What Today's Sportsman Owes to the Cave Man

THE SIX STAGES IN MAN'S DEVELOPMENT OF HIS MEANS OF DEFENSE AND OFFENSE

THE FIRST MISSILE. THE SLING. THE BOW AND ARROW. THE CROSSBOW. THE FLINTLOCK. THE MODERN AUTOLOADING RIFLE

The Dramatic Story of the Onward March That Has Raised Man From the Skulking, Hiding Creature of the Dawn of History to the Mastery of His Earthly Domain.

Extracts From "A New Chapter In an Old Story." Reprinted by Courtesy of the Publishers.

HOW IT BEGAN

A NAKED savage found himself in the greatest danger. A wild beast, hungry and fierce, was about to attack him. Escape was impossible. Retreat was cut off. He must fight for his life, but how?

Should he bite, scratch or kick? Should he strike with his fist? These were the natural defenses of his body, but what were they against the teeth, the claws and the tremendous muscles of his enemy? Should he wrench a dead branch from a tree and use it for a club? That would bring him within striking distance, to be torn to pieces before he could deal a second blow.

There was but a moment in which to act. Swiftly he seized a jagged fragment of rock from the ground and hurled it with all his force at the blazing eyes before him, then another and another until the beast, dazed and bleeding from the unexpected blows, fell back and gave him a chance to escape. He knew that he had saved his life, but there was something else which his dull brain failed to realize.

HE HAD INVENTED ARMS AND AMMUNITION!

In other words, he had needed to strike a harder blow than the blow of his fist at a greater distance than the length of his arm, and his brain showed him how to do it. After all, what is a modern rifle but a device which man has made with his brain, permitting him to strike an enormously hard blow at a wonderful distance? Firearms are really but a more perfect form of stone throwing, and this early cave man took the first step that has led down the ages to present day arms and ammunition.

This strange story of a development that has been taking place slowly through thousands and thousands of years, so that today you are able to take a swift shot at distant game instead of merely throwing stones—this story we shall briefly tell.

The Earliest Hunters.

The cave man and his descendants learned the valuable lesson of stone throwing, and it made hunters of them, not big game hunters—that was far too risky. But once in a while a lucky throw might bring down a bird or a rabbit for food. And so it went on for centuries perhaps. Early mankind was rather slow of thought.

At last, however, there appeared a great inventor—the Edison of his day. He added the second link—the sling.

The Use of Slings.

The new weapon worked with great success, and a little practice made expert marksmen. We know that most of the early races used it for hunting and in war. We find it shown in pictures made many thousands of years ago in ancient Egypt and Assyria. We find it in the Roman army, where the slingman was called a "funditor."

We find it in the Bible, where it is written of the tribe of Benjamin: "Among all these people there were seven hundred chosen men left handed; EVERY ONE COULD SLING A STONE AT AN HAIR BREADTH AND NOT MISS." Surely, too, you remember the story of David and Goliath when the young shepherd "prevailed over the Philistine WITH A SLING AND WITH A STONE."

Something Better.

Yet they had their drawbacks. A stone slung might kill a bird or even a man, but it was not very effective against big game.

What was wanted was a missile to pierce a thick hide. So through long years of groping for "something better" the bow and arrow was evolved and played a most important part in the development of arms and ammunition in many lands.

A Shooting Machine.

But the age of machinery was coming on. Once in awhile there were glimpses of more powerful and complicated devices to be seen among the many forms in which the bow and arrow were constructed.

A new weapon now came to the center of the stage. It was the crossbow, the first real hand shooting machine. This was another big step toward the day of the rifle. The idea was simple enough. Wooden bows had already been made as strong as the strongest man could pull, and they wished for still stronger ones—steel ones. How could they pull them? At first they mounted them upon a wooden frame and rested one end on the shoulder for a brace. Then they took to pressing the other end against the ground and using both hands. Next it was a bright idea to put a stirrup on this end in order to hold it with the foot.

Still they were not satisfied. "Stronger, stronger!" they clamored. "Let us try mechanics!"

So they attached levers, pulleys, ratchets and windlasses until at last they reached the size of the great siege crossbows, weighing eighteen pounds. These sometimes needed a force of 1,200 pounds to draw back the string to its catch, but how they could shoot! Notice the pictures of the crossbows and you will see that now the weapons began to look a little like guns as we know them. They had shoulder pieces.

And Now For Chemistry.

Human muscle seemed to have reached its limit, mechanics seemed to have reached its limit, but still the world clamored, "Stronger, stronger!" For answer man unlocked one of the secrets of nature and took out a terrible force. It was a force of chemistry.

Gunpowder was probably first discovered by the Chinese, though our civilization had to work out the problem for itself.

It is recorded that Roger Bacon, a monk, discovered what was practically gunpowder as far back as the thirteenth century.

Berthold Schwartz, a monk of Freiburg, studied Bacon's works and carried on dangerous experiments of his own, so that he is ranked with Bacon for the honor.

And then began the first crude, clumsy efforts at gunmaking. Firearms were born.

It took centuries for guns to become perfect enough to take the place of bows and crossbows.

The Coming of the Matchlock.

Hand bombards and culverns were among the early types. Some of these were so heavy that a forked support had to be driven into the ground, and two men were needed, one to hold and aim, the other to prime and fire. How does that strike you for a duck shooting proposition?

Improvements kept coming, however. Guns were lightened and bettered in shape. Somebody thought of putting a flash pan for the powder by the side of the touchhole, and now it was decided to fasten the slow match in a movable cock upon the barrel and ignite it with a trigger. These matches were fuses of some slow burning fiber, like tow, which would keep a spark for a considerable time. Formerly they had to be carried separately, but the new arrangement was a great convenience and made the matchlock. The cock, being curved like a snake, was called the "serpentine."

A Nuremberg inventor in 1515 hit on the wheel lock. In this a notched steel wheel was wound up with a key like a clock.

Flint or pyrite was held against the jagged edge of the wheel by the pressure of the serpentine. You pulled the trigger, then—"whir"—the wheel revolved, a stream of sparks flew off into the flash pan, and the gun was discharged.

And Then Came the Flintlock.

Everybody knows what the flintlock was like. You simply fastened a flake of flint in the cock and snapped it against a steel plate. This struck off sparks which fell into the flash pan and fired the charge.

A Minister Takes a Hand.

Jumping over to the year 1807, we have the Rev. Alexander John Forsythe, LL. D., getting his patent papers for something far better than even the steady old flint. He had invented the percussion system. In some form this has been used ever since.

Caps and Breechloaders.

Primers were tried in different forms called "detonators," but the familiar little copper cap was the most popular. But now we come to another great development, the breechloader.

Although found in a crude form as far back as 1537, it wasn't until fixed ammunition came into use that the breechloader really came to stay, and that was only the other day. You remember that the civil war began with muzzle loaders and ended with breech loaders.

France Contributes Cartridge Idea.

Houiller, the French gunsmith, hit on the great idea of the cartridge. If you were going to use powder, ball and percussion primer to get your game, why not put them all into a neat, handy, gas tight case? Simple enough when you come to think of it, like most great ideas. But it required good brain stuff to do that thinking.

THE ROMANCE OF MODERN ARMS

A Refusal and What Came of It.

TWO men, a smith and his son, both named Eliphalet Remington, in 1816 were working busily one day at their forge in beautiful Ilion gorge when, so tradition says, the son asked his father for money to buy a rifle and met with a refusal. The request was natural, for the surrounding hills were full of game. The father must have had his own reasons for refusing, but—IT MADE REMINGTON ARMS!

Eliphalet junior closed his firm jaws tightly and began collecting scrap iron on his own account. This he welded skillfully into a gun barrel, walked fifteen miles to Utica to have it rifled and finally had a weapon of which he might well be proud.

In reality it was such a very good gun that soon the neighbors ordered others like it, and before long the Remington forge found itself hard at work to meet the increasing demand. Several times each week the stalwart young manufacturer packed a load of gun barrels upon his back and tramped all the way to Utica, where a gunsmith rifled and finished them. At this time there were no real gun factories in America, although gunsmiths were located in most of the larger towns. All gun barrels were imported from England or Europe.

A Machine to Save His Shoulders.

The broad shoulders of Eliphalet junior must have ached under his load, for his busy brain soon devised machinery with which he could do the rifling for himself. Thus the forge became a complete gun factory, receiving material as scrap iron and turning out finished rifles. Shotguns also were made. Up in the gorge was a ledge of red sandstone. This furnished the first grindstones, which ground down the barrels to proper form by power from the brook. Thus father and son worked away briskly, creating a brand new American industry.

Bursting the Shell.

In 1828, the same year that the elder Remington met his death through accident, the business outgrew the little shop by the brookside—burst its shell like a "seventeen year locust"—and bought a large farm near the Erie canal. There today the great plant stands.

In "A New Chapter In an Old Story" several pages are given to the thrilling story of the part played by the fast growing industry in map changing wars and in the progress of nations the world over.

Ammunition Now Receives Attention.

It takes more than a perfect gun to make good shooting—the ammunition also must be right. So it was only natural that, spurred on by the lessons of the civil war, the country should look for metallic cartridges for the new breechloading arms. Marcellus Hartley, prominent in the firearms and ammunition business of the period and in later years a guiding spirit in the Remington organization, interested his partners and others in the opportunity, and on Aug. 9, 1867, the Union Metallic Cartridge company was incorporated, in later years combining with the Remington Arms Company. The oak had taken root.

At first the new firm made rim fire cartridges (for the center fire had not been invented), percussion caps and shotguns, but soon dropped the guns to concentrate on ammunition.

The Genius Comes.

Mr. Hartley and his associates by their business sagacity had created the opportunity and were on the lookout for a mechanical genius. He came. His name was Alfred C. Hobbs, superintendent of the Howe Sewing Machine company. After five years Mr. Hobbs brought his great ingenuity solely to the problems of cartridge making.

For twenty years he remained in charge, inventing nearly all the special machinery that made the business so successful. It is difficult to get a permit to visit the Bridgeport factory—the mechanical secrets are so valuable.

Paper Shells Are Made.

In 1873 the company bought from C. D. Wells of Springfield his equipment for making paper shells which were practically all handmade. Soon machines were invented for this work—an important development, because shotguns were rapidly increasing in use. This was due to the fact that as the country became settled and big game grew harder to find sportsmen gave more attention to wing shooting. A supposedly ample stock was made up, and the company advertised that such a shell was on the market. Orders aggregating 10,000,000 fairly flooded the plant, thus showing the power of advertising and the size of the market.

The first U. M. C. shot shells were of brass, but the paper shell followed. At first furnished to be loaded by sportsmen, the factory began supplying them ready loaded in the eighties. Today several hundred millions are turned out each year.

A Glimpse at Ammunition Making.

Doesn't it strike you as remarkable that in an output of something like 4,000,000 per day every cartridge should be perfect.

Such things are not accidental. The secret is IN INSPECTION. Let us see what that means. It means laboratory tests to start with. Here are brought many samples of the body paper, wad paper, metals, waterproofing mixture, fulminate of mercury, sulphur, chlorate of potash, antimony sulphide, powder, wax and other ingredients and even the operating materials, such as coal, grease, oil and soaps. In this room we see expert chemists and metallurgists with their test tubes, scales, Bunsen burners, retorts, tensile machines, microscopes and other scientific looking apparatus busily hunting for defects.

For example, one marker is examining a supply of cupro nickel such as is used in jacketing certain bullets. A corner of each strip is first bent over at right angles, then back in the other direction until it is doubled, then straightened. It does not show the slightest sign of breaking or cracking in spite of the severe treatment; therefore it is perfect. Let but the least flaw appear and the shipment is rejected.

Just read this little summary of one stage only in the inspection of empty shells:

"SHOT SHELLS are received by inspection department after the heads, tubes, bodies, primers and battery cups have been carefully examined, gauged, sized and tested. They are then—

"First.—Gauged for body diameter in chamber gauges.

"Second.—Gauged for head thickness and head diameter, and if any quantity of these defects be found all shells in inspection department of that particular brand are returned to manufacturing department to be either corrected or scrapped.

"Third.—Primers carefully examined.

"Fourth.—Entire shell examined for any blemish which might mar the general appearance. Slight scratches on head or spots on bodies are sufficient causes for their rejection. The average consumer would be unable to determine in many cases, if shown our scrap pile, why the shells in question had been rejected."

Similarly metallic cartridges must have shells gauged for size of pocket, heads gauged for diameter, shells carefully inspected inside and out for flaws, dents and buckled necks, primer pockets examined for shape and condition, shells gauged for length, shells gauged in chamber gauge for body diameter, necked shells gauged for profile and distance from head, shells examined for depth of primer seating, condition of anvil and exploded primer and shells finally gone over for general defects that may have escaped other inspections.

Weighing Bullets.

In the same spirit workers with delicate scales, like those you see in a druggist's prescription department, are weighing the bullets carefully, one by one, hour after hour, day after day, giving all their thought and attention to this one thing, while other employees explode about 2,000,000 primers a year in testing their sensitiveness.

The loaded shells and cartridges go through a series of gauges and tests seemingly unnecessary after all that have preceded the loading. For example, it does look a little wasteful to see men take shells at random from the various loading machines and packing tables in order to cut them up and examine the contents. When we learn that a half million perfectly good shells are thus destroyed each year it impresses us as painstaking run mad, but it helps to explain why there are no misfires in your U M C box.

Testing For All the World.

And then at last come the shooting tests. Five hundred thousand rim fire cartridges, 250,000 center fire cartridges and 500,000 loaded shells must still be sacrificed on the various shooting ranges each year in order to study velocity, intensity of sound, penetration, pressure and shot pattern; also the mushrooming qualities of soft point bullets and the rigidity of those with metal cases. Each of these points in what is known as the "ballistic" work has special experts and apparatus. There is no guesswork anywhere.

How Shot Is Made.

How many of our readers have ever seen a shot tower? The great building at Bridgeport, of solid masonry, metal and concrete, is a sight worth miles of travel. Two large iron cylinders descend in the center, coming down through the ceiling from above. We are invited to look through an open port in one of these.

Raining Shot.

We see nothing but the whitened opposite wall, against which a light burns.

It appears absolutely empty, though within it is raining such a swift shower of invisible metal that if we were to stretch our hands into the apparently vacant space they would be torn from our arms.

A large water tank below is churned into foam with the impact of the falling shot, and as we look downward we make out finally the haze of motion. It is so interesting that we take the elevator and rise ten stories to the source of the shower.

Here high in the air are the large caldrons where many pigs of lead, with the proper alloy, are melted into a sort of metallic soup. This is fed into small compartments containing sieves or screens, through the meshes of which the shining drops appear and then plunge swiftly downward.

Cascades of Shot.

But this only begins the process. Taken from the water tanks and hoisted up again, the shot pellets in a second journey down through complicated devices are sorted, tumbled, polished, graded, coated with graphite and finally stored.

The building is almost bare of workmen; everything is mechanical.

One pretty sight is that of cascades of shot pouring out of spouts and rolling smoothly down glass inclines, tier above tier. Here perfect shot, moving more swiftly than the occasional imperfect ones, shoot over low partitions, which check the latter and drop them into separate bins.

Some Secrets of Arms Manufacture.

From the ammunition plant let us travel to the great factory at Ilion that was once a forge shop. As in the cartridge factory, we find here similar vistas of swiftly whirling shafts, belts and pulleys, long rows of resounding machinery and armies of operators.

Making Barrels.

One of the most important features is, of course, the making of barrels. The machines for drilling and boring are the best that money can buy and the operatives the most skilful to be found anywhere. Care at this stage reduces the necessity for straightening later. Every point is given the minutest attention. In drilling 22 calibers, for example, the length of the hole must be from 100 to 125 times the diameter of the drill.

Taking Off 2-1000 of an Inch.

The boring is an especially delicate task. In chokeboring your shotgun, for example, the final reamer took off only 2-1000 of an inch. Think of such a gossamer thread of metal! But it insures accuracy.

Looking at Reflected Lines.

But here is the inspection department. Hanging in the windows are translucent frames with a black line across the center of each. You will see one of the inspectors take a barrel from the waiting rack, hold one end toward the light, squint critically through the tube and lay it aside approvingly.

You pick it up and follow his example. First you point it straight at the black cross line on the frame. Then you tip up the farther end ever so little and see how two reflected shade lines form on the shining inner surface and run down the barrel toward your eye. These lines are straight as a die; therefore the barrel is perfect. Should either one waver the slightest fraction the inspector's quick eye at once detects it.

There are 240 inspection points and 517 gauges must be used—forty-nine on the guard, forty-six on the receiver, thirty on the breech block, and so on. On the receiver for the No. 10 repeating shotgun, however, seventy gauges are used, and thirty-one for the trigger alone.

Beyond the Power of Sight.

Some of these gauges are marvels of delicacy, but there is one machine used which perhaps has never been equaled. Not only will it make measurements to one twenty-thousandth of an inch, but it is actually sensitive to differences of a ONE HUNDRED THOUSANDTH OF AN INCH. Such a minute dimension we cannot even imagine. It is beyond the range of the most powerful microscope, and yet here is a piece of mechanism which can really detect it.

Testing With Loads.

First, then, is the barrel as perfect as we believe it? We know that it is perfect in gauge and workmanship, but is there the slightest chance of an invisible flaw in material? The original tests of material made this very, very unlikely, but we will take no chances. If there be such a flaw it must burst at more than double the service charge.

Accordingly the gun is laid in a rest with its muzzle pointed through an opening in the wall into a bank of sand. We get behind a steel plate for safety and put cotton in our ears. The trigger is pulled by means of a string. Bang! The gun is unharmed. Its strength has been assured.

Then, follow tests for action and speed, and if the gun be an auto loader the swift rattle of its discharges is surprising. The well gauged parts move as smoothly as the works of a watch. And finally there are the target tests.

Firing at Targets.

Rifle after rifle in succession is laid in a rest and fired at a mathematically divided target upon the hillside.

The results are noted through a telescope. Difficulty at this point invariably rejects the rifle.

Shotguns are discharged at paper targets in the shooting gallery. We walk through the hallway that runs outside to the point where a boy is handling the targets. We hear a distant bang. The boy pulls a handle in the side of the wall and a frame emerges bearing a well peppered sheet of paper. This he unfastens and hangs up for reference, pinning a fresh sheet in its place. These targets must all be examined and every shot hole be counted. If in any case there be found less than 75 per cent of the shot within a circle of thirty inches from the center the gun is at once rejected.

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Here we find, a long way from the cave man, thousands of skilled mechanics producing arms and ammunition very different from the thrown missile of the stone age. And the part played in the wars of the earth has given way largely to the serving of peaceful hunters and marksmen.