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Firearms Fire Controls and the Inadvertent Discharge

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It is axiomatic that the discharge of a firearm in the absence of a depression of its trigger is evidence of a disabling defect which creates an extremely hazardous condition and a condition which must be prevented within the constraints of technical and economic feasibility. The causal defect(s) may be rooted in design configuration, manufacturing or material fault or in conditions of maintenance, use or modification, but whatever the source or sources of the problem, a firearm which discharges without a trigger pull is defective.

The release of a firing mechanism in the absence of a pulled trigger requires that its normal control mode be circumvented in some way. Common conditions which allow loss of normal operator control are those which result in faulty engagement of critical parts or their release or breakage due to impact and vibration.

Faulty engagement of the controllable release mechanism for either an exposed hammer design or a concealed striker configuration is often rooted in excessive complexity. As the number of parts in a mechanism of a relatively small and fixed size increases, the difficulty of assuring their precise cooperation on a long term basis in an uncontrolled environment increases. Given the assumed longevity of a firearm, its potential exposure to adverse environmental affects of field debris and the possibility that it will experience improper and inadequate maintenance, it is obvious that the use of simple rugged parts with thoughtful provision for control of contaminant buildup in concealed yet critical locations will yield optimum functional reliability. Complex designs enclose more numerous small parts in a tightly fitted trigger housing capable of entrapping field dirt and debris in critical locations, a problem often compounded by the presence of aged and oxidized cleaning materials.

Safety mechanisms are integral sub-parts of fire control systems. Their purpose is to prevent a discharge when in a "safe" mode. They must also relinquish control of discharge function to the trigger linkage when in the "fire" mode, thereby enabling the piece to be fired upon trigger depression. Some safeties have two design positions, "fire" and "safe". These may either lock the action closed on "safe" or enable it to be opened on "safe". Some two position safeties with

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action lock on "safe" have an action lock override feature. Other safety mechanisms have three positions, one "fire" and two "safe" with one of the safety positions providing a closed action lock and the other enabling the opening of the action while still preventing a discharge even in the event of a pulled trigger.

If a firearm fitted with a fire control of conditional reliability also has a safety system with only two designed positions ("fire" and "safe") which locks the action closed in the "safe" mode, the operator is forced to arm the piece by placing the safety on "fire" before the chamber may be unloaded. Such a controls interlock creates unnecessary exposure to an unwanted discharge during operations involving a chambered round. Safety systems which enable the unloading of a firearm while the safety is in the "safe" mode are inherently safer than those which require that the piece be armed by safety placement to the "fire" mode before commencing the unloading process. The two position without action lock on "safe" and the three position safeties are of this type.

Safety systems accomplish their function by the interruption of the mechanical sequence of firing mechanism release. One or more of the parts connecting the trigger to the firing pin may be blocked or deactivated. The farther away from the firing pin - cartridge primer interface that the interruption of the mechanical chain of events is accomplished, the greater the number of parts capable of an uncontrolled release to cause an unwanted discharge.

As an example, suppose that the safety system acts only to block the motion of the trigger. If there are other components intended to be controlled by the trigger which if released for any reason will discharge the firearm, the stage is seen to be set for firing with the trigger blocked and the safety on "safe".

Safety systems must also reliably transfer control for the firing function between it and the firing mechanism release system. Together they constitute the "fire control system". If the positioning of the safety from a "safe" position to the "fire" position results in a discharge, that control transfer has been faulty. Such an event will take place if some of the firing mechanism parts are displaced while the safety system is on "safe" and one or more of those parts fail to return the position where only a normally depressed trigger on "fire" causes a discharge. This is a condition called "fire on safety release" and effectively turns the safety control into a second trigger.

The ideal fire control system is therefore seen to be mechanically simple and secure, resistant to environmental contaminants and capable of allowing the loading and unloading of the firearm without having to place it in an armed condition. For dangerous game, it is considered advisable to have an "action locked" safety position as well.

Safety systems may be either manually or automatically actuated. Manual safety actuation requires the active involvement of the gun handler. No matter how positive the mechanical function of the manual safety may be, its actuation always involves the gun handler whose performance will not be universally faultless. The automatic safety if properly designed is completely passive in its operation and prevents the discharge of the firearm in the absence of a depressed trigger whether the manual safety, if present, is in the "safe" mode or the "fire" mode.

Certain striker configurations offer more exposure to external influences than others. An exposed hammer may be impacted causing an energy transfer to the primer of a chambered cartridge. Such an event is common with firearms lacking a device which disconnects the hammer from the firing pin unless the trigger is pulled. Typical of the type are revolvers which require manual cocking of the hammer before firing and other "single action" types like the old "snake eyes" double Derringers. The undisconnected single action hammer may also be "slipped" or partially withdrawn and released with enough energy stored in the hammer and main spring system to cause primer ignition. Such a firearm may also have its hammer placed full forward in the erroneous belief that since a trigger pull can not cause a hammer fall, it is in the safest loaded condition when in fact, the firing pin is in contact with the primer and the hammer is in position to transfer any blow that it may receive.

Single action firearms often are provided with an intermediate condition of cock between full forward or fired position and full cocked or armed position. This position sometimes is associated with loading and unloading operations and is intended to provide some measure of safety if used during carrying of the piece and to enable intercept of the hammer if it is "slipped" or if the hammer falls from full cock in the absence of a pulled trigger. The mechanical engagements of the "half cocked" position are typically fragile and prone to rapid deterioration in service leading the condition out of which rose the well-known expression "going off half-cocked".

Product liability litigation involving firearms is unlikely to occur unless there is personal injury or property damage caused by an inadvertent discharge. The firearm which by design and manufacture is most reliable provides not only the highest level of public safety but the most cost effective insurance policy available to its marketer - obviously a win-win situation.

Patents which have been in the public domain for upwards of 100 years and which would provide reasonable levels of product safety are available to firearm designers and manufacturers. Iver-Johnson, Smith & Wesson, Colt, and Winchester are some representative firms that have developed technically and

economically feasible responses to the problems caused by an inadvertent discharge. Even though the art and technology is well-known, not all manufacturers avail themselves of these existing resources and therefore are more likely to face litigation over a claim of accidental discharge.

Some support for the validity of the preceding discussion may be obtained from the writer's tabulation of court cases and reported incidents compiled from court records, technical expert experience and manufacturers complaint files made public as a result of litigation. The frequency of appearance of specific models and types in accident reportages is affected by the size of the population in use. It is significant however that populations of firearms of the same type do not exhibit a similarly proportional representation among court cases and reported incidents. Problems arising out of reported inadvertent discharges are heavily skewed toward models and types that for one or more reasons appear to be less reliable than others with similar size populations and conditions of use.

The following listing is offered with no judgment as to the validity of any claim made regarding any specific alleged incident. It is based solely upon the frequency of appearance of the particular model or type in court actions and reports of accidental discharge compiled over the period 1977 to 1997.

Bolt Action Rifles

Savage Model 110	1
Remington Model 788	3
Remington Model 700	61
Remington Model 600/660	20
Weatherby Mk V	1
Weatherby Vanguard	1
Winchester Model 70	1
Ruger Model 77	2

Pump and Semi-Automatic Rifles and Shotguns with Concealed Striker System

Remington "Common Fire Control" Types Rifles and Shotguns	51
Franchi "Pre-1966" ALS	2
Winchester Model 1400	1
Browning A-5	1
Mossberg "500" Series	3
Browning "BAR"	2
Chinese SKS 7.62 x 39	6

Exposed Hammer Actions Without Passive Safety

Winchester M94 (Pre-1986)	24
Winchester M9422	2
Winchester M37 Shotgun	1
Excam Derringer	2
R-G Revolver	4
S & W 1st Model M & P Revolver	1
Thompson Center Contender Pistol	4
Ruger Single Action Revolver Pre-1973	130
Colt Single Action Army Revolver	2
J. P. Sauer Frontier SA Revolver	2
Hawes Single Action Revolver	1
Navy Arms - Uberty Single Action Revolver	1
FIE .22 Rim Fire Revolver	3
Freedom Arms "454 Casull" Revolver	4
H & R Model 929 Revolver	1
Davis Double Derringer	3
American Double Derringer	1
Thompson Center "Renegade"	1
H & R "Topper" Shotgun (Old Model)	1

Exposed Hammer Actions with Defective Passive Safety

Dan Wesson M15 Revolver	2
H & R "Green Wing" Shotgun	1

This admittedly incomplete compilation of court cases known or reported to the writer has several representatives of some prominence. They are the Remington M600 - M700 bolt action rifle series with fire controls based on the same patent, the pre-1986 Winchester M94 lever action rifle, the pre-1973 Ruger single action revolver and the Remington semi-automatic and pump shotguns and rifles with a "common fire control" based on the same patent and a variety of revolvers, pistols and Derringers with exposed hammers and no passive safety.

The Remington bolt action M600 and 700 series of rifles involved in court cases alleging inadvertent discharge outnumber all other makes and models by 9 to 1. Certainly the conditions of usage and the population of the other representatives, some of which, such as the Model 788 bolt action rifles are also made by Remington, are at least comparable to that of the Model 600 - Model 700 series. It should be noted that the fire control configuration of all the Remingtons is relatively complex when compared to their competition as exemplified by Remington's most well-known market rival, the Model 70

Winchester. The M70 Winchester records a single fire control related court appearance in contrast to 81 by the Remington M600 - M700's. It is also worth noting that prior to February 1982, Remington Model 700's were marketed with a two position bolt locking safety requiring the rifle to be armed by placing the safety control on "fire" prior to unloading a round from the chamber. Since that time, there have only been two court cases involving inadvertent discharge upon movement of the safety on post 1982 Remingtons. Obviously, the public is avoiding some exposure by loading and unloading their rifles on "safe".

The exposed hammer fire controls without passive safety features are represented by Winchester Model 94's made prior to 1986 and the Ruger single action revolvers made prior to 1973. The M94 had 24 court appearances but the Ruger had 130. Winchester included a passive safety system in the M94 in about 1986 that prevents hammer impact on the firing pin unless the trigger is pulled. Ruger adapted the 1899 Iver-Johnson passive automatic safety transfer bar system to its revolvers in 1973. The writer has no record of an inadvertent discharge case involving either the Winchester M94 or the Ruger single action revolver manufactured after the dates that their designs were changed to include a passive automatic safety.

Colt on the other hand continues to produce a high priced custom made version of its single action army revolver to the same configuration that it patented in 1873 without a passive safety and has been to court at least twice since 1973 with a market population very much smaller than Ruger single actions have.

The largest representative of the group of fire controls blocking a fire control component remote from the final element in the discharge chain is Remington with its trigger blocking safety in the "common fire control" based on the Crittendon patent of 1948 and used in its line of pump and semi-auto shotguns and rifles. Others with remote acting safeties and no passive internal safety are the Mossberg shotguns and the Communist made SKS military rifles. These types have all been accused of discharge while the safety is on "safe" and have had their day in court.

The Franchi lightweight automatic shotguns with an early sear configuration sensitive to impacts on the butt which caused the piece to fire every time it bounced and reloaded itself have been blamed for causing injuries which if a system requiring the trigger to be pulled in order to fire it had been installed would have been prevented.

The Thompson Tool Company manufactures an exposed hammer single shot pistol with a trigger mechanism and manual safety that will enable the

arming and discharge of the piece if it is dropped so that it lands on its butt and rolls onto its hammer. Such a sequence of events is common when a loaded pistol falls from the shoulder holster in which it is usually carried as the bearer bends over. That body position also invites bullet impact in a vital body region and since the pistol contains no passive automatic safety to prevent firing in the absence of a trigger pull, the Thompson-Contender receives its day in court as well.

Firearms product liability litigation is shown to arise out of defects which could be virtually eliminated if properly addressed by the designers and manufacturers. Elimination of personal injury would not only prevent the human suffering attendant thereon, it would free valuable resources and assets currently expended in contesting actions at law in connection with injuries alleged to involve defects in the product.