

EXHIBIT 1

CONFIDENTIAL

MINUTE #2 1977

Jan. 26, 1977.

FROM PAGE NUMBER

2

SUBJECT

M/700-600 Fire Control Improvement
(Item 1 - Dev. Sched.)

1. M/700-600 Fire Control Improvement

R & D reported that design changes are being developed to make the fire control more versatile. The preliminary design should be completed by September, 1977.

CONFIDENTIAL

ITEM 0016799 1

FIRE CONTROL IMPROVEMENTS

M 700 - M 600

RESEARCH IS PRESENTLY DOING A DESIGN ANALYSIS OF THE M 700 - M 600 FIRE CONTROLS.

THE DESIGN OBJECTIVE IS TO DEVELOP A NEW FIRE CONTROL WITH THE FOLLOWING FEATURES:

- TRIGGER EXTERNALLY ADJUSTABLE FOR POUNDS PULL WITHIN SAFE LIMITS
- SEAR ENGAGEMENT AND TRIGGER OVERTRAVEL DETERMINED BY DESIGN (NOT ADJUSTABLE BY CUSTOMER)
- RIFLE CAN BE UNLOADED IN THE "ON SAFE" POSITION
- IMPROVED TRIGGER PULL CHARACTERISTICS
- COST REDUCTION OF TRIGGER ASSEMBLY

DEVELOPMENT SCHEDULE:

- PROTOTYPES WITH DIFFERENT DESIGN OPTIONS AVAILABLE FOR ANALYSIS - MARCH 1976
- PREFERRED MODEL READY FOR EXTENSIVE TESTING JULY 1978
- DESIGN COMPLETE MARCH 1979

CHART 19

EXHIBIT 2

MOHAWK 600 AND MODEL 700 RIFLES FOR EXPORT TO AUSTRALIA - contd.

with Du Pont Duco cement. The M/700 trigger engagement screw is Loc-Tited and sealed with Du Pont Duco cement. All of these trigger adjustment screws will stay in adjustment if they are not tampered with by the customer. The Owner's Manual instructs the customer not to adjust the trigger engagement on the Mohawk 600 and Model 700 rifle.

All Mohawk 600 rifles and Model 700 rifles to be shipped to Australia will be assembled with lock screws in the trigger assembly. These modifications are being made so the rifles will pass their customs requirements and have nothing to do with the safety, function, or performance of the rifles.

FUTURE PROGRAM

R & D will do a complete design analysis on all the bolt action rifles and present a proposal to the Operations Committee. The areas of investigation will include:

1. Trigger Assembly adjustability
2. Increase commonality of parts in bolt action line
3. Allow M/700 to be unloaded with Safety in the "on safe" position
4. Improve the trigger pull characteristics
5. Reduce the cost of the Trigger Assembly

ITALIAN CHECKERING MACHINE

IREM 0028208 1

IREM 0027600 1

EXHIBIT 3

MINUTE #13 - 1977

July 19, 1977

FROM PAGE NUMBER

12

SUBJECT

M/700-600 FIRE CONTROL IMPROVEMENTS

Chart 19

M/700-600 FIRE CONTROL IMPROVEMENTS

Research is presently performing a design analysis on the M/700 - M/600 trigger assemblies to improve their performance and customer desirability. The development program is aimed at designing a trigger assembly with the following features (see Chart 19): 1) trigger externally adjustable for pounds pull within safe limits; 2) sear engagement and trigger over-travel determined by design (not adjustable by customer); 3) rifles can be unloaded with the safety in the "On Safe" position; 4) improved trigger pull characteristics; and 5) reduction of trigger assembly costs.

The Development Schedule states that prototypes with different design options will be available for inspection and testing by March, 1978. The preferred model will be ready for extensive testing in July, 1978; and the design will be complete in March, 1979.

198M 0020865 1

EXHIBIT 4

BUSINESS MEETING - contd.PRODUCTION PERFORMANCE - contd.RESEARCH PERFORMANCE

R & D reported status of the Semi-Annual Firearms Development Schedule (July, 1977). The item numbers below are as listed on the schedule.

1. Model 700 - Model 600 Fire Control Improvement

The development effort has been divided into two objectives. The first objective is developing a safety mechanism which is easy to understand, reliable, and will allow the shooter to unload the rifle in the "ON SAFE" position. Three prototype safety mechanisms have been completed and at least two more will be developed. The safety development will be completed in the first quarter of 1978. The various designs will be rated by Marketing to determine the one with the greatest consumer appeal.

The second objective is to improve and simplify the firing mechanism to give a Trigger with a better feel and which is externally adjustable within safe limits for pounds pull. Sample prototypes of the proposed new assembly with both improvements should be complete by April, 1978.

4. Model 600 Carbine

Six prototype carbines have been fabricated and are ready for Marketing and Production review. The rifles have design improvements and alterations to the Stock, Bolt Handle, Trigger Guard, Recoil Pad, Sights and Bolt Release.

IREM 0028203 1

IREM 0027587 1

EXHIBIT 5

FIREARMS - Contd.MODEL 1100 DT-20 STOCK FINISH - Contd.SEMI-ANNUAL FIREARMS - TRAPS DEVELOPMENT SCHEDULE

Each item on the Development Schedule was reviewed.

1. M/700-600 Fire Control Improvements

R & D reported that the program objectives are to:

- a. Design a Trigger Assembly that is externally adjustable for pounds pull within safe limits.
- b. Sear engagement and Trigger overtravel to be determined by design and not adjustable by the customer.

In March, we will be ready to present Marketing with three samples.

2. M/700 - 7mm-06 Caliber

R & D reported that at Marketing's request, we will chamber the M/700 rifle for the 7mm-06 which is a 280 Rem. cartridge loaded to higher pressure and faster muzzle velocities. A sign transmittal is scheduled for April, 1978.

IREM 0026200

IREM 0027582

EXHIBIT 6

"B" Series Photos

Bolt lock is mounted and can work independently of safety lever.
Button shown in photo to right of safety lever is bolt latch
actuating button.

B-1 Gun cocked - ready to fire
Safe in "Fire" position
Bolt is unlocked

B-2 Gun cocked
Safe in "ON SAFE" position
Bolt is locked

B-3 Gun cocked
Safe in "ON SAFE" position
✓ Bolt latch actuating button depressed
Bolt unlocked and can be rotated.

F.E. Martin:T
4-11-78

PLAINTIFF'S
EXHIBIT

"A" Series Photos

Bolt lock on bolt plug - independent of safety

A-1 Gun cocked - ready to fire
Safe in "Fire" position
Bolt locked

A-2 Gun cocked
Safe in "ON SAFE" position
Bolt locked

A-3 Gun cocked
Safe in "ON SAFE" position
Bolt latch depressed
Bolt is unlocked and can be rotated

F.E. Martin:T
4-11-78

PLAINTIFF
EXHIBIT

EXHIBIT 7

(Ilion Research Division presentation contd.)

MAJOR PRODUCT UPGRADING

Bolt Action Fire Control

Although Remington Bolt Action Rifles have Fire Controls that have been in the line for many years, and have proven themselves to be safe and reliable, it was felt that these designs should be looked at and analyzed in light of new processing technology and materials. With this in mind, the following items were investigated. (Slide A23)

1. Improved Trigger Pull
2. Cost Improvements
3. Standardization of Operation

Improved Trigger Pull

The present Triggers at times have a variation in poundspull that can be distracting to the shooter. It was felt that improvements could be made by improving surface finish of mating parts and by the use of better materials. Grinding of surfaces and plating on parts are being investigated. Some redesign for elimination of parts should also help this problem and will now be covered under cost improvements.

Cost Improvements

The first thing to be looked at under cost improvement was simplification of design so that as many parts as possible could be used by each of the various models.

1868 0028199 1

1868 0027577 1

(Illion Research Division presentation contd.)

MAJOR PRODUCT UPGRADING

Cost Improvements - Contd. (Slide A24)

The design of the Model 700 and Model 600 Sear Safety Cam is being altered so that the same part will be used in both assemblies and models will be in test by the end of July.

(Slide A25)

Consolidation of design, if and where possible, is being looked at to help cut down on the number of parts. The Trigger of the Models 700 and 600 Fire Control can presently be adjusted for engagement with the Sear Safety Cam and for overtravel. It can also be adjusted for pounds pull when the Action is removed from the Stock. Designs have been altered and test models made to incorporate these features.

This slide shows the present Fire Control and a newly developed test model.

1. Fixed Sear and Trigger engagement

On the present Fire Control this is accomplished by adjustment of the Trigger Engagement Screw. On the proposed assembly, this is accomplished by a shoulder on the Sear that stops the Trigger and gives fixed engagement.

2. Fixed overtravel

On the present assembly, this is accomplished by adjustment of the Trigger Stop Screw. On the proposed model, a shoulder near the rear of the Sear Safety Cam will stop the Trigger overtravel.

(Illion Research Division presentation contd.)

MAJOR PRODUCT UPERADING

Cost Improvements - Contd.

3. Trigger externally adjustable

The adjustment of the present assembly is done with the Trigger Adjusting Screw and Spring after removing the Action from the Stock. The proposed Screw and Spring for adjusting pounds pull will be placed in the Trigger so that adjustment can be made without removing the Action from the Stock.

Another feature being tested in this new model is removal of the present Connector.

The first designs will be ready for testing by the end of July. These designs eliminate one screw, a Connector and two drilled and tapped holes. If materials being investigated for these parts do not prove adequate, more expensive material may be required. This could negate some cost improvements; however, improved function in creep and Trigger pull would help outweigh the cost disadvantage.

Standardization of Operation

Presently, all of our shotguns and some of our rifles can be unloaded with the Safe in the "ON" position. The rest of our rifles must be unloaded with the Safe in the "OFF" position. This is, and has been, a normal practice for years on rifles sold to the trade by all manufacturers. Research feels that Remington should offer the customer the option of being able to unload their Bolt Action firearms with the Safe in the "ON" position, while at the same time if possible, retaining the Bolt Lock condition. Designs have been developed and some models built for testing. They have been given to Marketing for their evaluation in order to decide which type of design the customer would prefer.

(Illion Research Division presentation contd.)

MAJOR PRODUCT UPGRADING

Standardization of Operation - Contd. (Slide A26)

One model is a three-position Safety. The "OFF" Safety position is forward. The middle position is "ON" Safe and the Bolt is locked. The rear position is "ON" Safe but the Bolt can be unlocked.

(Slide A27)

The other model is a Bolt Lock mounted on the Bolt Plug. It is used in conjunction with the present two-position Safety. When the Bolt is closed and cocked, the Bolt Handle is locked in the down position. With the Safe in the "OFF" position, the Trigger can be actuated to fire the rifle and this will automatically unlock the Bolt so that it can be opened. To open the Action with the Safe "ON", the Bolt Lock Lever on the Bolt Plug must be depressed, while at the same time, lifting the Bolt Handle. This can be done easily with a natural motion of the hand and thumb.

Prototypes of these designs are now in test. It is anticipated that final designs will be ready for acceptance by December 1978.

Guns with each of these design features are on display boards and can be examined after the presentations.

KSG

Because the autoloading shotgun market is such an important segment of the total industry, there has been heavy competitive pressure over the past few years. This can readily be seen in the quality and durability of our competitors' latest offerings. While we have not yet lost market share, the effects of the Browning 2000, Winchester SX-1 and Smith and Wesson 1000 will be felt.

EXHIBIT 8

CENTER FIRE RIFLES - Contd.MODEL 700 CLASSIC -- Contd.

Currently, this process is being used on all Classics and will be introduced, across the board, on all Model 700's by mid-February.

Samples of new and old style Classics were shown to demonstrate the appearance difference of the clean Barrel and the improved metal finish.

SEMI-ANNUAL FIREARMS - TRAP DEVELOPMENT SCHEDULE

The items on the Development Schedule were reviewed.

ITEM 1 - BOLT ACTION FIRE CONTROL IMPROVEMENTS

Research reported that a program has been instituted to design new Fire Controls for the entire Bolt Action line. Three Fire Controls have now been developed that allow the Safety Arm to be in the "ON" position for unloading the rifle. Two have Bolt Locks that are independent of the Safety Arm. These Fire Controls are on prototype rifles that are to be shown to a Marketing focus panel. Research also has another design on the drawing board that includes a Sear Block and Trigger Block. It should be possible to define model requirements by March.

ITEM 2 - BOLT ACTION CARBINE STYLING

Research reported that six (6) rifles with new carbine styling have been furnished to Marketing for a January focus panel. Two (2) of these models were reviewed with the Committee. These models included some of the following proposed features:

- . Restyled Stock
- . Walnut or Birch wood
- . Improved wood finish
- . Checkering
- . Sling Strap and Swivel
- . New Sights
- . New metal Trigger Guard
- . New Bolt Handle
- . Improved metal finish

EXHIBIT 9

CENTER FIRE RIFLES - contd.MODEL 7400 - 7600 - contd.BOLT ACTION FIRE CONTROL

Research reported that prototype rifles with several different Safeties and Bolt Locks have been shown to focus panels by Marketing. The results of the survey are being compiled. Model requirements will be defined in March.

BOLT ACTION CARBINE

Research reported that six different prototype rifles have been shown to focus panels. They have various design and cosmetic improvements to the Stocks and Actions. The results of the focus panels are being compiled. Model requirements will be defined by March.

Marketing reported that consumer research on the Bolt Action Carbine was conducted two weeks ago in three locations. Preliminary findings indicate a favorable response to the concept of a new, light weight Bolt Action Carbine capable of handling high velocity cartridges. There appears to be broad based appeal for a Bolt Action of this type. Acceptance was strongest amongst Bolt Action owners, but extended to lever action users as well.

Marketing further reported that a comprehensive report on the study will be available in about two (2) weeks. After its review, Marketing will prepare a listing of product requirements and a marketing plan by the March meeting.

MODEL 768 RESTYLED

Research reported that a drawing of the approved Stock has been furnished to Production for estimating. Marked prints of various metal cosmetics have also been provided to Production for estimates of cost and timing.

IREM 0028342 1

IREM 0028070

EXHIBIT 10

CENTER FIRE RIFLESMODEL 7400-7600 - Contd.

HA

BOLT ACTION FIRE CONTROL

Research reported that they plan to meet with the Product Safety Committee this month to review the results of the recent focus panel interviews on Bolt Action Safeties and Bolt Locks.

With regard to the program to design a new Bolt Action Safety, Research's approach is based on separating the Bolt Lock from the Safety, so that they can be operated independently. The focus panel results indicate that the customer generally prefers this approach as well.

EXHIBIT 11

CONFIDENTIAL

October 18, 1979

MINUTE #17 - 1979

FROM PAGE NUMBER

17

SUBJECT

Model 700 Bolt Lock

MODEL 700 BOLT LOCK

(1981 Introduction)

Research reported that two designs for a separate Bolt Lock are progressing. A model of each has been fabricated and assembled, but require revisions. The next samples of both designs will be ready for review in December.

CONFIDENTIAL

IRM 0015802 6

MINUTE #17 - 1979

October 18, 1979

FROM PAGE NUMBER

17

SUBJECT

Model 700 Fire Control Improvement

MODEL 700 FIRE CONTROL IMPROVEMENT
(1982 Introduction)

Research reported that progress is continuing on both Fire Control designs. Detailing on one design is about 70% complete, with final completion in two weeks. The remaining design and detailing will take an additional 3 - 4 weeks. A completed prototype of both designs will be ready in January.

It was commented that Browning has now begun using a security mark on their products indicating that it has passed a battery of safety checks. SAAMI is also reviewing this.

1888 0020626 1

EXHIBIT 12

CONFIDENTIAL

INUTE : 1979 December 12, 1979
ROM PAGE NUMBER 15
SUBJECT MODEL 700 BOLT LOCK

MODEL 700 BOLT LOCK
(1981 Introduction)

Research reported that layouts of newly suggested designs are being made. Assembly of previous designs is scheduled for mid-December.

MINUTE : - 1979

December 12, 1979

FROM PAGE NUMBER

15

SUBJECT

MODEL 700 FIRE CONTROL IMPROVEMENTS

MODEL 700 FIRE CONTROL IMPROVEMENTS
(1982 Introduction)

Research reported that detailing of both systems have been completed, and 98% of the parts have been returned from the Model Shop. Assembly is anticipated for the first of the year. Prototypes will be available for review with the Committee at the January meeting.

18EM 0021547

EXHIBIT 13

CENTER FIRE RIFLESMODELS 7400 - 7600 - Contd.MODEL 700 BOLT LOCK
(1981 Introduction)

Research reviewed a design concept for a selective Bolt Lock that is independent of the Fire Control. This system allows the shooter the freedom to choose the type of Bolt Lock operation he desires and to operate the Safety in any condition the rifle may be in. This means the Bolt may be open or closed, and the rifle may be fired or unfired.

Exhibit 4-2 shows the Safety in the "ON SAFE" position with the Bolt locked and the Bolt handle down.

Exhibit 4-3 shows the Safety in the "ON SAFE" position, the Bolt unlocked and the Bolt handle raised. Here the shooter depresses the release with his thumb to unlock the Bolt.

Exhibit 4-4 shows the Safety in the "ON SAFE" position, the Bolt unlocked with the Bolt handle raised and starting back to a load and unload position.

Exhibit 4-5 shows the Safety in the "OFF SAFE" position, the Bolt locked and the gun ready to fire.

Exhibit 4-6 shows the Safety again in the "OFF SAFE" position. The gun has been fired and the Bolt handle can be raised to load or unload the next round without having to depress the release.

MODEL 700 FIRE CONTROL IMPROVEMENTS
(1982 Introduction)

Research reviewed the operation of the improved Model 700 Fire Control. This Fire Control has been designed in conjunction with the new Bolt Lock system.

Exhibit 4-7 shows the Fire Control in a ready-to-fire condition. Note that the Safety, Trigger and Interceptor have a common pivot. This is done to reduce accumulated manufacturing tolerances of these critical components. Also note the Sear is supported by two independently moving parts.

EXHIBIT 14

CONFIDENTIAL

MINUTE #10 - 1980 May 14, 1980

FROM PAGE NUMBER 6

SUBJECT MODEL 700 BOLT LOCK

MODEL 700 BOLT LOCK
(1981 introduction)

Research reported that model drawings are complete for the latest Bolt Lock design, reviewed at the April meeting, and have been forwarded to Process Engineering for cost estimates. They requested Marketing approval to transmit the design, explaining that potential appearance changes should not affect the cost. Marketing responded that they are satisfied with the appearance of the latest design.

Production reported that work has already begun on the cost estimate.

CONFIDENTIAL

CENTER FIRE RIFLESMODEL 700 FIRE CONTROL IMPROVEMENTS
(1982 Introduction)

Research reported that work is proceeding on three separate designs. New components for the original design are being fabricated. A Fire Control of the second design will be ready for assembly the week of May 26. A third design is in progress with parts being fabricated in the Model Shop. This third design will use existing Model 700 components, adding features of the Trigger Block and Sear operation from the first two designs. Tests will begin in mid-June.

In response to a question from the Chairman, Research indicated that none of the designs have been reviewed with Production or Marketing. The Chairman asked that this program be reviewed again in July.

BOLT ACTION CARBINE
(1982 Introduction)

Production reported that high spot factory costs for the Bolt Action Carbine with a custom checkered birch Stock have been determined and submitted to Marketing and Research. At Marketing's request, an additional estimate is being prepared using a cut checkered walnut Stock. A suggested retail selling price will be calculated for each option using current sales margins for the Model 700.

Research reported that function tests for all calibers are being run this week. Models in 7MM-08 REM Caliber for a Marketing field test are on schedule.

Research is reviewing the factory cost estimate. If redesign is not required, an updated parts list and drawings will be furnished to Process Engineering to be used for final cost purposes.

PISTOLSMODEL XP-100 - 7MM BR REM
(1980 Introduction)

Research reported that trial and pilot for this gun has been successfully completed.

EXHIBIT 15

July 17, 1980

"Chart XXXVI shows Category I projects, intended to put us in a more secure position with respect to product liability:

1. The Model 700 bolt lock has been redesigned to operate independently of the safety and to allow the shooter to reload his gun with the safety in the "ON" position. Production costs are being developed by Industrial Engineering and the final version is now in test.
2. Three different designs of the M700 Fire Control are being considered. Two are ready for release to the Test Lab and one is still on the drawing board. Upon successful completion of the Model 700, work will continue to develop similar mechanisms for all of our bolt action rifles.
3. The Model 788 safety is being redesigned to prevent accidental release of the safety lever. To do this, a more uniform detent is needed and the size of the safety button has been reduced.

Chart XXXVII shows a time line schedule for Category I projects.

FIREARMS RESEARCH DIVISION
CATEGORY 1
NECESSITY

	1980					1981					1982				
	3	5	7	9	11	3	5	7	9	11	3	5	7	9	11
PORT LOCK															
MODEL 700 FIRE CONTROL															
MODEL 722 SAFETY															

GERT NOTE

KEY:

- Ⓘ Design Transmitted
Ⓦ Warehouse

FIREARMS RESEARCH DIVISION
CATEGORY 1.1

INITIATIVES

ENG.
MANPOWER

BUDGET
1980

ENG.
MANPOWER

BUDGET
1981

INITIATIVES

GERT NOTE

ITEM 0036323

EXHIBIT 16

CENTER FIRE RIFLESMODEL 700 EDL - 7mm-08 REM
(1961 introduction)

Production reviewed the economics of adding the 7mm-08 REM Caliber to the Model 700 EDL line (Exhibits 10 & 11). Margin and Return on Investment are slightly improved as a result of the incremental volume increase.

All tooling is currently available for this gun. Two hundred Trial and Pilot guns will be produced in April, with the next scheduled run of Short Actions.

MODEL 700 CLASSIC 7mm MAUSER (7 x 57)
(1961 Introduction)

Marketing reported that this non-catalogue version of the Model 700 Classic will be announced at the NRA Show in May, pending a successful Trial and Pilot.

Research indicated that tests have been satisfactorily completed on this model, and presented a sample for Committee review.

Production noted that the Mauser is currently scheduled for initial production to begin in April. The Secretary presented the economics of adding the Mauser Caliber to the Classic line (Exhibits 12 and 13).

Committee Action

The Operations Committee approved the addition of the 7mm Mauser (7 x 57) Caliber to the Model 700 Classic line.

MODEL 700 BOLT LOCK

Research presented samples of the Model 700 with and without the Bolt Lock feature for Committee review. Research has discussed potential cost reductions with Production, and the Plunger and Operating Handle are being re-evaluated. They pointed out, however, that costs are not expected to be reduced more than 5% to 10%. Five prototypes of the latest design are being tested along with the new Fire Control System. Testing will be completed this month.

A review of competitors' designs (Exhibit 14) indicates that a few of them have Bolt Locks but only the Bolt Lock has a Bolt Lock which can be released independent of the Safety.

EXHIBIT 17

REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington
ARMS

PETERS
ARMS

cc: C. B. Workman
J. P. Linde
F. E. Martin
S. A. Fanelli

"CONFINE YOUR LETTER TO ONE SUBJECT ONLY" _____

Ilion, New York
January 9, 1981

TO: T. L. Capeletti
FROM: J. S. Martin
SUBJECT: M/700 Bolt Lock - M/788 Safety

A meeting was held on January 8, 1981 with John Linde and Process Personnel to resolve the problems on the M/700 bolt lock and the M/788 safety designs.

The bolt lock design was covered first and a complete review of each component was discussed as to the design/cost, etc. The plunger will be looked at again (.0234) and the bolt handle. New quotes will be made. The rest of the parts were inspected for design/cost, etc. and found to be in line. Other designs were shown including the latest and the cost savings vs. the appearance and acceptability was not that much greater.

It was agreed upon that we will stay with the design we now have. Five models are complete and ready for test.

It is my opinion that we should finalize the bolt lock design as is, finish the testing and if proven satisfactory with the new fire control design, make a proposal to the committee that this be approved.

If there are objections, the other proposal would be to just remove the bolt lock completely and go with our present M/700 design fire control.

The M/788 Safety

The design was reviewed and explained to the Process Engineering Personnel.

It was suggested that a large sample of springs and plungers be purchased and our present safety lever be altered to the new angle 100° included and

PLAINTIFF'S
EXHIBIT

try the design of the new safety force (on and off) to better prove the design. The only other thing left would then be to add the new head design the way we have it.

It is the opinion of the writer that this is a good way to go and we have full cooperation from Process Engineering. We should propose the design this way to the committee, show the new design lever and ask for approval to proceed in this manner.

JSM:ws

Firearms Research Division

EXHIBIT 18

MINUTE # 3 - FEB. 11, 1981

FROM PAGE - 5

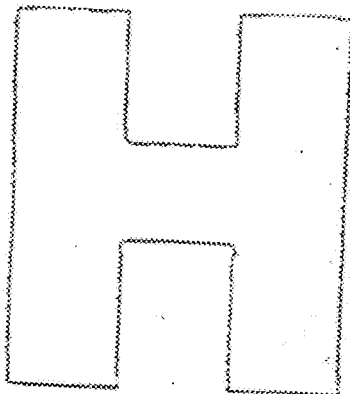
SUBJECT - MODEL 700 FIRE CONTROL IMPROVEMENTS

MODEL 700 FIRE CONTROL IMPROVEMENTS

1981 Introduction

Research reported that an alternative Model 700 Fire Control design has been completed, featuring a blocked Trigger and Sear. The design has the added advantage of making it very difficult to adjust the system to a "hair" trigger. When adjusting to the extreme light trigger pull setting, the Safety binds and is difficult to move from "Safe On" to "Fire" position. Five prototypes of the new design are in test. The 100 round functional test portion has been completed and results indicate no major problems with the design. Dry cycle endurance tests are scheduled for the end of February. Drawings have been provided to Production for cost estimating.

Marketing noted that both the Fire Control Improvements and the Bolt Lock will influence long range Bolt Action Rifle strategy.

CENTER FIRE RIFLESMODEL 300N LIMITED EDITION
(1981 introduction)MODEL 700 FIRE CONTROL IMPROVEMENTS
(1983 introduction)

Research reported that an alternative Model 700 Fire Control design has been completed, featuring a blocked Trigger and Sear. The design has the added advantage of making it very difficult to adjust the system to a "hair" Trigger. When adjusting to the extreme light trigger pull setting, the Safety binds and is difficult to move from "Safe On" to "Fire" position. Five prototypes of the new design are in test. The 100 round functional test portion has been completed and results indicate no major problems with the design. Dry cycle endurance tests are scheduled for the end of February. Drawings have been provided to Production for cost estimating.

Marketing noted that both the Fire Control Improvements and the Bolt Lock will influence long range Bolt Action Rifle strategy.

Exhibit 13

1981 PROJECT AUTHORIZATION FORECAST

Ilion Plant

(Dollars in Thousands)

<u>TITLE</u>	<u>AMOUNT</u>
<u>Projects to be Submitted in 1981</u>	
M/700 Fire Control Improvements	\$ 250*
New Bolt Action Carbine Styling	390
Replacement Broach for M/700 Receivers	110
Replacement Lathe for M/788 Receivers	83
<u>Total</u>	<u>\$2,456</u>

* Increased from \$120M

1 RE M /0020 310

EXHIBIT 19

REMINGTON ARMS COMPANY, INC.
Firearms Research Division

April 8, 1981

Xc: J.S.Martin
J.R.Snedeker
F.E.Martin
S.A.Fanelli

TO: J. H. HENNINGS *JH*
FROM: A. J. LONG
SUBJECT: M700 - NEW DESIGN PARTS EVALUATION
1 Trigger Block on Fire Control
2 Weight of Pull Adjustments
3 Bolt Lock

Date Started: 1-23-81 ✓
Date Completed: 2-23-81 ✓
Work Order: C 3004 - C 2054

PLAINTIFF'S
EXHIBIT

INTRODUCTION

Received from Design five (5) Model 700 rifles with the prototype bolt lock system and new design fire controls for evaluation. All test rifles have the new bolt lock and various changes to the present fire controls incorporating new design parts. A current production M700 rifle was withdrawn from the warehouse for control purposes.

TEST OBJECTIVE

To determine the degree of reliability of the New Design Bolt Lock, Trigger Block and Weight of Pull adjustment system supplied for test.

TEST OBSERVATIONS

Note: All rifles evaluated were subjected to a 100 rd. live fire test followed by a 10,000 cycle cock and fire dry cycle test.

A. Bolt Lock Detented and Non-detented

1. No functional or operational problems were experienced with the non-detented bolt locks during this test. A total of two (2) samples were evaluated.
2. Intermittent function of the detented bolt lock was observed on all three (3) samples evaluated.

Note: Refer to attached sheets for detailed comments on all rifles.

To: J.H.Hennings
From: A.J.Long
M700 - New Design Parts Evaluation

4-8-81
-2-

TEST OBSERVATIONS Continued

B. Trigger Block and Weight of Pull Adjustment Screw and Spring

1. One (1) fire control experienced a safety related problem connected with the trigger block. The remaining four (4) fire controls functioned satisfactorily.
2. Two (2) fire controls tested experienced an increase in weight of pull measurements during this test. The remaining fire controls were acceptable.

C. Warehouse Withdrawn Control Rifle

1. No functional or operational problems were encountered with the control rifle during this test.

OBSERVATIONS PER RIFLE AT TEST COMPLETION

Test Gun #1 - Serial No. A6748248 - Non-detented Bolt Lock

- a. Trigger bent and deformed at front face.
- b. Connector exhibits wear inside of the clearance hole.
- c. Bolt Lock functioning properly.
- d. Nominal wear observed on all parts.

Test Gun #2 - Serial No. A6744869 - Non-detented Bolt Lock

- a. Trigger is trapped rearward by trigger block plunger and load exerted by the safety lever.
- b. A condition exists when the trigger is pulled and the safety lever is moved to the rear (safe) position, whereupon closing the bolt the rifle will fire when the safety is pushed to the off (fire) position.
- c. Bolt Lock is functioning properly.

Test Gun #3 - Serial No. A6744915 - Detented Bolt Lock

- a. Cocking cam damaged during testing.
- b. Safety operating properly.
- c. Bolt Lock functions intermittently.
- d. Nominal wear observed on all parts.

To: J.H.Hennings
From: A.J.Long
M700 - New Design Parts Evaluation

4-8-81
-3-

Test Gun #4 - Serial No. A6745544 - Detented Bolt Lock

- a. Trigger is bent and will bind in the trigger guard.
- b. Bolt Lock functions intermittently.
- c. Safety operates properly.

Test Gun #5 - Serial No. A6752773 - Detented Bolt Lock

- a. Bolt Lock retaining pin loosened while testing.
- b. Bolt lock functions intermittently.
- c. Safety operates properly.

Control Gun #1 - Serial No. A6747525 - Warehouse Sample

- a. Safety operates properly.
- b. Nominal wear observed on all parts.

TEST PROCEDURE

1. Headspace, trigger pull and firing pin indent measurements taken on all rifles as received.
2. Fired 100 rds. of mixed 30-06 ammunition thru each rifle in Test Lab shooting jacks.
3. Rifles reviewed by Design.
4. Headspace, trigger pull and firing pin indent measurements taken on all rifles after live fire test.
5. Each rifle dry cycle tested in cock and fire machines for a total of 10,000 cycles.
6. During cycle test, trigger pull and bolt lock function checked every 1,000 cycles.
7. Individual inspection of each rifle conducted at completion of dry cycle test.

DESCRIPTION OF PARTS TESTED

A. Bolt Lock - Two (2) types.

1. Detented (Allows unloading in "ON" safe condition)
"Bolt lock will remain in unlocked position when depressed.
2. Non-detented (Allows unloading in "ON" safe condition)

To: J.H. Hennings
From: A.J. Long
M700 - New Design Parts Evaluation

4-8-81

-4-

DESCRIPTION OF PARTS TESTED Continued

A. 3. Weight of Pull Adjustment Screw & Spring

"If screw is backed out by owner, sufficient spring tension will remain against the trigger to allow satisfactory connection."

4. Trigger Block

"When safety is placed in ON (safe) position, the trigger is blocked and support cannot be removed from under sear/coanector surface."

FUTURE WORK

Additional samples of the non-detented bolt lock and weight of pull adjustment screw and trigger block will have to be evaluated.

EXHIBIT 20

cc: R.L. Hall
H.K. Boyle
G.E. Fletcher
J.C. Hutton
J.H. Sweeney
T.A. Capelatti
J.P. Linda) In
G.D. Campbell) In
J.S. Martin) In
F.E. Martin) In
L.B. Basque) In
G.J. Hill) In

Est. #4305

June 18, 1981

S.D. Bennett

M/700 Trigger Assembly
Present Trigger Assembly vs. Proposed New Trigger Assembly

A high spot economic evaluation has been completed using the 1981 M/700 forecast comparing the present M/700 Trigger Assembly to a proposed new designed Trigger Assembly. The safety is revised in the proposed new Trigger Assembly, cutting off the locking arm and adding a countersink to actuate the new safety plunger when the "safe" is on. New designed side plates, trigger and a new stop screw and spring completes the proposed new Trigger Assembly.

The attached economic sheet indicates an annual cost increase of \$35,270 in operating cost. A cost increase of \$16,800 after amortization of operation charges of \$16,500 will be realized with total capital required of \$20,000.

Industrial Engineering Section
R.H. Farrington, Jr., Supervisor

A.E. Desmond

By: A.E. Desmond

FED/xc
Reviewed

PLAINTIFF'S
EXHIBIT

EXHIBIT 21

REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington
6729

DETROIT
6729

Xcc C. B. Workman
T. L. Capeletti
S. A. Fanelli

"CONFINE YOUR LETTER TO ONE SUBJECT ONLY" _____

June 23, 1981

TO: J. S. Martin
FROM: F. E. Martin
RE: M-700 Trigger Assembly Estimate

Estimate figures \$.32 additional cost per gun. For this amount we have the:

- Bolt lock removed.
- Ability to unload the gun in the safe position.
- Insurance that the trigger won't be moved with the safety "on safe".
- Trigger becoming inoperative when adjusted out of spec.

I feel we should not pass-up this opportunity to improve our fire control.

FE
FEM:ws

PLAINTIFF'S
EXHIBIT

EXHIBIT 22

REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington
REM

PETERS
P

Cc:

C. S. Workman
T. L. Capeletti
J. R. Snedeker
S. A. Fanelli
J. J. Bechard

"CONFINE YOUR LETTER TO ONE SUBJECT ONLY" _____

June 24, 1981

To: J. S. Martin
From: F. E. Martin
Re: M-700 Fire Control

Test results of April 8, 1981 show that the fire control performance is acceptable. I feel more testing is needed to prove conclusively our system is best.

I will order 30 fire controls fabricated and tested. With proper priority this can be completed by October 1, 1981.

FEM:ws

PLAINTIFF'S
EXHIBIT

EXHIBIT 23

CC: J. S. MARTIN (No Attach
C. B. WORKMAN (No Attach

REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington

BRIDGEPORT, CONNECTICUT

JANUARY 4, 1982

FRED MARTIN

RE: BOLT ACTION SAFETY WITH SEAR AND TRIGGER BLOCKS

A preliminary patent search has been made on the trigger assembly shown in your drawing of February 10, 1981 (unnumbered), which shows a Model 700 sear-blocking safety with the addition of a spring-biased trigger block plunger (SKB-3633). This plunger is slidable transversely in a hole through the trigger; it has an enlarged tip which is depressed by the safety lever into locking engagement with the trigger in the "safe" position, but releases the trigger by seating in a conical recess in the safety lever in the "fire" position.

My search did not disclose any competitively-owned patents that would pose any infringement risks in connection with your design. While other types of safeties were found that block both the sear and the trigger, I believe that patent protection may be obtainable in the event your design is used.

Hildebrandt Patent 3,608,224 shows a safety lever 30 which carries a bent rod 36, and in the "safe" position, slides this rod between opposed surfaces of the sear 16 and trigger 8 to block movement of either.

Horsrud Patent 2,310,238 has a safety slide 123 formed with a vertical arm whose extremities 122, 125 are engaged with the sear 66 and the trigger 87 to block movement of either, when the slide is moved to the "safe" position.

These references are representative of the state of the art; no patent has been found that discloses a system equivalent to yours.

WLE/dt
Attached.

49.100

W. L. Ericson
WILLIAM L. ERICSON
SENIOR PATENT COUNSEL

PLAINTIFF'S
EXHIBIT

EXHIBIT 24

REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington
SPORTPETERS
SPORTXcc: J. W. Brooks
J. S. Martin
F. E. Martin

"CONFINE YOUR LETTER TO ONE SUBJECT ONLY" _____

April 30, 1982

TO: C. B. WORKMAN

FROM: T. L. CAPELETTI *TC*

SUBJECT: BOLT ACTION RIFLE DEVELOPMENT -- REPLACEMENT FOR MODEL 700

Based on our discussion Friday, April 23, the proposed specifications for bolt action rifle development are as follows:

A. Preferred Design B. Contingency Design #1 C. Contingency Design #2

1) Receiver

- | | | |
|-------------------------------------|-------------------------------------|-----------------------------------|
| a) Flat bottom octagonal | a) Round bottom octagonal | a) Full round |
| b) Integral recoil lug | b) M/700 - thicker | b) M/700 - thicker |
| c) Integral & standard scope mounts | c) Integral & standard scope mounts | c) Standard scope mounts |
| d) Anti-blind bolt | d) M/700 - no blind | d) M/700 - no blind |
| e) Front lock
— two lug system | e) Front lock
— two lug system | e) Front lock
— two lug system |
| f) Short and long actions | f) Short and long actions | f) Short and long actions |
| g) New bolt stop-release | g) New bolt stop-release | g) M/700 |

PLAINTIFF'S
EXHIBIT

A. Preferred DesignB. Contingency Design #1C. Contingency Design
#22) Safetya) Block trigger and
firing pina) Block trigger and
firing pina) Block trigger and
searb) Reposition switch
to bolt plugb) Reposition switch
to tang

b) M/700

c) Independent Bolt lock

c) Independent bolt lock

c) No bolt lock

d) Cocking Indicator

d) Cocking Indicator

d) Cocking Indicator

3) Fire Controla) Fully adjustable in
stock - With limits
on engagement
— Safe lower limita) Weight of pull
adjustable in stock
— Pre set engagement
and overtravel

a) Tamper proof M/700

b) Standard trigger

b) Standard trigger

b) Double set trigger

c) Exposed components
— No housing

c) Skeletonized housing

c) Skeletonized housing

4) Barrela) High gloss without
removing hammer marksa) High gloss without
removing hammer marks

a) M/700

b) Light weight contour

b) Light weight contour

b) Light weight contour

c) Target crown

c) Target crown

c) Target crown

d) Recoil reducing muzzle
device - Optiond) Recoil reducing muzzle
device - Optiond) No recoil reducing
device

e) Stainless steel - Option

e) Carbon steel

e) Carbon steel

f) Clean barrel

f) Drilled & tapped
for iron sights
— no sights

f) Iron sights

EXHIBIT 25

REMINGTON ARMS COMPANY, INC.

INTERDEPARTMENTAL CORRESPONDENCE

Remington



Defense



Distribution: C. B. Workman
J. S. Martin
C. E. Ritchie
F. S. Martin

"CONFINE YOUR LETTER TO ONE SUBJECT ONLY" _____

RESEARCH TEST and MEASUREMENT REPORT - Report No. 812441

NEW DESIGN M/700 TRIGGER/SEAR BLOCK EVALUATION

Prepared by: Ron Williams

Date Prepared: 9/10/82

Reviewed and Cleared By:

J.H. Henshaw, / R.E. Nightingale,
Foreman-Test Lab / Foreman-Measurement Lab

[Signature]
Signature

9-15-
Date

C.E. Ritchie,
Sr. Supervisor - Testing,
Mett. & Mech. Analysis Lab

[Signature]
Signature

9-14-82
Date

PLAINTIFF'S
EXHIBIT

TEST & MEASUREMENT LAB REPORT

REPORT NUMBER: 812441
REPORT TITLE: New Design Trigger/Sear Block Evaluation
MODEL(S): 700 ADL
GAUGE OR CALIBER: 6MM Remington
DATE: 9/10/82
WORK ORDER NO.: C-1293-000
PART NAME: Trigger Assembly
DESIGNER/ENGINEER: F. Martin

TEST TYPE:

1. PHOTO LAB
2. STRENGTH TEST - NO. OF GUNS TESTED _____
3. FUNCTION TEST - NO. OF GUNS TESTED _____
4. ACCURACY TEST - NO. OF GUNS TESTED _____
5. MEASUREMENTS - TYPE: Static
6. ENVIRONMENTAL TEST
7. AMMUNITION TESTING & EVALUATION - TYPE: _____
8. VISUAL EVALUATION - _____ OUT OF _____ GUN SAME
9. ENDURANCE - NO. OF GUNS TESTED: 5

NO. OF ROUNDS PER GUN 2500

TOTAL ROUNDS FIRED IN TEST: 12500

AMMO TYPE: MACE; TARGET: _____

REM FIRE _____ CENTER FIRE _____

September 10, 1962

TO: J. H. Hennings

FROM: R. Williams

REPORT TITLE: NEW DESIGN M/700 TRIGGER/SEAR BLOCK EVALUATION

ABSTRACT:

A total of (5) M /700 Fire control assemblies with the New Design safety assemblies, were delivered to the Test Lab by Fred Martin for testing. This safety assembly blocks the trigger and the sear so that the firing pin won't fall when the trigger is held back while the safety switch is pushed from the safe to fire position. Both dry cycle and live fire endurance tests were used to test the assemblies. A M/700 fire control assembly (Current Production) was used as a control and (4) out of the (5) New Design assemblies were used in the test.

SCOPE OF TEST

To evaluate the functional performance of the New Design safety assembly, in the M/700 Rifle during lab testing.

TEST RESULTS

No functional problems arose during testing. Both the New Design safety and the control functioned normally. There was no significant change in the safe On/Off forces measured before, during and after testing, on all the assemblies, including the control.

EXHIBIT 26

MINUTE #16 - September 22, 1982

FROM PAGE NO. 24

SUBJECT: NEW BOLT ACTION RIFLE
1983-1987 Firearms Research Strategy

New Bolt Action Rifle

In July, a four-page list of design specifications for a bolt action rifle that is being considered as a replacement for the 700 was reviewed. Three contingency designs are being considered. Today, I will review what we feel are the key

MINUTE 036 - September 22, 1982
FROM PAGE NO. 25
SUBJECT: NEW BOLT ACTION RIFLE
1983-1987 Firearms Research Strategy

Chart XLIX and design elements (Chart L) of this rifle: the receiver will be redesigned to provide the features that seem to be preferred by gunsmiths, gun writers, and customers; flat bottom and integral recoil lug. The external appearance will be similar to the sample Model Seven that was passed around.

It is desirable that the safety block the trigger as well as the firing pin, for the added margin of safety against accidental discharge. We feel that a bolt lock is a good selling feature and continue to feel that it should be independent of the safety switch for maximum protection.

A fully adjustable fire control is also a good selling feature and we will try to provide one. We would like to go the extra step of providing this feature without removing the action from the stock.

The combination of a high gloss, lightweight contour with a hammer marked barrel may prove incompatible with the process, but this will have to be investigated. It does offer unique styling opportunities.

The rotary magazine feed system offers three advantages:

1. Smooth operation;
2. Better feeding characteristics since you feed from a single location;
3. A more rigid receiver since the shell opening cut is not as large. This feature can contribute to improved accuracy.

In spite of the fact that our present extractor is stronger than most competitors, it is perceived by shooters as being a cheap, weak, unreliable stamping. We will try to correct that problem without compromising the superior strength of the 788.

Reduced lock time is a key factor in the recognized accuracy of the 788. We will try to duplicate that feature in this new rifle and at the same time provide our Marketing Department with laboratory measured effects of improved lock time at the target, to be used in sales promotions and advertising.

Finally, the stock will be walnut, designed in conjunction with leading stock makers, with features found only in custom-made stocks. The butt will be cast off and tuned out to fit the natural contour of the human shoulder and enable the shooter to sight quickly with a more natural head position. Current methods of stock manufacturing should enable us to make three versions if necessary: cast off or on, tuned in or out, or straight. We believe this touch of custom work is a good

MINUTE 216 - September 22, 1982
FROM CHART NO. 1
SUBJECT: NEW BOLT ACTION RIFLE
1983-1987 Firearms Research Strategy

MODEL REQUIREMENTS

NEW BOLT ACTION RIFLE

KEY ELEMENTS

-CONTD.

FEED SYSTEM

- o ROTARY MAGAZINE

BOLT

- o FULLY ENCLOSED CLAW EXTRACTOR
- o REDUCED LOCK TIME

STOCK

- o WALNUT
- o CAST OFF - TOE OUT
- o SPECIAL BEEBING
- o SPECIAL STYLING

EXHIBIT 27

REMINGTON ARMS COMPANY, INC.

INTER-DEPARTMENTAL CORRESPONDENCE

Remington
REM

PETERS
P

"CONFINE YOUR LETTER TO ONE SUBJECT ONLY"_____

Hlon, New York
December 7, 1982

Barry Estrin
Patent Department
Bridgeport

INVENTION REPORT NO. IT-300
A FIRE CONTROL FOR BOLT ACTION
RIFLES HAVING A TRIGGER AND
SEAR BLOCK

FRED E. MARTIN
BOX 599, RD #2, DUTCH HILL ROAD
FRANKFORT, NEW YORK 13340

REASON FOR DEVELOPMENT

A fire control featuring a sear block along with a trigger block was developed to eliminate unwanted trigger movement when the safety is in the on safe position.

THE PROBLEM

A major problem with present fire controls used in bolt action rifles has been unwanted and unnecessary trigger movement when the safety is in the on safe position.

The trend has been to allow this movement to exist unless specifically addressed by the use of a trigger block safety. A trigger block safety was used on the early Remington M/788.

PLAINTIFF'S
EXHIBIT

Invention Report No. IT-300
A Fire Control For Bolt Action
Rifles Having a Trigger and
Sear Block

- 2 -

12-1-82

Other safeties in use are the firing pin block used by U.S. Repeating Arms (Winchester) and Weatherby.

SUMMARY OF INVENTION

The trigger block plunger has an enlarged tip that is depressed by the safety into a recess in the trigger when in the on safe position. The plunger releases the trigger by seating in a conical recess in the safety lever in the fire position. The plunger is mounted thru the trigger and housing and is spring loaded to the unblocked position.

INVENTION DISCLOSURE

Completely assembled this unit consists of the present trigger housing assembly modified to accept the plunger, the trigger altered to have a thru clearance-hole and blocking recess, a compression spring to actuate the plunger, a newly designed safety lever, and the trigger block plunger.

PRIOR ART

To the writer's knowledge there are no fire controls that have a trigger block passing thru the trigger.

This system was designed for Bolt Action Rifles to eliminate unnecessary trigger movement, and may be adapted to Remington's present line.

Fred E. Martin
Hlon Research Division

Date

FEM:vs

EXHIBIT 28

MINUTE #20

December 15, 1982

FROM PAGE NO. 8

SUBJECT:

Model 700 BDL Replacement

MODEL 700 BDL REPLACEMENT

(1985 Introduction)

Research reported that a new bolt action rifle is being developed to replace the Model 700 BDL. This new rifle, to be introduced in November, 1984, will feature new styling and improved function (Exhibit 13). Styling items include a Stock designed by Bob Emmons, an octagonal Receiver with integral scope mounts, and a lightweight Barrel contour polished without removing the SFM hammer marks. Functional improvements will include a rotary Magazine Box for more reliable feeding, fully enclosed claw type Extractor for added strength, no bind, easy lift Bolt for smoother action, Receiver with a heavier, integral recoil lug for added stability, a redundant Safety Switch, and a fully adjustable Fire Control that does not require removal from the Stock. Due to priorities being placed on 1983 programs, preliminary design completion has been delayed until March.

The fourth model gun from Bob Emmons, featuring revisions to the Receiver by Pete Grisel, has been delayed until February. That gun will include a Tang Safety and a Schnabel Fore-end. Initial designs have also been completed for the rotary Magazine Box, the fully enclosed claw type Extractor, and Receiver with integral recoil lug. Tests of the Extractor will begin in January. However, priorities being placed on 1983 programs are delaying fabrication of key components.

Marketing noted that recent data indicate that some features proposed for the Model 700 BDL replacement are not as important to the customer as previously thought. Final specifications will be proposed in January.

EXHIBIT 29

M

United States Patent [19]

Martín

[11] 4,445,292

[45] May 1, 1984

[54] BOLT LATCH FOR BOLT-ACTION FIREARM

[75] Inventor: Fred E. Martín, Frankfort, N.Y.

[72] Assignor: Remington Arms Company, Inc., Bridgeport, Conn.

[21] Appl. No.: 511,449

[22] Filed: Feb. 7, 1983

Related U.S. Application Data

[63] Continuation of Ser. No. 290,641, Aug. 6, 1981

[51] Int. Cl.² F41C 11/06

[52] U.S. Cl. 42/16; 42/89 A; 42/70 R

[58] Field of Search 42/16, 69 A, 70 R, 70 F

[56] References Cited

U.S. PATENT DOCUMENTS

1,318,423 10/1919 Williams 42/16
 1,322,514 11/1919 Bader 42/16
 1,138,888 6/1966 Brewer 42/70 R

4,302,216 (2/1981) Gossow 42/70 R, X

Primary Examiner—Charles T. Jordan

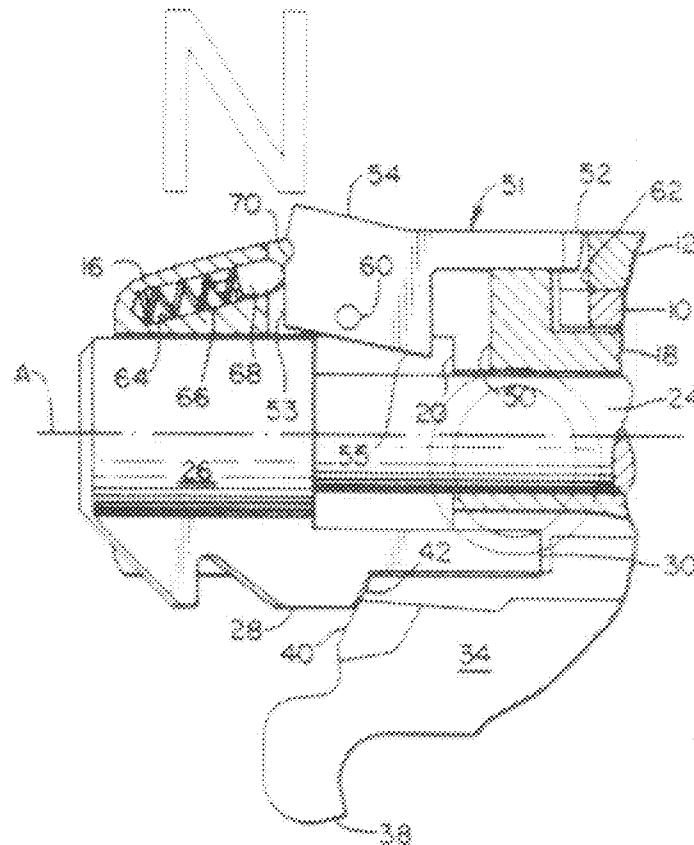
Assistant Examiner—Ted L. Parr

Attorney, Agent, or Firm—Nicholas Skovran, William L. Ericson, Barry Esno

[57] ABSTRACT

A bolt-action firearm, of the type having a bolt movably movable between closed and open positions, has an improved bolt latch mechanism which is operable independently of a safety mechanism. The latch locks the bolt in closed position automatically when the firing pin is cocked, and releases the bolt upon firing. The latch mechanism is recessed in the bolt plug or such feature that it is readily visible and accessible, yet does not interfere with normal manual operation of the firearm, and does not protrude so that it might readily be displaced accidentally. In one embodiment, the latch may be manually displaced to or from a disabled position, in which it is releasably detented.

7 Claims, 8 Drawing Figures



1 802 000 792 4

1 802 000 792 4

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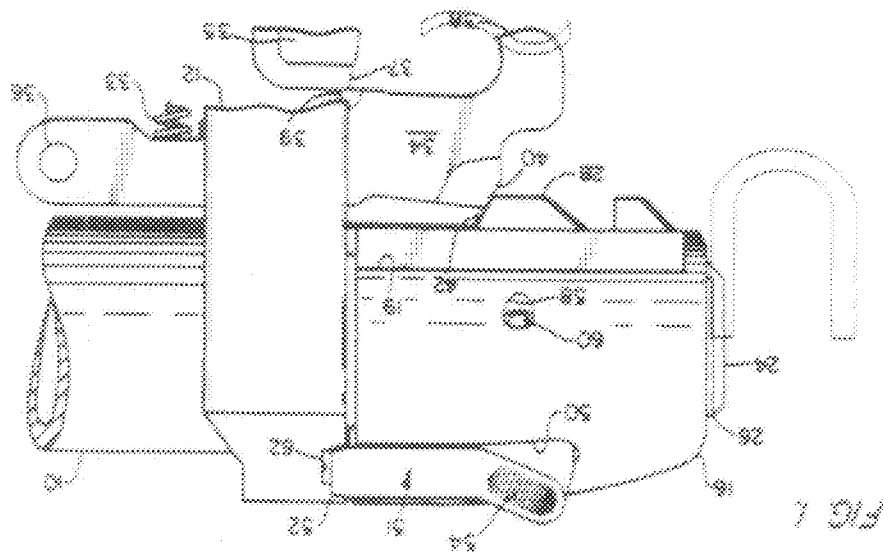


FIG. 1

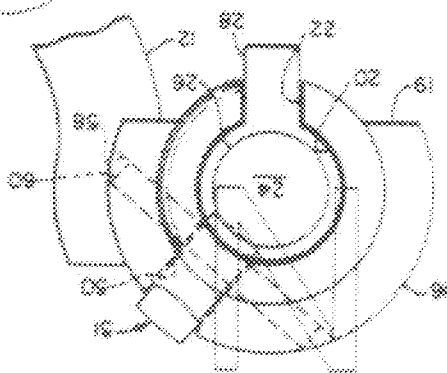


FIG. 2

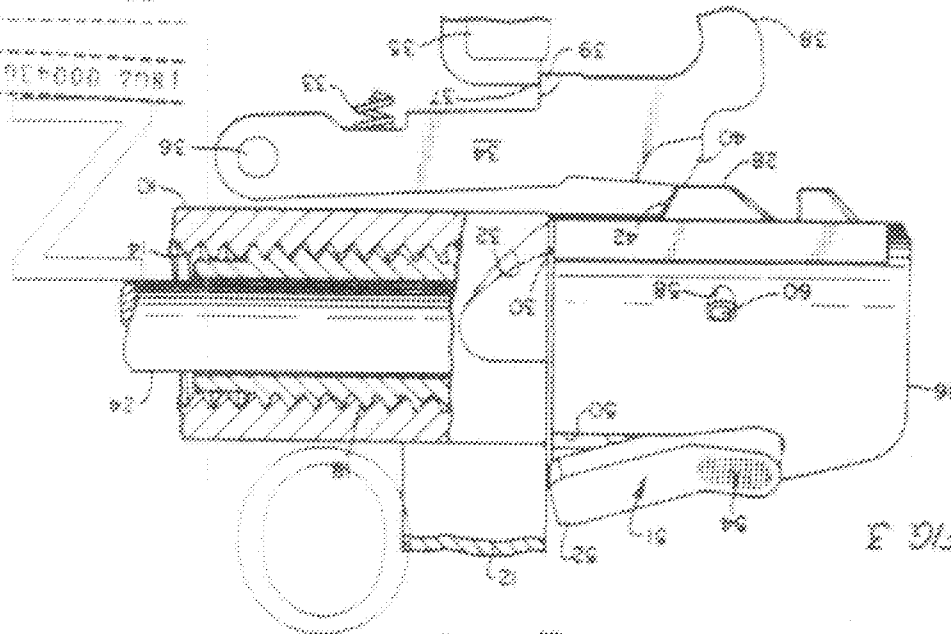


FIG. 3

1802 000+105 1
MEM 0032793 1

M

U.S. Patent

May 1, 1984

Sheet 2 of 2

4,445,292

U

FIG 4

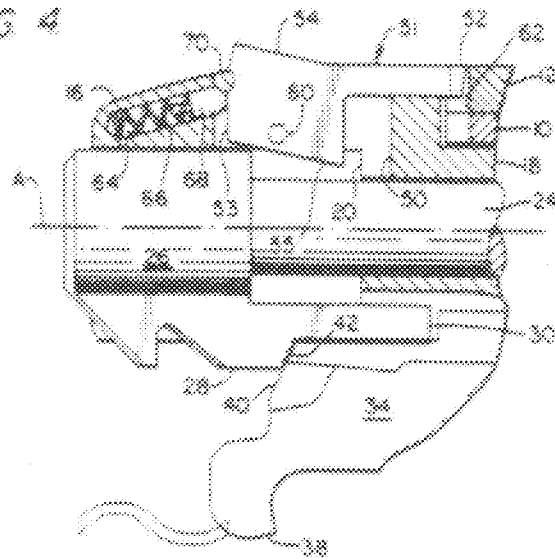


FIG 5

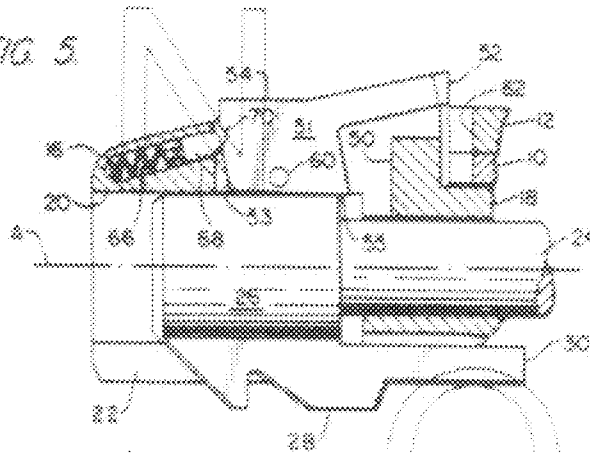
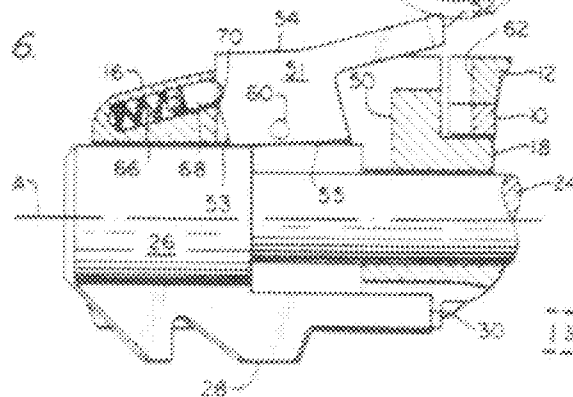


FIG 6



1802 800-1

REM 003279

M

BOLT LATCH FOR BOLT-ACTION FIREARM

This application is a continuation of application Ser. No. 790,691 filed Aug. 6, 1981.

This invention relates to firearms of the bolt-action type, which have a bolt reciprocable in a receiver between open and closed positions, and rotatable by means of a handle between locked and unlocked relationship to the firearm barrel. The invention is particularly concerned with an improved bolt latch mechanism which is normally operated automatically by the firing and re-cocking of the firearm, but which may be selectively disabled, according to the user's wishes.

In a bolt-action firearm intended for hunting use, it is desirable to provide both a safety, and a bolt latch for securing the bolt locked in a closed position. These two features allow the firearm to be carried in the field loaded and cocked, without risk either of accidental firing, or of the bolt being unlocked by some accidental jar or collision. At the same time, the user should be enabled to open the bolt readily and safely for unloading. Controls for the safety and bolt latch should be simple enough to avoid confusion in poor lighting conditions, should be readily manipulable even by a hunter wearing gloves, and yet should not provide in a manner either an interference with manual operation of the firearm, or to be susceptible to inadvertent displacement.

One approach to this question is shown in U.S. Pat. No. 2,314,981 to Walker et al., in which a two-position safety lever also serves as a bolt latch. The safety lever has two arms, a safety arm bearing an element which blocks the sear of the trigger mechanism in a "safe" position of the lever, and another latch arm which engages a notch in the bolt to latch it against rotation. Movement of the safety lever to the "fire" position releases the sear, and also removes the latch arm from engagement with the bolt. This is a satisfactory system, but it does require the safety to be released when the bolt is opened, and therefore calls for proper caution to be exercised when the user wishes to unload the firearm.

Another prior art solution involves a safety lever movable in three positions, one in which the safety and the bolt latch are both engaged, a second, intermediate position which either disengages the bolt latch, or enables it to be manually disengaged, but leaves the safety on; and a third, firing position in which both the safety and the bolt latch are inoperative. Examples of this approach appear in U.S. Pat. Nos. 1,834,402 to Fischer; 1,112,423 to Williams; 1,869,264 to Cournon; and 1,112,383 to Brewer. If a hunter is working in good lighting conditions, without gloves, and with leisure to see that the safety is correctly positioned, these systems are satisfactory. But in the press of urgency and excitement that often arises in the field, and under adverse conditions, error in selecting among three safety positions is not unlikely to occur.

Another solution that has been suggested is to provide a bolt latch that is completely divorced from the safety mechanism. This enables the hunter to unload without concern about changing the condition of a safety he has previously activated. Two examples of such a bolt latch are found in U.S. Pat. Nos. 1,512,514 to Bader, and 1,869,496 to Stahl. In Bader, a sliding latch, mounted on the side of the bolt plug just behind the bolt handle, is movable up or from latching engagement with

the bolt handle by means of a pivoted lever, which is spring-biased toward the latch-engaging position. The latch may be withdrawn either by lever engagement with a shoulder on the firing pin when the rifle is fired, or by manual rotation of the pivoted lever. After manual opening with the rifle cocked, the pivoted lever must be held manually retracted in order to re-close the bolt.

In the Stahl Patent, a rotatable shaft, formed with a flange and carrying a spring-biased latch plunger, extends transversely across a mating flange in the firing pin. The cocking of the firing pin mates the two flanges so as to turn the shaft and latch plunger into latching engagement with the bolt handle. Upon firing, the flange disengages so that the bolt handle may be raised, with the shaft and latch plunger now being free of the firing pin and able to rotate to permit this opening movement. If it is desired to unload the rifle with the firing pin cocked, the latch plunger may be retracted manually to permit the bolt to be opened. The latch plunger must once again be held retracted to permit the bolt to be re-closed; this disadvantage is shared by Bader and Stahl.

The present invention has as its general object the improvement of bolt latch mechanisms for bolt-action rifles which have independently-operable safety devices. The improved mechanism features a simplified construction, involving a single pivoted, spring-biased latch lever, which is automatically operated by the displacement of a firing pin during cocking and firing. In one embodiment, a detent is provided so that the latch is selectively operable manually to releasably secure it in a disabled position. The latch may readily be disabled or reactivated by the press of even a gloved finger, after which the hands are free to carry out loading, cocking, firing, or unloading operations without further attention to the latch.

According to the invention, the bolt plug of a bolt-action firearm is recessed to receive a latch lever, which is pivotally mounted in the recess for rocking motion to either of two positions, latched by engaging the weapon and closing the bolt handle, or unlatched by firing the weapon. A spring and plunger bias the lever toward the latched position, in which a notch formed at one end of the lever engages in a mating notch in the closed bolt handle. The latch lever has a cam surface so arranged, in the latched position, as to project into the path of motion of the head of the firing pin, which therefore pivots the lever to the unlatched position when the weapon is fired. Subsequent re-cocking and withdrawal of the firing pin head enables the spring-loaded plunger to return the lever automatically to the latched position.

In one embodiment, the latch lever may be manually rocked beyond the latched position to a disabled position, in which a detent notch formed in the lever engages and interferes with movement of the spring-loaded plunger. The plunger cannot then move the lever toward the latched position until the lever is manually pressed in a direction to release the detent and thus restore automatic operation.

FIG. 1 is a fragmentary view in side elevation of one embodiment of the improved bolt latch mechanism, shown in latched relation to the bolt assembly of an illustrative bolt action firearm, which is shown cocked and ready to fire.

FIG. 2 is a fragmentary view in rear elevation of the assembly of FIG. 1.

FIG. 3 is a fragmentary view showing the mechanism in unlatched position, with the bolt handle raised.

M

4,445,292

3

lock the bolt, and the parts of the firearm is fired and uncocked condition.

FIG. 4 is a fragmentary cross-sectional view in side elevation, with the parts in the uncocked and cocked condition as in FIG. 1.

FIG. 5 is a view similar to FIG. 4, but showing the firing pin in a fired position, and the latch mechanism is an unlatched position; and

FIG. 6 is a view similar to FIGS. 4 and 5, but showing the firing pin in a cocked position, and the latch mechanism detented in a disabled position.

The improved bolt latch mechanism is broadly applicable to bolt-action firearms of various designs, but is shown for purposes of illustration in a bolt-action rifle of substantially the same type as is shown in more detail in U.S. Pat. Nos. 2,383,193 to Walker and 2,514,981 to Walker et al., which were assigned to the owner of the present application. The rifle includes a hollow cylindrical bolt 18 which is mounted for rotation and longitudinal reciprocation in a receiver (not shown), by means of a handle 12 brazed or otherwise secured to the bolt. The bolt, when closed against the breech of the rifle barrel, may be locked by means of conventional lugs formed on its forward end (not shown), which are engaged by rotating the handle down to the position shown in FIGS. 1 and 2, or unlocked by raising the handle to the position of FIG. 3. The bolt is shown in its closed longitudinal position with respect to elements of a fire control mechanism which includes a sear 34 and a trigger 35. With the bolt turned to its unlocked position of FIG. 3, it may be pulled longitudinally to the left to open the action for loading and unloading cartridges, and for cocking a firing pin 36.

A bolt plug 16 has a threaded extension 18 which extends forwardly into threaded engagement with internal threads 14 formed in the bolt, thus drivingly connecting the bolt and bolt plug for joint longitudinal reciprocation, but permitting the bolt to rotate independently. The bolt plug is formed with recessed flans 19 for sliding engagement with mating surfaces formed on the receiver (not shown), to restrain the bolt plug from rotating with the bolt. The bolt plug also has a cylindrical recess 20 slidably receiving an enlarged head 26 of the firing pin 34, and a slot 22 through which a sear-engaging lug 28 and a cocking arm 30 of the firing pin extend in freely-slidable but non-rotatable relation.

In the relative positions of these elements shown in FIGS. 1 and 4, the firing pin 34 is cocked, with an oblique face 42 of the lug 28 bearing against a mating face 40 of the sear 34. The firing pin is continuously urged forward a firing position, that is, toward the right in the drawings, by a conventional firing pin spring contained within the bolt. The sear, pivoted on a pin 38, is held in its illustrated angular position by the engagement between a step 39 in the sear and a connector 37 attached to the trigger 35, thereby restraining the firing pin in its cocked position. To fire the weapon, the trigger is pulled to move the connector 37 to the position shown in FIG. 3. The angle of the faces 40 and 42 with respect to the longitudinal axis of the bolt and firing pin is such that the firing pin spring exerts a downward component of force on the sear that overcomes the upward force exerted by a sear spring 33, and pivots the sear counterclockwise to the position shown in FIG. 3, permitting the firing pin to be driven forwardly to its fired position shown in FIG. 5.

In the fired condition, the cocking arm 30 of the firing pin extends forwardly into the deepest part of a cocking

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cam 32 cut into the bolt 18, which is circumferentially aligned with the cocking arm when the bolt is closed (compare FIGS. 1 and 3). After firing, raising the bolt handle to the position of FIG. 3 causes the cocking arm to ride along the curved surface of the cam 32, and retracts the firing pin back toward the cocked position. Then as the bolt is opened and re-closed by a reciprocating movement along its major axis, the lug face 42 engages against the re-elevated rear face 40 and retains the firing pin in the cocked condition of FIGS. 1 and 4 once more.

The firearm action thus far described is conventional in design, and is further illustrated and described in the aforementioned U.S. Pat. Nos. 2,383,193 and 2,514,981. Therefore, no further detailed description of its operation and design is believed necessary. A safety mechanism of any type suitable in such an action may be utilized as desired, and the bolt latch of the present invention is intended to operate entirely independently of the safety mechanism. As illustrated, the sear 34 is provided with a cam lobe 38 for cooperation with a safety lever having an eccentric, of the kind disclosed in U.S. Pat. No. 2,514,981, which is selectively operable to block the sear against movement from the cocked position of FIG. 1. This is intended merely as an illustrative example of various safety mechanisms that might be used in conjunction with the improved bolt latch, which will now be described.

The bolt plug 16 is formed with a radially-extending recess 30, in which a latch lever 51 is pivotally supported on a pin 46 received in a transverse hole 52. The lever 51 has a notch 53 at its forward end, which, in a latched position of FIGS. 1 and 4, engages in a locking notch 43 at the rear of the bolt 18 and handle 12 to prevent the bolt from being moved from its closed and locked position. A plunger 48 is slidably received in a blind hole 54 in the bolt plug, and is urged against a rear face 55 of the lever 51 by a spring 56 to bias the lever in a clockwise direction toward the latched position.

The latch lever 51 is formed with a planar cam surface 55 which projects into the recess 30 in the latched position of FIG. 4, into the path of movement of the outer cylindrical surface of the firing pin head 26 from its cocked position of FIG. 4 to its fired position of FIG. 5. In the latched position, the cam surface 55 extends in a direction inclined downwardly in a forward direction with respect to the longitudinal axis A of the firing pin motion. When the trigger 35 is pulled to release the firing pin, the forwardly-moving cylindrical head 26 engages the cam surface 55 and pivots the lever 51 to the unlatched position shown in FIG. 3, against the bias of the spring-biased plunger 48. The bolt 18 is now free to turn, and may be unlocked and opened. The surface 55 continues to be inclined downwardly in a forward direction, for a reason which will appear, but at a greatly reduced angle to the bolt axis A.

Re-cocking of the firing pin 34 from the cam surface 55 from the head 26. This allows the plunger 48 to automatically re-latch the lever 51 in the position of FIG. 4, as the bolt handle is closed. When the firing notch 43 becomes aligned with the notch 53.

In the illustrated embodiment, the rear face 55 of the latch lever is formed with a detent notch 59 which is not reached by the plunger 48 sliding along the face 55 during the pivotal movements of the lever between the latched position of FIG. 4 and the unlatched position of FIG. 3. However, the lever may be rotated by applying finger pressure to a projecting V-shaped upper surface

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34, counterclockwise into a further disabled position shown in FIG. 6, in which the plunger 48 seats in the notch 78. The engagement between the plunger and the notch restrains the lever against being rotated by the bias of the spring 66, and thus detains the lever in this disabled position.

To provide for an ample arcuate displacement between the unlatched and disabled positions of the lever 31, the surface 33 must have some clearance from the head 38. Thus this surface is inclined downwardly at a small angle to the axis A in both the unlatched and the disabled positions, but in opposite axial directions.

When placed in the disabled, detented position of FIG. 6, the latch lever 31 will remain inoperative and unaffected by movement of the firing pin, until such time as finger pressure is applied to it in a clockwise direction to release the plunger 48 from the notch 78, and thus restore the parts to the normal automatically-operating positions of FIGS. 4 and 5.

In a hunting situation in the field, where a series of shots may be fired, the bolt is cyclically opened to reload the rifle, and reclosed to cock the firing pin for the next shot, and the latch lever automatically cycles between the latched and unlatched positions of FIGS. 4 and 5. Assuming, however, that the hunter begins to unload the cocked and latched rifle without firing previously-loaded live rounds, he need not release the safety to do so. He merely presses the latch lever 31 into the disabled position of FIG. 6, and opens the bolt with the safety engaged. When he next wishes to reload the rifle, the latch lever should be pressed to release it from the detented disabled condition, so that its normal automatic operation is restored.

The latch lever 31 is preferably positioned near the top of the bolt plug as shown, so that it is readily visible and easily pressed even with a gloved hand, but does not protrude in such a location as to be readily subject to accidental operation by the user's hand carrying the rifle, or by jarring against other objects.

I claim:

1. In a bolt-action firearm of the type having a substantially cylindrical bolt rotatably mounted for movement between open and closed positions; a bolt plug non-rotatably mounted and having threaded connection with said bolt; a firing pin mounted reciprocably in said bolt plug for movement between fired and cocked positions with respect to said bolt; the improved bolt latch mechanism which comprises:

a latch lever having a notch; said bolt plug being formed with a recess receiving said latch lever; said bolt being formed with a locking notch opening onto an outer peripheral surface thereof at a location radially aligned with said notch upon rotation of said bolt to said closed position; means mounting said latch lever in said recess for pivotal movement about an axis substantially perpendicular to the longitudinal axis of said cylindrical bolt between a first, latched position in which said notch is engaged in said locking notch to latch said bolt against rotation with respect to said bolt plug, and a second, unlatched position in which said notch is disengaged from said locking notch to release said bolt for rotation; spring-biased plunger means mounted in said bolt plug for biasing said latch lever inward said first position;

said latch lever having cam means arranged to project, upon pivotal movement of said latch lever

into said first position, into the path of reciprocation of said firing pin, whereby movement of said firing pin to said fired position normally pivots said latch lever from said first to said second position to unlatch said bolt, and movement of said firing pin to said cocked position normally permits said spring-biased plunger means to pivot said latch lever from said second to said first position to latch said bolt;

said latch lever having a detent notch, and being manually pivotable in said recess to a third, disabled position in which said cam means is withdrawn from the path of reciprocation of said firing pin, said notch is released from said locking notch and said detent notch engages said plunger means to interfere with rotation of said latch lever from said third position, and thereby render said plunger means inoperative to pivot said latch lever toward said first position thereof.

2. A bolt latch mechanism as recited in claim 1, said latch lever being manually pivotable from said disabled position toward said latched and unlatched positions thereof, by applying pressure sufficient to displace said plunger means from said detent notch.

3. A bolt latch mechanism as recited in claim 1, said latch lever having a face area normally bearing against said plunger means for relative sliding movement as said latch lever is pivoted between said latched and unlatched positions, said detent notch being formed in said face in a location spaced from said bearing area to engage said plunger means in said disabled position of said latch lever.

4. A bolt latch mechanism as recited in claim 1, said latch lever being pivotable in a first angular direction into said unlatched position, in an opposite angular direction into said latched position, and beyond said unlatched position in said first angular direction into said disabled position.

5. A bolt latch mechanism as recited in claim 4, said firing pin being formed with a head having a peripheral surface cylindrical about the axis of movement of said firing pin; said cam means comprising a cam surface formed on said latch lever; said latch lever being constructed and pivotedly mounted so that in said latched position thereof, said cam surface is inclined toward the axis of reciprocation of said firing pin in the direction of movement of said head from said cocked to said fired positions thereof, for sliding engagement by said head surface.

6. A bolt latch mechanism as recited in claim 5, said latch lever being transversely and pivotally mounted so that in said unlatched position thereof, said cam surface slightly engages said head surface and remains inclined to the axis of reciprocation of said firing pin in the direction of movement of said head from said cocked to said fired positions thereof, but at a smaller angle than in said latched position of said latch lever, thereby permitting further pivotal movement of said latch lever in said first angular direction into said disabled position without producing binding interference between said cam surface and said head surface.

7. A bolt latch mechanism as recited in claim 1, said latch lever projecting from said bolt plug rearwardly of said bolt plug, and having a V-shaped upper surface for manual rocking between said disabled position and said latched and unlatched positions.

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EXHIBIT 30

FIREARMS BUSINESS TEAM MEETING
MAY 31, 1985

FILE: BOLT ACTION RIFLE
(REPLACEMENT FOR THE MODEL 700)
J. W. BOWER'S LETTER TO W. H. COLEMAN, II

9. NEW BOLT ACTION RIFLE

THIS RIFLE HAS BEEN DESIGNED AS A REPLACEMENT FOR THE MODEL 700. TECHNICAL IMPROVEMENTS INCLUDE:

- O AN IMPROVED FIRE CONTROL CONTAINING:
 - PRESET ENGAGEMENT AND OVERTRAVEL
 - CUSTOMER ADJUSTABLE TRIGGER PULL TO A SAFE LOWER LIMIT
 - STEEL TRIGGER AND SEAR
- O A SAFETY THAT BLOCKS BOTH THE TRIGGER AND SEAR
- O A BOLT LOCK WHICH ALLOWS THE CUSTOMER TO UNLOAD THE GUN WITH THE SAFETY ON

MARKETING HAS COMPLETED INITIAL FOCUS PANELS TO GUIDE THE DESIGN EVOLUTION.

REVISIONS TO THE FIRE CONTROL ARE IN THE FINAL DESIGN STAGE. ADDITIONAL PROTOTYPES WILL BE READY FOR DEVELOPMENT TESTING THIS SUMMER.

Firearms Business Team Meeting
May 31, 1985

File: Bolt Action Rifle
(Replacement for the Model 700)
J. W. Bower's Letter to W. H. Coleman, II

9. New Bolt Action Rifle

This rifle has been designed as a replacement for the Model 700. Technical improvements include:

- o An improved fire control containing:
 - preset engagement and overtravel
 - customer adjustable trigger pull to a safe lower limit
 - steel trigger and sear
- o a safety that blocks both the trigger and sear
- o a bolt lock which allows the customer to unload the gun with the safety on

Marketing has completed initial focus panels to guide the design evolution.

Revisions to the fire control are in the final design stage. Additional prototypes will be ready for development testing this summer.

EXHIBIT 31

(SUPPLEMENTAL)

*Necessity

- (1) We will demonstrate improved fire control mechanisms for bolt action rifles. This program is on target as Clark will indicate.

*Commitments

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"There have been 91 individual items identified in our research work pool. Obviously all cannot be covered in detail at this meeting. They will be grouped as appropriate under one of five main headings.

1. Necessity
2. New Product Development
3. Process Development
4. Other Work
5. Backlog

"Under the heading of Necessity we have one commitment, Bolt Action Fire Controls (Chart 33). Our objectives here are to enable the shooter to load and unload his gun with the safety switch in the 'ON' position and prevent him from 'adjusting' himself into trouble. This work has been pursued in two ways:

1. Make the present fire control more tamper proof.
2. Design a new fire control.

"Working with Production, the Legal Department and Du Pont consultants, a number of possible improvements to the present fire control have been identified (Chart 33).

- (1) A warning 'Do not adjust Trigger Assembly' will be stamped into the side plate of the fire control.
- (2) Special screw heads will be developed to further discourage adjustment by anyone other than the factory or an authorized gunsmith.
- (3) A new sealant will be investigated that will enable us to prove conclusively that the seal on the adjusting screws has been broken.
- (4) A \$5,000 work order was authorized in March of this year for the Du Pont Engineering Department to assist us in developing a cleaning and lubrication procedure for the Model 700 Fire Control that can be included in the rifles instruction book.

"The evaluation program will consist of a preliminary review of all potential cleaning and lubrication candidates within proposed guidelines and selected products will be screened for performance. It is the program aim, if possible, to specify products on a generic name basis.

"Results of this work are expected in September.

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EXHIBIT 32

(SUPPLEMENTAL)

FROM: _____
Sgt. 48348

ROBERT A. DARBY
Production and Fabricated Products Dept.
Research and Development Division
S-2334-4
Wilmington, Delaware

Date: December 30, 1985

TO: 1) ~~E. E. Woodacre~~
2) J. E. Preiser 16

In reviewing the attached strategic summary on Firearms, one product feature which we stress internally, but to my knowledge we do not stress very extensively in the marketplace, is safety. (For example, our barrels will "bird-cage" rather than shatter like some competitive offerings.) The world is surely increasingly safety-conscious - I don't know whether macho hunters are concerned, but they should be. R & D is working on improved safety and security features which should have marketable value. (If they don't, we ought to stop the work.)

I'd be glad to discuss further with you and share views.

Thanks.

R.A. Darby

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