Edwin Budding and His Pepperbox: A 21st Century Update

By Matthew Schneiderman

There have been multishot firearms for centuries, but before the 19th century they were expensive to make and difficult to use. In 1807, Alexander Forsyth patented the use of fulminates for firearm ignition[1] and ushered in the percussion era.[2] Copper cap ignition was well established by 1820[3], which finally made reliable, affordable multishot firearms feasible. Appearing in England about 1825, the Budding pepperbox was the first step along this path. Historically, it's an important weapon:

1. the world's earliest percussion pepperbox;[4]
2. the world's earliest percussion revolver;[5]
3. the earliest percussion pistol with in-line (horizontal) nipples, long before Colt (makers of the period called this Central Fire);[6]
4. the earliest copper cap pistol with an enclosed action;[7,8]
5. and one of world's earliest percussion underhammer (understriker) firearms.

There is no surviving information on Budding's gunmaking business; this is a firearm without a historical record. Those of you who collect and research in similar circumstances will probably recognize and enjoy some of the issues debated in Budding Studies. This scant Budding firearms literature is almost half a century old, and it's time for an update.

The Budding Pepperbox: A General Description

I'm going to follow collecting history here and begin by describing the pistols. Early historians of the 19th century English textile industry knew about Edwin Budding, since that's where he spent most of his creative working life. Generally, they were unaware he made firearms. Nineteenth and early twentieth century arms collectors knew of Budding pepperboxes, but absolutely nothing about their maker. There was a certain communication gap. Major Brown, an English antique arms collector and writer from the 1940s, speculated that he was Irish.[9] J.N. George, author of important pre-WWII era books organizing the study of early English firearms, doubted he was a gunmaker.[10] Dunlap, author of what's still the last encyclopedic book on pepperboxes, didn't know his first name.[11] Keith Neal, writer of what used to be the only Budding Studies firearms article, called him Edward.[12,13] So, we'll leave him for later, just as earlier collectors did.

All Budding pepperboxes (Figure 1) are hand turned, 5 shot, .30 caliber percussion pistols with two-piece walnut

grips.[14] The barrel group must be removed for capping.[15] The barrels, frame, and grip retaining screws are brass.[16] A small, steel, spring-controlled catch at the top edge of the frame indexes the barrels (Figure 2). All are Birmingham proofed; on some, the barrels are numbered. As with other enclosed percussion action firearms, each Budding barrel

Figure 1. A budding pepperbox (Model 1). (Collection / Photo by Jas van Driel)

Figure 2. The steel catch (spring controlled) and tiny notches for indexing the barrels, and a typical "Budding Maker" marking on the top frame strap. Note also the vents and the barrel number. (Photo by Dan Retting)

Figure 3. The spring-enclosed and -driven striker with integral cocking lever. Note the steel plate with small notch for holding the striker mechanism cocked. (Photo by Dan Retting)

Figure 4. The barrel group retaining rod, and the barrel group, both removed. This is a Model 1 pistol, but the Model 2a removable rod would look the same. Note the head of the striker in the fired position. (Collection / Photo by Jas van Driel)

Figure 5. A Model 2b pistol. Note the protruding, square-headed nut at the front. (Collection / Photo by Jas van Driel)

has a small cap detonation vent (see reference 15). All pistols are marked "Budding Maker" on the top frame strap, surrounded by various patterns of scroll decoration. These are well-made pistols, and (as we'll see later) nicely cased and presented. However, the "action" is about the simplest imaginable. The lowermost barrel is fired by a horizontal steel striking rod enclosed in a spiral spring and made in one piece with a cocking lever (Figure 3).

To cock, pull back the striker by means of the lever (Budding's directions call this "the trigger", but it really isn't in the traditional sense). This compresses the (quite strong) spring. Push the lever with your index finger into the small notch cut into the steel plate on the pistol's underside (presumably a brass plate would not be hard enough to survive a normal working life). If needed, you can then hand rotate the barrel group. To fire, release the striker from the notch with your finger, and the spring does its work.

Keith Neal created the idea of three basic Budding pepperbox models, attempting to organize and classify, as collectors like to do. Dunlap's book subdivided the third model, based on Neal's later advice. My article is the first in Budding Studies to officially recognize the subdivision of the second model, but this distinction has been a part of unofficial English collecting practice.

The Details of the Different Models and Discussion of Timing

Model 1: Two brass grip screws. 2 3/8 or 2 15/16 inch barrels.[17] (See Figure 1.) The barrel group is retained and released like the model 2A.

Model 2A: Three brass grip screws. 3 1/4-3 1/2 inch barrels. The barrel group is held in place by a rod with a flat, slotted screw head. This rod unscrews from the frame, releasing the barrel group and providing a rammer (Figure 4).

Model 2B: Three brass grip screws. 3 1/4-3 1/2 inch barrels. The barrel group slides over a rod attached to the frame. It is held in place by a protruding, square-headed nut attached to the end of that rod (Figure 5). This nut is removed (and the barrel group released) using a special key. The nut, when freed, includes a 11/4 inch pricker, used for removing spent copper caps (Figure 6). The rod can be used as a rammer while still attached to the frame.

Model 3A: Separate trigger and cocking lever; no trigger guard. The trigger and trigger spring are made in one part (Figure 7). The only known model 3A pistol is capped externally without removing the barrel group.

Model 3B: Separate trigger and cocking lever with trigger guard. The trigger spring is attached separately just behind the trigger (Figure 8).

Both Model 3 mechanisms are basically the same as Models 1 and 2; the striker is held cocked by the trigger, instead of by a notch. Model 3s have three brass grip screws, like Model 2s. Their barrel groups are retained and released like the Model 2B.

Almost all Buddings seen today are Model 2s. Model 1s are very rare. Only one model 3A and two Model 3Bs are known to have survived.

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Figure 6. The barrel group removed from the frame-attached retaining rod, with the square-headed nut and pricker. This is a Model 3a pistol (with external capping slots), but the Model 2b would look the same. (Collection / Photo by Jas van Driel)

I've believed this 20th century model designation probably corresponds to the order in which the pepperboxes were produced, though Neal and Dunlap do not address this question. The open internal structure of the model 1 is simpler than all the others, suggesting a first try (Figure 9). I think the model 3 triggers and trigger guard were late, responding (unsuccessfully) to competition near the end of Budding's short firearms-manufacturing life. Other hand-turned pepperboxes appearing in the late 1820s, by various makers, had more sophisticated construction: real triggers, cockable hammers, and easily capable nipples.

However, it turns out that the sole surviving Model 3A pistol has the same simple, open internal structure as the Model 1 example shown at the bottom of Figure 9.[18,19] A living research area that's full of surprises! I can't even play the powerful "spare part used at a later time" card, since Model 1 and Model 3 frames have different numbers of screw holes. Forced to choose between an early Model 1 and a late Model 3, I'd favor the latter. I can't see abandoning a trigger for the Budding Notch.

Figure 7. The only known Model 3a pistol, with external capping slots. Note the protruding square-headed nut at the front. (Collection / Photo by Jas van Driel)

Figure 8. A Model 3b pistol. The barrel group attachment is not original, hence no square-headed nut is visible. (Collection / Photo by Jas van Driel)

The "Budding Patent"

Despite at least one auction house's statement otherwise, there is no Budding firearms patent.[20] However, I offer for your review British patent #4960 of May 30, 1824, by the Birmingham gunmaker, James Cook (Figure 10). Cook's working dates were 1817-1831, first at Old John Street and (from 1828) at 47 Holloway Head. He is described as a gun and pistol maker, and also as an air gun and air gun walking cane-maker.[21] The patent claims the use

Figure 9. Budding pepperboxes with their right grips removed. From the bottom: Model 1; Model 2a; Model 2b; Model 3b. Note the simpler, open internal structure of Model 1, and the surprisingly long (and substantial) striker and its surrounding coiled spring. At the top of each is the short rod and spring for the barrel indexing system (see Figure 2). (Collection / Photo by Jas van Driel)

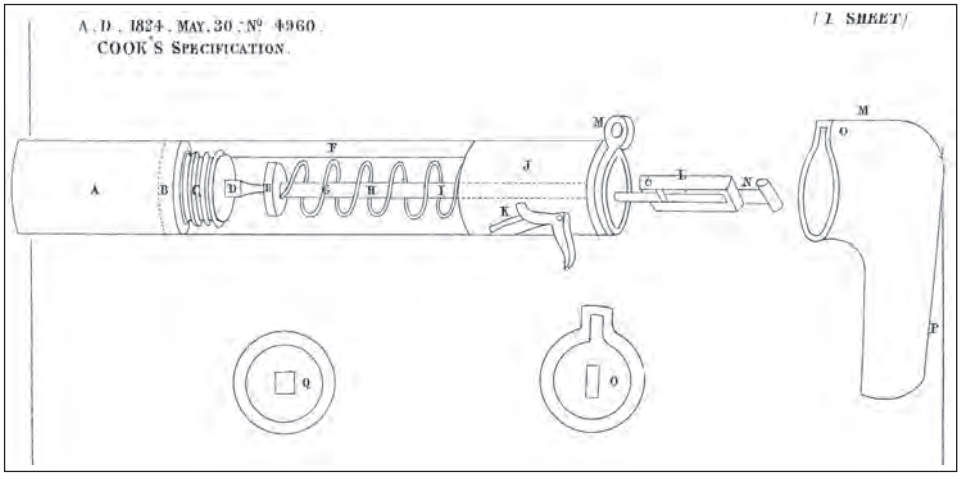

Figure 10. The James Cook patent drawing. A is the barrel, B the breech, D the horizontal nipple. Barrel, breech, and nipple unscrew at C from the tube F holding the simple action. H is the striker, E the striker head, and G the coiled spring.

of a spiral spring to drive a striker. The patent drawing shows a single shot cane gun, but that was Cook's specialty—he could have shown any type of gun. The spring wraps around a horizontal striker. The barrel, with a central, horizontal nipple in the breech, unscrews to allow capping. The striker is pulled back, coiling the spring, and set in a notch, from which it's released to fire. The drawing shows a trigger and sear, but that's not a necessary part of the patent claim.

This patent precisely covers Budding's firearms. Though no historical evidence tells us whether he knew of or licensed the patent, I think he must at least have known of it—the design fits, the timing is correct, and a gunmaker and inventor like Budding would have known new developments in his working areas.

Also, Cook's patent was news! "The Sheffield Mercury" newspaper in England ran an article about it. Later, this was summarized in "The National Gazette" (Washington, D.C.). Finally, that D.C. article was reprinted on August 6, 1825, in the "The Farmer's Cabinet", the local newspaper in Amherst, New Hampshire.[22] If they knew about the coiled spring in small-town New England, Budding knew the story back home.

A Short Edwin Budding Biography

I have web-searched "Edwin Budding" and examined all 6,520,000 entries: each one is about a lawnmower. But there's more to the story.

Edwin Beard Budding was born (1795), worked, and died (1846) in Gloucestershire, England. He was born in the town of Bisley, "the illegitimate son of a yeoman farmer". He had "a good education", and worked initially as a carpenter and then as a pattern maker in an iron foundry.[23] In the 1820s and early 1830s, he worked in Stroud. From the later 1830s to his death from a stroke, he lived and worked in Dursley, a town 8 miles from Stroud. During his Budding researches, Keith Neal met a Dursley man who had attended "Miss Budding's School" there in his early childhood (this was Edwin's daughter).[24]

In the few histories I've found that mention Budding, he's described in many ways: inventor, machinist, engineer, and manager. In at least two of these patents, he uses the term "mechanic." His major life's work was inventing, designing, building, improving, and managing the use of machinery for the woolen industry. His most famous invention is the lawnmower—the reason he's remembered today [and revered by lawnmower collectors (Figure 11)].[25] Among his other inventions are one of the first adjustable spanner wrenches,[26] a pneumatic oil can and a method for fastening leather machine belts.

In Dursley, he was manager for a maker of clothing-production machinery, and patented an improved method of making cylinders for carding engines. One source says: "Budding required police protection from those who saw their jobs threatened by [this] device." It ends by saying: "He made no fortune from his inventions."[27] Note that in this small amount of historical (non-firearms) literature on Budding's career, the only comments about his gunmaking were "he later rented a workshop in which he produced pepperbox pistols", and the dates 1825-1830.

What did the word "machinist" mean in the 18th and early 19th centuries? Budding certainly didn't do a modern-day machinist's job, operating an employer's machine. In his era, the word meant an inventor (or designer) and a

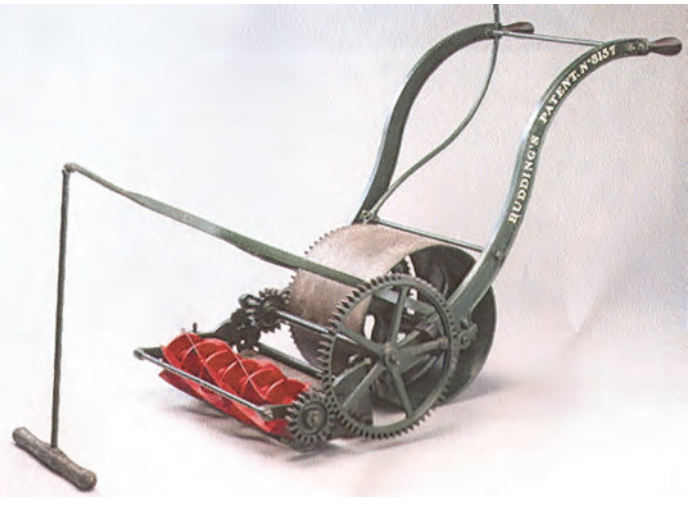

Figure 11. The Budding patent lawnmower. Note that it could be both pushed and/or pulled.

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maker/creator of machines. The other words applied to Budding, "engineer" and "mechanic", basically meant the same thing as "machinist" at that time.[28] This set of words captures Budding's inventiveness and creativity.

H.A. Randall interviewed Budding's (presumably very old) grandson in the mid-1960s. The family had little information, except for the handed-down memory that "Grandfather was a very clever man."[29] This word has a special meaning. "New Englanders use the word 'clever' to describe a man who, regardless of his education and training, has an instinctive ability to fix or make anything that he puts his mind to, without plans or books to assist. A 'very clever' man is considered near perfection in the New England vernacular..."[30] I expect this meaning also holds (or held) true in England, and it certainly applies to Edwin Budding.

"Budding Maker"

More than most people, I'd love to discover Budding's lost autobiographical fragment, "Strange Interlude: My Four Years as a Maker of Revolving Pistols." However, we have to face the possibility such a work won't be found. A major issue in Budding Studies has always been "Was Edwin Budding a Gunmaker?" Keith Neal believed "from its curious construction, [his pepperbox] was most likely the work of a skilled metal worker or engineer rather than a gun maker."[31] George believed "though eccentric in design and obviously the work of a person totally unaccustomed to firearms the pistol is exceedingly well made" [by someone of a] "calling [other] than a gunsmith ..."[32]

I find this view quite irritating, as well as incorrect. I understand that Budding spent most of his working life doing other things, but I have a number of thoughts:

1. Budding clearly had the skills to make these pistols; he was "a very clever man."
2. He marked his firearms "Budding Maker", and I think it's totally reasonable to take him at his word. He was a gunmaker by definition, even though that wasn't his entire professional life. This claim of "maker" was fairly common on English firearms of the 17th and early 18th centuries, using the Latin word "fecit" ("made it"). It's very rare thereafter on firearms, though seen on 19th century scientific instruments[33] and clocks. I know of one other percussion firearm marked in this way.[34] Maybe it reflects Budding's much broader range of "making" experience than the usual gunmakers.
3. In early 19th century England, there were no adults "totally unaccustomed to firearms." Guns were among the most basic and ubiquitous tools in existence. A man with Budding's broad experience would understand how they worked.
4. The pepperboxes were made in multiple variations (see above), and labeled and cased in a quality way totally consistent with 1820's best gun trade practice (see below). They show high-class workmanship and finish. Had the early writers actually seen a cased Budding pepperbox, they wouldn't have shown him such disrespect.
5. The Cook patent accurately describes Budding firearms' mechanism. Budding's name isn't on it, but the timing is correct. It's not surprising to find one maker using another's patent, either through license or not.
6. Rather than "curious" or "eccentric", I think Budding's design is just EARLY, a first attempt at a percussion multi-barrel firearm. It's simple, but it works.

The Budding Pepperbox Case

I'll describe my (correct) model 2A case and accessories in detail. I've seen some incorrect sets during my recent research, so you should know the original and be careful. I'll use "front" to mean closest to the lock, and "rear" closest to the hinges (Figures 12 and 13).

Figure 12. My cased set. Note the Model 2a pistol; the single mortice lock; the "crutch handle screw driver" combination tool; the wad cutter; and the plain copper flask. (Photo by Dan Retting)

Figure 13. My cased set, continued. Note the budding trade label under the compartment lid; the t shaped cleaning rod; and the green baize divider. Originally, a bullet mold sat with the cleaning rod. (Photo by Dan Retting)

External dimensions: 9 3/8 inches long, 5 11/16 inches wide, 2 inches deep.

Wood: Walnut. [35] Lining: Green felt.

Key escutcheon: Diamond shaped, with inlaid dark wood (not brass). Note: there is no escutcheon on the lid of the case.

Lock style: Mortise. Among the sets I've seen, about evenly divided between double and single mortise. There are no hooks to keep the case closed.

Internal spaces (front): Space for the pistol. Note that the end of the barrel group reaches the left side of the case. I have seen one set with a compartment for a cap container next to the muzzles; this is incorrect. **(Left middle compartment):** 3 1/4 x 2 1/16 inch compartment cover, with a black ribbon pull. On the underside, the Budding trade label "Manufactured by E. Budding, Thrup Mill, near Stroud, Gloucestershire." I have seen no other maker's cased set with a trade label under a compartment cover, but all correct Budding cases have the label in this location. There's no room available on the inside of the lid, where the "Directions" are pasted. The space is divided into two sections by an internal hump, the left being larger. It's unclear what's supposed to be inside this compartment (other than the 2B key wrench, if a 2B casing). Many cases now have bullets (of various sizes). **(Left rear):** in most sets, but not all, shaped for a wad cutter. **(Right rear):** Two levels, separated by a thin, mobile, soft green baize divider, attached at the outer edge. In my experience, this feature is unique to Budding.

CASE CONTENTS

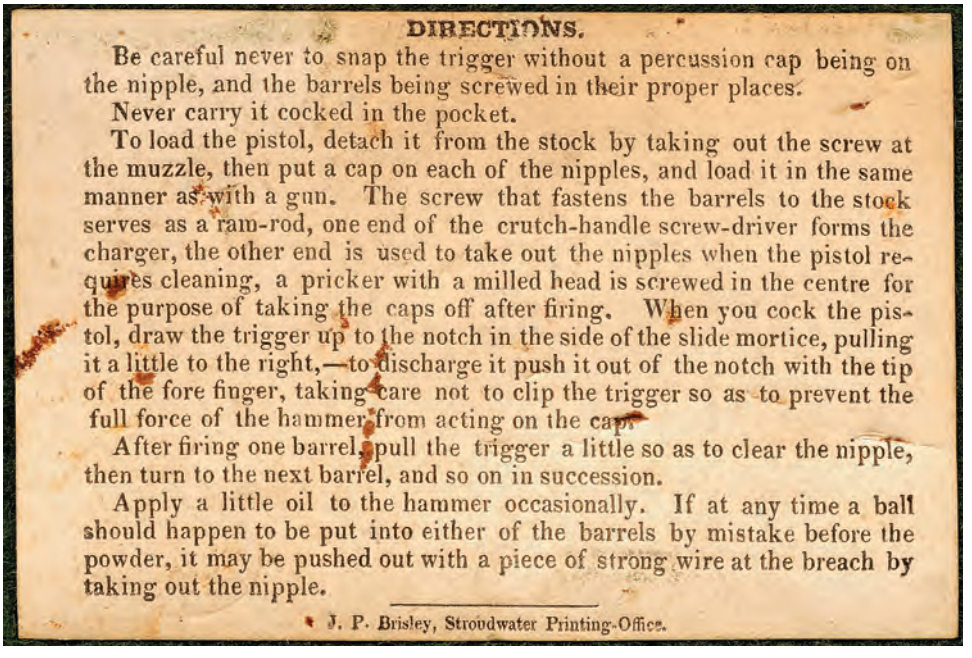
"Directions" Label inside case lid (Figure 14).

Crutch-handle Screw (see Figure 12) lies (with good fit) on top of the left middle compartment. This Budding-specific tool should be present in all 2A cases, but is almost always missing (no surprise, given its vulnerable position). It's mentioned in the model 2A directions. It is a combination tool, including screw driver ("turnscrew"), nipple wrench, powder measure, and screw-in pricker "for the purpose of taking the caps off after firing".

Barrel release/nipple removal key replaces the crutch-handle screw driver in 2B sets and is located inside the left middle compartment. (The model 2B directions call this a "key wrench".) I have reliable reports from two 2B owners that the key fits (Figure 15).

Wad Cutter lies in the (usually) shaped space at left rear. (see Figure 12) **T-shaped cleaning** lies under the green baize divider at right rear. (See Figure 13.)

Plain Copper Flask lies over the green baize divider. (Figure 12) Of 11 sets I've seen with flasks, 7 are like this, and Neal agrees this is correct. (See reference 35.) Three other flasks have a pheasant design, all the same. Applying the Pope Rule[36] we should accept this type of flask as a variation.



DIRECTIONS.

Be careful never to snap the trigger without a percussion cap being on the nipple, and the barrels being screwed in their proper places.

Never carry it cocked in the pocket.

To load the pistol, detach it from the stock by taking out the screw at the muzzle, then put a cap on each of the nipples, and load it in the same manner as with a gun. The screw that fastens the barrels to the stock serves as a ram-rod, one end of the crutch-handle screw-driver forms the charger, the other end is used to take out the nipples when the pistol requires cleaning, a pricker with a milled head is screwed in the centre for the purpose of taking the caps off after firing. When you cock the pistol, draw the trigger up to the notch in the side of the slide mortice, pulling it a little to the right,—to discharge it push it out of the notch with the tip of the fore finger, taking care not to clip the trigger so as to prevent the full force of the hammer from acting on the cap.

After firing one barrel, pull the trigger a little so as to clear the nipple, then turn to the next barrel, and so on in succession.

Apply a little oil to the hammer occasionally. If at any time a ball should happen to be put into either of the barrels by mistake before the powder, it may be pushed out with a piece of strong wire at the breach by taking out the nipple.

J. P. Brisley, Stroudwater Printing-Office.

Figure 14. The directions label for the Model 2a pistol. (Photo by Dan Retting)

Figure 15. A cased Model 2b pistol, with the 2b barrel release/nipple removal key. See the text for discussion of the cap tin. (Collection / Photo by Richard Garrett).

Bullet Mold lies under the green baize divider at right rear, with the T-rod. Neal agrees: a set "should include a bullet mold, which is concealed under [the] baize cover below the flask." (see reference 35) (My set lacks a bullet mold.)

I have studied 15 cased Budding pepperboxes, from auctions, dealer sites, and collector communications, and I'm quite confident about the proper contents I've just discussed. A complete (or almost complete) set is rare. Most sets are in disarray and are missing most (or sometimes all) of their original contents. Many have incorrect tools: outsized powder measures, incorrect molds, an odd wood-handled pricker, a set of calipers, a wooden rod; only 3 sets had case keys.

Case Research Summary

My small research study of Budding pepperbox cases confirms my impression from decades of collecting antique firearms: once cased sets by any maker exited the shop with their first owner, stuff left and entered the case frequently and unpredictably. I have never seen a cased model 1 or model 3 Budding. I think that Budding made mostly model 2 pistols, and case survival reflects this. Because of the completeness and the idiosyncratic nature of the casing, I believe that all Budding pepperboxes were originally sold cased.

Two Special Cased Set Considerations

A. The "Can of Caps"

Keith Neal says that a set should contain a "can of caps". (see reference 35) One of the two standard-style cap containers I've seen is in an incorrect space in an incorrect case. The other is in a correct 2B case, but placed where the key wrench should be (Figure 15).

Two other sets have unusual cap tins, which I've not seen before: small, round, metal, totally unmarked (i.e. without a retailer's name/address/advertising), and empty. I don't know their significance and can't judge their originality.

It's unclear what type of cap container, if any, would have come in the Budding set as originally sold. The standard metal, labeled cap boxs we find in later percussion cased are thought to have not existed in the 1820s. Some early cap containers were cardboard (hence extremely rare now).[37] The cap tin in Figure 15 is quite a good fit, raising questions; however, I believe the specific tin shown is too late to be original. Perhaps the key wrench fits atop the lid (like the 2A tool), leaving the compartment space for some type of cap container. But, the two 2B sets I have seen lack the lid, so we won't try, I just can't say.

B. Model 2B Cases

This century began with the auction of a great pepperbox collection. Lot 59 was a cased Type 2B Budding pepperbox. (see reference 17) The case is a little bit wider than the 2A, to accommodate the slightly longer pistol. The "Directions" label is different: the "crutch-handled screw driver" is omitted (it is not needed for the 2A); instead, the key wrench is mentioned. The barrel group fastener is called a pin, not a screw (Figure 15).

The English collector and writer Rex Pope owns a unique Model 2 cased set. A 2B pistol sits in what was originally a 2A case. To accommodate the protruding nut at the end of the barrel group, a hole has been made in the left side of the front space. First placing the tip of the pistol into this hole allows the pistol to fit comfortably. The "Directions" label has been altered with old, 19th century ink script, obliterating the "2A" sentence and substituting the "2B" phrasing. The correct 2B key wrench has replaced the crutch handle screw driver. Rex Pope views this casing as transitional, and believes it supports the view that model 2A preceded 2B. The cataloguer of the Greenwood Collection agrees, using the terms "later 2nd model (2B)" - lot 59, and "early 2nd model (2A)" -lot 173. (see reference 17) I also agree. But with just one such set known, it's possible that a later 19th century owner/collector put the set together and "corrected" the Directions.

Note that a cased Model 3 pistol would have a different set of directions. So far, none has been discovered. (Directions for Model 1 would be the same as for 2A.)

When Were These Pistols Made?

Keith Neal's set that "solved" The Great Budding Mystery included an "old card in faded handwriting" which read, "A great curiosity. Belonged to Col. Hewett about 1830. In perfect condition." (see reference 23) (The phrases "in perfect condition" and "a great curiosity" tell us this old card comes from a later, collecting era; users don't talk about their guns like this.) Others have latched onto this mention of "1830" and made it THE production year, but there must be a range. Neal quotes George's estimate of 1825-1830 with approval. The last sale of the Neal collection dates his famous Budding set as 1830-1835[38], which I think is too late. The HD Trust lawnmower history site makes one brief comment on the pistols, dating them 1825-1830.[39] Randall, who researched Budding for decades, and hence "[knew]something of Budding's movements", dated the pistols from 1823.[40] Because I think the Cook patent of 1824 influenced Budding's design of his pepperbox, I believe 1825 is a good start date.

Randall also has an opinion about the duration of pepperbox production: "... after 1829 he must have been too busy to devote much time to making the revolvers, as the design and development of the mower would have taken up much of his time."[40]

One other detail has impressed me. Budding's trade card in the cases says "Thrup Mill". Budding's lawn mower patent, from 1830, describes him as "of the Thrupp," (a more general geographic term), not at Thrup Mill. A mill had existed at this site for centuries, and the Thrup Mill name dates from the early 19th century. In 1828, the owner, then a widow, "leased Thrup Mill to John Farrabee, iron-founder, who was empowered to make extensive alterations which included taking down the dwelling-house, and ...building a foundary."[41] I think that after 1828 Budding was out of Thrup Mill and moving on to other business (e.g. perfecting and patenting the lawn mower, which he developed with and had manufactured by Farrabee). So I think 1825-1828 is a reasonable date range for the Budding pepperbox.

How Many of These Pistols Were Made?

Again, Neal influenced generations by stating "it is doubtful if as many as 50 were made." (see reference 24) Scores of collectors, dealers, and auctioneers have repeated this "fact" (often modified to "about 50 were made"), without contradiction—until now. The correct answer to this question is: "No one knows."

I've seen at least 30 different Budding pepperboxes. Even if I'd seen every surviving Budding (overwhelmingly unlikely), a 60% survival rate (30 of 50) for an early 19th century pistol would be extremely doubtful. Considering that collections often stay intact for longer than the 15-20 years I've been thinking about this pistol, let's say I've seen half the Buddings still in existence. Then pick a reasonable survival rate (say 10-20%), and voila—how about several hundred?

A Final Budding Thought

Keith Neal owned the one known Budding firearm that isn't a pepperbox.[20] This is a single shot longarm, cased with two screw-off barrels (one rifled, one smooth-bore). The shoulder stock also unscrews, leaving a central brass action around which the gun is built up. The breech of each barrel has a centrally placed, horizontal nipple. The mechanism is exactly like that of the pepperboxes, with a combined triggeresque cocking lever/internal striker powered by a coiled spring, and with the same type of resting notch. (There's a conventional trigger guard.) The Christie's cataloguer called this a walking-stick gun (the brass mechanism is shaped so that use as a cane or walking stick, with the shoulder stock removed, would be possible, though the muzzle of the chosen barrel would get dinged and dirty).

First of all, I want to point out that this gun conforms to the James Cook patent even more exactly than the pepperbox (see Figure 10). Second, the brass frame is signed "Budding Maker" on the top, just like the pistols.

Finally, beneath this "Budding Maker" is an engraved grotesque mask. To me, the appearance (and pairing) of these two anachronisms is well worth pondering: the claim of "Maker" on a firearm, unseen for many decades, and a decorative motif from the previous century. Perhaps Edwin fancied antique firearms, as we do.

ACKNOWLEDGMENTS

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REFERENCES

1. Fulminates are chemical compounds that explode when struck.

2. British patent #3032, July 4, 1807. See Matthew Schneiderman, "The Forsyth Patent: An Anniversary

Appreciation", *The Gun Report,* volume 53, #2, July 2007, pages 40-53.

3. S. James Gooding, email of April 22, 2005.

4. The only possible competition I know of is a pair of "3 barrel detonating pistols" sold by William and John Rigby around 1825. See D.H.L. Back, Great Irish Gunmakers Messrs Rigby 1760-1869, *Historical Firearms*, Norwich, England, 1992, page 42. These pistols are neither pictured nor serial numbered, and their dating is an estimate by David Back. They may have been later than the first Buddings, and they may not even have been pepperboxes (they could have had in-line barrels). Please contact me about any percussion pepperbox datable to before 1825.

5. My unsourced notes say that the percussion version of the Collier revolver first appeared in 1824. Please contact me if you can confirm or refute this claim.

6. Pauly system firearms are the earliest percussion examples of central fire (without nipples) and enclosed action, with British patent years 1814 and 1816. Predating copper caps, they employ either a reusable chamber insert (the pistols) or a paper cartridge built on a reusable copper base (the long arms), each with centrally placed fulminate.

7. An enclosed copper cap percussion action requires more than just an internal striker. All examples have vents, but you can't see the nipples, caps, or striker from the outside.

8. These 4 claims are not supported, contradicted, or even discussed in the antique arms literature. I challenge all readers to supply counterexamples.

9. Major R. Brown, *The Gun Collector*, issue 23, page 208, 1948.

10. J.N. George, *English Pistols and Revolvers,* Small-Arms Technical Publishing Company, Onslow County, North Carolina, 1938, pages 167-168. (Hereafter referred to as "George".)

11. Jack Dunlap, *American British & Continental Pepperbox Firearms*, Pacific Books, Palo Alto, California, 1967; chapter 4, pages 22-26. (Hereafter referred to as "Dunlap".) Dunlap uses the noncommittal name "E. Budding" throughout this chapter.

12. W. Keith Neal, "The Great Budding Mystery", *Guns Review,* May 1962, pages 13-15. (Hereafter referred to as "Neal".) This is both the seminal and (until now) the only firearms-related article in Budding Studies. Neal's discovery of the first known cased set, with its trade label associated the gunmaker's name with the Thrup Mill/Stroud/Gloucestershire Budding, and solved the mystery of who made the pistols. To be fair to Neal, in a letter/comment in *Guns Review* of August 1962, page 5, he noted his error and acknowledged the first name Edwin.

13. A wonderful letter to the magazine *Poetry,* June 2005, page 273, by Henry Taylor, addresses human beings' deep, mysterious tendency to confuse the names Edwin and Edward. "... raises the issue of Robinson's Curse: anyone who mentions [the American poet] Edwin Arlington Robinson has at least a thirty-percent chance of calling him Edward. It doesn't matter how much one knows about poetry in general, or American poetry, or even Robinson; nor does the eminence of one's editors matter. It happens, that's all."

14. Several Budding pepperboxes with light-colored grips are known. These are not walnut, but the type of wood (and source and originality of the grips) is uncertain.

15. Dunlap shows one odd, mislabeled example with a capping slot (i.e. capped without removing the barrel group), and speculates—not too helpfully—on its place in Budding production chronology. Late rather than early makes sense to me. One other externally capped Budding exists. Note that these two capping-slot Buddings don't require and don't have vents, since the actions aren't enclosed.

16. There's one pistol known without the "Budding Maker" mark, and it's also the only one with iron grip retaining screws. The significance of this is unknown. It currently resides in a totally incorrect case.

17. The Edmund Greenwood Pepperbox Collection Sale, Wallis & Wallis, January 9, 2001, lots 59 and 173. The catalogue descriptions use the terms 2B and 2A, the only place I've seen this distinction appear in print. (Hereafter referred to as "Greenwood Collection".)

18. Jas van Driel, email of March 24, 2005. Jas owns two type 1 Buddings, with these barrel lengths. Both Neal and George give a barrel length of 2 3/4" for type 1 pistols.

19. Jas van Driel, email of August 24, 2011.

20. Christie's London Auction, October 25, 2001, lot 18.

21. De Witt Bailey and Douglas A. Nie, *English Gunmakers,* The Birmingham Gun Trade in the 18th and 19th Century, Arco, New York, 1978, page 34.

22. Nick Chandler, email of November 8, 2010.

23. http://www.hdtrust.co.uk an on-line history of the lawnmower, by "The Hall and Duck Trust, Collectors of Vintage Lawnmowers." (Hereafter referred to as "HD Trust".)

24. Neal, page 14.

25. British patent #6081 of October 25, 1830. The first lawnmowers were sold in 1831. Budding is said to have been inspired by the rotary blades of cloth knapping machines.

26. This was not patented, but was protected by a Registered Design.

27. *Biographical Dictionary of the History of Technology,* Lance Day and Ian McNeil editors, Routledge, London, 1996, page 112.

28. David Williams, email of March 16, 2005.

29. H.A. Randall, "Some Mid-Gloucestershire Engineers and Inventors." A paper read at the Science Museum, London, March 2, 1966. Printed in *Transactions of the Newcomen*

Society, volume 38 (1965-1966), pages 89-96. (Hereafter referred to as "Randall".)

30. Nicholas L. Chandler, *Early American Underhammer Firearms,* Andrew Mowbray Publishers, Woonsocket, Rhode Island, 2010, page 20.

31. Neal, page 13.

32. George, page 168.

33. David Weaver, email of March 16, 2005.

34. James Julia Auction, October 5. 2010, lot 1371, an enclosed action percussion gun by Joseph Bentley, marked "J. Bentley Patentee and Maker".

35. Neal, page 15.

36. What accessories are original? This difficult and important question applies to all cased sets by all makers—what did the set consist of when it was first sold? Some items are documented in writing (e.g., for the Buddings, the "crutch handle screw driver" and the "key wrench"). Otherwise, we can only apply the Pope Rule: "My opinions are based on how often the same accessory appears in different sets; two or more makes it original. It's the best we can do with so few cased examples." [Rex Pope, email of February 8, 2010.] For firearms with many more cased examples, you could adjust the number required, but you understand the idea.

37. The ideas in this paragraph were kindly loaned to me by S. James Gooding, in his email of April 22, 2005.

38. Bonham's London Auction, November 10, 2005, lot 69. I think the cataloguer's (incorrect) 1830-1835 date derives from a reading of W. Keith Neal and D.H.L Back's book *British Gunmakers Their Trade Cards, Cases, and Equipment 1760-1860,* page 33.

39. This dating on the HD Trust website probably reflects reading of George and Neal (see reference 23). As a Western American collector of early British firearms, largely ignored and marginalized for decades, I owe it to my long-suffering colleagues, and to myself, to quote the HD Trust site: "Between 1825 and 1830, [Budding] designed a Pepperbox pistol which was further advanced than Samuel Colt's patent of 1836." Colt collectors—take note! (Of course, this refers only to the Budding's early and first use of copper cap "Central Fire." Colt's patent is the first to specifically claim horizontal nipples, but a number of earlier patents, and actual firearms, showed and used them.)

40. Randall page 94.

41. "British History Online." The Victoria History of the Counties of England. Stroud Economic—A History of the County of Gloucester, volume XI, 1976 (unpaged).