



THE GUNSMITH

COSTING UPWARDS OF £12,000 A PAIR, TODAY'S HAND-MADE SPORTING GUNS ARE INDIVIDUALLY DESIGNED AND DECORATED TO THE ORDER OF DISCERNING CUSTOMERS

Gunmaking is one of the younger British crafts, being a mere 450 years old. The armies of Henry VIII were armed with weapons made in Belgium, Italy and Germany, since there were few British gunmakers able to undertake the work. Uneasy about this dependence on foreign suppliers, Henry encouraged European craftsmen to settle in London, so giving the home industry a sounder footing. The first substantial British gun workshops were set up in the Tower, where English apprentices learned the trade while equipping the king's soldiers with the arms they needed.

Henry's successors carried on this support for the gun trade, but when James VI of Scotland assumed also the title of James I of England, his morbid fear of assassination made him recoil at the idea of so many skilled gunmakers in his capital. With a stroke of the royal pen, he reduced their number to one.

The favoured craftsman was Edmund Nicholson, whom the king trusted well enough to award a complete monopoly of gunmaking in England.

Other craftsmen, now outlawed, presumably went underground – where their products might easily have proved far more dangerous to the monarchy. Before long, the hasty legislation was reversed.

By the time Charles I succeeded James, the gun trade was thriving again, and in 1637 the Worshipful Company of Gunmakers was founded as a London livery company.

A hazard which still sets gunmaking apart from other crafts is that faults in construction are apt to be lethal. The chief problem is that any weakness in the barrel may result in more damage to the marksman than to the target. For this reason, a duty laid upon the Worshipful Company was to test, or prove, all barrels made by its members, by firing them under carefully controlled conditions. Each barrel which passed this test was stamped with an official mark, and the absence of such a mark provided a clear warning to anyone who knew anything about weaponry.

Guns acquired a more formidable significance during the years of the Civil War, and there was an even bigger boom in gunmaking after the Scottish rebellions of the 18th century. Gun workshops sprang up in the provinces, centred mainly on Edinburgh and Birmingham. Gunmakers eventually established their own Proof House in Birmingham to carry out the same barrel-testing service as the London company.

As a trade, gunmaking varied enormously from craftsman to craftsman and from workshop to workshop. Many people specialised in a particular part of the operation, such as fitting the wooden stock or assembling the lock mechanism, and the gunmaker who stamped his name on the finished weapon might be little more than a skilled assembler of other people's work. Others preferred to carry out the whole business, from forging the barrels to the final bluing and engraving in their own workshops.

In the main, though, making the barrel was such a

difficult and expensive job that most gunmakers went to specialised suppliers. This was one reason why, in the later years of the 18th century, Birmingham became established as a vital centre of gunmaking. Situated in the heart of the iron and steel industry, the city's metalworkers were able to work on a large enough scale, and with sufficient experience, to undercut most individual workshops in London.

In the old days, many gun barrels were made from melted down horseshoe nails, the idea being that the pounding the metal had endured in its previous role would ensure the strength and resilience needed to stand the stresses generated during the lifetime of a gun. But the forging process was very complicated. The nails had to be heated and beaten together into long strips of metal, which were then made up into a barrel by winding them round and round a long rod – rather like bandaging a leg – and hammering them together into a single tube.

This crude first stage of a barrel was then heated to a temperature where the adjoining strips could be welded together by hammering them over an anvil. Some specialists insisted that an essential part of the whole process was a barrel of beer for the forgers, to ensure that they swung the hammers with every ounce of their strength. When the welding was finished, the forgers had to get to work again, beating the cold barrel with hammers to harden the outside surface of the metal for extra strength.

The finished barrels had to be treated very carefully. The secret was to make the forged barrels as accurately as possible, so that the carefully created outer skin would not be filed away in bringing them down to the right size. Twin barrels were joined together by soft soldering rather than by using stronger methods, such as brazing, which were hot enough to run the risk of softening the welds which held the barrel bands together.

In time, all kinds of improvements were added to the basic method. Steel was added, usually melted down from old coach springs, and the fashion grew for elaborately patterned barrels based on the styles of Eastern gunmakers.

Barrel-making became more and more complex during the later 18th and early 19th centuries. One method involved twisting together six iron rods, between $\frac{1}{4}$ in. and $\frac{1}{2}$ in. across, and six steel rods to make a metal plait, and then using three of these plaits to make a thicker metal rope which was heated white hot and welded by hammering. After rolling out to the right thickness – varying from $\frac{1}{4}$ in. at the rear end of the barrel down to $\frac{1}{8}$ in. at the other end – the resulting ribbon was wound round a former and welded together in the same way as before.

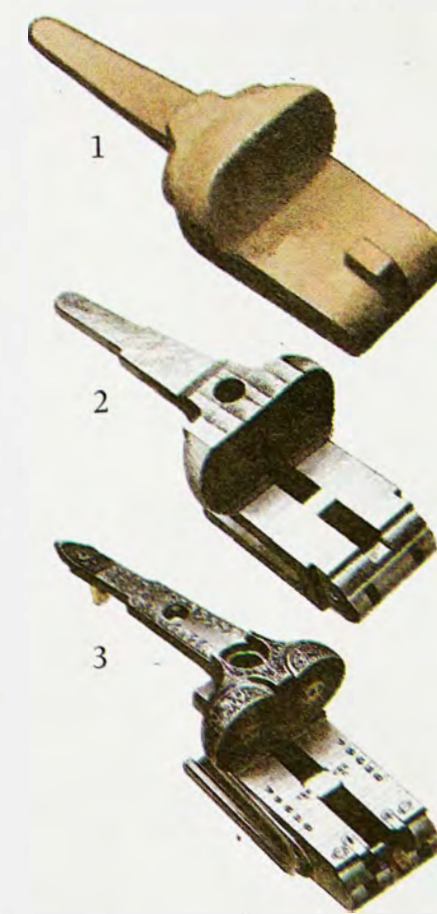
Some of the best-quality barrels had up to 40 or more alternations of iron and steel in their making. The main purpose of mixing the metals was for decoration. After being bored and filed to the right size, up to 75 per cent of the original metal might have been cut away. Known as Damascus barrels, they were given a brown finish by heating in powdered charcoal, as opposed to the modern blue or black finish. They were called Damascus barrels because this city was one of the traditional markets for guns made by Eastern gunmakers, who used this style of barrel patterning.

But however elaborately made, every barrel had to be proved by licensed Proof Houses in London, Birmingham or Edinburgh, and the system was designed to reduce the danger of testing newly made barrels. They were tested in two ways: provisional proof, which was a test to assure the gunmaker that a barrel was sound enough to warrant all the work which would be done to turn it into a finished gun; and the definitive proof, which was the test of the almost complete gun. To prevent any suspicion of favouritism in

MAKING THE MECHANISM

The making of the action – the mechanism of the gun which locks it closed for firing, then allows it to be opened to eject the cartridges and load new ones – starts with the forged blank (1), supplied by an outside specialist.

The first stage is to machine the surfaces and reduce the thickness of the blank to fit the finished gun (2). Eventually, the front edge of the blank will carry the hinge which allows the stock and the barrels to be swung apart when the gun is opened. The flat face which will close off the rear ends of the barrels has two recesses hollowed out to form the end of the firing chambers; and the surrounding rim is shaped to provide an airtight seal when the gun is assembled ready for firing (3). Other holes and recesses are made for pins and components, and the whole assembly is carefully engraved.

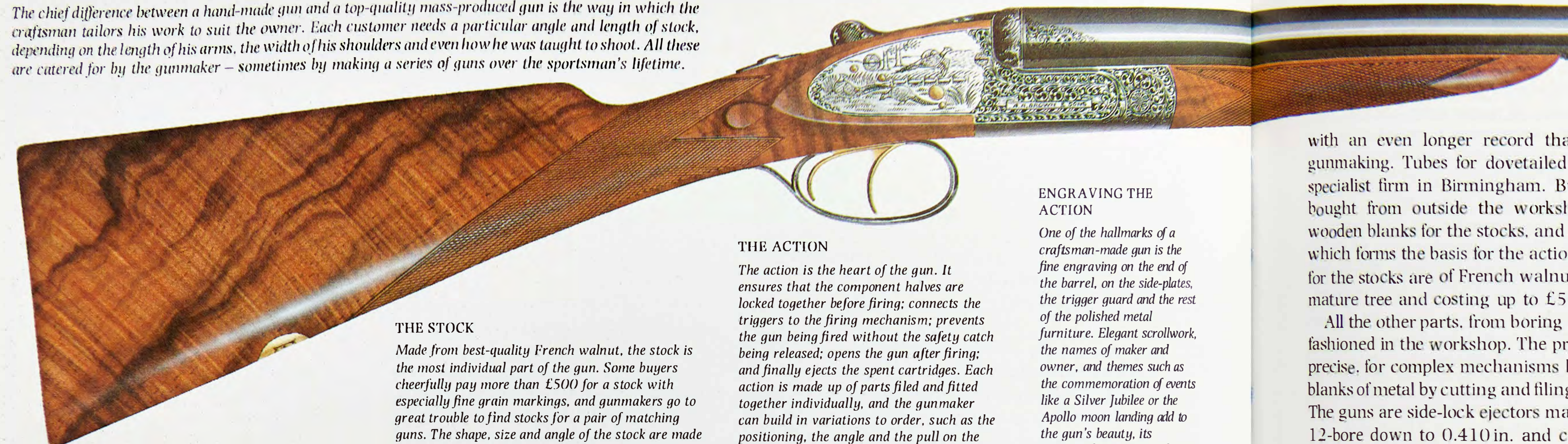


800 MAN HOURS PER GUN

The workshop at A. A. Brown and Sons contains a bewildering array of tools – files, chisels, hammers and gages, some of them familiar but many made to order for specialised jobs and handed down from father to son. Apart from boring the barrels, together with machining the action and other components from bar steel and drop forgings, all the work is done by hand, and each stage can take weeks of careful and painstaking work. Stock blanks (inset, top) can cost up to £500 for a specially fine piece, and come from similar walnut trees to those used for making Rolls-Royce dashboards. With increasing demand from foreign mass-producers, good walnut for gun stocks is becoming harder to find. The finished stock (lower picture) has to be a perfect fit for the barrels and the metal parts of the gun's action, and has also to be angled and weighted to suit the owner of the finished guns.

MAKING A GUN TO FIT THE CUSTOMER

The chief difference between a hand-made gun and a top-quality mass-produced gun is the way in which the craftsman tailors his work to suit the owner. Each customer needs a particular angle and length of stock, depending on the length of his arms, the width of his shoulders and even how he was taught to shoot. All these are catered for by the gunmaker – sometimes by making a series of guns over the sportsman's lifetime.



THE STOCK

Made from best-quality French walnut, the stock is the most individual part of the gun. Some buyers cheerfully pay more than £500 for a stock with especially fine grain markings, and gunmakers go to great trouble to find stocks for a pair of matching guns. The shape, size and angle of the stock are made to measure for the buyer, as determined by firing an adjustable test gun.

THE ACTION

The action is the heart of the gun. It ensures that the component halves are locked together before firing; connects the triggers to the firing mechanism; prevents the gun being fired without the safety catch being released; opens the gun after firing; and finally ejects the spent cartridges. Each action is made up of parts filed and fitted together individually, and the gunmaker can build in variations to order, such as the positioning, the angle and the pull on the triggers to suit a left-handed or right-handed shot.

ENGRAVING THE ACTION

One of the hallmarks of a craftsman-made gun is the fine engraving on the end of the barrel, on the side-plates, the trigger guard and the rest of the polished metal furniture. Elegant scrollwork, the names of maker and owner, and themes such as the commemoration of events like a Silver Jubilee or the Apollo moon landing add to the gun's beauty, its individuality and its value as a collector's item.

scarcely any military rifles are made by the old traditional methods.

But in the field of sporting guns – shotguns and sporting rifles – the priorities have always been different. Standardisation might certainly mean a cheaper gun, but in a world of wealthy sportsmen this has mattered little.

It has been considered more important to have a gun tailored to the individual owner, with the right size and shape of stock, the right balance, the right weight of charge, and the right kind of decoration and embellishments. It is still possible to buy guns made to measure by individual craftsmen, using many of the methods of a century ago but with the help of modern materials and ideas.

Such guns are costly. A family firm like A. A. Brown and Sons of Birmingham – less well known than Purdey's, or Holland and Holland, but a name to conjure with among connoisseurs of sporting guns – will charge anything from £5,000 upwards for a single gun. This is not surprising when you learn that the firm turns out only a dozen guns a year, each one taking some 700 to 800 man hours, spread over two years. Even at these prices there is a three-year waiting list on new orders.

Nowadays, barrels are made from steel, and so are lighter and stronger than their predecessors, but proving remains as important as ever. Chopper-lump barrels are forged with each barrel having half the 'lump' (the metal bar used to join the barrels together in a double-barrel gun) finished in one piece with it. The two barrels can then easily be joined by brazing the two halves of the lump together and soldering on the ribs and the loop which holds the forward end of the gun in place. The alternative type, known as dovetailed barrels, are joined together by brazing both barrels to a separate metal lump.

The most crucial joint, however, is between the ends of the barrels and the action, so that when the gun is closed the chambers are tightly sealed against the stresses of firing. The gunmaker usually blackens the two faces of the joint with the smoke from a paraffin lamp, then closes them together. Any proud spots on either of the faces show as bright patches against the soot, and he then carefully files these away until at each test the bright patches extend further and further. When they cover both faces of the joint completely, the fit is perfect.

Browns are unusual among present-day gunmakers in the amount of work they do themselves. The tubes for chopper-lump barrels are imported from Belgium, a country

with an even longer record than our own in quality gunmaking. Tubes for dovetailed barrels are made by a specialist firm in Birmingham. But the only other parts bought from outside the workshops are the unshaped wooden blanks for the stocks, and a one-piece steel forging which forms the basis for the action of the gun. The blanks for the stocks are of French walnut, cut from the root of a mature tree and costing up to £500 apiece.

All the other parts, from boring the barrels onwards, are fashioned in the workshop. The process is painstaking and precise, for complex mechanisms have to be built up from blanks of metal by cutting and filing, often for weeks on end. The guns are side-lock ejectors made in sizes ranging from 12-bore down to 0.410 in. and can be fitted with a self-opening mechanism. There have to be parts which lock the gun closed before firing; to fire the cartridges when the triggers are pulled; to eject the spent cartridges after firing when the gun is opened; and to provide a safety mechanism to prevent the gun going off accidentally.

Once the barrels and the action have been assembled, they go through the definitive proof testing.

The next stage is the fitting of the stocks, and this is where the tailoring to the individual customer shows most clearly. Often a new buyer, when being measured for his guns, will be asked to fire an adjustable try gun to decide how much 'cast' and 'drop' to allow – to decide the precise angle at which the stock should be fitted to the gun. Guns can be made left-handed or right-handed to suit the user, with not only the stock but even the triggers angled for maximum comfort.

The stocks are carved from wood which grows quickly enough in the French climate to ensure a straight grain at the forward end of the stock, with attractive figuring at the butt end. But the most painstaking work of all is in the chiselling out of the part of the stock which is to be fitted to the gun's action: the wood surface has to be an exact counterpart, in three dimensions, of the outside of the metal mechanism.

The join between the action and the stock is eventually covered by the lock-plates of the finished gun. Here, too, the fit has to be so close as to be watertight, preventing the entry of moisture that might harm the mechanism.

Usually, all the metal parts on the outside of the gun, the gun's action and its furniture (the metal plates covering the gun's mechanism) are elaborately engraved with scrollwork. The traditional designs often featured game birds and animals, or even favourite gun-dogs, and owners might supply photographs to help the engraver to produce a good likeness.

Following engraving, there is still another vital stage in the gunmaking process which has to be carried out with the greatest care. All the metal components must be case-hardened, which involves packing the parts in a cast-iron pot and covering them with granulated bone-meal before heating them in a furnace for 2½ hours. The carbon in the bone-meal is absorbed by the metal, and when the pot is taken out and tipped into cold water, the carbon coating forms a hard, mottled skin on the surface of the metal.

The case-hardening gives an attractive mottled finish to the metalwork of the gun, but some buyers prefer a brushed silver finish. At one time, some parts of the gun's metal furniture would be blued by heating in powdered charcoal, which eventually produced a hard, purple-blue sheen on

the surface. Nowadays a similar effect can be produced by a chemical process.

Shooting for sport reached its peak in the closing years of the last century. Until then, stalking game was as important as shooting, but this gave way to massed shoots where the game was driven towards the guns by teams of beaters, and speed and sureness of loading and aiming became vital. When a sportsman such as Lord Walsingham could bring down 1,070 grouse on a single day (August 30, 1888), then clearly a high rate of fire was important. Buyers would order guns in matched pairs, with the weight, balance, accuracy and performance as identical as possible.

Even today, many buyers still specify matched pairs, fitted into a specially made leather gun case for which the waiting time may be longer even than that for the guns.

Today, a record like that of the 2nd Marquess of Ripon, whose total bag over 28 years amounted to a staggering 316,999 – including 47,468 grouse, 111,190 pheasant and 89,400 partridge – will probably never be equalled. He died in 1923 after shooting his 52nd bird on the morning of September 22. But the craft of the few surviving gunmakers is thriving, with their current lists of customers including doctors, farmers and builders, along with the landed gentry.

Another change is perhaps less surprising, given the rarity value of such superb skill in these days of mass-production. More and more guns are being bought as investments, just as much as for their sporting qualities.

BALANCING THE GUN

Making the stock the right size and shape to suit the user is only part of the craft. For maximum comfort the gun must also be balanced, and this is done by drilling a series of holes in the end of the butt. To make the stock heavier, these cavities have weights inserted; to make it lighter, they are left empty. In either case, the ends are sealed off with plugs, with the grain chosen to match the rest of the butt.



Plugs

the tests, instead of the maker's name the barrels carried a reference number and such details as the length of the chamber, the choke or internal taper of the barrel and the charge of the gun.

At the provisional proofing stage, the barrels were open tubes without a finished breech, or closed-off end, to the firing chamber, so they had to be fitted with screw-in plugs for the test firing. The barrels were loaded, and a number of them laid out on a grooved rack in the firing chamber. Here, they were set off by a train of gunpowder lit from outside the chamber and laid so as to pass below the vent hole of each barrel. The recoil from the firing blew the barrels back into a pile of sand, where they could be collected for checking and cleaning.

Each barrel was examined before and after firing for any signs of cracking or distortion, and any suspect barrels given a hydraulic check in which liquid was forced into the barrel under pressure to show up any hairline cracks. Proved barrels were stamped with a provisional proof mark on the rounded underside of the barrel, close to the breech.

Definitive proof – a test of the barrel with the action fitted – was a simpler process, since the gun could now be loaded in the ordinary way, but with special test cartridges. The gun was clamped into a firing block to avoid damage, and once again it was fired from outside the room by a cord attached to the trigger. The maximum stress on the gun from proof firing was about 5 tons per square inch, compared with 3½ tons to the square inch in normal firing.

Barrels which passed their proof test had a further mark stamped on the underside, this time on the flat part of the barrels as well as on the action. These marks are an aid to dating and identifying old firearms.

This concentration of the business of barrel-making in the hands of specialists was just the beginning. It took the Americans to carry manufacture to its logical conclusion. Faced with the need for huge quantities of military rifles and muskets in the 18th century, and a chronic shortage of skilled craftsmen, they evolved the first mass-production assembly line in the world.

A series of machines was designed which could make all the parts of a military weapon to a standard pattern. They could then be finished and assembled by semi-skilled workers, with the added advantage that breakages in service could be repaired by replacing the broken part rather than the gun as a whole. In time, these methods became universal for military weapons, and nowadays



THE BARRELS

The barrels are joined to one another in one of two ways: dovetailed barrels are each brazed to a separate metal joining bar, called the lump, which fits between them (above). In contrast, chopper-lump barrels are each made with half the lump forged in one piece with the barrel. All the gunmaker has to do is braze the two parts of the lump together to join the barrels into a solid whole. Other variations include the bore (or inside diameter of the barrel) and the choke (the constriction in the bore at the muzzle end of the barrels, which can be adjusted by the maker to vary the spread of shot).



IN MEMORY OF A FAVOURITE GUN-DOG Among the most popular motifs for decorating gun furniture are one or more of the owner's dogs. A skilled engraver can work from a single photograph. Each line is cut into the metal by hand to produce an accurate likeness.