

Sketching a History

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Introduction

There are several pleasures associated with collecting. Among them are the initial discovery and acquisition of an object, the process of finding the perfect place for it in one's collection, and the occasional opportunity to share the object with others. Beyond these transient rewards are more enduring benefits, such as the companionship found in the society of fellow collectors, and the long-term friendships that often follow.

This paper focuses on the personal enrichment derived from the unexpected and often fascinating discoveries made while investigating the background of some simple object. These collateral results can expand one's knowledge beyond the scope of the collection, enabling a broader understanding of the world and its inhabitants. Presented as an example of that enrichment is the following digest of results from a search for the purpose, origin and creators of an object found at a flea market.

The Object

The object is a small drafting board, roughly ten inches high and nine inches wide. It includes a magnetic compass at the top, a means of securing paper to the board, a ruler appended to an adjustable arm, several markings and scales, and a threaded brass fitting on the back. It is branded with the name and logo of the Keuffel and Esser Company of New York, and is also marked "ENG. DEPT. U.S.A. 1908".

The board appears to be made for rough survey work. The markings indicate a military purpose. The 36th Edition of Keuffel and Esser's catalog provided a name for it: "Cavalry Sketching Case." Internet searches for "Cavalry Sketching Case" obtained numerous results, revealing a fascinating history for this little instrument. One eye-opening statement was this sentence from a K&E advertisement:

"... a stout strap attached by a swivel pin, serving as handle or for attaching the board to the bridle wrist when on horseback."¹



The object, showing the paper rollers at the sides, the compass with adjustable meridian line at top center, Vertical Interval scales along the top cross-piece, the articulated arm with rule attached, and the clinometer scale along the bottom cross-piece.



The back of the board, showing the compass lock at top, the threaded fitting for the wrist strap at center, and the pencil tubes for one blue, one red and two black pencils.



The K&E name and logo.

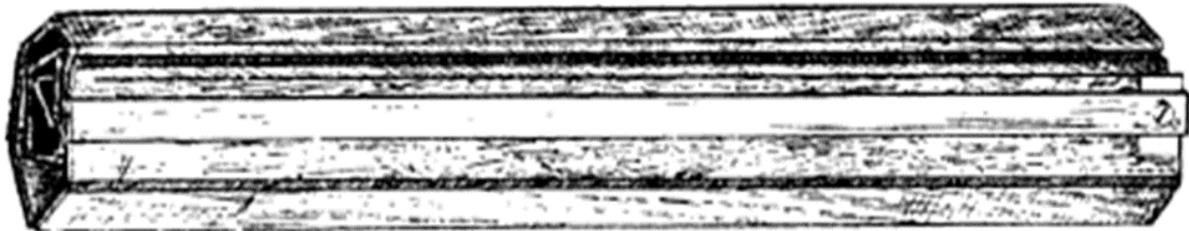


The Army markings.

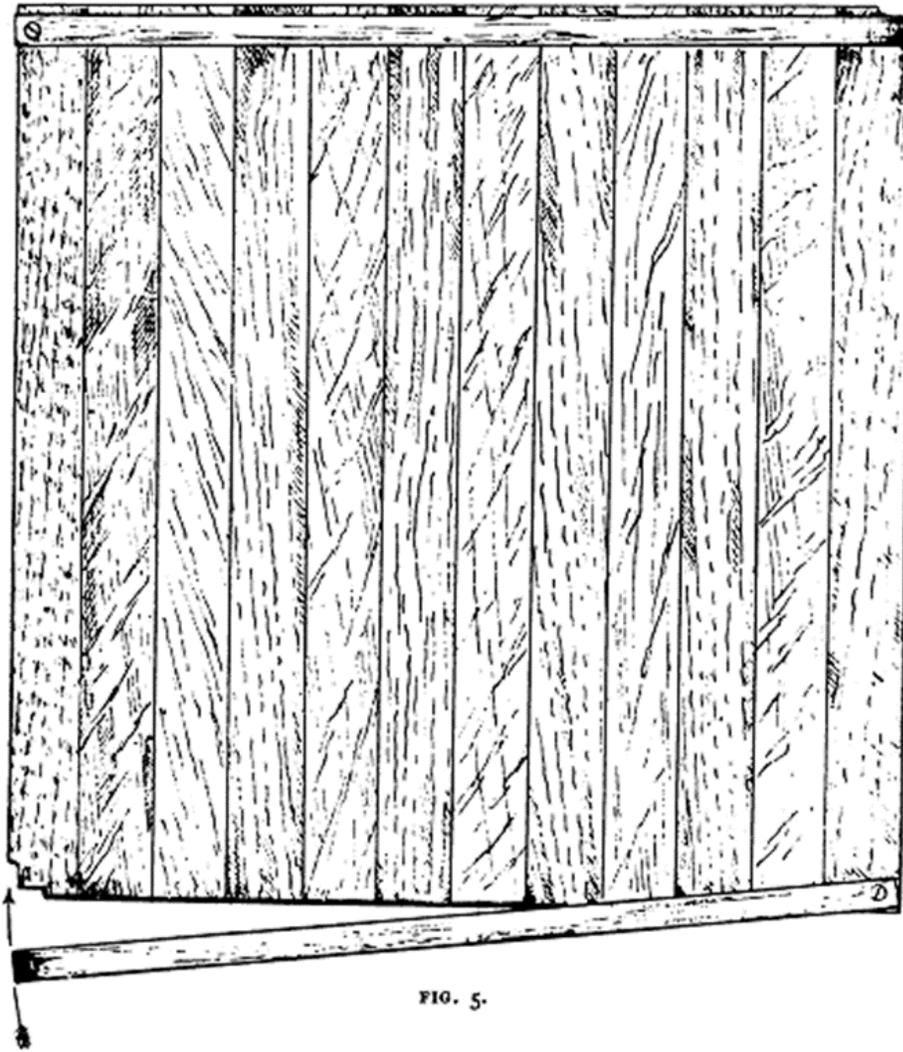
A Precursor

Before the development of the Cavalry Sketching Case, a mounted officer's reconnaissance equipment was described as follows:

"For a rapid survey such as a reconnaissance in the presence or vicinity of the enemy the following is a simple and portable construction of the plane table. It is composed of several rules of equal length and breadth held together by being pasted to a sheepskin or strong cloth. To make a plane table they are unrolled and held in the plane by means of two similar rulers turning about one extremity with a small hook fastened at the other. When not in use it may be folded up and carried in the pocket or holster. It may be fitted to an iron pointed staff. An index may easily be made for it provided with needles instead of sights."²



Sketching Board rolled-up



Sketching Board ready for use³

**The Origin of the Cavalry Sketching Case:
William Hamilton Richards (1833 – 1895)**

A few years after the preceding quote appeared, Major William Hamilton Richards wrote:

“All that is required is a straight edged piece of wood, a scale of yards, and the back of a book or a sheet of paper fastened on a board, to draw upon.”⁴

William Hamilton Richards was born to a well-to-do family in Roebuck, Dublin, Ireland in 1833. In May, 1853, Richards was commissioned an Ensign, by purchase, with the 55th Regiment (Foot). He was promoted to First Lieutenant in September, 1854.

During that time, deteriorating relations between Russia and the declining Ottoman Empire had led to armed conflict. Russia, already occupying the Principalities of Moldavia and Wallachia on the Turkish border, subsequently sank a squadron of Turkish naval vessels in the Black Sea port of Sinop.

Fearing that a Russian victory over Turkey would interfere with its interests in India and the Far East, Britain joined forces with France, Sardinia and Turkey to reverse the Russian advances. From 1853 through 1856, the opposing forces battled in the Crimean Peninsula on the northern coast of the Black Sea. Serving with the British Infantry in the Crimea was Lieutenant William Hamilton Richards.

Richards carried the Colors of the 55th Regiment during the Battle of Alma in 1854, was present at the Battle of Balaklava, the siege and fall of Sebastopol, and the assaults of the Redan. He was wounded, and received the Crimea Medal and other recognition. Richards was promoted to Captain in June, 1855.

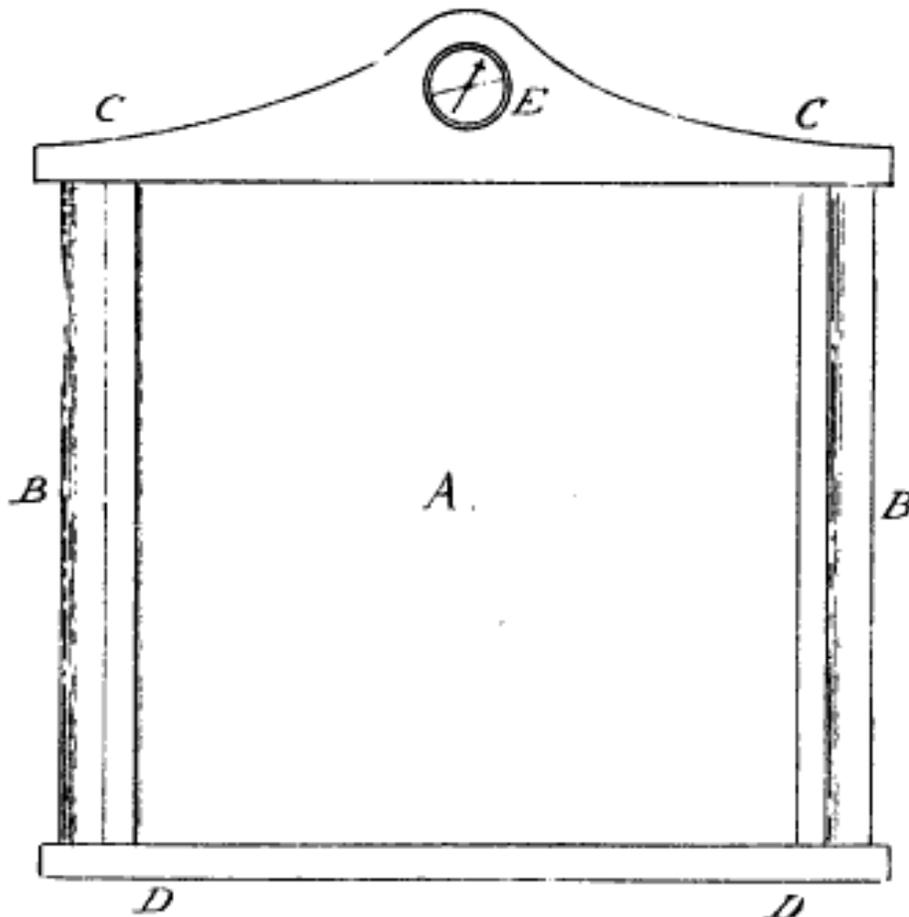
In 1863 Captain Richards was appointed Instructor of Military Drawing and Surveying at the Royal Military College, Sandhurst. He continued teaching there until retiring as a Lieutenant Colonel in 1888. Richards' curriculum for his course in Military Drawing and Surveying included instruction in reconnaissance sketching.

In 1883, Col. Richards' *Textbook of Military Topography* described an improved instrument for conducting reconnaissance surveys. Richards called his invention the "Cavalry Sketching Case". The essential features of Richards' Cavalry Sketching Case were:

- A small drawing board
- A magnetic compass set into the top of the board for establishing its proper orientation
- Rollers at the sides for scrolling paper across the board as a drawing progressed
- A fitting on the back of the board for attaching a wrist strap
- A separate canvas pouch for pencils (black and colored), a ruler and a protractor.⁵

In the 1888 edition of Colonel Richards *Textbook*, the following statement appears:

"Manufactured by Messrs. Elliott, Instrument Makers, 101, St. Martin's Lane. Since their introduction these cases have proved very suitable to active service. Many imitations of and deviations from the regulation pattern have been introduced. Care should be taken to procure none but those manufactured by the above-named maker, and stamped "Richards' Cavalry Case"; any others will prove disappointing."⁶



An illustration of Richards' original design for the Cavalry Sketching Case

After his retirement, Colonel Richards was appointed to command the Infantry Volunteer Dover Brigade in 1890. William Hamilton Richards continued to serve his country until his death in 1895, at age 61. He was buried at Hove Cemetery, Sussex.

**Improving the Cavalry Sketching Case:
William Willoughby Cole Verner (1852 – 1922)**

The next significant contributor to the development of the Cavalry Sketching Case was William Willoughby Cole Verner, one of Colonel Richards' former students. Born in 1852, Willoughby Verner joined the Rifle Brigade in 1873. In 1881, he graduated from the Staff College first in his class, with Honors.

Verner's military career included service in the Sudan during the Mahdist Sudanese uprising against Egypt. Because of its dependence on the Suez Canal, Britain had become deeply involved in Egyptian affairs, and subsequently became engaged in military action in the Sudan.

The culmination of this conflict occurred at Khartoum, Sudan, where, in March 1883, Mahdist forces besieged Major-General Charles George Gordon and his Egyptian troops. Gen. Gordon held his ground, and in August, 1884, Britain organized the Gordon Relief Expedition to evacuate Khartoum. Verner was part of that force. A few highlights of his exploits follow:

8 Jan 1885 – "Verner, Rifle Brigade, who was to sketch the road, and be left at Matammeh as intelligence officer."

9 Jan 1885 – "Dickson's camel broke loose, and started off, with Dickson, Verner, and servants in hot pursuit."

At Abu Klea, after a night spent enduring a constant barrage of rifle fire from the Mahdists, the Expedition formed into a square and was subsequently charged upon by Mahdist cavalry and infantry:

17 Jan 1885 – "Verner was knocked over by the rush, and saved by a camel falling across him."

While marching at night, hoping to reach the Nile so they could fight with their backs to the river:

18 Jan 1885 – "Verner was sent to guide the column on a night march toward Matammeh and the Nile with his compass."

19 Jan 1885 – "Verner was sent out to reconnoitre, saw Matammeh and enemy troops – no chance to reach the Nile unseen"

Eventually reaching the Nile, the Expedition met with “Gordon’s Steamers” that had been sent to ascend to Khartoum:

“On the steamer at Abu Alim on 28 Jan 1885, while trying to signal Gordon via heliostat, a Shagiyeh tribesman shouted from the riverbank that Khartoum had been taken and Gordon was dead. When the steamer reached the junction of the two Niles it became clear that Khartoum was in the Mahdi’s Hands.”⁷

Willoughby Verner received medals for his participation in the fighting on Gordon’s Steamers. He was subsequently “laid up with fever”. He published an account of his service with the Nile Expedition in *The military diary of Colonel W.W.C. Verner: an account of the expedition to relieve General Gordon at Khartoum in the Sudan, with associated papers, 1884-1885*.

Beginning in 1887, Verner suggested several improvements to Richards’ Cavalry Sketching Case. Verner’s improvements included:

- The addition of a protractor to the back of the board, with a weighted length of cord to act as a pendulum, forming a clinometer for measuring elevation and depression angles, added 1887.
- Elastic bands at each side of the board to hold a ruler in place.
- By 1895 a pivoted arm had replaced the elastic bands for holding the ruler, and a metal pendulum had replaced the weighted cord on the clinometer.

That last improvement is revealed in an account of Verner’s experiment with aerial reconnaissance during a balloon ascent in 1894:

“We carried with us . . . and last, but not least, a cavalry sketching case.

The latter was one designed by me and especially fitted for balloon-sketching with a pivotted ruler, by the aid of which I was able to “lay back” correctly on the course we had come and so draw in the roads, woods, streams, &c., we passed, in their proper relative positions.”⁸



A later version of Verner's Cavalry Sketching Case
(Illustration taken from an internet auction web site)

As they had done for Richards', Elliotts made Verner's Cavalry Sketching Case.

Verner was promoted to Lieutenant-Colonel in 1896, and served as Professor of Military Topography at the Royal Military College, Sandhurst, from 1896 through 1899. Col. Verner was an enthusiastic proponent of the Cavalry Sketching Case. He described it in his classroom and in the textbooks he wrote. He brought it to the attention of a wider audience via the numerous articles he published in military journals and magazines, such as his "Rapid Field-Sketching and Reconnaissance", which included a description of his improved Cavalry Sketching Case. The article appeared in Britain in the May, 1888, issue of *The Illustrated Naval and Military Magazine*, and in the United States in the November, 1891, issue of the *Journal of the Military Service Institutions of the United States*.⁹

Verner said of the Cavalry Sketching Case:

“For rapid work in the field nothing can equal the cavalry sketching case as it is commonly called and it is with this little instrument that I propose to deal in the following pages. It is the invention of Colonel W. H. Richards, for many years Professor of Military Topography at the Staff College and to whom I am indebted for my first lessons in its use.”¹⁰

Following his tenure as Professor of Military Topography at Sandhurst, Col. Verner was posted to South Africa as Deputy Assistant Adjutant General for Topography in 1899, and served on the staff of the Boer War South African Campaign from 1899 to 1900. An account of his service there follows:

“Colonels Sherston and Willoughby Verner were amongst the first officers to come to grief in the war. Colonel Sherston was fresh from his duties as A.A.G. on the District Staff of the Bengal Command; Colonel Verner went out to the Cape with General Buller ostensibly as D.A.A.G. for Topography, but on landing he was instantly sent to the front as Chief Staff Officer to the Frontier Force at Orange River. He was busily engaged there for a month, and on Lord Methuen advancing he accompanied that General to the Modder, as Reconnoitring Staff Officer. Colonel Verner took part in the battles of Belmont and Graspan. In the subsequent advance to the Modder the colonel's horse rolled upon him—a not uncommon occurrence when galloping across the veldt—smashing his shoulder and ribs, and injuring his spine. Colonel Verner was sent down to Wynberg Hospital in December. He was too hopelessly crippled to take any further share in the campaign, and was eventually invalided home.”¹¹

Col. Verner's injuries forced him to retire from active service in 1904.

According to his obituary in *Nature*, Willoughby Verner was a remarkable man. Born 22 October, 1852, he approached life with exceptional enthusiasm and industry. In addition to his commendable military service, Verner was also an accomplished author. He wrote a history of the Rifle Brigade and other histories and memoirs, and several books on Military Sketching, Reconnaissance, Topography and Map Reading. He also wrote a book on the wild birds of Southern Spain (*My life among the wild birds in Spain*, 1909), and he penned articles about Paleolithic cave paintings in south-western Spain. Among his other accomplishments, Verner received patents for a compass with luminous markings, a prismatic compass that served the military for half a century, and other improvements to the Cavalry Sketching Case. Colonel Willoughby Verner died on 25 January, 1922.¹²



William Willoughby Cole Verner¹³

**Introducing the Cavalry Sketching Case to the U.S. Cavalry:
William Dorrance Beach (1856 – 1932)**

The next proponent of the Cavalry Sketching Case, and one of its first in the United States Army, was William Dorrance Beach. Beach was born in New York in June, 1856, and was admitted to the United States Military Academy at West Point in 1875. He graduated in 1879 and was promoted to Second Lieutenant in the 3rd Cavalry.

Beach served on frontier duty in the west, at Wyoming, Arizona and the Mexican border. He was promoted to First Lieutenant in November, 1883. After a leave of absence he was made Assistant Professor of Drawing at the U.S. Military Academy.

After leaving his teaching assignment at West Point, Beach served on frontier duty in Texas for a few years, then returned to the role of educator in 1892 at the U.S. Infantry and Cavalry School, Fort Leavenworth, Kansas, where he was made Instructor in charge of the Department of Engineering. He was promoted to Captain with the 3rd Cavalry in the summer of 1892, and remained at the Infantry and Cavalry School until 1898. It was during his time as an Instructor at Fort Leavenworth that Beach popularized the Cavalry Sketching Case in the United States.

If Captain Beach was not aware of the Cavalry Sketching Case when he arrived at the Infantry and Cavalry School, he probably learned of it soon thereafter from the 1891 republication of Col. Verner's "Rapid Field-Sketching and Reconnaissance" mentioned above. Within four years of that publication the Cavalry Sketching Case had become a standard item of issue in the U.S. Army, and Captain Beach certainly had a role in its acceptance.

At Fort Leavenworth, Captain Beach impressed upon his students the utility of the Cavalry Sketching Case. The fact that First Lieutenant Edwin Alvin Root, 19th Infantry, Beach's assistant at the School, and Second Lieutenant Matthew Arlington Batson, 9th Cavalry, an 1895 graduate of the School, both went on to develop improved sketching cases of their own designs gives evidence of Beach's influence. Captain Beach also reached a wider audience via official reports, textbooks, and articles in journals and magazines. A testament to the value of Beach's work appeared in the *Annual Report of the United States Infantry and Cavalry School, Fort Leavenworth, Kansas, for the year 1894*:

"The department of engineering during the past year, as in the previous one, has been under the charge of Capt. W. D. Beach, Third Cavalry. Progress therein has been eminently satisfactory. Instructor and assistants have been untiring in their zealous efforts to improve this part of the course of study."

and for the year 1895:

"Since the introduction of the "Cavalry Sketching Case" in the Course here, many requests have been received from officers for these cases. Forty of them were specially manufactured, fourteen for the use of the school, and the remainder distributed throughout the army. As the manufacture of these cases requires the very best of material and workmanship, and I do not have the means to carry a

large stock of them, (if made in small lots the cost is too high) several recent orders could not be filled. If these cases could be made at one of the arsenals, where it is thought the facilities for their manufacture are ample, and kept for sale to officers, it would prove of invaluable benefit to the service, as without such a case map making, in connection with a mounted hasty reconnaissance, is almost impossible."¹⁴

In a Cavalry journal, Beach wrote:

"A RECORD OF EXPERIENCE WITH THE FIELD SKETCHING CASE AT THE INFANTRY AND CAVALRY SCHOOL.

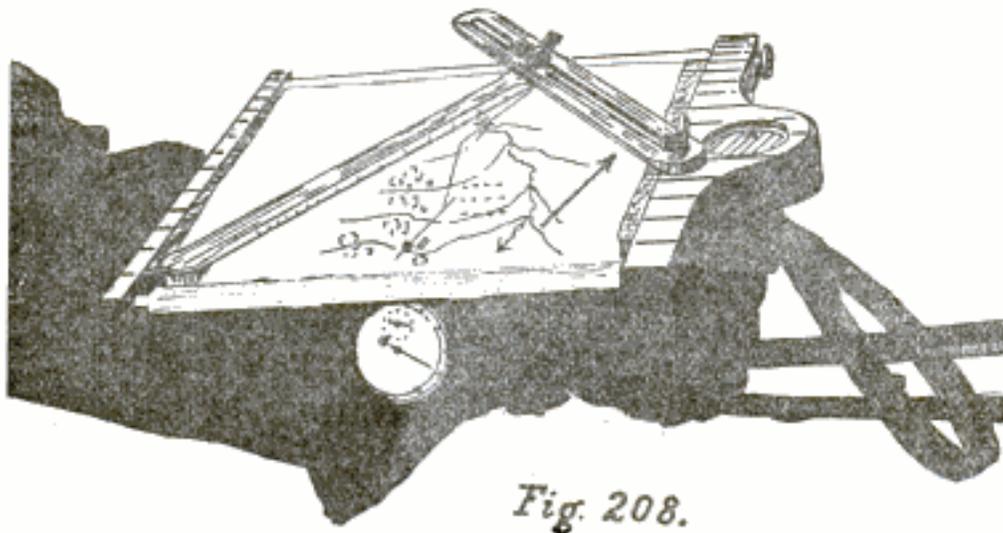
The field or cavalry sketching case, as it is familiarly called, is a device for use mounted whereby an intelligible sketch of a road and adjoining country may be quickly made. The original case was but an adaptation of an old style plane table with its rollers for carrying the paper; from this origin it has developed somewhat until now, as made at Frankfort arsenal, it appears nearly in the form shown in cut.*

The sketching case is intended merely as an aid in certain varieties of rapid work, and is seldom used where time and more accurate means are available.

There is no question but what the exact instruments would be used in military map making if time and circumstances permitted, but in making a rapid reconnaissance with report of the route traversed it is very evident that instruments must either be entirely dispensed with or be of the simplest character.

*The new regulations, par. 461, require the Engineering Department (corps of engineers) to furnish sketching cases, and it is understood that bids for them are now being invited."¹⁵

Beach's *Record of Experience* sets an important milestone on the timeline of the U.S. Army's adoption of the Cavalry Sketching Case.



The “cut” mentioned in Beach’s *Record of Experience*, which resembles the K&E version.

Farther along in Beach’s *Record of Experience*, he presents an example of Cavalry Sketching Case usage, including a summary of average errors. At the School,

“Of 328 road sketches made with the sketching case there is found to be an average error in distance of seventy-five yards per mile, thus showing the uniformity in the gait of the average horse.”

Next, Beach mentioned a popular late-19th Century mode of transport:

“The bicycle, as a distance measurer, far surpasses the horse in accuracy, but it has other drawbacks to which the horse is not liable; for instance, the metal affects the compass; stopping an instant to sketch or make notes is impossible without dismounting; leaving the road to get a view from an adjacent hill is out of the question, except on foot; mud and also a frozen, lumpy road are abominations; the point of view is possibly four feet lower than from the back of a horse (not an unimportant consideration); and finally, the rider must work his own passage. A nervous, excitable horse is, however, almost useless for this work, so that there are disadvantages in both means of locomotion.”¹⁶

In 1897, Captain Beach authored a textbook which went into six editions through 1912. It included an entire chapter on the Cavalry Sketching Case. In his introduction, Beach states:

“The manner of using the Field or Cavalry Sketching Case (which is now an article of issue) is thoroughly explained, as it involves the only valuable method of hasty sketching — namely, the ‘plane table method.’

The laborious protractor and prismatic compass method of mapping directions has been entirely discarded, and contours are only discussed in connection with ‘map-reading.’”¹⁷

After leaving the Infantry and Cavalry School in 1898, Captain Beach continued to serve with distinction. The following excerpt from an 1898 newspaper article mentions Captain Beach as Engineer of the Cavalry Division, 5th Corps, in Cuba with his former student Lieutenant Batson, and the Cavalry Sketching Case:

“Work of the Engineers – Important Service in the Santiago Campaign – Graphic Description of Movements of the Fifth Army Corps in Cuba

Reconnaissance

. . . four officers added to the reconnaissance party under order of Major William D. Beach, Division Engineer of the Cavalry Division, through whom they reported to Lt. Col. Derby, Chief Engineer of the Fifth Army Corps.

These line officers were Lt. Guy H. B. Smith and Lt. D. P. Cordray of the Infantry, and Lts. G. P. White and M. A. Batson of the Cavalry.

While the fighting was going on, nearly all the officers attached to the reconnaissance party were out with the troops at either Caney or San Juan in the line of fire, noting the position of the different regiments and brigades. The instruments used in the reconnaissance work were the prismatic compass, cavalry sketching case, and often a hand level. The distances were estimated by pacing. The average daily distance covered by each individual varied, according to the nature of the country and the width of the belt sketched, from one to ten miles. The different parties reported every evening to the office of the Chief Engineer where the works were compiled fitted together and added to the map of the previous day. A tracing was made, and then blue-prints were issued to the commanders of divisions, brigades and batteries, and other officers as far as the available number would permit. The first blue-print issued in the field was on July 3d, and they continued to be issued, from that time on nearly every other day, showing all additional information and changes in the position of the troops.”¹⁸

While serving in Cuba, Captain Beach was cited twice for gallantry in action during the Santiago de Cuba Campaign, 22 June to 17 July, 1898, for which he received two Silver Stars. After returning from Cuba, Captain Beach was Acting Inspector General for several different Army Divisions and Corps.

In 1899, Captain Beach participated in engagements on Luzon during the Philippine Insurrection. After returning from leave in 1901, Captain Beach held a number of administrative positions, and was promoted to Major in the 10th Cavalry in June, 1902. He was appointed Chief of Military Information Division of the General Staff in 1903.

In 1906, Major Beach was with a regiment in Santa Clara and Cienfuegos, Cuba, during the second Cuban intervention, where he was appointed Governor of Santa Clara Province for several months in 1908.

Promoted to Lieutenant-Colonel in November, 1908, Col. Beach continued to serve in administrative and staff positions. At the end of his assignment as Chief of Staff of the Philippines Division in Manila, Beach was promoted to Colonel, 4th Cavalry, in July, 1912.

Colonel Beach was made Brigadier-General in the National Army in August, 1917, and put in command of the 176th Infantry Brigade, 88th Division, at Camp Dodge, Iowa until September, 1918, when he embarked for France to command the 176th Infantry Brigade in the War in Europe. He returned to the United States in May, 1919, having been awarded the Cross of the Legion of Honor (officer) and Croix de Guerre with palm by the French Government.

Beach spent his final year in the Army at Camp Jackson, South Carolina, where he was returned to the grade of Colonel in October 1919. He retired from the Army in June, 1920. In 1923,

“The President of the United States of America, authorized by Act of Congress, July 9, 1918, takes pleasure in presenting the Army Distinguished Service Medal to Brigadier General William Dorrance Beach, United States Army, for exceptionally meritorious and distinguished services to the Government of the United States, in a duty of great responsibility during World War I. As Commanding Officer, 176th Infantry Brigade, 88th Division, General Beach displayed organizing and training abilities of the highest order, and by the sound judgment, constant initiative, resourcefulness, and indefatigable energy, abundant tact, and thorough understanding of men which characterized his performance of duty as Brigade

Commander, he contributed materially to successful operations of that Brigade and the 88th Division.”

William Dorrance Beach died in June, 1932. He is buried at the Fort Leavenworth National Cemetery in Kansas.



William Dorrance Beach

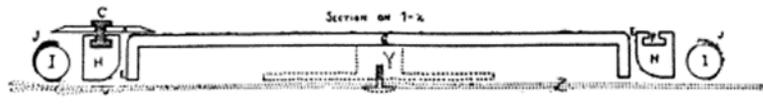
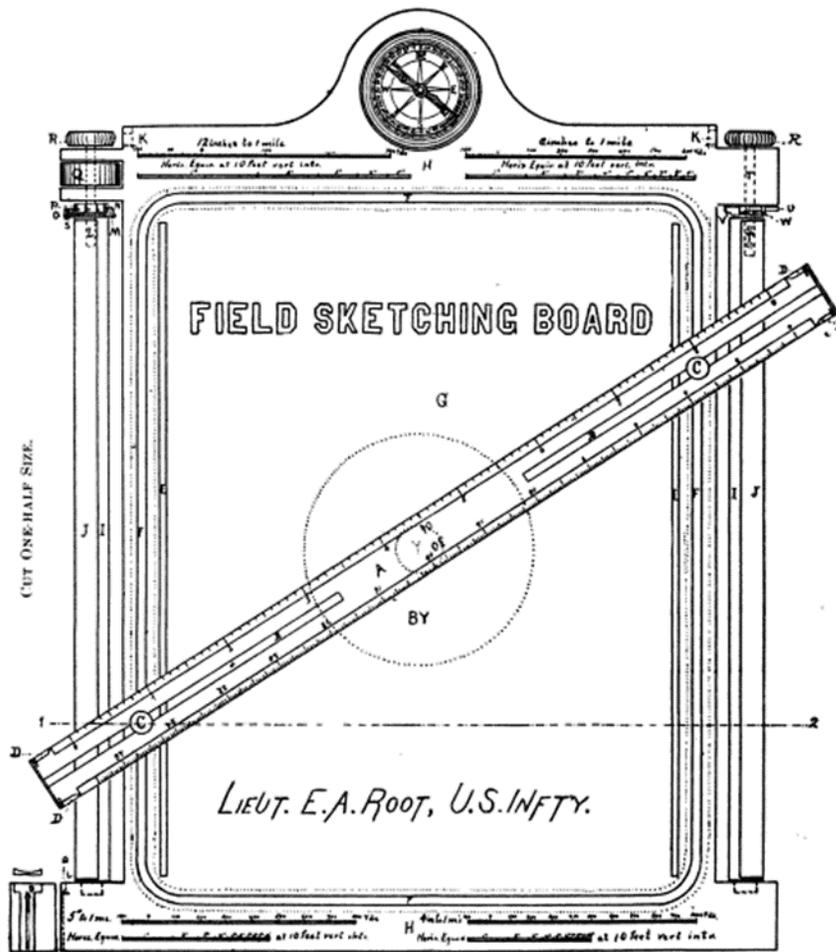
Edwin Alvin Root (1860 – 1943)

Graduating at the top of his Kentland, Indiana, high school class, Edwin Alvin Root declined a scholarship to Purdue University and accepted appointment to the United States Military Academy at West Point. He entered West point in June 1879 and graduated with the Class of 1883.

Second Lieutenant Root served with the 22nd Infantry at Fort Lyon, Colorado, and at the Indian Territory in Oklahoma, guarding the boundaries of lands to be given to citizens, until 30 August, 1887.

Lieutenant Root was one of the first Army Officers to apply to the new Infantry and Cavalry School at Fort Leavenworth, Kansas, where he graduated head of his class, with Honors. Root returned to Fort Leavenworth two years after graduating to become Instructor in the Department of Military Engineering. He wrote a popular text on military mapping, titled *Military Topography and Sketching*, co-authored the textbook *Military Field Engineering*, and invented an improved Cavalry Sketching Case.

A description of First Lieutenant E. A. Root's aluminum Cavalry Sketching Board appeared in 1891. Root's paper included drawings and an extensive quotation from Richards' text. Although the design offered a light-weight aluminum device with improvements over prior models, no later references to it were found.¹⁹



Lieutenant E. A. Root's Cavalry Sketching Board, 1891

After leaving the Infantry and Cavalry School, Root served with distinction in Puerto Rico, the Philippines, and China. He achieved the rank of Colonel in 1915 and in 1918 Col. Root was commandant of the Plattsburg Barracks in up-state New York.

During a 1918 visit to the Plattsburg Barracks with his friend General Leonard Wood, ex-President Theodore Roosevelt made a speech to the soldiers in which he expressed his belief that President Wilson had failed to make adequate preparations for war. President Woodrow Wilson was angered by Roosevelt's speech, and blamed Col. Root for allowing it to be delivered. That event effectively ended Col. Root's military career. He retired from the Army in 1920 and traveled throughout Europe, settling in Spain until the advent of the Spanish Civil War.

Edwin Alvin Root died in Indiana on the first day of April, 1943. He was buried at Indianapolis. His West Point Classmates remembered him in a Memorial Article that stated:

*"No other graduate of the Military Academy ever gave a life of service more faithful and devoted to our army and our country; few ever accomplished more of important, expert work, fewer ever received less reward for their work than this faithful, useful classmate of ours."*²⁰



Edwin Alvin Root

Matthew Arlington Batson (1866 – 1917)

Matthew Arlington Batson was born at Anna, Illinois, in April, 1866. His father, Irvin C. Batson, formerly a Captain with the Illinois Infantry during the Civil War, died in 1887. Matthew Batson enlisted in the United States Army at Jefferson Barracks, Missouri, in the following year.

Private Batson advanced to Corporal and served with the 2nd Cavalry through July, 1891. In August, 1891, Batson was appointed 2nd Lieutenant in the 9th Cavalry. He attended the Infantry and Cavalry School at Fort Leavenworth, Kansas, from 1894 to 1895, where he took Captain W. D. Beach's Military Topography course. In 1898, Lieutenant Batson served with Captain Beach while conducting topographic surveys in Cuba. He was promoted to First Lieutenant in the 4th Cavalry in July, 1898.

The United States' occupation of Manila after the conclusion of the Spanish American War in August, 1898, led to an exchange of gunfire between the Filipinos and the U.S. Army in February, 1899. War was declared four months later.

Lieutenant Batson distinguished himself while serving in the Philippines with the 4th Cavalry. He was mentioned in dispatches, received newspaper coverage while home recuperating from wounds from rifle fire, and he was recognized by his superiors for organizing a unit of sympathetic native volunteers to serve with the United States Army.

The volunteers were known as the "Macabebe Scouts", named for their native city in the Pampanga Province of Luzon Island. Lieutenant Batson and his Macabebe Scouts were recognized for their "splendid work".²¹

The United States recorded the war in the Philippines officially terminated in July, 1902. The Macabebe Scouts were eventually designated the Philippine Scouts and made part of the regular U.S. Army. The Philippine Scouts served with efficiency, loyalty, and discipline, and continued to serve through World War II, Korea and Viet-Nam.

After his service in the Philippines, Batson was transferred to the 1st U.S. Cavalry as a First Lieutenant. In February, 1901, he was promoted to Captain with the 15th U.S. Cavalry. He was honorably mustered out of the Volunteer Service in June, 1901, and retired from the Army in February 1902. A few days later, he was awarded the Congressional Medal of Honor for his distinguished gallantry in swimming the San

Juan River in the face of the enemy's fire and driving the enemy from his entrenchments on 26 July, 1899.

Mention of Batson's association with the Cavalry Sketching Case first appeared in the *Journal of the Military Service Institutions of the United States*, the same journal that published Col. Verner's article in 1891. The 1897 article about the "Batson Sketching Case" stated:

"It is based on the well-known and universally received instrument devised by Col. W. H. Richards of the British army. It has a number of improvements and refinements, however, which are not only ingenious but practical; and Lieut. Batson has had the good judgment to stop just short of complexity and over refinement."²²

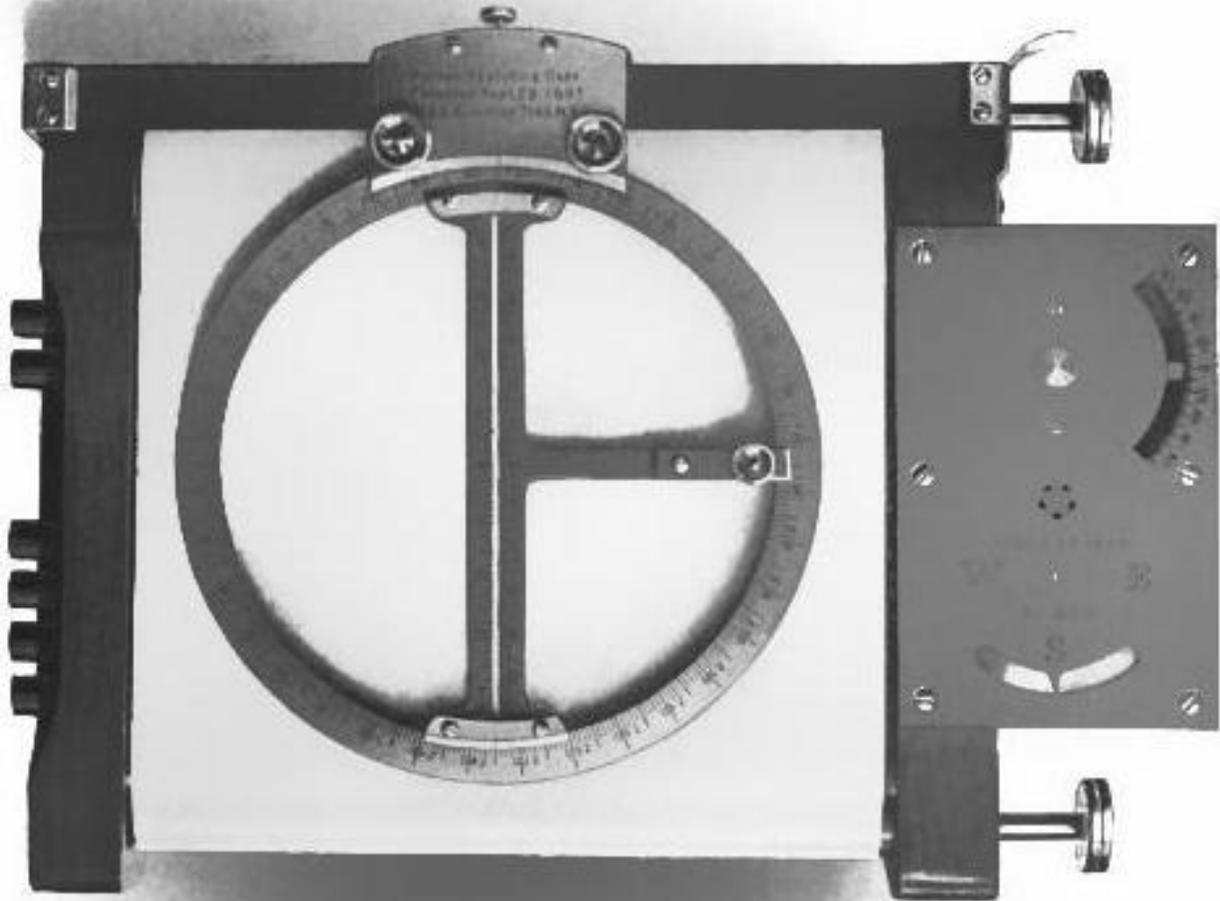
Batson applied for a United States patent for his "Rapid Field Sketching Case" while he was stationed at Willets Point, New York. His application was filed 27 May, 1896, and U.S. Patent No. 590,696 was granted on 28 September, 1897.

The U.S. Army mentioned Batson's device in training materials and survey reports. It also found acceptance on the civilian market. The W. & L. E. Gurley Company of Troy, New York, manufactured Batson's sketching case, listing it as Catalog No. 595 in the Forty-First edition of *A Manual of the Principal Instruments Used In American Engineering and Surveying* (1908), among other editions:

"Batson Sketching Case (Patented)
Catalog No. 595 Price \$30.00

... the Batson Sketching Case, designed for the use of civil and military engineers and surveyors in reconnaissance and topographical surveys. It was given an extensive and successful trial, in 1898 and 1899, in Cuba and the Philippines, as well as in the United States."

BATSON SKETCHING CASE



Batson's Sketching Case, 1912

In 1912 Matthew Arlington Batson found his way into the headlines again when newspapers and magazines across North America carried stories of his "Aero-Yacht". According to one report, Batson had begun experimenting with flight as early as 1896. Ideas of trans-Atlantic flight captured his imagination, and in 1912 he established the Batson Aircraft Company and the Batson Air Navigation Company. He was granted U.S. Patent No. 1,077,786 for his "Flying Machine" on 4 November, 1913.

Batson had his machine built on the Herb River at Dutch Island near Savannah, Georgia. He named it the *Savannah*, after the first steam vessel to cross the Atlantic from that same port to Liverpool in 1819.

Batson's "Aero-Yacht" was 74 feet long and had a 40-foot wingspan. There were six pairs of wings sprouting from a central hull. The hull included an enclosed cabin that housed three six-cylinder Emerson aircraft engines producing 125 H.P. each (two for normal flight, one spare), a crew of six, 25 passengers and a two-day supply of fuel.

An account of Batson's plans follows:

"TO TRY FLIGHT TO ENGLAND – Aero Yacht to Start by July 1, Says Batson Official

Savannah, May 4 – A Batson aero yacht will start by July 1 for a flight across the Atlantic Ocean, according to the statement made to-day by a representative of the company.

It is the purpose of the Batson interests to fly from Savannah to New York with a letter from Mayor Richard J. Davant to Mayor William J. Gaynor. Then the trip will be extended to Washington, where, with a letter from President Wilson to King George, the start of the transatlantic flight will be attempted.

Captain M. A. Batson, U.S.A., retired, is the inventor of the new air craft. His officers express confidence of winning the prize of \$50,000 offered by Lord Northcliffe through "The London Daily Mail" for the first transatlantic flight."²³

The initial water trials, conducted in early December, 1913, were declared a success, and the Batson company expressed hope to conduct airborne trials soon after that. Apparently, the flight trials were unsuccessful. According to tax records from New Jersey, no taxes were received for the year 1913, and in January, 1916, the Governor of New Jersey declared the charters for the Batson Aircraft Company and the Batson Air Navigation Company null and void.



Batson's "Aero-Yacht", 1912

Matthew Arlington Batson died of lobar pneumonia at the Ohio Valley Hospital near Wheeling, West Virginia, on 15 January, 1917. He was 50 years old. The records give his employment as a recruiter for the U.S. Army. He was subsequently interred at the Arlington National Cemetery in Virginia.



MAJOR MATTHEW A. BATSON, UNITED STATES ARMY,
COMMANDING A NATIVE CAVALRY SQUADRON
IN THE PHILIPPINES.

Matthew Arlington Batson, from *Munsey's Weekly Magazine*, 1912

Nathaniel Ephraim Bower (1879 – 1904)

Born to Ephraim and Mary Bower, Nathaniel was the Valedictorian of his Danville, Pennsylvania, High School class of 1896. He graduated from the United States Military Academy at West Point in 1901, and was appointed Second Lieutenant in the 2nd Company, Coast Artillery, at New London, Connecticut.

Lieutenant Bower was transferred to the Corps of Engineers in January, 1902, where he served with the First Battalion of Engineers at Fort Leavenworth, Kansas. Due to his energy, reliability and the accuracy of his work, he was often given special duty.

According to the *Report on Maneuver Division, Camp Root, Fort Riley, Kansas Sept – Oct, 1902*:

“A set of maps was made, under the direction of Second Lieutenant Nathaniel E. Bower, Corps of Engineers, Company "A," First Battalion of Engineers, of the route taken by the battalion from Fort Leavenworth to Fort Riley, a distance of one hundred and thirty-eight miles. The maps showed surveys of over three hundred and fifty miles of roads, to a scale of three inches to one mile. These maps are made on cavalry sketch pads, by mounted men, detailed for that purpose. On each pad is a scale which divides a mile into time periods to correspond with the time taken by a horse to walk that distance. A compass is set in the pad frame to determine direction, and a clinometer to determine grades. At the end of the day's march, the sketches made are placed in their proper order and orientated upon a stiff piece of paper upon which they are pasted. The rough office map showed a regular patchwork where the different pieces had been placed together on the large sheet. A tracing was then made, producing the finished map. These maps showed all natural and artificial objects by conventional signs; the rate and direction of the grade of the roads were indicated by percentages and arrows, which were marked on the side of the road. “

The quality of Bower's work was recognized at higher levels, as noted in the *Annual Reports of the War Department* for 1902:

“An itinerary and a map of the route traveled was also prescribed. . . . The map submitted by Second Lieut. N. E. Bower, Corps of Engineers, U.S. Army, of the route taken by the First Battalion of Engineers, deserves particular mention for the care and detail with which it was prepared.”²⁴

In 1903, Lieutenant Bower was sent to Philadelphia to inspect six Cavalry Sketching Cases there. (As mentioned above, Cavalry Sketching Cases were being made at the Frankford Arsenal in Philadelphia – the Army's source for artillery instruments.)²⁵ Later that year, Bower

“took part in the ceremonies incident to the dedication of the Louisiana Purchase Exposition at St. Louis. Companies A, B, and C, with pontoon bridge equipage, took part in the rescue and relief of citizens imperiled by the floods on the Missouri River during the spring of 1903.”²⁶

After the Maneuvers, Lieutenant Bower returned to Fort Leavenworth. During 1904,

“One Bower Sketching Case was manufactured, with modifications, and issued to the First Battalion of Engineers, Fort Leavenworth, Kans., for test.”²⁷

A description of Bower’s Sketching Case follows:

“Another form of sketching case is shown in fig. 27. The radial arm of the cavalry case is replaced by two sliding motions at right angles to each other, which permit the compass to be placed over the pivot end of the ruler and bring it directly under the eye when aligning the ruler. Several minor details are worked out to promote convenience and accuracy of use. These advantages are secured at some sacrifice of simplicity and compactness, and this form of case will not stand as much rough usage as the cavalry case.”²⁸

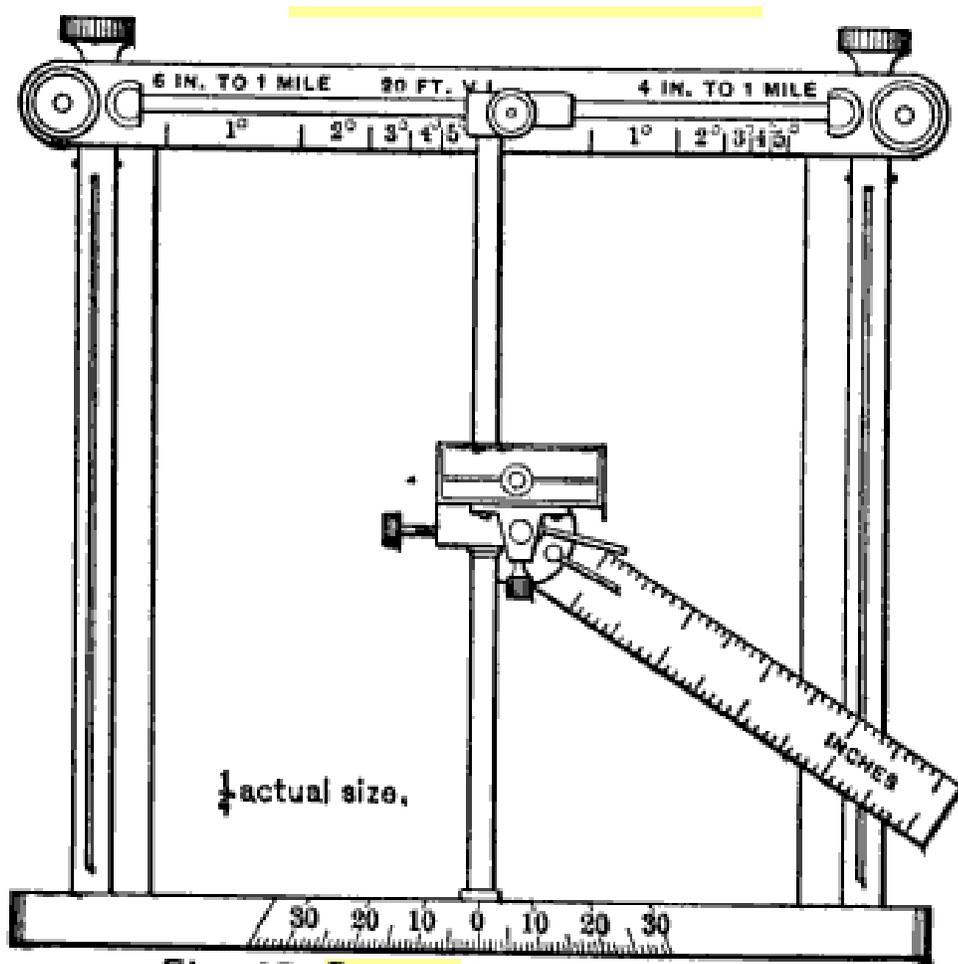


Fig. 27. Bower Sketching Case

Recognized for his intelligence, skill and enthusiasm, Lieutenant Bower continued to serve with distinction. On 13 June, 1904, while directing fire on the Fort Leavenworth rifle range, Lieutenant Bower was struck by lightning and instantly killed. He was 24 years old.²⁹



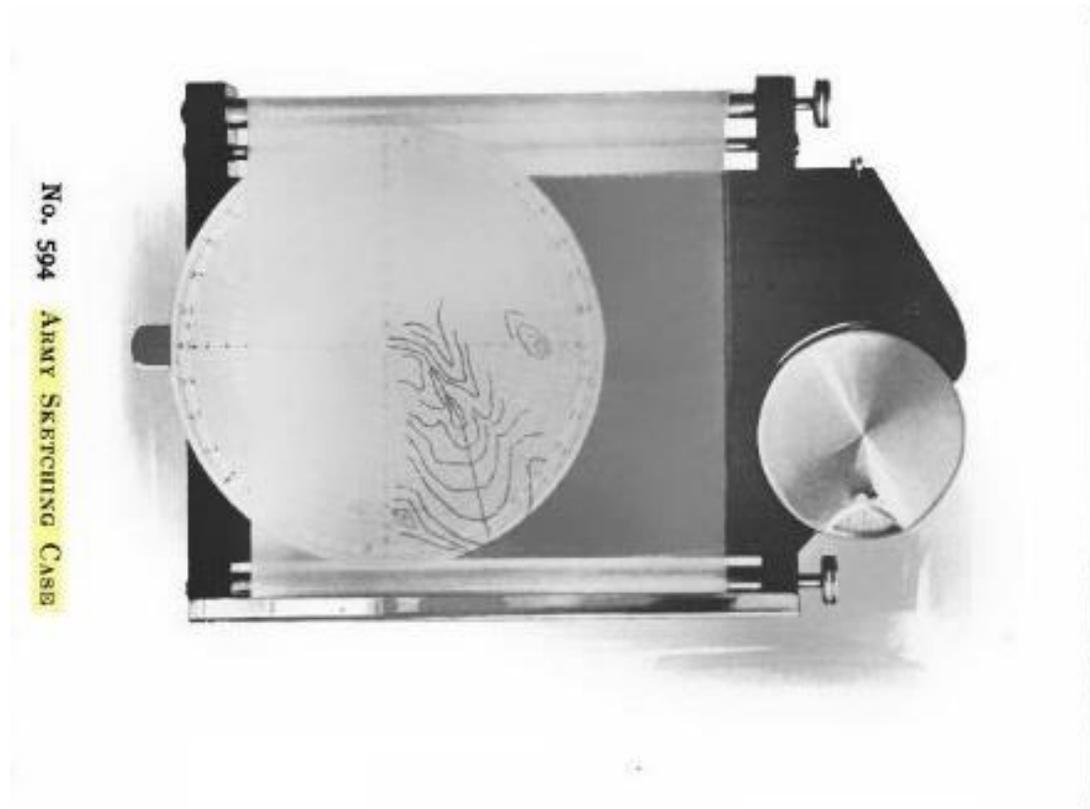
FIRST LIEUTENANT NATHANIEL E. BOWER.

Glenn Shepard Smith (1869 – 1951)

Glenn Shepard Smith was born in April, 1869, at Union, Broome County, New York. After completing high school, Smith was admitted to the United States Naval Academy at Annapolis, but resigned in February, 1887, during his first year there.³⁰

By 1890, Smith had secured employment with the United States Geological Survey, Department of the Interior. From 1900 through 1904, he served as a topographer in the Spirit-Leveling Survey of the State of New York.

At about this time, Smith developed an improved sketching case. He was granted United States Patent 897,794 for a “Sketching Outfit” on 1 September, 1908. In January, 1909, he received patents from France (No. 393824) and Great Britain (No. 190818481) for “apparatus for map drawing”. The 46th Edition of *The Gurley Manual*, published in 1912, listed “The Army Sketching Case” as Catalog No. 594, “Designed and patented by Glenn S. Smith, Topographer, U. S. Geological Survey”.



Smith's Sketching Case, 1912

Smith's topographic work with the Geological Survey continued through 1916, taking him to Maine, New York, Kentucky, Kansas, Missouri, and North Dakota.

The War in Europe prompted the United States to create a Division of Military Survey. Established in January, 1917, to conduct military mapping for the War Department, the Division of Military Survey was staffed by volunteer topographers and surveyors from the U.S. Geological Survey. Smith joined the Military Survey as a Major in February, 1917.

A special regiment, the 29th Engineers, was created to support the production and distribution of maps for U.S. Army forces in France. The 29th Engineers, under command of Major Glenn S. Smith, arrived in France in December, 1918. Major Smith's organization made important contributions to the interpretation and application of aerial photographs to map production. In one five-month period in 1918, the 29th Engineers printed more than five million maps!³¹ After the war, Smith presented an abstract of "American Mapping in France" at the December, 1918, meeting of Geological Society of America at Baltimore.³²

Promoted to Lieutenant-Colonel, Smith's next assignment took him to the Caribbean, where he directed the Division of West Indian Surveys of the Topographic Branch, United States Geological Survey. Lieutenant-Colonel Smith supervised survey parties in the Dominican Republic, Haiti, Cuba and Puerto Rico from 1920 through 1923.³³

The 48th Edition of *The Gurley Manual*, published in 1921, still listed Smith's "Army Sketching Case" as Catalog Number 594 (page 261).

In 1923, Stephen T. Mather, Director of the National Park Service, expressed interest in the creation of National Parks east of the Mississippi River. At that time, Colonel Glenn S. Smith was Acting Chief Topographic Engineer of the United States Geological Survey. When the Southern Appalachian National Park Committee met on 26 March, 1924, Glenn Smith was present as representative of the Interior Department on the Commission, and was elected Secretary and Treasurer.

After visits to several states, including horseback rides into areas of interest, the Blue Ridge Mountains were selected as a site for a park, subsequently named the Shenandoah National Park. Plans were approved by the President 21 February, 1925. Colonel Smith was part of the group responsible for acquiring the lands.

Glenn Smith continued in his work at the Department of the Interior, and was valued highly enough to warrant the creation of Executive Order 8075, the *Exemption of Glenn S. Smith From Compulsory Retirement for Age*, signed by President Franklin Delano Roosevelt on 4 April, 1939, a few days after Smith's 70th birthday.

Glenn S. Smith died at Los Angeles, California, in 1951.

An Aerial Mapping Trial

In 1913, the U.S. Army experimented with aerial mapping using the Cavalry Sketching Case.

"The first aerial map made by an army officer in a long-distance flight was drawn by Lieutenant Sherman, U.S.A., on return non-stop cross-country flight between Texas City and San Antonio, Texas on March 28 and 31, 1913.

The total distance covered in this flight was 480 miles, the machine used being a Burgess tractor biplane equipped with a Renault motor. It was planned to make this flight by compass, but the air was very hazy and rough, and after striking Sante Fe the railway was followed to San Antonio.

A portion of this country is flat and treeless, but from Eagle Lake to San Antonio the country is rolling and covered with forests interspersed with cultivated tracts.

The Air was so rough and the temperature so high that great difficulty was encountered in handling the plane, which on one occasion dropped to 600 feet, and it was frequently necessary to dive for 50 to 100 feet to regain equilibrium.

Lieutenant Sherman carried a cavalry sketching case, and only attempted a rough sketch. The sketching-board was held parallel to the fuselage and the compass-bearing noted and a time-scale used.

A long strip of paper was used and the map was made in sections, the map being rolled up as each section was completed. The entire map is about eighteen feet long, each section representing the country covered in ten minutes. The map is very complete in detail, and shows the railroad, wagon-roads, streams, woods, hills, prairies, and other features of the country so clearly that any army could readily locate each and every locality, and by studying the map the officers would become familiar with the topography of the country covered.

For military use such maps would undoubtedly prove of the utmost value, and if the country was occupied by an enemy the position of camps, guns, batteries, etc., could be easily located and entered on the map."³⁴

The Cavalry Sketching Case Falls From Favor: Clarence Osborne Sherrill (1876 – 1959)

Clarence Osborne Sherrill was born in Newton, Catawba County, North Carolina in May, 1876. He attended Catawba College and Trinity College in North Carolina before entering the United States Military Academy at West Point in June, 1897. Cadet Sherrill graduated second in his class in February, 1901, and was commissioned a Second Lieutenant in the Corps of Engineers, U.S. Army.

Lieutenant Sherrill served in the Philippines for two years, conducting surveys and building roads, bridges and wharfs. In July, 1903, he returned to the United States a First Lieutenant assigned to the 2nd Engineers at Washington Barracks, D.C. Lieutenant Sherrill was appointed social aide to President Theodore Roosevelt during the 1903-4 season.

From late 1905 through 1907, Lieutenant Sherrill participated in various training and educational activities, graduating with Honors from the Infantry and Cavalry School in September, 1906 and the Army Staff College in 1907. Next, he was posted to the Army School of the Line and Staff College, Fort Leavenworth, Kansas, as an Instructor in Engineering, through 1910.

Sherrill was promoted to Captain in February, 1908. He wrote several textbooks during his assignment at Fort Leavenworth, including *The Examination and Repair of Simple Highway Bridges* in 1909 and *Military Topography for the Mobile Forces* in 1910.

His textbook on military topography was accepted as a text for the School. Under a section about sketching roads, Captain Sherrill included an illustration and description of the standard issue Cavalry Sketching Case of the day. It appeared identical to the one shown in K&E's catalog.

Although he stated "The method of using the Cavalry Sketching Case is identical in principal with that of the drawing board without a tripod. A sketcher having learned one of these instruments will have no difficulty in using the other," Sherrill criticized the standard Cavalry Sketching Case as being too complicated, and his textbook included suggestions for improving it.³⁵

Giving form to his suggestions for improving the Cavalry Sketching Case, Captain Sherrill designed a new instrument, as mentioned in the following Report:

“MISCELLANEOUS

One hundred sketching boards of a new type designed by Capt. Clarence O. Sherrill, Corps of Engineers, were purchased in April, 1910, and under instructions from the Chief of Engineers three were issued to each company of engineers and one to each regimental headquarters of infantry and cavalry. All organizations to whom the sketching boards were sent were directed by the War Department to have them tried during the coming summer and to submit reports as to their value in comparison with the cavalry sketching case now issued, together with suggestions as to any changes considered desirable.”³⁶

The Chief of Engineers Report for 1911 stated:

“Reports of the test of the new type sketching board devised by Capt. Clarence O. Sherrill, Corps of Engineers, were received, and the board, with a few modifications, has been recommended for adoption as the standard sketching board of the Army.”

Unfortunately, neither *Report* included an illustration of Captain Sherrill’s design.

Sherrill’s textbook remained in print for several years, undergoing several editions and bearing a few different titles. The later editions were printed by the George Banta Publishing Company of Menasha, Wisconsin. Editions with the title *Rapid Reconnaissance Sketching, Including Contouring* were practically identical to the first edition.

The 1917 edition, however, showed some signs of change. Entitled *Military Map Reading and Sketching, Including Contouring*, its byline cited “Major C. O. Sherrill, Late Instructor in Engineering at the Army Service Schools”, Sherrill having been promoted in February, 1914. Another difference was the absence of any illustration or description of the Cavalry Sketching Case.

After leaving the schools at Fort Leavenworth in late 1910, Captain Sherrill went to the River and Harbor Works in Alabama and Texas, and then to New Orleans because of the flooding of that city in 1912. He remained in the South until November, 1914.

Major Sherrill next served in the Philippines through 1915, and as the Department Engineer and District Officer in charge of Fortifications at the Canal Zone in Panama until August, 1917.

Temporarily promoted to Lieutenant-Colonel in August, 1917, Sherrill commanded the 302nd Engineers, first at Camp Upton, New York, then in France. He received the Army Distinguished Service Medal (awarded in 1921) for his work during 1918:

“Colonel Sherrill organized the 302nd Engineers and conducted their operations with the 77th Division until he became the Division Chief of Staff. To his initiative, energy, and good judgment is due much of the success of the staff functioning in the division in its operations in the Argonne.”

After the War in Europe ended, Col. Sherrill was in charge of the Military Construction Division, Office Chief of Engineers, at Washington, D.C. In 1921, President Warren Harding appointed Col. Sherrill Military Aid to the President and Superintendent of Public Buildings and Grounds in the District of Columbia.³⁷

During his time at the nation’s capital, Col. Sherrill was involved in the building of the Lincoln Memorial, the monuments to Grant and Meade, and the Rock Creek and Potomac Parkways. He oversaw improvements in tourist camps for motorists, the expansion of the National Botanic Garden, and did “much for municipal golf in Washington, D.C.”³⁸

Col. Sherrill remained with the National Capitol Parks from shortly after Harding’s Inauguration through the Coolidge administration. One of Sherrill’s more unusual tasks was to help relieve the storage problems at the White House. At President Calvin Coolidge’s request, in February, 1925, Congress passed an act authorizing the acceptance of gifts of furniture and objets d’art. The mansion then became a museum as well as an office and residence. By autumn, the White House storage buildings were overflowing. Due to the lack of space, Sherrill transferred part of the collection for disposal. Some of the items discarded were reindeer antlers, a mantel top, carpets, a statue of a fawn, japanned trays, a trunk, and thermos bottles.

Colonel Sherrill resigned from the Army in 1926. During his military career, Col. Sherrill was awarded the following service medals: Philippine Insurrection; European War, 3 campaign clasps; Croix de Guerre, with palm, awarded for duty as Commander of Regiment in action on the Vesle, September, 1918.

After retirement from the military, Col. Sherrill turned his talents toward the civilian world in Cincinnati, Ohio, where he served at various times as the City Manager of Cincinnati, the Vice President of the Kroger Company chain of grocery stores, and the President of the American Retail Federation. During that time, he continued to suggest improvements to a variety of things, receiving patents for *Earthwork and method of making same* (US 1,900,205, 7 March 1933), *Store* (US 1,924,963, 29 August 1933), and *Motor vehicle windshield sticker* (US 2,324,885, 20 July 1943).

Clarence Osborne Sherrill died in February 1959. He is buried at the Arlington National Cemetery.



Harris & Ewing

COL. CLARENCE O. SHERRILL

A Comment on the Markings

Specific information about a contract with the Keuffel and Esser Company for manufacturing Cavalry Sketching Cases was not found during this investigation. It is likely, however, that K & E was one of the firms alluded to in Beach's 1895 *Record of Experience*. The following quote expresses the War Department's opinion of K & E's work on a later instrument:

"Section II – Engineer School of Application, U.S. Army

The instrument is called a 'hand plane table', and was manufactured by Keuffel and Esser, who cooperated most cordially in working out the plans. The instrument has been tested here, and with certain very minor changes promises to be satisfactory."³⁹

While the work mentioned in the 1902 report did not involve the Cavalry Sketching Case, the remark does show the War Department's satisfaction with K&E's work. The date stamped on the subject of this paper proves that K & E had won at least one contract for Cavalry Sketching Cases by 1908.

The following text explains the Army markings found on the Cavalry Sketching Case:

"Much attention was given the subject of supplying the most suitable and approved instruments under General Orders, No. 24, current series. . . . The present style of cavalry sketching case was much improved, and a sample case was made in accordance with the views of the Board of Officers having under consideration the field equipment of engineer troops.

All instruments ordered for use in supplying reconnaissance outfits under General Orders, No. 24, current series, are marked "Engr. Dpt. U. S. A. 1905." In addition to this they are numbered consecutively, beginning with No. 1. The marking and numbering is done by stamping and engraving at a very slight expense. In making shipments to the various localities the number of each instrument is noted on the invoice and receipt, and record is kept at the depot of each issue made and of the number of each instrument issued."⁴⁰

The 1905 Report also states:

“Engineer Depot, Washington, D.C.
Instrument procurement for 1905

During the months of May and June 1905 orders were placed for the following articles under the available funds and under the funds allotted during the month of June 1905 viz

. . . 112 new pattern cavalry sketching cases . . .

Improvements were made in the carrying straps of the new Cavalry Sketching Cases.”

The Cavalry Sketching Case Outside of the Army

The Cavalry Sketching Case, like the telegraph key and the slide rule, was made to answer a particular need at a particular time. Developed for use by mounted soldiers, the Cavalry Sketching Case served in conflicts for over three decades. By the end of the World War in Europe in 1919, however, the combat environment had changed dramatically. As armies mastered machine gun techniques and introduced motor vehicles to the battlefield, mounted cavalry became less effective. The application of aviation to warfare also had an impact. The need for sketching from horseback diminished as Armies turned to aerial reconnaissance and photography for information. By the 1920s, the Cavalry Sketching Case had fallen out of favor with most authorities on military topography, surveying and mapping.

Although no longer useful for cavalry work, the Cavalry Sketching Case found applications in several other fields, and its mode of use evolved to include trials on bicycles and mapping from aircraft. In addition to being included in the list of map making instruments for the U.S. Navy’s *Landing Force Manual* for 1918, it was adopted by various civil organizations.

Yale’s 1904-1905 curriculum for Forestry mentioned the Batson sketching case, and several geological organizations used it regularly. The following report shows a preference for the Batson sketching case:

“The instructions for the field season of 1912 called for the detailed mapping of the iron area adjacent to the Prescott, Paxton, and Lake mines on the south side of

Texada island, also of a belt along the north coast of the island to include the principal mining areas in that vicinity.

The detail was filled in by means of plane-table and stadia, plane-table, tape, and barometer, and Batson sketching case, tape, and barometer. The stadia methods were used along roads, the shore-line, and in all open country. On the major portion of the country covered by the north part of the sheet, however, the underbrush was so uniformly dense, that only the Batson sketching case and tape traverse could be run. These traverses were placed sufficiently close together to ensure control of all features."⁴¹

The Colorado School of Mines Magazine in 1919 and the *Bulletin of the American Association of Petroleum Geologists* in 1922 also mentioned the use of the Cavalry Sketching Case in conjunction with oil exploration.

Conclusion

Curiosity about the purpose and origins of a little drafting board found at a flea market led to a virtual circumnavigation the globe. From the British Isles, across the Middle East and down the African Continent; across North America, south to Cuba and across the Pacific Ocean to the Philippine Islands; the Cavalry Sketching Case traveled extensively with armies and explorers. The people who developed it, its advocates and its users, were as varied as the places it gave service. This search for information about a simple device yielded a wealth of knowledge, offering an interesting view of the world as it was a century ago.

Sources

Aside from the initial clue found in a physical Keuffel & Esser Company catalog, the entire content of this paper was derived from internet sources. The single most productive source was Google Books. Other sources included Google, the genealogical web site "familysearch.org", *Wikipedia*, and the European Patent Office Database "esp@cenet". Some of the original document names are given in the following endnotes, but the urls for internet sources are generally omitted. A simple search for "Cavalry Sketching Case", "Willoughby Verner", and so on, will produce abundant responses for anyone with further interest.

Notes:

¹ From *The Journal of the Military Service Institution of the United States*, Volume 38, Number 141, May – June, 1906, p. 547b.

² From *A Treatise on Military Surveying* by George Henry Mendell, Captain of Engineers, D. Von Nostrand, New York, 1864, Page 84.

³ Illustrations taken from “Some Notes on Military Topography Part VII” by Captain Willoughby Verner on pages 109 and 110 of *The Illustrated Naval and Military Magazine*, Vol. VI, No. 21, 1 September 1890.

⁴ From *Military Surveying and Field Sketching* by Major William Hamilton Richards, Fifty-fifth Regiment, Late Instructor of Military Surveying, Royal Military College, Sandhurst, Wm. H. Allen & Co., 13, Waterloo Place, Pall Mall, S.W., London, 1873, Page 107.

⁵ From *Textbook of Military Topography*, Col. William Hamilton Richards, Professor of Military Topography, Staff College, HMSO, London, 1883.

⁶ From *Textbook of Military Topography*, Col. William Hamilton Richards, Professor of Military Topography, Staff College, HMSO, London, 1888.

⁷ From *Korti to Khartoum: A Journal of the Desert March from Korti to Gubat* by Col. Sir Charles William Wilson, William Blackwood and Sons, Edinburgh and London, 1885.

⁸ From *The Rifle Brigade Chronicle for 1894 (Fifth Year)*, Compiled and Edited by Major Willoughby Verner, Rifle Brigade, R.H. Porter, London, 1895, Page 136 – “A Run in a War Balloon”.

⁹ From the *Journal of the Military Service Institutions of the United States*, Volume 12, No. 54, Nov. 1891, pp. 1247 – 1256.

¹⁰ From *Rapid Field-Sketching and Reconnaissance*, Capt. Verner, Rifle Brigade, 1889, W. H. Allen and Co., London, Page 3.

¹¹ From *The Rifle Brigade*, by Walter Wood, Grant Richards, London, 1901.

¹² From *Nature* 109, 16 Feb 1922, "Col. Willoughby Verner", by M. C. Burkitt, Pages 213 – 214.

¹³ From the internet site for the Cave of the Pool near Benaoján, Málaga, Spain – http://www.cuevadelapileta.org/textos_archivos/pileta-bullon.html

¹⁴ From *Annual Report of the United States Infantry and Cavalry School*, Fort Leavenworth, Kansas, 1 August 1894, and 1 August 1895.

¹⁵ Signed "W. D. B.", From the *Journal of the U.S. Cavalry Association*, Vol. VIII, No. 31, (Quarterly), December, 1895, Fort Leavenworth, Kansas, "Professional Notes", Pages 314 – 316.

¹⁶ A later author on the military uses of bicycles suggested an aluminum-framed bicycle to avoid interference with the magnetic compass. As late as 1912, the problem of magnetic compass deflection from iron and steel equipment was still a point of concern. See the *Journal of the United States Artillery*, United States Artillery School, Fort Monroe, Virginia, Vol. VIII, No. 1, July - August 1897, pp. 63 – 78, "The Bicycle and its Adaptability to Military Purposes - Part III. The Military Uses of the Bicycle" by William C. Davis, Second Lieutenant, Fifth Artillery, Page 69; and *Professional Memoirs*, Corps of Engineers, U.S. Army and Engineer Department at Large, Engineer School, Washington Barracks, D.C., Vol. IV, No. 15, May-June 1912, Page 323, "Influence of Rifle and Revolver on Needle of Sketching Case."

¹⁷ From *Military Map Reading, Field, Outpost and Road Sketching for Non-Commissioned Officers*, by Captain Willaim Dorrance Beach, 3rd Cavalry, Instructor in Military Topography at the United States Infantry and Cavalry School, Fort Leavenworth, Kansas, 2nd Edition, 1900.

¹⁸ From *The Record-Union*, Vol. 96, No. 82, Friday, 11 November, 1898, Sacramento, California.

¹⁹ From *Journal of the United States Cavalry Association*, Vol. IV, No. 13, June 1891, Fort Leavenworth, Kansas, pages 202 – 207, Under "Professional Notes", "Description of "Field Sketching Board" by E. A. Root, First Lieutenant, 19th U.S. Infantry.

²⁰ See <http://apps.westpointaog.org/Memorials/Article/2993/>

²¹ From *Annual Reports of the War Department for the F.Y. ended 30 June 1900*, "Report of the Lieutenant-General Commanding the Army", G.P.O., Washington, 1900,

²² From *Journal of the Military Service Institutions of the United States*, Volume 20, No. 85, New York, January 1897, pp. 71 – 80, "Description of an Improved Cavalry Sketching Case, Designed by Lieut. M. A. Batson, 9th U.S. Cavalry." by Capt. T. A. Bingham, Corps of Engineers, U.S. Army.

²³ From the *New York Tribune*, Monday, 5 May, 1913, Page 2.

²⁴ From *Annual Reports of the War Department for the Year Ended 30 June 1902* G.P.O., Washington, D.C., 1903, Appendix K: Headquarters, Department of the Missouri, Omaha, Nebraska, 31 October, 1902, by J. C. Bates, Major-General, U.S. Army, Commanding, Page 196.

²⁵ From the *Army and Navy Register*, Vol. 33, No. 1211, Washington, D.C., 7 March 1903, Page 18.

²⁶ From *Report of the Chief of Engineers, 29 September 1903, for year ending 30 June 1903*.

²⁷ From *Annual Reports of the War Department for the Fiscal Year Ended June 30th, 1904* G.P.O., Washington, D.C., "Report of the Chief of Engineers, Military Affairs", Page 292.

²⁸ From Professional Papers of the Corps of Engineers, U.S. Army, No. 29: *Engineer Field Manual* Parts I – VI, Prepared under the direction of the Chief of Engineers, U.S. Army, Second (Revised) Edition, Washington, G.P.O., 1907, War Department Document No. 296, Part I – Reconnaissance, Pages 47 & 48.

²⁹ From *Thirty-Sixth Annual Reunion of the Association of Graduates of the United States Military Academy at West Point, New York, June 13th 1905*, Necrology, Pages 54 – 57, Nathaniel E. Bower, Cullum File No. 4008, Class of 1901 (includes Bower photo).

³⁰ From *Register of the Commissioned and Warrant Officers in the Navy of the United States to July 1887*, Washington D.C., 1887, Page 141.

³¹ From *Photogrammetric Engineering & Remote Sensing*, Vol. 74, No. 1, January 2008, Pages 77-93, "Origins of Aerial Photographic Interpretation, U.S. Army, 1916 to 1918", by James B. Campbell, and the *New York Times*, 18 February 1917, "Noted Engineers in Army Reserve, Eastern Department, To be Majors, Engineers: Glenn S. Smith, Washington, D.C."

³² From *Bulletin of the Geological Society of America*, Vol. 30, No. 1, March, 1919.

³³ From *Natural History*, the Journal of The American Museum, Vol. XIX – October to May, 1919, The American Museum of Natural History, New York.

³⁴ From *Harper's Aircraft Book*, by A. Hyatt Verrill, Harper & Brothers, New York, 1913, See also *Aeronautics*, Vol. XII, No. IV, April, 1913, Page 135, "Aeroplane Mapping".

³⁵ From *Military Topography For The Mobile Forces* (including Map Reading, Surveying and Sketching), By Captain C. O. Sherrill, Corps of Engineers, U.S. Army, Instructor in the Department of Engineering, U.S. Service Schools, Fort Leavenworth, Kansas, 1910, Pages 289 through 294.

³⁶ From the *Annual Report of The Chief of Engineers, United States Army, For the Year Ended June 30, 1910*, Washington, D.C., 30 September, 1910, Appendix No. 2. – Engineer Depot, Washington Barracks, Page 1072.

³⁷ From the *Trinity Alumni Register*, Vol. VII, No. 1, April, 1921, Page 55, "Alumni Notes", Trinity College, Durham, North Carolina.

³⁸ From *American Motorist*, Vol. XIV, No. 8, 1 August, 1922, Page 18, "Washington Tourist Camp To Be Greatly Improved", By Louis A. Brown (includes Sherrill photo); *Parks and Recreation*, Vol. 5, No. 4, March – April, 1922, Page 339 "National Botanic Garden Move"; and "Golfer's Magazine", Vol. 39, No. 5, May, 1922, Page 26, Photo of Sherrill swinging club.

³⁹ From the *Annual Reports of the War Department for the Fiscal Year Ended June 30, 1902*, "Report of the Chief Of Engineers, Part 1", Washington, D.C., G.P.O., 1902, Appendix 3, Page 801.

⁴⁰ From the *Annual Report of the Chief of Engineers, U.S. Army, to the Secretary of War for the year ended June 30th, 1905*, Page 766.

⁴¹ From *Summary Report of the Geological Survey, Department of Mines, for the Calendar Year 1912*, Ottawa, Canada, 1914, Page 422.