

# Common Sense of Camouflage Defense

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HAVING been urged to write a book on camouflage, I applied to the librarian of the Hoover War Library for some literature on the subject. I was informed that the only references of importance were Solomon J. Solomon's book and some lectures published in the *Professional Memoirs*, Volume 14, Number 47, of the Corps of Engineers, United States Army, by an unnamed British officer.

I knew Solomon's book. He was a man of great ability, and President of the Society of British Artists, but he had an amazing obsession that the Germans were making surprise attacks by hiding huge armies under square miles of painted canvas representing railroads, churches, cultivated fields, and so on, and he had written his book in defense of his hallucinations.

Solomon's theories arose from defects in photographs known as halation, and having the entrée to the leading statesmen and Commanders in Chief of many of the allied nations, he pestered them to such an extent with his absurd ideas on camouflage that none of them were interested or would even investigate the methods of those who had common-sense views on the subject.

I was interested, however, in seeing the lectures on camouflage and entrenchments by a British officer, and I found to my astonishment that they were my own lectures delivered in 1914 and revised in 1915 and 1916.

I remember now that when I was head of the British School of Camouflage, which originated owing to my demonstrations, I gave these lectures to an American general with my permission to use them as he thought fit for the training of the United States Army, so I am much gratified to find that they were of practical value.

Although I served in the Boer War, I had little actual practical experience in the field during the Great War, at the time these lectures were delivered, so think it more than likely that my later investigations based on further practical experience of modern war conditions may be of value, and, moreover, it was not until after these early lectures were delivered that the whole of my time was devoted to the study of camouflage. The history of the war proved that the principles enunciated in these early lectures were sound and I would urge all my readers to study them.

I have always considered camouflage the most important principle in war and the lessons of the Great War confirmed my views.

Camouflage is of course as old as the hills; it is only the name that is new. Animals, birds, fishes and insects are all camouflaged to a greater or less degree against their natural enemies. Ambushes have been a favorite device of war since the early days of man. Napoleon was an adept at camouflage, and Wellington, if my recollection is right, owed almost all his victories, including Waterloo, to retiring behind crests and leading the French to destruction.

Nevertheless, the old methods were all somewhat

crude and it is only in recent years that camouflage has been developed to a higher degree of perfection. Even to this day it has only been practiced by a small minority of soldiers of exceptional intelligence, notwithstanding the fact that, since the introduction of magazine rifles and machine guns, I have never known a single example of the failure of a defending force who have made common-sense camouflaged defenses to repulse an attacking force of ten, twenty, or even fifty times their number.

In the old days of hand-to-hand fighting it is clear that an ambush could not be so effective as today, when one concealed man with a machine gun can mow down hundreds of an attacking force who are taken completely by surprise in the open. Nevertheless, the amazing thing is that the more civilized nations have become, the less they have resorted to camouflage.

My own interest in camouflage was aroused while I was serving in the Boer War and particularly during the black week of the war when the Boers, by means of ambushes, wiped out the British at the Battles of Colenso, Magersfontein, and Stormberg. At the battle of Colenso, with which I was best acquainted, the Boers by means of dummy fortifications behind, and concealed positions in front of the Tugela River, annihilated Buller's army with the loss of only five wounded men.

These lessons of the power of camouflaged defenses, perhaps the most significant in history as measured in terms of profit and loss, appear to have been completely ignored by soldiers and historians.

The brilliant successes of the Boers were due to a great extent to their making the best use of natural cover and the construction of artificial cover indistinguishable from nature. I made a close study of the subject because it was obvious that if similar ideas were developed along scientific lines even greater results could be attained.

## Camouflage and Golf Courses

I was a keen golfer and while studying camouflaged defenses, it struck me that inland golf courses could be vastly improved, not only from the point of view of beauty but in creating interesting strategic problems by the imitation of the natural features characteristic of the only golf courses which were at that time worth while, namely, the sand-dune courses by the sea. I then became one of the pioneers of modern golf course architecture and wrote the first book on the subject.

It was not only the lessons of the Boer War but to an even greater extent my practical experience in the use of folds in the ground and in the imitation of natural features derived in designing several hundred golf courses that enabled me to give the demonstrations which led to the formation of the British School of Camouflage. Golf-course architecture gives one much greater experience in imitating and making the best use of natural features, in increasing one's powers of observation and memorizing

the natural features of a country, in simplifying engineering problems, such as drainage, and, above all, in a mental training in strategic problems for devising traps for the enemy than any soldier or engineer could hope to obtain without this experience. A thoughtful golfer would reply that a first-class golf architect rarely makes concealed traps. This is

blind faith some soldiers had in painted canvas or a strip of camouflaged netting for protecting themselves or their guns.

It must not be assumed that I am disparaging Norman Wilkinson's dazzle painting of ships. He only claimed that his methods deceived the observer in a submarine as to the direction the ship was travelling; he himself thought dazzle painting made ships more and not less conspicuous.

Civilians such as Lawrence of Arabia, the Boer leaders, the Australians, and the Canadians take much more kindly to camouflage than regular soldiers. In fact, I can not recall a single example in history from the American War of Independence onwards when civilians who were permitted to use their natural instincts for self preservation in preparing their defenses, have failed to repulse an attacking force of trained soldiers.

Soldiers are the salt of the earth. There is no other training which turns out more honorable men, more gallant sportsmen, and more selfless friends. In Great

Britain there is always a demand for ex-officers for responsible positions requiring trustworthy men of the highest integrity. On the other hand, the very attributes which make them so admirable, their bravery, their honesty, their cleanliness, and their gentlemanly instincts, make them bitterly opposed to the filth and deceit of camouflage, and moreover, the training of the soldier is largely in suppressing his natural instincts for self preservation.

There have been of course some notable exceptions, such as the Duke of Wellington, Lord Roberts, and



Concealed Fire Trench with Rifleman Aiming at Camera

true, but every trap which has been constructed of a natural appearance, although extremely visible from the tee, is invisible when viewed from the opposite direction, and it is equally easy to make them invisible from every direction.

It must of course not be assumed that golf-course and defensive problems are identical. It is only the mental training that is similar. Golf-course problems, although head work is desirable to make them interesting, should always be soluble, whereas a well camouflaged defensive position in these days of modern machine guns should be insoluble, however intelligent and powerful the attackers may be.

#### The Futility of Paint

In the mind of the layman the word camouflage is often associated with paint. Paint and the camouflaged materials issued by the camouflage parks in France were worse than useless, and it would have been better if their distribution had been discontinued and soldiers had been forced to rely on their own common sense. One of the alternatives to paint was dirt, and it was natural that not only the soldier but every civilized man loathed the idea of resorting to it, but it was better to rely on it for a few hours and annihilate the attackers than allow them to dig in opposite you and then be forced to wallow in the mud and filth of trenches for months or even years as in the Great War.

Paint was the art of advertisement and only too frequently drew attention to the fact that there was something of importance to hide. Did Lawrence of Arabia almost single handed blow up seventy Turkish trains by means of paint? It was amazing the



Rifleman Standing to Show Position

Lord Baden Powell; nevertheless during the Great War all the chiefs of both the Central and Allied Powers were opposed to camouflage or even trench warfare and it was only the bitter realities of war that made them reluctantly resort to it. Baden Powell, the only British general who had any successful experience of camouflaged defenses was not allowed a job and was not even consulted; he was



forced to console himself in training his boy scouts.

The attitude of the military mind in the ascendancy during the Great War was reflected in Field Marshal Sir William Robertson's book, *Soldiers and Statesmen*. This book was written in defense of the straightforward frontal attacks of the soldier as opposed to the cowardly, camouflage, outflanking suggestions of statesmen.

To anyone with the smallest grain of logic in his composition there could not be a greater condemnation of military methods in the war than Sir William Robertson's defense. He proved unintentionally but conclusively that the statesmen were right and the soldiers were wrong. To take one of scores of similar examples he states "It is a tiresome heresy to suggest that to shoot down an enemy from behind cover was less costly than to advance across the open and be shot down oneself." Everyone with an atom of common sense knows that in these days of machine guns no troops could live in the open for more than a few seconds.

Robertson, I believe, was in the Boer War and he must have known that, whenever we attacked, at Colenso, Magersfontein, Stormberg, Paardeberg, and other places, we lost ten times, nay in some cases a hundred times as many lives as the Boers who were hiding behind cover.

#### The Power of Defense in the World War

During the late war, when most soldiers were ignorant even of the crude methods of the Boers, the power of the defense was so great, according to

were sound but they did not go far enough. They were delivered before I had any practical experience of constructing trenches in France, so it was difficult to make any suitable reply to critics who admitted that it appeared easy to conceal trenches, persons, and guns at the Camouflage School in Hyde Park, London, but it was an entirely different matter attempting to do so in the presence of the enemy. It was also a difficult matter to convince critics that it was possible to deceive the airman and his camera.



Men Standing to Indicate Position of Trench

As a matter of fact, when we put our theories into practice in the field the results exceeded our wildest expectations. The more disturbed the ground and the more it was pitted with shell holes, the easier concealment became. We also discovered that it was not only easy to conceal forts from the airman but still easier to provide him with entirely wrong information which was worse to him than none at all.

In other words, air observation photographs became a menace to the enemy instead of a help.

Concealment in chalk country also, which we ourselves thought might be difficult, in actual practice turned out to be the simplest of all problems, as it was so easy to make conspicuous dummies out of the white chalk to divert the enemy's fire from the real positions.

I note that in my early lectures I agree that, under the conditions prevailing in Flanders, total concealment was impossible. I would not admit this today, as in actual practice we found it was possible under all conditions, if one was not obsessed with the importance of retaining a few acres of ground

at the expense of tens of thousands of lives.

During the war senior officers often stated that their men were too busy doing other things than being burdened by non-essentials like concealment. Non-essentials indeed! When the most important thing in war is to see without being seen, to fire without being fired at, and to kill without being killed. The stoutest heart or the strongest chest will not stop a bullet, but by camouflage you can divert it so as to make it harmless.



Men with Heads Boldly Exposed Aiming at Camera from Trench 20 Yards Away

Winston Churchill in his book *The World Crisis*, that both the Allied and the Central Powers suffered three or four times as many casualties in the attack as on the defense.

In other words, every battle that was hailed by the press as a brilliant victory was in reality, as measured in terms of profit and loss, namely lives, a ghastly failure.

My early lectures published in the *Professional Memoirs* of the United States Corps of Engineers

In my early lectures I stated that "In the case of deliberate entrenchments concealment can be carried out without much greater expenditure of time, labor or material than is necessary in making existing trenches. It is almost a question of thought and experience and not so much of labor." Today I would go further and say that a concealed trench sited and constructed according to the irregular curves of nature can be made with much less expenditure of time, labor, and material than stereotyped trenches. The imitation of nature goes a long way to solve all drainage and revetting problems and traverses are unnecessary in a concealed trench. The more money spent on a fortress the less valuable it becomes from a defensive point of view. Fortresses are death traps and should only be used for dummies.

There were few things proved more conclusively in the great war than that a ditch dug by an agricultural laborer, owing to its concealment, was of greater defensive value than the strongest fortress. In my early lectures I give fairly minute details as to



Interior of Trench Shown on Opposite Page

how to hide trenches from the ground to such an extent that neither the trenches nor the men's heads exposed over them could be detected at twenty yards' distance.

#### The Four Principles of Camouflage

There are four main principles in concealing men, trenches, and guns. The first is to destroy the familiar silhouette.

A man may be made invisible by a camouflaged suit of sacking, to which sand bags full of straw tied together in irregular projections are attached. These irregular projections destroy the familiar curves of his head, his shoulders, his elbows and so on. If two regular slits are made for the eyes they are at once suggestive of a man. Slits should be made raggedly, irregular, resembling carelessly torn holes and should not be two regular circles.

Trenches are made invisible by avoiding stereotyped patterns and imitating the natural folds of the ground.

The second principle is to make the object you wish to hide indistinguishable in color from the surroundings. In a shell swept area the camouflaged suit of a man should be plastered with the local mud, in grass land with grass and so on. The parapet and parados of the trench should be cov-

ered with top soil in ploughed land and with sods in pasture. If there is any difficulty in making the parapet of the trench of the same color as its surroundings it is a simple matter to make the surroundings conform in appearance with the trench by ploughing and disc harrowing the whole of the field including the parapet and parados of the trench.

The third principle is to make use of countershading. Neutralize the shadow effects by degrees of white and the high lights by degrees of black. Cover the high spots on a camouflaged suit with the darker shades of mud and the shadows with the lighter shades.

In a trench throw sods and clumps of earth irregularly on the top of the parapet and parados so as to create shadow effects. This not only makes the parapet appear flat but also makes it easy to conceal the men's heads among the numerous projections. Avoid patting down the earth on the top of a parapet with a spade as this is fatal.

The fourth principle is to divert the enemy's attention with dummies. In deceiving the airman and his camera, dummy fortifications, dummy tracks, dummy wire, et cetera, are perhaps the most important of all. If a trench is well made, every natural fold on the ground acts as a dummy but for a still greater degree of safety additional dummies should be made.

It is easy to conceal a man in a camouflaged suit in a shell swept area owing to the fact that every projection thrown up by the shells looks more like a man than a man himself. In demonstrating these things it was always somewhat entertaining to see the class spotting lumps of dirt instead of the machine gunners and then finally falling over the gunners before they were detected.

#### Deceiving the Airman's Camera

In my published lectures I had little to say about the deception of the airman and his camera because at that time, although I felt sure there would be no more difficulty in deceiving the enemy than our own airmen, I had not had the opportunity of doing so. On visiting France we found it almost absurdly easy and the results exceeded our wildest dreams. The German airmen had entirely false information of our defensive positions, which was worse than none at all.

In deceiving the airman it is necessary to consider the means by which he gets his information. Air reconnaissance consists of two kinds. The low flying airmen, the hedge hoppers as we termed them in France, depended on direct vision, while observers in high flying planes depended on information derived from their photographs.

The low flying planes flew so low and so fast that observers in them were able to see little more than an observer in an express train passing through a station, who finds it difficult to tell even the name of the station through which the train is travelling. All that they could see were large masses of troops and their dust, and they were even likely to overlook these if methods such as a watering cart were used to suppress the dust and if the troops were ordered to stand in the shadows of trees or hedges on the approach of hostile aircraft.

Misleading the interpreter of air photographs was an entirely different matter. At first sight it would



seem that the only solution to deceiving the enemy would be by attempting to make objects of military importance invisible. As a matter of fact it was not, the exact opposite was the way. One took advantage of the fact that everything shows up in such a remarkable manner in an air photograph. It must be clearly understood that it was entirely a question of making trenches, barbed wire, gun emplacements, and so on, not invisible but indistinguishable from the actual objects an interpreter would expect to find in the landscape.

Air photographs of the ground it is intended to defend should always be carefully studied and the whole scheme of the defenses mapped out in conjunction with these.

For example a photograph of ground in France was chequered with small cultivated plots surrounded by drain ditches and if the defense were made indistinguishable from these drain ditches they were certain, as in the accompanying photograph, to escape the attention of the enemy.

On the other hand in California, where I live, the ground is intersected with small arroyos leading into larger ones, so it is easy to make all defenses indistinguishable from these natural features, which occur in the landscape. In fact I do not know any country where, after a careful study of airplane photographs of the terrain, it would not be possible to hide defenses from the observation of airmen and their cameras for scores of miles extending, if necessary, the whole width of the frontier.

In addition the making of dummy fortifications deceives the enemy still further. If one realizes that photographs consist simply of degrees of black and white this becomes a simple matter. The shadow of a deep trench can easily be depicted in the form of a dummy by brushwood or any material that creates a shadow effect, and strong belts of barbed wire may be simulated by pulling a harrow in the zigzag lines of real wire.

Track discipline and dummy tracks are of vital importance. It is amazing how clearly the track of even one man who has walked diagonally across a field shows up in an airplane photograph, yet, by means of track discipline, one thousand men can walk across the same field without arousing suspicion if they use the natural lines of the landscape, namely, the ridges and furrows and borders of fields in land that has been cultivated.

The interpreter of airplane photographs gets most of his information from tracks and it is the simplest matter in the world to deceive him as to their significance. Abundance of dummy tracks leading to dummy trenches and gun emplacements can be made readily by wagons and wheelbarrows, and if it is impossible by means of track discipline to hide the real tracks they should always be carried on to a conveniently placed dummy.

There are many other methods of deceiving the airman but in a short article of this kind it is impossible to describe them. All camouflaged defenses should be made in conjunction with one's own air force and they should be subjected to a much severer test than the methods the enemy are likely to employ.

Much to our own surprise, the air force in France reported that our dummy trenches were fully manned. We told them they were wrong and author-

ized them to try again. They then flew low and attempted to detect the real from the false by direct vision. They again swore that the dummies must be real because they were occupied and it was not until we had taken them over the ground on foot that we were able to convince them that what they



Two Men Side-by-side, One Camouflaged

thought were men were in reality only the shadows of the brushwood we had used to give to the dummies the impression of depth.

As an indication of the abysmal ignorance of the headquarter's staff of the value of camouflaged defenses, we were ordered to discontinue their use and, on making enquiries as to the reason for this order, we were informed that General Headquarters were making maps of our defenses from airplane photographs and we had spoilt their maps for them. They failed to realize we had also spoilt the enemy's maps and it would have been easy for us to correct our own maps, whereas the enemy had not our advantages for doing so. A most annoying but striking tribute to the value of camouflaged defenses.

#### The Importance of Camouflage

The greater one's experience of camouflage in the field, the more one felt that in war everything else was of purely secondary importance and that no combatant officer should be considered efficient until he could conceal trenches in any terrain to such an extent that not only the trenches, but the men's heads and machine guns exposed over them, were invisible at fifty yards' range, and that he could also deceive the airman and his camera as to the position his men were occupying.

This should be the supreme test of the soldier. History has proved time after time that one civilian who has had a few days' training in camouflage is worth more than ten soldiers who have had a life's training in the non-essentials of defensive warfare.

I should dearly love to have the opportunity of proving by army maneuvers that a camouflaged defensive force can readily repulse an attacking force of twenty times its strength in men, guns, airplanes, tanks, and all other implements of war. In these days when cameras can be used in place of rifles, as is the case in sham fights between airplanes, and when artillery fires largely by the map, and can pin-point the objects they are aiming at, it is easily proven. I have proved it before and I know that I can readily do it again.



There can be no possible doubt that an attack against hidden defenses is certain to lead to disaster, but my readers may be curious to know what is likely to happen if the attackers themselves are also experts in camouflage. A little thought, however, will make it plain that the attacker will still lose, as it is much more difficult to camouflage moving troops than those who are stationary.

#### Why is Camouflage Neglected during Peace?

If camouflage is as important as I suggest that it is, why is it neglected during peace? Why is it that all camouflage schools are disbanded, or, at any rate, that no attempt is made to retain and increase the number of specialists on the subject? Why is not the infantry trained in the elementary principles? Why have we returned to soldiering instead of training for defense? The dearth of articles on camouflage in military magazines is proof of its neglect.

There are, I believe, several reasons. At first sight camouflage seems to be a return to savagery. If red Indians built a trench, they would throw up the parapet and parados in a haphazard manner and in consequence not only would the trench be inconspicuous, but also the red Indian heads exposed over the top of it would be difficult to detect among the maze of projections.

Consider what would happen if a civilized man, such as an engineer, is supervising the construction of the same trench. His whole training has been in orderliness and tidiness, stereotyped patterns, and measuring objects to the thousandth part of a millimeter. He naturally attempts to make the trench

conform to the ideas which have been so successful in civilized walks of life, so he produces his measuring tape and insists that every bay of the trench conform with its neighbour. He levels down the parapet and pats the earth down with a spade so as to make a level place. The result is that the regularity and the reflection of the sun on the flat top make it visible so that it can be seen five miles away. The heads of the men firing over it are also as readily detected as they would be if they were exposed over a flat wall. He may even go so far as to top his masterpiece with white sand bags so as to make a good workmanlike job of it and ensure that it can not be overlooked even at ten-mile range. The more highly civilized he is, the more he is obsessed with the importance of clean, neat uniforms with polished buttons, glistening helmets and shining bayonets, and the more he loathes the camouflage of dirty faces and muddied clothes and helmets.

I do not wish to appear to belittle engineers. On the contrary, during the war I owed everything to them. In Britain they were the thinkers and the brains of the service and when once they realized that there was something wrong in the peacetime training they became the most ardent advocates of real camouflage. I shall never cease to be grateful to General Sir Scott Moncrieff, the Director, and Colonel Kent, the Assistant Director of Fortification in Britain, and also to Colonel Hoystead and all the engineers with whom I was associated in France, not only for their generous help and encouragement in my efforts in the cause of camouflage, but for their many brilliant suggestions for accentuating the power of the defense.



A Dummy Trench to Deceive the Camera

Made by spreading clods on grass. When photographed from the air, the grass in the center gives the impression of the dark shadow of the interior of a trench while the clods appear as the parapet and parados.