SLIDABLE HOOD LOCKING SYSTEM

Inventor: Mark C. Laney, Lee, NH (US)
Assignee: SMITH & WESSON CORP., Springfield, MA (US)
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ABSTRACT
A muzzle-loading firearm having a break-action design includes a stock, a receiver mounted to the stock, a forend pivotally mounted to the receiver and a barrel mounted to the forend. A hood is slidably attached to a top surface of the receiver in the area of a rear (i.e., breech) end of the barrel. The hood reciprocally engages and locks the barrel in a closed (i.e., firing) position. The hood also shields the area surrounding the breech end of the barrel from exhaust gas that flows therefrom.
SLIDABLE HOOD LOCKING SYSTEM

CROSS REFERENCE TO RELATED APPLICATION

This application claims the benefit of U.S. Provisional Application No. 61/423,301, filed Dec. 15, 2010, entitled "SLIDABLE HOOD LOCKING SYSTEM", the aforementioned application being hereby incorporated by reference in its entirety.

FIELD OF THE INVENTION

The invention relates to a muzzle-loading firearm having a break-action design and, more specifically, to a muzzle-loading firearm having a break-action design that includes a barrel and a slidable hood locking system that locks the barrel in a closed position.

BACKGROUND OF THE INVENTION

Muzzle-loading firearms are configured so that powder and bullets must be loaded at the muzzle or forward end of the barrel. A typical muzzle-loading firearm has a barrel with a breech plug attached to occupy an enlarged rear bore portion, breech plug chamber, of the barrel at the breech or rear end thereof. In some muzzle-loading firearms, the breech plug is permanently attached. In others, the breech plug is removable to facilitate pass-through cleaning of the bore.

Break-action muzzle-loading firearms facilitate access to the breech plug by pivotally mounting the barrel to the receiver or the forend of the muzzle-loading firearm, which enables the breech end of the barrel to be separated, via a pivoting action, from the receiver.

With removable breech plugs, and, in particular, with removable breech plugs of break-action muzzle-loading firearms, there is a need to maintain a proper seal of the breech end of the barrel. The presence of a leak in the seal can result in smoke, or vapor projecting from the receiver, which may not be desirable, especially if a riflescope is mounted to the gun.

In order to reduce the incidence of these projections from the receiver, the quality of the seal can be improved. Alternatively, a device can be utilized to block or obstruct the rear of the receiver. However, positioning a device in the area of the rear of the receiver can interfere with the accessibility and removal of the breech plug. In addition, positioning a device in the breech end of the barrel can interfere with the barrel-locking mechanism of the break-open muzzle-loading firearm. For this reason, the rear of the receiver is often left open or unobstructed to allow access to and replacement of the breech plug.

An object of the present invention is, therefore, to provide a hood for a muzzle-loading firearm having a break-action design, which, among other desirable attributes, significantly reduces or overcomes the above-mentioned deficiencies of prior muzzle-loading firearms.

SUMMARY OF THE INVENTION

Accordingly, the present invention provides a muzzle-loading firearm having a break-action design including a barrel that is secured in a closed (i.e., firing) position by a hood.
embodiments of the system of the present invention are intended to illustrate, but not limit, the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

0021] The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate embodiments of the disclosure, and together with a general description of the disclosure given above, and the detailed description of the embodiments given below, serve to explain the principles of the disclosure.

0022] FIG. 1 is a side view of a muzzle-loading firearm known in the art.

0023] FIG. 2 is a cross sectional side view of the muzzle-loading firearm in the barrel-closed position in accordance with FIG. 1.

0024] FIG. 3 is a cross sectional side view of the muzzle-loading firearm in the barrel-open position in accordance with FIG. 1.

0025] FIG. 4 is a cross sectional side view of a muzzle-loading firearm in the barrel-closed position according to one embodiment of the present invention.

0026] FIG. 5 is a cross sectional side view of the muzzle-loading firearm in the barrel-open position according to the embodiment of FIG. 4.

0027] FIG. 6 is a side view of the muzzle-loading firearm in the barrel-closed position according to the embodiment of FIG. 4.

0028] FIG. 7 is a top perspective view of a receiver and a ramrod according to the embodiment of FIG. 4.

0029] FIG. 8 is another top perspective view of the receiver according to the embodiment of FIG. 4.

0030] FIG. 9 is a top perspective view of a hood according to the embodiment of FIG. 4.

0031] FIG. 10 is a bottom perspective view of a hood according to the embodiment of FIG. 4.

0032] Other features and advantages of the present disclosure will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principals of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

0033] Referring to FIG. 1, a muzzle-loading firearm 10 having a break-action design, as known in the art, is shown. The muzzle-loading firearm 10 includes a stock 12 that is connected to a receiver 14. The receiver 14 is pivotally connected to a forend 16 via a lug 46 (shown in FIGS. 2-3), which has a ramrod 18 and a barrel 20 mounted thereto. The ramrod 18 is fitted to be received between the forend 16 and the barrel 20. The barrel 20 includes a bore that defines a bore axis 22 and has a rear (i.e., breech) end 24.

0034] The muzzle-loading firearm 10 also has a trigger 26 mounted to a bottom surface of the receiver 14 and a hammer 28 mounted to the rear of the receiver 14. The trigger 26 and the hammer 28 are in mechanical communication with each other, such that the hammer 28 is actuated in response to actuation of the trigger 26.

0035] A similar muzzle-loading firearm is disclosed in U.S. Pat. No. 6,604,311 to Lane et al., the disclosure of which is incorporated herein by reference.

0036] Referring to FIGS. 2-3, cross sections of the muzzle-loading firearm 10 are shown to illustrate the break-action design. Referring now to FIG. 2, the barrel 20 is shown in the closed (i.e., firing) position. The rear end 24 of the barrel 20 lies flush against an upper portion 30 of the receiver 14. A bushing 32 is mounted to a front facing surface of the upper portion 30 of the receiver 14. The bushing 32 defines a hole 34 in the center thereof. A striking pin 36 is located within the hole 34 of the bushing 32 to communicate the action of the hammer 28 to an ignition cap (not shown for clarity) in a breech plug 38 disposed in the rear end 24 of the barrel 20.

0037] The barrel 20 is retained in the closed position by a locking bar 40 that slides under a ledge 42 formed in the front facing surface of the upper portion 30 of the receiver 14, substantially below where the bushing 32 is mounted. The locking bar 40 is spring biased into a closed position, as shown in FIG. 2, and is actuated axially forward to disengage from the ledge 42 in response to an actuation of a trigger guard 44 for opening the break action muzzle-loading firearm 10.

0038] Referring now to FIG. 3, the muzzle-loading firearm 10 is shown in the open position. In the open position, the rear end 24 of the barrel 20 can be easily accessed, for instance, to service the barrel 20 or replace the breech plug 38. The barrel 20 is swung into the open position by actuating the trigger guard 44, which releases the locking bar 40 from engagement with the ledge 42 and allows the barrel 20 to swing open about a lug 46.

0039] The lug 46 is disposed in a forward portion of the receiver 14 and connects to the forend 16. As is known in the art, the lug 46 is fixedly secured. For example, the lug 46 is welded in place. The lug 46 is fixedly disposed on the muzzle-loading firearm 10 in order to provide a secure connection that can endure the forces experienced by this pivot point during operation of the muzzle-loading firearm 10.

0040] It should be appreciated that the breech plug 38 substantially seals the rear end 24 of the barrel 20 and that the connection of the barrel 20 to the bushing 32 further seals the rear end 24 of the barrel 20. Additionally, the outer surface of the barrel 20 defines a gap 48 at a lower position thereof. The gap 48 offers a low resistance path for the exhaust gas to flow from the rear end 24 of the barrel 20 downward into the receiver 14.

0041] Referring to FIGS. 4-5, cross sections of a portion of a muzzle-loading firearm 50 in accordance with the present invention are shown. The muzzle-loading firearm 50, which has a break-action design, includes a stock 52 that is connected to a receiver 54 by a bolt 56 that extends into corresponding recesses in the stock 52 and the receiver 54. The receiver 54 is fitted to mount to a rectangular recess 58 formed in the stock 52 so that, when assembled, the receiver 54 is covered to the rear, the bottom, and the sides by the stock 52.

0042] A fixed trigger guard 60 is disposed along a lower surface of the stock 52, generally below the receiver 54.

0043] The stock 52 extends forward of the receiver 54 and has a convex surface 62 at a forward end thereof. The convex surface 62 slidably connects to a matching concave surface 64 of a forend 66, which is pivotally mounted to the receiver 54 about a screw or screws 68. Due to various design modifications made to the muzzle-loading firearm 50 of the present invention, as is discussed elsewhere in this application, the screw 68 is used in place of the lug 46 as known in the art. This substitution is enabled because the forces experienced at this pivot point of the muzzle-loading firearm 50 of the present invention have been reduced relative to those experienced in
the muzzle-loading firearm 10 of the prior art. The reduction in forces experienced at this pivot point allows a removable (i.e., screw) connection instead of the fixed connection of the prior art.

[0044] The forend 66 receives a barrel 70 having a rear end 72 with a breech plug 74 inserted in a breech plug chamber thereof. The outer surface of the barrel 70 is tapered at the rear end 72, which defines a circumferential recess 76 in the barrel 70 adjacent to the rear end 72.

[0045] The removable screw configuration facilitates the manufacture and repair of the muzzle-loading firearm 50. For instance, since the barrel 70 is releasably connected to the receiver 54, the barrel 70 may be removed to perform precision machining process steps. As one example, the barrel 70 may be removed from the receiver 54 for processing and/or repair. By being able to remove the barrel 70 from the receiver 54 the muzzle-loading firearm 50 may be assembled in a different order and, in particular, the sub-components of the muzzle-loading firearm 50 may be fully processed and then assembled. In contrast, in known muzzle-loading firearms, as shown in FIGS. 1-3, the barrel can be drilled after the barrel has been permanently welded to the receiver by the lug. This known approach is cumbersome, unwieldy and renders the manipulation and processing of the barrel more time consuming and prone to error.

[0046] A hood 78 is slidably mounted to the receiver 54, such that the hood 78 is configured to slide forward and rearward on the receiver 54, parallel to the firing axis of the muzzle-loading firearm 50. The hood 78 defines a tapered opening 80 at the front-end thereof. The tapered opening 80 is fitted to receive the circumferential recess 76 of the barrel 70. The hood 78 slidably engages the barrel 70 and locks the barrel 70 in the closed position (i.e., in battery) as shown in FIG. 4. The hood 78, which circumscribes the barrel 70 and, in particular, secures the rear end 72 of the barrel 70 from the pivot point (i.e., screw 68), more robustly secures the barrel 70 in the closed position relative to known locking bars 40 (see FIGS. 2-3).

[0047] The hood 78 encases an upper portion 82 of the receiver 54. A bushing 84 is mounted to a front-facing surface of the upper portion 82 of the receiver 54.

[0048] It should be appreciated that the breech plug 74 forms a seal at the rear end 72 of the barrel 70 and the connection of the rear end 72 of the barrel 70 to the upper portion 82 of the receiver 54 and the bushing 84 forms a further seal. Additionally, the hood 78 of the present invention forms yet another seal therearound, further blocking exhaust gas from flowing out of the rear end 72 of the barrel 70.

[0049] A yoke 90 extends from the rear of the hood 78. The yoke 90 receives a pin 92 that is connected to one end of a spring-biased shaft 94. The other, remote end of the spring-biased shaft 94 is received in a recess 96 formed in the stock 52. The spring-biased shaft 94 spring biases the hood 78 forward and into engagement with the barrel 70 when in the closed position.

[0050] Referring now to FIG. 5, when the hood 78 is pulled rearward by a user, the barrel 70 is released from the closed position. In particular, when the user actuates the hood 78, the hood 78 slides rearward on the receiver 54 and out of engagement with the barrel 70, thereby allowing the barrel 70 and the forend 66 to swing about the screw 68 into the open position shown in FIG. 5.

[0051] In the open position, the rear end 72 of the barrel 70 is readily accessible, for instance, so that the barrel 70 can be serviced and the breech plug 74 can be removed.

[0052] Referring to FIG. 6, the hood 78 lies substantially flush with the contours of the muzzle-loading firearm 50. For instance, a top surface 98 of the hood 78 aligns with a top surface 100 of the barrel 70. In addition, a rear surface 102 of the hood 78 aligns with a top surface 104 of the stock 52.

[0053] As shown in FIG. 6, the concave surface 64 of the forend 66 abuts the convex surface 62 of the stock 52. It should be appreciated from the portion of the muzzle-loading firearm 50 shown in FIG. 6 that the receiver (not shown in FIG. 6) is substantially encased or housed within the stock 52.

[0054] Also as shown in FIG. 6, a trigger 106 is mounted to a lower surface of the muzzle-loading firearm 50, below where the receiver 54 is housed in the stock 52, and extends from an opening formed in the stock 52. Additionally, a hammer 108 is mounted to the rear of the receiver 54 and extends from an opening formed in the rear surface 102 of the hood 78. It should be appreciated that the hammer 108 is in mechanical communication with the trigger 106 so that the hammer 108 is actuated in response to the actuation of the trigger 106.

[0055] A muzzle-loading firearm having a removable breech plug and the operation of the hammer and the trigger is disclosed in U.S. Pat. No. 7,612,064 to Lane et al., the disclosure of which is incorporated herein by reference.

[0056] Referring to FIG. 7, the receiver 54 defines a pair of lateral holes 110 towards a front end thereof. The lateral holes 110 receive the screw 68 that retains the forend 66 to the receiver 54.

[0057] The receiver 54 also defines a recess 112 in a top surface 114 thereof. The recess 112 receives a block 116 that is pivotally mounted in the recess 112 by the screw 68 that retains the forend 66. The block 116 releasably attaches to the barrel 70 on a topside thereof, for instance, via pins 118. The block 116 also releasably attaches to a ramrod 120 on a bottom side thereof.

[0058] Referring to FIG. 8, the recess 112 defines an angled limiting wall 122 toward the front end of the receiver 54. When the muzzle-loading firearm 50 is in the open position, the block 116 abuts the limiting wall 122, limiting the rotation of the barrel 70 and the forend 66 relative to the stock 52 and the receiver 54.

[0059] The limiting wall 122 defines an opening 124 into which an adjustable cap screw 126 is inserted. The cap screw 126 can be rotated to cause an upward end 128 of the cap screw 126 to protrude from the limiting wall 122 or to retract therein. When the upward end 128 protrudes from the limiting wall 122, the position of the upward end 128 limits the rotation of the barrel 70 and the forend 66 relative to the stock 52 and the receiver 54. For example, the cap screw 126 may be fully rotated into the receiver 54, causing the upward end 128 to abut the block 116 when the muzzle-loading firearm 54 is in the closed position. In this position, the upper end 128 of the cap screw 126 blocks the block 116 from pivoting about the screw 68, thereby locking the muzzle-loading firearm 54 in the closed position.

[0060] Referring now to FIGS. 7 and 8, the upper portion 82 of the receiver 54 has the bushing 84 mounted thereto. The bushing 84 defines a hole 130 therein that receives a striking pin 132. The striking pin 132 communicates the action of the hammer 108 to the breech plug 74.
The upper portion 82 of the receiver 54 has rearward protrusions 134 that extend laterally outward from each side thereof. The rearward protrusions 134 are substantially trapezoidal.

The upper portion 82 of the receiver 54 also has forward protrusions 136 that extend laterally outward from each side thereof. The forward protrusions 136 are adjacent to the front facing surface of the upper portion 82 of the receiver 54 to which the bushing 84 is mounted.

The top surface 114 of the receiver 54 has a three-tiered surface. A first tier 138 abuts the barrel 70 when the muzzle-loading firearm 50 is in the closed position. Rearward of the first tier 138, a second tier 140 abuts a portion of the hood 78 and underlies the rearward protrusions 134 and the forward protrusions 136. With specific reference to FIG. 7, rearward of the second tier 140, a third tier 142 defines a bore 144 with a slit 146 formed in a rear surface of the receiver 54. The bore 144 and the slit 146 are sized to receive a portion of the spring-biased shaft 94 and a portion of the bolt 56 that connects the receiver 54 to the stock 52. An upper corner of the bore 144 is in fluid communication with a pair of lateral holes 148, 148 defined in the receiver 54. The lateral holes 148, 148 receive a securing pin 150. The securing pin 150 blocks the pin 92 (shown in FIGS. 4 and 5) connected to the one end of the spring-biased shaft 94 from exiting the bore 144, thereby securing the hood 78 to the receiver 54.

Referring to FIGS. 9 and 10, the hood 78 is shown in greater detail. The hood 78 has a substantially hollowed, tapered body with the tapered opening 80 that is fitted to the circumferential recess 76 of the barrel 70.

Inward-pointing forward ridges 152, 152 are formed along the inside of the tapered opening 80 of the hood 78. The forward ridges 152, 152 are fitted to contact a forward edge of rearward protrusions 134 during attachment and removal of the hood 78 from the receiver 54. The forward ridges 152, 152 are also fitted to engage a lower edge of forward protrusions 136 when the hood 78 is attached to the receiver 54.

Inward-pointing rearward ridges 154, 154 are formed along the inside of the hood 78. The rearward ridges 154, 154 are fitted to engage the lower edge of the rearward protrusions 134 when the hood 78 is attached to the receiver 54.

The forward ridges 152, 152 and the rearward ridges 154, 154 are separated by gaps 156, 156 that are fitted to slidably receive the rearward protrusions 134 there though during installation of the hood 78 to the receiver 54.

Wings 158, 158 extend laterally from the hood 78. The wings 158, 158 are substantially triangular protrusions with rounded edges that extend perpendicularly from each side of the hood 78. The wings 158, 158 facilitate the user's ability to engage the hood 78, for instance, to slide the hood 78 forward and rearward along the top surface 114 of the receiver 54 during the opening and closing of the barrel 70 and to angle the hood 78 with respect to the receiver 54 during installation and removal of the hood 78.

Corresponding to the second and third tiers 140, 142 of the top surface 114 of the receiver 54, a bottom surface 160 of the hood 78 has a two-tiered structure. In particular, a central tier 162 of the bottom surface 160 of the hood 78 is fitted to the second tier 140 of the top surface 114 of the receiver 54, and a rearward tier 164 of the bottom surface 160 of the hood 78 is fitted to the third tier 142 of the top surface 114 of the receiver 54. The yoke 90, which is two pronged, depends perpendicularly downward from the rearward tier 164. Each prong of the yoke 90 is fitted to abut a lateral side of the bore 144 defined in the third tier 142 of the upper surface 114 of the receiver 54 and includes an opening 168, 168 that receives a respective side of the pin 92 attached to the one end of the spring-biased shaft 94 (see FIGS. 4-5).

The hood 78 is installed to the receiver 54 according to the following illustrative process. First, the other end of the spring-biased shaft 94 is mounted to the stock 52. The pin 92 attached to the one end of the spring-biased shaft 94 is inserted into the openings 168, 168 of the yoke 90 of the hood 78. Then, the hood 78 is drawn rearward, compressing the spring of the spring-biased shaft 94, until the forward ridges 152, 152 of the hood 78 slide between the forward protrusions 136 and the rearward protrusions 134 of the receiver 54. The forward ridges 152, 152 and the rearward ridges 154, 154 are slid under the forward protrusions 136 and the rearward protrusions 134, respectively, for instance, under the force of the spring of the spring-biased shaft 94. In this position, the hood 78 is spring-biased into a forward position where the hood 78 can securely lock the barrel 70 in the closed position. The hood 78 is secured to the receiver 54 by inserting the securing pin 150 through the lateral holes 148, 148 that are in fluid communication with the bore 144, thereby trapping the spring-biased shaft 94 and the hood 78 in the bore 144.

Once assembled, the hood 78 can be reciprocated rearward on the top surface 114 of the receiver 54 and out of engagement with the circumferential recess 76 of the barrel 70, thereby releasing the barrel 70 from the closed position. By pivoting the barrel 70 into the open position, the breech plug 74 becomes readily accessible for maintenance, service, and replacement.

Preferably, the downward facing portion of the circumferential recess 76 of the barrel 70 is sufficiently tapered or sloped so that, when the barrel 70 is pivoted from the open position to the closed position, the hood 78 is reciprocated rearward by the engagement of the hood 78 with the barrel 70. Once the rear end 72 of the barrel 70 clears the hood 78, the hood 78 springs forward to engage and secure the barrel 70. Accordingly, the barrel 70 can be swung shut and locked in the closed position without independently actuating the hood 78 rearward on the receiver 54 and out of the path of the barrel 70.

It should be understood that the foregoing description is only illustrative of the invention. Various alternatives and modifications can be devised by those skilled in the art without departing from the broader aspects of the present invention.

What is claimed is:

1. A muzzle-loading firearm comprising:
   - a barrel defining a longitudinal bore therethrough;
   - a receiver adapted to be pivotally connected with the barrel, a hood being slideable from a forward position partially covering a rear end of the barrel and locking the rear end of the barrel against the receiver to a rearward position being spaced from the rear end of the barrel to allow pivotal movement of the barrel with respect to the receiver; and
   - a stock connected to and extending rearward from the receiver.

2. The muzzle-loading firearm according to claim 1, wherein the rear end of the barrel is tapered inward to facilitate centering of the barrel within the hood.
3. The muzzle-loading firearm according to claim 2, wherein the inwardly tapered rear end defining a circumferential recess for acting against an inner surface of the hood.

4. The muzzle-loading firearm according to claim 1, wherein the hood defines a tapered opening at the front thereof to facilitate centering of the barrel within the hood.

5. The muzzle-loading firearm according to claim 1, wherein the barrel being prevented from pivoting with respect to the receiver by the hood in the forward position.

6. The muzzle-loading firearm according to claim 1, wherein the hood forming a seal with the barrel and the receiver to prevent gases from escaping rearward therefrom.

7. The muzzle-loading firearm according to claim 1, wherein the hood having an outer surface being substantially flush with outer surface contours of both the barrel and the receiver.

8. The muzzle-loading firearm according to claim 1, wherein the receiver having a forward protrusion and a rearward protrusion extending outwardly along each side thereof to act against a pair of inward-pointing ridges on the hood to vertically restrict movement of the hood.

9. The muzzle-loading firearm according to claim 8, wherein the forward protrusions and the rearward protrusions being spaced at a distance from an upward facing surface of the receiver to allow longitudinal movement of the inward-pointing ridges of the hood between the forward and rearward protrusions and the upward facing surface.

10. The muzzle-loading firearm according to claim 1, wherein the hood having a yoke extending downward therefrom, the yoke being connected with a first end of a spring-biased shaft, the spring-biased shaft being connected at a second end with the stock, the spring-biased shaft limiting vertical movement of the hood with respect to the receiver.

11. A muzzle-loading firearm comprising:
   a stock;
   a forend pivotally mounted to the receiver;
   a barrel mounted to the forend; and
   a hood being slidably mounted to a top surface of the receiver, the hood being movable between a forward position and a rearward position, the hood extending over at least a portion of the barrel in the forward position.

12. The muzzle-loading firearm according to claim 11, wherein a rear end of the barrel is tapered inward to facilitate centering of the barrel within the hood.

13. The muzzle-loading firearm according to claim 11, wherein the hood defines a tapered opening at the front thereof to facilitate centering of the barrel within the hood.

14. The muzzle-loading firearm according to claim 11, wherein the hood having an outer surface being substantially flush with outer surface contours of both the barrel and the receiver.

15. The muzzle-loading firearm according to claim 11, wherein the receiver having a forward protrusion and a rearward protrusion extending outwardly along each side thereof to act against a pair of inward-pointing ridges on the hood to vertically restrict movement of the hood.

16. A muzzle-loading firearm comprising:
   a stock;
   a receiver mounted to the stock;
   a barrel pivotally connected with the receiver, the barrel defining a longitudinal bore therethrough; and
   a hood being slidably mounted to a top portion of the receiver at a location aft of the barrel, the hood having:
   a first engaging position to lock the barrel in a closed position,
   a second non-engaging position to allow the barrel to pivot with respect to the receiver.

17. The muzzle-loading firearm according to claim 16, wherein a rear end of the barrel is tapered inward to facilitate centering of the barrel within the hood.

18. The muzzle-loading firearm according to claim 16, wherein the hood defines a tapered opening at the front thereof to facilitate centering of the barrel within the hood.

19. The muzzle-loading firearm according to claim 16, wherein the receiver having a forward protrusion and a rearward protrusion extending outwardly along each side thereof to act against a pair of inward-pointing ridges on the hood to vertically restrict movement of the hood.

20. The muzzle-loading firearm according to claim 16, wherein the hood having a yoke extending downward therefrom, the yoke being connected with a first end of a spring-biased shaft, the spring-biased shaft being connected at a second end with the stock, the spring-biased shaft limiting vertical movement of the hood with respect to the receiver.

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