REMINGTON-WALKER TRIGGER EXPLANATION

INTRODUCTION--

This paper is published as a public service aimed primarily at gunsmiths and advanced amateur gun enthusiasts that have a curiosity about the fascinating mechanics involved in modern firearms and are willing to look at very easy facts and features and figure out how it works. Remington-Walker triggers are more complicated than pliers, but not by much. Much of their mystery remains because the design is so like others in appearance, but totally different in operation.

The author has a life-long love affair and intense interest in what makes guns do what they do and how to make them do it better by design instead of blind luck. For the past seventeen years, much of the gun study has been as a result of law suits involving firearms and their design. It has been an enlightening experience that needs to be talked about. I'm in no way picking on Remington, but they're in the spot light right now and actual facts are hard to come by on this subject. I've testified as an expert in Federal and other courts in civil and criminal matters in several states. My testimony has never been disallowed.

There is a difference between studying design and function by taking things apart and comparing what is seen by a parts diagram and testifying to how the gun operates to a great degree of mechanical certainty. When testifying of how something happens, *certainty* is essential. The rule of 'follow the forces' in gunsmithing is a good one. Once forces and pivots are seen and understood, the entire trigger is no longer a mystery. Just because it looks like any other trigger is no cause to think it operates like any other. It does not.

Attacks on the author by those that have not read this paper while actually examining a Remington-Walker trigger and the patent language pertaining to it will be happily ignored. Facts are facts and I'm trying to explain how to actually see those facts so you can come to your own conclusions based on mechanical knowledge instead of what was heard or said somewhere.

Questions on this paper are gladly answered but preferably in the public forum. The purpose is, after all, the education of a subject out of normal vision and experience of the shooter. If you want to talk politics or personal appearance or what you think of me or something else, please move it to another thread. This discussion is about one particular family of triggers that are present on more than seven million rifles spread all over the world.

Remington-Walker-Haskell trigger---

Please reference U.S.Pat. 2,514,981 That's the trigger we're talking about and it's different than all others. There are pdf download patents available without charge several places on the internet.

To fully understand the operations and failures of the Remington-Walker trigger, the drawings and the text of the patent are MOST important. Print it out, if possible, for ready reference. It is the heart of the Remington 'problem' in 600 and 700 series triggers. This applies to all models *but* the M-788 which has a one piece trigger design in it.

The patent drawings are probably different than the trigger you see in your rifle. Over the decades

many changes have been made to the various parts. I'll explain the differences and what effect they have on operation and safety, later, but here's a rough test to see which 'generation' trigger is in your rifle.

Remove the bolt and look down in the rear tang at the *sear*. If there is a stack of four parts, the outer housing and the two sears, it's an early gun and should be treated with special care. The more modern sears are chromed sintered metal and of one piece.

The second test is to see if it has a bolt lock safety. Does the bolt open easily with safety ON? If so it was made after 1982. If you have a bolt lock gun, cut the lug off so it's defeated. Just grind off #32 Fig 1 of the patent.

If the face of your trigger is smooth without the ridges commonly found on the face of triggers, it is a new X-MarkPro trigger that has a solid trigger and no connector. It was made after October of 2006. I have closely examined several X-Mark Pro triggers and their prototypes. It is as good as any trigger on the market and better than many. It's just 60 years late.

With those comments I'll dive into a subject I extensively covered on this site and others ten years ago.

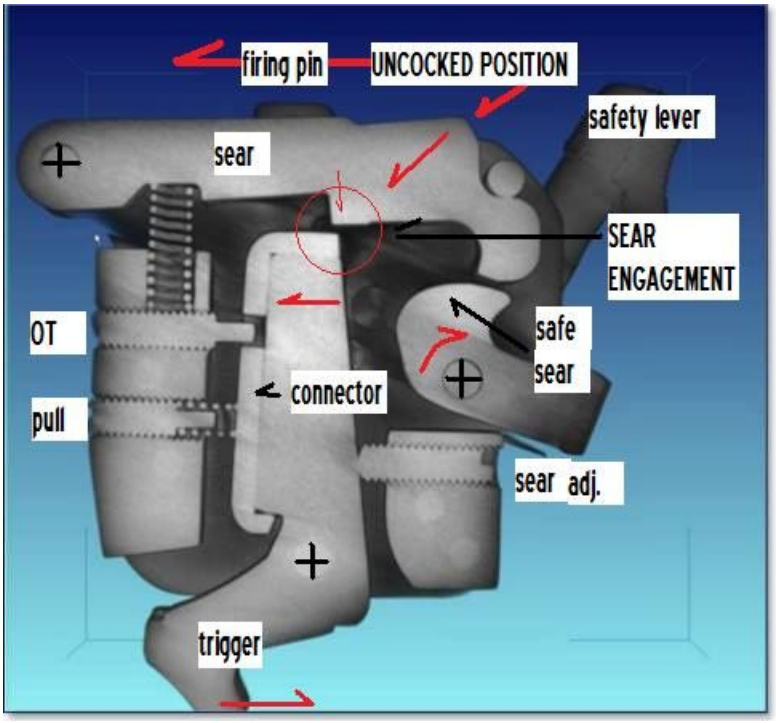
The fact that the plane you're flying in has not crashed is no evidence that crashes don't occur.
That pretty well sums up anecdotal evidence. Just because your rifle's trigger has never, ever done anything but what you directed it to do is no evidence of the lack of a defect. The defect is there and it's unpredictable and many times it won't repeat no matter what you do. The scientific method depends on masses of information when the occurrence is rare and non-repeatable. There are thousands of people that have written letters of complaints that describe the exact same failures time after time. The defect is in the trigger and just because it works now does not mean it won't fail in the future.

Basics--

The Remington-Walker trigger is an "Over-ride" trigger system. That means it's not a "Direct-acting" trigger that *pulls the sear* out of position with the cocking piece (like M-98, 03, etc). An over-ride trigger *props up the sear* and is not attached to it. Winchester started the over-ride, or 'negative angle' trigger in hunting rifles in the M-70 in 1937. Sako made an override trigger contained in a housing that was then fastened to the action. Many custom trigger makers copied it just after the War. Timney, Dayton-Traister, Canjar, Jewel, Ruger M77, A-bolts, Tikka - just name a modern bolt action rifle and it'll have an over-ride trigger in it. They are crisp and allow very good trigger pulls. They are the 'standard' in modern bolt action rifles.

The Remington-Walker is *different* than all those others and patent #2,514,981 tells us why that is.

Figure 1 of the patent shows a jumble parts that usually makes people slightly ill to try to cipher it out. Here's a better representation with the parts labeled in common language and direction of movements given to hopefully, though crudely, better 'see' what's inside.



Notice the area inside the red circle. When the bolt closes, the cocking piece pushes the rear of the sear downward so that the sear rests on the rear corner of the connector. That overlap is the 'sear engagement'. Its usually .018 to .025 inches which means the rifle is prevented from firing by about .004 square inch of steel, at most. In this position, the cocking piece is held by the sear, which is pressing down on the top of the trigger-connector. When the trigger moves forward the sear falls and the firing pin rushes forward to fire the rifle.

The safety cam lifts the sear off the top of the trigger-connector and locks the sear into the cocking piece so the gun can't fire, but the trigger and connector are free to move. When the safety is rotated to OFF, the sear comes back down on the trigger-connector. This is a simple 'Sako-style', modular, over-ride trigger. The fact that the sear is hinged at the front instead of the back makes no practical difference. It can be seen by this simple motion of the safety and sear that the trigger and connector HAVE to come back to the full rear position for there to be security in the sear / trigger engagement.

In its simplest form, an over-ride trigger is two levers and two springs and two retaining pins. The M-70 is exactly that, plus an over-travel adjustment. The 'Sako style' over-ride triggers, contained in a housing having more parts, operate exactly the same---The trigger props up the sear and when the sear is allowed to fall, the gun fires.

In the Remington-Walker trigger, the safety 'problem' is NOT in the safety. This is a common misconception but it's important to realize the Remington-Walker *safety* is not the cause of firing without a trigger pull. The safety could be called a 'victim of circumstance' in that it is converted to a *trigger* without the shooter's knowledge.

How does it do that?

Let's take a look at some patent language, shall we. Go to page 3, beginning on line 60 and read through to Page 4, line 61.

This description has several parts and pieces that need examination. It starts by telling how the *connector (*you'll hear that word a lot) is not fastened inside the trigger housing, but 'flexibly mounted' in it. That means it's loose on the trigger but for the trigger return spring pushing against it. A lot of the verbiage describes nifty ways of making the housing out of a stamping, but that was discontinued many years ago.

Page 4, line 22 through 40 is where it gets interesting to an experienced shooter.

"*This stop screw provides an adjustment to positively stop trigger movement just as the sear is released and makes possible the complete elimination of undesirable trigger slap or overtravel."*

Page 4, line 40 starts a section that needs to be examined very closely*:*

> *" If we examine the functioning of the unit, we will observe that the trigger and connector move as a unit,..."*

and line 44,

> *"At this point the trigger stops but the connector ...."*

Hold on, right there. Let's read that again and make SURE you know what that says, then try it on your UNLOADED rifle.

Does the trigger stop it's motion as the sear drops off of it? If it does, the patent makes sense. The operation of the connector would shorten the overall travel of the trigger to only the amount of the sear engagement and nothing more. But, if the trigger is going to travel until it hits the stop screw anyway, why complicate the trigger with a part that has no benefits? The amount of motion in the trigger is as little as it can be made if the corners are square and the sear falls cleanly from the corner of the trigger.

EXPERIMENT--

Take any unloaded, bolt action rifle with an over-ride trigger in it (anything bolt-action and civilian). With the rifle uncocked and bolt closed, carefully pull the trigger several times and note how much movement there is. It's usually about .020 inch or about two thirds the thickness of a credit card. What the patent is saying is that the trigger does not move that .020 after the sear trips. It says the trigger *stops* when the sear trips. That, of course is demonstrably not true. Try it on any rifle. The trigger 'follows through' as the gun fires. You can't stop it short of the stop if you wanted to. So, what are we left with?

Using .020 inch as the sear-trigger engagement figure and assuming the pivot pin is near the center of the trigger, it can be said the trigger pull is .020", plus a clearance after disengagement to allow the sear to fall without touching anything. Call the total trigger movement .030 inch when the trigger pull plus overtravel is figured. By actual experiment you can see that the movement of a Remington-Walker trigger is exactly the same as any other trigger having the same sear engagement and the nonsense on Page 4, line 30 does not apply.

> *"...for it is not practicably possible to produce and maintain absolutely sharp square corners on the engaging surfaces of the sear and conventional trigger."*

Nobody says that an absolutely sharp square corner is needed to make a good trigger, and everybody but Remington has done so.

So, why the connector? If the connector really doesn't *do* anything, why have it? Is it cheaper than say a heat-treated trigger by any other maker? Possibly, but others have solid triggers.
Does it, in ANY way, make the trigger a 'better' trigger? No, it's just different. It does not reduce the trigger movement at all, but it's different simply because it's more complicated.

It seems to be the perfect example of a new design patent as the result of one little change to something invented prior. In this case, the improvements and attributes said to be present in the Remington-Walker don't perform the function claimed in the patent. The change in the trigger design was for the purposed of a patent and not for performance.

Operation--

An over-ride trigger must, absolutely MUST, return to full position after every shot. The trigger return spring is there to do that job. That's the spring you feel in the trigger when the rifle is not cocked. A trigger that does not return to the proper position reliably under the sear is more likely to cause the gun to fire without the trigger being pulled. That is simple physics and easily set up in demonstration. "Return to battery" for internal trigger parts is part and parcel of over-ride trigger operations.

The Remington-Walker's 'trigger' is not the piece you put your finger on. The part that acts as the trigger under the sear is actually the connector which is 'flexibly connected' to the trigger body. The trigger return spring pushes the connector which then pushes the trigger body into position under the sear. The connector offers a complication that is not needed in the trigger. The addition of the connector only adds to the complexity of what is a very simple and amazingly reliable mechanism when its parts are limited to only what's necessary to do the job.

Is a mechanism that's called upon to return one lever with one spring more reliable than a spring pushing on an intermediary part and then the lever? Of course it is. The fewer parts, the simpler the mechanism, especially when dealing with simple levers.
With the re-positioning of the trigger-connector required after each shot, in the presence of recoil and powder residue and debris, the answer becomes even more certain. More parts means more complications without benefits.

HOW DO THEY FAIL?

Remington-Walker triggers are subject to several failures all due to displacements of the connector inside the trigger housing. These failures are common enough to have acronyms for them:

FSR-- Fire on Safety Release.

How many people have pulled the trigger with the safety ON just to 'test' it out? I know of hunter safety instructors that *teach* it as a good thing to do every time the safety is applied. How many times is the trigger pulled while the safety is ON but not by the shooter? That's probably a rarer occurrence but it does happen, that's why manual safeties and trigger guards are put on guns.
Should the trigger be pulled on a Remington-Walker, and the connector become displaced so that it does not return with the trigger, the shooter feels the trigger return not knowing the connector did not follow along with the trigger to its proper place under the sear. In that position, the safety lever is

holding up the sear and the rifle fires when the safety is pushed to OFF.

Prior to 1982, Remington rifles had a 'bolt lock' incorporated with the safety lever. (#32 Fig. 1) That bolt lock means the gun *has* to be taken off safe in order to unload it. FSR is one of the most common failures and the one that's caused the most damage, injury and deaths. In simple terms it's the improper displacement of the connector during the time the gun is ON safe. The 'trigger' is in the proper position, but the connector is not.

JO—Jar Off

When the gun fails due to impact it is said to have 'jarred off'. Precarious 'perching' of the sear on the very corner or edge of the connector causes a fragile connection that can fail with bumping or jarring. In all other over-ride triggers, this displacement is usually caused by improper adjustment of the sear engagement screw . A Remington-Walker can change that engagement dimension and drastically change the security of the system by simply capturing debris between two internal parts. It 'adjusts' itself to little engagement and just as quickly adjusts the other way as the debris is dislodged by the recoil of the shot.

FBO and FBC--
These refer to firing without a pull of the trigger when the bolt is opened or closed. This is a variation of a common 'Jar Off' caused by vibration of the bolt closing (easy to reproduce by mal-adjusting the sear engagement.) or the change in alignment of parts as the bolt handle is touched to open it. In both instances the most common cause is a connector being held out of position by debris, dirt, powder flakes, dried grease on any number of things that trickle through the mechanism as it's fired and stored. Fire on bolt close many times happens on the first loading after long storage. By design, the connector is pushed away from the trigger body when the rifle is in the fired position. That gives a chance for lint and debris to collect in sufficient quantity to alter the sear engagement the first few times the gun is then 'exercised'.

Can any of these failures occur in other triggers? Yes.

The operation of over-ride triggers, whether Jewel, Timney, Canjar, or Remington-Walker is the same. The trigger is a prop for the sear. If it doesn't properly support the sear under knocks and bumps a hunting rifle takes in doing its job, a discharge without a trigger pull *can* happen. The point is that the Remington-Walker has an extra 'trigger' that does NOT do the job it was patented to do and it's much more subject to become displaced than competing 'solid' triggers. *Why* is that connector in there?

Over-ride triggers, by design, are very fragile things and scary to think about when you also consider the risk involved. That they work well enough for a hunting rifle could have been disputed before the M-70 made it a fact in 1937. What had been known as a 'target' trigger became mainstream and a hunting trigger.

The M-70 has two parts pinned in a milled recess in the bottom of the receiver which keeps side to side motion to a minimum so the two parts are held closely in alignment with each other and the cocking piece. The M-70 trigger scrapes the sear surface clean into a trash trench cut in the trigger on each shot. There is no housing to catch debris. The sear comes up through a port in the rear tang which allows very little contamination of the trigger parts. The sear spring is nearly sealed and debris is blocked from entry into critical areas. 'Bad' M-70 triggers are the result of bad gunsmithing and usually found on match rifles. Otherwise they're very reliable and after a period of 'break-in' are usually very 'good' triggers.

Points to consider---

The Remington-Walker has an extra part that's free to move around inside the housing. That's the connector.

The connector is displaced from the front of the trigger on every shot due to the angularity of the back edge of the connector which is impacted by the corner of the sear as it falls. That is by *design*. Page 4, lines 46-50.

> "*...and, as the sear is cammed down, the radii existing on the points of the connector and the sear cause the connector to be cammed forwardly and completely clear of the sear step. ...*"

In a mechanism subject to environmental conditions as well as lubricants and powder residue, two parts that separate several times during recoil are subject to a wide variety of contamination between them. As can be seen by study of the mechanism and it's patent, the Remington-Walker trigger is not self cleaning and it is housed within steel walls, but the unit is open at the top where the greater amount of such contamination is present.

The top of the Remington trigger housings are totally exposed in the rear tang of the rifle. At each operation of the sear, debris is 'pumped' into the housing. (Look at the top of the bolt release to see the stuff that comes all the way through the trigger.) Each operation of the bolt pushes more material into the vicinity of the sear opening. Remington-Walker triggers do get dirty and they can't be easily cleaned without disassembly. Disassembly of the trigger breaks the factory seals.

The connector is, in reality, a separate *flexibly mounted* trigger. It cannot be felt by the shooter. The position of the connector can be different than the position of the trigger without the shooter knowing it. The shooter can not *know* the position of the connector, it's out of his control and out of his view.

Practical gunsmith's test of the Remington-Walker trigger---

Over the decades, standardized tests of Remington-Walker triggers have been developed to show a trigger that is prone to *repeatable failures*. These tests are simple, non destructive and can be very useful in identifying triggers that are demonstrably bad. It must be kept in mind that just because a trigger passes these test does NOT mean it's safe. As seen by the design, the defect is inherently present in the trigger. It just doesn't always fail. The shooter has no way of knowing when that failure might occur.

"Tricking" a trigger is done by carefully placing the safety lever in the 'null' position between fire and safe. Some guns won't perch there, some will. With the safety perched between detents, pull the trigger and release very slowly. Pay careful attention to a tiny 'click' as the trigger is pulled. If it's there, the gun will likely fire when the safe is pushed to OFF. Try that test several times and flip the safe off after each careful pull. Tricking is a way to determine if the lift of the safety cam is enough to clear the top of the connector in half-way position.

"Screw driver Test" is done with the gun cocked and ON safe. Push against the bottom of the connector, seen just in front of the bolt release leaf, with a screwdriver or punch and then push the safety to OFF. If the connector is sloppy on the trigger it will over ride the front of the sear so that the sear has no support when the safety is released. Guns that fail this test can sometimes fire on safety

release after suffering common vibrations in a vehicle or on horseback.

“Sear lift test” assures the safety cam raises the sear high enough to not drag on the connector when on safe. Place the rifle safety ON and pull the trigger several times and release it slowly. If the connector drags on the bottom of the sear it can't get back under the sear to catch it as the safety is flipped OFF. Guns that have been dropped while on safe can develop this failure by denting the safety cam.

Trigger adjustments--

Just be aware that the clear to cloudy-yellow sealer found on Remington-Walker screws is put there by assemblers as the trigger undergoes final adjustment at the factory. When that sealer is removed, the company has a certain amount of deniability and 'blame' is transferred to the one doing the adjusting. (I know, I know!!) I've adjusted Remington triggers for forty years because so many are useless without it. Just be aware of the liability involved and how it works so it's not made (much) worse by alterations of the surfaces or excessive adjustments.

Trigger repair---

The Remington-Walker can be made into a solid trigger system without using the connector by replacing the trigger and connector by an aftermarket or shop-made trigger, OR, the connector can be epoxied to the body of the trigger as long as one thing is done very carefully; The rear of the connector has to be ground square after the epoxy sets, BUT the actual disengaging corner of the connector has to be left in its' original position relative to the center line of the trigger pivot pin. It takes a precision grinder and fixture to do it right. Do it wrong and the trigger is even more unpredictable and could become very dangerous. Without grinding the rear of the connector square, the sear hitting the angle will soon break the epoxy bond and the trigger is worse than before.

In the coming weeks, the Remington-Walker trigger is going to be in the news. Those that *know* guns will be answering questions from those that don't. Please have the facts and please, please just look at the mechanism and the patent and understand how it all works and it’s then very easy to see how it also fails.