chest wall over the heart in cases where its action is being impaired by physical resistance. A list of 17 cases is given in the monograph before us, details of each operation and its results being tabulated; it appears that substantial relief has been afforded, sometimes lasting for long periods, which could hardly be obtained by other means. These cases are all quoted from German sources, and do not include those which have already been published in this country by Dr. Alexander Morison and others. Dr. Sinnhuber's monograph will doubtless call increased attention to a subject which has not of late years received its share of advancement.

STATISTICAL PSYCHOLOGY.

DR. WILLIAM BROWN'S work on *Mental Measurement*⁵ is the enlargement of a thesis for which he was awarded the degree of doctor of science. In the first two chapters the fundamental ideas of the psychophysicists are examined, and a few notes are incorporated dealing with frequency curves and their application. The second part of the book deals with correlation from the statistical side, nearly all the processes likely to aid the psychologist in the reduction of his material being mentioned. The historical part of this section mainly consists of a critical examination of Spearman's work. In the third chapter Dr. Brown discusses some interesting results of his own which have already appeared in the *British Journal of Psychology*. Spearman had concluded, from a statistical study of the correlations between ability in various directions, that such associations as were to be found might be referable to the existence of some common fundamental function or group of functions. Dr. Brown has been unable to find in his series any positive evidence in favour of this hypothesis. In the last chapter of the work some properties of the normal correlation surface are briefly considered, while the appendices contain useful arithmetical illustrations of processes mentioned in the text. The value of the book is enhanced by a short but well-selected bibliography. This book contains abundant evidence that Dr. Brown possesses a thorough knowledge both of statistical methods and of the special difficulties which attend their application to psychological problems. We should like to be able to think that his work will be of use both to the professed psychologist and the educationist. We fear, however, that he has to some extent underrated the difficulties which will be encountered by the class of readers likely to be interested in a treatise of this kind. While the trained statistician will find Dr. Brown's summaries of Professor Pearson's methods useful, he will probably consider the psychological discussions too technical; on the other hand, the mathematical treatment is much too condensed for the ordinary student of psychology. Dr. Brown has paid his readers the compliment of assuming their level of culture to be considerably higher than what most writers take for granted. The book is not, perhaps, very likely to be popular, but it represents a great deal of careful and conscientious work.

NOTES ON BOOKS.

THE editor of a *Quinquennium of Medicine and Surgery*,⁶ Dr. J. W. BALLANTYNE, is certainly to be congratulated on the conception of the volume and the fashion in which it has been carried out. As the title somewhat suggests, the book in a measure is of the same class as year books, the period covered being the five years 1906 to 1910 inclusive. In effect, it is a cross between an encyclopaedia and a dictionary, the whole contents being placed in alphabetical order, and some subjects being treated at considerable length, while for information as to others the reader, after being supplied with a brief explanation of the meaning of the term under consideration, is referred elsewhere for fuller information. Whatever is stated is stated clearly and succinctly, and from a rough test which we have applied to the work we are disposed to believe that there are very few points in medicine and surgery that have come up during the last half dozen years of which some account at least could not be found in the volume. Literary skill, industry, and care have all been exercised in its compilation, and the book as a whole should prove a very valuable addition to the library of any medical man in active practice.

⁵ *The Essentials of Mental Measurement*. By William Brown, M.A., D.Sc. Cambridge: University Press. 1911. (Demy 8vo, pp. 154. 3s. 6d. net.)

⁶ *Quinquennium of Medicine and Surgery*. By J. W. Ballantyne, M.D., F.R.C.P.E. Edinburgh: William Green and Sons. (Sup. roy. 8vo, pp. 411. 10s. 6d.)

THE MOTOR SHOW IN RETROSPECT.

CARS FOR MEDICAL MEN.

By H. MASSAC BUIST.

HAVING dealt last week with general tendencies and outstanding developments as illustrated at the Motor Carriage Show that closed at Olympia last Saturday, one may now draw attention to a few constructional developments in individual cars belonging to classes which are designed more particularly for the service of medical men. One could not begin better than by observing the policy of the De Dion firm (whose V-set eight-cylinder larger models were referred to last week) in returning to the production of the types of small car which first practically made motoring possible to the country doctor with strict limits as to the money he was prepared to spend. Thus there is now reintroduced the 6-h.p. single-cylinder model of 84-mm. engine diameter, by 130-mm. piston travel, and there has been a mighty change in the price of these machines, in that they now retail at £159 the chassis, with tyres. Still better there is introduced a new 7-h.p. two-cylinder type, that is listed at £174 (chassis with tyres); it is by far the cheapest vehicle for its power that has yet been put on the market by this firm, the cylinder diameter being 66 mm. and the piston travel 120 mm., while the very latest British practice is followed in driving the valves by silent chains.

BIG CARS IN LITTLE.

Another new model that comes from France is the 10-h.p. four-cylinder Vinot car that is practically a reproduction in little of the famous 15-h.p. model with its distinctive barrel type gear-box with bolted-on ends. It is of peculiar interest to the medical man by reason of the fact that the vehicle sells, complete with tools, lamps, horns, and two-seated torpedo body, for £260. The block style of engine, of 70 mm. bore by 110 mm. piston travel, is neat and accessible, the valves being encased, whilst a Bosch magneto is furnished, and the three forward ratios of speed are controlled on the gate system. The well-known Vinot adjustable, spring-padded, leather-faced, cone clutch is employed. Another French car that, as a two-seater, sells at the same price, is the 10-12-h.p. Gladiator of the same motor dimensions, and wherein alike the gear box and the steering gear rest on an underframe. This is quite a new model for the firm, the firing being done by a high tension magneto machine, while the power is transmitted to a leather-faced cone clutch, in which the entering member is a spoked disc. A semispherical metal case encloses the front cardan joint which is surrounded by the foot-brake. The details of the chassis throughout will bear the most careful inspection.

NEW SILENT MUSHROOM VALVE MECHANISM.

The new Chenard-Walcker models also include a 10-12-h.p. vehicle, while the largest power is a 16-20-h.p. type; their outstanding feature is an ingenious way of rendering silent the working of mushroom valves by means which are not exclusively mechanical. Three factors contribute to the result: the particularly careful balancing of the motor, the machining to gauge of the combustion valve area, and the introduction of steel flat springs for cushioning the valve, tappet, and cam contacts. The tappet motion is by end-fulcrum lifters having a special curvature, and being interposed between the cams and the tappets. The cams themselves are given an unusual amount of lift by comparison with average practice, while correspondingly the valves have a smaller diameter of head. The internal parts of these motors are particularly light, and the exterior appearance of the cars has been greatly improved.

MOTORS WITH VERY LONG STROKE.

In an age when the Treasury formula for reckoning horse power favours the long-stroke motor, and when constructional skill has enabled the long-stroke engine to score on the hills, it is not a little interesting to note the boldest example of this system of construction in the Sizaire cars, the new model of which is a nominal 15-h.p. four-cylinder block-engined vehicle; with a small bore measurement of 70 mm., it has a piston travel of 170 mm. Constructionally the car was quite one of the sensations of the recent show, while, with the De Dion, it is one of the two coming from France with the latest

practice of driving the valve shafts by silent chains. A notable feature of this chassis, which was shown on the stand of Messrs. Jarrott and Letts, is that both carburetter and magneto are encased, the former lying ensconced within the engine base. The control of the clutch pedal and the foot-brake are independent, and the cooling water is circulated on the thermo-siphon principle.

A RAILWAY TRAIN CAR.

In the Lorraine-Dietrich machines there is something more than the fact that this big French company has built railway rolling stock for generations past to suggest that the cars it makes run like railway trains. One of them has just come through a Royal Automobile Club test of running 150 miles a day for a total of 7,000 miles, always to schedule, and it has a clean record for that performance. These cars were formerly of the very powerful sort; but they are now brought within the range of the motorist of moderate means, the popular type for 1912 being the 12-16-h.p. chassis; this has a new style of gear-box giving four speeds forward and sundry refinements over former Lorraine-Dietrich practice, as in the encasing of the valve gear for enhanced silence and cleanliness in a detachable aluminium cover plate, in the fashioning of the cardan shaft brake on the rib-expanding principle, and in the improvement of the leather cone clutch. The cylinder diameter is 105 mm., and the piston travel 120 mm. Seemingly there has been no call to make any change in the 18-20 h.p. Lorraine-Dietrich car.

THE SMALLER DARRACQ TYPES.

Lastly—for the exigencies of space are imperative—in respect of French-built cars of the popular sort, reference was made last week to a notable Darracq departure in introducing for its largest model a very simple rotary valve motor that has fewer parts than any other Otto-cycle engine yet put on the market. It is a 20-h.p. chassis retailed, with tyres, at £360, and has an overhead worm-drive, dashboard cooler, and shoe-shaped bonnet. At the other extreme the firm puts on a little 12-h.p. model. This is also a four-cylinder vehicle, but of the mushroom-valve engine sort; still it is out of the ordinary in that the inlet valves for the block engine are set overhead. This machine, which has 75 mm. cylinder bore by 120 mm. piston travel, sells as a chassis, complete with tyres, for £197. Off the price of the 14-h.p. mushroom-valve Darracq model £30 has also been taken.

SOME BRITISH CARS.

I turn next to a consideration of some British cars, one of the most interesting of which is the 15-h.p. Napier; it is now available in what is styled a *de luxe* model, having a transverse rear spring and many other refinements, including a beautifully easy engagement of clutch and very light steering, as I know from experience in having handled the vehicle. The brakes are excellently smooth in action. This vehicle follows the typical Napier practice of not embodying any features with strikingly out of the ordinary constructional details, but is instead a gradually and logically perfected design along the well-known lines of the firm's constructional practice. Not less interesting is the 30-h.p. six-cylinder model; it is by way of being the latest edition of the original Napier model that heralded the commercial production of the six-cylinder car years ago. Fitted to it is a new two-jet carburetter with an independently controlled air-valve shutter for varying the temperature of the atmosphere supplied to the carburetter. On this model the springs are long, and lie flat in their normal, unloaded condition.

THE SIX-CYLINDER ARMSTRONG-WHITWORTH.

Quite contrary to the general tendency of the industry the new Armstrong-Whitworth model is a bigger one than any it staged last year, and the fact is particularly interesting since it spells the entry of this famous Newcastle firm to the ranks of the manufacturers of six-cylinder cars. The new vehicle is rated at 30-50-h.p., the cylinders being cast in two blocks of three each, after the most generally approved six-cylinder principle; the bore measurement is 90 mm., and the piston travels 105 mm. The valves are ranged Indian-file fashion, and the shaft is used besides to drive the magneto, the oil and water circulating pumps, and the air pressure pump for the petrol feed. On this vehicle there are used the spiral toothed bevel wheels of

the type that were employed years ago on the Wilson-Pilcher cars manufactured by this firm, and which were among the first to be remarkable for their silence of working. The new six-cylinder Armstrong-Whitworth is likewise fitted with an air pump for the tyres, while a feature of the change speed box is that it has sliding gears mounted on both shafts.

FRESH WOLSELEY SUSPENSION.

The Wolseley Company introduced a number of refinements and improvements in its 1912 models, which have been produced in the now vastly enlarged works in Birmingham. Only the two smallest models—the 12-16 and the 16-20-h.p. ones—have the worm drive, all the more powerful vehicles having the bevel sort, which is known to be the more efficient method. The problem, of course, is how to make it silent, and the Wolseley Company has solved it. The feature of the 16-20-h.p. worm-driven model and of the 20-28-h.p. bevel-driven one is the improved rear suspension by three-quarter elliptic springing. The under members are long and flat, and are slung below the axle in place of being seated upon it. The forward hinges of these springs, moreover, are on a level with the hubs of the wheels, the principle being to give a vertical rise to the axle and to avoid checking the momentum of the wheel mass by the backward throw of the springs caused by their radius rod action. The whole of the details of the springs are refined beyond the ordinary. Rudge-Whitworth detachable wire wheels are fitted as a standard on all models, while improvements on the smallest of all—the 12-h.p. sort—include the raising of the magneto, water and oil pumps well above the frame, the combined bronze bushing and flanging of both ends of the spring eyes, and the provision against lateral and oblique twist at the forward ends of the back springs. This company, of course, is owned by Messrs. Vickers, whose steels are used throughout its products.

THE SUNBEAM.

Another British firm whose cars are fashioned of Vickers steels is the Sunbeam Company whose engines, like the new Wolseley ones, have the valves moved by silent chains. Than the Sunbeam Company no motor manufacturing concern has made more rapid progress during the last two years; hence at the show it was not surprising to find engineers of all sorts carefully examining these chassis, because, as they said, there was no doubt about it that this firm has got on to the top rung of the ladder. From the designers' point of view simplicity is the keynote of the 1912 Sunbeam models, which are a distinct departure from the 1911 sort, in that the engines have all the valves on the one side and enclosed in detachable cover-plates, while the block form of casting is used for the four-cylinder 12-16 and 16-20-h.p. motors, the 30-h.p. six-cylinder one being cast in blocks of three each after the most approved manner. This is a standard type that holds the world's record for a twelve hours' run, which it performed at over seventy-five miles an hour, including stops for replenishing petrol, lubricant and water supplies, and changing wheels and tyres. You cannot, of course, judge these cars by their mere nominal ratings, for the 12-h.p., 80 mm. four-guinea tax model, for example, gives quite 40 maximum h.p., cars of this class having won the last fifty miles 15.9 standard car race at Brooklands at approximately a mile a minute, and that practically without effort. The value of all this power, which is got in part by the employment of comparatively a long-stroke engine, is for service on hills. It should be noted that an ingenious feature of the construction is that the motors are not coarse in developing their power, there being no vibration, thanks to lightness of the working parts and stoutness of the crank-shaft, as well as the numerous bearings supplied to it.

CLÉMENT-TALBOT IMPROVEMENTS.

The Clément-Talbot mark has long been a synonym for efficiency, hence there has been practically no call for changing the design. Improvements in detail have, however, been effected in such matters as the furnishing of sprags that automatically lift out of engagement if the reverse gear is employed. This is a very important detail in the design of ratchet sprags, which, if neglected in this respect, are liable to cause damage in the event of the car being driven on the reverse after the sprag has been in use

Another hint in Talbot practice that might advantageously be copied by a great number of other makers is the designing of the radius rods to the back axle in such a fashion that not only the rise and fall of the back axle is allowed for in the freest fashion but also the twisting tendencies arising from one wheel moving up while the other is down when rough road surfaces are being traversed. It is astonishing how few motor manufacturing firms make any provision at all in this latter connexion.

THE ARGYLL INNOVATION.

I wrote last week of the new single sliding sleeve valve 25-h.p. Argyll engine; it is furnished with a thin cast-iron sleeve between each piston and its cylinder wall, which, rising and falling in spiral or corkscrew-like fashion, controls by slots or ports the inlet and exhaust gases. It remains merely to add in this connexion that this chassis has interconnected front and rear wheel brakes, and that radius rods are furnished to the front axle, while the back axle is geared considerably lower than in conventional practice; hence it is possible, without running the engine at high speed or straining it, to use the through, gearless drive for practically all work. Of no less interest to the medical man are the smaller Argyll models—namely, the little 12-h.p. mushroom valve engine four-cylinder car with overhead worm drive and four forward speeds, and the 15 and the 20-h.p. four-cylinder models. In these, however, there has been practically no call to make any change, so satisfactory have the types proved since their introduction twelve months ago.

A 10-H.P. ADLER CAR.

Turning next to a consideration of German cars, it should be noted that the Adler firm introduces a smaller four-cylinder model than any that was in existence before. The policy is to produce a big car in little, the design throughout following Adler practice, including the method of mounting the engine and gear-box on a tray-like under-frame, and the oiling system employed. As shown, mounted with Morgan coachwork, there were many points about it worthy of note, as for instance the manner in which, with the hood up, it is possible to enter the car without having to dodge a number of hood stays; also the sweep continuance of the curve of the bonnet, which is narrower at the radiator than at the dashboard end, whereby width sufficient to accommodate three persons is achieved, while a spectacle glass plate is comprised in the scuttle dash, thereby illuminating the oil gauge. The familiar 12-h.p. Adler doctor's model has now a longer stroke, the cylinder bore remaining at 75 mm. with the piston travel of 103 mm.

BUILT IN ITALY FOR ENGLAND.

Cars with shoe-shaped bonnets and dashboard coolers are novel as far as the Italian industry is concerned, and on that account alone the S.C.A.T. machines, which are built in Turin specially for the British market, would be notable. But there is more to it than that, for on the one hand such machines have been successful all about the country, and at Brooklands during the last summer, and, on the other, they are fitted with the Newton and Bennett ingeniously simple compressed air starting device. These chassis are produced in two models, the lesser-powered being a nominal 15-h.p. vehicle of 85 mm. bore by 180 mm. piston travel, while the larger is also a four-cylinder car of nominal 22 h.p., and engine dimensions of 102 by 140 mm., the motors being mechanically oiled, and the gear-boxes giving four speeds forward. All the chassis are fitted with Newton and Bennett detachable wire wheels, or, at option, with the same firm's detachable artillery wooden spoke wheels. The manner in which the frame is exceptionally deeply channelled is particularly worthy of attention.

SUNDRY AMERICAN CONTRIBUTIONS.

American cars in the show were not many, but the Ford stand of course attracted a great deal of attention, not by any reason of mechanical change in the design, but chiefly on account of the price having been brought down so that this four-cylinder vehicle complete with body and accessories is retailed at £150 and yields the agent a very handsome commission into the bargain. Minor improvements have been embodied in the cars, as, for example, the mode of affixing the wheels, certain details of the engine

pipings connexions, and so forth, so that these cars are better vehicles than any of the type yet produced. They have, of course, the Sun and Planet type of gear, which is pedal worked. Those who do not like that form of power transmission may find in other cheap American cars that were not staged within the building, though they were seen on the platform at Olympia Station—I mean the Flanders and E.M.F. machines, represented in this country by the Studebaker Corporation—a very clever combination of a three forward speed gear-box, with the differential gear in the rear axle, which makes for silence and compactness, and is controlled in the conventional fashion. Despite the theoretical argument that it is a bad form of construction because it adds to the amount of vital unsprung parts, practice once more upsets theory in motor engineering, in that this unit system form of construction is found to work exceedingly well in a wide variety of other American cars besides those in question. As a four-seated car complete the Flanders is a very strong competitor in the field against Ford practice, and the suspension details follow European practice, whereas the Ford is wholly original.

COACHWORK, TYRES, AND ACCESSORIES.

I have left myself scant space in which to speak of coachwork and accessories. In the former connexion, however, I would like to refer to the recent exhibit in the coachmakers' section at Olympia of the "all-weather" body shown by the makers, Messrs. Salmons and Sons, of Newport Pagnall, on a 15-h.p. F.I.A.T. chassis. In wet weather the whole of this light body, including the driving seats, is enclosed, yet in fine weather it can be turned into a wholly open car, while the driver's seat is adjustable to suit the physique of any person, and the seat behind him can be pushed forward under the dash when not needed, or it can be wholly removed. The curtains, screens, and so forth are most ingeniously contrived. The next most important section to the coachwork was that devoted to tyres, in which connexion there was introduced by the Dunlop Company, after very exhaustive experiments, a novelty in a steel-studded pneumatic with leathern tread; this, in the hands of some of the firm's customers has given a fifth more wearing life than the data obtained with any other make. Dunlops also introduced a detachable wire-wheel of very fine design, this being the class that is standardized, for example, by the Minerva Company. The chief novelty on the stand of the Continental Tyre Company was the improved rim, which is detachable by removing five nuts. There are no wedges, and the flanges form an integral part of the rim, so that there are no loose parts to cause wear. Other features of the exhibit were improved specimens of the red-black, steel-studded, non-skid Continental tyres. Aluminium, rubber, and linoleum matting for motor cars, as well as a diagonal solid tyre, chiefly for use on heavier classes of vehicles, such as fire engines, and a complete range of the well-known Connolly band tyres were staged; whilst the latest forms of the Challenge reinforced inner tubes make greatly for the reduction of the chances of trouble by puncture, and a complete exhibit of Atlas puncture-proof covers were other items of interest to the medical man. The Atlas treads consist of three superposed, but staggered, layers of steel discs bedded in rubber, so that without interfering with the resiliency of the tyre one is nevertheless furnished with a completely armoured article, and you could not plunge a nail or a stone into it without coming on one or more of the metal discs. The Harvey Frost firm showed, besides its well-known vulcanizer, which is now made in a "baby" size, a new compound, called H. F. Plastine; this is noteworthy as reducing alike the time and the heat needed to effect a vulcanized repair. Another firm, Messrs. W. J. Harvey, showed the S. U. carburetter and a variety of other accessories, including the R. V. electric specialties that comprise head lights, side lights, tail lamps, dash lamps, accumulators, switches, signal horns, and the like, the R. V. projector being all-British and possessing an untarnishable reflector and great range. The fact of its being hermetically sealed does away with all necessity for internal cleaning. The newest of these projectors is made to give three effects, one called "Diamondlyte" for brilliancy, the other "Moonlyte" for antidazzle, and the third "Sunlyte" for fog penetration.