Jan. 29, 1957 C. H. STEVENS 2,779,248

CAM BLOCK ACTUATOR

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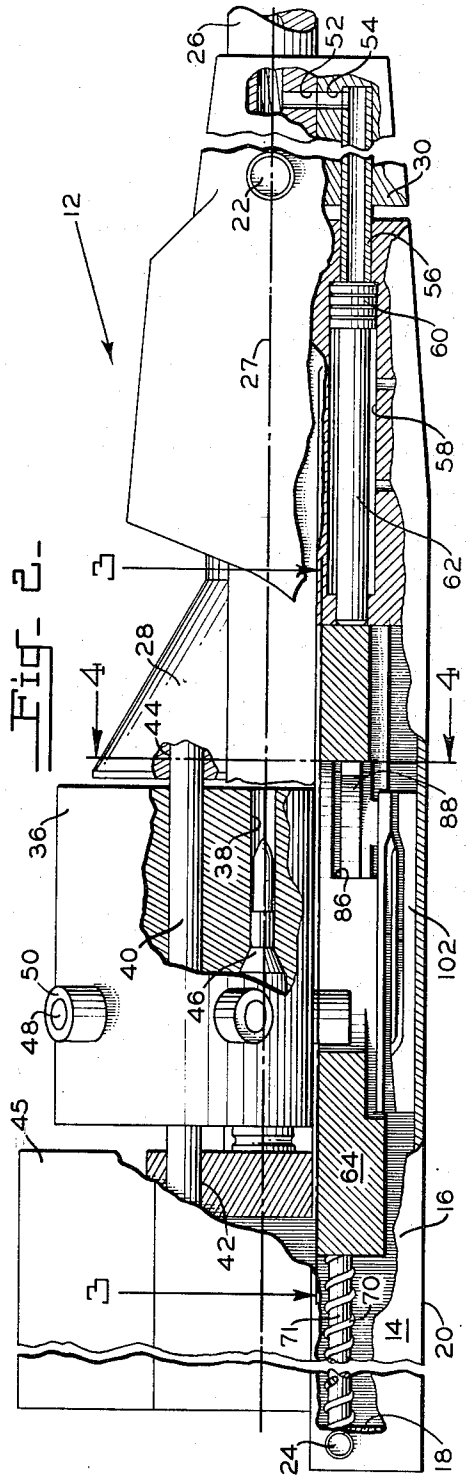


Fig. 2.

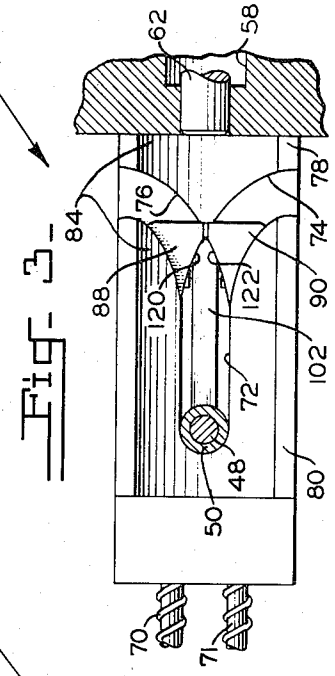


Fig. 3.

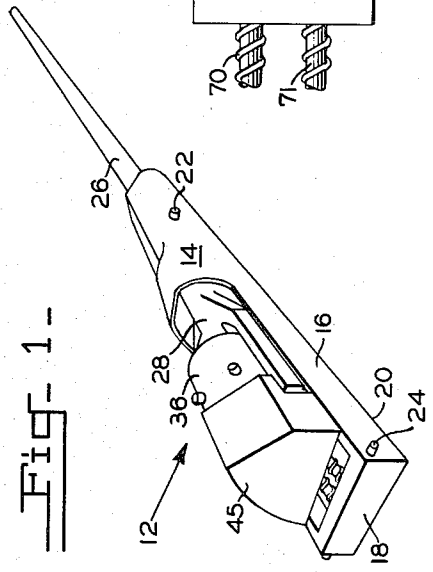


Fig. 1.

INVENTOR.
Charles H. Stevens
BY
W. E. Thibodeau & A. W. Dew
ATTORNEYS

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Fig. 4.

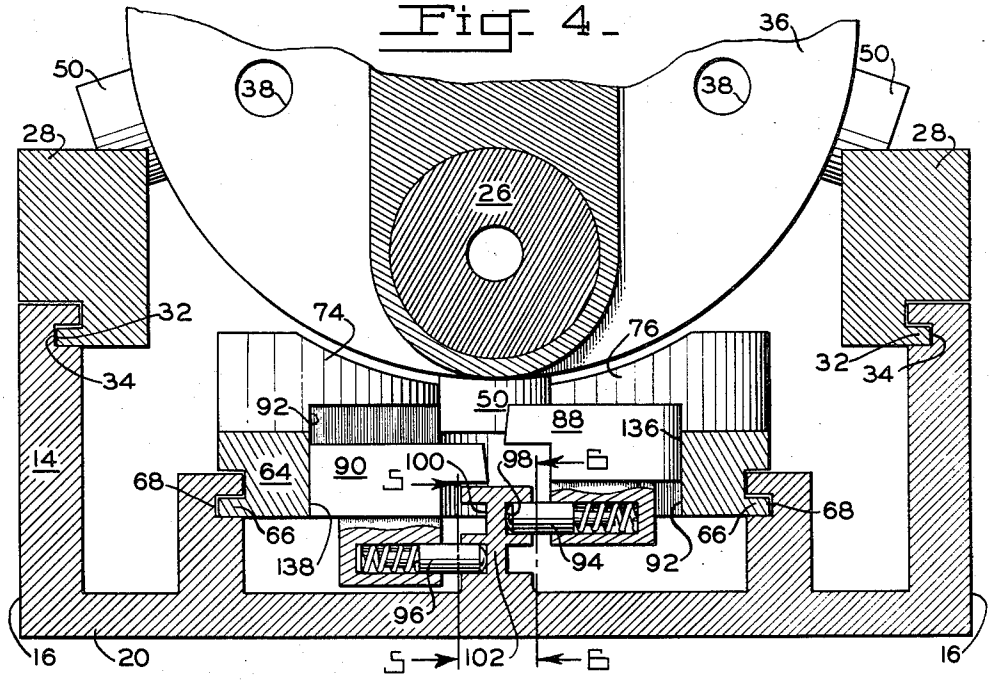


Fig. 5.

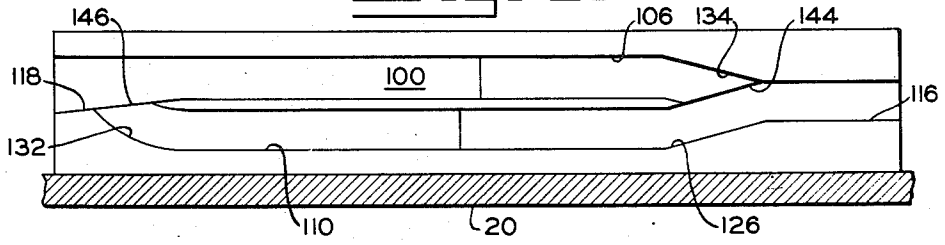
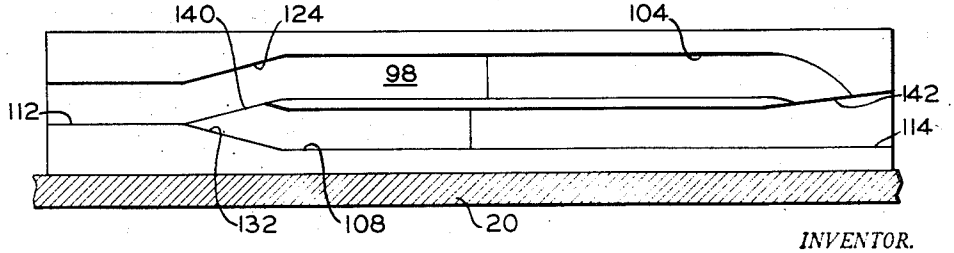


Fig. 6.



INVENTOR.
Charles H. Stevens
BY
W. E. Thibodeau & A. W. Dew
ATTORNEYS

Jan. 29, 1957 C. H. STEVENS 2,779,248

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Fig. 7.

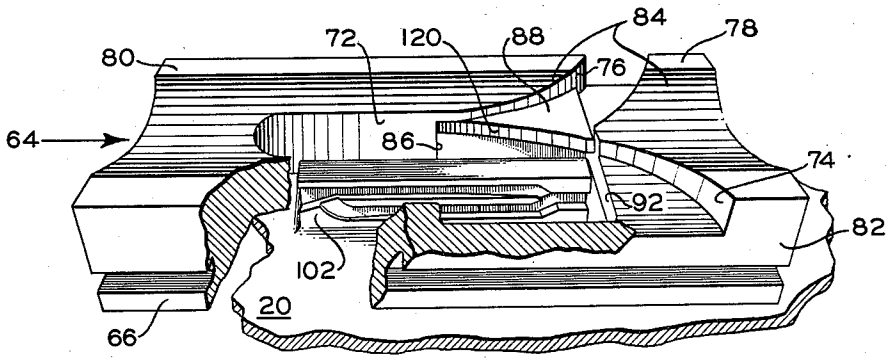
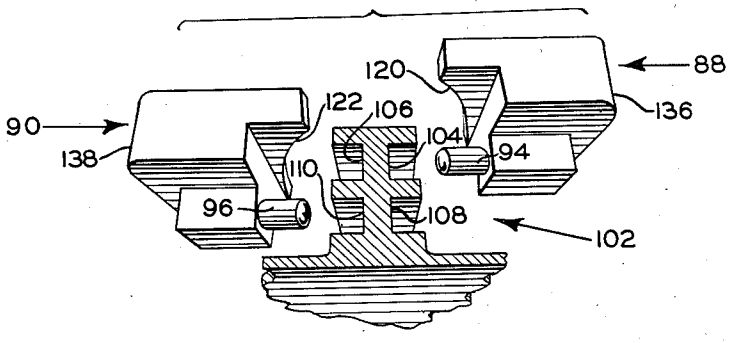


Fig. 8.



INVENTOR.
Charles H. Stevens
BY
W. E. Thibodeau + A. W. Dew
ATTORNEYS

United States Patent Office 2,779,248 Patented Jan. 29, 1957

2,779,248

CAM BLOCK ACTUATOR

Charles H. Stevens, Springfield, Mass., assignor to the United States of America as represented by the Secretary of the Army

Application August 28, 1953, Serial No. 377,268

6 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.

My invention relates to an electrically fired revolver-type automatic weapon and more particularly to the actuator for rotating the cartridge drum of such a weapon.

Such a weapon ordinarily comprises a receiver with a recoil unit slidable therein including a barrel and a cartridge drum having peripherally spaced stub shafts thereon with the axes thereof intersecting the axes of the cartridge chambers of the drum. The drum is rotatably mounted on the recoil unit to convey the cartridge chambers successively to a firing position of the drum aligned with the barrel. An actuator, slidable on the receiver, is biased to a battery position and provided with grooves for engaging the rollers to locate the chambers.

The grooves include a straight groove for retaining a chamber in the firing position when the actuator is in battery position and curved outlet and inlet grooves extending oppositely from the straight groove. The actuator slides in an indexing cycle of rearward and forward strokes responsive to discharge of the cartridge in the firing position chamber. A tongue pivoted on the actuator consecutively connects the outlet and inlet grooves to the straight groove during the rearward and forward strokes to remove the chamber with the spent cartridge from the firing position and to rotate the succeeding chamber into the firing position.

The tongue is rotated by a separate cam mounted on the recoil unit, by means of a switch pin secured to the tongue and projecting through an arcuate slot in the actuator to engage a guide surface of the cam.

In the weapon described, the strain of accelerating and decelerating rotation of the drum falls on the pivot and switch pins of the tongue causing them to break and the weapon to fail. Also, the means for securing the cam to the recoil member is necessarily of light construction and frequently fails.

It is an object of my invention therefore to provide a simple, substantial and efficient means for rotating the drum of such a weapon.

Another object of my invention is to provide an integral actuator means for rotating the drum of such a weapon.

An additional object of my invention is to provide a device for rotating the drum of such a weapon including positively actuated blocks for directly transmitting forces between the actuator and the drum.

Other aims and objects of my invention will appear in the subsequent description.

In carrying out my invention, the actuator of a gun similar to that described above includes similar roller guide grooves and the receiver is provided with a cam. The actuator includes outlet and inlet blocks slidably disposed therein having followers for engaging the cam to

insure positive operation of the blocks and bearing surfaces for simultaneous engagement with the actuator and the rollers. The blocks are alternately moved to and from roller engagement positions as the actuator moves in the rearward and forward strokes of the indexing cycle. In the engagement positions, the roller bearing surfaces of the blocks respectively connect the curved grooves with the straight groove to control rotation of the drum by direct transmission of forces between the rollers and the actuator.

For a better understanding of my invention, reference is directed to the accompanying drawing in which:

Fig. 1 is a perspective view of an electrically fired revolver-type automatic weapon including one embodiment of my invention;

Fig. 2 is a partly cutaway elevation view of the weapon;

Fig. 3 is a view along the line 3—3 of Fig. 2;

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

Figs. 5 and 6 are views along the corresponding lines of Fig. 4;

Fig. 7 is a partial perspective view of the actuator of the weapon; and

Fig. 8 is an exploded view of the outlet and inlet blocks and the cam.

As shown in the drawing, a weapon **12** is provided with a receiver **14** including sides **16** and an end **18** substantially perpendicular to a flat base **20**. Pairs of mounting trunnions **22** and **24** are perpendicularly secured to sides **16**.

A recoil unit slidable on receiver **14** includes a barrel **26** provided with a bore axis **27** and secured to a cradle **28**. Barrel **26** is slidably disposed in a support **30** of receiver **14**, and cradle **28** includes a pair of feet **32** slidable in corresponding grooves **34** of receiver **14**. A cartridge drum **36** including chambers **38** is rotatably mounted on a shaft **40** journalled at **42** and **44** in cradle **28**. Chambers **38** are loaded by a feeder mechanism represented generally by a housing **45**.

Weapon **12** is shown in battery position in Fig. 1 with the chamber **38** in the six o'clock firing position of drum **36** in alignment with barrel **26** and with a cartridge **46** shown in position in the chamber. Drum **36** is provided with radial stub shafts **48** projecting from the surface thereof and intersecting the axes of chambers **38**. Index rollers **50** are rotatably disposed on shafts **48**.

Barrel **26** and receiver **14** respectively include passages **52** and **54** communicating between barrel **26** and a tube **56** slidably disposed between receiver **14** and a cylinder **58** of cradle **28**. Cylinder **58** incloses a piston **60** secured to a plunger **62** projecting rearwardly from cylinder **58**.

An actuator **64**, slidably disposed on receiver **14** by means of projections **66** extending into channels **68** parallel to axis **27**, is biased to a battery position in engagement with plunger **62** by a pair of buffer springs **70** engaging end **18**. Springs **70** are guided by rods **71**.

Actuator **64** is provided with grooves for guiding rollers **50** including a straight groove **72** parallel to channels **68** for selectively retaining chambers **38** in alignment with barrel **26** when actuator **64** is in the battery position thereof and a pair of curved outlet and inlet grooves **74** and **76** of equal section for engaging rollers **50**, oppositely extending from straight groove **72**. Grooves **74** and **76** separate actuator **64** into a pair of forward and rearward lands **78** and **80** secured to a body **82**. The lands include an interrupted surface **84** concentric with drum **36**. An aperture **86** provided in land **80** forms an inverted T-slot with a portion of straight groove **72**.

Outlet and inlet blocks **88** and **90** are slidably disposed in a pair of corresponding sockets **92** in body **82**. The

sockets communicate with aperture 86. Blocks 88 and 90 respectively include a pair of spring-biased follower pins 94 and 96 for projecting into tracks 98 and 100 of a cam 102. The cam is secured to base 20 and projects between the blocks.

Tracks 98 and 100 respectively include upper branches 104 and 106 and lower branches 108 and 110. Branches 104 and 108 of cam 102 are respectively connected forwardly and rearwardly to join intermediate sections 112 and 114 and branches 106 and 110 of cam 100 are connected to similar sections 116 and 118.

Curved surfaces 120 and 122 provided on blocks 88 and 90 respectively are positioned for engagement with rollers 50 when the corresponding pins are respectively restrained in the upper branches. In the engagement positions, curved surfaces 120 and 122 respectively connect grooves 74 and 76 with straight groove 72. Blocks 88 and 90 are depressed out of their respective engagement positions when pins 94 and 96 are respectively engaged by lower branches 108 and 110. As shown in Fig. 4, blocks 88 and 90 are respectively in positions of roller engagement and disengagement.

Weapon 12 is electrically fired, and at the moment of discharge, pins 94 and 96 are respectively engaged by end sections 112 and 116. Gases from the discharge of the cartridge 46 in the firing position chamber escape from barrel 26 through passages 52 and 54 and tube 56 to force piston 60, plunger 62, and consequently actuator 64, rearwardly. As actuator 64 slides against buffer spring 70, pin 94 is progressively engaged by connecting groove 124 and groove 104 to raise block 88 to the engagement position thereof to allow the roller corresponding to the spent cartridge roller 50 to be guided from actuator 64 by curved surface 120 and outlet groove 74. Simultaneously, pin 96 is progressively engaged by connecting groove 126 and groove 110 to depress block 90 below the engagement position thereof.

End sections 114 and 118, respectively, allow overtravel for pins 94 and 96 and thus compensate for differences in charges of cartridges 46.

As cartridge 46 leaves barrel 26, gas pressure is released and actuator 64 slides forwardly responsive to springs 70, with pin 96 constrained by upper branch 106. During this time, roller 50 succeeding the spent cartridge roller is guided by successive engagement with curved groove 76 and curved surface 122 into firing position engagement with straight groove 72. During the latter portion of the stroke, pin 96 traverses groove 134 and enters end section 116 as actuator 64 returns to battery position. Simultaneously, pin 94 progresses through lower groove 108 and groove 132 to end section 112.

Bearing surfaces 136 and 138 on blocks 88 and 90, respectively, contact actuator 64 in the engagement positions for direct transfer of forces between the actuator and rollers 50. The floors of tracks 98 and 100 respectively include steps 140, 142 and 144, 146 to permit passage of rollers 94 and 96 through the tracks in the directions described only.

The cam arrangement described is of great advantage in weapon construction, since blocks 88 and 90 controlling rotation of cartridge drum 36 are positively guided instead of being spring-controlled as in other weapons. In addition, the blocks are supported by the actuator structure to transmit forces between the actuator and the drum rollers.

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. In a revolver-type automatic weapon having a receiver, a recoil unit slidable thereon provided with a rotatable drum having cartridge chambers and corresponding index rollers, and an actuator for rotating the drum slidably disposed for axial reciprocation on the receiver, a device for engaging the drum comprising outlet and inlet blocks respectively slidably disposed on the actuator and provided with roller engagement surfaces, and means for positively moving said blocks to and from positions thereof in direct engagement between the rollers and the actuator responsive to the axial reciprocation.

2. In a revolver-type automatic weapon having a receiver, a recoil unit slidable thereon provided with a rotatable drum having cartridge chambers and corresponding radially disposed index rollers, and an actuator for rotating the drum slidably disposed for axial reciprocation on the receiver, a device for engaging the drum comprising outlet and inlet blocks respectively slidable on the actuator and provided with surfaces for engagement with the rollers and cam means disposed on the receiver and said blocks for positive movement thereof to and from positions for direct engagement between the actuator and the rollers during relative movement of the recoil unit and the actuator.

3. In a revolver-type automatic weapon having a receiver, a recoil unit slidable thereon provided with a rotatable drum having cartridge chambers and corresponding index rollers, and an actuator for rotating the drum slidably disposed for axial reciprocation on the receiver, a device for engaging the drum comprising outlet and inlet blocks respectively mounted in slidable relation with the actuator and provided with cam followers and surfaces for engagement with the rollers, and a cam disposed on the receiver between said blocks and provided with cam tracks for receiving said followers to alternately move said blocks into positions of direct engagement between the rollers and the actuator, during relative movement of the recoil unit and the actuator.

4. In a revolver-type automatic weapon having a receiver, a recoil unit slidable thereon provided with a rotatable drum having cartridge chambers and corresponding radially axised index rollers, and an actuator for rotating the drum slidably disposed for axial reciprocation on the receiver and provided with a straight groove and curved inlet and outlet grooves for engaging the rollers, a device for engaging the drum comprising outlet and inlet blocks provided with bearing surfaces and follower pins and slidably disposed on the actuator, and a cam mounted on the receiver and provided with a pair of tracks for engaging said pins to alternately convey said blocks to and from positions for direct engagement between the actuator and the rollers, during the reciprocation, said bearing surfaces being constructed to respectively connect said curved grooves with said straight groove in said engagement positions.

5. In a revolver-type weapon having a receiver, a recoil unit slidable therein, a drum with cartridge chambers and corresponding index rollers, and an actuator disposed in the receiver for slidable axial reciprocation to rotate the drum, a device comprising outlet and inlet blocks disposed for compressive engagement between the actuator and the rollers, and means for consecutive positive displacement of said blocks to and from positions for said compressive engagement responsive to said reciprocation.

6. In a revolver-type automatic weapon having a receiver, a recoil unit slidable thereon provided with a rotatable drum having cartridge chambers and corresponding radially axised index rollers, and an actuator for rotating the drum slidably disposed for axial reciprocation on the receiver, a device for engaging the drum comprising outlet and inlet blocks respectively mounted in slidable relation with the actuator and provided with cam followers and roller bearing surfaces, and a cam disposed on the receiver between said blocks and provided with oppositely disposed cam tracks for simultaneously receiving said followers, said tracks each including upper and lower branches for alternately guiding said bearing surfaces for roller engagement and disengagement during

relative movement of the recoil unit and the actuator, intermediate sections to join said branches in loops and end sections for respectively engaging the follower in battery position and in overtravel of the actuator, said followers and said tracks being respectively provided with cooperating spring tips and steps to permit progress of each of the followers in but a single sense in the loop corresponding thereto.

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