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On Military Equipment

Lieutenant F. J. Graves

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LECTURE.

Friday, 18th January, 1878.

MAJOR-GENERAL SIR GARNET WOLSELEY, K.C.B, G.C.M.G.,
&c., &c., in the Chair.

ON MILITARY EQUIPMENT.

By Lieutenant F. J. GRAYES, 20th Hussars.

THE question of Military Equipment has for some time past been occupying considerable attention, not only among military authorities, but among many classes of civilians. It is generally felt that as war is a progressive science, so the various implements and articles of equipment pertaining to it must necessarily be of such a character as will in the best possible manner fulfil the various needs of war as they arise. Change, then, becomes necessary; but changes may be made without sufficient ground, and simply for the sake of change. I can only hope, however, that such changes as may be proposed in this lecture will be found to have a good basis of fact, and the opinions of great men founded on fact to support them.

With regard to the dress, &c., of Officers, an opinion is gaining ground that we want more simple dress for actual work; that gold belts and silver pouches would be advantageously replaced by white belts and cases, with compass and field-glass, together with brown leather sword-belts, &c. But to take a wider field. I propose to deal shortly with a few, and only a few, points, touching the equipment of artillery, infantry, and cavalry, from the standpoints of utility, the comfort of the soldier, and economy both to the State and the individual. I cannot pretend to exhaust this large and important subject in one lecture, and, indeed, I cannot lay claim to the knowledge required to do so, even if I had that important element, time, completely at my disposal.

With your kind permission, then, I will proceed to the consideration of the equipment of artillery, the term "equipment" to include all articles required for the use of the soldier.

Artillery.

My remarks upon this branch of the Service must necessarily be brief, first, because the most important part of its equipment, namely,

the gun, demands an amount of technical knowledge which it does not possess; secondly, because the remarks concerning several pieces of artillery equipment, &c., apply equally to that of the other pieces in the Service under consideration to-day.

Much attention has been given within the last few years to the subject of the equipment for the supply of ammunition in the field, with a view to improvement in this direction, Major W. F. Ellis, while proposing to raise the number of guns attached to a division from 18 to 24, and also that no guns shall belong permanently to the cavalry brigade, but that a brigade of 48 horse artillery shall be formed, from which guns shall be detached as required. He suggests that the equipment for the supply of ammunition shall be materially altered. He proposes that the ammunition waggon now in use shall be replaced by two limbers, carrying together the same amount of ammunition as the waggon, and requiring no more horse power, namely, six; the first line of limbers to be drawn by four horses, which would keep up with the guns in action; the second line to be drawn by two horses, and to move as a rule at a walking pace. The weight of a waggon loaded is 40 cwt. 0 qrs. 2 lbs., whereas the two limbers each weigh, when packed, 18 cwt., or, taken together, upwards of 4 cwt. less than the loaded waggon. Each horse service waggon carries or draws 747 lbs., whereas in the 4-horse limber each horse would carry 504 lbs., but in the 2-horsed limber each horse would carry 1,008 lbs. The question among others to be considered is whether or not this latter weight is excessive when moving at a walk. I am inclined to think not. Should Major Ellis's proposal be adopted, there would be greatly increased mobility, a more rapid supply of ammunition in the field, and last, but not least, the adoption of such an alteration would be acting out the common-sense proverb that "It is better not to carry all in one basket." When we consider the tremendous moral effect produced by a concentrated, well directed, and rapidly delivered artillery, and directed and delivered in such a manner as, I am led to believe from the authority of the latest experiments, only our British gunners could do when, moreover, we consider that Germany had 4 to 5 guns per company in the army corps in their last war, and that Russia deems it necessary to have 4 guns to every 1,000 bayonets and 8 to every 1,000 cavalry when we consider that the adoption of Major Ellis's proposal would have by no means exhausted them) would raise our proportion of guns per 1,000 bayonets, or 4 per 1,000 men in an army corps; and when we consider these points, and the issues dependent on their right solution, I am sure I am not exceeding when I say that the subject of the equipment for the supply of ammunition in the field is a most important one, and demands a searching and extended investigation and settlement.

A few words with regard to the fire-arms, &c., used by the infantry in defending themselves and their guns when attacked, either by the cavalry, or cavalry, at close quarters. For the defence of each gun, and complement of men, two carbines are supplied, the ammunition for which is to be maintained by drawing on the cavalry regiment.

and on the cavalry carts with the sections of the army. These carbines are carried with their sword-bayonets on, and, as a rule, are taken with the limber under cover when in action. The gunners with the guns are thus left with arms to defend themselves and their guns from an enemy's quarters. Now the fact of their being supplied with arms proves incontestably that they are supposed to expect an attack, and to meet it as best they can with the weapon provided. The provision of carbines and side-arms sufficient for the purpose. Suppose the carbines with ammunition were always taken by the gunners with the guns, and that the cavalry supply-cart were so conveniently near that the supply of ammunition could be obtained, would they then constitute, with the 74 sword-bayonets, the hands of the gunners not armed with a fire-arm, an advantage against a well-delivered attack by cavalry at close quarters?

One thing we may safely say is this: such a provision would be introduced into the calculations of the attacking party.

Should, on the other hand, each gunner be given a revolver, taking guns, even by surprise, would be a more dangerous game than under existing circumstances. A gunner armed with carbine and side-arm has his hands full, and the first named aside, with the strong probability of a hurried action, he is useless in working the gun; but if the side-arms were away, and let the man wear the waist-belt and have a pouch for his ammunition and his revolver a waist-belt behind his back, so that he can slip them off from rear to front, and you have both his hands free and unimpeded, and he has a weapon which can be used with confidence at close quarters.

With regard to the tunic, I cannot help thinking that the comfort of the man are in too many cases sacrificed. As a rule, the tunics are made much too tight round the chest to be comfortable in working, and I believe that if cut in one piece from the collar to the bottom, as some cavalry in India have them, it would last longer and look better. There would be no seam under the belt to wear thread while the rest of the garment remained in good repair.

My remarks on the head-dress of the artillery being those I have to make upon that of hussars, I pass on to the present in use in this branch of the Service. I am informed that a gunner receives three pairs of Bluchers or ankle boots; Wellingtons in two years. Now, with regard to the many, myself among the number, who have been led to believe that a most unworkmanlike article of kit.

At some athletic sports at Aldershot, I saw a tug of war team of as fine a set of gunners as one could well pick, an infantry regiment. I watched with interest for the result. At that time I was trying to devise some improvements in the tug. I was not surprised to see the gunners slip down several times and in the end lose the tug, because they nearly all

Wellington boot, having come to the games dressed in war costume, and when they pulled on the rope and turned side heels gave way and consequently their ankles turned and went. The same principle would apply in going over rough or dragging guns, especially in mountainous country. Against the Wellington to the country is, as a rule, 16s. 10d. per pair of the ankle boot, 10s. 6d. Further, the cost to the man for the fronts to his Wellingtons, is 14s. 6d., no small item out of a pocket. I have here a highlow made on an entirely new pattern, the side seams, as you see, open to the rear and not as in the old boots to the front; rain hard as it may, no water or possibly beat in and wet the foot; it fastens simply by a buckle on each side, and when on, you cannot tell the difference between it and the Wellington; but in the one important point in which the Wellington fails, namely, support to the ankle, it succeeds where the Wellington fails, moreover, lighter than the Wellington, and in the space taken by 700 Wellingtons, you may store 1,000 of this class. Further, the man less than half to repair, and the cost to the country 6s. 4d. per pair less than the Wellington; in other words, the man would save 3s. 2d. per annum for every man so equipped. The ankle boot has one serious disadvantage, viz., that the whole armament makers and contractors would be against it, because it would diminish the profit on 3s. 2d. per man per annum. On the other hand, the Wellington boot has an advantage which is considerable to a small number of Officers who go in for appearances rather than for utility, namely, that the trousers fit over the foot with fewer wrinkles than it would with the other; but then who talks of wrinkles at the bottom of an infantry man's trousers, all wear a short boot in full dress?

In concluding my remarks on this branch of the Service, I draw your attention to the fact that the various classes of infantry, whether heavy, medium, or light, are distinct, and that for the duties connected with the guns, two distinct classes of men are required, the gunner as a rule is the heavy man, the driver is always the light man for his lightness in comparison.

This principle of "the right man being put in the right place" seemed to hold sway in the classifying of infantry from the earliest times, for instance, about 300 B.C., the Grecians had three distinct classes of infantry, heavy, medium, and light, equipped according to their various characteristics. They fought in three lines, the light foremost, then the medium, and the heavy in the rear, the same way, at the time of the second Punic war, the Romans had four distinct classes of infantry; they also were distinct with regard to physique and equipment, and fought in three lines as the Grecians did, except that the fourth class, the lightest, fought between the first and second lines.

Now, without going into the development of our own infantry from its earliest history, the fact remains that we have preserved three distinct classes of infantry in our Army, and no one can fail to notice the great differences which exist with regard to the size, weight,

pace of the various classes in this arm in the present tin service the light would be used on occasions when the heavy is useless, and *vice versâ*.

The progress made by other nations; the introduction of breech-loading rifles; the increasing value of artificial cover for the soldier and other things, have drawn considerable attention to the equipment of this arm, and one cannot read of the results of the present war, and also of the possibilities and probabilities of the future, which future—though not very far off—without coming to the conclusion that important and very material changes are necessary. The question would naturally propose itself at the outset is this, "Have we kept pace with the times, and altered our equipment to meet the requirements of modern warfare?" On careful consideration, the answer must be, that "If our pace is not quite that of the times, we are pretty handy, and moreover, just now it is evident that a number of committees appointed within the last few years on this subject, that we are going to quicken our pace considerably."

There are few but will admit that the Henry-Martini rifle in use is in many respects a step in the right direction, but it has some serious defects, most of which can be remedied easily. The length of barrel is insufficient; this makes the arm awkward to handle; the "order"; far worse, it takes away, to a considerable extent, the efficiency as a bayonet-carrier. It is no less than 10 inches long with bayonet fixed, than the Turkish weapon made in America at a cost of about £2 15s. or so, and called the Martini-Peabody.

Another great defect in this arm is, I believe, the spiral breech action; the practical result of the adoption of the spiral spring instead of the well-tried flat mainspring has been that a 16 lb. blow a spring with a force of 40 lbs. had to be added to an excessive strain on the sear-nose, and the introduction of another complication of the lock. I may refer to several examples of flat mainsprings may be examined and it will be found that there is no difficulty in having a flat mainspring if desired.

Again the divided stock is objectionable; first, because it is much more severely felt where the greater part of the shock is transmitted by an iron bolt, not indeed touching the heel-plate, but from having the elastic movement of the whole old stock when the stock of the Martini-Henry shrinks or expands from the effect of climate, a change by the armourer-sergeant in the case of the guard lever becomes necessary, or the breech cannot be shut.

Again the distance from the toe of the butt to the trigger is well known to gun-makers, to be exactly $14\frac{1}{2}$ inches, but this has been overlooked in the weapon under consideration, and the consequence is that the Martini-Henry has a misshapen stock, ill-adapted for shooting when rapid fire is resorted to.

One other serious defect in this weapon is that the hold

¹ Having found that the information given me regarding the re-charge for the Martini-Henry rifle was incorrect, I am glad to withdraw unreservedly the remarks made by me on that point.—F. G.

the arm is entirely metal, and most inconvenient, in winter & cold countries.

Some of the above defects are under consideration now, I believe, proposed to bring up the present total length to the deemed necessary by lengthening the bayonet. Would it not "to kill two birds with one stone," in gaining the required adding to the barrel, and thus be able to use the original charge of powder, and regain the good trajectory absolutely under present circumstances? This brings me to the cartridge; it is a built-up one of greater weight than necessary, cent. (or 10 cartridges per 100), a very serious consideration composed of various metals, and liable, as shown in India, to instantaneous decay in the magazines, from electrical action; it is, more expensive and less simple, as well as weaker than a metallic cartridge.

Now, supposing the above-mentioned defects to be remedied then? Are we to rest satisfied with putting a good weapon in the hands of the man? No! we must seek to place the man in such a position that, with safety for himself, he may bring his weapon to bear on the enemy with the greatest obtainable effect.

We must all admit that natural cover does not always admit of the above-mentioned conditions being fulfilled; it, therefore, becomes necessary to provide the man with the means of making artificial cover, the value of which is incontestably proved by the occurrences of the war of 1861-62, and of that now in progress. Our own action in the matter, with frequently-expressed public opinion, shows that the importance of the subject is increasingly appreciated, but I am rather inclined to think that the equipment for the provision of artificial cover for the man, if I may use the simile, in too homœopathic doses. The system of allopamy is the system for the patient under treatment, for in order to supply an infantry regiment, of 1,000 bayonets, with the necessary tools in action, one cart (No. III in the circular of December 1861) weighing when packed 18 cwt. 3 qrs., and drawn by two horses, is allowed. Amongst other necessities, this cart conveys 304 lbs. of tools, suited for entrenching purposes. Now, the manifest disadvantages of this system are, 1st, loss of time, an important element, in the use of the tools; 2nd, the number, when issued, is inadequate for quick work; 3rd, the cart cannot be in every place at the same time; 4th, it is liable to injury or destruction by artillery or other means; 5th, in many places where the regiment would be required to go, it cannot admit of its following; 6th, it is liable to be lost, and thereby causes the trouble of the supply of forage for the horses and escort.

I have here two inventions for intrenching purposes, one by Surgeon-Major Oliver, the inventor of the magazine equipment, and the other by Colonel Rice, of the American Army. The latter has not been submitted to a thorough trial, in actual service; the former has not, I believe, been submitted as yet to His Royal Highness the Field-Marshal Lord Cardigan, in-Chief, and is, in one sense, therefore, untried. Colonel Rice's invention is an amalgamation of the bayonet and trowel, and

carries one; it is light, and but little more expensive bayonet, and about the same or less expense than the in present use.

Bear with me whilst I give you a few interesting facts trial.

General Miles writes:—"As a trowel it has been severely
" my immediate supervision. A company in single rank
" a soil of medium hardness, threw up, in the space of t
" work along its entire front of sufficient height and thic
" tect a line of battle. The work was tested, and found
" proof against the Springfield breech-loader; at a di
" paces the balls would not penetrate half through the
" bayonet, I believe that it is as formidable a weapon as
" in use, and that as severe a wound can be inflicted with
" moral effect in a charge would be as great as that of
" The Small Arms Committee report that "Three men for
" work 5 feet long, 3 feet thick at bottom, 1 foot thick a
" inches high, in 4 minutes. The soil was very hard, not
" disturbed for over 20 years, besides being full of roots,
" second trial, in easier digging, they cut a trench 6 feet squa
" a parapet similar to the above, and when lying down in t
" they could not be seen at 10 paces distance. "This," continu
" is making cover in a much less period of time than entrench
" could be ordered and brought up from the rear to the
" army." The following is a resolution of the Board
" report on it:—"Resolved: That the Board recommend
" Department that the Rice trowel-bayonet be adopted f
" the military service." The Board was composed of
" Officers of high rank, as well as one or two of junior
" American Army. The Ordnance Office thereupon advise
" tary for War to issue 10,000 of Rice's trowel-bayonets.
" and, in the campaign of 1876, on the Yellowstone, accord
" report of the General in command on that river, "The mer
" use of it in cutting sticks to put up their shelter-tents
" hatchets, for digging a small trench round their tents, an
" their meat, digging for water, &c." Again, the Co
" Chief, writing from Dakota, says, "The experience in th
" of the troops who are supplied with the trowel-bayonet
" be invaluable. It also deserves the name of an univers
" my judgment, every infantry regiment in the Servic
" supplied with it." Now, these are facts and opinions fa
" fact with regard to the above-mentioned weapon. The
" whole line of infantry can be put out of sight in an ave
" six minutes, and that in a trench with a parapet in fr
" impervious to bullets fired from breech-loading rifles at
" only 20 paces, speaks volumes; further, the fact that the
" the implement himself, without any increase of weight, tl
" away with the need of the cart now used for its conveyance,
" the cart-horses and driver, as well as part of the escort, to
" other purposes, also speaks volumes, because the man i

the moment the word "halt!" is given, to set to work, without time, and make cover for himself. The disadvantages accruing from the adoption of the regular spade-form of trenching tool for the soldier, may, to a limited extent, be seen even before experiment; the soldier would have to carry $3\frac{1}{2}$ lbs. to 4 lbs. extra weight; there would be a loss of time in detaching and fitting and then in unfitting and attaching again; and also an extra expense to the country. The advantages would be that the implement could accomplish more work than the soldier did not get in each other's way, owing to its size and shape, and that it acts, when adjusted according to Dr. Oliver's proposition, as a shield to a very vital part of the man's body. The latest instructions published by authority on this matter, that I have been able to put on my hands on, and which are imparted to the students at all military instruction classes, show that men at an interval of about 4 feet make a trench, with the larger tools, 7 feet wide and $1\frac{1}{4}$ feet deep, and a requisite parapet, in 50 minutes, taking the mean time laid down; I think, therefore, that there can be no two opinions as to the comparison between the trowel-bayonet system and our present system from this point of view.

A military correspondent of one of the daily papers wrote a little time back to the effect that the trench dug by the Turks was a better trench than that in vogue amongst us, because it was $3\frac{1}{2}$ feet deep instead of $1\frac{1}{2}$. Now, an essential feature in a trench is, that while it gives sufficient cover to the defender, it shall not afford him sufficient cover from fire from the rear. One of the causes of the many failures of the Turks to retrenchments captured from them, was that their trenches were so deep that they afforded good cover either way. Our Americans lay more stress on the moral effect than on the actual effect of the bayonet; and, perhaps, they are right when we consider the effect of the causes of the casualties in the Franco-German war as given by the Germans; they were as follows:—95 per cent. from the rifle, 4 per cent. from artillery fire, and only 1 per cent. from sabre and bayonet combined. If, therefore, the moral effect be retained, the adoption of a trowel-bayonet, I think the actual effect will be to a certain extent, take care of itself.

I hold in my hand an invention by Admiral Selwyn, in which, without extra weight to the man or gun, a good trowel is incorporated which fits into the stock of the gun which is hollowed out for its reception. The great advantage in the eyes of many in such an invention would be that our sword-bayonet would be retained, and that the trowel would have an efficient tool for trenching without increasing the weight of his kit.

It has been more or less generally felt that the present system of carrying the man's kit is too cumbersome, and that with it he cannot carry sufficient ammunition to meet the requirements of modern warfare, the outside limit of what he can carry, being only 70 rounds, while a regiment of 1,000 bayonets 70,000 rounds. The means of attaching it to the body are much too intricate.

Surgeon-Major Oliver has attempted to meet the need called the "Magazine Equipment." I think it is as it makes every man his own magazine, and with ration, food, clothing, and waterproof sheet, it makes him independent of the base of supplies for 24 hours. This, as you see, very simple in design, and will, if adopted, relieve a great many encumbrances in the way of straps, ballbags &c., which now interfere with the free manipulation of trenching tools. The chief parts are two bags for kit, as a rule, is left in the barrack room in time of peace, marching from one station to another, and in time of war, the base of supplies. The great coat is taken out of the bag which is then placed on the belt, and the coat is on the shoulders. The magazine bag contains a day's ration sheet, and 100 to 150 rounds of ammunition, which the man carries in front of him by simply bringing the magazine bag from rear to front, which, as you see, the man can do with ease and comfort to himself. Another great advantage of this equipment, is that the man can march at ease without fear of the kit falling off or being disarranged. He can get at any thing he wants without help; moreover, the kit is more compact and rests nearer the centre of gravity. Further, it does not cover the whole back, and so allows of free play of air. I beg now to draw your special attention to this, that a regiment of 1,000 bayonets equipped in this kit weighs less than 72,000 rounds of ammunition, more than an equal number of men equipped in the valise equipment in present use, the three ammunition supply carts attached to an infantry company. Add to the "magazine equipment" the trowel and trenching tools, and you eliminate one cart weighing 18 cwt. 3 qrs., at present required for the required entrenching tools. (For full particulars see Appendix.)

With regard to the head-dress of the infantry, I am sure that the regiments which have been, and are to be supplied with the present hideous shako, are to be heartily congratulated that they are to be relieved of this useless, ill-shaped, and, as regards sunstroke, dangerous head-dress. I feel sure that the change, if there be any, will prove uncontestedly a great improvement. Contractors are, however, inclined to increase the weight.

A word or so about the tunic. At first it was made so tight that a man seemed as though he could scarcely do more than move his front; later on they were made rather looser, and more so; but now I fear that comfort and utility are sacrificed at the altar of appearances in many regiments in this matter. I mistake to think that a tunic cannot be made smart as well as comfortable, and that therefore it must be made very tight. In the making of the tunic, the remarks touching the application of the material apply equally here.

I cannot pass from the subject of infantry equipment without drawing attention to the boot now in general use in

the Service. The complaints with regard to this article of
loud and general. Some of the disadvantages it is said to possess,
1st, that after it is in wear some little time it becomes very
through the gaping of the seams to the front—that the soldier
let in water, dust, and mud freely, and give, as a natural result,
sore feet. The man has to keep up laces, and these rot when
wetted. Again, when the men are in camp and have to march
in the morning, it is difficult for them to fasten the boot on
owing to the small size of the lace-holes. Now, with this
no seams show to the front at any time during wear; it
looks like a Wellington as far as neatness goes, and is easily
or put on by means of this simple buckle and strap, and the
laces is done away with. As far as storing these boots goes,
be stored in exactly the same manner as the boot in present
cost the same money. This is a boot I had in wear nearly ten
at Aldershot and Hounslow (Fig. 21, Plate VI). It was worn
the heavy snows of 1874 and 1875, and has, as you see, had
done to it in the way of repair. I wore it without the aid
buckle in plain clothes as well as in uniform.

In speaking of the equipment of cavalry, it is not my intention
to detain you long by tracing the various and most interesting
that have occurred with regard to this branch of the military
enough to notice the crisis that was reached upon the invention
introduction of gunpowder. It was then thought necessary to
by degrees fire-arms into the cavalry arm, thus they were
their great discomfiture, pitted against infantry. Then, in the
part of the sixteenth century they were intermingled with
and the pace of the charge was reduced to the trot; the result
a formation was, of course, not satisfactory. Colonel Der
marking on these and other attempts to bolster up the waning
cavalry against infantry says, "these facts all serve to show
"completely the soldiers of that age misunderstood the real
"uses of a cavalry force, and how completely the invention of
"had upset the whole principles of warfare."

For a long time there were in existence two classes of cavalry,
heavy, which were more or less independent of infantry or other
and the light archers, who were included for tactical purposes
gendarmes, but who were banded together for these purposes
when Charles VIII entered Rome.

To come at once to our own cavalry: we now have three classes
cavalry in our Army. They are generally called heavy, medium,
light, and no doubt the heavy and medium fulfil to a certain
the requirements which their names imply. But what about
cavalry? Does it do so? I fear the line of demarcation
our medium and light cavalry has been trodden down to a
extent.

When we consider the important duties which cavalry, and
light cavalry, has now to perform; when we think that the
an army is to a very great extent dependent on the information
concerning the enemy's movements that its cavalry provides; an

second place, when we think of the importance of hiding enemy the movements, dispositions, and numbers of the army it belongs, to say nothing of obtaining information of the country to be passed through, and that in performing these duties it may have to cover a great amount of ground at a should not this branch of the cavalry arm be horsed, and equipped, in such a way as to fulfil the term "light" letter?

Let us see what the hussar was in 1802, and then compare what he is now.

On referring to Charles James's "Military Dictionary" we read that the hussar was dressed in a fur cap—a velvet thing from the instrument of torture we at present wear breeches, and boots; they were armed with a crooked sword and carbine; he says, "their equipage is so light, and their" "excellent horsemen, that no other cavalry can preter" "them." What is the case now? The average weight of a man on service now, including ammunition, forage, and ration, including articles of kit left behind, is over 19 stone. The average of the men in my regiment who would go on active service is 11 stone—the average weight of the whole regiment of boys and the last joined recruits (a spare lot, as a rule), is 10 stone. The weight of their equipage brings up the total to the mentioned figure, 19 stone. Look on that picture and on this many men in the hussar regiments who would make fine guardsmen, and very many who would make good lancer are some lancers who would make good hussars, as far as concerned.

Compared with the Austrian hussar, in 1873 or thereabouts the weights of the horse, man, and equipment together, weighed 120 lbs. more, man for man. The French dragoon weighed 70 lbs. more than our hussar, and the Prussian weighed only 30 lbs. more. Since then, I believe, our equipment has grown heavier, and the men enlisted as hussars are bigger but not least, the horse meant to carry them is of a new class.

I believe that horses for military purposes are becoming every year, and that the present system of supply requires modifications.

When we consider what the horse for light cavalry is doing, I maintain that this question calls for very grave consideration. Many, whose opinions are entitled to respect, believe that horses are bought too young; one disadvantage of doing so is, that the horse has all his baby sicknesses before him; and I am informed that in this country the loss through these is about 3 or 4 per cent of the year before he can be used in the ranks, and this time is a year per horse from general duty and parade work in or out of the ranks and attend on him. The present price paid for a trooper at the usual age at which they are bought is rising four; so that of 1s. 9d. per diem for food, by the end of one year the horse

Government 71*l.* in round numbers. I, among many other that if the price were raised to 60*l.* or 65*l.*, and horses bought or two older, great benefit would be obtained, but then this merely a palliative measure, it would not strike at the root of the disease; and there are causes at work now in the country before long, will so aggravate the disease that the cure will be costly; the country is being overrun with a worthless, unsound stallion; and, owing to the low rate charged by the owners who sell to the recognised buyers for military purposes patronize them, so that it does not pay a man now, as it used to, to keep a good horse for the purpose under consideration.

How does the case stand now? The war strength of a regiment in horses is 480 troop horses and 44 for draught. Suppose fifteen cavalry regiments were ordered abroad in a few weeks, we should want for each regiment 120 to 164 horses to obtain say, to take about a mean, 2,000 horses, we should draw upon the second line to an alarming extent. Then the difficulty of filling up the gaps caused by death, loss, lameness, backs, &c.; and further, the still greater difficulty of filling once the ranks of the second line, and of establishing a reserve would require many thousands of horses within a short space. Turkey wanted 3,000 horses the other day, and could not get them. "For" (the question of neutrality put aside for the moment) the words of Mr. Tattersall, "we have not got them to spare, we want them ourselves, and if we get them at any price, shall pay a high figure for an inferior animal." He further asserted in a letter to the *Standard* of the 22nd December, that, out of 2,000 required for last year's manoeuvres, 1,500 to 1,800 came from

I believe there never was a time when we needed so much of this question straight in the face as the present; and I believe the only cure must be found in the establishment of regular reserves on the same principle as those of Russia, Germany, Austria, and Prussia. Mr. Tattersall, in supporting this view, asserts that the result will be to "have a good supply of the right sort of horses when needed, and at a cheaper rate."

I am inclined to think that our horses are, as a rule, very unsound in front of the saddle; and, considering the great weight they have to carry, the great height at which the kit is at present adjusted for the long distances they may have to travel, I think that it needs to be particularly well shaped about the forehead. This is not the case in the saddle in present use. Much attention has been paid in late years to this subject, but no definite result has been achieved as yet.

The manifest defects of the present saddle are, that the kit is too high off the horse's back, and when the man is mounted and the girths loosen, and when the man becomes tired, there ensues an amount of sway that a sore back is the infallible result; the man's bridle hand is forced into a most uncomfortable position. The panels require constant re-stuffing, another fruitful cause of sore back; lastly, the weight of the whole kit is borne by the

With a view to remedy the above defects, Captain Craven invented a saddle and numnah which are undergoing a series of experiments in several regiments. He has kindly placed one at my disposal. You see the saddle carries the man, his arms and shoes; the numnah carries the cloak and kit, and they are independent of each other. The numnah is made of leather underneath next the horse's skin, then comes a layer of felt and then one of canvas; the whole is fastened by means of rivets to pieces of sheet steel which run rear between the canvas and the felt, and these pieces are arranged so that the numnah up so that it shall not press on the withers of the horse. The numnah, besides carrying the kit, now takes the place of the crupper, and it has no stitches on the side next the horse. From this combination of parts several advantages are derived, that the weight of the whole is distributed in three places instead of one. The whole is about seven inches thick, which prevents the top-heavy look so apparent in the saddle in present use. The kit takes less time to clean, as the numnah keeps every article from the horse's sides, and there are fewer buckles and straps. The latter are conveniently placed, the kit can be turned out in a considerably less time than can be obtained under existing regulations (Plate VII).

The blankets for man and horse can be carried, between the saddle and the numnah without danger of becoming wrinkled, or allowing dirt to accumulate, and the crupper would still be next the horse's skin. The crupper and the girths may be dispensed with, as the numnah adjusts itself to the horse's back; also, this saddle not having the rounded cantle projecting in front, but being shaped like a plain saddle, is more comfortable forward. It is considerably lighter than the saddle in present use.

The numnah can be equally well made without the steel, the felt next the horse's skin, it being still a most comfortable arrangement. (For further particulars see "Crichton" in the Appendix.)

We must now consider the question of armament for cavalry. When I think of the small number of cavalry we possess, compared with that belonging to the Continental Powers, I am reminded of the causes which forced Alexander the Great to stop short of conquering the cause of the annihilation of the glorious army of Darius in Scythia, the cause of the disasters which befell the army under Marc Antony and Crassus at the hands of the Parthians. I am led to ask, why was it that Richard Coeur de Lion failed against the hosts of Saladin? Why was it Napoleon failed against Russia? Had the famous Cossacks nothing to do with it? It led to the defeat of such great men and great armies of more of that very arm which formed so important a part of the armies against which they were pitted? These and other questions lead me to believe that our small force of cavalry is not so well equipped far better than those of our neighbours. The men, horses, and equipment of our light cavalry should attract special attention, for, to quote the words of General Napier in his "Defects, Civil and Military," "hussars

“not: a real hussar, including his twelfth part of a kettle
“weigh twelve stone.”

It has already been remarked that the first crisis which
about great changes in the use of cavalry against infantry
introduction of powder and fire-arms; now the second
was, in my opinion, reached on the introduction of the cili
oidal bullet, together with improvements in breech action, v
make it necessary for a body of cavalry to run the gaunt
shots to one that they risked in the time of Frederick the
of Napoleon. The manner in which infantry in square simply
through cavalry armed only with sword and lance at É
Fuentes d'Onor, Crâone, and Rheims, and other instances,
infantry were armed with the flint lock musket of sho
proves that cavalry to act effectually against infantry must
better than at present. Notice again what cavalry effect
infantry during the American War, now checking all three
whole day, as at the battle of Five Forks; again, coming up
engaging the enemy's rear-guard, while a considerable por
beyond and took up a strong position, dismounted, and th
inflicted very severe losses and took 6,000 prisoners and
Again, see how cavalry dismounted, although ridden ove
defeated their mounted opponents at Okolona, where For
mounted men were charged by three lines of Federal cav
succeeded in repelling them; a fourth body of Federals th
his line and got among his men, who at once took to their
and shot down a great number and took many prisoners, an
those who did succeed in getting through were discomfit
reserves.

The question now is, what is the best armament for our
I answer at once that it is my firm belief that the front ra
regiments should be armed with lance and revolver, and the
with sabre and carbine.

Permit me to bring to your notice the opinions of others, :
facts from history, and the action of other Powers in Europ
regard to *les armes blanches*, this is no new idea, for C
describing the Battle of Dunbar, writes: “But here on t
“their horses with lancers in the front rank, charge desper
“drive us back across the hollow of the rivulet.” Again, i
1828, the Emperor of Russia ordered the lance to be used in
rank of all regiments then about to engage with the Turks, :
it has been in vogue for a long time in some of our irregula
in India.

The lance is the best weapon to bring first to bear on the e
it is no use in a *mêlée* and must be supported by the sabre.
proved by the fact that, at the Battle of Aliwal, when
Lancers broke into the Sikh squares, they were cut down :
left by the Sikhs who had put down their muskets and take
swords. The casualty-return of January 29th, 1846, speaks
it runs thus:—“Cavalry—first brigade—H. M.'s 16th
“2 European Officers, 56 men, 77 horses killed; 6 European

" 77 men, 22 horses wounded; 1 man, 73 horses missing gives a total of 8 Officers, 134 men, and 172 horses *pl combat* in one fight.

Sir Hope Grant was not caught thus, for at Meangli Lancers charged, supported immediately by the 7th Irregulars, who cut down 500, and took 400 prisoners.

Nolan says, "All seem to forget that a lance is useless Marshal Marmont in his *"Esprit des Institutions Militaires"* would be better for cavalry to have both the lance and the sabre. . . . the lance should be the principal weapon, and the sabre an auxiliary arm." Jomini says, and his utterances are to the point: "In charges in line the lance is very useful; the sabre is much better; hence comes the idea of giving the lance to the front rank, which makes the first onslaught, and the sabre to the second rank, which finishes the encounter usually in the first combats. The lance is the best arm for offensive purposes. A body of horsemen charge in line, for it enables them to reach an enemy who cannot reach them, but it is a very good plan to have the second rank as a reserve armed with sabres, which are more easily handled than the lance in hand-to-hand fighting, which is liable to become broken." De Brack also calls special attention to the necessity of supporting lancers by swordsmen.

With regard to fire-arms, Trower writes in his "Hints to Cavalry," "The number of carbineers should be 10 carbineers to 50 lancers—this is an advance direction. Hozier, in his "Seven Weeks War," when speaking of the axiom applying to cavalry, says, "But it no longer applies to the introduction of breech-loading rifles. The morale of cavalry is not so much affected if lancers are properly instructed as to the use of these arms." The use Sheridan made of his 10,000 horsemen in the battle of Gettysburg, striking with General Lee's rear-guard on the way to Lynchburg, but then they were thoroughly instructed in the use of these arms, and, as noticed before, were the means of capturing 6,000 prisoners, together with 16 guns and 400 waggons effected against cavalry, infantry, and artillery combine the advantage of a well-chosen position. The determination, therefore, by His Royal Highness the Field Marshal Lord Roberts, to give our lancer regiments a breech-loading rifle which will be effective up to 800 or 1,000 yards, placing them in a position to act in a like manner when occasion presents itself. The late wars prove conclusively that, except under exceptionally favourable circumstances, cavalry should not charge bodies of infantry. The four charges made by light cavalry at Sedan is a case worth noticing in support of this view, and again when at Plavigny, near Vionville, General Foy charged the Prussians and lost in a few minutes 22 officers and 243 horses, and the Prussian infantry did not lose a man. Now, with regard to cavalry being opposed to cavalry, remind you again, that the casualties during the Franco-Prussian war stand thus: 95 per 100 from the bullet, 4 per 100 from the lance, 1 per 100 from lance, sabre, and bayonet, combined. I

1864, a fight took place in Virginia between a squadron of cavalry armed with the sabre, and a squadron of Mosby's, armed with the revolver; the loss of the latter was 1 man killed and 1 wounded, and the loss of the Federals was 24 men killed, 12 and 62 prisoners—36 killed and wounded out of 100. In this fight, the sabres lost 26 killed and wounded, 54 prisoners; horses, the Confederates, who were armed with the revolver, single man.

On the other hand, in 1799, at Egmont-op-Zee, two English cavalry charged 500 French and drove them off; they rallied and charged again; however, the result of both mêlées was loss on the English side of 3 killed and 9 wounded. Similar to this, 65,160 killed on the German side in the war with France, were killed and wounded with the sabre and clubbed musket killed by the sabre in the whole six months' war, including Vionville, and Sedan, together with the battles on the Loir and northern provinces, as well as all the outpost service, extending nearly half of France, was six, notwithstanding that there were men engaged. What does Sir H. Havelock say about the cavalry? "The practical experience of nearly four years of war, the entire and untrammelled confidence placed in it amongst the Northern leaders, when they proved themselves so, and the complete freedom left them of devising and making the improvements their daily experience suggested, had made Sheridan, and one or two more of similar bent of mind, themselves free of the unsound traditions of European cavalry theory, and to make their own horse, not the jingling, costly, but almost helpless unreality it is with us, but a cavalry was able, on all grounds, in all circumstances, to act efficiently, without any support from infantry."

What were the best cavalry in the eyes of Napoleon? He said the Poles and Cossacks were the best light cavalry in Europe; were the former armed and equipped? Roemer, in his "Cavalry," says, "At its reorganization in 1817, the Polish cavalry retained both heavy and light cavalry. The former consisted of companies, half of which, armed with lances, formed the front while the other half, armed with carbines, formed the rear; each man had also sword and pistols. This heavy cavalry was divided into *husarz* and *paucerny*." He further says, concerning light cavalry, "They wore no defensive armour, but in other respects were equipped like the heavy cavalry."

With, therefore, such conclusive evidence before us, with the host of opinions of men of vast experience, must we not conclude that the best armament for our cavalry all round is lance and rifle for the front rank, and sabre and carbine for the rear rank. No cavalry ever has more than about one-third of its carbines in use at a time, and therefore it is superfluous to arm with carbine whereas if all the best shots (and I believe the prizes for shooting ought to be doubled) were put in the rear rank, and were on the quietest horses, I believe the end required would be attained.

that without extra expense. In concluding my remarks I will only add, that I think that the fact of Russia adopting this plan for a long time back, and that since the Franco-Prussia, Austria, and Italy also, have begun to do the same degree; these facts, I say, ought to have considerable weight who possess such a small force of cavalry, and who ought to equip them in the best possible manner.

One word with regard to the busby. In its present form a mere parody on the original, which was simply a band of cloth bag hanging over the side; a small cock's feather being stuck in the top. Now, it is so high off the head that it forms a regular dome, being hollow at the top, it also makes a very efficient rain-coat. A serious disadvantage it possesses is, that when brought into use the perspiration of the man's head, as well perhaps as his face, is put in a bag and hung on a peg, and thus the brow is wet and causes great pain to the man, especially when riding in a high wind. Further, it is no protection against the sun at the back of the neck. This helmet (*pointing*) would have the advantage of being light, comfortable, and utility, for it gives good cover to the eyes and back of the neck, and further, would last five times as long.

The cavalry tunic is made in many instances too tight, and it ought to be made in one piece from top to bottom. The present stable-jacket is, fortunately for the comfort and pocket of the soldier, a thing of the past, he requires some sort of undress jacket. As a recruit, to attend riding-school, foot drills, and fatigue duties, he has to do all these duties in his tunic, it will not be long before a short time after issue. The jacket at present in trial is a great improvement on the tunic, as in the artillery, has not had a chance of finding favour in the eyes of the Officers, which it is being tried, with the exception perhaps of the Hussars, because it is, as a rule, so badly cut. The jacket worn by the honours of submitting to His Royal Highness the Prince of Wales the Commanding-in-Chief some two years ago was a very good jacket, and the 17th Lancers have kept to it as nearly as possible; those issued to the Artillery are more like a very bad jacket, while those issued to the 7th Hussars, although I believe the Commanding Officer is in favour of them, might be made better with the simple and inexpensive addition of a scarlet piping, which would take away the general appearance they give at present.

One great instrument of torture to the soldier is the sword-belt. After a long ride the pressure on the region of the spleen, and lower part of the liver becomes almost unbearable. Here an idea which, carried into effect, would, I trust, be of great service. A sword-belt is required to do, and that without any disadvantage to the man, and with great saving to the country.

By it, as you see, the sword can be hung from the proper place, and not from the waist, the left shoulder should support the weight of the front sling, and the right shoulder be the support of the back sling. This can be effected by a very simple alteration

in present use. I cannot pass from the question of hanging without saying a word about the sabretache: a more useful, convenient, as well as unornamental, article of kit does not a man never carries despatches in it, it trips him up when dismounted and stops him when going through underwood; further, then a mounted parade but some have to be repaired, having been wheeling, &c., &c. If it were abolished, the country would save considerable sum of money. Again, in its present shape, it, busby, is a complete parody on the original; it was worn inches higher, and had the opening outside; further, the La continued its use in 1854. The adoption of the above would, besides saving money to the country, give the man more comfort at his foot drill and riding school; but it would not root of the matter in the question of dismounted work on the reverse; the sword should then be fixed on the saddle, and then the man would be able to act with much greater freedom, and as a consequence with greater effect.

Another cause of discomfort is the method in vogue of carrying a water-bottle: this, when filled, weighs somewhat under 3 lb and is carried behind the right elbow on the hip, and slung from a strap passing over the left shoulder. Thus it not only positions the man when moving at the trot and canter, but prevents him from quickly at his pouch. A very simple, and I think effectual, remedy meeting the difficulty would be found by adopting this plan, the strap is abolished and the bottle taken out of the way of the man and leaves room for the revolver to be carried in a manner similar but not identical with, the American fashion, with the full advantage, should the revolver be so carried, of ensuring to the man an effectual weapon when, by any accident, he may become separated from his horse and carbine. The present haversack is simply divided down the middle by a line of stitching, so that the man can carry provisions on one side and his tobacco, &c., in the other; it then slips on a leather loop by a strong clip, and will not then swing to the man's side (Fig. 19). The objection to carrying the bottle on the side gained ground to such an extent that some regiments adopted the plan of carrying the bottle on the saddle. The objection to this system is obvious, for the water being meant for the man and not for the horse, let the man be wounded and separated from his horse he loses that very thing which he then so much needs.

One great need in our service is a good method of hobbling horses in camp; this is an invention registered by Mr. Pallin of the 20th Hussars, by which it becomes impossible for the horse to move loose without breaking something. It costs more than those in use, but it is wiser, I think, to pay a little more for an article that will last than to lose a number of valuable horses once in a way.

I am informed that it is under consideration whether or not to do away with the Wellington boot for cavalry. Certainly to replace it would be to confer a boon on the man and on the country in the way of saving expense, but what will be the substitute? If the man is to wear his jack-boots always it will entail enormous expense to the

because they would have to be issued oftener, and they cost to 11. 6s. Again, the man would find them most uncomfortable in the summer months, besides which, by continual wear would lose their shape, and would cost the soldier more repair than even the Wellington. By the introduction already noticed, we could combine the highlow and a very great extent, and so keep the smart unstrapped walking out and dismounted work, and thus would all comfort as well as the appearance of the soldier.

I must heartily thank those Officers who have placed their commissions at my disposal to-day, and I also have to acknowledge my indebtedness to the Secretaries of this Institution for their pointing me to the various sources of information. Further, I thank the Assistant Adjutant-General, Colonel Baker, for having given me information on various points now under consideration, and for having generously placed at my service several articles of equipment.

In closing my remarks, allow me to draw your attention to the letters written by Her Most Gracious Majesty the Queen of the Crimea. One written to Lord Raglan runs: "The Queen earnestly trusts that the large amount of warm clothing now out has not only reached Balaclava, but has been distributed in writing to Lord Panmure on the subject of the matter. Her Majesty says: ". . . there would be no difficulty in procuring the money requisite for the purpose, so strong is the feeling of the public mind for improvements of all kinds connected with the Army and the well-being and comfort of the soldier." In writing those kind and heartfelt letters, it was not without finding out that the coffee brought actually to the spot for the men was not even roasted, that the poor fellows' coats were so stiff with stuff that they rotted off their backs, and that their boots put together that they fell in pieces off their feet. That feeling of the public mind need never have been created; Her Majesty the Queen might have been spared many a bitter night of heart-breaking anxiety on behalf of her faithful and brave men who were dying by hundreds from absolute hunger and the evil spirit of "Let us alone, we are as well off as our fathers." It has not been in existence, and had the spirit which now obtains in our military quarters then found free course, which spirit, I believe, pervades to a great extent the mind of that British public who are interested in our Army, and who express their opinion in the words I now take for my text, namely:—

"Prevention is better and less costly than cure."

APPENDIX.

OLIVER'S MAGAZINE ACCOUTREMENTS.

THE accoutrements in which my invention is comprised are:—braces—magazine brace, and kit brace; two bags—the magazine bag, a magazine pouch, a water-bottle, a coat yoke, a mess can, and a waist

The device termed "magazine-brace" is adapted for cavalry use; and is provided with a cavalry cartridge-holder.

The more prominent portions of the accoutrements are the two brace bags.

My improved accoutrements enable the soldier to carry his kit, a lar (as much as two hundred rounds) of ammunition, his day's rations of food, a canteen, a waterproof sheet, and great-coat. At the same time, he dispenses with necessity of all cross belts or straps in front of the chest, the valise bag and ration bag, and all ammunition pouches or ball bags, except one, capable of holding thirty rounds of ammunition.

The nature of my invention, and the manner in which the same is carried into effect, will be understood by reference to the accompanying which I shall now proceed to describe.

All the straps and braces of which accoutrements are composed are of good bridle-leather, thinned down where necessary, for the small straps; of moderate thickness for the two principal ones, viz.:—the "magazine" and "kit brace."

The magazine brace is shown in Fig. 1, and is composed of one main strap and two side straps. The main strap, A, is fifty-six inches total length from tip to tip; the ends are unbuckled. Its neck or centre part is six inches by two inches, shaped to fit the lower part of the back of the neck. The side straps, B, are four-fifths of an inch straps, each twenty inches long, and perforated at the ends with six holes, each three-fourths of an inch apart.

In the centre part of the main strap are two button-hole slits, *a*, five inches apart, for the iron loops of the kit brace to pass through. External to this magazine brace begins rapidly to decrease in width, until, at the distance of six inches more from the centre, it becomes a $\frac{3}{4}$ -inch strap, and continues so to the ends. Each of its ends is perforated with eight holes, three-fourths of an inch apart. At eleven inches from the tip of each end is a buckle, $\frac{3}{4}$ -inch; also a strap, *b*, and buckle, *b*, three inches in length on external edge, and two loops one and one half-inch apart from each other and buckle. These are attached to main strap at the same time by means of a leather backing to the buckle. When the ends of the main strap are buckled up, as shown, the two small hooks, *c*, to hook on to two brass eyes on the front of waist-belt four inches from centre of belt.

This magazine brace is made of four pieces joined strongly at the centre by an extra backing of leather. It rests on the kit brace behind the neck, and shoulders; and hooks on to waist-belt hooks in front, while *b* and *c* together at each side of chest after the latter have passed through loops of coat or magazine bag.

The kit brace, D (shown in Fig. 2), is forty-eight inches long in its fully extended state—that is, from tip to tip of strap when in fully extended state. It is a bridle-leather curvilinear strap, with a broad centre part twenty-four inches deep, cut away behind toward each extremity of this semicircular part for an extent to fit front of shoulders, as seen at *d*. It then becomes cord four inches, and for the remaining eight (leather) inches, at each end it is of the dimensions of a one-inch strap. These last eight inches, at each end, are buckled on themselves and inclose in each loop an iron D, to which the magazine bag, 1 or 2, or coat yoke can be attached as required. Each of these is perforated with five holes, one inch apart, for the purpose of lengthening this kit brace by means of buckles attached. Toward the centre of the semicircular part of this brace are two strong iron loops or eyes, *e*, five inches apart. They must be exactly two and a half inches from the centre point of the brace. They pass through the brace from beneath, where they are firmly fixed by strong iron stays, which are covered with leather. This brace is made of one piece, while the magazine brace is, as I have mentioned, composed of four pieces of leather, for the sake of economy. When those two braces are buckled together, as is usual, the iron loops, *e*, of the kit brace are passed through the loops of the magazine brace, and all is then ready for use, and appears as shown in Fig. 3. When on the soldier, they present the appearance shown in Figs.

will there be seen that the centre parts of the two braces, firmly rest on the centre of the lower part of the back of the neck. The main strap of the magazine brace pass together over and in front where they separate, the latter extending downward to hook on to waist-belt, the former extending backward between the body and the sides well below the axillæ, its rear ends receiving the hood magazine bag, or coat yoke, as the case may be. The two back-strap brace pass down over back of shoulders and forward along the buckle on to the main strap of the brace at *b*, where the buckles are by the hand.

When either of the bags, or the great coat are carried on the straps, *B*, before buckling at *b*, pass through loops on the adjacent between coat and coat straps, and thus steady them in position, by this means and by the hooks which engage the loops or eyes, *e*.

The next things to be noticed are the two bags—the magazine Fig. 6 (rear view), and Fig. 7 (front view), which resemble each other in respect, and can therefore be made on the same machinery. strong, canvas waterproof bags, having a thick strong leather border encircled by two strong bridle leather one-inch straps, *f*, each of five inches long, and are free in front, with one-inch buckle attached while their centre part is sewed firmly on to the back of the leather the distance of seven inches from centre to centre of each strap, two interspaces unsewed, to form loops, *g*, obliquely for the back-strap brace to pass through to steady bag on back.

The leather backing must be made of good sole leather, and is full in depth by fourteen inches crosswise at the top, and fifteen at bottom; and the formation of this leather backing, and the straps on back, and also hooks, and a leather loop, *h*, at its centre belt to pass through, is the first step in the construction of each same time the straps are sewed on to this backing three pockets of loose canvas in the interior of each of the bags. The centre pocket is ten inches of canvas, and contain eighty rounds of ammunition will contain each ten rounds.

The front wall of each bag is ten inches deep, and has a length at the top, and fourteen inches at the bottom. The side pieces of wall with the backing are three inches at top and four inches at exterior of the front wall of each bag are two loose pockets, *i*, five inches wide, and four inches deep. They are situated near the lower end of each bag, and open obliquely upward and outward, and are for filling each ten rounds of ammunition. Immediately above each pocket is a strap and buckle, which buckles on to a short six-inch strap, extending from the front wall of the bag, to support the pocket when full. The cover or flap is fifteen by twelve inches.

A central strap, *k*, designed principally to hold the mess tin, is attached to the bag, loops being formed on the bag cover or flap for the strap to pass through. The mouth of the bag is strengthened throughout its entire extent by a half-inch strap sewed all around, except where the two hooks work. The hooks are capable of moving from side to side so as to increase or diminish the distance between them from side to side and so enable either bag to be carried at the back of neck or effected by forming the magazine hooks with rings, which are held to be $2\frac{1}{2}$ inches and made of $\frac{3}{16}$ -inch brass wire, and attached to the bag so that the hook can thus move from side to side of the bag strap as desired. This is seen by reference to Fig. 6, which is a rear view of the magazine bag or cover uplifted. The hooks, *k*, are represented in full lines five inches apart, in dotted lines they may hook into the eyes, *e*, hereinbefore referred to, and enable the bag to be carried at back of neck. They are shown also, in dotted lines moving ten inches—which is the position they occupy when either bag is carried, not on the shoulders, but on the buttocks by the iron D' strap. The flap or cover of the magazine bags are formed slits, *l*, through

straps can pass, so as to be under the covers instead of over them; this is desirable at times when the bag contains ammunition; in which case, by passing the bag straps through the slits and under the cover, the cover may be unfurled, and the bag opened without disturbing the bag straps, which will then be able to support and uphold the contents of the bag. In the right wall of each of the two small outside pockets for the carriage of oil-bottle and a jack knife; and I recommend that there be a small chamber in the butt of every rifle for the carriage of oiled rag.

The next part of my accoutrements is the coat yoke, which consists of a centre piece, with two hooks attached. It is shown in Fig. 9. The straps, *m*, are $\frac{3}{4}$ -inch wide, thirty-two inches long, to encircle and suspend the mess tin or a waterproof sheet with great coat; they are connected near the centre by a strong cross strap, *n*, two inches wide and six inches long, and at the points of juncture are two small curb chain hooks, *o*, from which the great coat can be suspended, either on the shoulders by the eyes, *e*, or on the iron D's of the kit brace. This device thus affords an easy means of transferring the great coat from one point of carriage to the other. The great coat is carried in so folded that it occupies a space ten inches by thirteen inches, by three inches. It weighs four and a half or five pounds. At the centre of cross strap is a loop for back-straps of "brace" to pass through, and prevent yoke from becoming hooked.

The magazine brace, with slight change, can be used for cavalry purposes. It is illustrated in Fig. 8 of the drawings.

The cartridge holders I here make use of are waterproof leather pouches for cavalry (one reserve) and four for mounted rifles, arranged in pairs on each side. Each pouch, *P*, is four and a-half or five inches, with collar and bottom, capable of containing about ten rounds of ammunition. It is united by means of a strong leather backing ten inches long. The upper part of this backing tapers to one inch, and holds a one-inch buckle, to which is attached the front or main strap of the magazine brace. To the backing is also attached a strap and buckle, *b*, to connect with the back-strap of the brace. On the back of the backing is a loop, through which the cavalry sword-belt passes. The belt retains the pouches in their place, while the brace upholds the belt and prevents the sword from dragging at the side.

The pouches lie close against the person, and are not in a position to interfere with the sword or bridle arm. By a simple device, the ammunition is prevented from accidentally falling out when the flap or cover of the pouch is unfasted. The device consists of a small piece of leather, sewed on to the front and side of each pouch at its mouth, leaving a segmental opening at the back for the ejection of the cartridges by means of the fore-finger and thumb.

This concludes the general description of the bags and braces, and I now proceed to state their uses.

When the soldier wears the full set of accoutrements, one magazine bag is carried on the shoulder and the other on the loins, as heretofore specified, each by two points, the former by the eyes, *e*, and by the magazine brace straps, *m*, through the loops; and the latter by the iron D's of the kit brace, and by the belt, which passes through the belt-loop on back of bag. The bag, No. 2, is for the carriage of the kit, the soldier's bread or biscuit rations, and 20 rounds of ammunition in external pockets.

By this means the havresack is entirely done away with, the meat ration being carried in the mess tin. This bag is in effect the soldier's "clothes bag." During peace time, it is, as a rule, seldom used or needed, but allowed to remain in the barrack room; and on the battle-field the soldier divests himself of it, and leaves it, with the kit it contains, at the base of supplies, either to be removed or to be removed in the supply waggon to a place of safety, while its owner is engaged in fighting. His number is on it, so that he can easily find it on his return; and should he be killed in action, Government is saved its loss and that of the soldier. That part of my accoutrements which takes its place both in peace and war, as it performs the necessary offices of havresack and extra ammunition pouches, &c., is the magazine bag, No. 1—the chief and leading article in my accoutrements.

This special bag, under ordinary circumstances, carries the soldier keeps it dry; and when this great coat is taken out of it and carried yoke (to be presently described), it leaves this magazine bag free for the purposes mentioned—either on guard, or on the field of action; "bag" in the very fullest sense of the term.

When this magazine bag is to take the place of the other on going to the front, the great coat, with its yoke attached, is taken out of the bag, and the magazine bag is placed over the shoulders, leaving his man's hands free. The magazine bag is buckled on entirely at the soldier's disposal for the carriage of his rifle, and is placed over the buttocks. When thus placed the ammunition and rifle are carried in the very easiest sense of the term.

When either only from the bag *behind*, but in *front*, as it can I straps, B, before run round to the soldier's right front on the waist between coat and be at once got at by unbuckling only the centre by this means anding still buttoned up for the support of the con

The next thing of the magazine brace support the belt and bag Fig. 6 (rear view) coat and mess tin on the soldier's shoulders at the respect, and can to use the ammunition in the magazine bag with strong, canvas waheet may best be carried on those occasions being encircled by two straps. This magazine bag has furthermore, a five inches long, sockets for the carriage, close to the body, of 10 while their centre can easily contain and carry 40 or 50 more, in the distance of sections of biscuit, which, with the rounds the man can two interspaces to about 200 rounds for siege-operation purposes. The magazine brace is used during actual field service, which can be done

The leather bag actual weight carried then by the man being more full in depth English soldier has to bear when carrying seventy rounds bottom ; and then heavy marching order.

bottom, and finally ready marching order. straps on back, presents the soldier fully accoutred. Fig. 15 repr belt to pass thru magazine bag No. 2 removed, the coat yoke taking same time the sNo. 1 on the shoulders, and the latter transferred fr loose canvas in

ten inches of c-c can be worn, if desired, without the magazine brace. The yoke will, of course, be carried on the loins. For

The front wavo braces conjoined will be used. at the top, anding to which I direct attention is the mess tin strap. wall with the Fig. 10. The mess tin itself, marked E, Fig. 11, is si exterior of S and structure to that used by the English soldier, t wide, andand contains an inner tin called the "meat can." The co each has a plate, and that of the outer tin as a frying-pan.

ing end strap which binds up the mess tin is composed of crossed broad strap, *p*, is twenty-two inches long, two inches wide a yoke-half inch at the ends. The other strap, *r*, is a half-inch strap, length. There are on the broad strap three loops, *s*, for the mess bags to pass through. When the strap is on the canteen its broad end is perpendicular on the back of the tin, and its buckle end crosses the brass loop in front. The mess tin by this means can be carried in different places on the accoutrements.

The water bottle is that now in general use (see Fig. 12) in modified by me in a very simple manner, so as to obviate certain it previously possessed. By attaching to it a brass "rest," and lea it can be now carried out of the soldier's way in a fixed position hip, whence it can be removed or replaced with facility; the expense of a chest strap is also done away with; and its metal ri prevented from staining the scarlet clothing, or falling off when th store or barrack room.

The magazine pouch, G (shown in Fig. 13), is similar in shape an the cavalry pouches above described, being, however, consideral carried on the waist-belt in front by means of a strong four-inch bac button. This strap, y (indicated by dotted lines in Fig. 13), is fi top edge of the pouch behind, and has in its lower end a button-h

on to a stud at the bottom of the rear face of the pouch. This strap is between the soldier's belt and body in front, and is then buttoned down, then occupying the position shown in Fig. 5.

The bags and great coat can be carried by means of iron or brass loops instead of by hooks and loops, as herein described, should such be considered desirable.

How to wear and use Accoutrements.

The accoutrements can be used and worn in different ways, the weight carried (which may be either kit, ammunition, great coat, blanket, waterproof medical appliances for use in the field by Army Hospital Corps, or trench for throwing up earth works), being all transferable from one point (shoulders and buttocks) to the other with great facility.

When kit, great coat, and waterproof sheet, and 70 or 80 rounds are represented in Fig. 14, the kit with sheet is usually carried below; and when required the waist-belt is passed through the waist-belt loop of whichever contains the kit, and the hooks of the bag are separated to their full extent, hooks of the other bag (which is to contain the great coat) are to be placed on inner side of bag straps, and attached to iron rings of the conjoined brace. Back-straps of "magazine brace" are then passed through the loops on bag.

The waist-belt is next taken, the right end in right hand, and left is buckled (with bag attached) around the waist; and in the same manner joined braces are taken—right in right, and left in left—and the bag and lifted on to the back of shoulders; the front straps of "magazine brace" followed down by the hands, and its ends hooked on to the loops in waist—the D's in kit brace attached to loops of kit bag; the back straps of "brace" are next buckled at side of chest, and all are on.

The waist-belt should be open while this is being done. By catching each in each hand and extending both arms, and also drawing on conjoined braces of shoulders, every part will assume its proper position, and rest extreme of the body. The "magazine pouch" is next attached to front of waist-water bottle either slipped around on belt, or hooked on to it behind right the soldier is fully equipped in "heavy marching order."

The soldier can now get at waterproof sheet or any portion of his kit in a moment by merely unhooking left hook of lower bag from kit brace and moving it to waist-belt to right front; he can also take great coat from back, and replace it *unassisted or without removing accoutrements*, by simply unhooking both ends from shoulders, and the same can be replaced as already described.

As the soldier is now accoutred he is carrying the two bags—in one of which is his great coat, and in the other his kit and bread ration. If the latter exceeds a pound in weight, and he should require more, he can easily make it by removing the shirt and towel from the kit bag and transferring them to the great coat.

He seldom, however, needs to carry and use the two bags in this manner. The weight and carriage of the kit is a most useless and unnecessary encumbrance on a soldier on almost all occasions, except when required to march with it from one station to another in time of peace, or carry it to the "base of operations" at the outskirts of an engagement in time of war.

When so accoutred, however, he is prepared for any emergency, and in the event of the same amount of food, clothing, and ammunition as the soldier is equipped in "Heavy Service Marching Order" in the "Valise Equipment" being disposed of as follows: 30 rounds in "expense pouch," 20 rounds in breast pocket of tunic or jacket, and 10 rounds in each of the pockets of lower "magazine bag."

But for ordinary daily duties, guards, parades, field days, or active service in the field of battle, the soldier only needs one bag, the other being almost unnecessary. In circumstances left in the barrack room in peace, or at "base of supplies" in time of war, the "reserve bag."

On those occasions the great coat is taken out of "magazine bag," and is suspended on its own "coat yoke," either at the back of shoulders or by

always the former when the "magazine bag" is required for use 16, 17.

This leaves the "magazine bag" free for the carriage of bread ration sheet (at bottom of bag), and from 100 to 140 rounds of ammunition.

The "mess tin" is, under those circumstances, carried either on great coat on "coat yoke," provision being made in mess tin strap contingency.

The "water bottle" is slung on waist-belt, as before mentioned, and the "magazine pouch" in front of waist-belt; and the soldier from 140 to 200 rounds of ammunition, a waterproof sheet, great rations of food and water. Not more than 140 rounds should except when required at siege operations.

When this large amount of rations and ammunition are thus: weight of the kit they are distributed as follows:—Bread ration "bag" behind buttocks, meat ration in "meat can" of mess tin on coat, 80 rounds in the centre inside pocket of "bag," and 10 in each outside pocket of "bag" 20 or 30 rounds in "expense pouch" 10 in each breast pocket of tunic or jacket. These latter should be strong waterproof material and have their openings sewn up during war.

When the soldier has expended all the 60 or 70 rounds he carries in "bag," in bag pockets, tunic pockets, and "expense pouch," requires more, he has merely to unhook the *left* D, and bring the waist-belt to his right front; when he can either replenish pocket expended ammunition direct from the "bag" itself. (See Fig. A.)

The great coat should have no cape or shoulder straps, and should be 5 lbs., and be folded 13 in. wide, 10 high, and 3 in. deep.

When it is carried on its own yoke (Fig. 15) on the shoulders, the "magazine brace" are passed between coat and its straps in yoke hooks have been hooked on to iron rings of conjoined braces.

The "mess tin" can be carried in six different places, either "magazine bag," Nos. 1 and 2, or above or below great coat, on

The soldier can march with his waist-belt open. The magazine transferred to the left side from centre of waist-belt. (See

All accoutrements, kit, coat, &c., can be removed at once by unhooking brace, and right chest strap, and opening waist-belt, and removing waistcoat.

The "magazine pouch" can be carried in the centre pocket required for immediate use on waist-belt.

When blanket, splints, trenching tools, &c., are required to be carried, the straps on "magazine bags" can be utilized for that purpose. Boots, clothing, &c., when wet, can also be carried by the same means.

SOLDIERS' FIELD KIT.—*What it is to contain, and how to*

Consists of one pair of boots, one pair of summer trousers, or pair of socks, one towel, one holdall, complete, containing needle and laces (spare set), knife, fork, spoon, razor, and shaving brush; one hard brush, and a clasp knife.

Place legs of trousers together, and fold them in the usual way to their length, which will make their dimensions about 10 inches long in bag, front edge upwards, and the flat against proper back holdall up carefully (it should contain spare boot laces, needles, place it with one sock in one boot, and the hard brush and piece of sock in the other boot. Then place both boots together (with a down), heel to toe and upper to upper, at the bottom of bag, below the sole of one boot on the bottom of bag, and that of the other. Next draw the boots well asunder, to fill all space at bottom of the trousers, which now appears above the upper boot, should be level with it. The shirt is next rolled up hard inside of towel lengthwise, and packed against proper back of bag, over the trousers.

tin and small book are placed at opposite ends of bag—between bag wall and tent. The forage cap, when not worn, is carried in the other bag with coat under coat yoke straps, and clasp knife in pocket for same near oil bag.

The meat, as before-mentioned, is carried in "meat can" of mess tin bread and biscuit ration in the loose pocket which either bag has for that.]

Should there not be ample room for the bread ration in the lower bag, full field kit is being carried there, the shirt and towel are removed from carried folded flat in the upper bag with the great coat, as already mentioned.

When coat alone or rations alone need to be carried, the bag or the coat below behind buttocks on kit brace and waist-belt.

My system of equipment is intended to render every soldier independent, self-supporting, and be in every respect his own magazine; and, who stances admit of it in the field, and heavy fighting is anticipated; or who siege operations the soldier needs as much ammunition and food as possible trenches, to render him self-supplying, and save both the precariousness of hand-carts in the field, or to have men employed and exposed to the enemy while bringing up supplies to advanced posts from the "base of supply," that the soldier should disencumber himself of unnecessary articles of weight, and be his own "magazine," by divesting himself of such portion as he does not require for the time being, and substitute—

	lbs.
A waterproof sheet weighing	2
And 140 rounds of ammunition.....	16
Total weight.....	19
 For the present weight of—	lbs.
Coat cape	1
Field kit.....	10
2 ball bags and haversack	1
And 70 rounds of ammunition	8
 Carried by the British soldier in action.....	22
Proposed weight of articles of clothing, food, and ammunition, which will render him independent of his base of supplies for 24 hours, shows a balance of weight in soldier's favour of 3 lbs. 7 oz.	19
 Less weight....	3

I, of course, intend that the waterproof sheet¹ should be used and carried on occasions instead of the coat cape. It is so much more useful; protecting from rain or dew at night, either as a cape or sheet, or (two joined) as a tent or he can rest on it on damp ground on the halt, or at night; or he can use it instead of the great coat itself in time of peace, to protect him from wet but warm weather on field days, guard, or while performing any of the duties of a soldier. As an extemporary stretcher or splint-cloth it will also be found useful for its wounded possessor in time of war.

The Trenching Tool.

Advantages:—

1st. Can be used with greater efficiency than shovel, trowel, or pick on all occasions in the field, and especially grass ground.

¹ This sheet is composed of strong waterproof material; weighs 2 lbs. 6 feet by 3 feet 9 inches, and has an oval space 3 inches deep at centre of long margins to fit neck when worn as cape.

It can be carried *rolled*, 17 inches by 3 inches under bag straps at top of bag; or at back of bag *folded*, 15 inches by 10 inches; or in the coat yoked great coat, when the nature of the *weather* or *duty* render such advisable.

2nd. Acts the part of a measure, shield, spade, and shovel, and present number of men (125) using picks to be reduced to 40 per men replace them on service.

3rd. It weighs 2 lbs. 6 oz. less than the united weights of pattern pick and shovel.

4th. Can be carried by every soldier with or without bayonet either by the "Oliver" or valise equipment, without alteration in tion,¹ and be detached for use with great rapidity and facility.

Method proposed for the Carriage and Use of the Trenching

I beg to make the few following remarks regarding the above, use and carriage, but respecting the system by which I propose those objects most efficiently; and which is altogether based on the that of my accoutrements, viz., that of rendering every soldier his self-supporting, and independent of his "base of supply," and as all unnecessary weight and impedimenta in the field, &c., as it is plish. Acting on this principle, I beg to suggest, that the soldier the bearer of his own trenching tools, instead of using the present purpose.

Trenching tool carts, or pack horses, like ammunition carts, on fire, are dangerously precarious in the extreme, as means of supply with either ammunition or trenching instruments—so liable are they to be killed or wounded, or the carts themselves rendered unusable or shell at the critical moment, perhaps, when they are most needed of this, their transit over roadless, hilly, swampy, or wooded supply distance of the regiment to which they are attached, made impracticable, if not quite impossible, and be fraught with the consequences—no tools being within reach when the moment of demands their immediate use.

If every soldier does not carry a trenching tool (which for me not be advisable) certainly 250 men per 1,000, or per regiment, or easy access of them; and the tool or tools placed at the men's disposal would be the very best that art can devise for the special service to be employed.

Two of the different advantages that I claim for my spade are, part of spade and shovel, and also considerably reduce the present men using the pick. On trial (for light field works) I trust it will be found feasible and advisable to reduce this number to 40 per 1,000, and to have in the hands always of 240 men per 1,000, and often to extend it to 280—when the use of the pick is not required.

How I propose to accomplish this is as follows:—Instead of having covered carts for the carriage of the tools for each regiment, let there be covered carts, one for each wing, to be called "kit carts," and be on my system, of the kit bags and kits of 280 men. This would free those men of 12 lbs. 12 oz. of useless impedimenta; and place each man unimpeded while carrying, 40 of them,² 40 picks and handles—240 spades complete. The weight of each pick or spade would be 3 lbs. 6 oz., or 9 lbs. 6 oz. less than the weight of kit and bag; so that 40 pick men could also carry a light hand axe weighing 2 lbs. 5 oz. and the remaining 240 a corresponding weight of extra ammunition and still be 7 lbs. 1 oz. lighter in the field than the English soldier "marching order," and carrying, like the pick men, 70 rounds of a

¹ The frog alone requires a slight addition to be made to it; as the "valise equipment" the two small bag straps may have to be side to inside the bag flap to retain spade cover.

² The present light pattern picks and handles could be used if these pick heads could be made to fit my spade handles.

280 men would also be in possession of their rifles, bayonets (not sword) water, food, great-coats, waterproof sheets, and clasp knives; while they carried those 5 lbs. 11 oz. of useful trenching tools, instead of 12 lbs. 12 oz. less kit and bag.

It must be remembered, also, that the 20 extra rounds per man of ammunition the 210 men will place 4,800 extra rounds within easy reach of themselves comrades.

The cubic space required in each cart for the kits and bags of 140 men 60 cubic feet; and the weight to be carried by each 16 cwt. Those carts kept out of reach of the enemy's fire in the "first line" of transport within sufficiently convenient distance of the men themselves.

The tools and ammunition are easily disposed of for carriage as follows: spade handle is carried with bayonet in the ordinary frog, and the spade head is kept out of reach of the enemy's fire in the "first line" of transport by the "bag" behind buttocks, either inside bag or under bag flap on the bag strap, the spade and cover being retained in this latter position by the straps of bag belt to pass through the buckles on the face of the spade cover. Pick handle is carried on waist-belt; pick head inside, or at bottom of bag on bag straps. To equalize weight of ammunition and spade head:—when the latter is carried in front of the 20 rounds of ammunition should be carried in the "expense pouch"; and when the spade head is carried behind, 30 additional rounds might be removed to the "magazine bag," and carried, 10 in each breast pocket of tunic or jacket, and 10 in "expense pouch" on front of waist-belt. His own common sense will guide each man how to act most judiciously in this respect.

With but a slight modification in its construction, the ordinary frog can carry the spade or pick handle, and bayonet; and the combined weight of bayonet, and sheath is less by 7 oz. than the present rifle sword-bayonet and scabbard. These latter are also $1\frac{1}{2}$ inches longer than my spade handle; and, therefore, in rifle regiments, the 280 men per 1,000 employed as "trench men" would be armed with bayonets instead of swords.

When the moment for action occurs in the field, those 280 men carrying their tools and ammunition, by this system, in less than one minute they should be suddenly surprised at their work by the enemy, or want to advance at a moment's notice, they can, almost instantly, place themselves in position of defence, and in possession of their rifles, by reversing the handles in spade carrying them, thus slung, on front of waist-belts.—See Fig. D.

I would also beg to recommend that the 280 "trench men" per 1,000 receive special instruction in the construction of field works, &c.

In conclusion, I beg I may be excused mentioning and suggesting, the propositions regarding the "trenching tool carts" were also extended to "regimental reserve ammunition carts," 420 more men per regiment could be employed to carry their kits and kit bags; and, in lieu thereof, could each carry an additional 20 rounds of ammunition; which would make a total of 29,400 rounds extra would amount to no less than 600 more rounds than the whole three ammunition carts carry at present—while the actual weight of the extra 70 rounds of ammunition per man would only be 8 lbs. 5 oz., as compared with the 12 lbs. 12 oz. of kit and bag from which each would be thus relieved.

When war is localized, and there are standing camps, and a fixed "base of operations," whole regiments can almost constantly dispense with the necessity of carrying their kits and "kit" or "reserve bags," and carry in their "magazine" or "service bag" to the "front," an amount of food, ammunition, and necessary clothing sufficient to render them independent of their "base of operations" for twenty-four or forty-eight hours.

W. S. OLIVER, M.D., F.R.C.S.I., Surgeon-M

¹ My bag, being transferable in a moment from back to front of waist, the spade head to be carried in or on it behind buttocks within easy and immediate reach for use. This the Government accoutrements do not admit of; and consequently the spade head is best carried by them in front of chest.

Rear-Admiral J. H. SELWYN: This being principally a military matter, I have preferred to have waited for my brethren of the other arm, but has been mentioned with regard to the attachment of the spade to the rifle, to that and to one or two other points. I will only say that in my opinion of the accoutrements of the military branch has been found to be bad, that we consider the best thing a Marine can do, at the double, is to put the rifle under his arm, put one hand to his cartridge box, and the other to the order that he may lose neither of them. I have very long had a high opinion of the Rice trowel-bayonet as a means of rapidly entrenching troops. No occurrences in Turkey have shown us the extreme value of even such entrenchments under modern attack, and more attention must now be directed to the subject. But, I object first to that fact, that although the use of a thing which will nearly cut you in two may be very considerable of a point and the length of that point was very clearly shown by the fact that the spoke of the different lengths of the old Enfield arm and its modern Martini-Henry without its sword-bayonet. No doubt the object of the sword-bayonet added to the length of the Martini would be of the old weapon, but, as we have had to give up the sword-bayonet for the length which was of value. Incidentally we lost also the weapon which prevented the kick sure to be given by a large charge. The lance (as the lance) has been called the "Queen of Weapons," and Marshal Bugeo that the bullet was a fool and the bayonet a hero; I, therefore, do not think it done away with, and I think it is still useful. At the last attack at the battle of the Trenches was a ten minutes' combat between the rival infantry with the bayonet to me that the trowel-bayonet could be very well carried on the out of the rifle without increasing the weight. A certain portion of use could be taken away, and the soldier would then have an entrenching tool bayonet without increased weight or complication.

With regard to the question of the calibre of the revolver, some time ago I sent to the War Office to bring to their notice the Smith and Wesson revolver, which had been largely used in America, and which is a very efficient weapon. First, that a double-barrelled breech-loading pistol had been sold for some time, secondly, that the instructions issued prevented any cavalry soldier from using arms for any other purpose than signalling. That was a sufficient reason, and I left the subject. Now, I am happy to hear that a revolver has been adopted, certain modified use in the cavalry, but the great error of the lecture was that with the one weapon your bridle-hand is not used at all, with the other you must take two hands and pick out every cartridge after you have fired. With the American revolver you throw out the cartridges by a side which leaves the chambers exposed and which does not throw out arms which may not have discharged; with the other you have to take out a round, and then force out each cartridge. You may imagine a very different operation that would be in a *mêlée*. The calibre of the bullet has been increased. This is an unmitigated benefit in one respect, that it does give a better chance of stopping a man at once, but it has its disadvantages; you must either increase the charge to the same bullet, by reason of its increase of weight, in the same proportion between the length and diameter, or you must have a shorter bullet too short to give the best results. If the bullet be increased in weight, you want more than the 23-grain charge, which is sufficient in the Smith and Wesson revolver, I hear the present charge is only intended to be 15 grains, which shortens the bullet, and then you get less accuracy. Between these two I should prefer a moderate charge of powder, a lessened range, and less power, but it is essential to have a weapon which does not require bridle-hand if you are to have a weapon efficient for cavalry. I have had considerable experience in the West of America, where they are very fond of the revolver, and where these matters are attended to very closely. There is a great improvement over the American pistol, and it is that which the Americans in California call the English pistol the English revolver. As regards the proportion of the powder to the bullet, and the weight of the bullet, you will find that in the simple metallic cases, without any mixture

the Americans have avoided some very difficult points which still exist with ammunition, and, as you improve breech-loading arms, you not only ammunition, but you are obliged to have more of it in stock. Anything on this point is of very great importance. Our present cartridge is made of iron, lead, powder, brass, and paper; the American cartridge has nothing but brass. The English cartridge has a bell, cup, an anvil, a detachable iron cup, and a fulminating cap. An American cartridge has nothing but the one fulminating cap. This is simplicity, and that is its value. Now let us look at the weight. Our present cartridge (which received a prize in this country before the American cartridge was generally known) weighs ten per cent. less than the English cartridge as it is at present, that is to say, you get on the 100 rounds 10 rounds more with the same weight. The English cartridge again, when kept in store, by the galvanizing between the iron and saltpetre destroys its own case. The American cartridge is of nothing of the kind. It is worth while to look at all these things before they come out in actual practice. I should have said I quite recognize the cartridge held out by Colonel Rice, in giving the soldier an efficient tool for all purposes as cutting brushwood and other things, which we cannot do with the present cartridge attached to the stock; but still, I think, if you put a thing to too many uses, it is very likely to have some of them inefficiently performed. In the latest invention of an American magazine rifle, which has been exhibited here for some time, it has not yet been shown in England at all, you have remarkable power of firing without taking the weapon down from the shoulder, a perfect balance of the weapon, which we have sought in vain in other rifle cartridges quite true when loaded as a magazine arm it weighs more, but when you use the magazine such considerations disappear altogether. When you use it for accurate firing at long ranges, you do not use the magazine and it retains its normal weight; but when you want to shoot half-a-dozen cavalry one after the other, without taking the arm from the shoulder, you do not care whether the weapon is a little lighter or not, provided you can accomplish the object. I can only congratulate the author on the comprehensive way in which he has treated those few subjects amongst all he has referred to with which I am acquainted; I can only hope other Officers connected with other subjects will be so good as to reason to say as much as I have great pleasure in doing. I must congratulate the Institution on a most valuable paper.

Captain the Hon. H. G. CRICHTON, 21st Hussars: I can show best by unparaphrasing kit how simple the arrangement of it is. I have found it necessary to make alterations since I first commenced which do not alter the principle but only the tails of the equipment; these alterations I had arrived at by watching the troops took place last summer. The numnah now could be made of felt or leather, there were no stitches or rivets next to the horse's skin, which were necessary in the kit at first constructed the numnah. The front and hind parts of the numnah were made self-supporting by thin pieces of sheet steel, which make the numnah independent of the numnah and the kit attached to it. The saddle has been made longer so as to give the man more room in it, and the side-boards are closer so as to keep it more off the back since it is ridden without panels, and is ridden without numnah in light order.

I look upon the blanket as infinitely preferable to the panels. As to the former is useful for covering the horse when standing out in cold weather every time it is refolded it is like re-stuffing the panels, which always will be so and with no opportunities of re-stuffing, get as hard as a board; the dam blanket when it used to be worn under the saddle was, that if carelessly became wrinkled, or gravel perhaps remained on it when folded on the horse's back, and, above all, it was sure to slip back from under the saddle, the horse's hair causing this. In my equipment, the two former dangers are lessened, as there is a layer of felt and leather under the blanket, and the blanket altogether obviated as the blanket does not touch the horse's skin in any way, it lies on top of the numnah between the front and hind part.

The sheep-skin which covers the regulation saddle of course adds very much to its appearance, but occasionally it covers a multitude of sins in the way of a packed kit beneath it. I could equally well cover mine with a sheep-skin.

think a waterproof sheet for the man to lie down on in camp or bivouac, and made like this one to roll up into a pocket infinitely more useful, this being made of strong waterproofed canvas in it dry, and is packed on the hind part of the numnah, the front by a waterproof horse-cover like those at present used in camp. necessary waterproofs are thus always with the horse instead of being in waggons, where they are so likely to remain if cavalry are pushed to their combined weight is about the same as that of a sheep-skin.

I have made my new numnah the same shape in front as behind, reversed and the pressure on it will be in different places according to which way it is turned, and it is not so liable in this way to get hard in one particular place as the greatest pressure is.

The water-bucket, which is fastened to the shoe-case and shaped like a bucket, is intended for use in places where the banks of canal or river are so boggy to allow the horses to walk into water; also it frequently happens that the carts with buckets, &c., are late in arriving, and the men at the end of the line want something to draw water in to clean their equipments; under such circumstances I consider a bucket of this description very essential.

The lecturer remarked that the question of leather or felt next to the horse is a very important point, and one that requires a great deal of consideration in settling. The felt I think requires a great deal of rubbing, scrubbing, and beaten into holes before very long, if it is something strong, it also requires sun or fire to dry it; the leather, on the other hand, is so spongy and kept pliable with oil, fat, or soap, and does not require fire, but the leather ought to be backed by something soft. If the felt when too great pressure comes on it rubs up and stretches it, which wrinkles it, and matter forms under it, which causes a multiplication of sore back than leather, which rubs the hair off without stretching it, under these circumstances I am inclined towards the leather in preference to the felt.

Captain APPLIN, late commanding H.M.S. Legation Guard, 1st Military Train: With your permission I should like to make one or two remarks. With regard to the pistol, I think that Admiral Selwyn is perfectly correct in his opinion is that the quantity of powder used is a great mistake; it is too strong a charge. Using a pistol, no man should fire certainly more than twenty paces on any consideration. Some six or seven years ago in Japan it was necessary for every man to carry a pistol, but the Japanese got the better of every man carrying one, even when he had it in his hand. In fact, the Colt revolver is the very worst weapon you can possibly use, being loaded a week, probably not more than one of the whole fire. I have seen sixty men armed with these revolvers, of which not more than four or five were of any use. I very nearly lost my own life through the use of this weapon. For the breech-loading pistol the charge is also too strong. You do not want *penetration*; what you really require is a pistol which can be easily loaded and unloaded, and will carry a bullet to stop a man. Then with regard to the sword and lance, there is no doubt the lance is an effective weapon, but it is very easily put on one side. In a charge against infantry it is effective, but I do not think it is so against cavalry. A man of nerve, a well-trained soldier, might very easily put the lance aside and maintain the great fault in our swords is that they will not cut. Unless you like, unless you have them specially sharpened the night before, they are useless; and then we do not use the point of our swords as we should. The effective part of the weapon is in the hands of a good cavalry soldier; you will see this at once, because you have to raise your arm into a position for the cut. In the cut our swords are useless in nine cases out of ten, as shown in the Crimean War. Then with regard to saddles there can be no doubt of the vast improvement made by Captain Crichton. There is no Indian numnah is far preferable to anything that has ever been used. I have taken my troop sixty miles in ten hours without a sore back, shoe, or over rough country. Some of my men rode 22 stone, and the

14 hands 2 inches in height—little Arabs. I did not do this only once, I constantly doing it for seven years with the same horses. When I left, I from twenty to twenty-two years of age, and I never had a sore back or command, always using the Indian numnah. I think that is good proof of utility. I cannot refrain from repeating that something should be done with the sword exercise in our cavalry, so as to do away almost entirely with it. You might have the weapon two or three inches longer; and I am sure any man who has gone through one or two campaigns will see the advantage of the point rather than cutting. The Japanese use two-handled swords; if we use them, I should say *cut* by all means, for they never want a second cut. regard to the small bullet and great penetration, I remember that in one instance a man had been shot through the chest with two bullets from a *Colt's* revolver, succeeded in killing two men, giving one man sixteen wounds, every one of which was death. This I saw with my own eyes, and I brought in the man myself. There is no weapon equal to the breech-loading revolver in the hands of men who know how to use it; and as to the sword I certainly prefer it to the lance.

Lieutenant WALTER H. JAMES, R.E.: There is one point I have not touched upon, viz., the question of a forage cap. In the British Service we have roughly speaking, two patterns, that worn by the Guards, the cavalry, the Infantry, and the Artillery, and the "line" forage cap. To my mind, neither of them meets the requirements of a proper forage cap, and neither of them on service is of any use at all. The infantry forage cap is too small: it does not cover the head. It may have what we call a soldier-like appearance, but it would be quite useless in service to protect the head from the weather. The same objection holds good regard to the other pattern, it goes to pieces in a very short time, and does not protect the head. But we have in the well-known forage cap that the Guards used in Crimea the elements of a good cap, and I must say it is one I should like to see introduced throughout the service. On the question of the bayonet, I remember Selwyn has, to my mind, hit the nail on the head, when he said that the "bayonet" would not fulfil every purpose. If it be used as a digging tool it will certainly fail as a cutting weapon and as a weapon of attack. With regard to the length of the Martini-Henry, the question of the use of the bayonet I have in mind, been somewhat exaggerated. We are told that only one per cent of the casualties in the late war were caused by the bayonet, and that is the very small number to my mind, why we should not have a weapon as we had in the old Enfield which was cumbersome by its length, simply for the purpose of having the bayonet end of it. When the Martini-Henry rifle was first introduced I shot with it and saw a great deal of shooting with it. I confess I utterly failed to discern its value, it kicked to any great extent. Certainly the recoil was not more than that of the Snider-Enfield, and I believe that the opinions of a great many first-rate marksmen of the regiments to whom it was issued coincided with mine.

NOTE.—The lecturer objects to the Martini-Henry, firstly, on account of the spiral spring, and, secondly, on account of the divided stock, which he says increases the recoil and renders the breech difficult to shut in a variable climate.

With regard to the first objection, I may observe that France, Germany, Italy, and Switzerland use spiral springs, and that the campaigns of 1815 (the Insurrection) 1864, 1866, and 1870–71, have proved most conclusively that a rifle constructed on this principle are quite capable of withstanding the trial. So far from being unmechanical, the testimony of such eminent mechanical engineers as Professor Pole, Mr. Nasmyth, and Mr. Woods was distinctly in favour of the spiral spring as opposed to the flat spring for the purpose required of it, while the work of Salter's spring-balances shows that, so far from being uncertain, spiral springs are most accurate and reliable in their working.

With reference to the second class of objections, it is a mechanical impossibility that the old stock could absorb any of the recoil by its elasticity. The recoil is transmitted directly to the shoulder, which, being elastic, yields to it. If the stock were to absorb a portion of the recoil in the stock, it would be necessary to construct the stock of material more elastic than human flesh and muscle. Such a material, I do not point out, would scarcely possess the other requirements of a military stock. As to the contraction and expansion of the stock, if it be constructed

There is a similar cap, having a different ornament, for the lancer, and the heavy dragoon. I think it gives everything that is wanted, and this pattern which has been placed at my disposal by the Assistant Adjutant have to thank you for the kind attention which you have given to me.¹

The CHAIRMAN: There are one or two points I noted during the lecture, which I perhaps might draw attention to. I think the lecturer slight mistakes in his figures. First with reference to the proportion of stated that in some armies at the present moment the proportion of guns is every 1,000 men. I think he is wrong there; because, if I am correct I think the proportion of guns laid down, according to regulations for the present, comes up to quite the same proportion as that established in the German army, namely, $3\frac{1}{2}$ or $3\frac{3}{4}$ for every 1,000 men. The next point is about revolvers. It has been said upon that subject, and I fully concur in the remark that has been made. I certainly agree with reference to the advisability of a revolver to artillerymen. At the present moment an artilleryman is in a most defenceless condition: for if his battery is charged, unless he uses a spike, he has actually nothing to defend himself with. Every gunner is furnished with a good revolver. As to the size of the revolver, what we want is a heavy bullet. We do not want a weapon that will kill a man at 20 yards. One gentleman said 20 yards, but nothing would ever induce a man to use a revolver at a greater distance than 10 yards. If the pistol is only required at very short distances, I think you can very easily reduce the length of the barrel, which is at present usually too long; by doing so you would make it very handy for use on horseback.

With reference to the question of dress, I think the lecturer has hit upon some serious blots existing at the present moment. Our men are dressed for appearance, for show, and for theatrical effect instead of for work. We have a man at the present moment in England when he goes out shooting would be in the absurd dress in which a soldier is sent into the field to fight: hunting, shooting, sporting, walking, climbing, or on any kind of wild country dress for the occasion. Our clothes are made very loosely, and full play is given to all our muscles; but the unfortunate soldier is tied up in a manner that is unpleasant to him if he has to make use of very great exertion. My experience is, that the first thing he does is to take his coat off, and cut off his sleeves. As far as one can see from general common sense, the Norfolk jacket seems to be the most practical dress. A great number of Volunteer regiments have adopted it, and I think most wisely.

With reference to boots, I think the lecturer did not lay sufficient stress upon the fact that people who ride most prefer the long boot with breeches. For an infantry soldier it is different, although the Russians themselves, who are the best marchers in the world, march in long boots; but I think indisputably the best mounted branches of the Service, long boots and breeches are the best and most comfortable.

Upon the subject of our infantry dress I have two or three remarks to make. First, as to the Oliver equipment, I shall not go into any detailed account, but I am very glad to see it is now going to be very freely tried in the Service. Two regiments are going to be equipped with it, and in my opinion they will find it the better. There are several very excellent things about it, but the least striking, is the absence of pipe-clay. I think, if there is any absurdity in the Service, it is the use of pipe-clay. Why you should use it in the field, where he will have to sleep out of doors exposed to

¹ I must add that when I spoke of the American cavalry, I did not compare them with our cavalry as such. I wanted to direct special attention to the results obtained by the use of a certain class of armament. If mounted men who were bad riders, but armed with revolvers, gave such a handsome account of themselves, regular cavalry who were only armed with the sabre, as in the instance of the 11th Cavalry, in the body of my lecture, how much more necessary it is, therefore, to have the front ranks of our cavalry all round with revolvers. The writers who have quoted are Jomini, Marmont, De Brae, Woerner, Cromwell, Napier, Lock, Trower, Denison, and Elliott.

weather, dressed up like a scare-crow with white stuff all over him that falls off on the first shower of rain, dirtying his boots and clothes, I cannot understand. I am glad to see in the specimen of the Oliver equipment before us to-day that all the straps are of the natural colour of the leather.

With reference to what has been said regarding the Martini-Henry, I am very sorry I do not know enough about rifle shooting to be able to give any decided opinion. The question, however, put before us by the lecturer, and also by Admiral Selwyn, as to the cartridge, has struck me very recently. The American cartridges are made stamped in one piece, and ours are built up in a complicated way. I regret that no gentleman capable of speaking on the subject has explained how it is that the style of cartridge we have in use has continued so long. As to the shortness of the rifle, I do not share all the objections which have been put forward by the lecturer on that subject. I think the days when men prodded one another with bayonets are past and gone; and I therefore think you should look at the rifle as a thing that shoots, and not as a thing with a bayonet at the end for the purpose of killing with. If the short rifle shoots as well as the long rifle, I think the former should have the preference. The lecturer, however, said the trajectory of the short rifle was not as good as that of the long one. I never heard that before, and I hope he is misinformed. With reference to the bayonet, I certainly have a very strong opinion; as I have just said, I do not think it should be simply regarded as a weapon to kill with. It is, doubtless, necessary to have it for the moral effect, and as you must therefore carry some prodding weapon at your side to put on the end of your musket when you require it, it is very desirable it should be something you can turn to some other use as well. The trowel-bayonet was used in America many years ago during the war; but I do not entertain the very high opinion of it that has been expressed by the lecturer. As a rule, I do not think that things that are intended for so many purposes, generally answer any; and the trowel-bayonet, after being used some time for digging, would be of very little use I think for any other purpose whatever. As one gentleman said it certainly would not cut, and I very much doubt if it would last long as a digging-tool; I have seen experiments carried out with it; to dig a hole large enough to get into, with a trowel whose handle is only six inches long, is a very break-back job. There is a bayonet which will cut and saw wood or meat, and that is the Elcho bayonet. This was at first adopted by some regiments of Volunteers. I saw it used on several occasions, and I must confess that, to my mind, it is one of the most valuable weapons I have ever seen. We used it during the Ashantee campaign, where it was invaluable. You could cut small trees down with it, and it is an efficient and handy weapon for all purposes on the field. I have only one other remark to make, and that is with reference to the lecturer's allusions to the use of cavalry. He quoted the observations of Colonel Denison, and also a work of Sir Henry Havelock's on the subject. Now, Colonel Denison is a very excellent Officer, and a man who has studied the profession most earnestly; but he does not, I think, appreciate fully what real cavalry can do. He has a very intimate acquaintance with cavalry as they existed in America; but I wish to impress upon all here one fact with reference to the use of cavalry during the war in America. It is this: that neither on the Federal side nor on that of the Confederates, had they any regular cavalry at all. They had men on horseback, but they were not cavalry soldiers as I understand cavalry men. They were mounted infantry, and simply mounted infantry: that is, they were infantry soldiers put on horseback. I saw a little of both armies in that war, and as regards the Northern cavalry nothing could be worse; they were very bad horsemen, indeed, in the European acceptation of the term, they certainly were not cavalry. The great feats that we heard of as performed by the American cavalry were really done by mounted infantry. The remarks on the Confederate war, made by Sir Henry Havelock in his book on this subject, were made before he had been in America, or he would not have fallen into the common error of referring to Virginia as a country of plains suited to cavalry. Now, my experience of Virginia is that there are few places where a squadron could charge for 500 yards, as it is a wooded country with numerous fences. I think, ladies and gentlemen, we have had a great deal of very valuable information imparted to us both by the lecturer and by those gentlemen who have taken part in the discussion, and in your name I beg to tender them our cordial thanks.