

this alkaline fluid is at first perfectly clear, but later on it assumes a milky color, hence the name *M. alba*. When the predominant lesion is papular, as in the typical type of the disease, it has often been called lichen tropicus. This variety in the terms used has been the cause of great confusion.

The vesicles always remain discrete, having no tendency to rupture; sometimes the burning and itching are so intense that the sufferers scratch and tear their skins in the vain effort to obtain relief; these self-inflicted lesions at times become infected by the dirty nails of the patients, and when the sufferers come under observation the accidental features are apt to make the diagnosis difficult. If properly treated or if not unduly irritated, the disease ought to be of short duration, but sometimes it is lengthened by the successive appearance of several new crops of the lesions.

The pathology of the disease has been disputed: it consists of hyperemia of the vessels of the sweat glands and a leucocytic infiltration about the sweat glands and their ducts; the latter are dilated and filled with a clear or an opaque fluid rich in cellular elements. Unna suggests the possibility of a micro-organism as a factor in this disease, but it has not been demonstrated.

DIAGNOSIS.—Outside of those cases in which traumatism due to scratching or other irritation and subsequent infection has occurred, or when it appears in connection with some other disease, the diagnosis of this trouble ought to offer no difficulties. The one disease most liable to be confounded with it is eczema; the differential points are as follows: In miliaria the vesicles and papules are discrete, the vesicles are smaller, there is no tendency to rupture, they do not weep, no crust forms over them, the inflammation is not so deep-seated nor is it so intense, and it is more sudden in its appearance; if to the above we add the previous sweating, a history of exposure to heat, natural or artificial, and the amount and kind of clothing worn, the diagnosis ought to be made without trouble. It should, however, always be borne in mind that eczema of a secondary nature may supervene in this condition, as a result of scratching or other irritation; furthermore, eczema may also follow this disease independently of mechanical injury—for example, in the very stout, wherever two surfaces are in apposition, as between the buttocks, in the axillæ, etc.

The prognosis is always good; the disease lasts between eight and ten days, or less, when properly treated; relapses are common, unless the original cause of the disease be removed.

TREATMENT.—First, if possible, endeavor to remove the original cause. Cold or cool water baths are useful. The bowels should be kept open by the use of saline laxatives, or mild diuretics, like the citrate, acetate, or nitrate of potassium. Locally, any one of the innumerable dusting powders on the market is useful; lotions are also very useful, viz., those containing alcohol, vinegar, lead water, carbolic acid, menthol, or sulphate of copper, any one of which will help toward the cure of the disease.

N. J. Ponce de Léon.

MILIARIA RUBRA. See *Lichen*.

MILITARY HYGIENE.—This paper is confined to the application of hygiene to the troops of the United States. It is necessarily limited to a dogmatic expression of the practical essentials with little discussion of the principles involved, and it treats only of those matters which affect the soldier as such. Until recently the United States army has consisted of a small body, about twenty-five thousand, of well-selected and well-instructed men distributed among somewhat crowded garrisons throughout the country. The organization has been such that the enlisted force may be more than doubled for active operations, without increase in the number of officers. The peace minimum has been much enlarged by the legislation of 1901, but the principle by which the rank and file may be increased remains the same. In time of war there is added a new army of volunteers, whose

men are often accepted without proper scrutiny. The preservation of these men from disease is the chief concern of the medical officer, misnamed the surgeon. The medical officer's first duty is rigorously to examine his command, if it has been newly raised, and inexorably to eliminate all men unfit for full military duty. Upon the medical officer who examines recruits for enlistment lies a heavy responsibility, for it practically rests with him to determine the physical efficiency of the command. Unfortunately in time of war, when the necessity for effective men is the greatest, this selection is apt to be devolved upon untrained civilians who have neither the special knowledge that fits them as judges nor the position that enables them in doubtful cases to withstand the constant importunities of still less informed recruiting officers. The careful examination of recruits is not practical hygiene, but the successful application of hygiene requires carefully selected men to secure the best results. (See *Recruiting Service, Army*.) When a command has once been mustered in, the discharge of men not unequivocally disqualified is difficult; nevertheless every newly raised regiment or detachment should be held in a detention camp for careful weeding out of the imperfect. The effectiveness of a force depends upon its vigor rather than its size. The presence of the sick and the feeble is depressing and embarrassing. Only robust men should be allowed to bear arms, and discharges for pre-existing disabilities should clearly set forth their civil origin, to protect the state from fraudulent pension claims. Such pruning is important because some apparently slight blemishes develop under exposure, and all defects afford occasion to claim exemption from unpleasant duty. The temporarily weak and invalid should also be excluded by examination from any serious march or expedition, due allowance being made for malingering. Abundant work can always be found at the base for those incidentally unfit for vigorous marching, whose presence with it would only impede a column. Experience invariably confirms the importance of such selection, and that it is better to maintain a small sound command than a large one of doubtful vigor.

The enlisted men are provided with clothing, food, shelter, and occupation; and their whole duty is discharged by prompt obedience to their military superiors, upon whom rests the serious responsibility of their care. This care is practical hygiene and in every respect, excepting that which involves the direct shock of arms, the medical and line officers share it. The one should instruct, the other enforce the instructions. In the nature of military administration there can be but one commanding officer at a time, but all commanders are morally bound to follow the advice of an intelligent staff as to the health of the troops, where military considerations do not compel the temporary subordination of sanitation to active operations.

In treating of the soldier, infantry is taken as the type, the special conditions of cavalry and artillery not affecting the general conclusions.

CLOTHING.—The primary object of all clothing is to secure the comfort of the wearer by protecting him against wet, by conserving the heat of the body when the external temperature is low, by shielding against solar heat, and by preventing suffering from heat generated by exercise. Its secondary object, in a military point of view, is to increase the soldier's legitimate pride in his calling and to recognize him easily, but to keep him inconspicuous to the enemy.

General Character.—Soldiers should be dressed as nearly alike as possible, and attractive dress adds to self-respect; but a soldier's business is war and his working clothes should be adapted to it. For convenience of administration the clothing should be uniform by arm and the field dress of State troops, who at any time may be called into active service, should be identical with that of the Federal troops so that it may readily be supplied from the common store. The men are liable to suffer when damaged clothing cannot easily be replaced, which is apt to be the case when it is of special cut or has other

peculiarities. For parade and the purposes of display the ornateness of a uniform need only be limited by taste and expense, and its snugness of fit by the duty required.

Color.—The color of the outer garments should be neutral. For sentimental reasons blue, which is not a desirable military color, has long characterized the United States uniform, and it is only now (July, 1902), that olive-drab is about to be substituted in the field. Cadet-gray, dust-brown, and the so-called butternut dye used by the Confederates in the Civil War, are much more serviceable than blue, and gray was advocated for the United States troops as long ago as 1868. Upon the neutral tints any distinguishing facings are adaptable for ornament. In action colors draw fire in proportion as they are conspicuous, red being the most deadly and white the next; the scale continuing black, dark blue, light blue, butternut, dust-gray. As exposed to long range guns, there should be nothing to break the uniformity of color. The khaki (dusty) uniform in vogue is admirable, especially for arid countries. Color out of the sun's rays is not a factor of heat, but under direct exposure to the sun black absorbs most and is the warmest, blue is the next, and so down the scheme to white, which is the coolest. The absorption of odors depends partly upon the color, where black takes up the most, blue next, and white the least, and partly upon the hygroscopic character of the material.

Material.—The ordinary and most serviceable material for use in all but tropical and sub-tropical climates is woollen cloth. In very hot regions it should be cotton duck; the finer textures of cotton, as sheeting, which are suitable for civil life, are too light for military use. It must always be remembered that clothing does not create warmth except as it absorbs solar heat from the direct rays, which is a matter of color and not of texture, and that it is regarded as hot or cool in proportion as it retains bodily heat or permits its escape. Woollen cloth is durable, hygroscopic, and an excellent non-conductor of heat. It absorbs water within its fibres (hygroscopically), and between them (by interposition), and the hygroscopic absorption by wool in relation to cotton or linen is double in proportion to weight and quadruple as to surface. The sensation of warmth that follows putting on dry woollen clothing when the body is rapidly cooling by evaporation from the surface after excessive exercise, depends upon the condensation of the vapor and the consequent evolution of heat, which had become latent when the water of the body passed off as insensible perspiration. Woollen clothing rarely becomes saturated with perspiration, and when it does much of the water may be wrung out and condensation and absorption will continue. The non-conductivity of dry wool and its comparative impenetrability by wind make it acceptable in cold and oppressive in warm climates. Closely woven cloth is preferable to that of loose texture as more easily parting with dust, but where the temperature is moderate, serge, which admits the passage of air more freely than heavier cloth, has the advantage of lightness as well as the good qualities of the lesser woollens. Shoddy, which is old, worked-over wool and cloth sometimes mixed with fresh wool, is an adulteration most easily detected by the ease with which it is torn. From the qualities described wool, and especially dark wool, is unreasonable and hurtful as apparel in extreme southern stations where the air for long periods together is above the normal temperature of the body and slowly enervates the system. The constant disadvantage of wool is its hardening and shrinking when imperfectly washed, whereby it loses its faculty of absorbing perspiration and also becomes uncomfortable. This is best overcome by using a smoothly knitted merino, two-thirds wool and one-third cotton. Soiled woollens are best washed by soaking and stirring in hot soap-suds, transferring to cold water to remove the soap, and finally hanging to dry in their natural position without at any time wringing or hard rubbing. This is practically impossible in the field, and very difficult for a soldier anywhere. Excess of alkali in soap injures the wool by acting on the

natural oil. A little kerosene assists to remove the dirt.

There is a widespread opinion that flannel next the skin renders the wearer less susceptible to the malarial poison. It probably does partly protect against the stings of possible disease-bearers, as compared with thinner and less perfect dress, and by conserving bodily heat renders the person more resistant to general disease.

For special purposes leather, canvas, oiled cloth, and india rubber are used. Properly tanned leather, with or without the hair or wool, is impervious to air and is very warm, but except in rainless climates it is fit only for boots or shoes. The special virtue of canvas is that it sheds water. It is heavy and is an excellent non-conductor of heat, and lined with wool is admirable against external cold. A light and loose canvas overdress, thoroughly washed and soaked with raw oil and slowly dried in the sun, known as a "slicker," sheds rain admirably and is especially useful for mounted men, but it has not yet been officially recognized. India rubber completely protects against rain, but its impermeability to air allows it to be used only occasionally. It becomes inelastic in cold climates and is too distensible and self-adherent in the tropics. It ultimately decays by the absorption of oxygen. Its greatest value is as an underlying sheet to protect against ground moisture, or when thrown over a shelter tent, or over the man himself on the march, to shield him from heavy rain.

A simple method of rendering clothing waterproof has been devised recently and independently by Capt. E. L. Munson, Medical Department, United States Army, and Dr. Pierre Kolb, of Lyons, France. It consists in immersing the fabric for about five minutes in a solution of 25 to 30 gm. of pure lanolin to 1,000 c.c. of benzine, when it becomes saturated. Any excess of solution is removed by wringing and the garment is then hung up smoothly or spread out flat in the open air and the sun, and the remaining fluid is allowed to evaporate, leaving the lanolin in the fibres of the fabric. Articles thus treated are not wetted through by exposure to heavy rain for at least three hours, although water may be forced through them mechanically by pressure exceeding one inch. As ventilation is not impaired, these fabrics may be worn without feeling the uncomfortable and depressing heat of wet clothes and without bearing the additional weight of absorbed water. The military advantages are the retention of their shape by hats and caps, general protection against wet, and the elimination of a rubber poncho or blanket as an additional article.

Animal materials are more satisfactorily treated in this way than vegetable fabrics, although the latter may be led to shed water. Boiling water or strongly alkaline soap destroys this quality of a garment, but it may be renewed by again immersing it in the water-proof bath.

Wool fat deprived of its potash salts and aromatic constituents is as efficacious as lanolin and is cheaper. The lanolin of commerce contains twenty-five per cent. by weight of water mechanically incorporated, which must be removed or the solution will be milky and the result unsatisfactory.

Grades.—For health and comfort clothing should vary in warmth and in material with the climate and with the service. Formerly a uniform fairly well adapted for the middle zone of the United States was the only one for all places and for every duty. By degrees this narrow uniformity has been modified, and the very severe weather of the more intolerably cold posts of the northwest and that of the tropics are being recognized. Varieties of clothing are relatively expensive to keep in stock and troublesome to issue, but the improved health and comfort of the wearers justify the effort. There should be different grades in both outer and under clothing, and when the climate requires it the materials themselves also should vary as has very recently been authorized.

Uniform.—The United States soldier is expected to wear a cap, a felt service hat, or a cork helmet, a coat and trousers of one of four patterns, or breeches, a shirt, an undershirt, drawers, stockings, shoes, and gloves,

and to possess an overcoat and a blanket. He wears leggings with breeches, and canvas fatigue clothing under certain conditions, and when circumstances require he may obtain fur gauntlets and cap and mittens, and a rubber poncho. Besides his pay he is given a money allowance for the purchase of this clothing at cost price, and it is sufficiently liberal to permit a large proportion to be saved by a careful soldier, who receives the balance in cash on his discharge.

Head-covering.—The ideal military hat should protect against heat, cold, rain, and glaring sunlight. It should

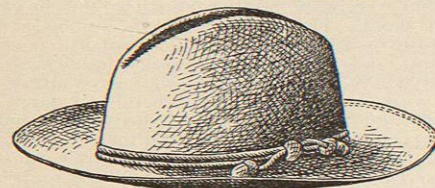


FIG. 3335.—Service Hat as Issued.

be attractive on parade, convenient under arms, and useful in bivouac, and it has yet to be devised.

A black felt helmet, that combined nearly all the possible hygienic objections to a military hat, has just been abandoned, and it is hoped that it may never be revived. For it has been substituted a dark-blue cloth cap, three and a half inches deep, with an average diameter of eight and three-quarter inches across the top, to be used on occasions of ceremony. For habitual wear in garrison, except at drills and target practice, a service cap of the same size and shape is to be worn, olive-drab in color, woollen or cotton to match the uniform. This seems well suited to its purpose and likely to be comfortable. Its appearance is a matter of taste. It does not protect below the line of contact with the head.

A white helmet may be worn, at the discretion of the commanding officer, in hot climates with white uniform when not under arms. A drab service helmet, of cork or like body, is authorized, apparently to be worn when under arms, although this is not specified. A cork helmet, white or drab, is an excellent guard against a fierce sun, and is comfortable, except in the field, where it can be taken care of only with great difficulty.

A service hat of drab felt is now issued for drills, marches, and field work, mounted or dismounted, the equivalent of the campaign hat heretofore used (Fig. 3335). It is tolerably high in the crown, whose centre is depressed in a longitudinal crease, and has a moderately broad brim. This is more serviceable than any hat for the field yet furnished to the army at large. Having found that the fold in the top diminishes the air space and retains rain-water, some commands have drawn the central point upward to form a pyramidal peak (see Fig. 3336). It

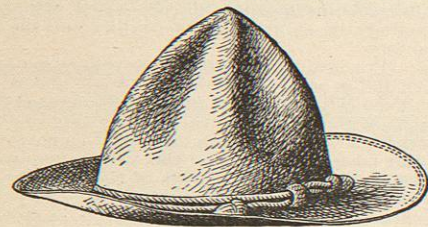


FIG. 3336.—Service Hat, as Forbidden to be Worn, but more Comfortable.

then sheds water, affords an air space, and is more comfortable. War Department orders forbid any alteration of the original shape, at the advantage of the change apparently not being understood.

The soldier's head-covering should be light in weight, neutral in color, tasteful to the eye, not in the way of his

own weapons, a shelter by day, and in the field a protection by night. It should not charm the spectator at the expense of the wearer, and in tropical regions it is very desirable that the occiput should be well protected by it. A soft canvas hat such as sportsmen often wear, which appears to have been evolved from their necessities so similar to those of soldiers, has stood the test of much rough usage and bears an excellent reputation for comfort and durability. It has a reasonably stiff but flexible brim with a peak before and behind, and could be transformed into a good military headdress for the field or for fatigue (Fig. 3337). In the tropics the crown should be high and be ventilated. A small piece of wet muslin in the crown of any hat assists in preventing insolation.

Coat.—Up to this time a tightly buttoned, closely fitting, cloth frock-coat has been required to be worn on parade. This was the remains of a dress that formerly distinguished all armies, and was a possible relic of the attempt to impose upon soldiers through clothing the artificial erectness and rigidity that armor compelled. No man can fight or do other work effectively in such a dress, whose compression interferes with muscular action and the expansion of the chest. For years it was never taken in the field, where the progress of military science has required constantly increasing mobility in the individual as well as in the organization. It had no virtue but warmth, and now it has been definitely abandoned, we may hope, like the heavy black helmet, never to be restored. It was an extension of the principle of the vicious leather stock, also no longer seen. A sack coat of dark-blue cloth, presumably not tightly fitting, has just been substituted for purposes of parade and ceremony only, and it is not supposed that even this will be required in the tropics.

Tight collars, whether of coats or shirts, have the serious disadvantage of disturbing the cerebral circulation, thereby sometimes affecting the vision and sometimes causing graver trouble.

For some years the undress coat or blouse, the working dress of the army, has been gradually approaching the model of a hunting-shirt, which is the typical military dress, and to it in some form all woodsmen and frontier scouts ultimately come. Freedom of muscular action and particularly full expansion of the chest are necessary for vigorous exertion, and these require loose garments. The ideal military coat for the field should follow the figure with yokes and gores, but loosely; it should be large at the shoulder and in the arm, for the most unstrained exercise of a muscular man, and small at the wrist; it should be full in the body, to permit the use of extra underclothing without interfering with exertion; it should have a belt between the body and the skirt, upon which the waist belt of the accoutrements may rest accurately; it should be secured at the waist by an inner belt; and it should contain stout pockets in the body and in the skirt. The skirts should just clear the ground on kneeling to fire. This might be embellished at pleasure with detachable ornaments for garrison use. For use in temperate climates the fabric should be closely milled, light woollen cloth, neutral in color, or a good grade of flannel; for tropical service it may be of cotton. The service coat of woollen or cotton now prescribed, which is required to be cut so as to be at least five inches in excess of the chest measurement, closely follows this pattern, except that there is no belt. It contains four outside pockets in front, two above and two below the waist belt, and is a very convenient garment.

The issue of a bleached cotton-duck sack coat and trousers is authorized as garrison uniform in extreme southern latitudes in summer, at the discretion of the

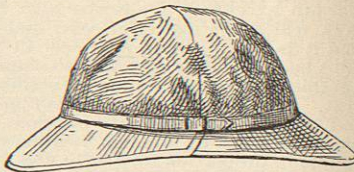


FIG. 3337.—Sportsman's Canvas Hat.

commanding officer. The trousers alone may be worn under arms as a part of the "full dress" or "dress" uniform, for parades and ceremonies, by order of the commanding officer. The relief from the oppressive woollen that was formerly compulsory is a material physical advantage. White duck clothing is provided for all hospital corps soldiers, to be worn on ward duty.

Shirts.—Olive-drab flannel overshirts of light and heavy material, with rolling collar and pockets in the breast, are issued and may be worn without the coat on fatigue and under certain conditions in the field. Provision is made for the insignia of both officers and non-commissioned officers to be attached to the shirt when the coat is allowed to be laid aside, and it thus closely approaches the hunting-shirt already commended. If these were made in many sizes with and without collars, men would be able to wear one over the other in cold weather. Undershirts are issued of cotton and of light and heavy knit wool. There is risk in the fabric being so coarse as to be unendurable by delicate skins, and being too short for complete protection. Whether the outer shirts may be worn in duplicate or not, the undershirts should be arranged for that purpose; for animal warmth is better conserved by the layers of contained air between several garments than by one shirt of the aggregate thickness. Lumbermen and ice-cutters, and others exposed to severe weather while working, use several shirts in preference to an overcoat. Undershirts should be light in color, to avoid undue absorption of animal odors. They should be long enough fairly to cover the abdomen after they are washed. A linen neck-band prevents undue shrinkage at the neck. An extra shirt should always be carried for wearing next the body in the field, that the two may be worn alternately. The underclothing that becomes saturated with perspiration and dust should be dried and stretched at the end of the day's march and be well beaten.

Trousers and Breeches.—Sky-blue kersey trousers are issued for dress occasions. Heretofore the cloth trousers have been made in two grades, neither of which was well suited to climatic conditions. Now that cloth is limited to occasions of ceremony, the relative thickness is less important; but it should be closely milled, one grade very light, and it would be better if a third grade especially thick should be provided for winter use on the northwestern frontier. Bleached cotton and brown cotton duck trousers to be worn exceptionally, as are the corresponding coats, are also supplied. Military trousers should be large over the pelvis to allow the evaporation of perspiration, but should fit snugly about the waist. A broad inner band might be arranged as a secondary support. A russet leather belt or a pair of suspenders is now issued to each man. Opinions differ as to the propriety of suspenders, but it is my own judgment that a man whose hip bones will not sustain his trousers without undue pressure upon the abdomen is not physically qualified for the military service. Trousers should have large pockets, and those for foot-troops should be sufficiently narrow at the bottom for their convenient stowage within gaiters. Full-bottomed trousers may look better on parade, and the constant tendency of the enlisted man is to alter the ordinary issue to "spring-bottoms" unless the company commander maintains a watchful and repressing eye. But the distressing condition in which troops reach camp after a muddy march appeals strenuously against leaving the bottoms of trousers large or flowing. During the Civil War and later, foot-soldiers would frequently draw the stocking legs over the folded ends of the trousers, and hold both in place by wrapping them with string. The saddle pieces in the reinforced trousers for mounted troops should be turned in, to avoid the rapid fraying of the ragged edge. On the plains the infantry often face the lower six inches of the legs with buckskin or canvas to avoid cutting out by grass, which might well be done before issue with all designed for the field, did not the habitual use of leggings obviate the necessity.

These general remarks on military trousers have little

immediate bearing upon the United States service, as so-called breeches are about to replace that garment excepting for dismounted dress occasions and strictly garrison duty, neither of which involves continuous exposure or strain. They are still applicable in practice to the State troops, and belong to a general discussion of the subject. The service lower garment, as now prescribed for both mounted and dismounted regular troops for all duty out of garrison, is breeches to match the service coat in color and material. These are loose about the knee, fitting the leg closely and extending to the top of the shoes, where they are fastened with tapes or laces. Breeches proper, as the name implies, extend from the waist to mid-thigh or to the knees. These would better be called ankle breeches. Service trousers, of the same material and color as the service coat, are for habitual wear with or without arms in garrison. White trousers may be allowed, not under arms, in hot garrisons.

Drawers are primarily for cleanliness and secondarily for warmth. Several grades are now prepared, and care should be taken that the proper one is actually issued. The man is sometimes tempted to discard drawers, to the ultimate decrease of his comfort and at occasional risk to his health. The dusty trousers saturated with perspiration quickly become filthy, and the heat and coarseness irritate and excoriate the legs. With cotton clothing drawers are necessary to provide against a lower temperature at night, as well as for cleanliness. A very thick knitted woollen might be made for arctic and sub-arctic posts. Drawers should be of the same cut as suggested for infantry trousers with plenty of room in the seat, where they frequently are deficient, and when not of elastic material they should be fastened with tapes instead of buttons. The wearing of drawers should be enforced through inspection by company officers; but that drawers may be worn, the grade should correspond with the climate.

Stockings are issued in woollen and cotton. Woollen stockings frequently lead to the feet being chilled in the winter by excessive moisture from the retained perspiration, so that men who have a tendency to excessive perspiration should use cotton regardless of the season. The men should always be cautioned against folds or creases in the stockings as leading to sore feet; and in hot and wet regions soldiers may sometimes be authorized to discard stockings, so as to avoid the chafing caused by mud entangled in them within the shoe. In some armies the stocking is replaced by pieces of muslin wrapped smoothly about the feet. These are more easily kept clean than the ordinary stocking, and when skilfully applied do not irritate the skin.

Boots and Shoes.—Campaigns are won by marching, and soldiers cannot march with crippled feet. It is as necessary for the infantry that is not accustomed to going barefoot to be well shod, as it is for the cavalry horses to have their feet well protected. Officers sometimes underestimate the importance of foot-gear, and even General Sherman went so far as to announce officially that it was a matter of indifference what shoes were worn. But serviceable feet are indispensable and if shoes are worn at all they must fit well, which means anatomically and without pressure, and they should be durable. A good shoe should have a thick wide sole, a low broad heel, it should neither be tight over the instep nor large enough to chafe, it should have no seams to press upon the skin, and

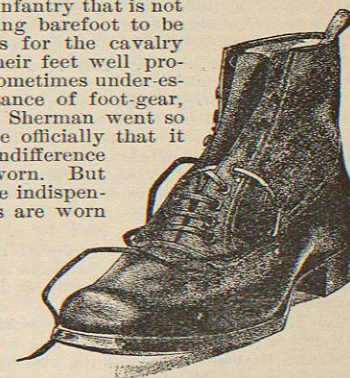


FIG. 3338.—An Army Shoe.

it should allow one-tenth of the foot in length and one-eighth or one-ninth in breadth for its expansion under exercise (Fig. 3338). The best heel has a narrow iron rim at the rear. Shoes frequently have too much leather in front of, and not enough over, the instep. Good shoes will last about two months in constant marching over reasonably rough roads. Under more favorable circumstances their life is much longer; but with the sand and gravel of regions like Arizona they will cut through much more quickly, unless protected by the hob-nails which experienced men always introduce. A poorly made shoe will sometimes almost fall apart when a single stitch is cut by grass or gravel, or when under extreme heat and dryness a few pegs or screws loosen. To carry extra shoes upon the person is a considerable tax upon the soldier's strength, and sub-depots for such supplies should be easily accessible. As so much of a soldier's comfort and efficiency depends upon his having a proper shoe, it becomes the medical officers of National Guard regiments liable for active duty either in the State or Federal service, and especially those of newly raised volunteer regiments, to impress upon all concerned the supreme importance of substantial, well-fitting, and comfortable shoes. In the field all shoes should be occasionally greased to render them more flexible and to repel water, and they should be occasionally water-proofed. For garrison use there is supplied a light brown canvas shoe that may be worn in barracks. White canvas shoes may be worn with the white uniform, but not on duty. The English issue a stout water-proof slipper for use in camp after a day's march, but with our lighter shoe it is not worth while for the man to carry this additional weight.

Boots, hitherto the mark of the mounted soldier, which are very ill-suited for dismounted duty, are no longer to be worn by any enlisted men. Both black and russet leather shoes are official, but at this time no particular pattern is obligatory. The black shoe must be worn on dismounted "full-dress" and "dress" occasions. On all other duty the russet shoe, which better retains its appearance in the field, is required. It seems unfortunate that a standard shoe in numerous sizes is not adopted. A good shoe is so important for the welfare of troops, and so few soldiers, particularly recruits, are competent to judge of more than its appearance without regard to its utility, that without unceasing and intelligent vigilance by company officers, great risk will be run of permanent damage to the feet.

Parkes ("Practical Hygiene," 7th ed., p. 531) says: "The sandal in all hot countries is much better than the shoe, and there is no reason why it should not be used in India for the English soldier as it is by the native; the foot is cooler and will be more frequently washed." In the tropics a light sandal may well be supplied for camps and for active service at discretion. Where the march is not through thorny ways a durable sole is sufficient, and an otherwise bare foot is more comfortable. Some of the Spanish troops in the Philippines wore a shoe of this description that seemed serviceable.

Leggings of cotton duck or canvas, of the color of the service uniform, are now required for troops of all arms on any other than ordinary garrison duty or occasions of ceremony. The exact specifications are not accessible at this writing, but those heretofore used were of brown cotton canvas in various sizes. They were laced at the side and held under the foot by a strap and buckle. Light canvas is apt to wrinkle, and light leather to become harsh under wetting; and, as heretofore made, the strap under the sole easily tears and wears out. They should always reach nearly to the knee, and would be better if well-fitted and clasped with a spring. When properly adjusted they afford a grateful sense of support, and they preserve the leg and ankle from sand and dust and mud. When tight enough to remain accurately in place, they are liable to be too tight and to lead to swelling of the feet and ankles. That is a possible objection also to fastening the breeches with tapes.

The British troops in Asia use putties. These are long

bandages extending from the ankle to above the calf, applied as the ordinary spiral roller. The men soon learn to adjust them neatly and securely, so that they do not require re-arrangement on the march, and they seem to serve their nominal purpose much better than the leggings, and as additional articles of uniform they are more portable and are more easily cleansed. The mounted troops use them equally with the infantry.

One of the chief factors of the efficiency of any command is its mobility, and this depends in large part upon the condition of the feet. Therefore an important part of a company officer's duty is careful and frequent inspection of the lower extremities and the supervision of their care. That includes seeing that the nails are properly trimmed directly across the toe, that corns and chafes are guarded against, and that cleanliness is practiced. Corns and chafes depend upon ill-fitting shoes. Men unaccustomed to marching should soap or grease the feet before setting out; and when camp is reached should wipe them clean, for which but little water is required. Blisters are to be allowed to drain through a minute hole at the most dependent point. A powder first used by the Germans consisting of salicylic acid 3, starch 10, and powdered soapstone 87 parts by weight, when sifted into the stockings keeps the feet dry, obviates chafing, and facilitates healing. This is more economically used in the form of ointment. Of course it does not neutralize the bad effects of improperly made shoes. When in spite of care raw troops break down from foot-soreness, it is necessary to carry them in wagons. Such transportation should not be long deferred, neither should men be carried on account of moderate discomfort from their own neglect. Soldiers disqualified by their own neglect should be punished.

Overcoat.—The soldiers' overcoat is to be of olive-drab woollen material, in general design like the officers' overcoat. This is doubtless wisely to make the officers less conspicuous than they heretofore have been under fire. The officers' coat upon which this is patterned is a double-breasted ulster extending eight or ten inches below the knees, with a detachable hood large enough to cover the head when worn at night or in inclement weather. The front corners of the skirt may be turned back for convenience in marching. This coat has no cape. Waterproof overcoats or capes as near as may be the color of the service uniform are permitted to be worn on duty when exposed to rainy or other inclement weather.

Blankets.—Every man is required to have at least one woollen blanket of the regulation issue, five and a half by seven feet in size and weighing five pounds.

Poncho.—The poncho, a rubber sheet with a central slit so that it may be worn over the shoulders on the march in the rain, or be laid under the soldier in camp, has been removed from the class of "equipment" into that of "clothing." It is not a part of the regular allowance but is supplied at cost and is very useful in damp climates.

Gloves of drab-colored leather are to be worn with the service uniform, and white Berlin or wool at dismounted ceremonies. Gauntlets are abandoned.

Fatigue Suits of brown cotton duck are allowed in garrison for men on stable or fatigue duty, or with fixed guns and emplacements. These may be worn alone or over the uniform.

Abdominal Bandage.—A woollen bandage is issued in hot climates for the protection of the abdomen. This encircles the loins and is supposed to protect the kidneys as well as the intestines. The official pattern, which does not appear to have been evolved from experience but from theory, is neither comfortable nor very effective, and is liable to roll up into a comparatively narrow band. A much better form is that of a small flannel apron of one or two thicknesses, from fourteen to eighteen inches wide and from six to eight deep, tied by a tape around the waist and worn next to the skin. This abdominal protector will materially lessen the chance of those intestinal affections that depend upon abrupt changes of tem-

perature and make serious inroads upon the health of the command.

Special Articles, as hoods, gloves, overshoes, and overcoats of extra warmth are now issued at very cold posts for protection against the severe weather. This is eminently proper, inasmuch as formerly fifteen per cent. of such garrisons were off duty from frost-bite for several weeks every winter, besides the absolute inability of unprotected troops to take the field under extreme cold.

Woollen Comforters, such as some men will wear about the neck in cold weather if permitted, are usually harmful. They keep the throat bathed in perspiration and render it unduly sensitive. Speaking generally, a soldier should not wear any article of clothing not supplied from the public stores.

Because a soldier is completely deprived of a civilian's opportunities for personal provision, it is very necessary that the clothing he is compelled to wear should be perfectly suited to his arduous work. War inevitably tears away the non-essentials of dress, but unfortunately does not supply the deficiencies it develops. Therefore their wants should be carefully anticipated and provided for by the officers who are responsible for the comfort and efficiency of their men. Furthermore, war is apt to be accompanied by lower commercial standards, and deterioration under the pressure of great demands will always lead troops to suffer unless rigorous inspection and inexorable rejection intercept unsound and defective supplies.

Weights to be Carried.—The soldier in the field carries upon his person all that is necessary for his complete independence in the presence of the enemy. Formerly his extra clothing and small articles, and in emergencies part of his ammunition, were carried in a knapsack. This was slung between the shoulders supported by straps that crossed the chest and also passed under the armpits. The pressure over the heart and lungs and the constriction of the axillary vessels and nerves by these straps, with the discomfort from its presence on the back and its great weight, always made the knapsack peculiarly obnoxious in both our own and foreign armies. It is probable that no other condition of the service has been responsible for such physical discomfort and for so much ineffectiveness, not to say disability; and constant effort has been made to lighten both the amount and the severity of the soldier's burden. In the effort for relief the blanket bag was substituted in 1882. It is practically a knapsack, although it leaves the chest freer (Fig. 3339). This also, which was never satisfactory, is now (1902) after trial for twenty years to be abandoned. Its object was to keep the enclosed blanket dry and clean, and to carry a few small necessaries in its pocket, with the rolled overcoat resting on the top. In practice the spare shoes and the other clothing were put in the bag and the blanket was rolled under the overcoat. It was made of duck and had a total capacity of 990 cubic inches. Its weight with the straps was a little more than two and a half pounds. The remainder of the equipment consists of a haversack to hold three days' rations, with three small bags for coffee, sugar, and salt, and a canteen of three pints' capacity, with their straps; a tin cup, a meat-can divisible into two independent dishes, and a knife, fork, and spoon. These weigh nearly four pounds six ounces. The accoutrements are a cartridge belt and plate, gun-sling, and bayonet scabbard, which weigh about two pounds. Thus the carrying apparatus weighs about six and a half pounds. To this must be added a rifle and bayonet weighing ten and one-quarter pounds and one hundred rounds of cartridges weighing nearly six and one-third pounds. Hence, without reckoning food or clothing, the soldier in line of battle carries about his person twenty-three pounds' weight of appliances. To this must be added three pounds of water in his canteen and five pounds of bread and meat, as three days' rations, in his haversack. The contents of the blanket bag were ordinarily one blanket, a towel, comb, brush, soap, socks, and undershirt, an undershirt, and a pair of drawers, the contents weighing in all nine pounds. The old-pattern

overcoat weighed six pounds ten ounces, and for the shelter tent two pounds must be added. The weight of the new coat must be approximately the same as that of the old. The weight of the clothing and kindred articles besides what he is wearing, and exclusive of an extra pair of shoes upon which some authorities insist, is seventeen and one-half pounds. The ordinary clothing actually on the person weighs about ten and one-half pounds. Consolidating all the burdens, we find that the American soldier in heavy marching order, and carrying, as the regulations presume, three days' rations, bears nearly

sixty pounds. The weights borne by the British and the Austrian soldier are also about sixty pounds, the French and the German carry about sixty-seven, and the Russian and Italian about seventy-five pounds. These are approximate figures which vary according to the conditions, and all are probably reduced in the field. In fact the United States soldier often places extra underclothing and a few light articles within the blanket which he rolls into a long cylinder and, with its ends tied together, carries it *en écharpe*. This is popularly known as the blanket roll, which has long received semi-official recognition and now is formally recognized. It is safe to say that in the immediate presence of the enemy the blanket bag has always been replaced by the blanket roll. The shelter tent has lately been equipped with straps expressly to retain the blanket and contents in a roll, and the same order that discards the blanket bag accepts and authorizes the blanket roll "until some more satisfactory method of carrying the pack has been devised." Occasionally the overcoat and shelter tent half are also rolled and carried on the other shoulder, crossing the chest in the opposite direction. Although strong men carry these rolls more readily than they do similar weights in the knapsack or blanket bag, and they may also be discarded very easily in action, nevertheless even this reduced pressure across the chest is oppressive and, at least in some cases, interferes with the action of the heart. As noted by a military board in 1889 "such use [during the civil war] did not imply an approval of the roll, so much as a condemnation of the knapsack then provided for the troops." The double roll is more than doubly objectionable. Dr. W. T. Parker, formerly an acting assistant surgeon, has devised a clothing case of light water-proof material so arranged with interior pockets as to hold underclothing and small articles, which are necessarily dispersed when the ordinary blanket roll is opened. It is intended to be carried either within the blanket roll or independently over the shoulder. For the purpose this is an admirable contrivance, although it has never been introduced in the army (Figs. 3340 and 3341). The late Captain Dodge proposed a flexible wooden strip or yoke to which the roll would be lashed which would also take up the weight of the haversack and the canteen. It passes over the shoulder and rests, as the blanket roll would, against the opposite side. Where it crosses the collar bone there is an elastic leather strap, like a crutch-head, to take off the rigid bearing. The presumed advantage of this support is to relieve by its curve all pressure from the chest and back. If that can be successfully done and the weight prove not too great

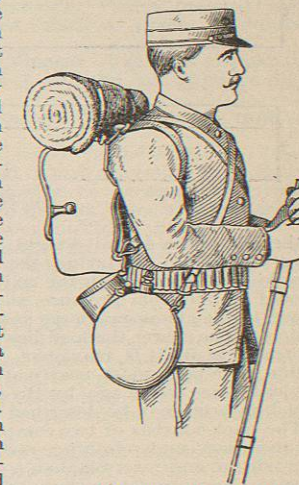


FIG. 3339.—The Blanket Bag.