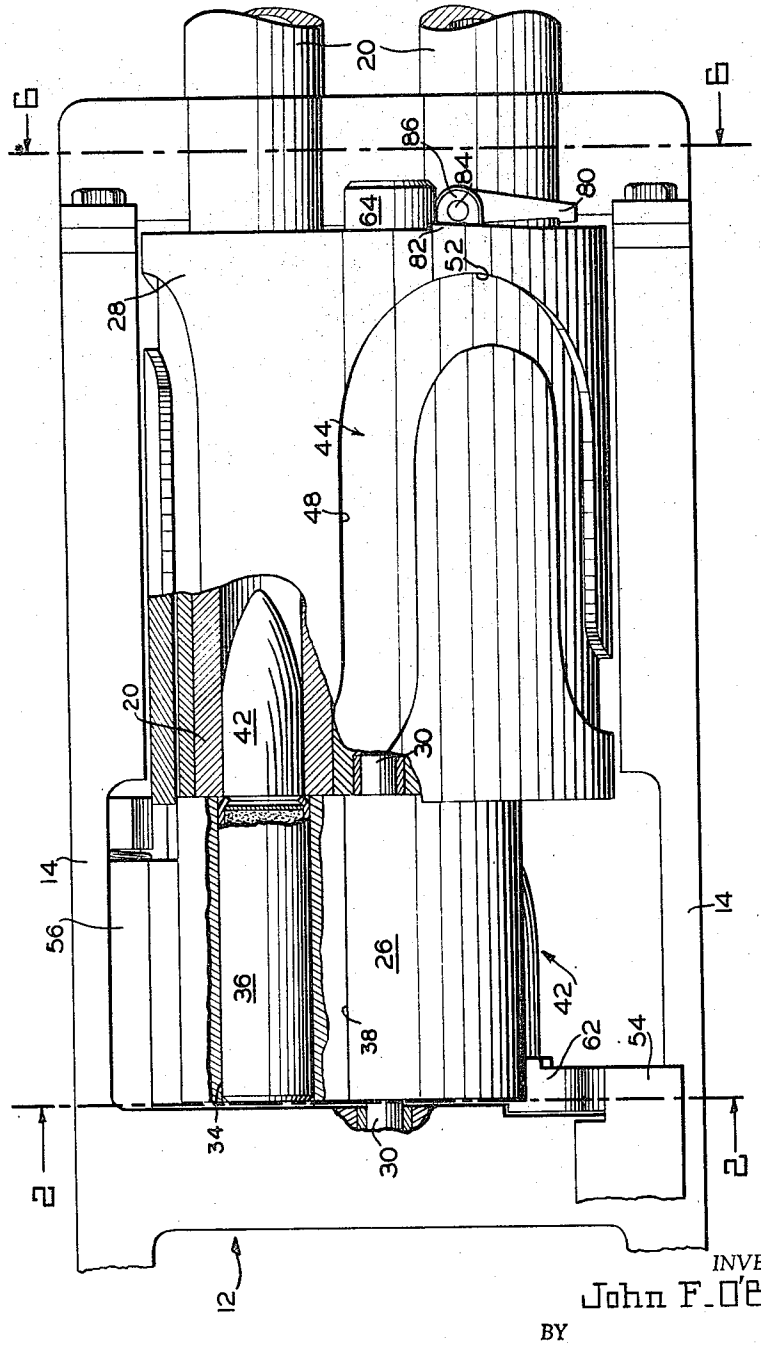
Aug. 30, 1960 J. F. O'BRIEN 2,950,652

CHAMBERING MECHANISM FOR AN AUTOMATIC REVOLVER TYPE GUN

Filed Dec. 20, 1957 5 Sheets-Sheet 1

Fig. 1.



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CHAMBERING MECHANISM FOR AN AUTOMATIC REVOLVER TYPE GUN

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Fig. 2.

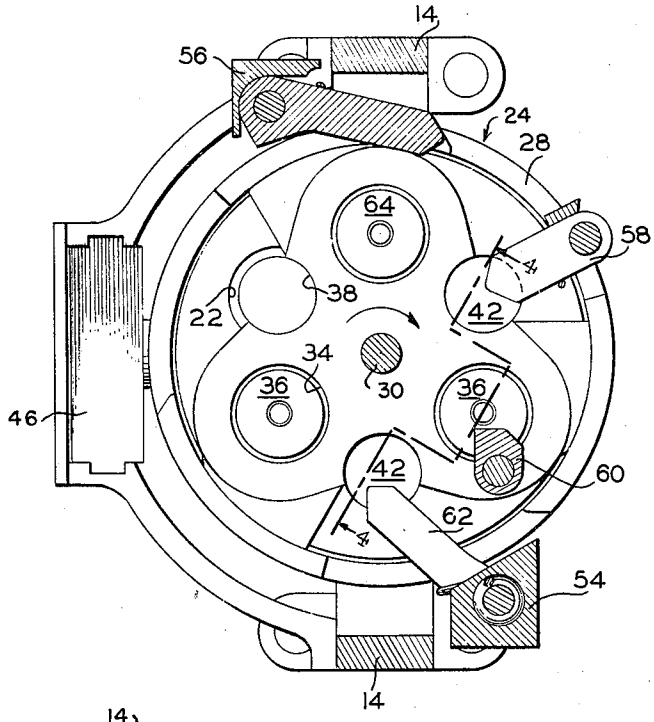
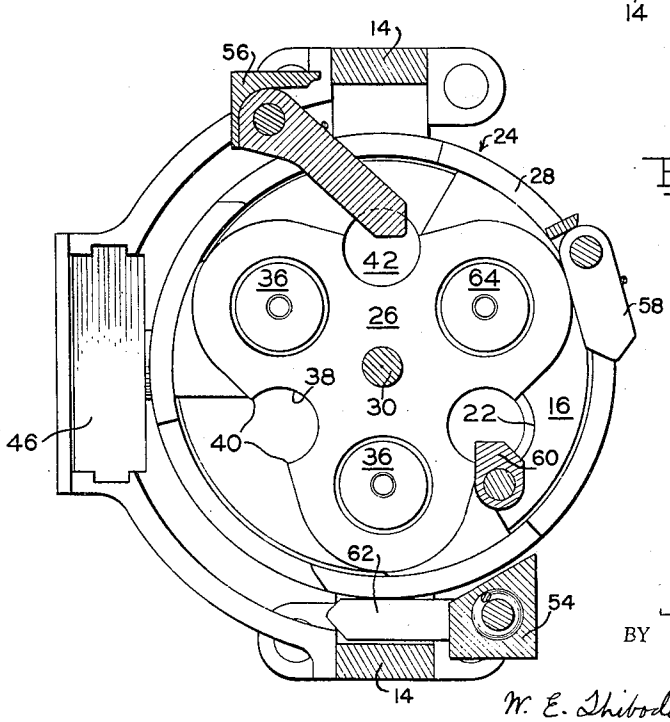


Fig. 3.



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CHAMBERING MECHANISM FOR AN AUTOMATIC REVOLVER TYPE GUN

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Fig. 4.

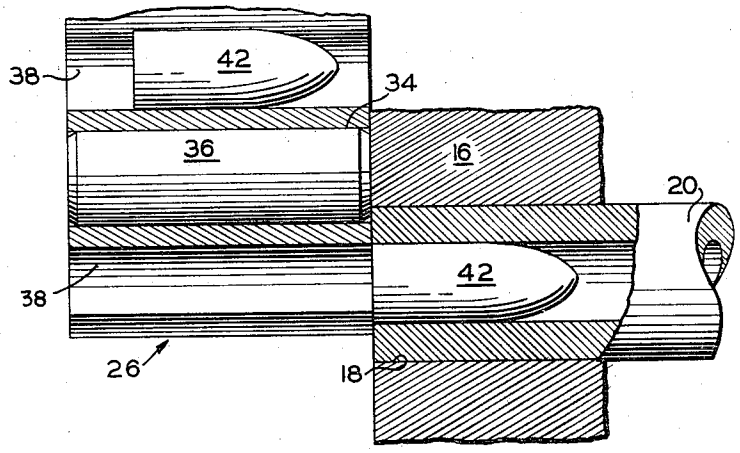

Fig. 5.

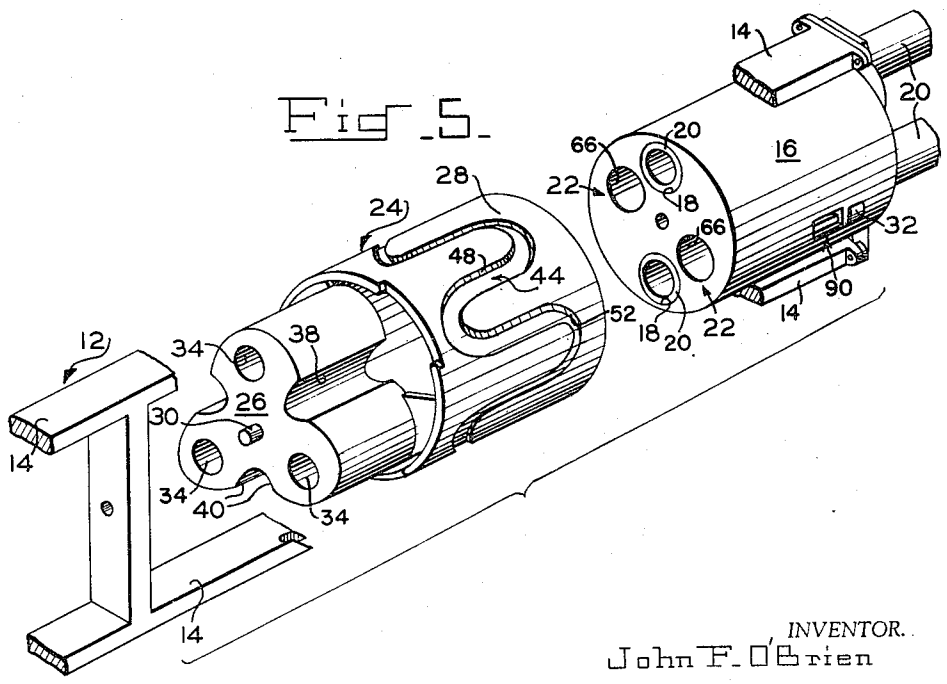

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Fig. 6.

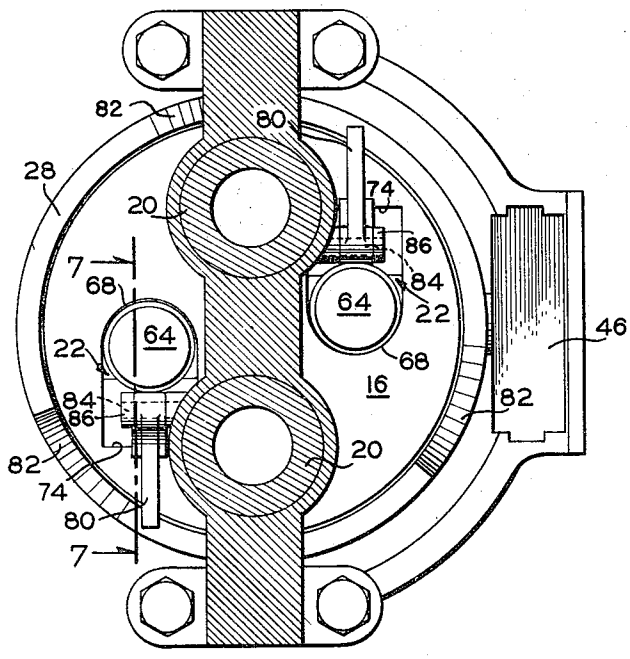
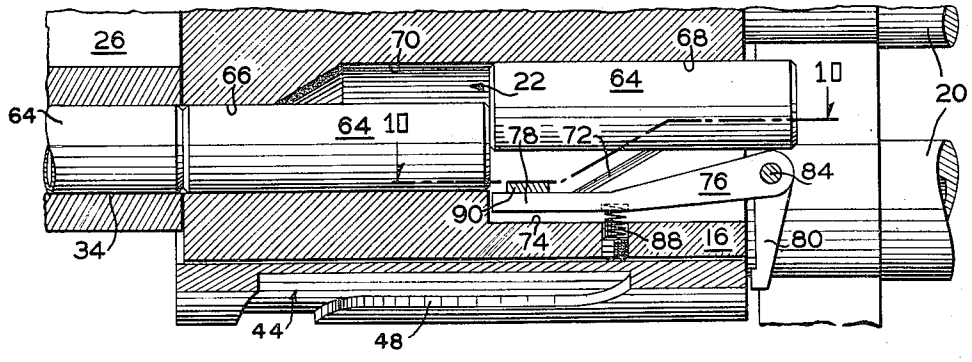


Fig. 7.



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CHAMBERING MECHANISM FOR AN AUTOMATIC REVOLVER TYPE GUN

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Fig. 8.

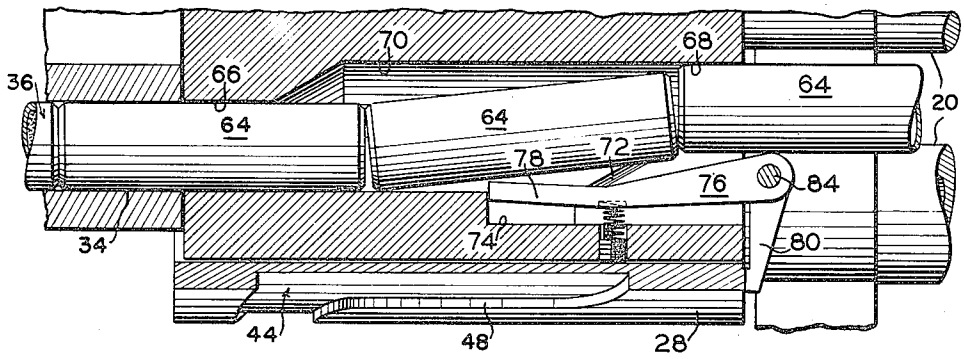


Fig. 9.

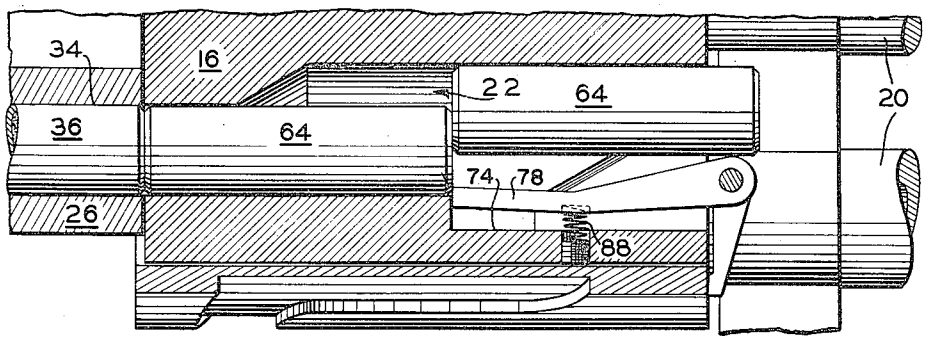


Fig. 10.

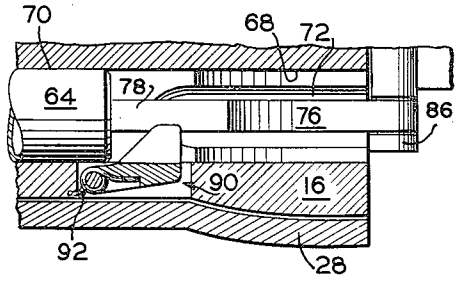
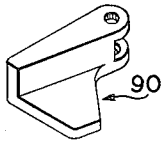


Fig. 11



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United States Patent Office 2,950,652 Patented Aug. 30, 1960

2,950,652

CHAMBERING MECHANISM FOR AN AUTOMATIC REVOLVER TYPE GUN

John F. O'Brien, Springfield, Mass., assignor to the United States of America as represented by the Secretary of the Army

Filed Dec. 20, 1957, Ser. No. 704,219

7 Claims. (Cl. 89—155)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment of any royalty thereon.

This invention relates to revolver-type automatic guns and more particularly to the chambering mechanism therefor.

This application is a continuation-in-part of application Serial No. 536,793, filed September 26, 1955, in the name of John F. O'Brien for "Twin Barrel Revolver-type Gun," which application is now abandoned.

It is the principal object of this invention to provide a revolver-type automatic firearm which fires at a faster rate than those of conventional design.

It is well recognized that the firing rate of automatic guns may be increased through the simplification of the operating cycle and/or a reduction in the mass of the moving parts, and/or the minimizing of the displacement required of such parts.

The conventional revolver-type gun includes a drum for conveying cartridges to and from a battery station responsive to the reciprocation of an actuator, with the expended cartridge cases being extracted rearwardly from the drum for ejection from the gun. With such guns the firing rate is affected by the mass and length of the drum which in turn determines the mass and linear displacement of the actuator. Also, the loading of live rounds into the drum is necessarily delayed until the expended cartridges are extracted therefrom and moved out of the way. Efforts have been made to decrease the mass of the drum and, consequently, the mass and the displacement of the actuator through the use of cartridges in which a projectile is telescoped in a cylindrical case to decrease the overall length of the cartridge and, therefore, the length of the drum. This, however, is not completely satisfactory as the diameter of such a cartridge has to be increased to accommodate the necessary propellant charge and such increase requires a corresponding increase in drum diameter, to offset the advantages which are gained from shortening the drum by reducing the length of the cartridges.

It is a more specific object of this invention to provide a chambering mechanism which increases the firing rate of revolver-type automatic guns by providing such guns with a drum assembly which cooperates with a pair of barrels and a ramming mechanism such as is described in applicant's copending application, Serial No. 536,791, filed September 26, 1955, to convey separate projectiles and cartridges to the barrels and form thereat complete rounds with such chambering mechanism having a minimum mass and displacement of the parts.

Another specific object of this invention is to provide such a gun with a chambering mechanism through which the operating cycle is simplified by having the expended cartridge cases in the drum ejected therefrom by the live cartridge cases rammed thereinto to eliminate the waiting period required in the cyclic operation of conventional revolver-type guns where the ramming of live cartridge cases into the drum must be delayed until the

expended cartridge cases have been extracted and moved out of the way.

A still further object of this invention is to provide such a chambering mechanism with a device for conveying expended cartridge cases from the drum and for releasably holding live cartridge cases therein.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from a description of a preferred embodiment as shown in the accompanying drawings in which:

Fig. 1 is a partially cross-sectioned side view of the chambering mechanism showing a projectile disposed in the top barrel and a cartridge case positioned in the chamber unit rearwardly thereof;

Fig. 2 is a view taken along line 2—2 of Fig. 1 but showing the relationship of the parts after actuation of the ramming mechanism but before rotation of the drum;

Fig. 3 is a view similar to Fig. 2 but showing the chamber unit rotated to the following station;

Fig. 4 is a view taken along line 4—4 of Fig. 2;

Fig. 5 is a reduced exploded view of the chamber mechanism in perspective;

Fig. 6 is a view taken along line 6—6 of Fig. 1;

Fig. 7 is a view taken along line 7—7 of Fig. 6;

Fig. 8 is a view similar to Fig. 7 but showing an expended cartridge case partially moved from the chamber unit into the communicating ejection port;

Fig. 9 is a view similar to Figs. 7 and 8 but showing the incoming expended cartridge case stopped by the stop member;

Fig. 10 is a view taken along line 10—10 in Fig. 7; and

Fig. 11 is an enlarged perspective view of the latch.

Shown in the figures is a substantially U-shaped support 12 provided with a pair of parallelly extending arms 14 the ends of which are secured to diametrically disposed flanges provided on the front end of a cylindrical barrel mount 16 so that such mount extends rearwardly between such arms. A pair of bores 18 are disposed so that the axes therein lie in the vertical plane of the firearm and extend longitudinally through mount 16 to securely receive a pair of barrels 20 so that the breach ends thereof are flush with the rear end of the mount. Also extending longitudinally through mount 16 is a pair of ejection ports 22 which are more fully described hereinafter.

Rotatably mounted to mount 16 is a drum assembly 24 (as best shown in Fig. 5) which includes a chamber unit 26 and a cylindrical sleeve 28 of larger diameter which extends forwardly to encircle mount 16. An axle 30 extends axially from the rear and front ends of chamber unit 26 to be rotatably received in mating holes in the base of support 12 and mount 16 respectively for rotatably supporting drum assembly 24, while rollers 32 are provided circumferentially around mount 16 to assist in supporting the front end.

Chamber unit 26 is essentially triangular in cross section and provided longitudinally through each of the apexes thereof is a chamber 34 which is axially alignable with the barrels 20 as drum assembly 24 is rotated and such chambers are adapted to slidingly accommodate a cartridge case 36 charged with a propellant. Extending longitudinally along each of the sides of chamber unit 26 is a cylindrical trough 38 provided with a longitudinal mouth portion 40. The walls of the troughs 38 are more than 180 degrees in circumference so that a projectile 42 is slidingly retained thereby, and such troughs are disposed so as to be alignable with the bores of barrels 20 as chamber unit 26 is rotated whereby the projectiles may be slidingly moved from such troughs into the bores of the barrels.

The chambers 34 and troughs 38 are arranged in

diametrically opposed pairs so that a chamber and a trough are simultaneously alignable with opposite ones of the barrels **20**, and as the chambers and troughs are alternately disposed around chamber unit **26** they are alternately alignable respective to each one of the barrels when drum assembly **24** is rotated.

Provided around the outside of sleeve **28** is a cam track **44** having cooperation with an actuator **46** as hereinafter described to rotate drum assembly **24** and index chamber unit **26** relative to the barrels **20**. Actuator **46** is slidingly disposed for operation in a rearward stroke responsive to gases produced in one of the barrels **20** by discharge of a cartridge case **36** thereinto and a forward stroke responsive to similarly produced gas pressure in the other one of the barrels. Whereby, actuator **46** is moved through a complete cycle by the combined firing of the two barrels **20**.

Cam track **44** includes a number of longitudinally disposed linear portions **48** equal to the total number of chambers **34** and troughs **38**. The linear portions **48** are slightly longer than cartridge case **36** or projectile **42**, whichever is longer, and are disposed around the circumference of sleeve **28** so that when actuator **46** is sequentially engaged therewith the chambers **34** and troughs **38** are sequentially aligned with the barrels **20** whereby a ramming mechanism such as is described in applicant's aforementioned copending application may move cartridge cases **36** and projectiles **42** from a feeding mechanism (not shown) into position to form a complete round at the breech ends of the barrels **20**. The opposite ends of the linear portions **48** are joined by semicircular portions **52** to form a continuous track around sleeve **28**. The semicircular portions **52** cooperate with actuator **46** in sequentially rotating drum assembly **24** to succeeding stations while the linear portions **48** cooperate with such actuator to hold drum assembly **24** immovable during the ramming operation.

The ramming mechanism includes a right-hand rammer **54** and a left-hand rammer **56** which are longitudinally actuated by the gas pressure formed in the barrels **20** and are synchronized by conventional means (not shown) to the movement of actuator **46** so as to be simultaneously moved in opposite directions. The right-hand rammer **54** includes three cooperating finger portions. One of these, as noted at **58** in Fig. 2, engagingly moves a projectile **42** from the feeding mechanism (not shown) into the one of the troughs **38** which is positioned in the station immediately adjacent the top battery station on the right side of drum assembly **24**. Another finger, noted at **60**, simultaneously moves a cartridge case **36** from the feeding mechanism to the chamber **34** which is immediately adjacent the bottom one of the battery stations, also on the right side of the drum assembly. At the same time, the third finger, noted at **62**, is extendable through mouth portion **40** to engageably move from such trough into the breech of the bottom one of the barrels **20** the projectile **42** which was previously placed in such trough by finger portion **58**. Finger portion **62** is pivotably mounted so as to be cammingly moved out of the mouth portion **40** by engagement with the cooperating wall thereof when drum assembly **24** is rotated.

Left-hand rammer **56** includes three finger portions which correspond to finger portions **58**, **60** and **62** and which are arranged to simultaneously move a cartridge case **36** and a projectile **42** into the chamber **34** and trough **38** positioned in their respective charging stations between the top and bottom battery stations on the left-hand side of chamber unit **26** and a projectile into the breech of the top one of the barrels **20** when actuator **46** responds to the discharge of the bottom barrel.

The ejection ports **22** are positioned in barrel mount **16** so as to be axially aligned with the chambers **34** when in the charging stations whereby the expended cartridge cases **64** carried to such charging stations after being discharged in one of the battery stations are movable into such ejection ports and out of the gun by the live cartridge cases **36** being moved into the chamber unit **26** by the ramming mechanism. Each of the ejection ports includes a cylindrical rear portion **66** having a diameter slightly larger than that of cartridge case **36** and a front portion **68** which has a similar diameter and is axially offset from such rear portion. An intermediate oval portion **70** is formed by the injunction of such front and rear portions and a ramp **72** leads from the front end of oval portion **70** to front portion **68** to facilitate the passage of the expended cartridge cases **64** through the ports **22**. Front portion **68** is offset from rear portion **66** to provide clearance space for the operation of a stop member **76** arranged as hereinafter described to stop the forward movement of an expended cartridge case **64** into rear portion **70** to prevent the movement of a cartridge case **36** past the front end of the receiving one of the chambers **34** when moved thereinto by the ramming mechanism. Each of the stop members **76** includes an arm portion **78**, which is receivable by a groove **74** in radial communication with front portion **68** and oval portion **70**, and an extension portion **80** which extends at right angles therefrom contiguous the front end of sleeve **28** for engagement with three equally spaced cams **82** which extend angularly forward from such front end. A pin **84** extends transversely through stop member **76**, at the junction of arm portion **78** and extension portion **80**, and a lug **86** projecting from the front end of barrel mount **16** to pivotally support such stop member. A coil spring **88** is disposed between the base of groove **74** and arm portion **78** to bias such portion outwardly from such groove and extension portion **80** inwardly toward the end of sleeve **28**. When extension portion **80** is in engagement with the end of sleeve **28**, the free end of arm portion **78** projects out of groove **74** and into position to engage the front end of the expended cartridge case **64** being moved into the ejection port **22** by the rammed cartridge case **36** when the rear end of such expended cartridge case is clear of chamber unit **26**. Thus, the cartridge case **36**, which is being moved into chamber unit **26** and is pushing the expended cartridge case **64** therefrom, is prevented from being positioned too far forwardly to interfere with the rotation of drum assembly **24**. The cam portions **82** are so arranged that the arm portions **78** are moved thereby into their respective grooves **74** to free the front end of the expended cartridge case **64** before the chambers **34** carrying the expended cartridge cases are rotated into alignment with their respective ejection ports **22**, and so that such arm portions are disengaged from the cooperating ones of such cam portions when such chambers are aligned with the ejection ports. However, the arm portions **78** are retained in their respective grooves **74** after the disengagement of the extension portions **80** from the cooperating ones of the cam portions **82** through the cooperation of a pair of latches **90**.

Each of the latches **90** is substantially L-shaped in configuration as is best shown in Figs. 10 and 11 and is pivotally mounted for transversal movement relative to stop member **76** so as to be movable over the top of arm portion **78** to releasably retain such arm portion in groove **74** after being pivoted thereinto. The latches **90** are also disposed in the path of the expended cartridge cases **64** when moved from rear portions **66** to front portions **68**, as is best shown in Fig. 10, so as to be engageably moved thereby to unlatch positions. Whereby, the arm portions **78** are released to be biased by the cooperating springs **88** into position to engageably stop the expended cartridge cases being moved into the ejection ports **22**. The latches **90** are held out of latch positions by engagement thereof with the adjacent sides of the arm portions **78** when in the stop positions, and a spring **92** biases each of the latches to the latch position when the cooperating arm portion is pivoted into its respective groove.

Thus, when a cartridge case **36** is fired, for instance, in the top battery position, the resulting gas pressure in the

top one of the barrels **20** causes actuator **46** to be moved either in a forward or rearward stroke depending upon the station to which chamber unit **26** is indexed. During the initial portion of the stroke, actuator **46** moves along one of the linear portions **48** to hold drum assembly **24** against rotary displacement while right-hand rammer unit **54** moves a cartridge case **36** and a projectile **42** respectively into the ones of the chambers **34** and troughs **38** which are positioned in the charging stations relative to the bottom one of the barrels **20**. At the same time, finger portion **62** engagingly moves the projectile **42** in the bottom battery station forwardly into the breech of the bottom barrel **20**. Also, as cartridge case **36** is moved into the chamber **34** in the charging station, the expended cartridge case **64** therein is pushed forwardly thereby into the communicating one of the ejection ports **22** to move the expended cartridge cases therein forwardly. Such forward movement is permitted because arm portion **78** of stop member **76** is held within the cooperating one of the grooves **74** by latch **90**. However, when the expended cartridge case in rear portion **66** is moved forwardly, latch **90** is cammingly moved thereby to a release position, but through the sliding engagement of arm portion **78** with such expended cartridge case the arm portion is maintained in groove **74** until the front end of such expended cartridge case engages ramp **72**. Whereby, such expended cartridge case is cammed away from engagement with arm portion **78**, as best shown by Fig. 8, to permit such arm portion to be pivoted through the bias of spring **88** into position to engage the front end of the expended cartridge case **64** being moved into rear portion **66** and thereby correctly position the rammed cartridge case **36** in chamber unit **26**.

When actuator **46** enters the semicircular portion **52** of cam track **44** at the end of the actuating stroke, drum assembly **24** is rotated in a clockwise direction to the following station whereby the cartridge case **36** previously rammed into chamber unit **26** is rotated in back of the projectile **42** moved into the breech of the bottom of the barrels **20** to form a complete round of ammunition which, when fired, produces a reaction similar to that produced by the firing of the top barrel already described.

From the foregoing, it is clearly apparent that there is herein provided an improved firearm structure in which the pair of barrels, the drum assembly and the ramming mechanism are uniquely arranged to fire at a rapid rate rounds composed of separate cartridge cases and projectiles, and that by separating the cartridge cases and projectiles the mass of the drum assembly is considerably reduced, permitting a corresponding reduction in the mass of the actuator, as well as the rotary displacement required of the drum and in the linear displacement of the actuator because of the reduced diameter of the drum. Further, the operating cycle has been simplified by having the expended cartridge cases ejected from the gun by the cartridge cases moved into the drum assembly whereby the ramming of such cartridge cases need not be delayed until the expended cartridge cases have been extracted rearwardly and moved out of the way as with conventional revolver-type firearms. Therefore, because of the rejection in mass and displacement of the parts and the simplification of the operating cycle, the firing rate of a firearm incorporating subject invention is considerably increased.

Although a particular embodiment of the invention has been described in detail herein, it is evident that many variations may be devised within the spirit and scope thereof and the following claims are intended to include such variations.

I claim:

1. A gun comprising a pair of barrels supported at the breech ends thereof by a mount, a rotatable chamber unit of triangular cross-section disposed for rotation adjacent the breech ends of said barrels, said chamber unit including a chamber in each of the apexes for slidingly receiving cartridge cases and a trough disposed in each of the sides of said chamber unit for slidingly receiving projectiles, said chambers and troughs being disposed for alternate and simultaneous alignment with alternate ones of said barrels, each one of said troughs being provided with a longitudinal mouth portion, a ramming mechanism disposed for operational cooperation with said chamber unit for sequentially and unidirectionally moving the cartridge cases into said chambers against the expended cartridge cases therein for ejection therefrom, for moving the projectiles into said troughs, and for simultaneously engaging the projectiles in said troughs through the mouth portions thereof to transfer the projectiles from said chamber unit into the aligned one of said barrels for subsequent combination with the cartridge cases in the rotationally succeeding ones of said chambers to form a complete round at alternate ones of said barrels, and ejection means to receive the expended cartridge cases from said chamber unit for removal from the gun.

2. The device of claim 1 wherein said ejection means includes a pair of ports extending through said mount so as to be in position to receive the expended cartridge cases moved from said chamber unit by the cartridge cases transferred thereinto by said rammer mechanism, a stop member pivotally disposed in each of said ports for releasable engagement with the expended cartridge cases moved from said chamber unit into said port for stopping the movement of the cartridge case into said chamber unit, and cam means disposed on the forward end of said chamber unit so as to cooperate with each said stop member for actuation thereof to release the expended cartridge case for subsequent ejection from the relative one of said ports after said chamber unit rotatingly moves the cartridge case out of alignment with the expended cartridge case moved thereby into the corresponding one of said ports.

3. The device of claim 2 wherein each of said ports includes a rear portion for receiving expended cartridge cases from said chamber unit, a front portion for guiding expended cartridge cases from the gun with the front and rear portions being axially offset to form an intermediate oval portion providing clearance for the operation of said stop member.

4. The device of claim 2 wherein each of said ports includes a rear portion for receiving the expended cartridge cases from said chamber unit, a front portion for delivering the expended cartridge cases from the gun, said front and rear portions being axially offset to form an intermediate oval portion providing clearance for the operation of said stop member, and a ramp disposed between said oval portion and said front portion for facilitating the movement of the expended cartridge cases through said port and for freeing said stop member therein from engagement with the expended cartridge cases when moved from said rear portion to said front portion so as to be returnable to a position for engaging the succeeding front ends of the expended cartridge cases moved from said chamber unit into said port.

5. The device of claim 2 including a pivotal latch member disposed for releasable engagement with each said stop member to maintain said stop member in the release position and for actuation to a disengaged position by the expended cartridge cases when moved from said rear portion to said front portion of the associated one of said ports.

6. A gun comprising a pair of barrels supported by a cylindrical mount, a chamber unit rotatably disposed adjacent the breech ends of said barrels and the rear end of said mount, receptacle means disposed in said chamber unit for alternately receiving and conveying projectiles and cartridge cases separately and alternately to alternate ones of said barrels, ramming means for unidirectionally moving the cartridge cases and projectiles separately into said receptacle means and ejecting spent cartridge cases therefrom by engagement of the cartridge cases moved

thereinto, said ramming means being disposed for operational cooperation with said chamber unit to combine the projectiles and cartridge cases at the breeches of alternate ones of said barrels to form thereat a complete round ready for firing, ejection ports disposed in said mount for receiving the expended cartridge cases ejected from said chamber unit, a stop device disposed in each of said ejection ports for releasably stopping forward movement of the expended cartridge cases through said ejection ports to limit the forward movement of the cartridge cases in said chamber unit, and cam means disposed for rotation with said chamber unit and for engagement with each said stop device for actuation thereof to release the expended cartridge cases for forward movement through said ejection ports.

7. A gun for the discharge of rounds, each round including a case with a propellant therein and a separate projectile, said gun including a pair of barrels, a drum disposed for intermittent rotation adjacent the breech ends of said barrels, said drum being provided with a plurality of chambers respectively formed to slidingly receive a case and an equal number of troughs respectively formed to slidingly receive a projectile, said chambers and troughs being angularly spaced and alternately disposed relative to each other and disposed relative to said pair of barrels so that one each of said chamber means and said other

means is simultaneously alignable with said pair of barrels, cam means including a cam track formed around said drum and a discharged energized actuator disposed for intermittently rotating said drum and indexing said chambers and said troughs alternately respective to each of said pair of barrels responsive to the forces produced by the discharge of a completed round in one of said pair of barrels whereby the cases and projectiles are alternately alignable with each one of said pair of barrels during intermittent rotation of said drum, and a ramming device disposed adjacent said drum for longitudinal reciprocation relative thereto and for operational cooperation therewith to transfer the projectile aligned with one of said barrels thereinto for subsequent combination with the case in said drum rotated in back of the barrel inclosed projectile during the succeeding intermittent rotation of said drum to successively form complete rounds at alternate ones of said pair of barrels.

References Cited in the file of this patent

UNITED STATES PATENTS

2,509,734	Higson	May 30, 1950
2,790,353	Bird	Apr. 30, 1957
2,849,921	Otto	Sept. 2, 1958
2,865,126	Dardick	Dec. 23, 1958