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November 20, 1991

Dear John,

I certainly did enjoy your book on the Model 700. I am very impressed that you were able to compile so much detail. And more so that an "outsider" should be able to get so much. There are many in the company who profess to be "experts" and know a lot less. You organized the subject well and the book is enjoyable as well as technically structured. I do hope you are able to follow on with the 788, 600, 660 and Model 30 as you mentioned.

I have some detail that may be of use to you. I am a little uneasy at revealing the companys business and it is hard to do it accurately without getting into personalities and human conflicts. But the story makes no sense without the human factors. Lets leave it that I will write here "off the record" and if you elect later to use any of it, you will omit my references to peoples actions, character and decisions. With ^{the} ~~my~~ comments ~~out people removed~~, the rest is all "for the record".

I grew up in Maine, graduated from University of New Hampshire as a mechanical engineer in 1939, through ROTC found my self in the Army in 1940 in Coast Artillery, impulsively transferred to Ordnance and ended up at Aberdeen Proving Ground first as a proof officer testing artillery and then with incredible luck as Chief of the Design Section developing both facilities and weapons. I answered an ad in the RIFLEMAN for gun designers and arrived in Ilioa in January 1946. The R & D manager in Ilioa was a "Superintendent" Pete Rutherford and his assistant was Sam Alvis. I was hired with three others and it was crazy because Ilioa's war production was shutting down and there were too many engineers already there. Alvis tried an innovation— rather than putting me at a board, I went to production as an assembler in work clothes and learned "final assembly" first with the 500 series 22s, then 121 and 241, then 141, 81 then model 31 and then the Model 11. I think I spent six months doing this. Then Sam put me with Mike Walker to learn the ropes in design.

as well as with others

In college, I had made up my mind that I wanted to work for an arms company. It was depression time and guns weren't selling. It was turned down by Winchester, Remington, Savage, Smith & Wesson, H&R—everyone. Later I had an offer from Colts through

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a family friend but the Army got me before they did. In retrospect I should add, "Thank God".

in $\sqrt{1946}$

Remington was in disarray. It was ironic that Eli Whitney had used "muskets" to illustrate for the first time the theory of interchangeable manufacture. Remington might have first had ~~it~~ ^{this} but long ago lost it. In 1946, the tools did not produce parts to the model drawings, the gauges did not match the tool drawings and the finished parts after they were filed by the assembler to make a gun matched neither. As I recall, the assembly of six or seven Model 31 pump shotguns was an acceptable output by an assembler. This situation existed in the whole sporting arms industry. Colt had developed and was sole source prewar for the caliber 50 machine gun. By Wars end, the Army was paying AC Spark Plug about \$ 50 per gun (for a profit) and Colt \$600 for the same gun and Colt was losing money. AC "machined" everything and Colt "filed" everything-- filers were on piece work and made more than engineers. The AC gun was more reliable.

From the time duPont bought it, Ilion had made no profit except in 1940 briefly. At the time, duPont controlled Remington thru 51% of the common stock. duPont also was the largest stockholder in General Motors- about 20% of the common. General Motors thru Ico, Inland, AC, Saginaw and etc made more small arms than anyone else. They turned to Remington for information about guns but they had ^{newer} ~~better~~ techniques for cutting metal than Remington had. Mutual assistance was a marriage of convenience. Assurances from GM gave duPont confidence that the Ilion plant could be completely retooled and make redesigned guns at a profit. duPont backed the expenditure by the Remington Board, promised technical assistance although Remington might later just as well perhaps not have wanted so much 'technical assistance' as finally came.

When I started to work with Mike say midsummer of 1947, the 721/722 was completely designed and the plant was making the pilot quantity of 100 (?) in 30-06 (always first) and Rutherford with an engineer Don Luster was starting the design of the 851 shotgun which finally was to have the model name of "Model 11-48".

It will sound like heresy to you but the 721/722 was of much less importance than the 851. Prewar, Remington had never done well with bolt actions. Even the Model 70 was sold in much smaller numbers than the 94. Even if the 721/722 was to have great acceptance, the numbers would be smaller than the yield from pump and auto shotguns and pump and auto rifles. The 721 related to no ~~er~~ gun in the factory. The tooling that would make 851 would also make a pump shotgun, rifles etc and etc. This was the hind-
sight. Reality was that the excellence of the 721 prompted sales
Plaintiff's Appendix Page 11
(Confidentiality Motion)

-3-

and lower price

in numbers beyond anyones expectations. Its excellence in effect created the market. The public fastened on to bolt guns.

When I started with Mike, our job at the moment was to get the Williams floating chamber out of the 550 22 rifle. The plant was busy restarting its line to make the shotguns and rifles it hadn't made in wartime plus 100 721s. And the big technical worry was the new shotgur to come. The order was to be first the bolt rifle, then the autoloading shotgun, then the pump, then the pump rifle then the autoloading rifle.

I would have gathered that the design team on the 721 was Mike with Dana McNally helping and John Howell helping and Homer Young. I never met Dana McNally. He apparently went back to Maine to help his folks run a hunting camp. I never met Jack Howell but he must have been a tremendous guy and I have a lot of respect for his work. I think he must have made big contributions to that bolt design. He had designed a pump centerfire rifle that an engineer two boards back, Crawford Hayes was testing. I was impressed because Hayes fired 5,000 rounds through the model gun with no malfunctions; in get this, 300 H & H Magnum! And this gun had a die-cast aluminum receiver. The Company never accepted this gun I think because of the diecast receiver. A cartridge fracture might have been serious although today the '16 (similar) is not questioned. I agree with the companys judgement but Rutherford didn't.

The 100 721s from the pilot operations came and were fine. But suddenly all Hell broke loose. John Lewis said the firecontrol violated a Winchester patent and the gun couldn't be sold. Pete Rutherford put four of us on that job and for maybe two or three weeks, we all read that patent, sketched ideas etc. Rutherford reported to Corporate that we had a big serious problem and that there would be substantial delay in announcement. Pete always encouraged us with "make it new, don't copy, think big" make a new arrangement completely, etc. It suddenly came to me that the part could be divided into two similar parts, one a safety cam and the other a sear. The factory had plenty of the thick stamped pieces on hand which could be thinned on a surface grinder to get production going quickly. Pete seemed almost disappointed with that solution (too simple ?) but Mike liked it and John Lewis said Go, Go.

I should explain that John Lewis had become patent attorney after Del Greens retired. John had been a civilian patent attorney in the Ordnance Department and we had common friends in the service.

The gear I mentioned as having been stamped. Ilion R&D had a Chemical Metallurgical section and a metallurgical engineer, J W Miller, would later start work leading to strong but inexpensive powdered metal parts.

Other calibers of the 721 came and all was well, although Mike was tense, overstressed from the fire control problem. The first 722s came through in the all-new 222 caliber. We got the first samples late in a week. They wouldn't feed. The base of the cartridge would pop out of the receiver guide rails before the bullet nose was in the chamber. And the fired case when extracted would spin madly then fall back into the action rather than eject to the right. That Saturday, Mike and I and the Plant metallurgist Kelly Chadwick went duck hunting and Mike had a nervous breakdown in the duck blind. Monday morning found me as the resident "expert" in the 721/722 and it was a hairraising experience fixing that 222 feeding problem under pressure from the production guys standing around the desk asking, "What do you want to do?" Mike was out ill and I would rather have been out hunting. But a lot of people were helpful. I found out from the old timers that a good bolt gun would not only put the point of a bullet into the chamber but also "put the bullet point only into an annular area outside the primer so that the point of a Spitzer bullet feeding at high speed into a chamber could not possibly hit a live primer of a round inadvertently left in the chamber". I don't know whether guns made today have that quality. We used toolmakers blue and dummies to develop this.

I mentioned that Mike was under stress. Mike was a crack shot with a rifle and understood what in the action, the bore, the chamber, the breeching, bedding etc would make accuracy. He loved the details of accuracy. Me, -- I liked actions, feeding and sometimes enjoyed shooting a good rifle at a bench -- but not often. The plant engineers, production and inspection, all were production driven. Mike, all by himself had to break often the bad news, "That isn't good enough" or "it doesn't shoot good here's why". Mike not only designed the gun but also set the standards that later earned the accolade for "out of the box" accuracy. He stubbornly held out for "in the limits", quality!

I remember too that while he was out, some of the salesmen were reporting that the trade folks were saying the spring driven ejector in the bolt "looked weak" and why didn't we copy the ejector of the Model 70. I was in Alvis' office talking about that and had a Model 70 in my hands with dummies that just happened to be the 220 grain variety. I slammed the 70s bolt back real hard and fast. That heavy dummy flew out and struck his office window. That ended that suggestion.

The fire control of the 721/722 was interesting to me because it was one of the first "blocked sear" guns I had ever seen. We used the terms "blocked sear" and "hooked sear". The Colt revolvers, Win 94 and Mauser 98 all had what we termed hooked sears. Imagine that the shooter takes a bead on the target and starts his squeeze. As the sear rotates to release the hammer, the hammer must slightly overcock. If the trigger squeeze is stopped when the sear is half out of the hammer notch, the main spring tension (force) and the hook angle tend to make the sear reseal itself fully in the hammers notch. The same sequence occurs in the Springfield or Mauser. If the effort to complete the second stage of trigger pull is discontinued, the force of the main spring contributes to the effort of other return springs. In the blocked sear arrangement, the striker doesn't have to retract as the trigger is pulled. Pull can be lighter because it doesn't have a component from the main spring. And the weight of pull doesn't have a variable resulting from having to precisely machine accurate angles on the hammer notch and the sear itself.

I think the blocked sear originated with the Sweany (sp?) trigger. I would guess when John Lewis first reviewed the 721 design for infringement, maybe either the Sweany hadn't been patented or he overlooked it. Maybe in the interval, Winchester had bought the Sweany to use on a later Model 52. I don't recall.

The other feature of the 721 arrangement that stood out in my mind was the fact that the trigger was dynamically balance. Its shape was such that mounted on a pin for rotation, a force or impulse from any azimuth could not induce movement of the trigger. Jar the butt to the ground as hard as you wish but that trigger wouldn't jar off. In theory at least. I've heard stories that they have but I am not able to explain why it could. The Model 70 by contrast has a trigger with its rotating pin mount just under the receiver with the entire mass of the trigger swinging below (or backward if the butt is thumped to the ground) The Springfield, Enfield, Mauser are all grossly dependent below the receiver. Jar-off is prevented by the single stage motion where the trigger can have major movement prior to let-off. Be cautious with devices that block out the single stage movement. Big trigger "slack" can absorb an awful lot of jar-off energy. I can remember that with designs on the board, we made cardboard cutouts of trigger shape and pin mounted them to see if they were rotationally neutral. Today's computers would do that quickly.. The desirability of a balanced trigger will be apparent also if you, as part of the 700 story, take up the XP100 pistols which, think have extra parts in a sort of trapeze arrangement intended to prevent jaroff.. by maintaining dynamic balance. even when the trigger is several inches away from the sear.

The 721 started to work as intended and production took off. I decided I had better buy one. The lab had just finished an accuracy test of 222s— ten guns with ramp front held on by screws and ten guns with brazed-on ramp. I asked the technicians which was most accurate and then bought the gun with that serial. And stopped off at the wood job to get a better stock.

But things were not good in the department. The design of the auto shotgun was stalled- no working model. A centerfire companion to the Howell-designed diecast pump rifle (an auto-loader) didn't work. Rutherford was retired and his 851 designer transferred. A new Project Manager from duPont showed up with three engineers and a working model of a streamlined 851. We had heard rumors about this and what a "bad" man he was and suddenly I am meeting him and being told that I will work for him and design a new pump action shotgun. His name was Lexie Ray Crittendon and during the war years at Ilion, he had designed the Springfield 1903A3 and A4 models. And he had been on the wartime R&M committee working with GM personnel on the Remington problem.

He turned out to be one of the most brilliant and likeable leaders I ever had. I worked briefly on the bolt design for what became the 740-760. Then I designed the 870 shotgun. That went well and even as the plant was starting to produce the last-tooled angles, 28 & 410 of the Model 11-'48 long-recoil shotgun, he put some funds and I designed what became the companys first gas operated shotgun, Sportsman '58. With a new gas system, the M1100.

Ray Crittendon had the brilliance to steer towards that family of guns principle which let rifles and shotguns, pumps and autoloaders, 22's and centerfires to be made on common tooling with interchangeability of stocks, firecontrols, etc and etc.

He helped me too in the design of a 15 pound semiautomatic caliber .50 Spotting Rifle for Ordnance.

Crittendon was on loan from duPont and went back there about 1951. My pay came from Remington but technical direction from Ray. In the course of this crash design work, there had been some resentment in Ilion that Ray was calling the shots and I resisted the opportunity to 'inform' my Remington bosses as problems came up. Things became uncomfortable and I sought transfer and went to Bridgeport research in 1951 or 1952. Worked on cartridge powered devices—stud drivers, pipe cutters, cattle stunners in sort of pioneering research. Then I ran chain saw design for a company that Remington bought then back to Bridgeport for other stuff including 310 Skeet and then with two others, created a new division that manufactured wide grit edge cutting tools. Retired in 1980 from that activity (Abrasive Products Division).

-1-

I take you through this long travel for a reason. My time with the 721/722 was a few months, maybe 5 or 6 in 1947. And I got my name on a patent with luck-- others spent much more time on that gun. BUT I MET HER AGAIN ! And its funny.

In 1974, I again encountered the gun. A friend was intent on making up his "ultimate rifle". He had started by buying an FN bolt action in the white as made by FN in Belgium. Action only-no barrel. He asked me if I could make the action smoother and silkier. It already was, to me at least, very smooth. I think FN has some process by which they case-carburize medium carbon nickél steel. His criteria was that with the action aimed upward, the bolt should slide rearward of its own weight. In his sample it "almost" would, especially if it was given a little shake. But of course a 721 I was comparing it with wouldn't. But this shocked me into realizing that while the follower, gun empty, would rise until it came into frictional contact with the bolt body, it didn't have to be this way. It could instead stop against the receiver. I grabbed a tin follower from a 721, cut two slits with a hacksaw, bent up a lip and presto ! A free fall bolt. The next morning, I walked into Jack Lewis office and told him I had an "improvement" for turn-bolt rifles. He laughed and said, "You can't. NO way, . There have been so many thousands of patents issue for turn-bolts that you couldn't possibly have anything new". I handed him the lipped follower and asked him to try it in his 721. The next morning he said, "Get me an Inventions report". He filed but he had died when it issued. I sent a copy of the Inventions report to Ilion. The subsequent Patent Attorney when the patent issued gave a copy to the Research Director but he didn't understand it. It issued in 1975 and lay unused until 1983. And I gather it is the follower , "none contact" that you describe in the book. It was "lost" for eight years.

This was the easiest patent I ever received. Inspiration took five minutes. It took maybe twenty minutes to make and try the model. And maybe two hours to write an Inventions Report. I've worked in engineering groups where maybe three or four guys might work two or three years on ~~an~~ idea or project and come up zilch.

That something like this could happen was symptomatic of what had happened with the Ilion operations. Prewar, ammunition made money: Ilion guns didn't. Postwar, the new guns were forecast to be sold in what were thought to be optimistic quantities. Due the economics of the redesigned line, each new gun was profitable at even lower volumes. The tremendous post war economic growth boosted sales quantities fantastically and profits were up exponentially. There was a feeding frenzy for jobs, activities connected with new guns and designs for new guns. And the groups in power closed ranks against outside inputs. That was one reason I left Ilion and I think the reason maybe why Mike got shuffled off to

a newly designated "Custom Shop". It was a ruse so that the Department could get free to design their own 721 improvement which became the 725. But even in this new Custom Shop, Mike was hemmed in. He was free to make altered models of the 721 but was not encouraged to make better versions of "target" shotguns for Skeet and Trap. Nor improved versions of 760 or 742. Or Police Guns. Or anything new.

January 27, 1992

I took a little "time out" here. For the Xmas holidays and also for time to get the Flu. Even with the shots.

I enjoyed your chapter on the 720. I sort of have one--all most. I bought an Enfield (Ilion manufacture) from the DCM in maybe 1947 or 48. Took it into the factory in a case and told the Guards to enter it into the books as a Remington 257 Roberts which they did without examining it. I then stripped it to the receiver and bolt. Through the Cashier, I bought 720 parts such as bolt stop, magazine box and filler, trigger plate, sight and guard etc. But I wasn't permitted to buy a barrel. In a deserted warehouse, I found a wooden tub of dusty barrels for the Model 30. All were 30 caliber except one was 257. The Model makers in the tool room helped me. Typically, they found the cutters to mill off the receiver sight. I started to set up to mill off the rear sight whereupon they would push me to one side and do the job saying, "You'll ruin it". They inletted for the new bolt stop. I turned on the barrel but they pushed me aside and finish chambered it, asking, "what weight bullet?" and I said 117 grain. Every time I shoot it it reminds me. You can just start to feel the 117 grain bullet enter the rifling as the bolt finishes closing. My metallurgist friend Kelly Chadwick saw the gun and said, "Where did you get that barrel?" I mentioned the dusty tub and he said, "I know those barrels. I put them there because they all failed magna-flux testing. It will split open when you shoot it". He and I took the gun to the proof house and had it proofed. Several rounds. He admitted that the barrel had to be OK. I put a "cock on opening gadget" from Numrich on it and have shot several deer with it. I had admired Ned Roberts and his development work on this round. It has low noise which is welcome in New England. I think the +P round is silly. If one needs more power, get a 25-06! When Ned Roberts did his thing, there was no Speer, no Hornaday, no bullet sources except the Army, Winchester and Remington. For 25 caliber, a shooter could use

bravado, cockiness as I was designing the 870. The Part Prints were being released to tool up (machinery and fixtures and dies) as fast as they came off the drafting boards and before any of us had seen and handled a model. I would never want to go through this again and never had to.

Management too took a lot of risk and it was never really recognized what the risk was. In 1946, those soldiers home from the war started to buy guns. The quantities were big, prices rose so that ^{over} the Ilion plant with its too-expensive prewar designs started to make money. But as the new models came along and because floor space was tight, the machinery to make Model 11 had to be scrapped to make Model 11-'48. And the machinery to make Model 31 had to be physically scrapped to make room for the 870. The big risk was, WHAT IF THERE HAD BEEN NO USER ACCEPTANCE OF Model 11-48, of 721, of 870? And the old tooling was forever gone! You couldn't go back.

There was another risk involving Ilion labor. The prewar guns had a lot of hand filing and fitting. Labor rates to workers reflected that. The newer guns with the General Motors metal-cutting modern machinery, tooling, gauging and quality control made guns that literally could be assembled by unskilled labor in departments where a metal cutting file could be outlawed. Labor rates for such work ^{is} justifiably lower. The company would have been justified in dropping wages. But it instead opted to do this by long term attrition protecting the wages and dignity of older workers. Very creditable. The whole line of gun products, all the machinery was changed, the forge shop and stamping shops closed to buy competitively "outside", workers retrained to stop filing, to stop gunsmithing and use gauges, quality control methods without curtailing shipments and to do so with labor "peace" and minimum disruptions. Quite impressive performance. And unit volume rose, market share increased and profits went up. It was quite an event.

Your book gives the Ilion folks a lot of the credit for cartridge innovations. For the immediate post-war era, I'm not sure this is correct. The Bridgeport plant had an R&D section with skills in interior and exterior ballistics and electronic and high speed photographic innovations.

I have the impression that calibers 222, 222 Magnum, 244 and 280 came as products from that lab. And there was prewar justification for these.

The 222 round came because the company postwar wanted to pro-

vide an alternative to the Hornet that was first, rimless and second, ^{had} little more zing. The mag version was an alternative to the Swift. I forget the justification for the 244. The 280 was in response to the "pressure problem" of the 270.

I don't really know whether it is truth or fiction but the story went that when Winchester first devised the 270, the lots of powder they had on hand were "friendly" in that the published velocity could be had without exceeding max individual pressures. When REMINGTON loaded production quantities, it usually had to drop below published velocity in order to stay within pressure limits. WINCHESTER it was rumored was a little less likely to do this. I have never shot a 270 from the shoulder because of this. The 280 from REMINGTON permitted more margin through larger case volume so it could be loaded easily within both velocity and pressure specs. Probably post war improvements in powder manufacturing eased the "pressure problem".

The four rounds mentioned above came to Ilion really as fait accompli. But I do confirm that the Ilion people were absolutely originators and sponsors of the ~~244~~ Magnum within the Company.

I always felt the Company missed the boat with the 350 Magnum. There was a loyal following of older deer hunters who swore by the 35 Remington round. Many of them might have been ready converts and buyers if that round had been named 35 Remington Magnum. With that 24" barrel, short action and maybe the 158 grain 357 pistol bullet, it would have been a zinger. Even I would have bought one.

It is early March and I had better conclude this "short" note to you. I have an old document that seems to relate to misfires in the 720. Also I have copied my file on the non-contact bolt. I regret I have no photos that I might send. I will flip through the book again and comment if appropriate. Good luck on your future ventures.

With best regards,


Phil Haskell

3/19/92

Notes from rereading-

22 & 14 To me, the important elements of the fire control is the fact that main spring force exerts only a frictional resistance which is quite constant in value, ^{why} the fact that the shape/mass of the trigger about its mounting point, the pin around which it rotates, is dynamically balanced so that forces that might arise from dropping the gun when the safe is "Off" or otherwise banging the gun around, can not impart movement of the trigger--especially movement which in effect could fire the gun even though the shooters finger isn't touching it.

I like also the fact that the rear vertical surface of the safety cam is angled so that -- pushing the safety to "On" forces the cam upward which in turn produces slight rearward movement of the firing pin head, This movement of the firing pin head is very slight but I think it is reassuring to the user to confirm that the arm is truly on "Safe" And of course this same angle "speeds" the sear down out of the way after trigger pull to help make lock time short.

In the era in which the 721/722 was designed, use of telescope sights was not widespread and many people used the receiver sight holes. The most widely known scopes early on were low powered and small in diameter. I think the 330 Weaver had a body diameter of $\frac{3}{4}$ and the Lyman Alaskan I think was $\frac{7}{8}$; both had straight tubes with only a slightly enlarged eyepiece diameter. With either mounted, the line of sight was only a little bit higher than iron sights and the stock comb was still felt against the cheek. But wow! When you mounted a Lyman target scope, your cheek had to come up off that stock. I think there were accessory combs shooters added as Weaver went to a 1" tube body and the magnifications started to grow. I think within the Company there was talk that the bolt guns might have to be shipped with both "standard" comb and "high" comb. Someone in Ilion hit on the idea of making the iron sights higher so that the comb was useful under all conditions and that was a fine idea.

As you mention in the book, some users mount huge scopes on the gun. And then complain they can't see a moving deer. I used to urge hunters going to Maine, New Hampshire or Vermont to use a $1\frac{3}{4}$ power in a Weaver pivot mount and hunt with the scope swung out of the way but quickly available if they get a shot at a non-moving deer at long range. With the pivot mount, one has to carry an angled screw driver and learn to keep the pivot tension quite rigid.

Plamun's Appendix Page 23

gunners know that it is easy to brighten the bead sight
to '00. They are made I guess using powdered metal pro-
duced with an alloy rich in copper. Its possible using a
or nail "emery" board or a fine cut file to make one or
strokes straight across the bead whereupon the face will
it "glow". But--- only for a week or so before oxide
is. ~~But~~ this brightened bead has high visibility against
rest background. And it takes only a minute to do when the
on comes round.

I never knew there was a change in the height of the rear
over bridge. I guess I have mounted a few scopes where I
d have used shims. And there were other matters you mention
e book that were new to me. I was never "bored" reading