

## The Shotgun Maker's Art.

The process of manufacturing gun metal and making it into gun barrels for shotguns may be classed as one of the fine arts. The past fifteen years have witnessed great changes and marked improvements in it. At one time gunmakers depended entirely for their material upon the supply of scrap, of fine iron and mild steel, such as horse shoes, nails, old coach springs, clippings of saws, steel pens and scraps, great and small, of all kinds. The pieces were carefully sorted and placed in a cylinder which, revolving slowly, polished and cleaned them by attrition one against the other. They were then cut into small pieces of uniform size and placed in the furnace until at a white heat or state of fusion. Then they were gathered together in a bloom, after which they were welded into a rough cube of iron.

This cube was rolled into bars and the bars cut into the lengths required, bundled together and again brought to a welding heat. Then they were hammered into rods 5-16 inch square or smaller or larger as required by the barrel welder for the work in hand. At one time fine Damascus barrels were made almost entirely from old coach springs. It was found that this metal would make very strong and fine barrels with a great freedom from 'greys,' or the specks that disfigure barrels, but do not impair their strength. It was thought that the peculiar wear to which the fine metal in the coach springs was subjected had a tendency peculiarly to fit it for gun barrel metal.

As the years rolled on the demand for coach springs exceeded the supply until at last gun barrel metal was made from a mixture of pig metal of the very best ores, and today barrels in twist, Damascus, laminated and plain steel are produced simply strong for all the uses for which the shotgun is intended. Inferior metal scraps of all kinds are used in making the barrels of the very cheap guns. Fine gun barrels must be made up from the very best of material, and the most expensive steel and iron that can be produced is incorporated in the best barrels, be they twist, Damascus or laminated work.

The pig iron first is placed in a furnace and reduced to a fluid state. This operation cleanses it from all dross. It is then permitted to cool. While the temperature is going down it is gathered and worked into blooms. It then goes to the stern hammer, under which it assumes the shape of square blocks. It then passes through various rolls until bars of the proper diameter and length are obtained. The hammering has condensed the metal and eliminated many of the impurities. The rolling has augmented its tenacity and ductility, elongating and ramifying the fibres. The mild steel to be used in connection with the fine iron is prepared in a similar manner and is made from the best Swedish pig iron and becomes extremely tenacious and elastic under the repeated heating, hammering and rolling. In these operations of preparing and refining the steel and iron there is a constant loss of metal. The loss in puddling is about 16 per cent. and in rolling 12 per cent.

The bars being now ready are cut into equal lengths, bundled together, put into the furnace, heated and welded and elongated by rolling into rods. This process of heating, rolling and hammering is gone through with from five to seven times in the operation of making good and first quality barrels. The quantity of mild steel used in good Damascus is about 60 per cent., and of fine iron 40 per cent. The percentage having been determined on, rods of each metal five eighths of an inch square are bundled together, steel and iron rods being sandwiched. The bundle is then brought to a white heat and the successive layers of iron and steel welded together and rolled out into a rod. The rod is again heated and placed in a machine for the purpose and twisted into rope form until it has from ten to fifteen turns to the inch. If a fine figure is desired, from four to six rods of iron and steel are used and bundled together, and by twisting down produce fine damascene work.

This severe twisting has shortened the rod to the desired length and increased its thickness 40 or 50 per cent. Two of these rods are now placed side by side with the twistings running in opposite directions reheated and welded into one and rolled into a flat rod or ribbon of say 1/2 inch by 7-16 of an inch for the breech ends of the barrels and 3/4 inch by 3-16 for the muzzled ends. The barrels or tubes are made in two parts

and in the operation of welding, called jumping, they are brought together in the middle. These rods are again heated and twisted in the form of a spiral tube; this tube is brought to a white heat and glowing under the master hand is by a quick and deft movement jumped on the anvil and the open coils welded together. The tubes are immediately placed on a grooved rest and hammered lightly to round them up.

The muzzle and breech ends of the barrels having been thus welded separately the next operation is to join them together. This is a very neat and artistic piece of work, but is quickly and perfectly performed. On first grade barrels it would require the inspection of an expert to detect the jointure, the whole tube from breech to muzzle presenting the appearance of being made from one coiling of rods. The ends of the two coils are heated and brought together, there is a light tap on the anvil and the welding is completed.

In all the operations of heating, hammering, twisting and rolling, the metal has been in the fire from seven to ten times, and under each manipulation has grown purer, stronger, with increased density and ductility, resulting in an exceedingly tough and wonderfully homogeneous product. The tensile strength of the good gun metal is enormous. There is a consumption of from fourteen to seventeen pounds of prepared gun metal in making a pair of 12 gauge barrels that will weigh, when finished, from 3 1/2 to 4 1/2 pounds. It has been estimated that a ton of prepared gun metal of good grade is worth from \$300 to \$350. It is hardly necessary to state, therefore, that the gun barrels are expensive to produce.

Damascus and laminated barrels are made from two or more rods of different kinds of metal. Twist barrels may be manufactured from one or more rods. When from one rod, it is simply coiled and welded.

The breechloader, whether for traps or field work, must be light so as to handle quickly, thereby reducing the fatigue to a minimum, and at the same time sustain its proportionate charge of powder. Hence, if the barrels are light, they must at the same time be strong; all of which is obtained by working the metal in the manner described. Fine gun barrels are very beautiful to the eye. The mild steel and the fine iron, being joined so intimately and regularly, form a beautiful curled figure in the damascus and a wavy figure in the laminated work. This figure is but faintly perceptible in the bright metal. It is only when the barrels are brought to a high polish and subjected to the brownish process that it is brought out. The dark lines show the steel and light the iron. The two blended, and turning regularly, look not unlike a piece of lace work. A fine gun is made by skillful hands. Expert workmen get high wages. It is, therefore to be considered that the price put on medium and fine guns today is not exorbitant. During the past ten years or so, laminated steel has fallen in disuse for gun barrels to an appreciable extent.

There is not a manufacturer of guns but has from time to time to wrestle with a customer on the subject of a burst barrel, and it is a fact that these bursts usually occur at or very near the muzzle, and the source carelessness on the part of the shooter in not observing the muzzle to detect mud, sand, snow, or other foreign substances that sometimes finds lodgment during a day's field.

To illustrate the great strength of good gun metal in resisting pressures the following experiments are of interest, the conditions being excessive charges of powder fired through a barrel that had been bored out to such a degree of tightness that a very light tap with a file handle would indent the metal. Indeed, so tight was the barrel that it had the appearance of a film. Beginning with 3 1/2 drs. of black powder measured by Dixon's No. 1 105 measure, the burst did not occur until 6 1/2 drs. charge was fired. The powder was increased 1/2 dr. until the bursting pressure was reached. Another barrel was burst under other conditions of pressure. The barrel yielded to the force 2 1/2 inches from the muzzle and was opened 4 1/2 inches; the shot charge reached the target paper intact, resulting in a pattern quite up to the standard of the boring; 1 1/4 ounces of No. 7 1/2 shot was used in the experiments. It is interesting and instructive to know that the conditions causing such a burst permit the shot to be fired out of the gun before the powder gas has destroyed the power of the barrel.

Some years ago another metal created interest among gunmakers. It was called silver steel. It is obsolete now. It contained scraps of steel of fine quality and no iron. The rods from which the tubes were made were 1/2 inch wide. A figure was obtained by the welding marks of these strips. At one time a Birmingham gunmaker advertised a metal called silver steel Damascus. It was simply a new name for ordinary Damascus and not superior to the latter. Figured gun barrels are not made in America.

During the past twelve years there has been gradually introduced among the gun makers, abroad and at home, the plain steel barrel, without the ribbon figure of twist, the vermicelli curl of damascus or the wavy figure of laminated steel. It is absolutely plain and is finished up deep black or black blue. Two gun concerns in America make their own plain barrels; others import the barrels in the rough. An American firm as far back as 1873-74 used plain steel barrels of its own manufacture and to day it employs them in an improved form in its fine guns. Other American gun companies use the imported tubes in good and very fine guns.

American gun makers are much in favor of plain steel barrels and are turning out some beautiful guns at very moderate prices. It will be many years, if ever, that any metal will entirely supplant damascus for gun barrels. The beautiful curled figure like lacework marking the ramifying fibre of the metal is dear to the sportsman's heart.

The evolution of the shotgun from the wheel lock to the present hammerless gun is remarkable and interesting. The modern breech loader with its cartridge made up with one of the nitro-cellulose (bulk) smokeless powders, the greatly improved wadding and chilled shot, is an extremely powerful weapon. It is handy and comfortable to use and safe to handle. Accidents have decreased fully 90 per cent. since the general introduction of the breech loader—and those that do occur can, as a rule, be attributed to carelessness.

### Strange Circumstance.

Mr. Potts had been hearing from the different members of a new physical club a good deal about mysterious disappearances of inanimate objects, and one day he had an experience of his own to relate.

"It is a curious thing," he said to Mrs. Potts, as they sat at the dinner-table one night, "a very curious thing, and I hesitated to speak of it this noon for fear it would seem as if I really—er—credited a supernatural agency in the matter. But that letter from sister Helen—"

"Yes," said Mrs. Potts, interrogatively, as her husband paused with a deprecatory smile.

"Well, really, it seems unaccountable," continued Mr. Potts, "it really seems so my dear. When you gave me that letter to read this morning, I placed it on my study table with half a dozen others, pending a leisure half hour. Then, as you know, I was called to see Mrs. Kenyon. When I returned, at the end of an hour, I went to my desk, and Sister Helen's letter was not there.

"I hunted carefully everywhere, though, as you are of course aware, my methodical habits make it almost impossible for me to be mistaken as to the exact place in which I put an article.

"I thought of speaking to you, but you were engaged with Mrs. Knox at the time and before she went I was summoned to the vestry to give my opinion of the new reading desk; and when I returned, half an hour later, and searched once more for the letter, there it lay, exactly where I had put it, with those other letters! It—it seems incredible that I could have overlooked it, and yet if I do not admit that possibility, what—"

"I wish you had spoken of it this noon," remarked Mrs. Potts in her briskest tone, as her husband's voice trailed off appealingly, "for I could have relieved your mind at once. While you were at Mrs. Kenyon's I went into the study and took Helen's letter, to read Mrs. Knox the account of the wedding; and when she departed, while you were at tea, I returned the letter, putting it exactly where I'd found it, so you shouldn't have to hunt for it. There, does that make your mind easier?"

"That of course explains the matter," said Mrs. Potts, slowly, but it didn't seem to her wife as if there were a note of something like disappointment in his voice.

### Valuable Advice to Rheumatics.

Eat meat sparingly, also very little sugar, avoid damp feet, drink water abundantly, and always rely on *Nervine* as an absolute reliever of pain. Five times stronger than any other, its power over pain is simply beyond belief. Get a bottle at your druggists, test it and see if it is not so. Medicine dealers sell it everywhere.

### BRAVE IN THE RANKS.

But as an Officer this Young Man was a Decided Failure.

"Most good officers would make excellent soldiers," murmured the old staff officer, "but all brave soldiers would not make fine officers—no, not by a big sight!"

The time was just after supper, but the old soldier lay back with one leg thrown over the arm of his easy chair and his face almost hidden behind the cigar smoke. The light, faded down, threw the dim uncertain shadows of a misty past about the room. Battalions of shadows chased each other over the walls, and through the cigar smoke charging squadrons rushed batteries placed high upon the ceiling. It was the time for a story. Both the colonel and his Boswell recognized that.

"I was thinking of a child I knew in Longstreet's corps," said the colonel simply. "He was just 15 and a chap to be proud of. Longstreet saw him about the second fight. The general had ridden to the front, and there far ahead of the line was the boy. He was about the size of a woodstick, but he made enough noise for a brass band. The men were crouching and hiding behind cover, but to see that lad you would not have thought there was a tree or a rock in a hundred miles. Every time his gun went off it would almost knock him over. Then he would rub his shoulder, all the while jumping up and down and shouting; 'Give 'em lead, boys! Give 'em lead!'"

"Well, that time 'we give 'em lead,' and in the charge the boy was the first one over the breastworks. His commander was overjoyed to see it. After the fight the general sent for the youngster. The lad came and stood at attention before his officer as straight as you please. General Longstreet complimented him on his bravery. Then he said, 'And why are you fighting, my son?'"

"Why, to be an officer, of course, sir," replied the little hero.

"All right. I'll make you a lieutenant."

"In a week not an officer in the army could strut like the new lieutenant."

"Then we had another fight. The bullets began to whistle and to sing, and the new lieutenant showed signs of nervousness. He did not about 'Give 'em lead' this time, but looked all white and scared. Of a sudden he dropped his sword. Right before General Longstreet's eyes the boy soldier ran away."

"The general summoned him after the battle. The lieutenant came, fearful and penitent."

"Don't you know I should have shot you, sir?" thundered the officer.

"Yes, sir," replied the boy. "I don't know why I did it, sir. Shoot me if you want to, or give me my gun and I'll win my straps again."

"For a minute the general stared at his impudence, then said, 'I'll do it.'"

"In the next fight I was at the front with Longstreet. There was that boy, not a boy, but a fend of battle, shouting, cheering, whooping at the very front in every charge. Two men had to drag him away when we were forced back."

"After the fight Longstreet promptly had his straps returned to him. Again the youngster went in as an officer, and again he ran. For the second time Longstreet put the boy back in the ranks in disgrace, only to reappoint him after a fight. As usual, the boy lieutenant ran."

"Then, before he could be summoned, he sought out the general's tent. Longstreet looked at him sourly."

"What do you want?"

"The lad flung his sword on the ground and tore the straps from his shoulders."

"Take your sword," he said. "I wouldn't have it. I'm going back to the ranks."

And he stalked proudly from the presence of the astonished general and his staff.

"Three days later a boy hero fell yards in advance of a charging gray line."

### Sentinals on Deck.

A wise man will take the weapon at his hand, even if it is not the conventional one. So thought Captain Slocum, who, on his sloop the *Spray*, made a voyage alone around the world, and met many good friends and singular enemies. This is his description of one comic happening, which might have ended in tragedy. He says:

I discovered, as she sailed along through a labyrinth of islands, that she was in the Lockburn Channel, which leads into the Strait of Magellan at a point opposite Cape Froward, and that she was passing Thieves' Bay, suggestively named. That right she lay at anchor in a snug cove at the Turn.

I now became jaded and worn from my previous battling with danger and rough weather, and as drowsiness came on, I sprinkled the deck with tacks, for it is well known that one cannot step on a tack without saying something about it. A pretty good Christian will whistle when he meets the commercial end of a carpet tack; a savage will howl and claw the air. That was just what happened that night,

at twelve o'clock, when the savages thought they had me, a sloop and all, until they stepped on deck; then they learned that I had them.

They howled like a pack of hounds, and jumped pell mell, some into their canoes, others into the sea to cool off. I fired several guns when I came on deck, to let the rascals know that I was at home, and then I turned in again, feeling sure I should not be disturbed by people who laid in so great a hurry.

The Fuegians, being cruel, are naturally cowards, and regard a rifle with superstitious fear. The only danger from their quarter would be in allowing them to surround one within bowshot, or to anchor within range, where they might lie in ambush.

**Dr. Agnew's Catarrhal Powder.**—Rev. W. H. Main, pastor of the Baptist Emanuel Church, Buffalo, gives strong testimony for and is a firm believer in Dr. Agnew's Catarrhal Powder. He has tried many kinds of remedies without avail. "After using Dr. Agnew's Catarrhal Powder I was benefited at once," are his words. It is a wonderful remedy. 50 cents.—65

"They tell me that you are a vegetarian, Mr. Beechwood," said Mr. Homewood.

"Yes," replied the former, "I am a Biblical vegetarian."

"I never heard of Biblical vegetarians."

"Well, the Bible says that all flesh is grass."

**South American Rheumatic Cure Cures Rheumatism.**—It is safe, harmless and acts quick—gives almost instant relief and an absolute cure in from one to three days—works wonders in most acute forms of rheumatism. One man's testimony: "I spent 6 weeks in bed before commencing its use—4 bottles cured me."—66

"We had a professional parlor oracle at our party."

"Did she entertain the guests?"

"They entertained her; she says nine out of ten asked her what we were going to give them to eat."

**Help the Overworked Heart.**

—Is the great engine which pumps life through your system hard pressed, overtaxed, groaning under its load because disease has clogged it? Dr. Agnew's Cure for the Heart is nature's lubricator and cleanser, and daily demonstrates to heart sufferers that it is the safest, surest, and most speedy remedy that medical science knows.—67

They were looking at the man who was occupying two seats while women were forced to stand.

"I should judge," said one, "that he would bring about \$11 68."

"On what do you base your estimate?"

"The present price of pork and sausage."

**Indigestion, that menace to human happiness,** pitiless in its assaults, and no respecter of persons, has met its conqueror in South American Nervine. This great stomach and nerve remedy stimulates digestion, tones the nerves, aids circulation, drives out impurities, dispels emaciation, and brings back the glow of perfect health. Cures hundreds of "chronics" that have baffled physicians.—68

"Tupper, who keeps that hair store on the corner, says the business seems to be the development of his youthful tendencies."

"How does that happen?"

"Why, he says he remembers that when he was a little boy in school he used to go out and get switches for the teacher."

**Little Braves.**—Old time a quarter-a-box "Purgers" are quitting the field in whole battalions. Dr. Agnew's Little Pills at 10 cents a vial are driving them out at all points. Because they act gently, more effectively, never pain, and are easy to take. Sick Headache succumbs to one dose.—69

"Do you think the manish young woman could ever fancy the modest youth well enough to marry him?"

"Perhaps so, if it ever becomes the fashion for chuns to marry."

**A Cry for Help.**—A pain in the back is a cry of the kidneys for help. South American Kidney Cure is the only cure that hasn't a failure written against it in cases of Bright's disease, diabetes, inflammation of the bladder, gravel and other kidney ailments. Don't neglect the apparently insignificant "signs." This powerful liquid specific prevents and cures.—70

"Galsby took his Boston Terrier over and had him vaccinated the other day."

"Did he have himself vaccinated, too?"

"No; he doesn't believe in it. But he said he wouldn't take any chances with the dog."

**Have you Eczema?**—Have you any skin disease or eruptions? Are you subject to chafing or scalding? Dr. Agnew's Ointment prevents and cures any and all of these, and cures Itching, Bleeding and Blind Piles besides. One application brings relief in ten minutes, and cases cured in three to six nights. 35 cents.—71

Caller—My! What a big girl you're getting to be. You'll soon be able to help your mother about the house.

Ethel—Oh, I do that already. Whenever she says, "For goodness sake, get out of my way," I do it.

**60 Specialists on the Case.**—In the ordinary run of medical practice a greater number than this have treated cases of chronic dyspepsia and have failed to cure—but Dr. Von Stan's Pineapple Tablets (50 in a box at 35 cents cost) have made the cure, giving relief in one day. These little "specialists" have proven their real merit.—72