

Lock, Stock, & Barrel



This book is dedicated to Joseph Manton, the father of the modern gun, and to the legion of skilled English gunmakers and craftsmen who succeeded him. They have left us with a legacy of the finest sporting guns ever produced. May we treat these guns with deserving respect and shoot them with competence.

Lock, Stock, & Barrel

Making an English shotgun and shooting with consistency

by

*Cyril S. Adams &
Robert S. Braden*



Safari Press

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Foreword

For a couple of Americans setting out to do a definitive book on fine English shotguns, Cyril Adams and Bob Braden share a relatively rare qualification. They know what they're talking about. I can say that with conviction, having done a great deal of shooting research of my own and having hunted birds with them, shared shotgun studies, debated double guns, and shot clays with them for more than twenty-five years.

It was, in fact, about thirty years ago, at the old Greater Houston (Texas) Gun Club that I noticed a tall fellow stepping out onto the long yardage handicap line. He was at the box pigeon ring and he cradled a beautiful old Damascus-barreled English hammer gun. He shot the gun the way fine guns should be shot. He cocked the hammers without looking at them, and when the bird appeared, it dropped instantly in successive puffs of feathers. The old gun's double triggers had been strummed so smoothly that the two barrels spoke almost as one.

That was Cyril Adams. I've since seen him take many a bird, including enough clay ones to win the Texas State Sporting Clays championship and numerous helice (ZZ) competitions with his favorite London best Grant hammer gun made in about 1890. I always thought he was simply accepting a handicap with that old gun, perhaps for reasons of nostalgia or its elegance. Then one day he let me shoot it. This thing of grace and beauty turned out to have a life of its own. It literally moved after targets as if it were self-willed rather than being pushed.

Since then I've paid a lot more attention to what Adams says about shotguns. His knowledge of English guns is so profound, yet common sense practical, that many times I have relied on his answers to questions from my readers rather than delving into definitive books by English authorities. One reason is that his knowledge is not just academic. He's still sufficiently involved with the English gun trade that he maintains a flat in London.

It was during a south Texas dove shoot that I really got to know Braden. We were shooting some distance from each other, and we

gradually worked nearer to one another. We each wanted to observe how the other was making some of those long shots. Not only was I impressed by his technique, but also by his intelligence and inquisitive nature in discussing differences in our styles. I've since learned that I'd have been better off paying more attention to his English shooting-schooled techniques then, rather than having to develop them later in order to win at sporting clays.

Braden is a consummate student of detail in whatever he does. He is a highly successful businessman. He brings to this book his gleanings from shooting and studying shooting around the world. Both Braden and Adams tell it as they see it, and often with humor. Braden, for example, once mentioned to me that God shoots an English hammer gun. Once, when I asked Adams his opinion of a certain over/under with twenty-six-inch barrels, he said it was probably a pretty good gun for holding up convenience stores.

There are a few points made in this book with which I cannot agree, which is to be expected when any three students of the shotgun compare notes and experiences. For any shooter or hunter serious about fine English guns, or anyone interested in an informative distillation of shooting tips from the cream of the crop of British instructors, this will be a book referred to many times after its original reading. It's absorbing, and it treats the best gun as it should be treated, not just as a tool, but as a pleasure.

Bob Brister
Shooting Editor, *Field & Stream*

Preface

Friendships are often born of unusual circumstances. We came to know one another over thirty years ago in the border town of Eagle Pass, between Texas and Mexico. We accidentally crossed paths in pursuit of that challenging game bird, the mourning dove. Considering our mutual passion for wingshooting and our common educational backgrounds in civil engineering, a lasting friendship was virtually assured. Over the next several years, we also decided to expand our horizons.

Since this first casual meeting in south Texas, we have shot birds in sixteen countries that span four continents. We have also exposed ourselves to some of the finest wingshooters of the second half of this century, have competed more or less successfully with them, and have learned much from superb shooting instructors in Britain and America. During the course of our odyssey, we have tried every type of shotgun produced from the 1860s to the present.

Our journey was so fascinating that Adams abandoned a sensible engineering practice to earn his way in the world as a gun dealer. Fortunately, the engineer in him demanded that he uncover each component that goes into making a great shotgun. This pursuit led him to gun factories throughout the world, to seductive, detailed meetings with individual masters of the art of gunmaking, to in-depth research of the literature, to learning the sometimes difficult lessons of the gun trade, and ultimately to the challenge of making best guns.

Braden remained committed to shooting. He followed the more conventional pathway of learning about guns by the way they felt and pointed. In the process, he developed an enduring love for the shooting stage, for the backdrop of the field, and for the essence of what it all means to a sportsman.

These lifetime investments have led to a fair understanding of shooting and of the tools of the trade. Readers of *Lock, Stock, & Barrel* will become aware of our strong, collective bias regarding English shotguns and how to use them; we are unabashed in our opinions. Some shooters may not agree with what we say, but readers may have

confidence these viewpoints are based on ninety years of combined, extensive experience and study. If we have strayed off target, it is not because *we haven't been there*.

The book is presented in two parts, covering subjects that are related only by the common thread of the gun itself. The purpose of "Part I—The English Shotgun" is to present an overview of these remarkable guns as the pinnacle of shotgun perfection, and why they deserve the reputation they enjoy. In "Part II—Shooting with Consistency," the authors have attempted to convey some of the lessons learned through great effort and from shooting hundreds of thousands of cartridges in practice and in the field.

We are obligated to far more mentors than we can name and to countless friends who have shared our experiences. It is our hope that this book, as a legacy of what has been a major part of our lives, will benefit those who read it.

Cyril S. Adams
Robert S. Braden

March 1996

Acknowledgments

We owe much to the many gunsmiths whose workshops and stores we have visited over the years. We are also indebted to the many matches and schools where we picked up valuable bits of shooting advice along the way. The gradual accretion of this information over the years has been reinforced through personal experience and is reflected in this book. We are grateful to all those many persons who cast light on these subjects.

While it is virtually impossible to remember all the individuals who have passed along gems of information during our lifetime of investigation, it is fitting that special recognition be given those individuals whose contributions were of greatest value to us. We appreciated their gracious and unselfish input at the time it was given and we are forever in their debt because of its enduring quality.

Part I deals with technical and historical aspects of shotguns. We are particularly grateful to Ludwig Borovnik, Gordon Brent, Jess Briley, Bob Brister, George Caswell, Ivo Fabbri, Billy Hodge, Harry Lawrence, John Rowe, Ron Solari, Joe Toot, Mr. Verees, and David Winks for their contributions to our knowledge in this area. For information on shooting in Part II, we are indebted to Norman Clark, Ken Davies, Rudy Etchen, Rex Gage, Jay Herbert, Grant Ilseng, Patrick Lynch, David Olive, Chris Potter, Billy Purdue, Alan Rose, and Michael Rose.

We also gratefully acknowledge the assistance and advice of Barrett Allison, Robert Griffin, Bob McBee, Chris Potter, and Ron Solari, who read the manuscript and offered helpful comments and suggestions. Lieber Laboratories in Houston, particularly Butch Lieber, was most generous in allowing us the use of its studio facilities and in giving us technical support in producing most of the photographs in this book.

Finally, we are indebted to the authors whose printed works are listed in the two selected bibliographies included at the conclusion of this work. Fortunately, their valuable contributions are still available to all of us.

Part I

The English Shotgun

An Overview

Introduction to Part I

Guns discussed and pictured in “Part I – The English Shotgun” are all double-barreled. The vast majority of text deals with the side-by-side double. These elegant pieces are, with almost no dissent, considered to be the finest shotguns ever made. Frequent references will be made to best guns. This term in Britain has a special connotation, meaning the *crème de la crème*, the very best, the absolute top of the line.

A voluminous body of literature deals with the subject of the English shotgun, as is evident in part by the selected bibliographies included in this book. It is a history of progressive development over more than two centuries. It is a mechanical evolution, complete with its own natural selection process, which has led to the renowned best guns of Britain. It is also a story of individual craftsmen, of functional excellence, and of aesthetics.

Much of the literature on the English shotgun consists of narrative accounts of many systems that were tried, and the successes, failures, and tortuous process of trial and error. Some of these accounts are very well done. Others, while informative, have appeal only to dedicated students of the subject. It is a kindness to say that still others are boring, devastatingly so.

This presentation attempts to reduce volumes of available material to an overview of the English shotgun, with sufficient photographs to keep the narrative description within the bounds of reason. The objective, then, is readability at the sacrifice of detailed coverage, which is a delicate and dangerous trade-off. Some omissions, therefore, are inevitable.

Most shooters are aware that English guns are highly regarded but woefully expensive to own. Those shooters who have had actual exposure to these remarkable firearms share an enhanced appreciation of their merit. Surprisingly, however, very few people outside Britain have a full understanding of how these guns came to be, why the reputation for excellence is deserved, and why their cost is so high. Answering these questions is a primary purpose of this overview.

Any account of the English shotgun must include some history and tradition, otherwise it would be impossible to understand such

terms as London best. In this day of modern manufacturing processes, it is difficult to accept that a working and durable mechanical product is actually a work of art as well. In chapters that follow, this theme is defined and explored.

Readers should bear in mind that the individually crafted London best shotguns were made with ghosts of such legends as the incomparable Joseph Manton and the likes of Boss, Grant, the Purdeys, and Woodward looking over the shoulders of the artisans who produced them. This is the story of British tradition at its best and of guns with quality and performance that is unexcelled.

❖ Chapter 1 ❖

Chronology

*Whose distant footsteps echo
Throughout the corridors of Time.*

– Henry Wadsworth Longfellow

Historical Context

It is essential in understanding the modern gun to know the development of the English shotgun from its earlier forms. The modern gun has, without question, evolved over the course of time. Sometime during the early 1600s, the French began to shoot flying birds. At the time, they used clumsily stocked, long, single-barrel guns and slow-burning, charcoal-based black powder. During Cromwell's hegemony, King Charles II spent much of his time in exile on the Continent and had been exposed to this new sport. Upon his return in 1660 to England and the throne, he introduced the concept to the British Isles and thereby initiated the process of gun development.

It was not until the latter part of the eighteenth century, however, that the technologies of gunmaking and gunpowder produced a practical shooting application. Reliable Damascus shotgun barrels came on the scene about 1770. By 1790, the flintlock was perfected and shootable double-barrel guns were introduced.

The acknowledged “father of the modern gun,” Joseph Manton (1766–1835), put in motion the many advancements that took place in the middle of the nineteenth century. Remarkably, the last major development of the modern shotgun took place in 1909, when Boss perfected the over/under. Only refinements have marked the past eighty-five years, unless mass-produced, repeating shotguns and lesser quality double barrels are recognized as advancements.

The chronological charts that follow demonstrate some interesting, but little-known facts. For example, the flintlock era endured for about 170 years, as compared to only 125 years for current centerfire guns.

Muzzleloaders prevailed for 210 years, modern hammer guns for only about twenty years, and the hammerless ejectors of today have been available for the past 105 years.

Most mechanical features of the modern gun came into existence during an amazingly productive period from 1850 to 1910. The new innovations were vigorously debated by shooters and makers alike. It was a period when percussion, pinfire and centerfire guns could all be seen in action on shooting estates. It was the practice of London's famous *Field* magazine to sponsor field trials from time to time (*see "Chronology of Major Events" chart*) to test the effectiveness of the new concepts.

In one sense, the story of shotgun development is a paradigm of the Industrial Revolution, but it is a contradiction as well. The best of English shotguns were not mass produced. Instead, they endured as a mechanical art form. Great craftsmen with skilled hands continued to produce them, and no doubt Joseph Manton would have been proud of the fine guns his successors made.

Chronological Charts

The summary chart that follows is based on dates taken from extensive gun literature covering this early period. The selected bibliography presented at the conclusion suggests sources for further reference.

**DATES OF GENERAL INTEREST IN THE
CHRONOLOGY OF SHOOTING FLYING TARGETS**

1660 Early British wingshooting (approximate)	Flintlock Era	Muzzleloaders
	170 Years	
1770 Damascus barrels perfected (approximate)		210 Years
1790 Flintlock perfected; double-barrel guns		
1807 Percussion ignition		
1820 Percussion cap perfected		
1846 Pinfire	Percussion Era	Hammer Guns
1861 Centerfire		
1870 Breechloader perfected		20 Years
1875 Choke perfected		
1880 Hammerless guns perfected; steel barrels		
1890 Smokeless powder; ejectors perfected		
1909 Over/under guns		
1995		

**CHRONOLOGY OF MAJOR EVENTS IN
DEVELOPMENT OF THE ENGLISH SHOTGUN**
1800 to 1910

1807	Forsyth Percussion Priming	
1843	Lefaucheux Breechloader (France; approx.)	
1851	London Crystal Palace Exhibition Pin-fire Cartridges; Drop Down Barrels	
1858		***Major London "Field" Trial
1859	Jones Underlever	***Major London "Field" Trial
1861	Daw Centerfire Cartridge	
1862	Westley Richards Sliding Top Lever; Smokeless Powder	
1863	Purdey Sliding Bolt	
1865	Scott Spindle	
1866	Pape Choke	***Major London "Field" Trial
1867	Stanton Rebounding Lock; Greener Cross Bolt	
1874	Needham Ejector; Barrel Cocking	
1875	Anson & Deeley Boxlock	***Major London "Field" Trial
1878	Purdey Concealed Third Bite	***Major London "Field" Trial
1879	Rigby & Bissell Rising Bite	
1880	Beesley Self-opening Action	
1887	Holland Safety Sidelock	
1889	Southgate Ejector	
1897	Woodward and Holland Single Trigger	
1909	Boss Over/Under	

◆ Chapter 2 ◆

Barrels

The English maker takes a barrel that will do best; the foreign maker the barrel that will look best.

— W. W. Greener

Background and Development

Which of the essential components—lock, stock, or barrel—is the heartbeat of the total gun? A strong contingent of experts would insist that barrels are the most important. This position has many supportable arguments. A shotgun, for whatever else commends it, has no value without a finely bored, well-balanced set of barrels. Barrels, after all, contribute vitally to a smooth swing and accurate point, and at the same time safely project and shape the shot charge.

Direct antecedents of modern barrels were perfected in the late 1700s. Except for absence of choke boring, the balance and beauty of Joseph Manton's masterful Damascus flintlock guns of circa 1790 compare with the best quality of guns produced in our own time. Many of the famous, or favorite, sets of barrels from muzzleloading flintlocks were converted in the early 1800s to percussion guns. This was achieved by fitting them with a new breech and remaking the locks. Some percussion barrels were so highly regarded that they were converted to pinfire or centerfire by an expensive addition of a break-open action, new locks, and a new stock.

Because early barrel makers did not have access to improved metallurgy that came about just before the turn of the twentieth century, and because the machine technology of boring a straight hole thirty-six inches long was also not available, these pioneering practitioners found it necessary to employ difficult techniques to achieve strength, durability, and weight in their barrels. It is hard to imagine the skill required to make light, thin-walled (0.030-inch) barrels capable of withstanding the pressure of firing under the

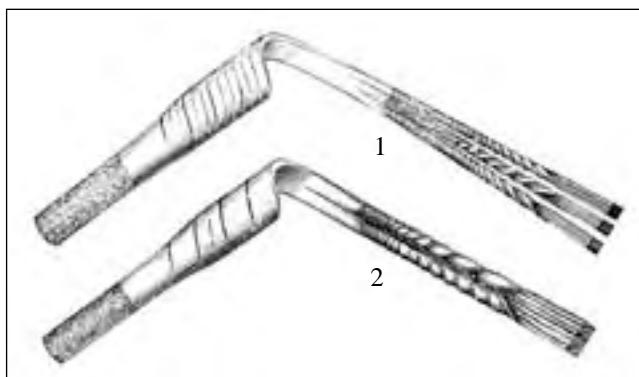
technologically primitive circumstances of the day. The barrels were the approximate thickness of a modern credit card.

These early shotgun barrels were made by using hard, low-carbon steel and soft, low-carbon iron in a unique combination that enabled the finished barrel to be hard enough to avoid bulging and denting, yet elastic enough to restore itself to proper size after the pressure wave passed. The process of producing Damascus barrels was remarkable in itself. By about 1875, when requirements of choke boring added another level of stress, lesser quality barrels could not be used for best guns. English Damascus barrel makers continued to improve the quality of their product until it met the new demands. The reputations of barrel makers rose, and today these great artisans enjoy prominence even in this period of steel barrel making.

The Damascus Misconception

Shotgun barrels were first made by rolling up the edges of a long, flat piece of low-carbon plate around a mandrel, and then forge welding the longitudinal seam. Some of the results were good, but this procedure had the inherent weakness of an extended seam along the entire length of barrel. Because it was subjected to the full load of hoop stress, the pressure wave from firing tended to split the longitudinal seam.

In the late 1700s, some ingenious craftsman, inspired by a common sense understanding of these forces, determined that a



Process of barrel welding: 1. Three-iron Damascus 2. Two-iron Damascus*

near 90-degree rotation of the seam would better accommodate the hoop stress effect. Rotation was achieved by winding thin strips of material around the mandrel in a spiral and forge welding the resulting circumferential seam. The hoop stress was now borne mostly by the strips in tension, instead of along the longitudinal seam. This approach became the fundamental concept of Damascus barrels (*see *W. W. Greener, 1893*).

The process was soon perfected. High-quality thin strips were made by rolling, drawing, hammering, and twisting layers of best available [low-carbon] steel and best available [low-carbon] malleable iron when hot—thereby condensing and aligning the grain in the most advantageous direction. Nonmetallic impurities were also broken up and dispersed. Approximately eighteen pounds of very high-quality gunmaking iron and steel were required to produce a normal 3½-pound set of finished barrels.

This system produced excellent results from the late 1700s forward, and contrary to popular beliefs, could serve equally as well today were it not for the amount and quality of labor involved. Costs were always high. They would be prohibitive today.

English barrel makers perfected Damascus of higher quality than similar products of Belgium and Spain. One characteristic, greater hardness, was critical to meet requirements of choke boring, which by 1875 was rapidly becoming accepted, in parallel with the now well-established breechloaders.

It was during this period of shotgun development that Sir Joseph Whitworth perfected his fluid pressed steel, which limited the size of flaws in steel ingots. A uniform steel product was now available to barrel makers that was harder than Damascus, could match the strength of Damascus, and was well suited to choke boring. About the same time, machining tools were developed that could bore long straight holes, thereby making it practical to produce tubes from solid forgings.

Steel barrels were now possible. They were thin enough and strong enough to compare in weight with Damascus, but they were harder, an advantage that made it possible for the choke section to be thinner. This steel product, coupled with new manufacturing procedures, brought to barrel making art the additional feature of

lumps forged integrally with the barrels (*see Figure 2*). Moreover, finished barrels would withstand more banging abuse by careless owners or loaders, a valuable characteristic.

Two alternatives were now available: Damascus and high-quality steel. Which was better? The controversy over this issue has survived for 120 years to the present day. There are exponents of both perspectives: the elegant beauty of Damascus versus the more practical steel equivalent. The fact that steel barrels were less expensive drove new Damascus barrels from the market about seventy years ago and gave rise to the erroneous conclusion that steel is also a vastly superior product, which is not the case.

In 1888, the Birmingham Proof House made an exhaustive test comparison of steel and Damascus barrels, which proved conclusively that there was no technical superiority to be found between best English Damascus and best English gun-barrel steel. Today, either type of barrel, with current nitro proofing, can be considered equally usable. Beauty and levels of care are another matter.

The strangely consistent, but totally unjustified, bad reputation that Damascus barrels have in America probably comes from low-quality material used in inexpensive trade guns, which found their way into foreign markets from various manufacturers. A related issue that also may have contributed to the formation of negative popular opinion involves the issue of gunpowder.

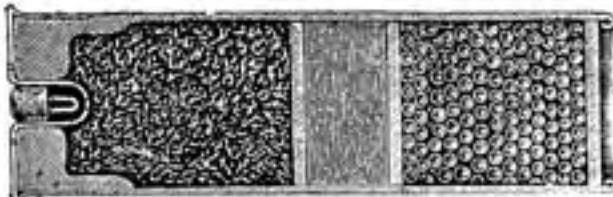
A Primer on Powder

Misconceptions surround the development of gunpowder from the original black powder to modern nitro powders. Failure to understand certain fundamentals of powder evolution has no doubt contributed to distrust of Damascus barrels in America, where it is almost universally, but erroneously, assumed that these barrels cannot withstand the modern pressures (a meaningless term) of nitro powder.

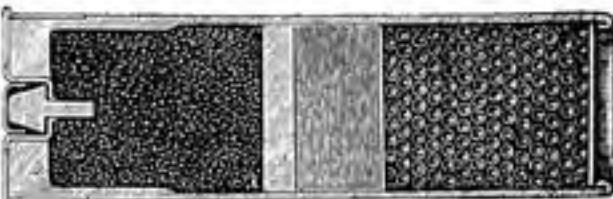
It was not until 1862 that a viable alternative to black powder appeared on the market. This first successful smokeless nitro powder, by Schultze, was followed by EC powder in 1882. Both of these powders, and many others manufactured before World War I, were bulk powders. This means that they shared an equivalency. Any weight (or volumetric) charge of one was equal

to an identical weight (or volumetric) charge of another, and to the same charge of black powder. This consistency was purposely maintained, so loading equipment then in use could accommodate black powder or any of the new smokeless nitro powders without any inherent dangers.

An illustration from Greener's 1893 work clearly shows that the bulk (volume) of the early nitro powders was meant to correspond to



Cartridge loaded for close shooting with black powder



Cartridge loaded for close shooting with nitro compound

the same bulk (volume) of black powder, which made it possible to use existing loading tools and shotguns:

Bulk powder substitutes that supplanted black powder had the advantage of being smokeless and much cleaner, but were obviously intended for guns then in general use, most of which had Damascus barrels. So far so good! A dram is a dram is a dram.

In 1888, however, Alfred Nobel introduced a radically different smokeless powder that was dense, meaning it took a much smaller amount to duplicate the performance of black and bulk smokeless powders. Now the issue of suitable loads became quite critical, and predictable problems arose.

To enjoy the benefits of smokeless powder, shooters had to be very cautious to determine whether bulk powder or new dense smokeless powder was being used in the loading of cartridges. In the event the volumetric powder charge was not properly reduced for a dense powder, failures occurred. After an unhappy transition period, dram equivalent ratings became widely used and reduced the danger. It is fundamental to recognize, however, that barrel pressures for black, bulk, or modern (dense) smokeless powders, for a reasonable muzzle velocity and an identical shot charge, are in the same range and always have been. In other words, there is no such thing as modern pressures for nitro powders.

European versus American Approaches

Europeans seem to have had few problems with the concept of dense nitro powders and how to use them. In 1904, the British introduced nitro proof to provide a secure basis for the increasing use of new dense powder. In 1925, the use of nitro proof became compulsory in Britain. It is noteworthy, however, that English Damascus barrels continued to be favored by many shooters. Only after World War I, when inexpensive steel suitable for barrels greatly reduced the price of guns, did steel barrels finally supplant English Damascus barrels for best guns. During the period of transition, Damascus barrels were still offered, but at a substantial increase in cost.

In America, the situation was quite different. Most early shotguns produced in America used Belgium Damascus. Imported trade guns used even poorer quality barrels. Later, after the introduction of dense nitro powders, there was a distinct trend to escalate loadings of both powder and shot. This American preference for heavier loads, coupled with a total absence of proof laws, soon resulted in failures of lower-quality Damascus barrels.

The problem was approached and a solution achieved by redesigning the barrel thickness profile and by using new inexpensive barrel steels. Naturally, thicker barrels meant greater overall gun weight, a feature that has characterized American guns even into the modern era. Ironically, the post-World War II trend toward shorter barrels for machine made guns can probably be attributed to the desire of some shooters to decrease total weight. This solution, however,

carries with it some unfortunate features of balance and performance. Barrel length is discussed in some detail in chapter 19.

Evolution of Sleeving

While it is well established that fine Damascus barrels are equivalent to best quality steel barrels, the same composition of materials used for the tubes is too soft for the barrel lumps. To achieve proper results, barrel makers filed up hard steel to produce the lumps, which were then dovetailed and brazed into place on Damascus barrels. This procedure had the advantage of lumps with good wearing qualities, but the corollary disadvantage of occasional separation that required rebrazing.

After the advent of Sir Joseph Whitworth's fluid pressed steel and later metallurgical developments, lumps could be forged with the barrel blank, one-half to each tube. Chopper lump barrels, named because of their resemblance to a common chopping tool, came into being. This integral forging had the obvious advantage of eliminating separation problems, but it resulted in a material for the lumps that was softer than desirable since the barrels and the lumps were of the same composition.

Around 1900, Birmingham barrelmakers, always alert to less expensive techniques of production, introduced a third basic approach that would permit greater use of machine tools and avoid much of the costly hand labor in filing. Because chopper lump barrels were long and clumsy, they did not lend themselves well to machining, so Birmingham makers concluded that the two components should be produced separately and joined, but not in the same manner as Damascus barrels.

New lumps were machined from a piece of hard steel about three inches in length, configured to consist of the breech end of the barrels as well as the traditional lumps. Two large holes were then bored into this monoblock, which permitted insertion and soldering of two round barrel tubes. This clever process achieved desirable hardness in the lumps, securely joined barrel tubes to the monoblock, and was less expensive. It was, however, an approach shunned by the London gun trade as not suitable for best guns, so it was used only in Birmingham on less expensive guns. After World War I, Italian



King George V

George V and his father, Edward VII, are sometimes referred to as England's shooting kings. Until his death in 1936, King George used hammer ejector Purdey shotguns. He owned three trios of 12-bores, and one trio of 16-bores.