ANTI-TANK.

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FOR the past year or more, both in this country and abroad, Service Journals have been indulging in a severe attack of "Tankitis," if one may be allowed to coin a word to describe a new and extremely virulent malady. Prophets and visionaries foretell the day when cavalry and infantry shall be no more and tanks alone shall endure; others possessing perhaps a less wide outlook, but of a more practical turn of mind foreshadow the increasing importance of these machines acting with other arms. The daily press and engineering periodicals from time to time retail with greater or less accuracy, according to their source of information, the development of cross-country traction. Even Parliament is not immune from the prevalent malady, as is shown by the constant questions asked in the House of Commons regarding the welfare of the Tank Corps.

Such being the case, it may perhaps not be inappropriate to study the opposite side of the picture for a moment and see whether those who are suffering from Tankitis in its present virulent form have not overlooked the historical fact that for every new offensive weapon produced an effective defensive counterpart has always been devised; whether in short the value they set on tanks is not an exaggerated one, and likely to be negated to a large extent by the evolution of appropriate and perfectly feasible counter measures.

What then is the situation to-day? On the one side we have the tank, a machine capable of attaining a maximum speed of eight to ten miles an hour for a short period on any moderate ground, armed with machine guns and in some cases a small calibre gun, armoured as to the vital parts sufficiently to render it immune against shrapnel, H.F. splinters, and A.P. rifle or machine gun bullets.

On the other side we have (a) cavalry armed with horse, rifle, sword and a proportion of Hotchkiss and Vickers machine guns, armoured as to the vital parts by a steel helmet, and capable, on ground free of obstacles, of developing a speed of sixteen miles an hour for a short period, (b) infantry armed with rifle, bayonet, Lewis gun, grenade and a proportion of Vickers machine guns and Stokes mortars, armoured like his mounted confrère with a steel helmet, and capable of attaining for a very short period a maximum speed of five miles per hour on really good ground, but under normal conditions not more than two to three miles an hour; (c) Artillery (Horse or Field) equipped with a Q.F. gun firing a shell capable of penetrating the armour of a tank but

hampered by lack of traverse and inadequate appliances for dealing with fast moving targets at any but very short ranges, armoured in action against frontal fire by the gun shield, in movement not at all, capable of moving on good ground at eight to ten miles an hour, on other ground at two-and-a-half to three-and-a-half miles an hour.

What means of defeating tanks, then, have these combinations, cavalry and artillery, infantry and artillery?

The sword, rifle or machine gun of the cavalry are powerless even to delay a resolute attack by a section of "Medium C" tanks, and much more so that of a section of tanks of the types which will be available both in this country and abroad in the near future. The horse is therefore the cavalryman's sole means of resisting a tank attack, and the mobility of the horse on good ground exceeds, it must be admitted, that of the present tank for short distances.

But of what value is this mobility? It may protect the cavalryman from immediate destruction or capture, but its employment postulates the abandonment of the mission undertaken or the ground gained as soon as tanks threaten. Cavalry by itself is therefore defenceless against tanks and must depend solely on such Horse Artillery as may be acting with it. It is, however, improbable, to say the least of it, that the guns available at the critical moment will be sufficient in numbers or suitably placed to destroy 100 per cent. or even 50 per cent. of the attacking tanks.

Even if guns are present the doubt which will exist in the minds of the cavalry as to whether the former will be able to deal with the situation is bound to react unfavourably on its moral.

We may safely say, therefore, that at present cavalry is to all intents and purposes defenceless against a well-organised tank attack.

Turn now to the case of infantry supported by Field Artillery. Neither rifle, Lewis gun, nor Vickers machine gun have it in their power seriously to embarrass attacking tanks. Stokes mortars may do so provided that they can obtain a direct hit, but this necessitates flat trajectory fire at short range and consequent exposure of the teams to heavy machine gun fire from the tanks, a situation not conducive to accuracy of fire. Grenades unless specially designed are useless, and specially designed grenades are an additional load for the already overburdened infantryman to carry, quite apart from the fact that their fire, in order to be of value, must be very accurate, a result by no means easily achieved against a fast-moving target under machine gun fire. Wire and other artificial obstacles which infantry can erect in the field present no difficulties to tanks.

Apart, therefore, from the support of the artillery, or rather of that small portion of it specially sited so as to be able to bring direct fire to bear on the particular zone across which the tank attack develops, the infantryman to-day has but one refuge from the tank (it can hardly be called a defence) namely sound use of ground and natural obstacles—sound use of ground in selecting defensive positions on terrain where tanks cannot operate or can only do so with difficulty—sound use of ground locally by smaller units when actually attacked, and this de-

fence, when regarded from the point of view of the psychology of the infantry soldier, is not one likely to inspire him with much confidence in actual practice, however excellent it may sound in theory.

If then the question be put to-day "What means of defence against tanks have cavalry or infantry?" the answer cannot be other than "None," for it is inconceivable that a man of mere unprotected flesh and blood should be expected to face an attack by armed and armoured machines, knowing that not one of the weapons which he himself wields is of the smallest value against them, and that the power of the supporting artillery to destroy the machines is doubtful, even assuming that that support can be given where and when required, a factor over which he himself has no control.

Such being the case, what further means of countering the tank menace can be developed?

Anti-tank weapons must fulfil the following conditions:—

(1). Their power must be sufficient to enable them materially to damage the hostile tank.

(2). Since it is impossible to tell exactly (often not even approximately) where a tank attack will develop, and it is impracticable to provide an adequate defence by dispersing anti-tank weapons evenly along the whole front, such weapons must be capable of being rapidly placed in the right position at the right moment. In other words they must be mobile in a high degree, since, to quote Marshal Foch, it is in manœuvre and mobility that success lies.

(3). Their employment must not reduce the fighting value of an army for offensive action, having regard to the fact that man power is always likely to prove a limiting factor in war. In other words they must not be specialist weapons incapable of use other than against tanks, locking up man power which might otherwise be employed for a wider purpose both in the factory and in the field.

(4). Bearing in mind human psychology, the main anti-tank weapon for the defence of any particular arm must, if it is to instill real confidence in that arm, be under the entire control of and wielded by that arm, e.g., the primary anti-tank defence of the infantry must be an infantry weapon, not an artillery weapon for the support of which the infantry must depend on artillery co-operation.

(5). Since anti-tank defence, as in the case of other forms of defence, must have depth to enable it first to impede and disorganize and later to destroy the attack, anti-tank weapons must be suitable in range and power for giving effect to this requirement.

Bearing these conditions in mind, let us consider the advantages and disadvantages of the types of weapon which might possibly fulfil them.

(1). *The anti-tank rifle as evolved by the Germans.* This weapon has sufficient power of penetration but is heavy and cumbersome. It is a "specialist" weapon, depends for its effect on the moral courage of the individual to face a tank, and is easily overwhelmed.

(2) *The machine gun.* The .303 in. Vickers machine gun is insufficiently powerful to produce any real effect on a tank. To obtain

a machine gun which will not only penetrate tank armour at a range sufficient to prevent the detachment being annihilated by fire from the tank but also be capable of breaking up an attack in its early stages, it would be necessary to adopt a weapon of the largest calibre practicable, probably somewhere between .5 in. and .7 in. Such a weapon would probably be adequate to deal with any tank likely to be evolved in the near future unless the alternative of increasing the thickness of armour to the detriment of speed and manœuvring power were adopted. It would also be a useful infantry weapon under other circumstances (e.g. against low flying aircraft), *but*, and this *but* is the crux of the matter, such a machine gun would be so heavy that its transport and that of its ammunition to the right place at the right time would be almost impossible unless the gun were placed on a mechanical mounting.

(3). *A light gun—say to 3-pounder.* With this weapon we should again have sufficient power to deal with any tank likely to be encountered in the near future, but its method of transport again involves difficulties. On a fixed mounting with all round traverse it would in theory be excellent, that is if it ever happened to be at the right place at the right moment. Since, however, such a mounting involves almost complete immobility it would be of little value in static warfare and useless in mobile warfare.

Horse transport would be unduly vulnerable, since the gun, in order to carry out its rôle, must necessarily be placed in action in the infantry line. So, once more for the satisfactory transport of the light anti-tank gun we are compelled to fall back on mechanical transport which is capable of moving across country.

(4). *A light mortar.* The Stokes mortar as it exists to-day can undoubtedly obtain a percentage of hits on a moving tank provided that the tank by its fire does not first annihilate the mortar detachment, but the range of the mortar is so short and the vulnerability of its detachment when employing low trajectory fire so great that this may be looked on as more or less a matter of certainty. A better mortar might prove more effective, but once again its transport and that of its ammunition is bound to prove the critical factor, since it, in common with all other weapons, must be brought to the right place at the right moment if it is successfully to repel a tank attack. Man and horse transport are open to the same objections as in the case of the light gun, and some form of cross country mechanical traction would alone prove satisfactory.

(5). *Field Artillery (including Horse Artillery).* Field guns have unquestionably adequate power to deal with any tank likely to be met with in the near future, and are bound to form one of the main anti-tank defences for many years to come. Yet field guns have their disadvantages. In the first place they do not fulfil the condition specified above, in so far as cavalry or infantry are concerned, that the main anti-tank defence of any arm should be under the complete control of and be wielded by that arm. However good co-operation between artillery and infantry (or cavalry) may be in any particular instance, the mere presence of guns will never give infantry that confidence which will be

necessary to ensure their standing up boldly to a tank attack. Secondly, artillery equipment does not enable guns to engage fast and erratically moving targets except at fairly short ranges over the sights. Consequently anti-tank guns must be specially sited, and positions suitable for anti-tank defence are rarely suitable for general artillery purposes and are usually very exposed as our experience in France in March, 1918, showed.

Thirdly, if guns are held in mobile reserve to meet an attack, they are under present conditions vulnerable when in movement towards the threatened point. They are also only capable of moving at a slow pace across country or on roads congested with troops, with the consequence that a considerable period of time must elapse before they can make their effect felt even under the most favourable circumstances. In the case of a tank attack such a delay in meeting it may well be fatal.

To increase the mobility and decrease the vulnerability of the field gun and thus render it suitable for anti-tank operations, it seems clear again that we must take to mechanical traction, and in this connection it may be worth while to quote the opinion of the chief instructor in tactics at the French School of Artillery: "The problem of tactical mobility has not been solved during the war. It will only be solved by the adoption of a system of artillery caterpillars, the system of the future."

(6). *Mines.* Mines may undoubtedly be valuable as a method of countering tanks under certain circumstances, but they have many obvious disadvantages—(1) They cannot be laid broadcast along the whole front, but only in specific areas which we are prepared to deny, not only to the enemy, but to our own troops. (2) Their transport in mobile warfare becomes a matter of the greatest difficulty. (3) If small mines are employed it is not difficult to adopt means by which tanks can explode them before passing over them; if larger or more complicated mine systems are employed much labour is necessary to install them, their positions can be detected in aeroplane photos, and they can be destroyed by hostile artillery fire.

Mines therefore may be looked on, at any rate as far as the defence of forward areas is concerned, as weapons only suitable for use in static warfare for the passive defence of certain limited areas.

What conclusions then can be deduced from the above consideration of possible weapons?

First that the main defences against tanks must be (a) the field gun and (b) a small calibre gun or heavy machine gun. *Second* that even if the field gun be so mounted and equipped as to form a really satisfactory weapon for this purpose, nevertheless human psychology will necessitate a light gun or heavy machine gun being given to the infantryman in addition as his primary defence against tanks. *Third*, that field guns, light guns and machine guns, in order that they may be brought to the right place at the right time and, having been brought there, may carry out their rôle in reasonable security, must be mounted on armoured self-propelled cross country vehicles.

And it is in these conclusions that the comedy lies, since like Balaam of old we set out to curse and have ended by blessing. For what after all are armoured self-propelled cross country vehicles carrying guns or machine guns but tanks, and what therefore is the real conclusion at which we have arrived, but that the true defensive counterpart of the tank is the tank—certainly not such a tank as the cumbrous Mark V which we are apt to picture when we think of a tank to-day, probably not even any one type of tank, but rather a combination of heavily gunned tanks, fast and of some size, and small light destroyer tanks armed with powerful machine guns or perhaps a light gun (forming an integral part of the infantry) and its primary defence against the hostile tank.

The working out of the details of these machines and their organization lies ahead; for the present it is enough to satisfy ourselves that it is in the tank itself that the effective defensive counterpart of the tank will be found.

As the French officer already quoted well sums up the situation : "Material and mechanism have invaded all branches of the service and all modern armies and dominate to-day the conditions of war to such a point that without them the most heroic valour would only end in bloody disaster. But this mechanism and this material will still continue to develop and improve during peace; the armies of to-morrow will therefore, for fear of finding themselves in the next war with obsolete weapons, be obliged to follow unceasingly the improvements, adapting their form and their organization to the new materials which will arise, teaching their soldiers their employment, and enlarging the industrial output for the day of war. And yet . . . the moral of the combatant will always remain the supreme argument in war, and it is with material handled by men that war will always be made."