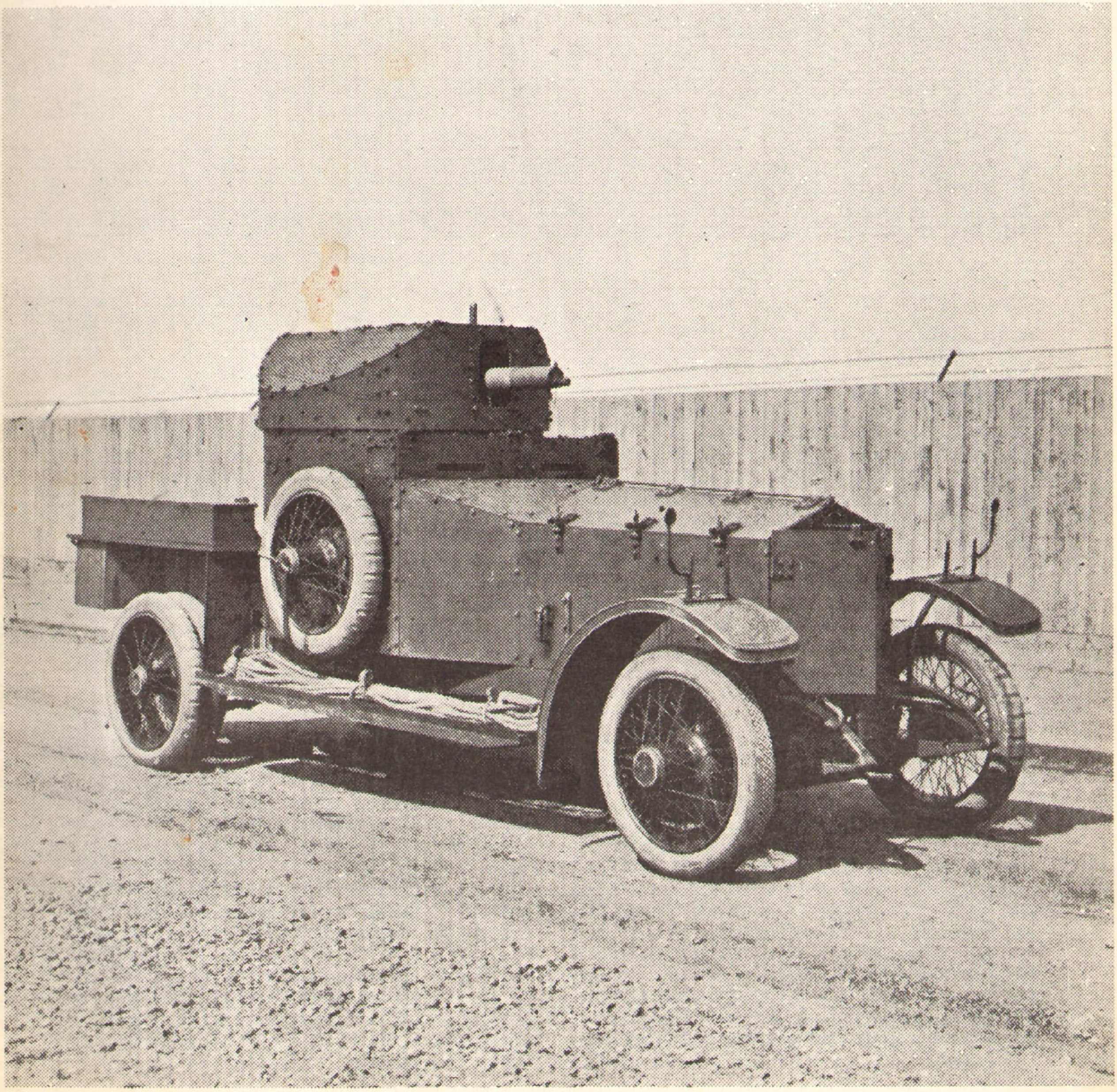
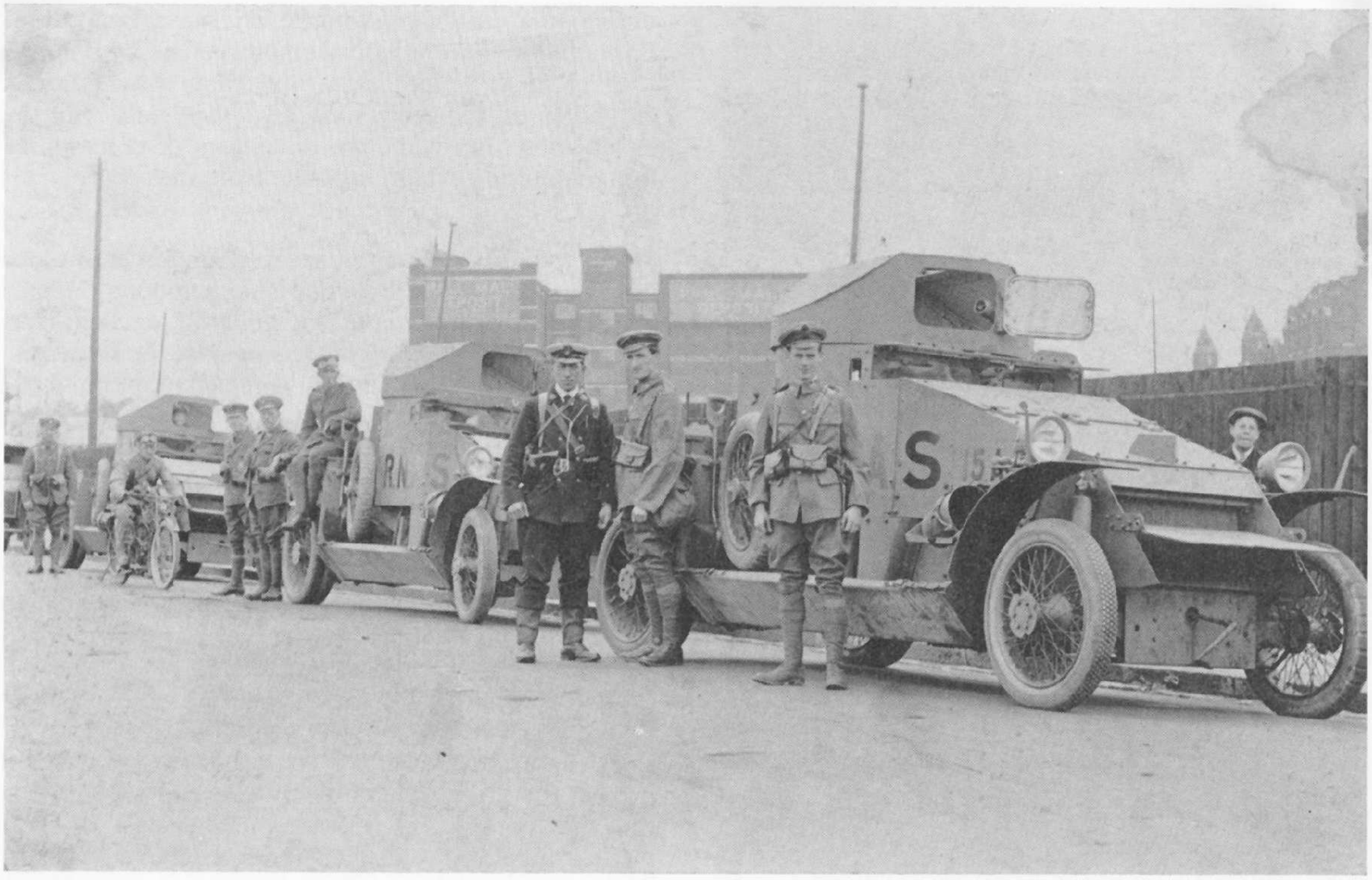
AFV 9

EARLY ARMOURED CARS

FIVE SHILLINGS





Lanchesters of the R.N.A.C. Division at Hammersmith, London.

Early Armoured Cars

by Maj.-Gen. N. W. Duncan

THE introduction of the petrol engine made the armoured car a practical proposition. In 1896 E. J. Pennington, an American inventor, put forward plans for an open topped armoured vehicle. In England F. R. Simms demonstrated a De Dion motor-quadricycle with a Maxim machine-gun mounted on the handlebars, protected by a sheet of armour plate, and followed this by the Simms War Car in 1902. This vehicle was remarkably like Pennington's earlier design: it was open topped, oval in plan with sides that sloped inwards from hub cap level. It had a 15 h.p. Daimler engine and carried two machine-guns on pedestal mountings. An alternative design provided for two revolving turrets but this never materialised. The War Car was shown at the Crystal Palace and aroused considerable interest but it then sank into the apathetic oblivion that enveloped the efforts of all inventors who tried to harness the mobility of the new petrol engine to gun power behind protective armour.

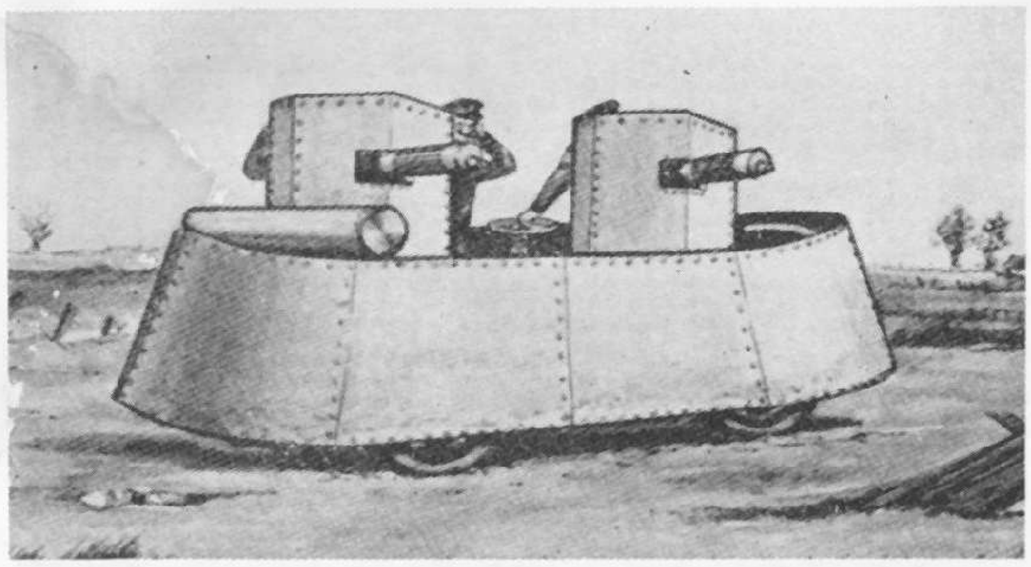
In Germany Erhardt built an armoured car in 1906 with a 60 h.p. engine. It mounted a 50 mm. gun for which 100 rounds of ammunition were carried in a non-revolving turret: the gun could be fired at a high angle, a remarkable piece of crystal-gazing when the aeroplane could only just leave the ground and Count Zeppelin's airships were in the very early stages of their development.

In Austria the firm of Austro-Daimler were experimenting with armoured cars from 1903 onwards. By 1906 their designs took the shape of a car weighing 3 tons, carrying a crew of 4 or 5 men and mounting either a 37 mm. gun and a machine-gun, or two machine-guns in a revolving turret. The vehicle was completely armoured, with side plates down to rear hub level: nothing more came of this promising design.

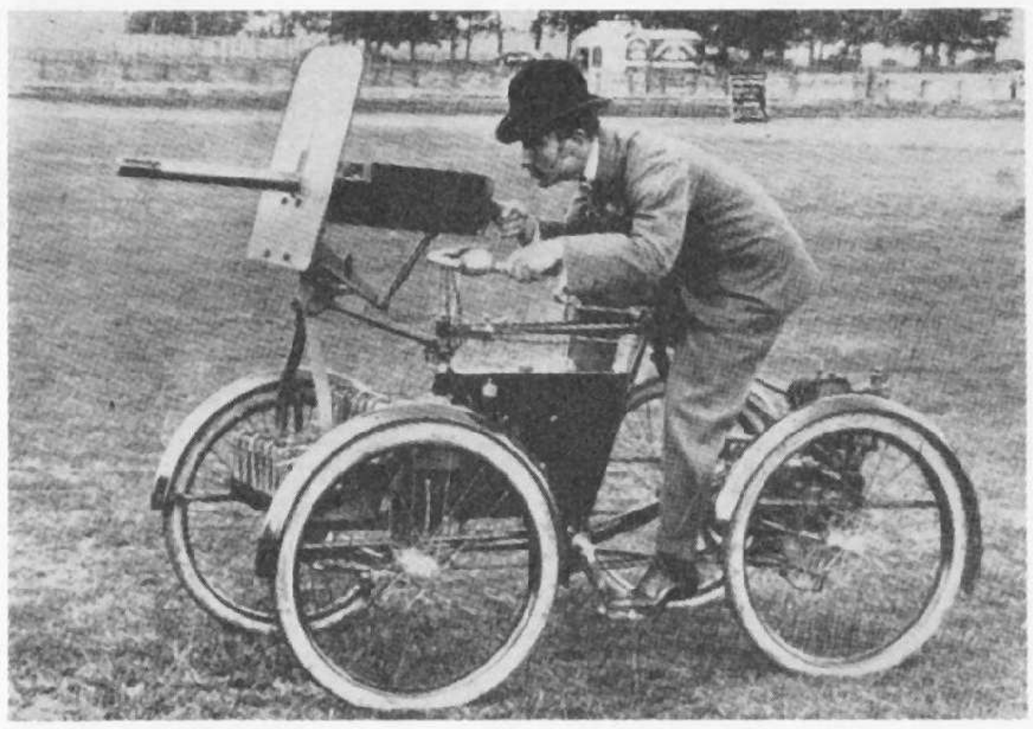
France produced a Charron armoured car in 1906 and a Hotchkiss car in 1909 with a sheet of armour bent round the tonneau of an ordinary touring car. A machine-gun was mounted on a pedestal in the centre of the armour but no protection was provided for the driver, co-driver or the engine.

These early machines represent the first attempts to bring a new measure of mobility in warfare. Their designers and makers had a vision of the possibilities open to a really mobile machine and translated their dreams into reality which stimulated thought to some extent. However they failed to make any practical impact for two reasons, the first of which was mechanical unreliability. Considerable skill was needed to keep these early motor cars on the road; mechanical failures which were frequent enough with ordinary touring cars were increased by the additional weight of the armoured body and not enough was known about metal fatigue and the production of the necessary steels and alloys to ensure reliability. Engines were almost invariably too low powered and the high pressure pneumatic tyres gave constant trouble. Cars had rear wheel transmission and the combination of inadequate springing, primitive transmissions, absence of shock absorbers coupled with small section tyres, resulted in a very poor cross-country performance.

The second reason for the failure to develop the early types of armoured cars lay in the rigidity of current thought. The advent of the armoured car disturbed



E. J. Pennington's sketch for an open-topped armoured car, 1896.
(R.A.C. Tank Museum)



F. R. Simms' Motor Scout being demonstrated by the inventor in June, 1899. A De Dion motor-quadricycle with a Maxim machine-gun, this was the first armed motor vehicle.
(Simms Motor & Electronics Corporation Ltd.)

the pattern of military training and operations. The infantry soldier reigned supreme, reconnaissance was carried out on horses which also solved the problem of haulage: there was no room for the unreliable motor. A Ruston tractor which had been on military trials was dismissed contemptuously with the remark that "its noise and smell in a column are intolerable and very few horses will pass it!"

However despite the difficulties that the petrol engine brought in its train some armoured car development did take place on the Continent. In 1912 the Italians put an armoured body on Fiat truck chassis for use in the conquest of Tripolitania, and by 1915 the Germans had a Daimler armoured lorry and an improved Erhardt armoured car. This weighed 8 tons and bristled with no less than 5 machine-guns and a crew of 9 men. It had 8 mm. of armour, a revolving turret and 85 h.p. engine which gave it a reputed top speed of 35 mph. By 1914 the Russians had an armoured lorry that mounted a 76 mm. gun: its turret did not rotate and its armour was 9 mm. thick. The vehicle weighed 8 tons but it only had a 35 h.p. engine and its performance was indifferent to say the least: however, a Russo-Balt armoured car with 3 machine-guns in a non-rotating turret which weighed 4 tons and had a 45 h.p. engine promised better things.

THE OPERATIONAL STORY, 1914-1919

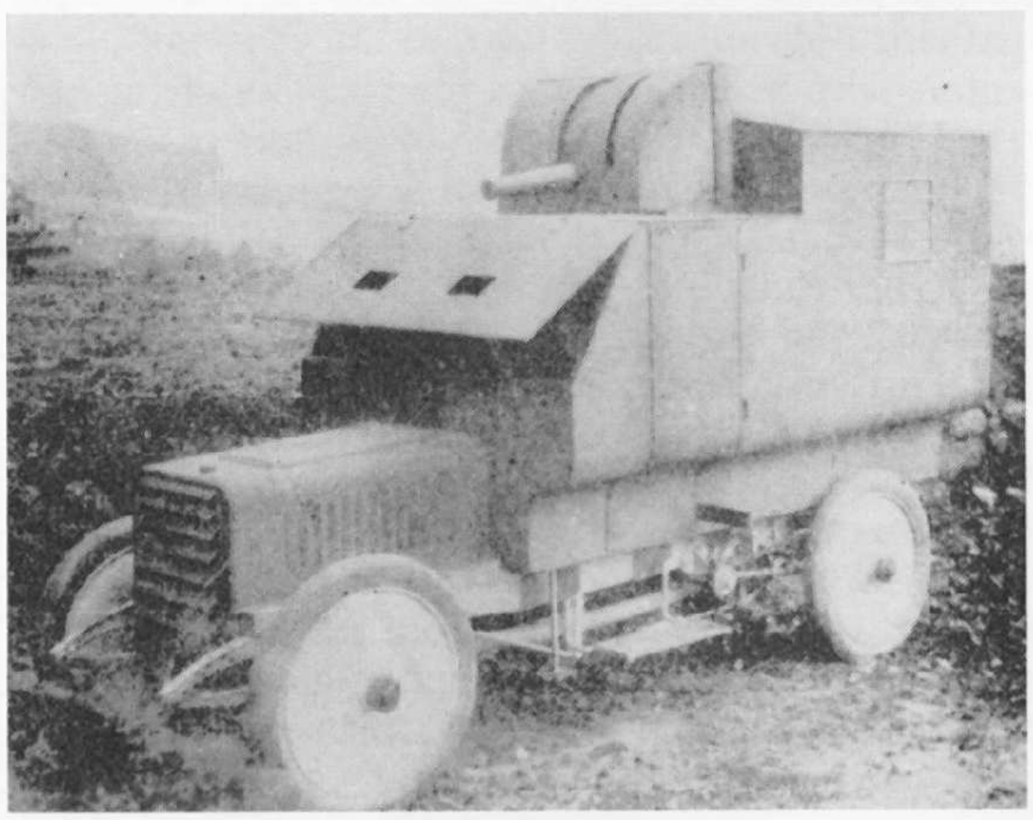
As always war galvanized military thought into activity and as far as Great Britain is concerned the armoured car story runs in two channels: armoured car development and operations in Europe, Africa and the Middle East; and secondly the Indian story. The two parallel each other to some extent and there was a limited exchange of thought, men and materials, but the distances involved and the difficulties of communication make one virtually separate from the other.

The R.N.A.C. Division

When the Germans overran Belgium in 1914 a few touring cars with improvised side armour of boiler-plate and mounting a machine-gun, did excellent work in the hands of Belgian officers against the advancing German troops. Their success directed attention to the possibilities of armoured support and two Royal Naval Air Service cars were given extemporised armour after they had been in action with German cavalry. This occurred around Dunkirk where a RNAS squadron under Commander Samson had been sent. It was equipped with an assortment of aircraft and an equally motley collection of eighteen cars, the latter intended for "aeroplane support" to supplement the results of air reconnaissance and to rescue any pilots who had been forced down by mechanical trouble. A Rolls Royce and a Mercedes were given boiler-plate on the sides of the body and a steel hood was provided to protect the driver. Two lorries were also armoured so that they could carry riflemen but their lack of speed made cooperation between them a chancy business. The multiplicity of types accentuated the problem of spare parts but the results obtained by these cars were held to justify the construction of two types of bodies by the Admiralty: the first, a short-lived stopgap, had no turret but protected crew, driver and engine, and mounted a machine-gun: the second was a proper armoured car body giving full protection for the engine, overhead cover and a revolving turret which carried a machine-gun all round with traverse.

This body was used on Rolls Royce, Lanchester, Talbot and Delaunay-Belleville cars which were issued to the Royal Naval Armoured Car Division, formed in October 1914 under the command of Commander E. L. Boothby RN. The division was to consist of 15 armoured squadrons and a divisional HQ. Each armoured car squadron consisted of three sections, each of four cars. Numbers and types of armoured cars and other vehicles are shown on page 3.

Eberhardt BAK 1906. 1 × 50 mm. gun; 3 × 7·92 mm. M.G.s. The mounting provided for AA fire at need.
(R.A.C. Tank Museum)



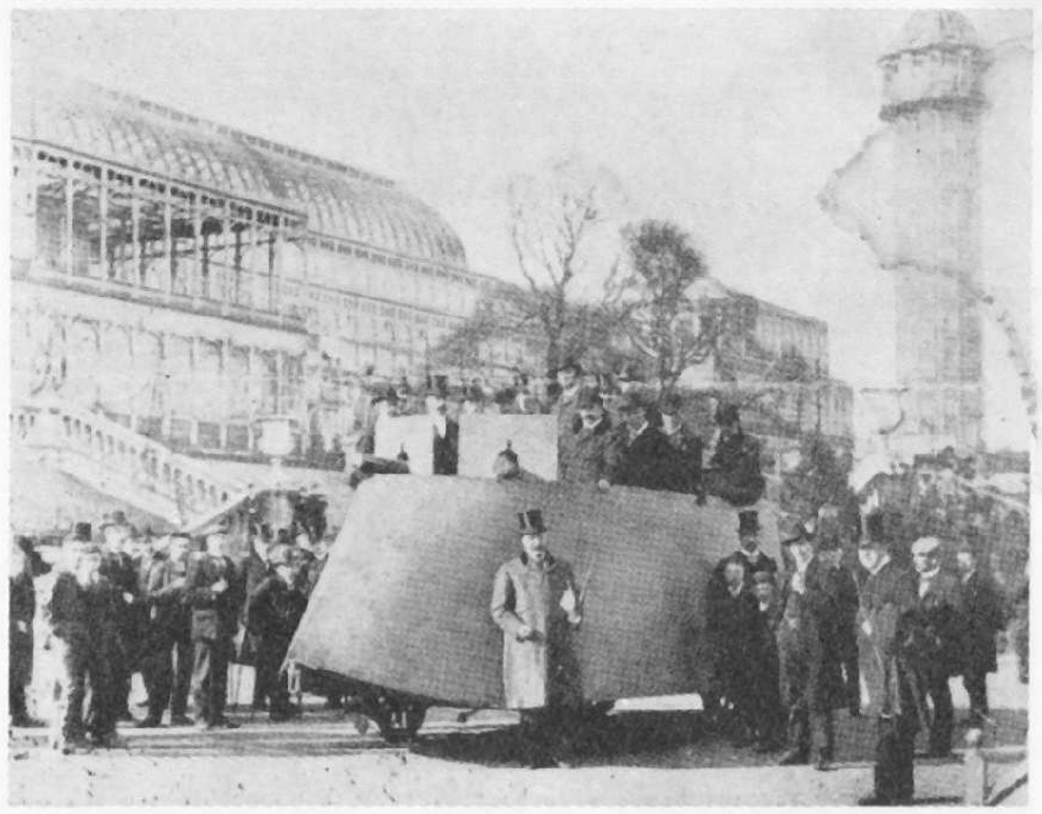
Distribution of cars by types - March 22, 1915

Make	Arm'd cars	Touring cars	Lorries	Wagons	W'less vehicles	Ambu-lances	Vans
Rolls Royce	78	4	—	—	—	—	—
Talbot	3	14	—	40	1	2	—
Ford	—	4	—	—	2	—	46
Seabrook	30*	—	22	—	—	—	—
Wolseley	—	—	—	—	11	12	—
Lanchester	36	2	—	6	1	—	—
Delaunay–Belleville	3	—	—	1	—	—	—
Jeffrey Quad	—	—	4	—	—	—	—
Austin	—	—	—	**	—	—	—

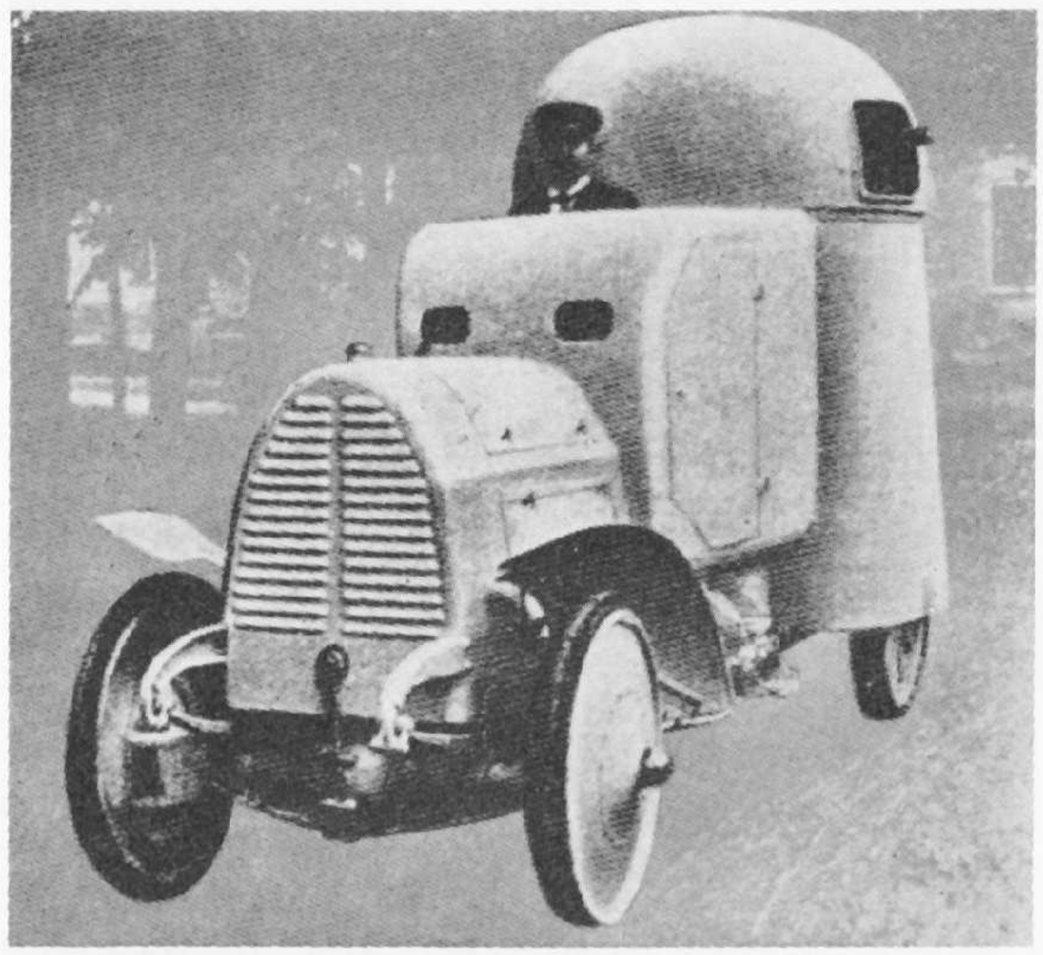
* Seabrook armoured lorries mounting a 3 pdr. Hotchkiss gun
**2 Workshop 1 Office

In the event ten squadrons were equipped with the armoured cars and lorries shown in the table and the other five were equipped with Maxim motor-cycle combinations.

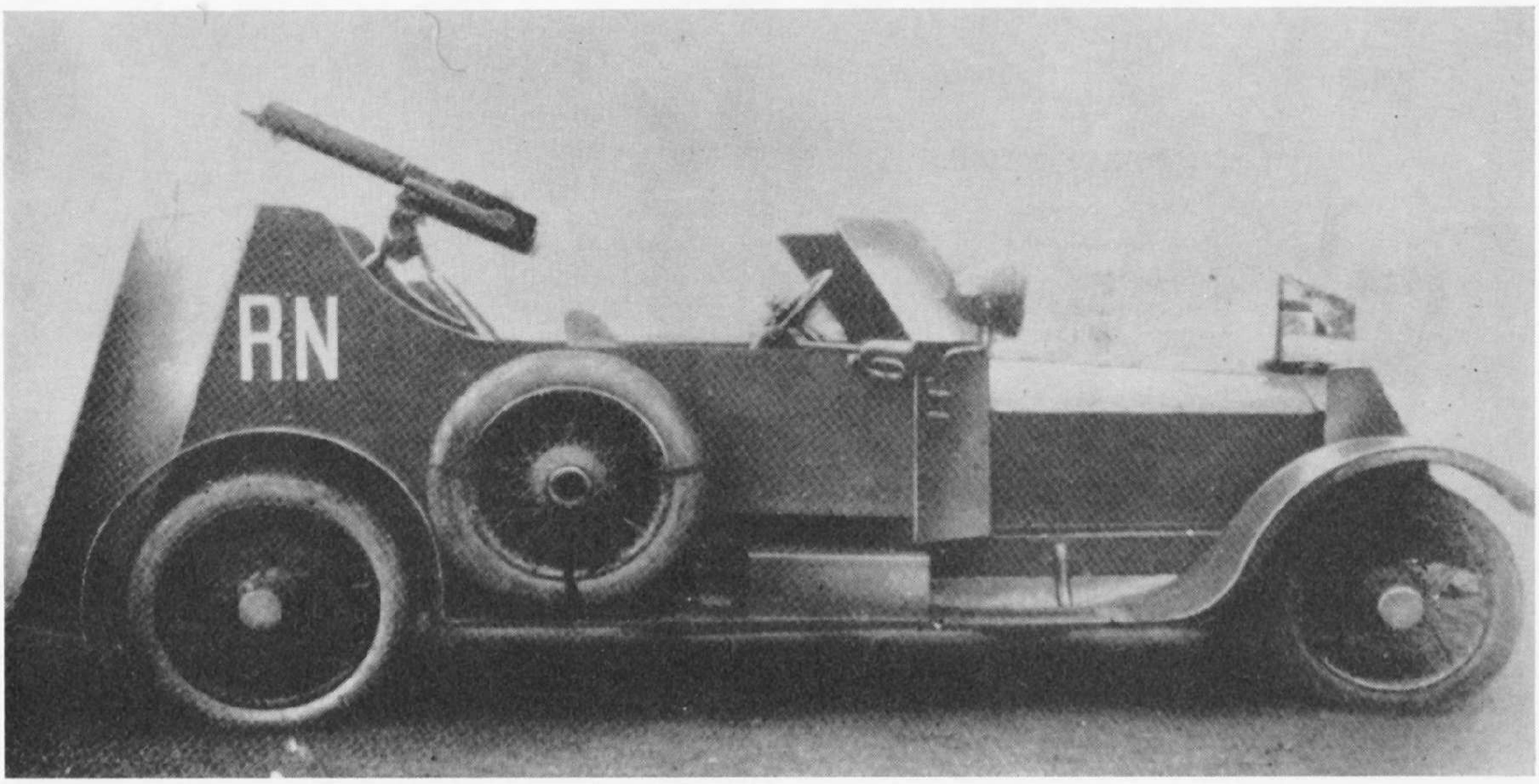
The first squadron was equipped with Rolls Royce armoured cars and was ready by December 1914 when it was sent to the East Coast to guard against the threat of an enemy invasion which was believed to be imminent. The squadron carried out a lot of operational training with no troubles from the cars, which were standard touring car chassis, except for the springs which had to be strengthened to take the additional load. By January 1915 eight squadrons had been completed with everything except machine-guns which were very short. However by denuding the Fleet of its Maxim machine-guns this deficiency was remedied and No 2 Squadron under the Duke of Westminster was sent to France in March 1915. The machine-gun fire of the armoured cars was reinforced by three Seabrook lorries per squadron, each mounting a 3 pdr. Hotchkiss gun. The need for more powerful supporting fire had been recognized following the successes of armoured cars equipped with a 1 pdr. pom-pom which had operated in France in the early days. The continuing requirement for support of this nature was not appreciated after the disbandment of the division and it was not



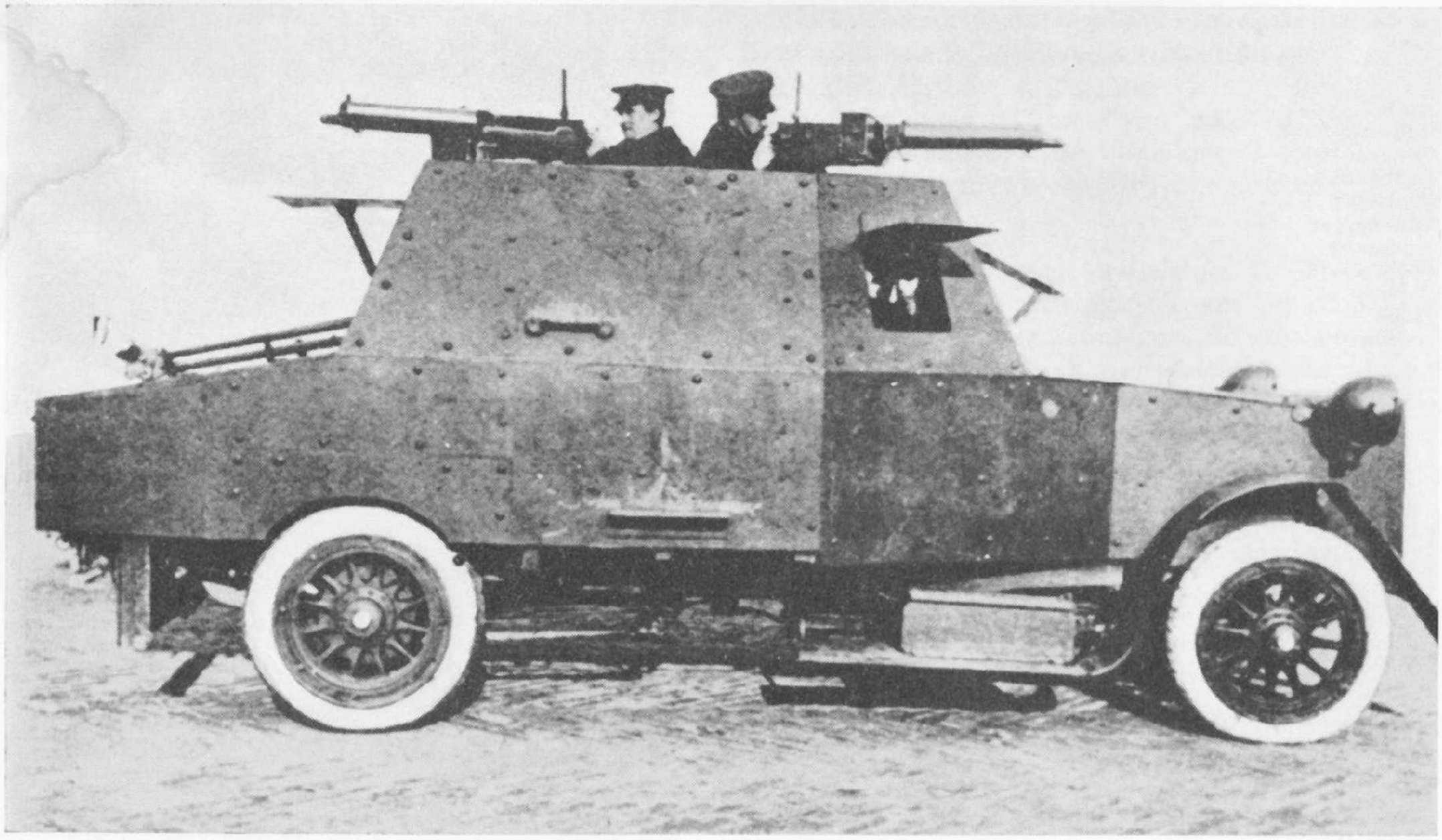
Simms' War Car at the Crystal Palace, London, April 1902. It had a 4-speed gearbox and was said to do 9 m.p.h. in top gear. It weighed 5½ tons and had steel tyred wheels which kept it to hard road surfaces. The hull was of 60 mm. Vickers armour.
(Simms Motor & Electronics Corporation Ltd.)



Above: *Austro-Daimler armoured car, 1904.*
(R.A.C. Tank Museum)

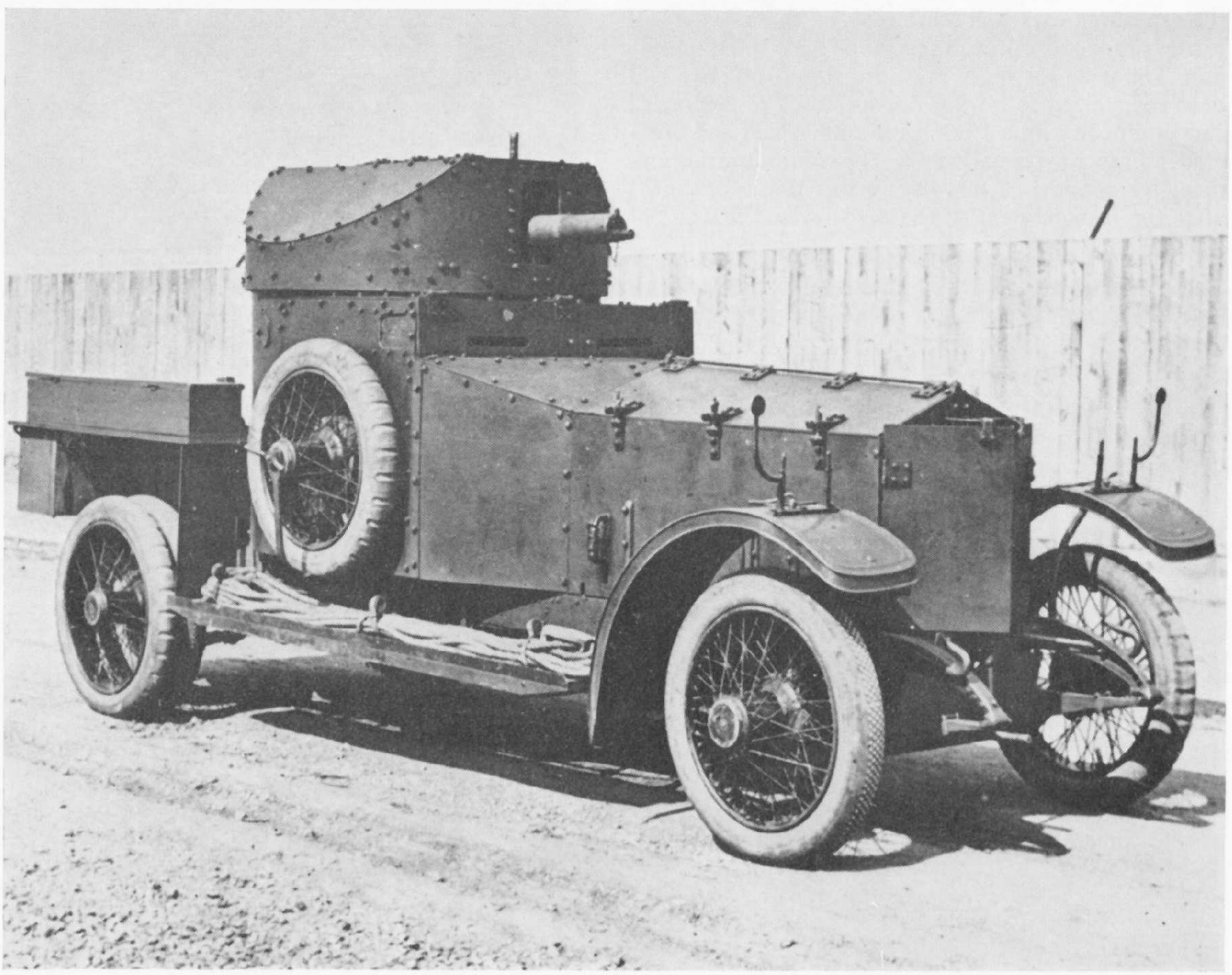


Below: *First armoured body on a Rolls-Royce, 1914. Maxim machine-gun mounted at the rear.* (R.A.C. Tank Museum)



Talbot armoured in France and armed with two Maxims. (R.A.C. Tank Museum)

Rolls-Royce armoured car, 1914 pattern, seen at Wormwood Scrubs in 1915. Armament was a Maxim. (Imperial War Museum)

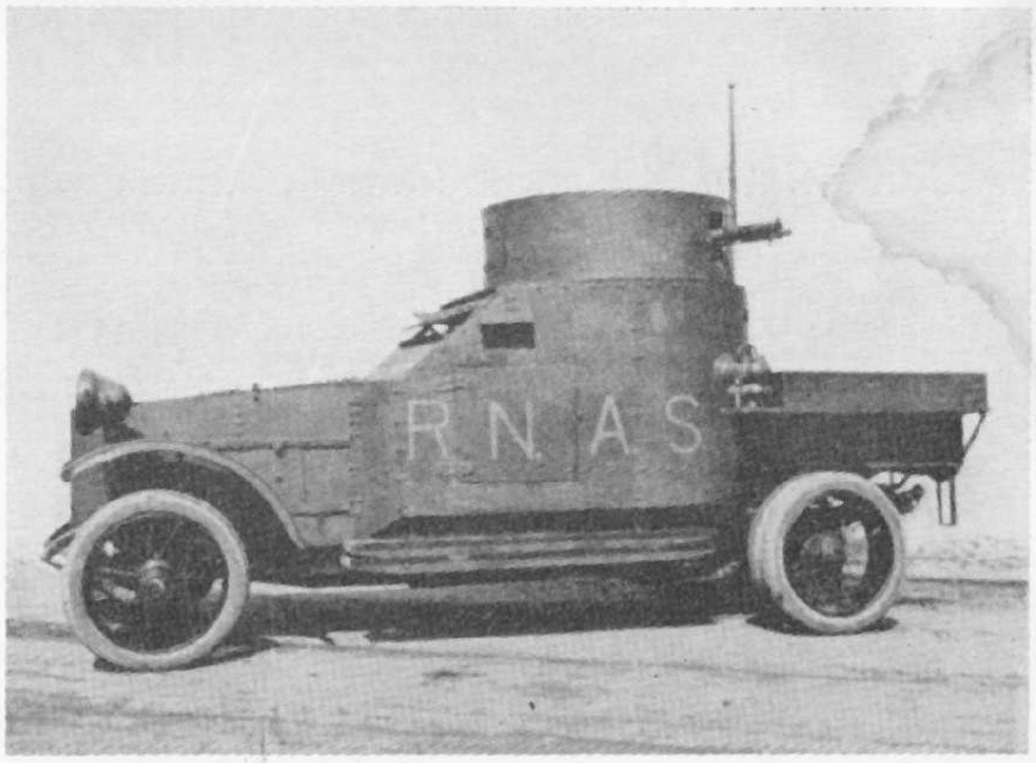


until the Daimler armoured car of 1940 that anything heavier than a machine-gun was mounted in a British armoured car. Following this both Staghound and Coventry Mark II had low velocity 75 mm. guns but it was not until 1953 that the Saladin armoured car appeared in British service mounting an effective dual purpose weapon of 75 mm. calibre.

Africa and The Middle East

As the "race to the sea" was halted and the Western Front stabilized into lines of trenches behind belts of barbed wire, opportunities for successful armoured car operations in open country grew less and less. Even so the limitations of wheeled vehicles in the armoured rôle were so little appreciated that two Rolls Royce squadrons from the R.N.A.C. Division, Nos. 3 and 4, were sent to Gallipoli where they spent most of their time in a deep trench to protect them from shell fire. A section fitted with grapnels towed away a length of Turkish barbed wire preparatory to an assault, but otherwise the cars were of no value and they were evacuated to Egypt where the open country favoured their operations both in the defence of the Suez canal and also in operations in the Western Desert against hostile tribes.

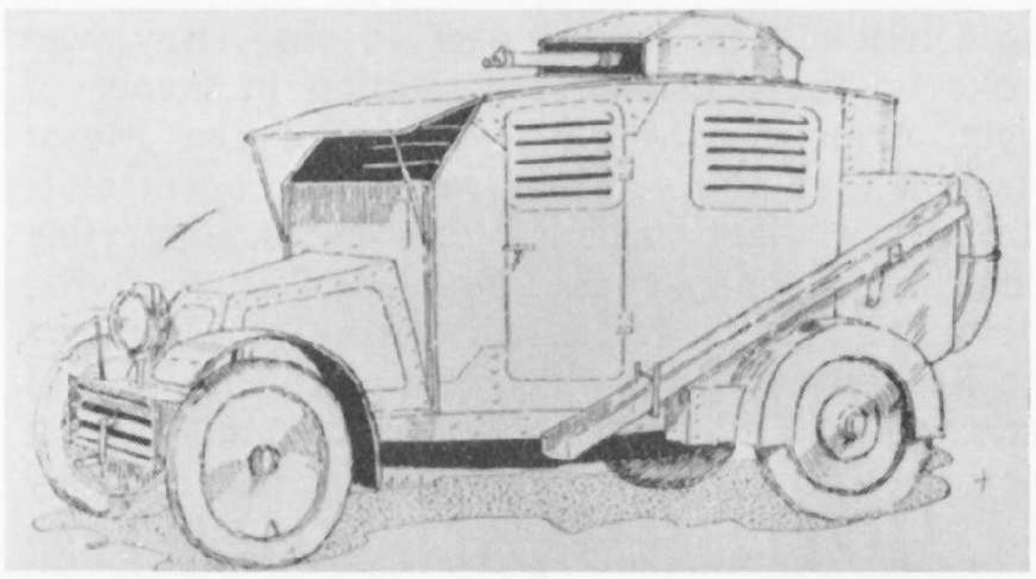
A Rolls Royce squadron was sent to German South West Africa in 1915. It was landed at Walfisch Bay but the going, which was deep soft sand with no made roads, was so unsuitable that the cars were railed fifty miles inland. Although there were still no roads and tracks were very narrow, the ground was firmer and



Delaunay-Belleville 1915. Note cylindrical turret and side door. A spare acetylene headlamp is carried above rear end of running-board. (R.A.C. Tank Museum)

the squadron was involved in several actions against the Germans, among them ambushes by day and also by night using the car headlights to illuminate the targets; on another occasion they broke up an enemy counter-attack by the speed and mobility of their machine-gun fire. Despite unfavourable conditions the armoured cars did a lot of work in German SW Africa and played their part in cooperation with other troops in bringing the campaign to a successful conclusion.

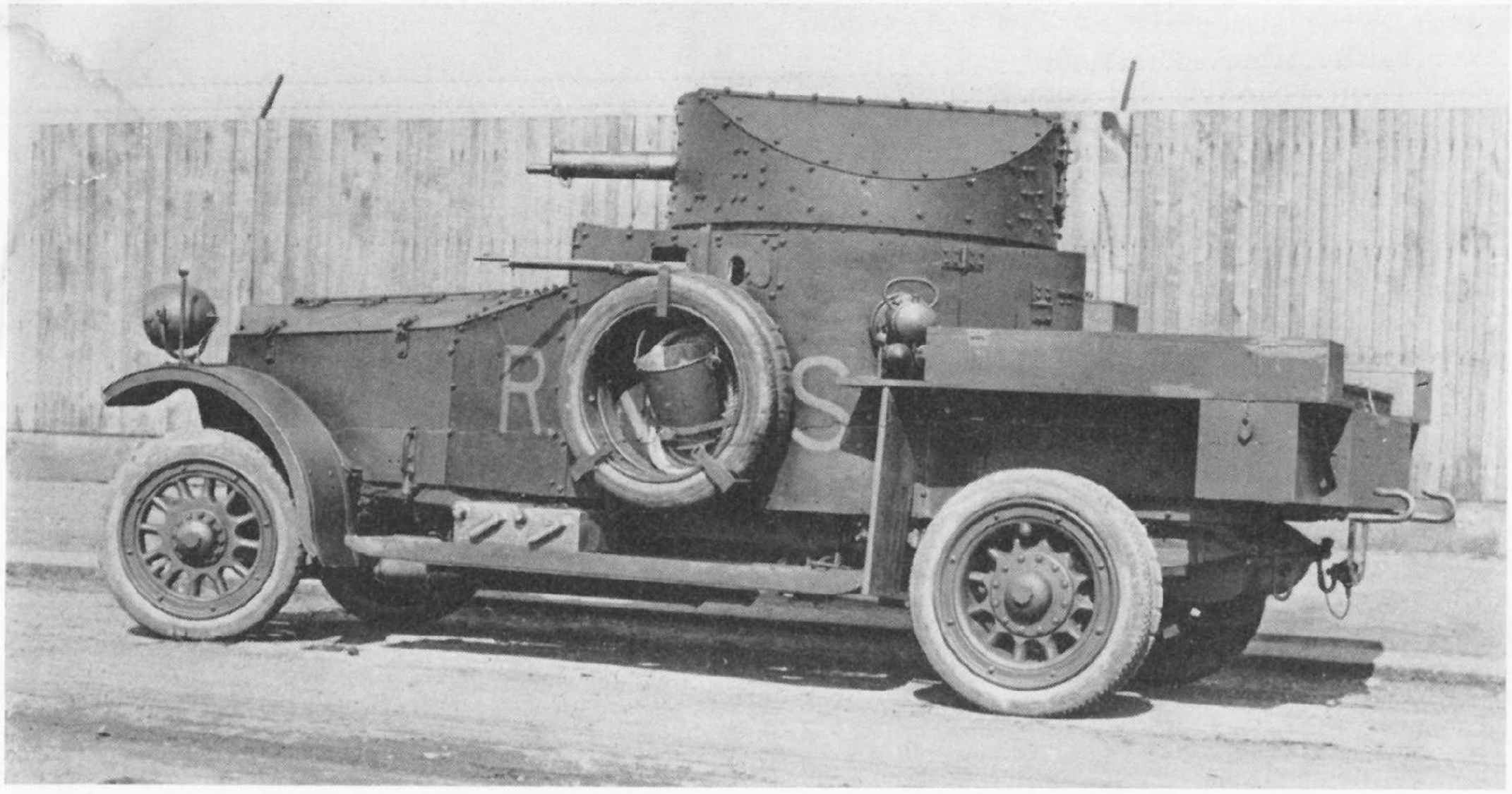
On the other side of the African continent a Lanchester squadron from the RN Armoured Car



Charron 1906. All-round traverse — probably 30 mm. gun. Unditching channels on side. (R.A.C. Tank Museum)

Seabrook armoured lorry and crew, 1915. Muzzle of 3 pdr. gun can be seen behind man sitting above the "S" on vehicle's side. (B. T. White)

Wolseley. First Admiralty open type 1914. (The Times History of the War)



Talbot armoured car. Armament is a Maxim. (R.A.C. Tank Museum)

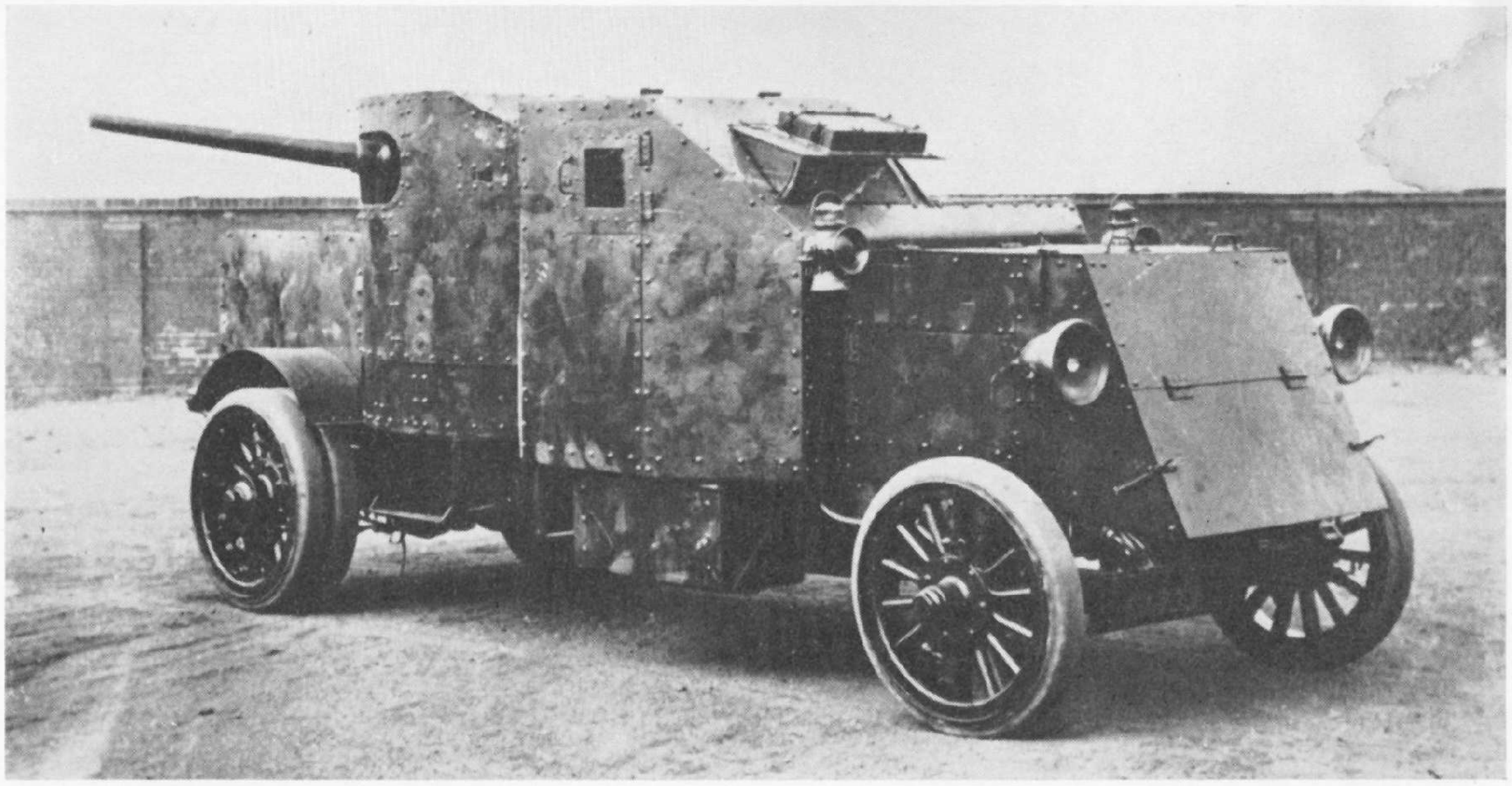
Division and armoured Leyland lorries belonging to the Army were operating from British East Africa against German forces to the south. The situation was not a pleasant one; German troops had advanced northwards and were raiding the Uganda railway which was not only vital for the carriage of supplies but was being extended to facilitate future operations. The going was as bad as in SW Africa but by superhuman efforts the crews managed to get their cars, reinforced by a Rolls section from SW Africa, through the swamps and over the sand until they could be brought into action: in one instance gangs of natives took a complete day to haul four cars through a swamp only a few hundred yards wide, while soft sand meant that the crews had to dig the cars out, jack them up until some sort of firm going could be placed under the wheels to enable the car to drive another few yards before becoming stuck again.

The armoured cars were given the task of patrolling the railway line, both the part in use and also that under construction. They hacked passable roads out of the bush and in a very short space of time had established complete mastery over their sector. Raids ceased abruptly with the infliction of heavy casualties on the raiding parties and the armoured cars were driven, as they put it, "to operations with the mounted infantry to avoid boredom".

One of the most spectacular armoured car operations took place in the Western Desert under the Duke of Westminster. This was the rescue of the survivors from SS Tara, a small cargo ship which had been sunk off the north coast of Africa. Those of the crew who reached shore were captured by the Senussi who took them to Bir Hakim about one hundred miles inland. A force of nine Rolls Royce armoured cars, three unarmoured Ford cars mounting 4 Lewis guns and twenty-eight cars and ambulances made the trip: an easy one by modern standards with low pressure tyres, emergency low gear ratios, wireless, air supply and much knowledge about desert navigation, but a very different story in those days. In the event all the cars got through and the shipwrecked survivors were brought back unharmed. It was a bloodless victory: the Senussi would not face the cars and withdrew before action was joined, but this does not in any way diminish the technical achievement of this first long trip across unknown desert.

In August 1915 the Royal Naval Armoured Car Division was disbanded with the exception of No 1 Squadron which eventually went to Russia under Commander Locker-Lampson. The equipment of the Division was handed over to the Army who broke up the divisional organization in favour of Light Armoured Motor Batteries of the Motor Machine Gun Corps. These were independent units of four or eight armoured cars with supporting tenders and operated in Egypt, Palestine, Syria, Mesopotamia and Persia. The Army only retained the Rolls Royce cars, which had more than proved their worth in reliability, performance and speed, in the armoured car rôle, and supplemented them by Light Car Patrols, independent units equipped with Model T Ford cars with an open box body on which a Lewis gun could be mounted if needed. The Light Car Patrols were unarmoured but their high power/weight ratio gave their vehicles an excellent cross-country performance.

In the Western Desert LAM Batteries took part in operations against the Senussi in 1917. These tribes had been making a considerable nuisance of themselves, raiding the western borders of Egypt, harrying Bedouin friendly to the British and destroying or carrying off herds of cattle, sheep and goats. The raids gradually grew in intensity until they were being carried out in considerable force. The Senussi were repulsed on the border and then withdrew across the desert to the oasis of Siwa over 200 miles from Cairo. Armoured cars and tenders together with a lorry carrying a field gun for covering fire and the necessary supply vehicles crossed the desert to the oasis and engaged the main force of the enemy, which was about 800 strong and equipped with machine-guns and two

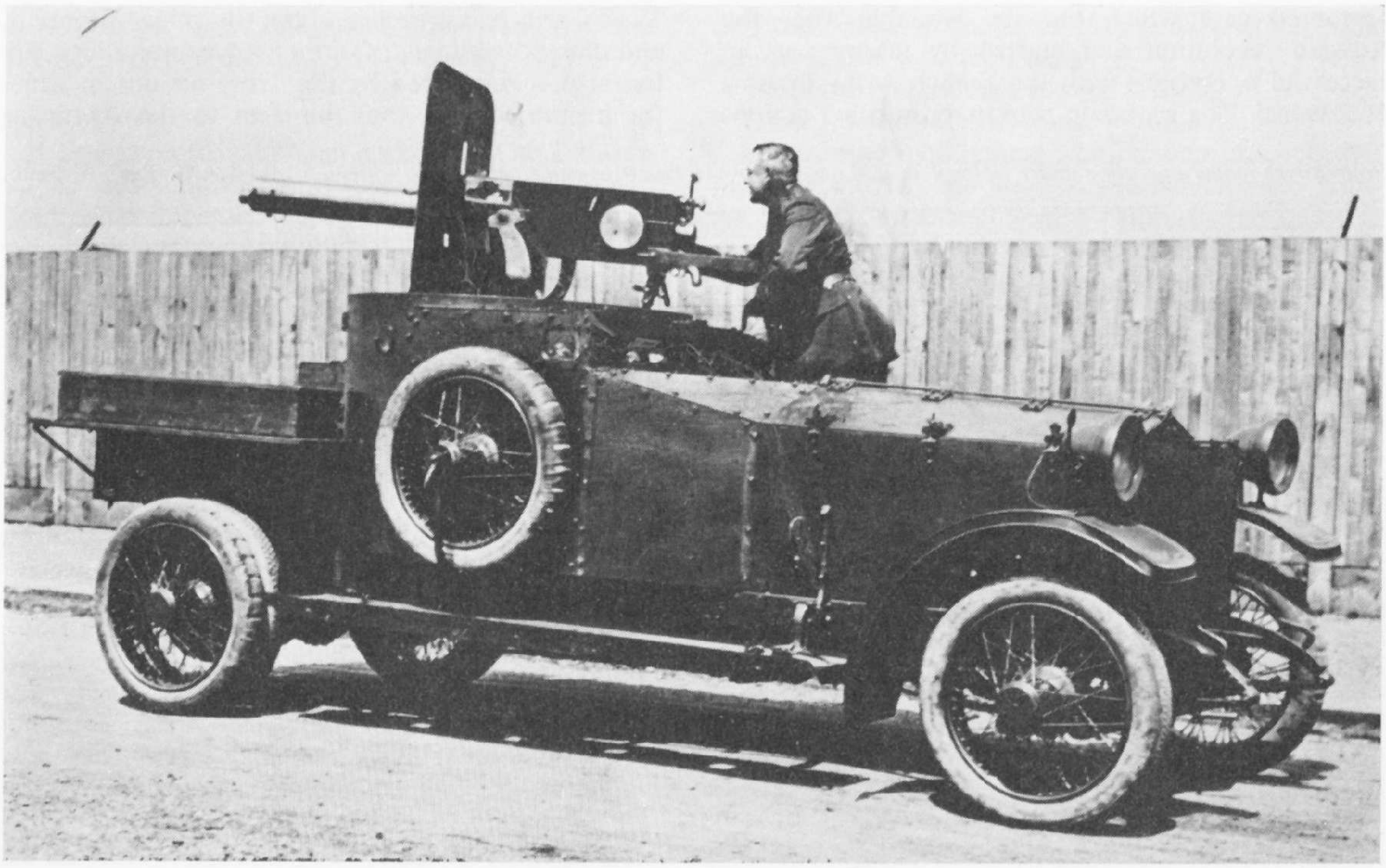


Pierce-Arrow armoured lorry with a 3-pdr. gun. (R.A.C. Tank Museum)

small field guns. A two-day battle ensued in which the superior mobility of the armoured cars brought them success. The enemy were driven off and their camp was destroyed.

As the campaign in Palestine opened out, opportunities for the use of armoured cars presented themselves and LAM Batteries were often in action. Throughout this campaign Colonel T. E. Lawrence was working with the Arabs and was continually supported by armoured cars and by Rolls Royce tenders. He refers to one tender known as Blue Mist. This was a Rolls Royce 1913 Silver Ghost requisitioned in England for the RNAS and subsequently taken over by the Army. Its War Office number was LC 305 and after taking part in all Lawrence's operations it came back to the 4th Armoured Car Company of the Tank Corps and was later handed over to the RAF in 1922. Its total mileage was not known; but when it went to the RAF the log-book showed a total of over 100,000 miles and it was still in excellent condition. Armoured cars operating with Lawrence were, on occasion, supported by Talbot cars mounting a 10 pdr. mountain

Rolls-Royce 1914 pattern mounting a 1-pdr. pom-pom. This was an experimental model. (R.A.C. Tank Museum)



Leyland armoured lorries for the East African campaign outside the Leyland works. These were Army vehicles. (R.A.C. Tank Museum)

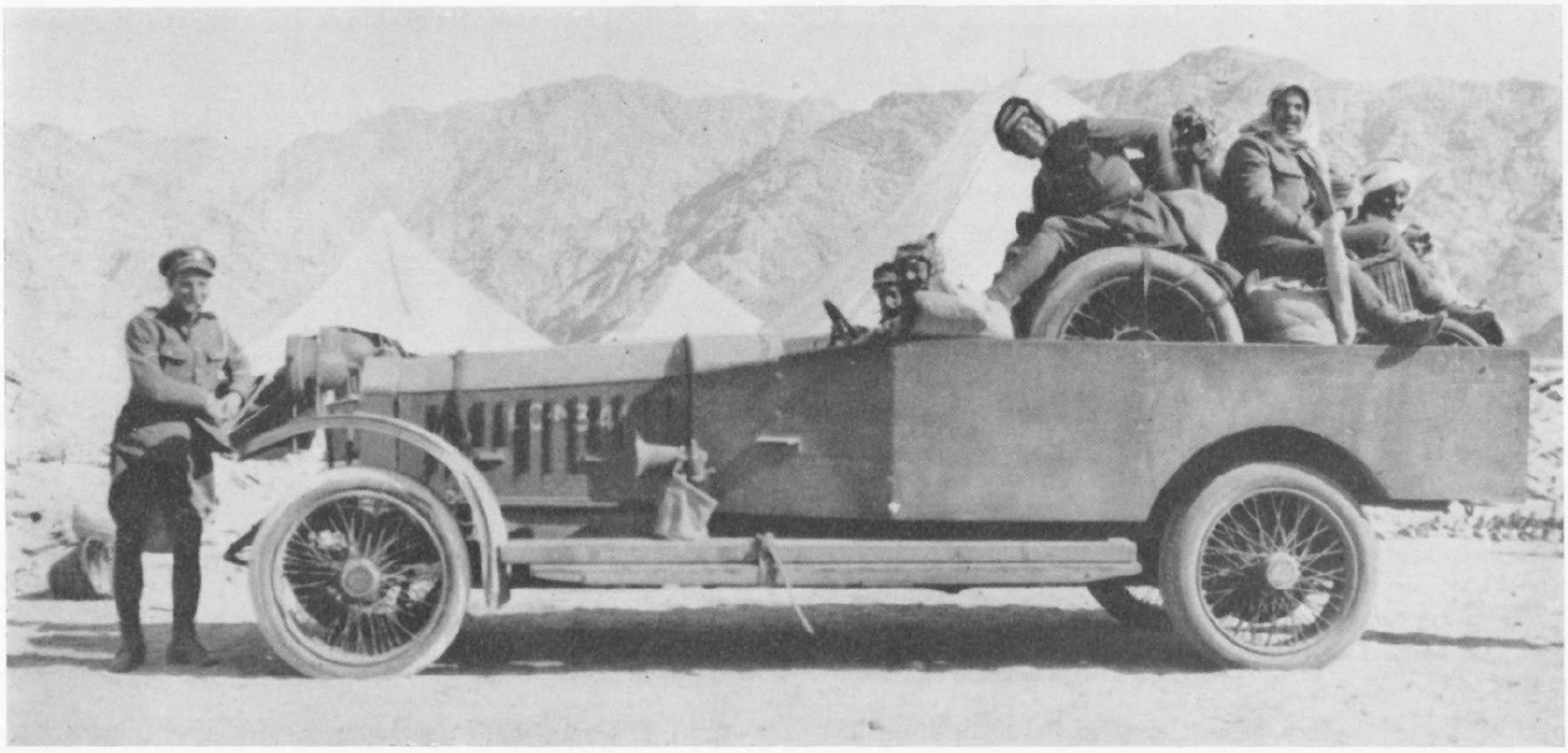
gun. The fire of these guns was invaluable but the extra load gave trouble with the chassis.

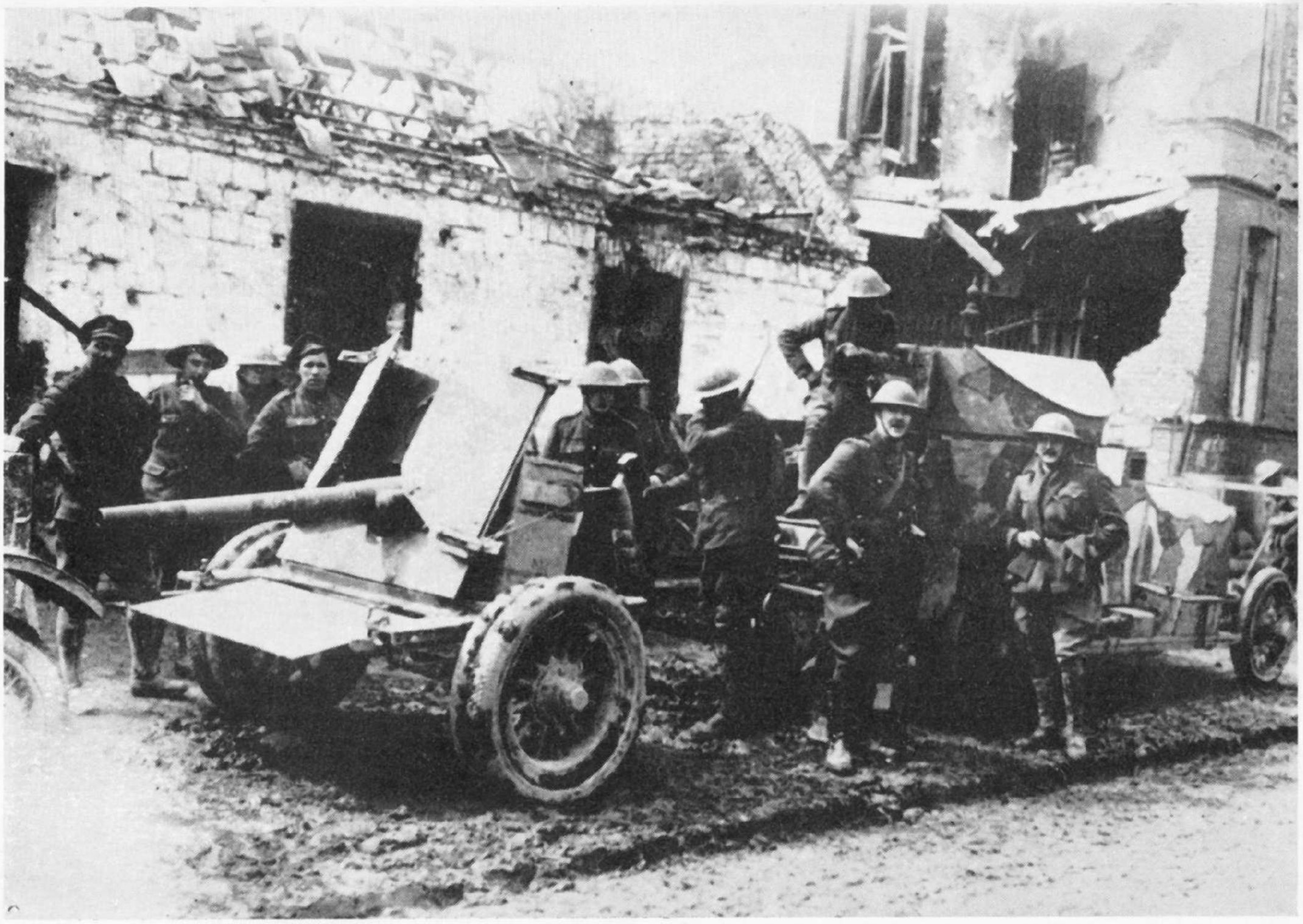
The 17th (Armoured Car) Bn. Tank Corps

In France opportunities for successful armoured car operations had apparently come to an end with the advent of the continuous trench line from the North Sea to Switzerland. However in 1918 the 17th (Armoured Car) Battalion Tank Corps was formed and went overseas to France in April, ready to take part in operations following the repulse of the German advance in March. The unit was equipped with Austin armoured cars which became available after the Russian revolution and started by taking part in successful operations with the French Army in June at Ravenel. The battalion took part in other actions with the French returning to the British Army in time to take part in the Battle of Amiens on August 8, 1918. For this battle the cars were towed across the trenches and over the shelled ground in pairs on a tow rope behind a tank. They were released when they met good going and by 1000 hrs. had captured a German Corps HQ some ten miles behind the front line. They spent the remainder of the day shooting up German supply columns, artillery lines and reserve formations, completely denying the use of two most important lateral roads to the enemy.

It was a striking demonstration of all that the Tank Corps had preached about the value of mobility and the possibilities of armoured exploitation. The lesson was reinforced by the many actions in which the armoured cars took part up to the Armistice.

Rolls-Royce tender operating under Colonel T. E. Lawrence in the Palestine campaign. (R.A.C. Tank Museum)





Camouflaged Rolls-Royce with captured German gun in tow, Arras 1917. (R.A.C. Tank Museum)

They set the seal on their achievements by being the first British Troops to cross the Rhine in 1918. In 1945 the flag that they carried across the Hohenzollern Bridge was brought out from England and was carried across the Rhine once again, this time by the 4th Royal Tank Regiment who were the first British troops to cross the river on March 23, 1945.

Russia

No 1 Squadron Royal Naval Armoured Car Division escaped disbandment in 1915 and remained in Flanders until October when it returned to England before being sent to Russia. The Russians themselves had about 500 armoured cars in service. This was the largest number employed by any country, and included many British-built Austins.

The squadron was equipped with Lanchester armoured cars among which was one Rolls Royce. Their operations ranged from the White Sea to Persia but records are scanty: the squadron disembarked at Archangel in June 1916 and was then sent by train to Vladikavkas. It then travelled by road, or at least across country because roads were non-existent, until it reached Ezeroum where it took part in operations against the Kurds. On conclusion of these operations the squadron moved to Odessa and thence by sea to Roumania. They took part in the Dobrudja retreat, spent the winter at 40 degrees below zero, and then moved to Galicia to take part in operations connected with General Brussilov's offensive. After the failure of this movement the unit returned to England having covered over 53,000 miles as registered on the speedometers of the cars concerned.

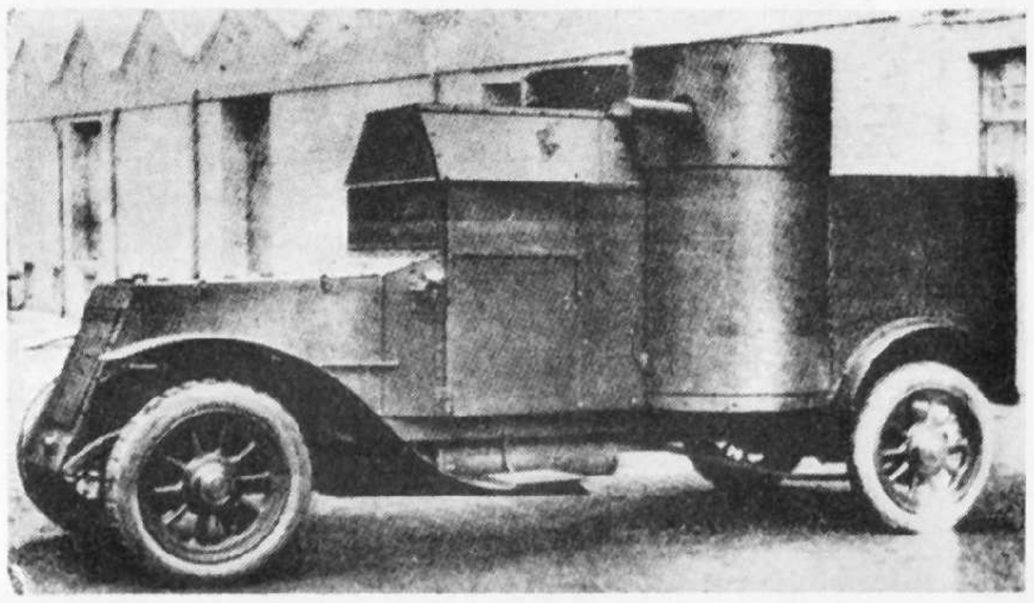
India

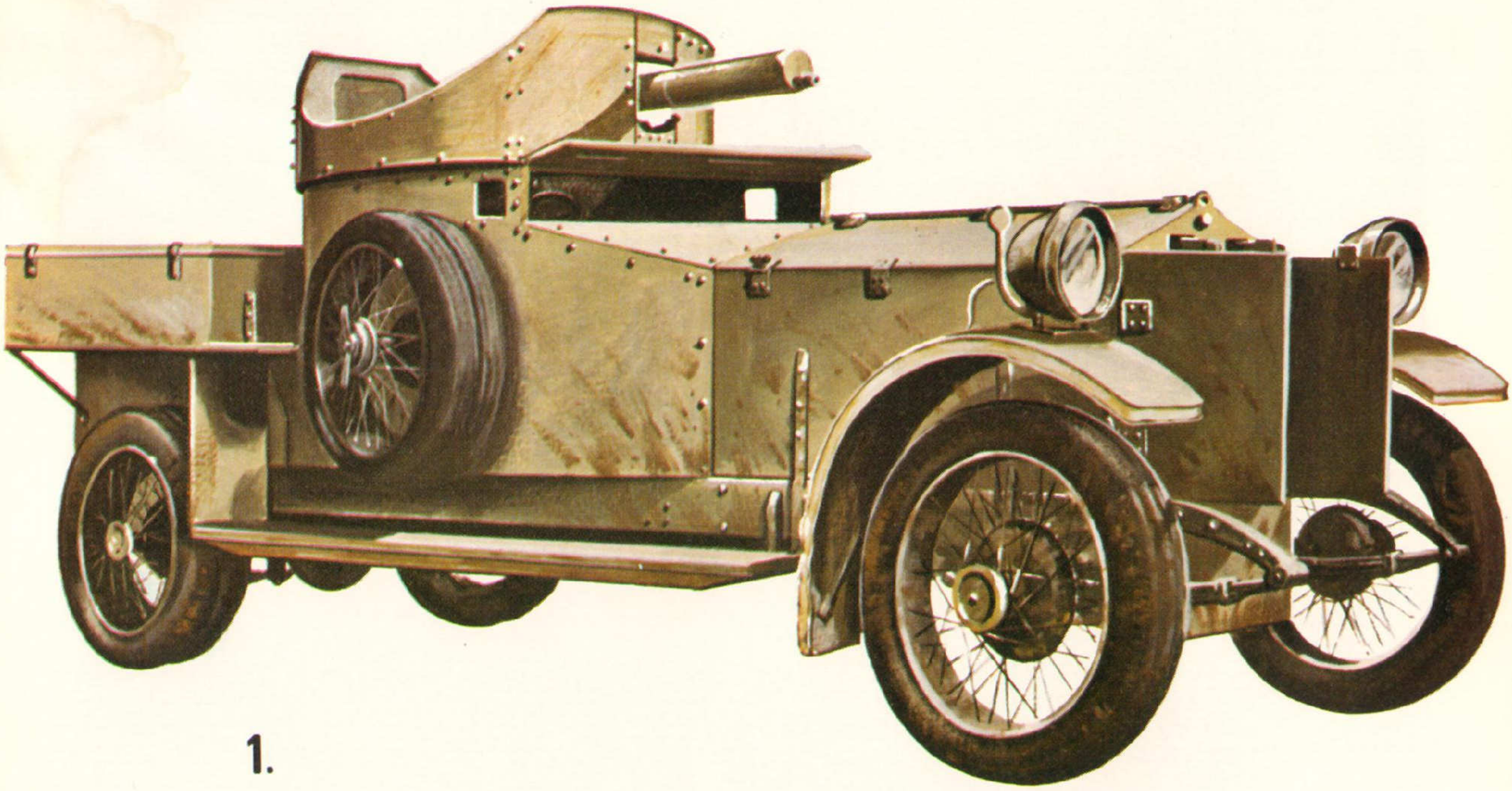
The other side of the British development of armoured cars took place in India. In 1914 it was decided that armoured cars were required

i For use on the NW Frontier of India
ii For internal security duties in India itself.

The frontier requirement was for some arm speedier than the current mobile columns which were composed of all arms and were so slow that they never caught raiding tribesmen who always got away to their own territory unscathed. The need to send men overseas meant fewer troops in India and the situation

Austin armoured car as supplied in large quantities to Russia until the Revolution. The high roof of the driver's cab restricted the traverse of the Vickers machine-guns.
(R.A.C. Tank Museum)





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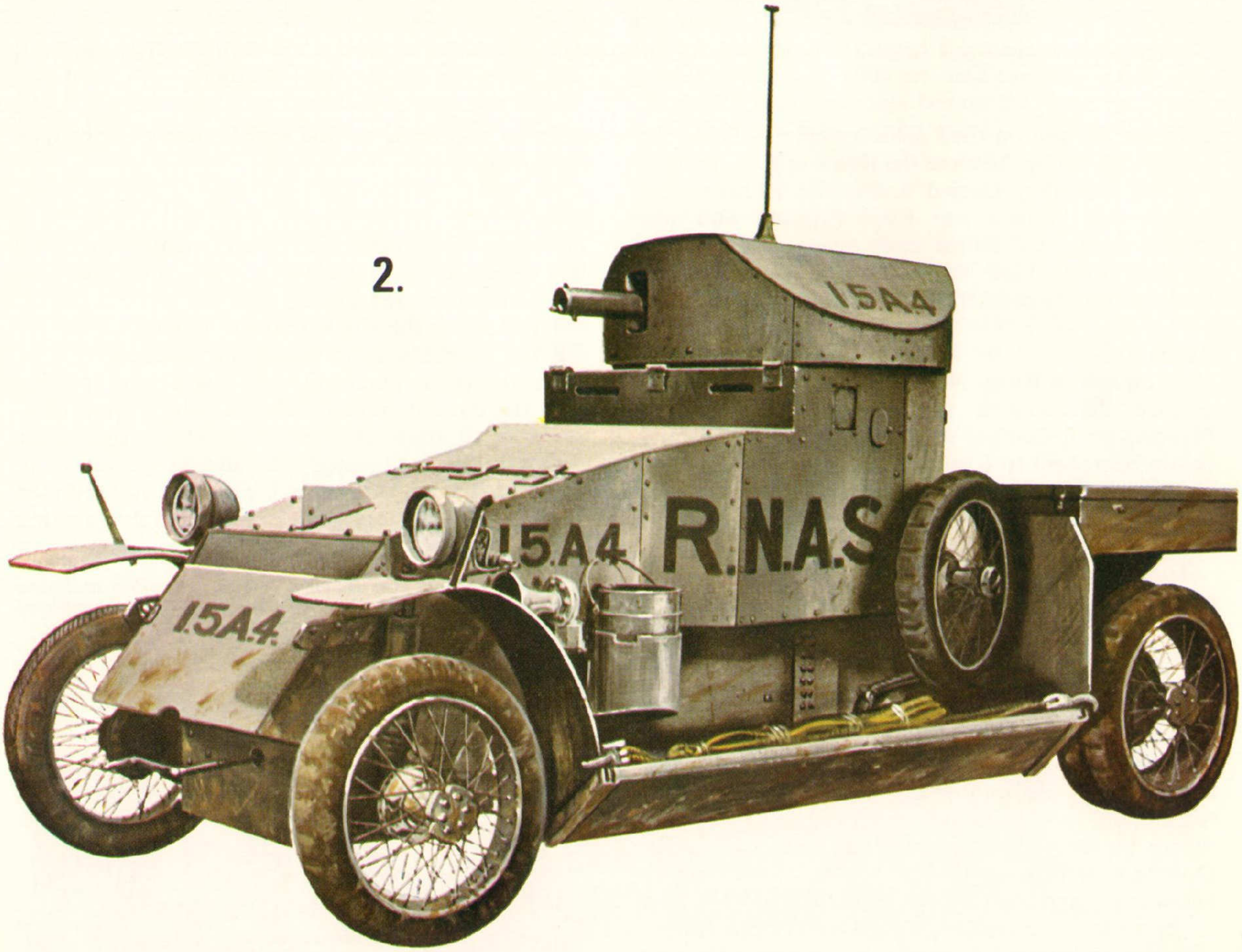

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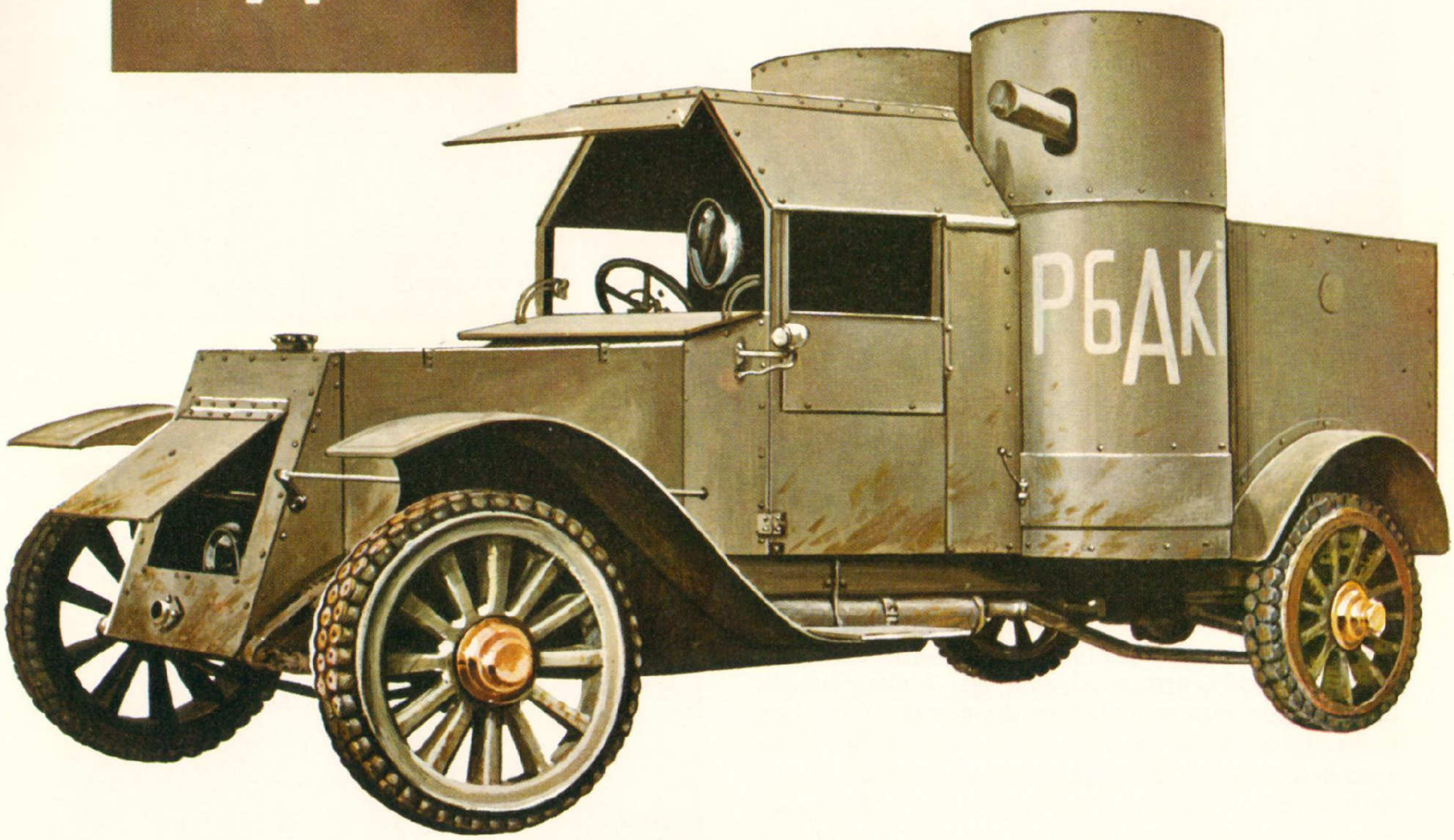
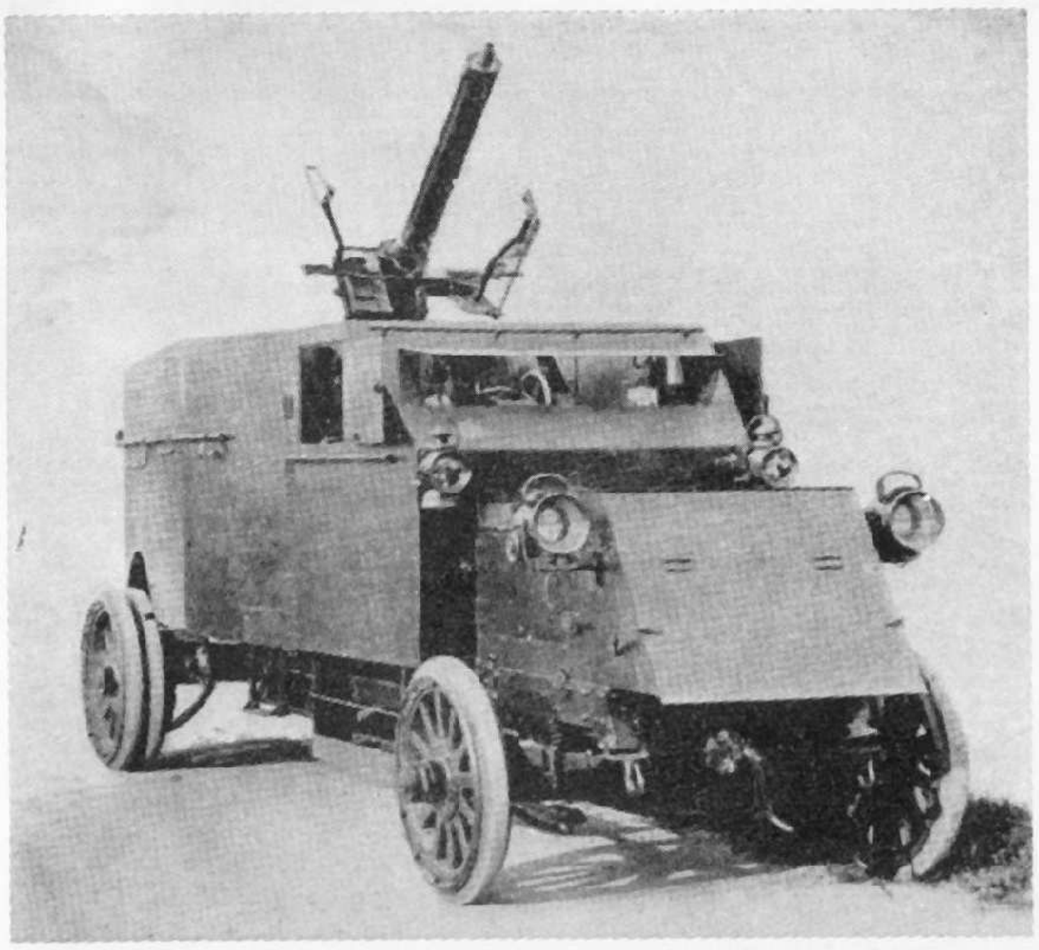


Rolls Royce armoured car 1914 pattern. Top of turret has been removed as in all armoured cars used in the Western Desert in 1916.

Lanchester armoured car 1915. Next to the Rolls Royce there were more Lanchester armoured cars in British service than any other make. Two squadrons of the Royal Naval Air Service Armoured Car Division were equipped with Lanchesters.

Austin in Russian service with extra-spoked wheels and K.T. type studded tyres. (Inset) Russian inscription on car. Same lettering appears on back of car.



Peerless armoured lorry, 1915-16. One of the first anti-aircraft AFVs. Armament was a 1-pdr. pom-pom. The chassis was imported from the United States. Vehicle was chain-driven, and had acetylene lighting and solid tyred artillery wheels.
(R.A.C. Tank Museum)

Austin of 17th (Armoured Car) Bn. Tank Corps. The height of the driver's cab has been lowered giving wider traverse to the two Hotchkiss machine-guns. (R.A.C. Tank Museum)

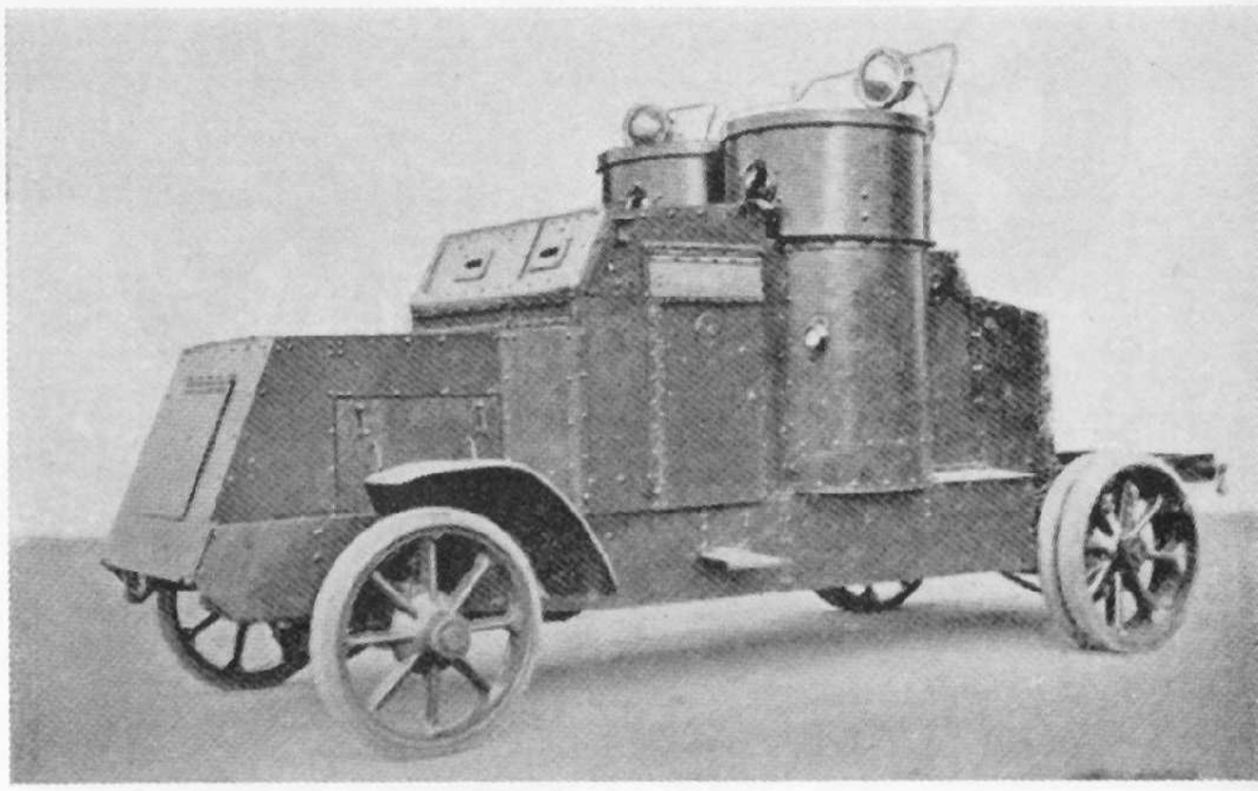
became so acute that it was only just possible to hold the Frontier against the raiding tribesmen who love fighting and who have been described as the "world's best minor tacticians". To oppose them armoured cars were to be located at the main frontier garrisons.

Their organization was based on a 3 car battery which was the indivisible tactical unit and usually had at least one tender for stores and ammunition. Touring cars were requisitioned and converted to an open box body, armoured with ¼in. boiler-plate. A machine-gun was mounted in the centre of the box body. Guns were in very short supply but were eventually found from garrison cantonment forts, designated as rallying points in case of serious internal disturbances. One car actually mounted a ten-barrelled Gatling gun, hopper fed and actuated by a handle, rather like a barrel organ: the rest had ·45in. Maxims firing a solid lead bullet with a low muzzle velocity and a slow rate of fire, 250 r.p.m.: the resultant high trajectory was very useful in boulder covered country. HQ Armoured Cars was established at Peshawar where there was also a School with three wings; Tactical, Machine-Guns and Mechanical. It must be remembered that the motor car was rare in India and drivers and crews had to be trained *ab initio*.

Long range machine-gun fire was constantly employed, up to 2,000 yards. Communications from car to car were by flag, from battery to the HQ under which it was working, by flag signal or heliograph or else by field telephone, tapping into the military network that linked all garrisons.

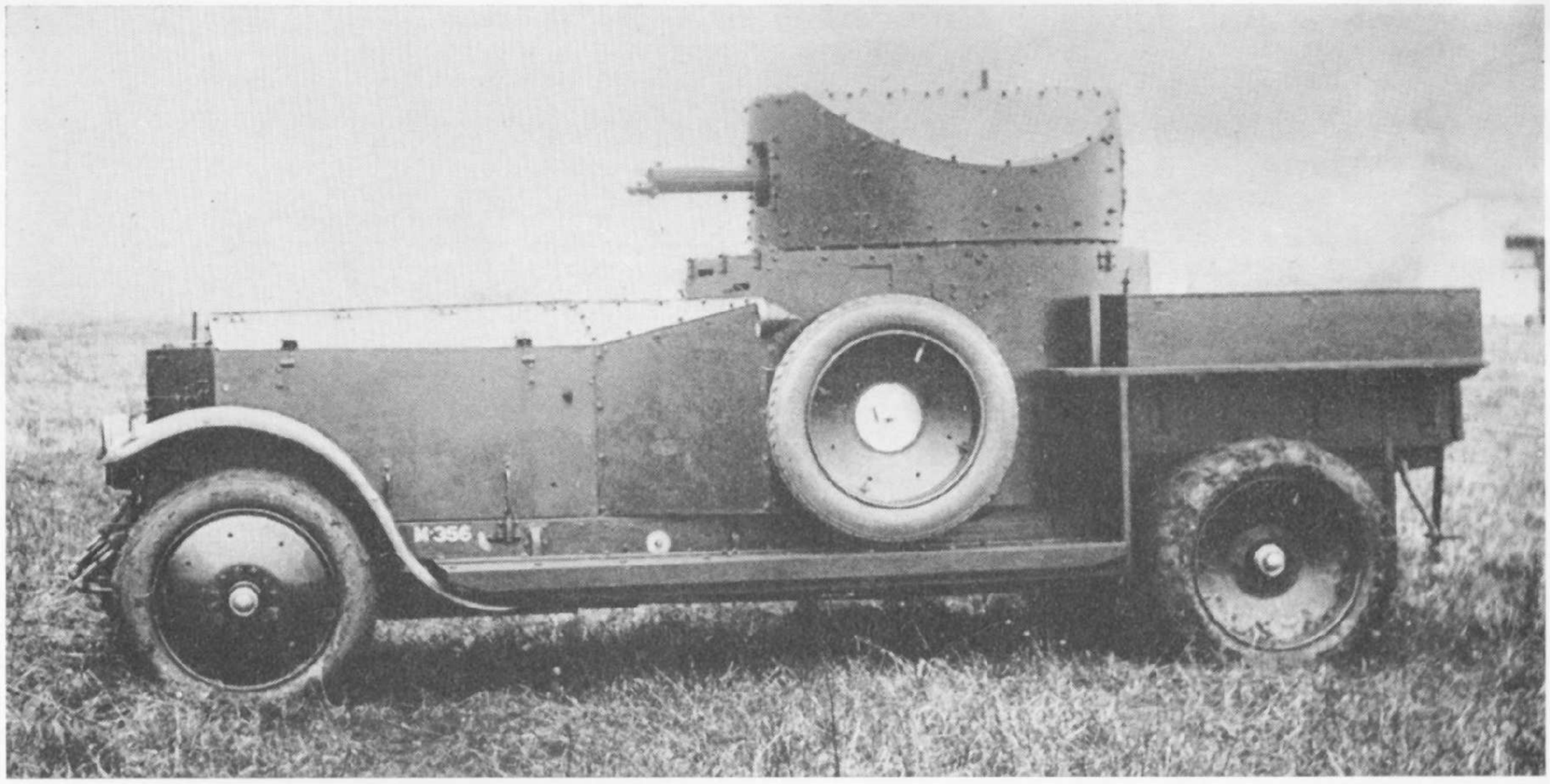
By 1915 the armoured car force was trained and organized to run a variety of cars including Rolls Royce, Mercedes, Lanchester, Daimler, Benz, Fiat, Hotchkiss, Straker Squire and various American makes–always requisitioned in "threes" for convenience in making up batteries but usually of different models. Spares and tyres were a constant trouble.

Apart from continual Frontier disturbances, the armoured car highlights during 1916-1919 were the Mohmand rising in 1916 under Haji Mullah who proclaimed a Holy War against the English and with organized aid from the Turks and Germans gave a good deal of trouble. A Field Force sent against the Mullah carried out its task successfully with its flanks guarded by armoured cars–a quicker and more



Peerless 1919 with ex-Austin twin-turretted body that was too short for chassis. (R.A.C. Tank Museum)

Rolls-Royces (1920 pattern) of 12th Armoured Car Company, Royal Tank Corps. (Frank Mitchell)



Rolls-Royce 1920 pattern. Armament is a Vickers machine-gun. (R.A.C. Tank Museum)

efficient way of doing this task than sending out parties of cavalry who became embroiled on withdrawal, requiring another operation to get them clear of the enemy. The Mohmands were eventually contained by a blockade line consisting of blockhouses connected by tracks which were patrolled by armoured cars. These tracks were very rough and the bad going caused many mechanical casualties to the overloaded chassis.

In 1917 the force was increased by 6 Rolls Royce and 40 Jeffrey Quad armoured cars: the latter was a four-wheel drive vehicle of American origin whose maintenance, following the torpedoing of the ship carrying spares, was always very difficult. Thereafter matters were fairly quiet, except for the continual tribal activity and raids on the Frontier until 1919 when serious internal rioting broke out, culminating in the Punjab disturbances in March followed a month later by the Amritsar episode. No sooner was this over than the 3rd Afghan War broke out. The Afghan Regular army was soon disposed of and they sued for an armistice in September. Their activity had triggered off a wave of unrest and set the Frontier ablaze: all the tribes took up arms, the frontier militia, armed by the British to keep order, deserted with one exception and the outbreak was not brought under control until Waziristan was occupied, an operation which began in 1919 and was completed the following year. The Frontier then remained quiet, relatively speaking, until 1939.

War experiences had convinced the Indian Government of the value of armoured cars and they were preparing to include them on the establishment in 1920. The proposal was abandoned in favour of Armoured Car Companies of the Tank Corps who took over responsibility for this duty in 1921.

MECHANICAL CHARACTERISTICS

All cars that were armoured and all armoured cars used by the RNAS and the Army during World War 1 were on 4 x 2 chassis. No successful front wheel drive cars or lorries were built in Great Britain at the time and with two exceptions, the Austin and

Belgian armoured cars at Houthem, between Ypres and Comines, September 9, 1917. The Belgians were the first to use armoured cars in the war. (Imperial War Museum)

French armoured car in support of British troops at Meteren during the Battle of the Lys, April 16, 1918. The French had about 300 armoured cars in 1918, most of them based on the American White truck chassis. (Imperial War Museum)

Peerless armoured cars, no provision was made for an alternative steering position to facilitate the handling of the vehicle in reverse. Standard car chassis were used, in some cases reinforced by tie bars parallel to the main members, running over king posts and tensioned by turnbuckle.

An outstanding feature of these cars was their accessibility: engines were simple and monobloc construction was only coming in at the time. Side valves were the order of the day, usually covered by valve caps, one of them carrying the sparking plug, through which a defective valve could be replaced without disturbing the cylinder block. The other valve cap often had a compression tap through which the engine could be primed if starting was difficult–as it often was. Inlet and exhaust manifold were separate castings and virtually no attempts were made to preheat the mixture by warming the induction pipe. With very few exceptions where a full pressure system was used lubrication was a somewhat haphazard affair. Oil was poured into the sump and thrown about the inside of the engine by the connecting rod big ends which dipped into it. More refined engines had troughs into which the big ends dipped. These were filled by a low pressure engine-driven pump whose operation could be checked by sight feed lubricators—glass tubes on the dashboard where oil could be seen dripping to the troughs.

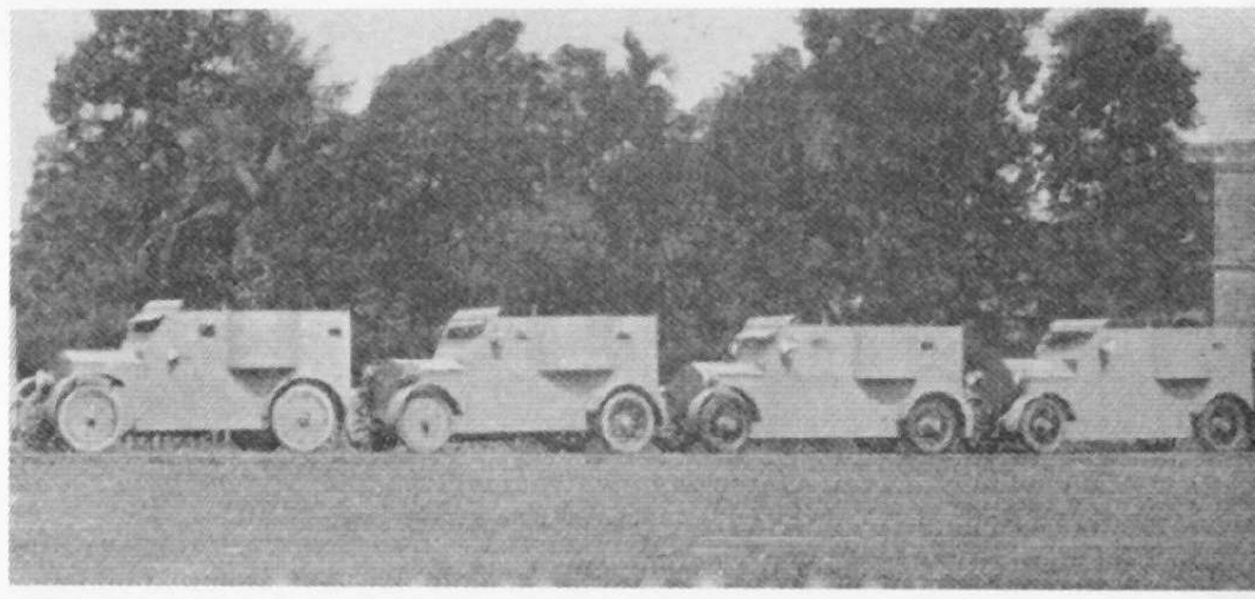
Arrangements were made for the carburettor mixing chamber to be warmed on the more expensive cars. A conventional float chamber was common and fixed multiple jet carburettors were in vogue. Petrol was fed by gravity from a dashboard tank where possible but there were obvious limitations to the size of the tank that could be installed. Larger cars used a rear tank and favoured an air pressure system to get the petrol to the carburettor. A small pump driven off the engine or the gearbox maintained the pressure which was initially raised by a hand pump on the dashboard. An alternative system was the Autovac which was a vacuum tank operated by the depression in the inlet manifold: this kept a small gravity tank full of petrol by a system of valves embodied in the instrument and so maintained the level in the float chamber.

Magneto ignition was almost universal: the German firm of Bosch had established what was almost a world-wide monopoly in the construction of these instruments and considerable trouble was experienced in the provision of magnetos to meet the expanding British motor industry. Battery ignition was provided as an alternative means of ignition on expensive cars, using trembler coils, while at the other end of the scale, the Model T Ford, used for light car patrols—had a low tension dynamo in the flywheel which supplied current to four trembler coils, one for each cylinder.

Gearboxes were of the sliding pinion type: gears were straight cut with a direct drive on top and no form of synchro-mesh mechanism was in existence: considerable skill was needed to avoid unpleasant noises and damage both changing up and down while accurate "double declutching" technique was always needed to maintain speed on hills.

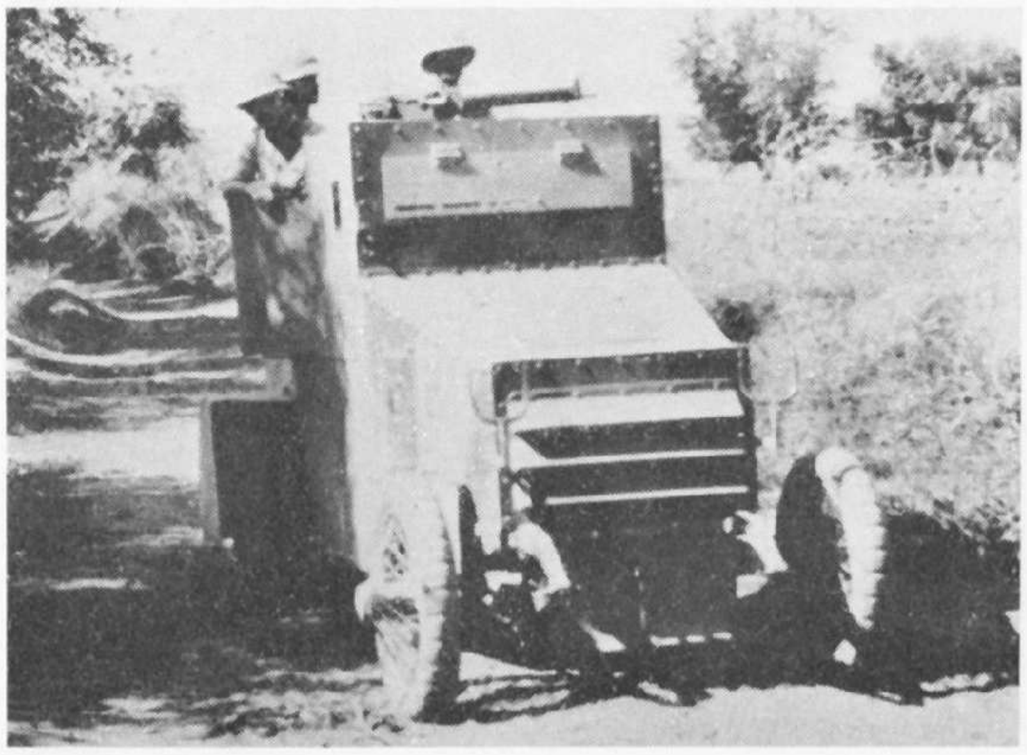
Engine and gearbox were separately mounted; the engine flywheel and clutch mechanism being in the open. A short shaft with universal joints at each end took care of any minor misalignments. Cars using an enclosed propellor shaft and a torque tube proved more suitable for armoured car work than those which took the torque through their springs. There were no front wheel brakes: a transmission brake operating on a drum on the cardan shaft was in common use but imposed a considerable strain on the transmission. The small diameter of the rear wheel brake drums and the narrow section of the brake shoes in common use accentuated the problems of stopping a car carrying a four ton armoured body.

Lorries, notably the Peerless and the Seabrook, used chain drive to the rear wheels running from chain

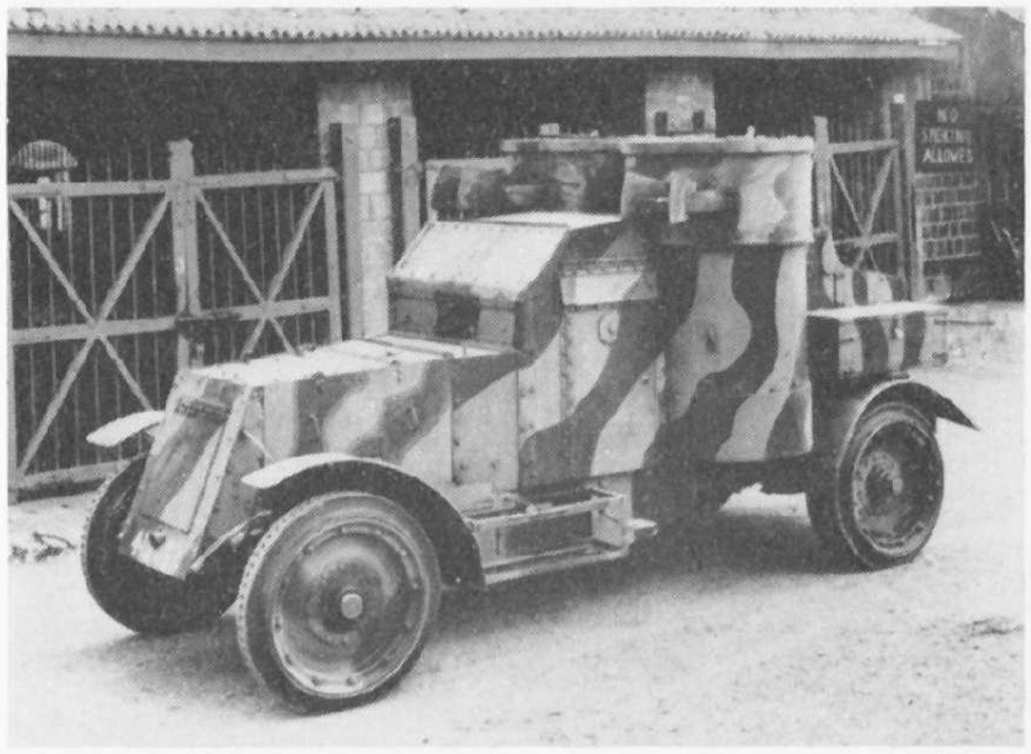


Fiats armoured in India, 1915. (R.A.C. Tank Museum)

Rolls-Royce armoured in India and armed with a Vickers machine-gun. This is the car, No. 2641, later known as Wedding Bells. (R.A.C. Tank Museum)



Austin as used in India. Two Vickers machine-guns. NAP (normal air pressure) semi-solid tyres. (R.A.C. Tank Museum)



sprockets on a cross shaft immediately behind the gearbox. The chains were not enclosed and wear was heavy, but this was the standard final drive for lorries of the period.

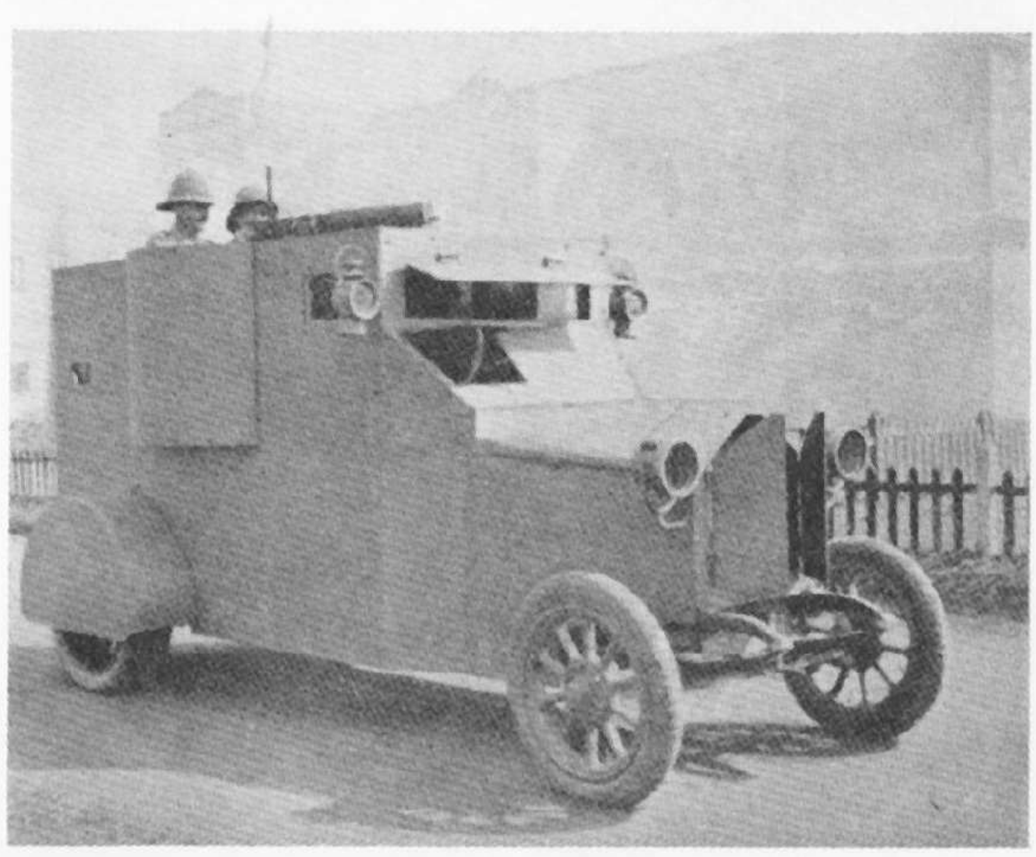
The high pressure narrow section pneumatic tyres and the solid pattern used on lorries at the time were heavily loaded. To reduce the loading figure and to improve cross-country performance twin wheels were in common use for the back wheels. To obtain immunity from small-arms fire tyres filled with a semi-solid material replaced the pneumatic covers. They were not very satisfactory: if the car was allowed to stand still for any length of time, a "flat" was apt to form on the tyre which gave a very uncomfortable ride until sufficient heat had been generated to restore some fluidity to the filling and to allow centrifugal force to restore the tyre to circular shape again.

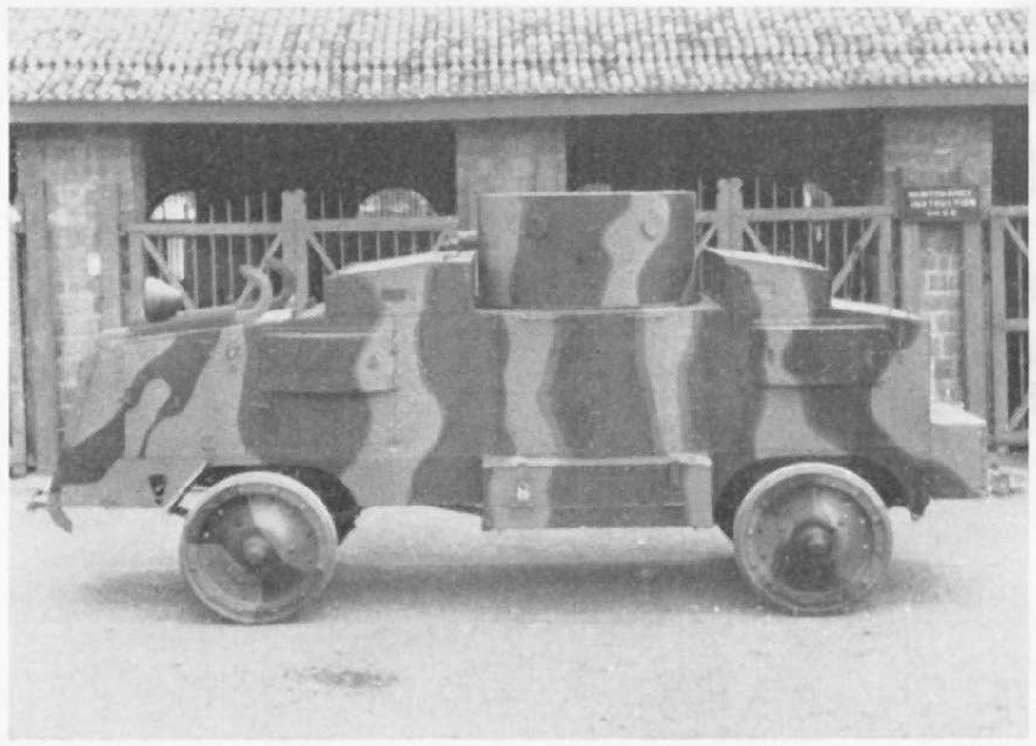
Pneumatic tyres built on a casing of natural rubberised canvas gave a good deal of trouble under the loads they had to carry. Storage arrangements were primitive and deterioration was rapid: after World War I one armoured car, travelling from Amman, in what was then Transjordan, had twenty-five punctures or bursts and ruined twelve covers before it reached the River Jordan—a distance of about forty miles, admittedly over bad roads. The disc wheel was unknown. Either wire-spoked or artillery pattern wheels were in use and a large proportion were non-detachable. For them a Stepney rim could be attached in case of a puncture: this was a rim carrying a cover and tube which could be attached to the wooden spokes by means of clamps, after the car had been raised by a jack.

ROLLS ROYCE 1914 PATTERN

The Rolls Royce, which was the most successful armoured car, weighed 3½ tons with the Admiralty pattern body mounting a machine-gun in a revolving turret. The chassis were Silver Ghosts unmodified except for the springs which were rebuilt with thirteen stouter leaves in front and fifteen in the cantilever rear springs. A gravity petrol tank holding six gallons was built in behind the dash and twin rear wheels were fitted: these cars were still in service in 1922.

Standard 1915. The first car to be completed at the East Indian Railway Workshops, Lillooah, near Calcutta, where requisitioned touring cars were converted to armoured cars. Others were converted at the North-Western Railway Workshops at Lahore.
(R.A.C. Tank Museum)





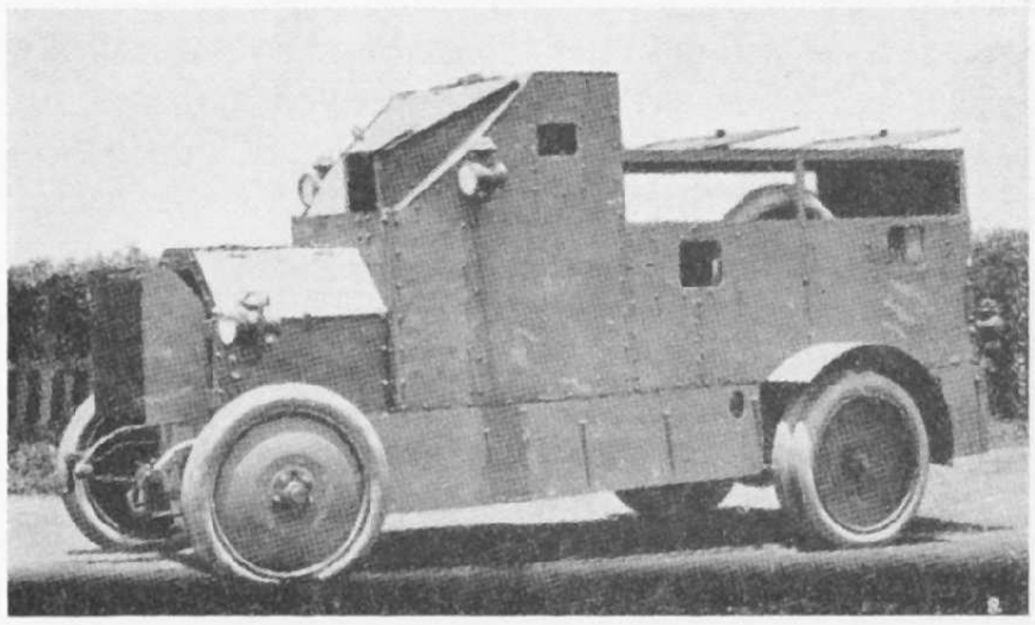
Jeffrey Quad 1917. One ·303 Vickers MG. Alternative steering position. Solid tyres. (R.A.C. Tank Museum)

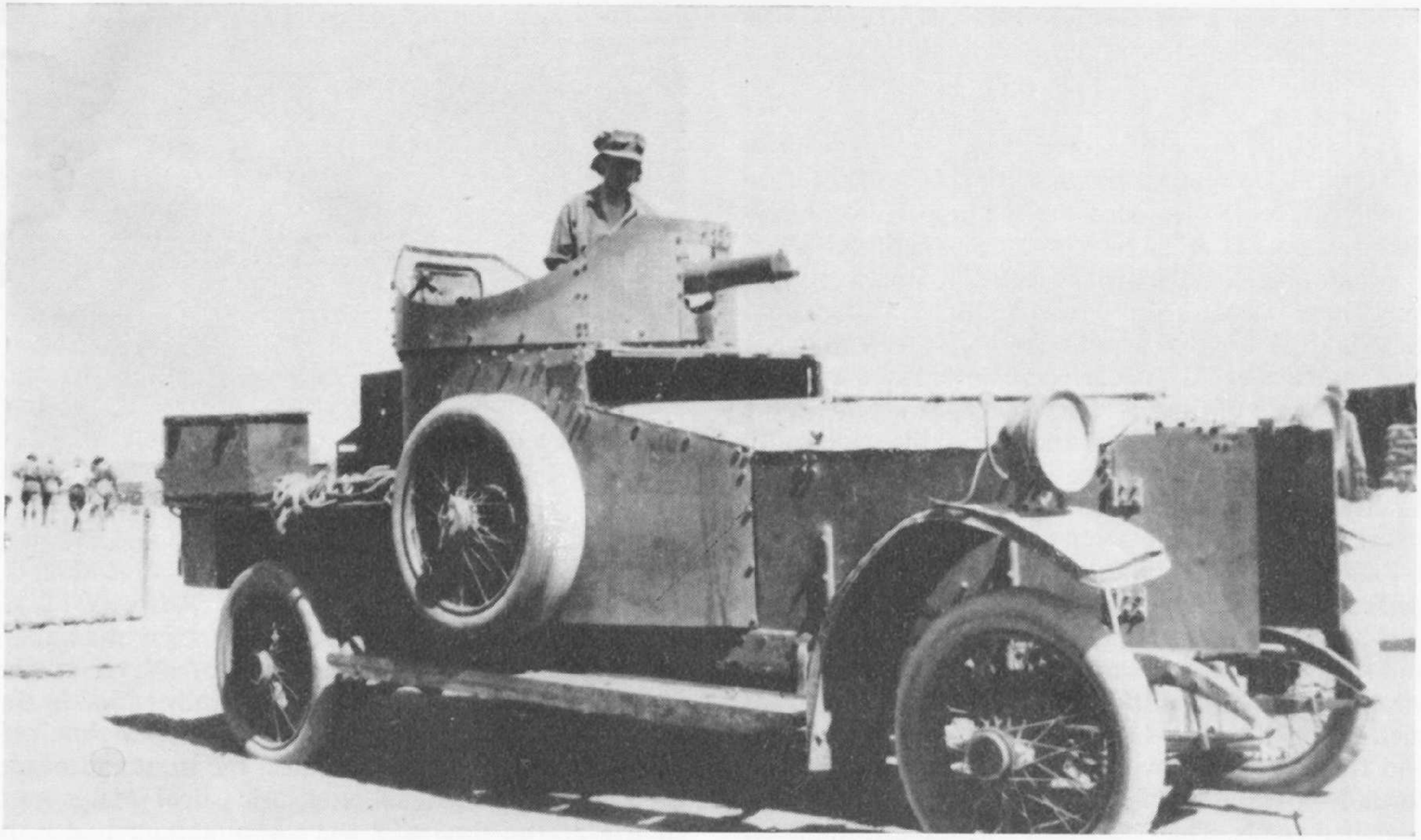
Petrol was supplied to a Rolls Royce twin jet carburettor with dashpot control of the jet and a mixture device which could be altered by a lever on the steering wheel. Air pressure was initially raised in the rear tank by a hand pump and was thereafter maintained by a mechanical pump driven off the front end of the layshaft. No mechanical or electric petrol pumps were in use at the time and the vacuum tank had only recently been introduced.

The engine had full pressure lubrication including special provision for the small ends of the connecting rods and a device to lubricate the lower portion of the piston on acceleration: cast iron pistons were used on this model. There were two three-cylinder blocks mounted on an aluminium crankcase. The mixture flowed through a long induction pipe which passed right across the engine to the near side where it was distributed to the inlet ports. The mixing chamber was water-jacketed but otherwise there was no heat for the induction pipe. It always worked but petrol consumption was heavy; 8-10 mpg on good going and less if much low gear work was involved.

These cars had dual ignition with one sparking plug in the inlet valve cap and one in the centre of the head. No self-starter was provided but the battery operated through an ignition trembler coil. In theory the engine was pulled over with the ignition "Off" and the mixture control set to "Start". The battery ignition was then switched "On" and movement of the ignition lever made one or other plug fire. In post-war days when batteries were either non-existent or faulty the cars had to be started on the Bosch magnetos by swinging the engine: hard work on a cold day and a

A 1915 Indian-converted Fiat. (R.A.C. Tank Museum)





Rolls-Royce Cockatrice *in the Western Desert, May/June 1916.* (Imperial War Museum)

painful business with the radiator doors to trap an unwary hand.

CAV lighting systems were standard: no cut-out was fitted to the dynamo which could run as a motor through a free wheel if the engine was stopped. When this happened the free wheel gave a series of ringing clicks as a warning to switch off the dynamo circuit.

ROLLS ROYCE 1920 PATTERN

Like the 1914 pattern this was also a Silver Ghost, the engine showing virtually no difference in layout from the earlier model. Aluminium alloy pistons had replaced the cast iron pattern and a self-starter operating through the gearbox had been fitted. Cylinder walls had been specially treated to reduce wear and a larger radiator header tank replaced the standard civilian pattern. The radiator doors were provided with louvres to keep down the temperature when in action and, to the great relief of the crews, a mechanically driven air pump, operated from the front end of the magneto driving shaft, had been fitted.

Steel disc wheels, retained by wheel nuts, had replaced the wire-spoked pattern with its complicated but excellent locking device: tyres were of a larger cross-section with a better cross-country performance.

Chassis lubrication had not improved. Grease guns and one shot systems were still far away and lubrication was effected by Stauffer cups—little brass cylinders which were unscrewed, filled with grease and then replaced to force the grease to the bearing: a laborious and messy business.

LANCHESTER

Next to the Rolls Royce there were more Lanchester cars in the armoured rôle than any other. However they fade out with the disbandment of the RN Arm'd Car Division in 1915 with the exception of those sent to Russia with Commander Locker-Lampson in 1916.

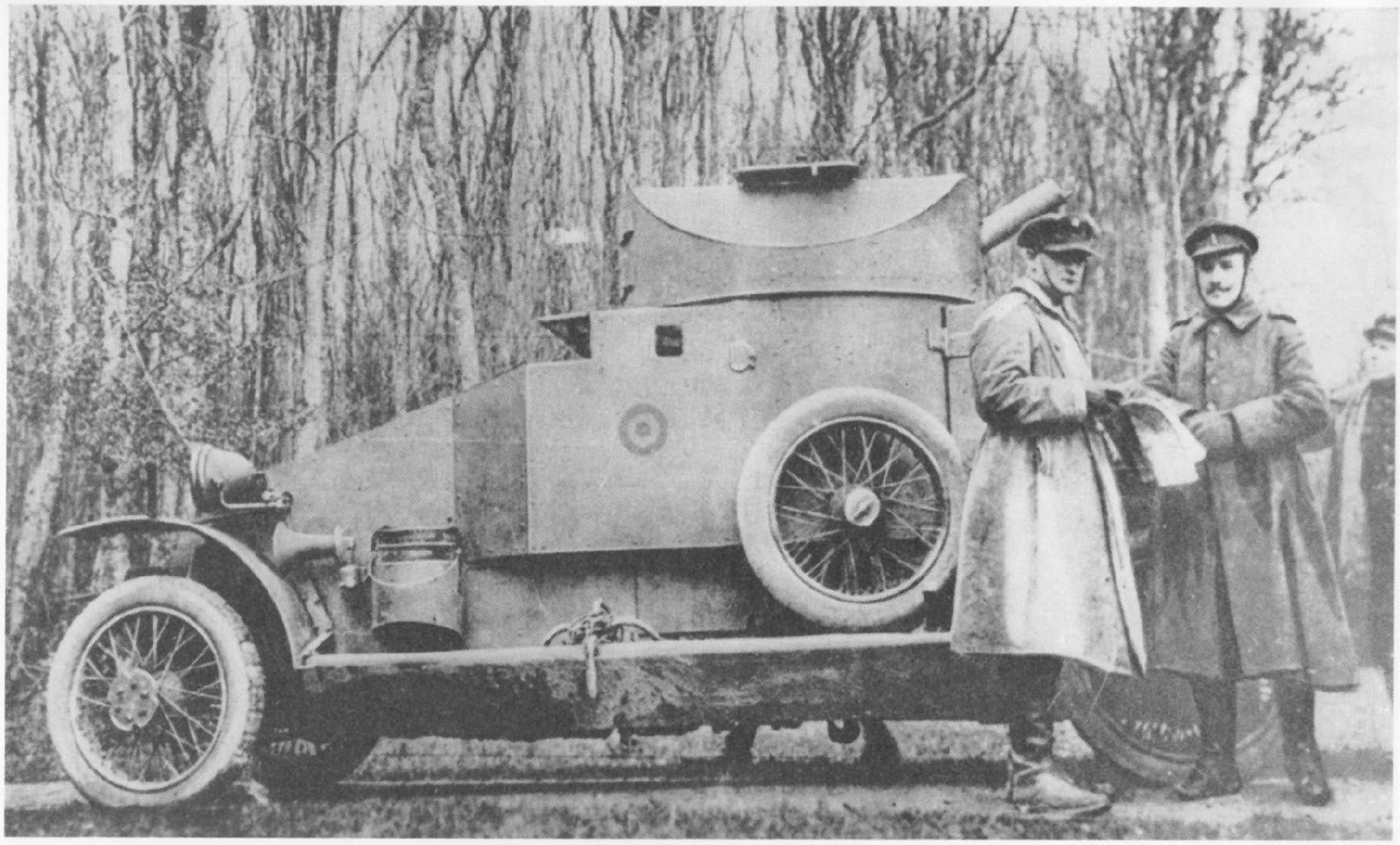
The Lanchester was a 38 h.p. car incorporating many advanced design features. The 6-cylinder monobloc engine which had dual ignition and full pressure lubrication, was situated alongside the driver, a position which allowed a better ballistic shape for the front of the vehicle. A gearbox using epicyclic trains was an unusual feature and the car had cantilever springs at the rear: wire-spoked wheels with Rudge Whitworth knock-on hubs were provided, the rear wheels having twin tyres.

DELAUNAY-BELLEVILLE

Only four of these cars were on the strength of the RN Armoured Car Division, three as armoured cars and one as a tender. The three can be distinguished by their turrets which are cylindrical in shape with no side bevels: they also have a door in the near side armour for crew access. The Delaunay-Belleville was one of France's best cars, beautifully finished and with a performance well up to that of its contemporaries: the chassis was approximately the same size as the Rolls Royce. The four cars disappeared from sight on the disbandment of the division: they never went overseas but one of their bodies was used on the Killen Strait tractor during the early tank trials in 1915.

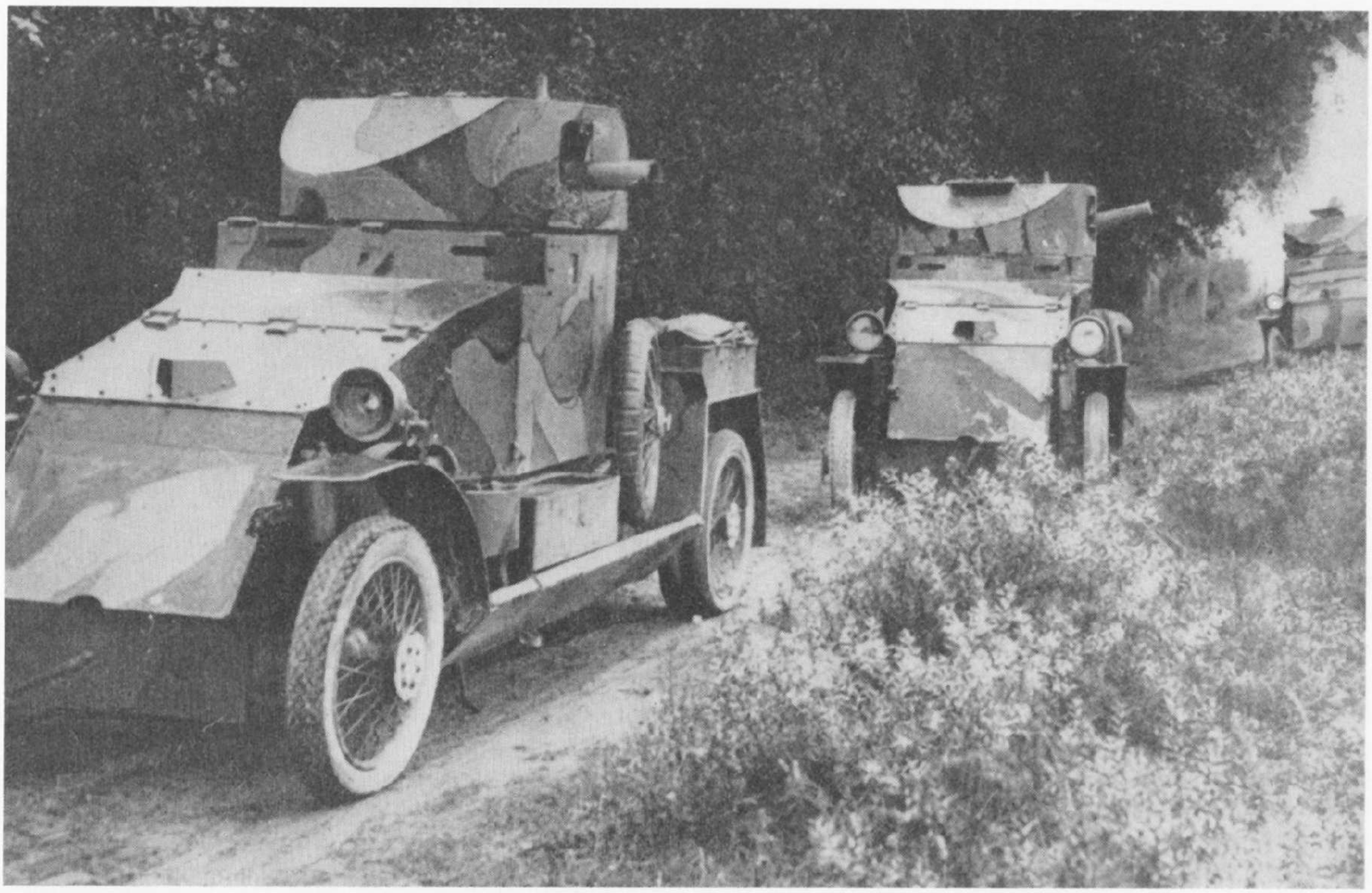
TALBOT 25 HP

Three of these cars were fitted with armoured bodies but the weight gave trouble with the transmission and after 1915 they were not used in the armoured rôle. They had a 4-cylinder engine, a cone clutch and a 4-speed gearbox. The chassis was well built and robust



Lanchester of No. 1 Squadron R.N.A.C. Division on the Russian expedition, 1916. (Imperial War Museum)

Lanchesters in Belgium, 1915. (Imperial War Museum)



No. 1 Squadron car bogged down in Russia. (Imperial War Museum)

and forty of them were used with an open box body for the carriage of stores, designated in RN parlance as wagons but known to the Army as tenders. In this guise they performed well and some had a 10 pdr. mountain gun fitted to them: these operated with Lawrence's forces in Syria supporting the operation of Rolls Royce armoured cars.

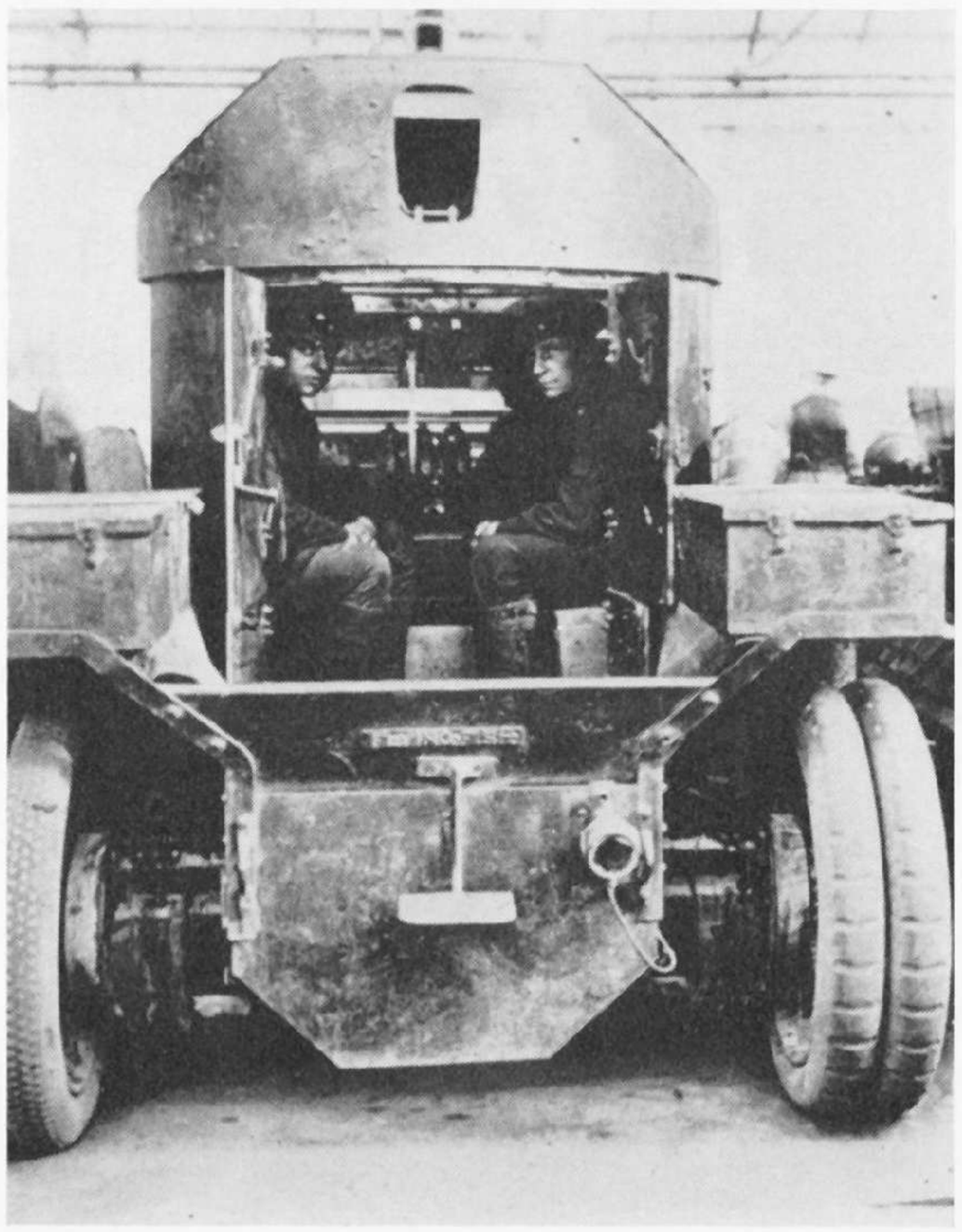
The Talbot used a special detachable rim, held on to the wooden spoked artillery wheel by a number of nuts. In the event of a puncture this rim could be removed and replaced by one with an undamaged cover.

AUSTIN

When war broke out in 1914 the Russian government asked Austins to design an armoured car for them. A twin-turretted model was produced and was supplied in considerable number. After the revolution in 1917 no more Austins were sent overseas but sixteen which were available were used to equip the 17th (Armoured Car) Bn. Tank Corps.

Two models of the Austin were produced, the later version having a lower driver's cab to allow the machine-gun turrets to fire direct to the front. The guns were changed from Vickers to Hotchkiss machine-guns since this was the standard weapon of the Tank Corps. The car had a 50 h.p. Austin engine and a 4-speed gearbox; detachable rims were used with twin pneumatic tyres at the rear. Very little tyre trouble was experienced although mechanical failures were frequent. Although the cars were well built they were not up to the extra load imposed by the armoured body.

Lanchester Flying Fish *with rear doors open. Nos. 1 and 6 Squadrons were the only ones equipped with Lanchesters.* (Imperial War Museum)



Lieut. Nixon and Rolls-Royce armoured cars in a dug-out at Cape Helles in the Gallipoli campaign, 1915. Turret of left-hand car is pointing to the rear. Radiator doors are open. (Imperial War Museum)

PEERLESS

After the war the 17th Bn. moved to Ireland where they were engaged on internal security duties. The Austin chassis was replaced by a Peerless lorry chassis which hailed from the USA. The original Austin body was too short for the Peerless whose side members protruded beyond the armour plate but the combination proved a successful and reliable one. The Peerless was slow but very robust. It had a 40 h.p. engine with a T head and side valves. Drip feed lubrication was fitted and it originally had a low tension magneto. A 4-speed gearbox was used but the cross-country performance was poor owing to the weight and the narrow solid tyres that were fitted. The Peerless was widely used and a few of them were still in service as training vehicles in 1939.

SEABROOK

Each of the RNAC Divisional squadrons had three Seabrook lorries on its strength. They carried a naval 3 pdr. gun mounted on a pedestal over the rear wheels in an armoured body whose sides let down to make a firing platform with all-round traverse for the gun.

The Seabrook lorry which came from America had a 32 h.p. Continental engine and chain final drive to the twin rear wheels. Its opportunities for successful action were limited by the weight of the vehicle which came to ten tons and virtually confined it to main roads where bridges could take the weight.

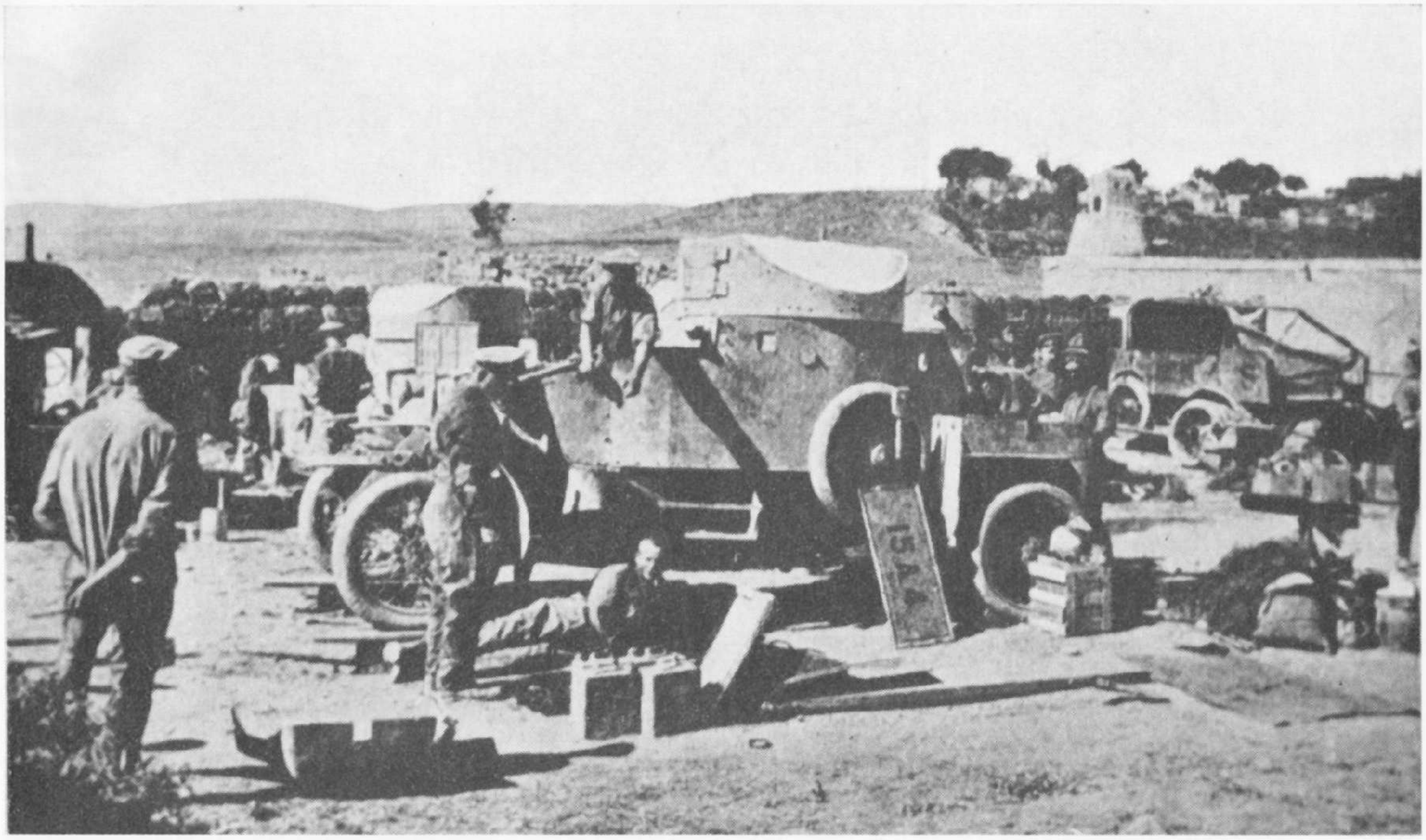
MODEL T FORD

Strictly speaking this is not an armoured car but it was used so extensively by the Light Car Patrols that it deserves inclusion. They were employed with an open low sided box body with one or two vertical posts in it on which a Lewis light machine-gun could be mounted. Owing to the light weight of the car and a 20 h.p. engine the performance in sand was very good. It had a 4-cylinder engine with a detachable head, a rare feature for those days. Splash lubrication was used with a dynamo consisting of a number of V shaped magnets bolted to the flywheel which revolved past stationary coils. Current generated by this device passed to a low tension distributor and thence to four trembler coils, one to each cylinder, on the dashboard. Current was tapped from the dynamo for the electric headlamps: there was no battery and when the engine stopped the lights went out! Oil side-lamps were standard equipment.

Transverse springs and rear wheel brakes of small diameter and cross section were provided. The car had a two speed and reverse epicyclic gearbox. Application of the handbrake put the gear into neutral; low gear was engaged by depressing a pedal and when this was released the car was in high gear. A separate pedal engaged reverse and this was sometimes used in emergencies in hilly country when the brakes failed. It usually stopped the car but did not do the gearbox bands much good.

JEFFREY QUAD

This was a 4-wheel-drive lorry from America. It had independent transmission to all four wheels and an auxiliary gearbox giving a wide range of gears. Its cross-country performance should have been good but was handicapped by the narrow tread solid tyres. It was slow, with a maximum speed of 20 m.p.h.: in practice anything much over 12 m.p.h. gave trouble with engine fans and bearings. Petrol consumption was 5 m.p.g. These cars were fitted with electric lights and electric self starters: the engine could also be started



Maintenance on Lanchesters in Asia Minor during the Russian expedition. (The Times History of the War)

by hand from inside the body. The vehicle was fitted with twin steering. The gunner occupied the central turret, the driver and car commander sitting in front while the co-driver and a spare crew member faced the rear. Observation from the car was limited.

A.F.V. Series Editor: DUNCAN CROW

ARMOURED CAR DETAILS

(These figures are as accurate as possible but more than fifty years have elapsed and records are scanty)

Type	Wt/ tons	Length	Width	Height	Engine	HP/ ton	Transmission	Max speed	Radius Miles	Armament/ Amn	Armour mm	Crew	Remarks
Rolls Royce 1914 pattern	3·5	16'9"	6'3"	7'7"	Rolls Royce 6 cyl. 40/50	11.1	4 speed IR sliding pinion gearbox	60	150	1 × ·303 Vickers machine-gun 3000	9	4	RNAS used a crew of 3
Rolls Royce 1920 pattern	3·8	17'0"	6'3"	7'8"	Rolls Royce 6 cyl. 40/50	10.5	4 speed IR sliding pinion gearbox	50	150	1 × ·303 Vickers machine-gun 3000	9	4	
Lanchester	4·8	16'0"	6'4"	7'6"	Lanchester 6 cyl. 60 hp	12.5	3 speed IR epicyclic gearbox	50	180	1 × ·303 Vickers machine-gun 3000	8	4	
Seabrook	10	24'0"	7'0"	6'0"	Continental 4 cyl. 32.5 hp	3.2	Final drive by chain	20	100	3 pdr. Hotchkiss 2 Vickers m.g.	8	7	
Austin	4·2	16'0"	6'8"	9'4"	Austin 4 cyl 40 hp	9·5	4 speed IR sliding pinion	35	125	2 × ·303 Hotchkiss 5000	6–3	5	Twin steering
Peerless	5·8	20'6"	7'8"	8'10"	Peerless 4 cyl 40 hp	6·9	Final drive by chain	20	90		8–3	5	Twin steering
Jeffrey Quad	?	By comparison of contemporary photographs probable dimensions were 18'0"	6'4"	8'0"	?		4 wheel drive twin steering	20	?	1 × ·303 Vickers m.g.	5	5	No other details available. Car of American origin used in India

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