the nations. The Williad is illustrated by full-page drawings by Mr. Stanger Pritchard, who also contributes a large coloured cartoon showing the horrors of war. Another coloured cartoon by Mr. Roland Hill ("Rip") shows the two Kaisers arraigned in a police court before a bench of neutral sovereigns with the President of the United States in the chair. The whole number is excellent alike in conception and in execution.

The *Medical Directory* for 1915⁴ is the seventy-first annual issue of this useful publication. A numerical summary of the medical profession in the British Isles shows a total of 36,656 names. This is an increase of 528 as compared with the number in 1914. The names are arranged in seven sections—London, the Provinces, Wales, Scotland, Ireland, and the Naval, Army and Indian Services. A list of practitioners holding British qualifications resident in other parts of Europe and in North Africa has taken the place of the old section of practitioners resident abroad. This is a saving of space, but we think it will cause a considerable amount of inconvenience. We regard the omission of British practitioners in the Overseas Dominions as particularly unfortunate. There is a separate list of dental practitioners. Mr. W. Oliver Hodges, barrister-at-law, contributes an abstract of the principal laws affecting the medical profession. There are lists of sanatoriums, convalescent institutions, and private asylums which are likely to be useful to the public as well as to the profession. A short account of the principal British and some of the Continental spas and climatic health resorts is given by Mr. Norman Hay Forbes, F.R.C.S.Édin., F.R.S.Édin.

MOTOR AMBULANCE DEVELOPMENTS.

By H. MASSAC BUIST.

THE work of educating the public to some appreciation of the problem of establishing motor ambulance services proceeds apace. It is beginning gradually to be realized, for example, that it is useless subscribing to individual efforts. The collective ambulance organizations officially recognized are receiving a generous response to their appeals for funds, so that there is manifest a tendency to diminish waste of effort. Nevertheless, much remains to be done in this direction, particularly as the old trouble of multiplicity of types of chassis is as pronounced as ever.

NEED FOR STANDARDIZING MOTOR AMBULANCE CHASSIS TYPES.

The fact is, we are learning the business only by degrees and through cumulative experience. To begin with, we had to improvise a motley variety of vehicles. We have now got to the stage when there is at least some attempt to produce ambulance bodies on more or less recognized lines. Now that we have secured large numbers of chassis, however, and that the motor industry has had time to settle down to the new demands created by the war in place of those existing before August, it is time we attacked another basic problem. None of the chassis used for motor ambulances produced in Britain to date have been designed or built for that particular work. We have instead taken one chassis after another of the widest possible variety of types, no one of which was ever designed in the original instance for motor ambulance work. By far the majority of the chassis have been made for pleasure car service. There is little or no similarity between the coachwork accommodation necessary for a motor carriage body and for an ambulance body. This is the prime cause of the difficulty of overhang. Every example that comes to hand, no matter from what company, whether it be an English or a Scottish built vehicle, reveals this same fault; instance the vehicles presented by the King and Queen to the Indian Expeditionary Force. These have the cantilever type of spring, with the driver's seat about midway between the front axle and the mid-length of the rear cantilever springs where those members are attached to the frame of the vehicle. The result is that nearly two-thirds of the ambulance bodywork where the patients are accommodated projects behind the rearmost point at which the cantilever spring is attached to the chassis frame.

ACCOMMODATION OF THE DRIVER.

Unless we are to consider that the prime object in producing motor ambulances is to give an opportunity to

motor-car manufacturers to work off chassis which they may have on stock, or to continue making patterns of pleasure-car chassis rather than go to the charges of devising mechanism specially suitable for motor ambulance work, there is, in the light of experience to date, no excuse any longer to continue to accept vehicles schemed on ordinary pleasure or even commercial car lines. In every type of motor ambulance yet produced the driver's seat invariably occupies space that ought to be used for the accommodation of patients. The construction of all the varieties of pleasure-car chassis being employed is such that this is unavoidable, by reason more particularly of the steering column and connexions and of the control levers and pedals.

Yet in the story of the motor car to date we have had experience of something that suggests a line on which chassis might be schemed. I refer to the placing of the driver over the engine, in the manner seen in a large variety of French and German motor omnibuses, and as schemed in the original Wolseley motor omnibus, with the result that for that particular class of service the great advantage of proportionately shorter wheelbase in relation to the number of passengers accommodated was achieved and the great objection of overhang was avoided. If memory serves me right the Austin Company, making a smaller class of chassis intended for private cab work some years ago, also employed this idea of saving space.

Yet earlier in the story of the motor industry we have had examples of putting the engine further back, sometimes midway between the axles. But this has never become commercially practicable, nor does it seem to me to be desirable for motor ambulance chassis, as it would cause heat and undue vibration beneath the patients.

WHY NOT OVER THE MOTOR?

The motor ambulance is a vehicle that is not required to progress at the fast speeds ordinarily needed for touring carriages. There is therefore no inherent objection to placing the driver above the engine, particularly in these days when, if a reasonable price is paid for the vehicle, it can be made so reliable and designed in so accessible a fashion that the engine and kindred details can be got at quite well for such attention as they need.

Therefore in face of the urgent necessity for us to do something to produce a type of chassis that shall really be primarily designed for motor ambulance work, serious consideration must be given to the problem of where the driver is to be accommodated. On all types of motor ambulance produced to date, the driver is in the wrong position for the purpose to be served by the vehicle. The expenditure of money subscribed in future by the public should be controlled on such lines that the motor industry should not be permitted to work off stock chassis. The first and only consideration is the benefit of the wounded. As Lord Kitchener has pointed out, men who have been to the front are very much more valuable to the nation than those who have no experience of war, therefore every additional man whose life is saved and who is restored to health during the campaign is doubly precious to the nation in this time of crisis.

DIFFERENCE BETWEEN PEACE AND WAR CONDITIONS.

Moreover, let us not overlook the fact that a type of motor ambulance which might be most suitable for the average conditions of service obtaining in peace is quite a different sort of vehicle from the one needed in war. In peace, the motor ambulance is called on to deal with cases, as it were, retail; whereas in war it has to deal with them wholesale; in peace the motor ambulance is kept and worked under the most favourable circumstances possible; in war it is neither properly housed nor used under ideal conditions for the mechanism. Therefore the ambulance for war service has to be a vastly sturdier and more powerful vehicle, for it carries greater loads over rougher roads, and every detail of the mechanism must be far more hardy. Indeed, the premium on reliability is incomparably greater for war service than for peace use, because in campaigning the facilities do not obtain for attending to a hundred and one minor details on the stitch in time principle. The car must be hardy, yet it is particularly essential that the machine should embody exceptional degrees of refinement so as to reduce vibration and jarring to the minimum, since this is so essential to the saving of life and suffering.

⁴ London: J. and A. Churchill. (15s. net.)

These circumstances practically dictate that the speed of the motor ambulance for active service should be slower than that of the average touring car. We do not want to hurtle the wounded over the roads, bumping and jarring them about, despite the fact that the saving of time between the receipt of an injury and its treatment at the base hospital is one of the prime uses of the motor ambulance. There is to be observed an intelligent compromise between the question of killing your patient in your haste to transport him to a place where he can be treated, and taking a little longer about the business, but depositing him at the destination in a condition in which a serious drain has not been made on his vital forces. Consequently, the most important problem before those concerned with motor ambulance work to-day is that of evolving a special type of chassis.

PROBLEM OF MAINTENANCE IN THE FIELD.

On the grounds of economy and efficiency there is every reason for following this policy as regards ambulances to be manufactured for future use. At present the wastage and failures in service due to the extraordinarily wide variety of chassis employed represents a margin of at least 50 per cent. that could be avoided by some official action such as that the Government should approve of one special type of motor ambulance chassis designed for that work, and quite unsuitable for touring car or any other use, and issuing that to all manufacturers who are to receive any future orders for motor ambulance vehicles. As various sizes of car may be needed, the scheme of the vehicle might be made in three sizes; though for my part I think two should be the greatest number necessary. This would mean that, no matter from which factory the individual vehicle hailed, and no matter how many had to be sent out to replace losses at the front, the problems of maintenance and of replacing parts damaged in service, and so forth, would be simplified to the extremest possible extent, because it would not matter who the maker of the individual ambulance, any given part needed made by any other maker to the same specification would fit perfectly well as a replacement.

As it is, individual donors of motor cars are only doing half the good that could really be achieved by their generosity, because each will choose the type of chassis for which he has an individual preference when considering the problem of his own private motor car, as instance the numerous six-cylinder chassis that are being offered for work of this sort. While the engine is in its present place and the driver as ordinarily accommodated, there is no gain, but actual loss in using the six-cylinder chassis, because at least half, and usually something like three-fifths, of the frame length of the vehicle is occupied by engine and driver, only the remainder being available for the accommodation of ambulance body work. The engine must occupy the briefest possible over-all length in the chassis frame, and the driver should be accommodated somewhere or other, preferably above the engine, where he will not be using up any part of the frame of the car between the two axles, all which space it is absolutely essential should be placed exclusively at the disposal of the patients.

HOW TO UTILIZE THE SITUATION.

The longer the campaign progresses the greater the number of motor ambulances we shall need. No mistake could be more absolute than to imagine that we have anything like sufficient vehicles yet. Therefore there is no reason why it should be assumed that we shall have to go through this war with the type of chassis that have been available up to the present. On the contrary, the fact that ever since the outbreak of war some makers have actually been producing types of pleasure car chassis solely for motor ambulance work because they have not enough in stock shows how unenterprising it is to neglect the opportunity thus presented for causing the motor industry to produce a type of vehicle absolutely suitable for ambulance work.

How are we to go about the business? Obviously, the designing staffs of nearly all motor manufacturers are quite capable of evolving very ingenious fresh chassis schemes for the particular purpose in view; but we should only have solved one part of the problem if we allowed each to exploit the special type of motor ambulance chassis he

might evolve. Yet to put a check on the use of the wide variety of inventive talent thus available, and, instead, to select some single firm, or even some quite independent designer, for the work would be to miss a hundred and one little practical details, and therefore to produce for the nation's need a chassis inferior to one that might be evolved were there some competition about the business and all the available brains engaged on it.

EMPLOY ALL OUR INVENTIVE TALENT.

It seems to me that the really practical way to set to work would be for the British Red Cross Society and the St. John Ambulance to agree, in the light of experience in the war to date, as to the power necessary for two classes of ambulance chassis which should be sufficient for the needs. The price at which such chassis should be available, with the understanding that the individual manufacturer would be asked to tender for a minimum of fifty or a hundred machines over a given period, should be indicated by way of assisting the designing department, that they may be able to estimate what materials and degrees of refinement they could embody for the money. All the faults of chassis in service to date should be collected and issued in summary fashion that designers might further learn, not from the experience of an individual vehicle, but from that of all employed, exactly the details of ordinary chassis in use that have failed in service to date.

Individual manufacturers desirous of making motor ambulances should thereupon be required to produce designs within a period of, say, a month, for the designing departments are not over busy at the moment. The results should be collected and selected. There should then be available an enormous amount of excellent material, and the practical motor engineers of two or three firms should be instructed to embody all the best points in a sort of composite design.

In face of the nature of the work there cannot be a firm in the motor industry of the country that would be so wantonly unpatriotic, as well as unenterprising, as to refuse the services in a consultative capacity of its designers towards so grand a thing for the good of the nation, particularly as there would be a business end to the matter also. When the composite chassis had been schemed, orders should be distributed for them among the manufacturers who had competed and whose work is known to be of a suitable sort.

PROBLEM OF QUANTITY PRODUCTION.

It may be said that there would be difficulty in placing fifty or a hundred orders with individual firms. But this would not happen if the public were properly educated through the medium of official communications to the general press, pointing out that our present methods are wasteful, and unsatisfactory, and that there is an urgent need for designing special ambulance chassis to accommodate motor ambulance bodies. We must produce special vehicles to standard designs for purposes of future war, and in face of the probable duration of the present war it would be lamentable lack of enterprise on our part to continue merely muddling through as we have perforce had to do to date, but as we need not to have appreciable extent hereafter.

Admittedly even the crudest motor ambulance is a vast advance on the old horse-hauled wagons, which a wounded officer of the North Lancashire Regiment has described from personal suffering as "the wickedest anachronism of all our British war gear—slow, cumbersome, springless, creaking, jolting, with no accommodation in comparison with their size and unwieldiness. They wallow and bump along, an everlasting monument to the inhumanity of their designer." Later in the morning on which his case was being dealt with, there came along "a fleet of motor ambulances, quick, well sprung, and holding twice as many as the old horse wagons. They soon shifted a lot of cases to the railhead."

The point to have in mind, however, is not that any motor ambulance perchance represents a degree of advance, great or little, on the horse-drawn variety, but that such motor ambulances as we have and are at present employing are merely makeshift examples, and in no way comparable with the excellent vehicles which the motor industry of the day has the ability and the resources to

produce, provided the national organizations concerned with the work co-operate on lines which will give the proper direction to the motor industry in general.

Let us have in mind that motor ambulances are needed not only for the British forces, but also for the French and for the Russian, and that the demand for these classes of vehicles must increase to an extraordinary extent, as instance the fact that, starting the campaign with an army of about 186,000 men, the British forces to be in the field by next summer will be increased by anything up to 1,000,000 men. Hence the urgency for ceasing the policy of drift and makeshift, and for substituting one of co-ordination and logical direction in face of the lessons of the war to date.

THE AMBULANCE CONSTRUCTION COMMISSION.

Mr. Henry S. Wellcome, founder of the Bureau of Scientific Research bearing his name, has intimated that the bureau will provide a sum of £2,000 to be distributed in the form of prizes for the best plans and designs of motor ambulances. The functions of the Ambulance Construction Commission, which is being appointed on behalf of the bureau, will be to collect, judge, and report upon such plans, designs, and ideas as may be submitted to it. It is to be of an international character, so that it may obtain information from all sources, even, if it sees fit, from Germany and Austria. The competition will close within six months. This Commission is empowered to arrange for the publication of such designs and particulars as it may approve, or which it may consider meritorious. Apart from the prizes for it, there will be no payments made for plans, designs, inventions and ideas submitted to the Commission. All these are to become public property, so that, when considered advisable, they can be utilized in the cause of humanity. The Commission met last week to discuss such questions as that the design should be for one type of ambulance only; that the specifications submitted by Lieutenant-Colonel James should be accepted, with such alterations as may be necessary; that the last day for the receipt of designs should be June 30th, 1915; that the competition should be open to all nations; and that a subcommittee should be appointed to draw up for the information of competitors a pamphlet embodying the views of the Commission, including the specification of the ambulance required, together with the substance of results already accepted, and to make the necessary arrangements for securing publicity.

THE ORIGIN AND DEVELOPMENT OF THE RED CROSS.

(Continued from p. 98.)

GERMANY.

In 1863 Dunant went to Berlin to press his scheme on the attention of the members of the Fifth International Congress of Statistics, which met in that city in September of that year. The fourth section of the Congress was composed of medical officers of the army, who, among other things, discussed the comparative statistics of health and mortality in the civil and military population. Dunant asked for the neutralization of the medical services, a matter which the Geneva Committee had not then considered. His propositions were adopted by the fourth section, and Drs. Boeger and Loeffler, physicians to the King and Queen of Prussia, were charged by these sovereigns with messages of congratulation to Dunant. At its final general meeting the Congress expressed its gratitude to Dunant, and passed a sympathetic resolution. The Crown Prince Frederick, afterwards Emperor, had a long interview with him, and afterwards, at the instance of Queen Augusta, Dunant was presented by Dr. Boeger to General von Roon, Minister for War. The Minister received him with the words, "Ah, ah, you wish, then, to make all our doctors neutral!" As Dunant insisted on the importance of the neutralization of the wounded, the General replied, "We will come to that later." After some minutes of reflection he added, "Of course the neutrality of the doctors and voluntary helpers entails that of the wounded." The cause was won. Von Roon became an enthusiastic supporter of Dunant's scheme, and expressed his approval of a uniform and international

flag. Prince Karl of Prussia, brother of the King, promised the co-operation of the Order of St. John of Jerusalem, of which he was Grand Master. It was he who sent Prince Henry XIII of Reuss to represent that powerful hospital association at the Geneva Conference. Count Otto von Stolberg-Wernigerode, later Prince and President of the German Red Cross Societies, who died in 1896, fostered the beginning and promoted the progress of the work in Germany.

From Berlin Dunant went to Dresden, where Baron von Weber and General von Engel procured for him an interview with the King of Saxony. Dunant's account of this interview so well illustrates the combination, simplicity, and steadfastness of purpose characteristic of him that we cannot forbear quoting it:

Baron von Weber hastened to inform me at the Hôtel de France, where I was staying, that everything was arranged for the audience which was fixed for the following morning, Thursday, October 2nd, 1863, at half-past ten precisely. I went to the Royal Palace. On getting out of the carriage an official of the Palace, who was waiting for me before the entrance gate, took me to a kindly old chamberlain, M. de Gersdorf. The latter, with a quite paternal benevolence, took me by the hand and conducted me across a part of the Castle. We came at last to a little room, very plainly furnished. Before retiring M. Gersdorf said to me, "The King will come in by this door which is in front of you. You will bow three times and wait for him to address you." I followed exactly the instructions of the Chamberlain, conforming to the ceremonial required by etiquette, when His Majesty appeared. With great kindness the King, speaking in French, asked me as to the purpose of my visit. "What can I do for you?" said he. I laid my request before him; then I ended with much earnestness by saying, "Sire, I should be profoundly grateful if Your Majesty deigned to accept the patronage of this work in your states, and if you would be good enough to send a delegate to the conference which will open at Geneva on the 26th of this month." I added that as the result of an interview with the Minister of War at Berlin, I hoped that at that conference the proposal of a general agreement intended to make the wounded soldiers and all those who look after them sacred, would be considered. The King began to smile on seeing my animation, but with an air so kind that I was not intimidated. "I will willingly grant my patronage to so excellent a work," he replied. "But as for sending a delegate, for that I must consult my Chambers." I at once replied with the same respectful animation, "Sire, for a work which is wholly for the sake of humanity, Your Majesty is sure that the Chambers will ratify whatever it may please the King to ordain." The King again smiled. Then, after some questions relative to the project of neutralization, he ended the audience with these precious words: "I will do all I can, for certainly a nation that should not take part in this work of humanity would stand disgraced before the bar of public opinion of Europe."¹

Dunant that evening wrote to the correspondents he had in most of the capitals of Europe, and soon the various rulers were made acquainted with the result of his interview with King John of Saxony. "Thus," he says, "the cause which I pleaded was won." He attributes the success of his endeavours to get Governments to send delegates to the conference especially to the declaration of the King, none of them wishing to be disgraced before public opinion.

The organization of the German Red Cross Society is described by Professor Antony, of the Val-de-Grâce,² and more fully by Surgeon-General W. G. Macpherson.³ On these articles the following account is based. The German Red Cross Society had in 1905 700,000 members distributed among a hundred local societies, and possessed funds to the total amount of £800,000. There are other bodies, such as the religious orders of the Knights of Malta, St. John, and St. George, intended for rendering voluntary service to the sick and wounded. These bodies are recognized for the purpose because it is understood that they already devote themselves in peace and within the German Empire to the care of the sick and wounded. Under exceptional circumstances permission may be given to others to take part in voluntary aid. Application for such permission has to be made through a high official known as the Imperial Commissioner and Military Inspector of Voluntary Aid, and in the event of approval by the War Office, the society or individuals

¹ *Les Origines de la Croix-Rouge*. Par Ch. F. Haje et J. M. Simon. Stuttgart: Imprimerie de A. Lindheimer; Amsterdam: Academische Boekhandel, Delsman and Nolthenius. 1901, p. 22 et seq.

² *Archives de médecine et de pharmacie militaires*, t. 46, 1905, p. 253 et seq.

³ *Journal of the Royal Army Medical Corps*, vol. i, July-December, 1903, p. 460 et seq.