

# The 'Bird Cage' Press Studs of WWI.

## A Short History of Early Snap Fasteners



**Figure 1.** Left, Bird Cage snap fasteners on a 'cut down' Cowl Type RFC flying helmet, 1916-17. Right, patent drawings; bottom, the original design by P. A. Raymond, 1886, top 1902 – (first sighted use of the term 'Bird Cage'). The *bird cage* press stud was an example of a 'sprung clasp' snap fastener, in which the stud was a deformable clasp, which compressed as it entered the slightly constricted mouth of a rigid socket then expanded into the socket body.

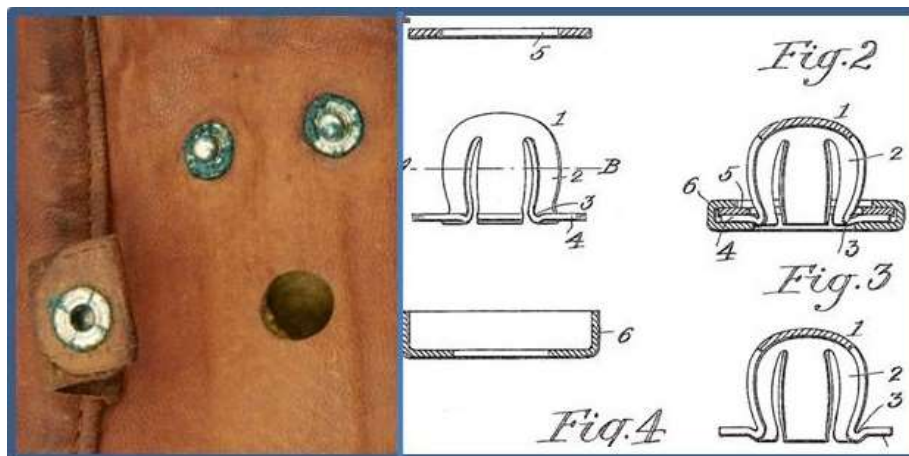
Having collected early C20th headgear for a number of years, including flying helmets and being confined to lower cost items, press studs are often missing. It became apparent that there are no modern equivalents of the type available to undertake repairs. Some research was needed to ascertain what the type was actually called, their time span, who made them etc.



**Figure 2.** Both German and French 'soft' helmets had the 'Bird Cage' type studs during WWI. Wire sprung 'Prym' fasteners seem to have taken over on the German ones, late in WWI or post war.



**Figure 3.** Shown here (1), a 'Bird Cage' press stud used on a WWI British slouch hat, (2), on a French military flying helmet as late as the early 1940s. (3), on WWI Triplex goggles cases; (4) Kodak camera cases and (5), on a compass case.



**Figure 4.** Meanwhile in the United States a mirror image of the *bird cage* clasp fastener was in use during WWI. Patented by Greenebaum, 1914 as the 'Spring-Socket for Snap-Fasteners', the socket, rather than the stud was described as of 'bird-cage type'. The socket, internal to the button, was formed as a metal dome with its skirt split into four sectors and splayed at 90°, riveting the button to the material and allowing expansion and contraction of the socket mouth as the rigid stud was inserted. They were used on the standard Scully and Spalding flying helmets. This type is still available today as 'segmented spring socket' snap fasteners, somewhat of a novelty item, it is advertised for light applications.

Although fasteners for clothing are as old as clothing itself, the concept of what we now recognize as snap fasteners seems to be reasonably recent. The basic idea, however, of having an internal sprung (or resilient) portion, or spring, in one half of a separable device, which could interlock into the opposing

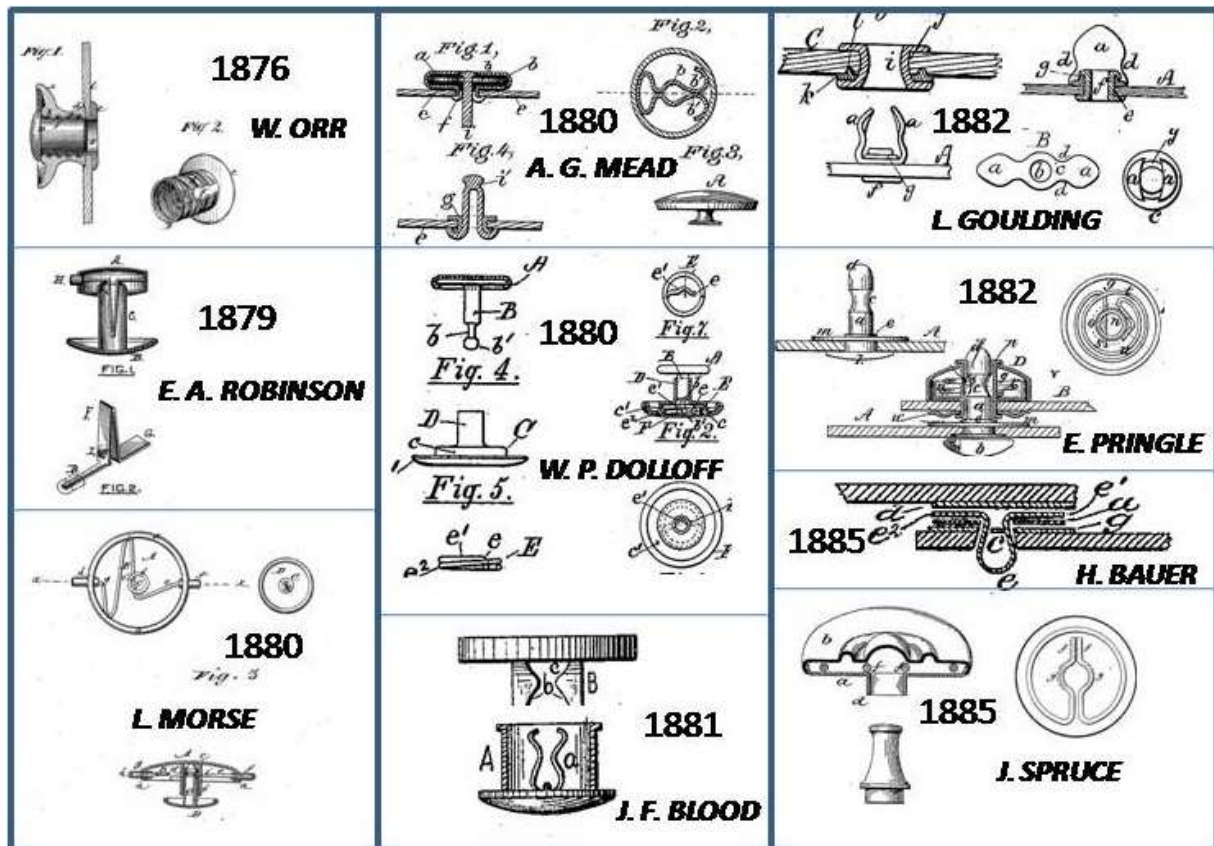
half of the same device, temporarily joining the halves in their working position, is an ancient concept. Cork bungs and bottle tops etc., could loosely be put in this mechanical class. A popular ancient example is found in the ~2,200 year old Chinese 'Terracotta Army', which includes models of horse halters which use a device made-up of two short telescoping tubes, which could be temporarily fixed together with a sprung tag; they had to be unlocked, however, by withdrawing a pin.

More recently, in the early C19th, Benjamin Sanders in the UK and Bertel Sanders in Denmark, are both separately credited with developing the first modern snap fastener, although details of their devices are elusive. Unfortunately the UK company's early records were destroyed in a factory fire in 1915 (*Mike Sharpe, Bromsgrove Society, pers. Comm.*). Benjamin Sanders had lived and setup a button factory in Copenhagen in the 1800s, so Bertel may have been a relative of his? Searches in Danish for Bertel Sanders, snap fasteners (snaplåse), press stud (trykknep) etc. return no original results.

Here a snap fastener is taken to be a simple, small, separable mechanical device for fastening two pieces of material together, which can be pressed together, securely holding light items together, but can then be pulled apart with finger pressure alone. Having to operate a separate locking or unlocking device precludes it being a snap fastener; further the two parts of the device should be permanently attached to the object.

Published patents make clear that by the 1870s all the factors that make up modern snap fasteners were in existence and inventors were churning out numerous designs called variously *separable buttons; button and stud; snap fasteners; press buttons; sleeve and collar buttons; spring buttons* and the like. Many were separate items, not attached to the garment, like cuff-links, fiddly and easily lost. But by 1880 unmistakable modern snap fasteners were being patented. Looking at Fig. 5 the statement 'who designed the first snap fastener?' is complex. The confusion is not helped by several large companies decades later being attributed with the title of 'inventor' of the press stud (culprits include Prym and Newey). Fig. 5 shows that lone inventors had done all the basic design work by 1880 and all later patents were variations on these early designs.

A.G. Mead in 1880 certainly could be said to have designed the first version of the 'wire spring' (later called 'parallel spring', after the development of the 'round spring' type in the 1920s) snap fasteners (the first without unlocking pins), with E. Pringle refining it to a robust permanently attached item in 1882. J.F. Blood (1881) and L. Goulding in 1882 designed the earliest 'clasp stud' version, which in turn was refined, by inverting the open clasp to the more robust 'bird cage' type, by P. A. Raymond in 1886.



**Figure 5. The Dawn of the Modern Snap Fastener, mid 1870s to mid 1880s.** Left column, Almost; but not quite! **Top**, In 1876 Orr designed a fastener with a corrugated sprung stud which passed into a corrugated socket, however a plunger had to be depressed to keep the stud open inside the socket. **Robinson 1879**, a 'V'-shaped spring engages into a socket; it snaps into place, but needs the depression of a protruding pin to disengage. Likewise **Morse 1880**, has a flat sprung wire held in the flat socket button, the stud has a square cut annular groove into which the spring 'snaps'. To undo, however, protruding pins had to be depressed. **Central column**, shows perhaps the first true snap fasteners. **Mead, 1880**, designed a snap fastener recognizable to the modern eye. The grooved stud could be 'snapped' into the wire spring in the socket button, and because the top of the groove was rounded the stud could be 'snapped' out again, just with a firm pull (note this is 26 years before Prym's first press stud patent). **Dolloff's 1880** design was a similar principal, but the spring was a small coil with a central inner tail to engage the rounded stud's head. **Blood's 1881** design had a bent sprung clasp forming the stud inside an outer socket (an attempt to protect the fragile u-shaped clasp?), which engaged with a contoured hollow part of the inner socket. The **central column** shows examples of true snap fasteners, but, apart from Mead's design, their attachment to the garment etc. is not addressed. **Right column**, **Goulding 1882**, a sprung clasp is bent from a pressing, the clasp which is riveted to one side of the garment snaps into a grummet passing through the other part of the garment. It shows a dome could be used over the grummet, to give a button like appearance. **Pringle's 1882** design shows an improvement of the 1880 wire sprung snaps, addressing in detail the attachment to the garment. **Baur 1885**, said by some to be the first snap fastener, but plainly one of many by that date, was a design that featured a number of simple holes on a stiffened strip, the studs were able to compress and expand when passed through the holes. **Spruce, 1885**, another example of a wire sprung snap fastener, with a stud that could be riveted to the garment.



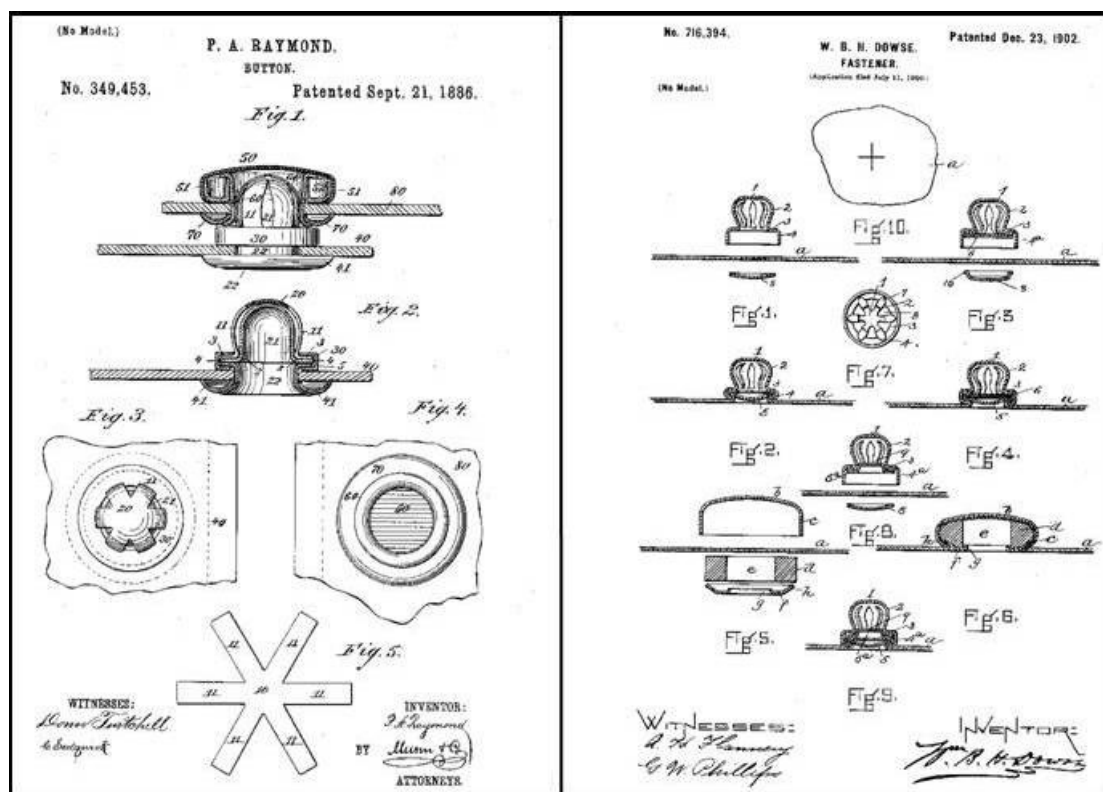


Figure 6. Left, P. A. Raymond's 1886 patent drawings of his 'Spring Button' a 'sprung clasp' type snap fastener. It shows details of how to stamp out the 'spring stud' and the text details how to form it into the distinctive clasp. This is taken by many as the first modern snap fastener, and is certainly an improvement on Blood's (1881) and Goulding's (1882) open clasps; but it can be seen as a simple inversion of those, with the splayed skirt able to act as a rivet flange and the top of the clasp more sturdy as it forms a closed dome. It became an industry standard in Europe for medium and large snap fasteners for at least 40-50 years. Although rare by the mid 30s the French Air Force's 'Airaile' type helmets had them into WWII. They appear to have become extinct after WWII. The drawings at right, show William B. H. Dowse 1902 design incorporating a novel clinched base design for fixing to a garment, it is included here as it is the first occurrence of the term 'Bird Cage' sighted by the author, although it was probably called that much earlier.



Figure 7. In France the inventor's company 'Raymond & Guttin of Grenoble' produce the type. Companies in Britain that produced and marketed the bird cage fasteners included George & Co., London and Dryad Handicrafts, Leicester. No doubt there were others in other counties.

So it appears that after a burst of ideas around 1880 two basic types of snap fastener prevailed at the turn of the century; the sprung clasp type, perfected by Raymond in 1886, and various wire sprung patterns, evolving from several ~1880 types. Raymond's sprung clasp type was stronger than the rivals and dominated during the Edwardian era and WWI. A mirror image of it, the spring socket type appeared in the USA in 1914. In Europe, however, the popularity of Raymond's design seemed to rapidly diminish in the inter-war years and apparently disappeared during WWII.

Why did the bird cage stud snap fastener go extinct? Due to its design there was a lower limit to the size it could practically be made. Also there was an upper limit to its size, the larger the stud the thicker gauge the metal would have to be to maintain its strength, making it correspondingly stiffer in operation. The competing 'wire spring' buttons later called 'parallel spring' could be made to grip a pinhead sized shank. The 'round spring' fasteners, or 'American type' (see fig. 10) which appeared around 1920 could be made in large sizes, without any change in the basic size ratio of parts, and were consistently tough and firm in operation. So 'wire spring' fasteners began to dominate the small to medium size market and the 'round spring' fastener medium to large size applications. Like the American bird cage socket (Fig.4.) Raymond's design may have lived on as a novelty item, but it was relatively complex to produce and, having its main working part exposed when open the stud could be bent out of shape, (see top stud in Fig. 1). So their popularity began to wane in the 1920s; they were rarely used in the 1930s and appear to have become nonexistent after WWII.

New old stock 'Bird Cage stud' fasteners are now very rare, especially the larger sizes, so if anyone has some, I still need about half a dozen!

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### Other notable press stud developments in the early C20th.

As shown above all the basic features of the two families of snap fastener had been invented by the early 1880s. The majority of the numerous subsequent patents were modifications of those basic designs; changes in spring shape, attachment methods etc. Below are shown a few notable developments which did have new, original features.

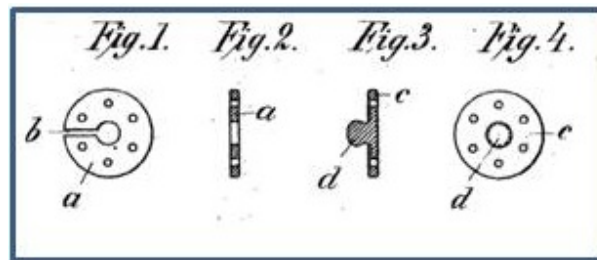


Figure 8. Richter's 1908 plastic snap fastener. The necessary springiness to allow the stud to enter the socket hole was achieved by having a slot in the plastic socket washer. The idea of using plastic, (e.g. Bakelite, nitrocellulose at that time) was to allow it to be produced in various colours to unobtrusively match a garment. Plastic is still used to this day, with modern plastics allowing the necessary resilience without slits, slots or wire springs. Now the extreme cheapness of plastic is its main advantage.

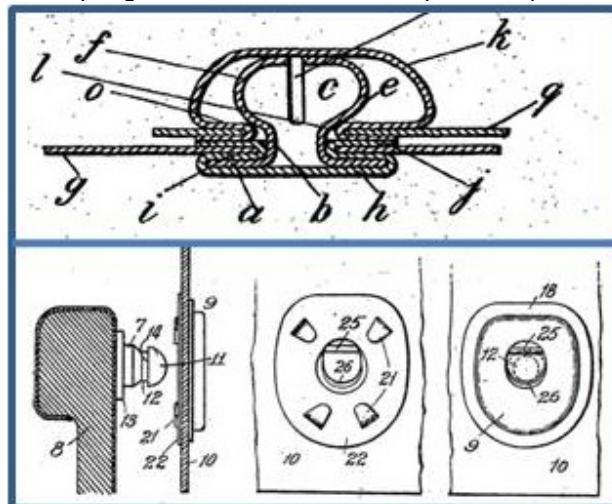


Figure 9. Asymmetric buttons. Top, Aldersley (1911), Bottom, Carr Fastener Company, (1920). The asymmetry enabled the mechanical advantage of a lever action, allowing the fastener's grip to be stronger, than a simple button topped one. The levering action enabled rigid materials to be better connected/disconnected with snap fasteners; with simple button headed snaps getting a grip and applying the necessary force to un-snap was difficult on flat rigid surfaces. Carr's design became the 'lift-the-dot' fastener of WWII, e.g. ammunition pouches and holding in the liner of the British Mk IV helmet.

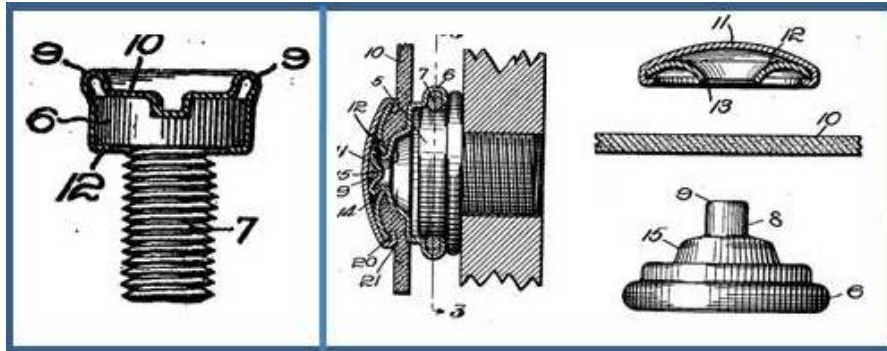


Figure 10. Around 1920 the automobile industry started to patent various snap fasteners designed to be attached to the bodywork of vehicles for securing various items of trim and roof canvas etc. Many were of a traditional snap fastener design. But in 1919 (Left), the Carr Fastener Company designed the first Round Spring type, (sometimes called the American Pattern). The wide stud was originally designed to incorporate a screw slot in its crown with the bottom of the stud extended as a bolt/screw shank for attaching to car bodies etc. It was realized that the larger surface area of the wide stud and the encircling round spring in the socket, produced a stronger and easily manufactured snap fastener. Soon the bolt shank was left off and the screw head portion was left open to allow it to be riveted to any material. They became the most popular medium to heavy duty snap fastener. WWII saw widespread use by the Allies, including on US and RAF flying helmets enabling quick attachment of oxygen masks. Today a ubiquitous snap fastener, from clothing to auto and industrial usage (look at how your car's foot-well carpets are held down).



Figure 11. Electrical snap connectors. In 1921 J. d'Argaville Clark patented the first electrical connector utilizing snap fasteners attached to insulated wire (shown at left a later Nu-Way commercial version). They allowed quick and easy connections to low voltage power supplies and enabled experimental circuit boards to be built and modified rapidly. They were common in laboratories, schools and electronic design workshops up to the late 1960s. Cheap, brightly coloured, educational sets are still available today. Centre, a WWII Japanese electrically heated helmet, with a '+ / -' snap fastener connector for rapid attachment and disconnection to the aircraft's electrical system. Right, An important offshoot of Clark's idea is today's medical usage, with disposable stick on snap fastener backed electrodes, connected by leads to various monitors.

Steve Saunders, Rabaul. Nov. 2020

## References

<https://worldwide.espacenet.com/> Source of all the patent drawings.



<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4883472/> Article on the electrical snap fasteners.