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BREECH MECHANISM

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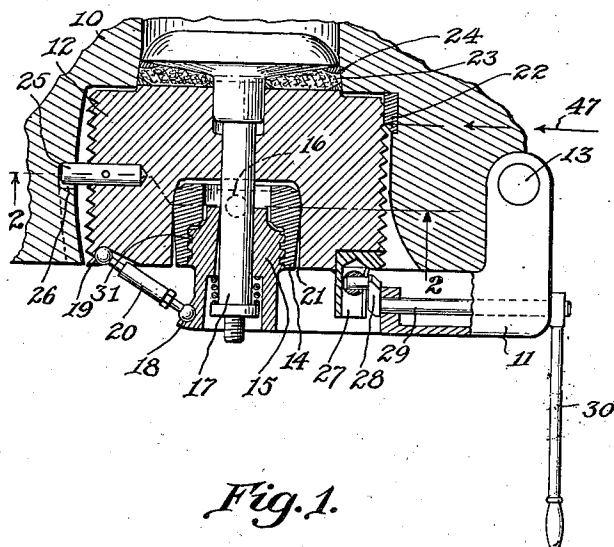


Fig. 1.

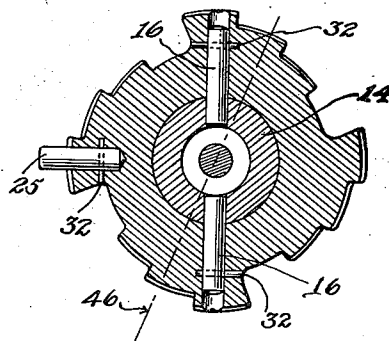


Fig. 2.

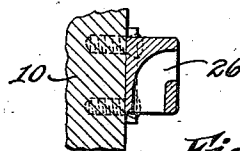


Fig. 3.

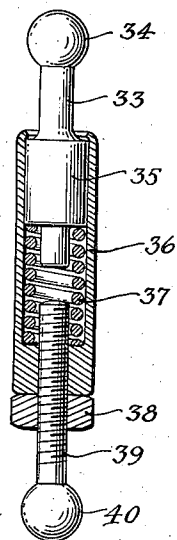


Fig. 4.

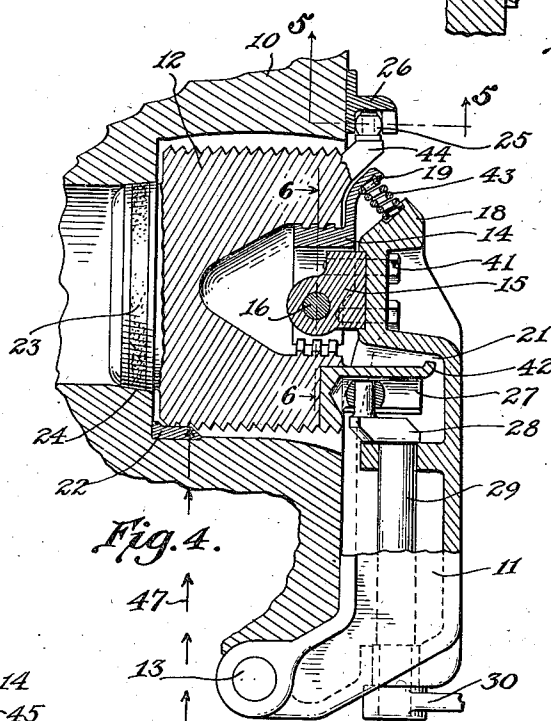


Fig. 5.

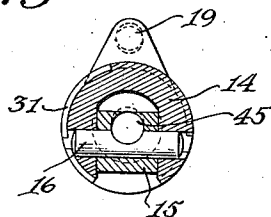


Fig. 6.

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BREECH MECHANISM

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15 Claims. (Cl. 89—17)

My invention relates to the swinging carrier type of breech mechanisms for guns using the De Bange type of gas check.

This gas check has proven unreliable in those swinging carrier types of breech mechanism in which the plug starts its swinging movement as soon as it is unlocked from the gun, because of the excessive flare to the gas check seat necessary to permit the gas check to swing out of it. With a gas check seat substantially cylindrical in form, a much better seal is effected.

In the Smith-Asbury type of mechanism shown in U. S. Patent No. 1,020,849 a gas check with a decidedly flared or conical seat is necessitated as the plug is screwed to, and swings with, the carrier. This mechanism is a very effective one, however, as it is smooth and rapid in operation largely due to the variable lead cam device between the plug and gun for transforming swinging movement of the plug and carrier into rotary movement of the plug, in closing the breech, and for transforming rotary movement of the plug into swinging movement of the plug and carrier, in opening the breech.

In the Asbury type of breech mechanism shown in U. S. Patent No. 1,310,045, the plug is mounted on its carrier for both rotary and endwise movements so that it can be withdrawn directly to the rear a short distance after being unlocked and before the swinging movement begins, thus permitting the use of a substantially cylindrical gas check seat. In this type of mechanism, the variable lead cam device acts between the plug and carrier to transform swinging movement of the plug to rotary movement and vice-versa, but does not act to control the movement of the carrier. Consequently, in closing the breech, the carrier hits the breech of the gun with considerable force and puts unnecessary stresses on the mechanism.

The object of my invention is to mount the plug on the carrier in such a way that the variable lead cam device will act on both plug and carrier as in the Smith-Asbury type of mechanism and also to make it possible to use a substantially cylindrical gas check as in the Asbury type, thereby combining the desirable features of both mechanisms. In addition, I control the movement of the plug so that its front end guides the gas check into its seat without danger of damaging it. I utilize means between the plug and carrier so that no lost motion can interfere with the proper entry of the gas check into its seat, and I so employ this means as to assist in slowing up the swinging movement of the mech-

anism in closing it and to assist in initiating this swinging movement in opening it.

In the drawing chosen to illustrate my invention, the scope whereof is pointed out in the claims—

Figure 1 is a horizontal sectional view of a breech mechanism embodying my invention with breech plug unlocked;

Figure 2, a section of the breech plug on line 2—2 in Figure 1;

Figure 3, an enlarged sectional view of part 20 shown in Figure 1;

Figure 4, a vertical sectional view of an alternate type of vertical swinging mechanism showing the breech plug unlocked;

Figure 5, a view on line 5—5 of Figure 4; and Figure 6, a view on line 6—6 of Figure 4.

Referring to the drawing, the numeral 10 represents the gun breech, 11 the carrier, 12 the breech plug, which is of the interrupted screw type, and 13 the carrier hinge pin connecting the carrier to the gun. An annular ring 14 is adapted to screw to the hub 15 of the carrier, its screw threads being of the same pitch as the plug threads. The plug 12 is pivoted to the ring 14 by the pins 16 (Fig. 2). With breech plug unlocked as shown in Figure 1 these pins assume a substantially vertical position parallel to the hinge pin 13. When plug is locked these pins set at an angle with hinge pin 13 as represented by the line 46 in Figure 2. This change of position is due to the rotation of plug to lock it to the gun breech. A bearing 18 projects from the carrier 11 and a similar bearing 19 is provided in the rear face of plug 12 to receive the compression member 20. The space 21 between the plug 12 and ring 14 permits limited pivotal movement of the plug on the pins 16. On the gun is a guide plate 22 upon which the front end of plug bears as the gas check 23 moves into and out of its seat 24. Contact with this guide plate is maintained by the compression member 20. The cam follower 25 on the plug operates in the cam groove 26 mounted on the gun breech in the manner fully described in the aforementioned Smith-Asbury Patent No. 1,020,849 and is the means for transforming rotary movement of plug into swinging movement of plug and carrier when opening the mechanism, and for transforming swinging movement of plug and carrier into rotary movement of the plug in closing the mechanism.

The breech plug may be operated by the same type of mechanism as shown in the aforementioned Smith-Asbury patent and consists of a

cross head guide 27 attached to the plug, a crank 28 with its pin and cross head, a shaft 29 and the lever 30.

The compression member 20 shown in Figure 3 is comprised of a plunger having a ball 34, shank 33 and cylindrical piston 35 which slides in the tube 36 and has its free end bearing against a spring 37. The shank 39 screws into the end of tube 36 and is provided with a lock nut 38. The ball 40 at the outer end of shank 39 seats in the bearing 18 and the ball 34 in the bearing 19. The screw threaded connection of shank 39 with tube 36 is to adjust the length of the compression member 20 to give the desired spring compression.

In Figure 4, I show an alternative design for a slightly modified breech plug without the mushroom stem 17 shown in Figure 1 and with the pivot pin 16 carried by the carrier 11 so that it does not rotate with the plug. In this construction the gun breech 10, carrier 11, plug 12, and hinge pin 13 are of the same general type as that shown in Figure 1 but the ring 14 screws to the plug by the screw threads 31 and is open at the bottom as shown in Figure 6. One pin 16 connects the ring 14 to the detachable carrier hub 15 and this hub is secured to the carrier 11 by bolts 41. A coil spring 43 takes the place of the member 20 and acts between the bearing 18 on the carrier 11 and the bearing 19 carried by an arm extending from the ring 14 as shown in Figure 6. The pivoting of the plug on pin 16 is limited by a toe 42 on cross head 27 which contacts with the carrier when the gap 21 is closed.

This construction can also be used with a mechanism having a mushroom stem 17 by providing a hole through parts 15 and 16 as indicated in Figure 6, by circle 45.

The operation of the mechanism is as follows:—

Referring to Figure 1 the plug is shown swung into the breech to the point where it is about to rotate to the locked position. In opening the breech by pulling to the right on handle 30 the plug is withdrawn from the breech and its front end slides back on the guide plate 22 and is held in contact therewith by the compression member 20. When the pivotal movement about pin 16 is sufficient to close the space 21, further movement on pin 16 is arrested and the plug and carrier swing as a unit about pin 13 out of the gun breech.

In closing the mechanism, the plug swings into the breech about the hinge pin 13 until the plug hits guide plate 22. As the swinging motion is continued the pivot 16 carrying the rear portion of the plug swings about pin 13 while the forward end of plug slides along guide plate 22 producing a pivoting movement of the plug 12 on pins 16 which causes the gas check 23 to enter its seat 24. As the guide plate 22 is parallel to the axis of the gun the gas check is guided in an axial line into its seat so that a very slight taper to this seat can be used without danger of damaging it.

In closing the mechanism, the action of member 20 in producing a pressure of the plug on the guide plate 22 prevents any lost motion of plug which might interfere with the entry of the gas check into its seat and this pressure reacts about the hinge pin 13 along line 47 in Figures 1 and 4 to retard the forward swinging movement of the plug and its carrier, while in opening the mechanism this pressure reacts about the hinge pin 13 to accelerate the outward swinging movement of plug and carrier thus assisting the variable lead cam device 25, 26, in its operation of accelerating or retarding this swinging movement.

The pivoting of the plug on pins 16 produces a small angular displacement of the axis of the plug with respect to the carrier, swinging the forward end of this axis towards the hinge pin 13 in opening the breech and away from it in closing the breech, and it will be noted that this pivoting movement in both opening and closing of the breech takes place at the same time as the action of the variable lead cam device 25, 26 so that the sliding movement of the forward end of plug 12 on guide plate 22 is not only in a line with axis of gun but also includes a slight rotary movement about this axis.

I claim:

1. A breech mechanism for guns comprising a carrier swingably mounted on the gun, a member having a screw threaded connection with said carrier, and a breech plug pivoted to said member.

2. In a breech mechanism for guns, a carrier swingably mounted on the gun, a detachable hub rigidly secured to said carrier, and a breech plug mounted on said hub for both pivotal movement and axial rotation, said pivotal movement varying the location of the plug's axis of rotation.

3. In a breech mechanism for guns, a carrier swingably mounted on the gun and having a detachable hub, a breech plug pivotally mounted on said hub for angular movement of its axis with respect to said hub, and means controlling said angular movement.

4. In a breech mechanism for guns, a carrier swingably mounted on the gun and having a hub, a member mounted on said hub for rotation about the axis of said gun when said mechanism is closed, a breech plug pivotally mounted on said member, and means controlling the pivotal movement of said plug on said member.

5. In a breech mechanism for guns, a carrier, a breech plug rotatably and pivotally mounted thereon, and resilient means constantly tending to pivot said plug in one direction.

6. In a breech mechanism for guns, a carrier, a breech plug rotatably and pivotally mounted thereon, and resilient means pivoting said plug against its carrier when the mechanism is open.

7. In a breech mechanism for guns, a gun breech having a gas check seat, a carrier, a breech plug rotatably and pivotally mounted thereon and having a gas check at its forward end, a guide in said breech, and means reacting against the centrifugal force set up by the swinging of the plug and carrier and urging said plug against said guide during movement of the gas check into and out of its seat.

8. In a breech mechanism for guns, a swinging carrier hinged on the gun, and a breech plug pivotally and rotatably mounted on said carrier, the pivotal axis of said plug being angularly movable with respect to the carrier hinge.

9. A breech mechanism for guns comprising a carrier swingably mounted on the gun and having a hub integral therewith, a member rotatably mounted on said hub and a breech plug mounted on said member for angular movement of its axis with respect to the axis of said hub.

10. In a breech mechanism for guns, a breech having a gas check seat, a carrier hinged to said breech and having a hub rigid therewith, a ring rotatably mounted on said hub, a breech plug mounted on said ring for angular movement of its axis with respect to the axis of said hub and having a gas check, and means carried by said breech and coacting with the forward end of said plug to guide the gas check into its seat.

11. In a breech mechanism for guns, the combination with a breech and a plug of a variable lead cam device between the breech and the plug for initiating bodily movement of the latter to withdraw it from the breech, a plug carrier hinged to said breech, supporting and imparting a swinging movement to the rear end of said plug, a bearing surface in said breech engageable with the front end of said plug to impart a rectilinear movement thereto and means urging said plug against said bearing surface.

12. In a breech mechanism for guns, a swinging carrier mounted on the gun, a breech plug rotatably and pivotally mounted on said carrier, and means between the carrier and plug urging pivotal movement of the latter, said means acting during such pivotal movement to accelerate the swinging movement of said carrier in opening the breech and to retard the swinging movement of the carrier in closing the breech.

13. A gun breech having a substantially cylindrical gas check seat, a carrier swingably mounted on said breech, a breech plug mounted on the carrier for axial rotation in one direction to lock the plug to the breech and in the opposite direction to unlock the plug from the breech and for pivotal movement, a substantially cylindrical gas check carried by the plug engaged in said seat when the plug is locked to the breech, mechanism between the plug and breech operating during the final rotation of the plug in an unlocking direction to initiate opening swing of the plug and carrier, and means for imparting pivotal movement to the plug to maintain the

gas check out of contact with its seat during initial opening swing of the plug and carrier.

14. A gun breech having a substantially cylindrical gas check seat, a carrier swingably mounted on said breech, a breech plug mounted on the carrier for pivotal movement and for axial rotation in one direction to lock the plug to the breech and in the opposite direction to unlock the plug from the breech, a substantially cylindrical gas check carried by the plug engaged in said seat when the plug is locked to the breech, a cam device between the plug and breech operating during the final rotation of the plug in an unlocking direction to initiate opening swing of the plug and carrier and during the final closing swinging movement of the plug and carrier to translate the stored energy of the plug and carrier into energy to rotate the plug in a locking direction, and means for imparting pivotal movement to the plug in one direction to maintain the gas check out of contact with its seat during initial opening swing of the plug and carrier and for imparting pivotal movement to the plug in the opposite direction during final closing swing of the plug and carrier to maintain the gas check out of contact with its seat until the final seating of the gas check occurs.

15. A breech mechanism for guns comprising a carrier swingably mounted on the gun and having a hub integral therewith, a member pivotally mounted on said hub, and a breech plug rotatably mounted on said member by a screw thread connection.

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